

Aqua Frame | Aqua Compact

SYSTEM MANUAL



Aqua Frame Series – Open Frame Style with Internal Booster Pump

SRC 200AF
SRC 400AF
SRC 600AF
SRC 800AF
SRC 1200AF
SRC 1500AF

Aqua Compact Series – Open Frame Style with External Booster Pump

SRC 200AC
SRC 400AC
SRC 600AC
SRC 800AC
SRC 1200AC
SRC 1500AC

Sea Recovery Corp.
P.O. Box 5288
Carson, California 90745 U.S.A.
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Revisions: 1/1/83, 2/1/85, 11/1/85, 9/1/87, 8/1/88, 3/1/90, 1/1/92, 12/1/94
B651010001

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Sea Recovery®

SYSTEM IDENTIFICATION INFORMATION

INSTRUCTIONS: At the time of purchase of the Sea Recovery R.O. Desalinator, please complete the following information. In order to better serve you, this information may be requested by the Sea Recovery Service Department whenever contacting Sea Recovery for technical assistance or by the Sea Recovery Marketing Department whenever ordering parts.

System Information:

Model Number: _____ Serial Number: _____

Operating Voltage _____ VAC; Cycles _____ Hz; Phase _____

Date Purchased: _____

The System is Equipped with the following Optional Equipment:

Plankton Filter:	<input type="checkbox"/>
Multi Media Filter:	<input type="checkbox"/>
Commercial Prefilter:	<input type="checkbox"/>
Oil/Water Separator:	<input type="checkbox"/>
Ultra Violet Sterilizer:	<input type="checkbox"/>
Rinse/Clean Valving:	<input type="checkbox"/>
Remote Sound & Visual Alarm:	<input type="checkbox"/>
Remote Monitor:	<input type="checkbox"/>
Remote Control:	<input type="checkbox"/>

Dealer Information:

Dealer's Name: _____

Address: _____

City: _____

State: _____

Country: _____ Postal Code: _____

Dealer's Invoice Number: _____

Sea Recovery Corp.
P.O. BOX 2560, GARDENA, CALIFORNIA 90247-0560
U.S.A.
TELEPHONE (310) 327-4000 ♦ FACSIMILE (310) 327-4350 ♦ TELEX 182598 SEARECOVE

Sea Recovery®

WARRANTY REGISTRATION INFORMATION

INSTRUCTIONS: At the time of purchase of the Sea Recovery R.O. Desalinator, please complete the warranty information listed below. After completing this form please insert it into the supplied postage paid envelope and mail it to Sea Recovery Corp. Attn: Warranty Registration.

System Information:

Model Number: _____ Serial Number: _____

Date Purchased: _____

Dealer Information:

Dealer's Name: _____

Address: _____

City: _____

State: _____

Country: _____ Postal Code: _____

Dealer's Invoice Number: _____

Customer Information:

Customer Name: _____

Street Address: _____

City: _____

State: _____

Country: _____ Postal Code: _____

Please fill in your T-Shirt size and we will send you a free Sea Recovery T-Shirt.

Allow up to 4 weeks for delivery.

T-Shirt size: small _____ medium _____ large _____ X-large _____

Mail to:

Sea Recovery Corp.
P.O. BOX 2560
GARDENA, CA 90247 U.S.A.
Attn: Warranty Registration

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SECTION "A"

WARRANTY

NOTES:

LIMITED WARRANTY

Sea Recovery Corp. warrants that the Sea Recovery Desalination System will perform according to specifications for a period of twelve (12) months from the date of shipment. Sea Recovery's liability under this warranty shall be limited to repair or replacement of the Sea Recovery Desalination System at Sea Recovery's option, and under no circumstances shall Sea Recovery be liable for consequential damages arising out of or in any way connected with the failure of the system to perform as set forth herein. This limited warranty is in lieu of all other expressed or implied warranties, including those of merchantability and fitness for a particular purpose.

In the event of a defect, a malfunction, or failure during the warranty period, Sea Recovery will repair or replace, at its option, the product or component therein which upon examination by Sea Recovery shall appear to be defective, or not up to factory specifications.

To obtain warranty service, the defective product or part must be returned to an authorized Sea Recovery Factory Service Center. The purchaser must pay any transportation or labor expenses incurred in removing and returning the product to the service center.

The limited warranty does not extend to any system or system component which has been subjected to misuse, neglect, accident, improper installation, or subject to use in violation of instructions furnished by Sea Recovery, nor does the warranty extend to components on which the serial number has been removed, defaced, or changed.

Sea Recovery reserves the right to make changes or improvements in its product, during subsequent production, without incurring the obligation to install such changes or improvements on previously manufactured equipment.

The implied warranties which the law imposes on the sale of this product are expressly LIMITED, in duration, to the time period above. Sea Recovery shall not be liable for damages, consequential or otherwise, resulting from the use and operation of this product, or from the breach of this LIMITED WARRANTY.

Some states do not allow exclusions or limitations on the duration of the warranty or exclusions or limitations of incidental or consequential damages, so these limitations or exclusions may not apply to you. This warranty gives you specified legal rights, and you may also have other rights which vary from state to state.

This limited warranty service does not apply to normal reoccurring user maintenance as described below.

Normal reoccurring user maintenance which is not covered by this LIMITED WARRANTY:

- | | |
|---------------------------------|------------------------|
| 1. Sea Strainer Element | 7. Pump Crankcase Oil |
| 2. Cartridge Filter Elements | 8. Auxiliary Tubing |
| 3. Pump Seals | 9. Fuses |
| 4. Pump Packings | 10. Ultra Violet Lamps |
| 5. Pump Valve Assemblies | 11. Indication Lamps |
| 6. Gauge Instrument Calibration | |

The Sea Recovery Reverse Osmosis Membrane Element is guaranteed to be cleanable for a minimum of one year from date of shipment, providing cleaning periods are adhered to and foulant is acid soluble metal hydroxides and calcium carbonates or alkaline soluble organic, inorganic substances and microbiological slimes. The Sea Recovery Membrane Element is not guaranteed against iron fouling (rust), chemical attack, extreme temperatures (over 120°F/under 32°F), drying out, or extreme pressures (over 1000 psig).

CAUTION: Use of non Sea Recovery parts and parts not supplied directly by Sea Recovery, including but not limited to maintenance parts, spare parts, replacement parts, system components and or system accessories, shall void all warranty expressed or implied.

Sea Recovery Corp.
P.O. BOX 2560
GARDENA, CALIFORNIA 90247-0560
U.S.A.

TELEPHONE (310) 327-4000
FACSIMILE (310) 327-4350
TELEX 182598 SEARECOVE

NOTES:

SECTION "B"

SPECIFICATIONS

NOTES:

SPECIFICATIONS AQUA MODULE SERIES MODULAR STYLE

SRC 200AF - SRC 400AF - SRC 600AF - SRC 800AF - SRC 1200AF - SRC 1500AF
SRC 200AC - SRC 400AC - SRC 600AC - SRC 800AC - SRC 1200AC - SRC 1500AC

PERFORMANCE:

RATED PERFORMANCE:

200; 400; 600; 800; 1,200; 1,500

U.S. Gallons per 24 hours

757; 1,514; 2,271; 3,028; 4,542; 5,678

Liters per 24 hours

PRODUCT WATER PRODUCED: $\pm 15\%$ at 820 psig / 56 BAR & 77°F / 25°C

SRC 200AF/AC:	8 U.S. Gallons per hour / 31 Liters per hour
SRC 400AF/AC:	16 U.S. Gallons per hour / 63 Liters per hour
SRC 600AF/AC:	25 U.S. Gallons per hour / 94 Liters per hour
SRC 800AF/AC:	33 U.S. Gallons per hour / 126 Liters per hour
SRC 1200AF/AC:	50 U.S. Gallons per hour / 189 Liters per hour
SRC 1500AF/AC:	62 U.S. Gallons per hour / 236 Liters per hour

SALT REJECTION (CHLORIDE ION):

Per individual element

Sea Water Systems Minimum 98.6%, Average 99.1%

High Rejection Systems (-HR suffix) Minimum 99.2%, Average 99.5%

PRODUCT WATER TEMPERATURE: Ambient to feed water temperature

SPECIFICATIONS:

SALINITY MONITORING:

Automatic electronic monitoring. Temperature compensated with the exclusive Sea Recovery solid state continuous "DOT LED" readout. The salinity monitoring components of the system give a continuous readout in micromhos per cubic centimeter, are temperature compensated and of a fail-safe design.

SYSTEM FEED WATER:

FLOW:

60Hz Operation:

200 - 600 GPD Systems

2.5 GPM / 9.4 LPM

800 - 1500 GPD Systems

4.2 GPM / 15.9 LPM

50Hz Operation:

200 - 600 GPD Systems

3.0 GPM / 11.4 LPM

800 - 1500 GPD Systems

3.5 GPM / 13.3 LPM

SALINITY RANGE:

Seawater up to 35,000 ppm TDS (NaCl) (typical seawater salinity is 35,000 ppm)

High rejection systems up to 50,000 ppm TDS (NaCl)

TEMPERATURE RANGE: Max. 122°F / 50°C, Min. 33°F / .5°C

pH RANGE: 3-11 (typical seawater pH is 8)

REVERSE OSMOSIS MEMBRANE:

TYPE: Selected aromatic tri-polyamid, thin film composite, spiral wound, single pass reverse osmosis membrane element.

CHLORINE TOLERANCE: 0.1 PPM

SYSTEM PRESSURE:

FEED WATER: Max. 35 psi

SYSTEM OPERATION: Seawater nominal 820 psi
Brackish Varies w/ppm

DIMENSIONS & WEIGHT:

DIMENSIONS: Refer to Installation Section "E"

WEIGHT:

SRC 200 AF	147 Lbs / 67 Kg	SRC 200 AC	145 Lbs / 66 Kg
SRC 400 AF	154 Lbs / 70 Kg	SRC 400 AC	152 Lbs / 69 Kg
SRC 600 AF	161 Lbs / 73 Kg	SRC 600 AC	159 Lbs / 72 Kg
SRC 800 AF	211 Lbs / 96 Kg	SRC 800 AC	209 Lbs / 95 Kg
SRC 1200 AF	222 Lbs / 101 Kg	SRC 1200 AC	220 Lbs / 100 Kg
SRC 1500 AF	233 Lbs / 106 Kg	SRC 1500 AC	231 Lbs / 105 Kg

WATER CONNECTIONS:

Inlet	3/4 FNPT	(Female National Pipe Thread, American Standard)
Brine	1/2 FNPT	(Female National Pipe Thread, American Standard)
Product	3/8 MNPT	(Male National Pipe Thread, American Standard)

CAUTION: The Sea Recovery Reverse Osmosis Desalination Systems are designed to be as electrically efficient as possible. RPM supplied to and Pressure created by the High Pressure Pump govern the amount of energy required by the High Pressure Pump's Electric Motor. In order to maintain a sufficient flow of feed water into the Reverse Osmosis Membrane Element, Sea Recovery utilizes several different High Pressure Pumps with different displacement characteristics. These different High Pressure Pumps, in turn, have different power requirements.

As such, several different Electric Motors are used in the various Sea Recovery Systems. In order to keep power consumption to a minimum most Sea Recovery Systems utilize a mono Cycle (Hz) Electric Motor capable of operating from either 50 or 60 Hz but not both.

Special Sea Recovery Systems are available which utilize a dual Cycle Electric Motor capable of operation from either 50 or 60 Hz. However, these Systems utilize an over sized motor and they consume more electrical power than a standard mono Cycle Electric Motor. This is due to the different RPM generated at different Cycles and the resulting required power at the High Pressure Pump.

Do not attempt to operate the Sea Recovery system from a power source that creates 50 Hz if you have a 60 Hz System. Likewise, do not attempt to operate the Sea Recovery system from a power source that creates 60 Hz if you have a 50 Hz System. The Electric Motor will sustain damage if you attempt to operate the Sea Recovery System from the wrong power source. Therefore, in a Boat application, use caution when switching from your auxiliary AC on board generator to shore power. In many cases, due to insufficient wiring or long distances from the power source to the end of the dock, shore power from a Marina may be insufficient to operate your Sea Recovery System. And, when in a foreign port, that utilizes different power specifications, from that which your on board auxiliary AC generator is set to, never operate the Sea Recovery System on shore power.

You may only operate the Sea Recovery System from both 50 and 60 Hz power sources if your Sea Recovery System is specifically designed for dual Cycle operation. If in doubt, before you damage the Electric Motor, check the Addendum Specification Sheet supplied with your New System Owners Manual or contact Sea Recovery and provide us with the Serial Number of your System.

ELECTRICAL POWER REQUIREMENTS:

(H.P. = Horse Power; FLA = Full Load Amperes; LRA = Locked Rotor Amperes - Start Up)

HIGH PRESSURE PUMP MOTOR:**200 to 600 GPD SYSTEMS**

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	60	115	1.5	16	89
Single	60	230	1.5	8	50
Three	60	230	1.5	5	34
Three	60	460	1.5	2.5	18
Single	50	220	2	10	65
Three	50	220	2	6	40
Three	50	380	2	3	22
Single	50/60	220/230	3	15	90
Three	50/60	220/230	3	9	55
Three	50/60	380/460	3	4.3	30

800 to 1500 GPD SYSTEMS

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	60	115	3	30	160
Single	60	230	3	15	90
Three	60	230	3	9	55
Three	60	460	3	4.3	30
Single	50	220	3	12.4	128
Three	50	220	3	9	55
Three	50	380	3	4.3	30
Single	50/60	220/230	3	15	90
Three	50/60	220/230	3	9	55
Three	50/60	380/460	3	4.3	30

BOOSTER PUMP:**1/3 horse power**

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	50/60	115	.3	6	24
Single	50/60	220/230	.3	3	12.5
Three	50/60	220/230	.3	1.5	7
Three	50/60	380/460	.3	.7	3.5

1/2 horse power

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	60	115	.5	7.5	32
Single	60	230	.5	3.7	17
Three	60	230	.5	2	12
Three	60	460	.5	1	6
Single	50	220	.5	3.2	15
Three	50	220	.5	2	11
Three	50	380	.5	1	6
Single	50/60	220/230	.5	3.7	17
Three	50/65	220/230	.5	2	12
Three	50/60	380/460	.5	1	6

RECOMMENDED CIRCUIT BREAKER:**200 to 600 GPD SYSTEMS**

Operating Voltage Hz & Phase	Recommended Circuit Breaker Size
115 VAC, 60 Hz, Single Phase	30 Amperes
230 VAC, 60 Hz, Single Phase	15 Amperes
230 VAC, 60 Hz, Three Phase	10 Amperes
460 VAC, 60 Hz, Three Phase	7.5 Amperes
220 VAC, 50 Hz, Single Phase	20 Amperes
220 VAC, 50 Hz, Three Phase	15 Amperes
380 VAC, 50 Hz, Three Phase	7.5 Amperes
220/230 VAC, 50/60 Hz, Single Phase	20 Amperes
220/230 VAC, 50/60 Hz, Three Phase	15 Amperes
380/460 VAC, 50/60 Hz, Three Phase	7.5 Amperes

800 to 1500 GPD SYSTEMS

Operating Voltage Hz & Phase	Recommended Circuit Breaker Size
115 VAC, 60 Hz, Single Phase	40 Amperes
230 VAC, 60 Hz, Single Phase	25 Amperes
230 VAC, 60 Hz, Three Phase	15 Amperes
460 VAC, 60 Hz, Three Phase	7.5 Amperes
220 VAC, 50 Hz, Single Phase	20 Amperes
220 VAC, 50 Hz, Three Phase	15 Amperes
380 VAC, 50 Hz, Three Phase	7.5 Amperes
220/230 VAC, 50/60 Hz, Single Phase	25 Amperes
220/230 VAC, 50/60 Hz, Three Phase	15 Amperes
380/460 VAC, 50/60 Hz, Three Phase	7.5 Amperes

POWER SOURCE: PER ORDER

Additional specific specifications to this system are provided in the Supplemental Specification Sheet. Further operation requirements are given in the Installation Section. Also, consult the Temperature vs. Production Chart near the back of this manual.

NOTES:

SECTION "C"

INTRODUCTION

NOTES:

SYSTEM INTRODUCTION

Thank you for purchasing a Sea Recovery Reverse Osmosis Desalination System. Please read this Owners Manual carefully before attempting installation or operation. A subsequent better understanding of the system will ensure optimum performance and longer service life from the system.

All Sea Recovery reverse osmosis desalination systems are designed and engineered to function as a complete working unit. Generally speaking, the performance of each component within the unit is dependent on the component prior to it and governs the performance of all components after it. Proper performance of the system is thus dependent upon proper operation of every single component within the system.

The intent of this manual is to allow the operator to become familiar with each component within the Sea Recovery system. By understanding the function, importance, and normal operation of each component within each subsystem of the unit, the operator can readily diagnose minor problems. Such problems, when they first develop, usually require minor maintenance and are easily corrected. Left unattended, though, a problem in one component will affect the rest of the system and lead to further required repairs.

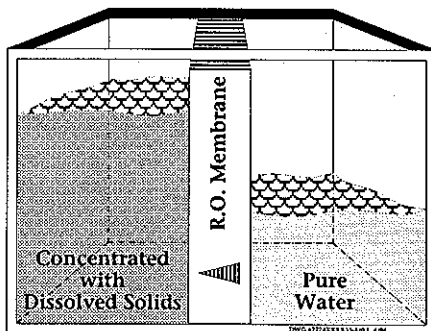
Please take time to read this entire manual several times.

Sea Recovery's Approach to Water Desalination.

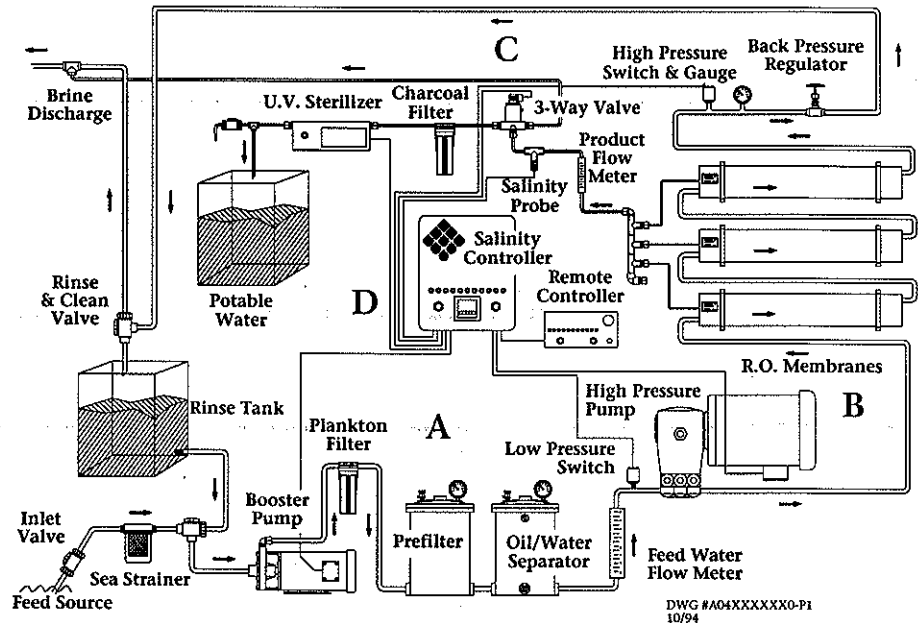
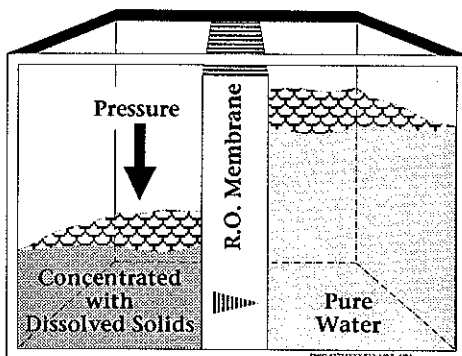
The Problem: Osmosis is the diffusion of two miscible (mixable) solutions through a semipermeable membrane in such a manner as to equalize their concentration.* (By allowing a lesser concentration, potable water, to naturally diffuse through a semipermeable membrane into a higher concentration, sea or brackish water.)

Sea water or brackish water is a high concentration solution. Potable water is a low concentration solution.

Therefore, sea water or brackish water cannot naturally diffuse through a semipermeable membrane to provide potable, or drinking water.



The Solution: A manmade process, Reverse Osmosis, overcomes this natural phenomenon. By forcing sea or brackish water (under high pressure) through a semipermeable membrane, potable water can be realized. Reverse Osmosis Desalination Systems by Sea Recovery make possible the once impossible, potable water from undrinkable water sources.



A. Feed Water (Salt Water or Brackish Water) is pumped into the system via a Inlet Valve, then filtered through a raw water Sea Strainer. The pressure level of the Feed water is then boosted by the Booster Pump and filtered once more through a tight micron Prefilter. Oil, if present, is now separated and removed through the Oil/Water Separator. An added feature, a Low Pressure Switch, shuts down the system in the event of low flow condition. This prevents cavitation in the high pressure pump. The feed water flow is measured by the Feed Water Flow Meter to ensure proper operation of the High Pressure Pump.

B. The High Pressure Pump, which features an automatic, over pressure safety shut down switch, then increases the filtered feed water to a high pressure level and forces it into the Membrane Vessel Assembly. The Back Pressure Regulator controls and automatically maintains the necessary high pressure level in the membrane. Concentrated brine is discharged through the Brine Discharge connector and diverted back to the feed source.

C. The product water flows out of the R.O. Membrane and passes into a Product Flow Meter where the amount of potable water produced is registered. Next, the Salinity Probe adjusts automatically for temperature changes and registers, electronically, the salt content of the product water. The product water then proceeds into the 3-Way Solenoid Diversion Valve. Here, potable water is diverted to the Charcoal Filter where gasses or odors present are absorbed and removed from the product water. The final filtration process occurs in the Ultraviolet Sterilizer where 99.9 % of all microorganisms, including viruses and bacteria, are destroyed.

D. All electrical connections terminate at the Salinity Controller. Highly advanced, the Salinity Controller features reliable solid state electronics. The Remote Controller connects into the Salinity Controller and allows for remote monitoring or operation of the system.

**Funk & Wagnal's New Comprehensive International Dictionary"

1. PRINCIPLES OF REVERSE OSMOSIS:

- A. **OSMOSIS:** Osmosis can be defined as the spontaneous passage of a liquid from a dilute to a more concentrated solution across an ideal semipermeable membrane which allows the passage of the solvent (water) but not the dissolved solids (solutes).
- B. **OSMOTIC PRESSURE:** The transfer of the water from one side of the membrane to the other will continue until the head (pressure) is large enough to prevent any net transfer of the solvent (water) to the more concentrated solution. At equilibrium, the quantity of water passing in either direction is equal, and the pressure is then defined as the Osmotic Pressure of the solution having that particular concentration of dissolved solids.
- C. **REVERSE OSMOSIS:** As described above, water will continue to flow from the pure water side of the membrane to the saline solution side until the pressure created by the rise in water level on the saline solution side of the membrane equals the osmotic pressure. If the pressure of the saline solution is increased until it exceeds the osmotic pressure, water is forced to flow through the membrane from the solution containing the higher salt concentration into the solution with the lower salt concentration. The process is called *Reverse Osmosis*.
- D. **SPIRAL-WOUND MEMBRANE:** The spiral-wound membrane consists of one or more membrane envelopes each formed by enclosing a channelized product water carrying material between two large flat membrane sheets. The membrane envelope is sealed on three edges with a special adhesive and attached with the adhesive to a small diameter pipe to form a cylinder 2, 4, 6, 8, or 12 inches in diameter and up to 40 inches in length. A polypropylene screen is used to form the feed water channel between the membrane envelopes. A wrap is applied to the membrane element to maintain the cylindrical configuration. The center tube is also the permeate (product water) collecting channel. Several elements may be connected in series within a single or multiple pressure vessel(s).
- E. **BOUNDARY LAYER/CONCENTRATION POLARIZATION:** When water permeates through the membrane, nearly all the salt is left behind in the brine channel. In any dynamic hydraulic system, the fluid adjacent to the wall of the vessel is moving relatively slowly. Even though the main body of the stream is turbulent, a thin film adjacent to the wall (membrane) is laminar. This thin film is called the boundary layer.
- F. **COMPACTION:** Some densification of the membrane structure may take place while operating at elevated pressures, above 1000 psi. The change is known as compaction and is accompanied by a reduction in the water permeation rate.
- G. **WATER TEMPERATURE EFFECT:** The product water flow through the membrane is significantly affected by the water temperature. At any given pressure this flow increases with increasing water temperature and is reduced at lower temperatures.

- H. PRESSURE:** The operating pressure has a direct affect on product water quality and quantity. Both factors will increase as the system pressure increases (within design limits). The system must be operated at the lowest pressure required to achieve the designed product water flow rate. This parameter also affects compaction, which proceeds at a faster rate at higher pressures as well as at higher temperatures.
- I. BRINE VELOCITY:** The brine flow over the membrane surface is very important to both product water quality and quantity. At low flows, concentration polarization occurs, causing the water quality to decline. In addition to inferior product water quality, low brine flows can increase the precipitation of sparingly soluble salts which will foul the membrane surface. If this occurs, the product water flux (production) will decline.

SECTION "D"

SYSTEM SCHEMATIC

with

COMPONENT IDENTIFICATION

&

COMPONENT DESCRIPTIONS

NOTES:

IDENTIFICATION OF SYSTEM COMPONENTS: Identification numbers correspond to the System Schematic numbers shown on pages D - 4 and D - 5.

A. PREFILTRATION SUBSYSTEM:

1. Sea Strainer (Coarse Strainer) & Suction Tubing with Sea Cock Connection
2. Booster Pump
3. Plankton Filter (option)
4. Multi Media Filter (option)
5. Prefilter
6. Oil/Water Separator (option)
7. Low Pressure Gauge
8. Feed Water Flow Meter (Gallon / Liter Per Minute)
9. Low Pressure Protection Switch

B. PRESSURIZATION SUBSYSTEM:

11. High Pressure Pump
12. Electric Motor
13. High Pressure Hose
14. R.O. Membrane Element & Vessel
15. High Pressure Shutdown Switch
16. High Pressure Gauge
17. Back Pressure Regulator
18. Brine Dump Line with Thru-Hull Connection

C. PRODUCT WATER MONITORING SUBSYSTEM:

20. Product Water Tee Collector
21. Product Water Flow Meter (Gallon / Liter Per Hour)
22. Salinity Probe (Temperature Compensated)
23. 3-Way Product Water Diversion Valve
24. Charcoal Filter
25. Ultra Violet Sterilizer (option)
26. Product Water Test Tap Valve (option)
27. Product Water Tubing & Storage Tank Connection

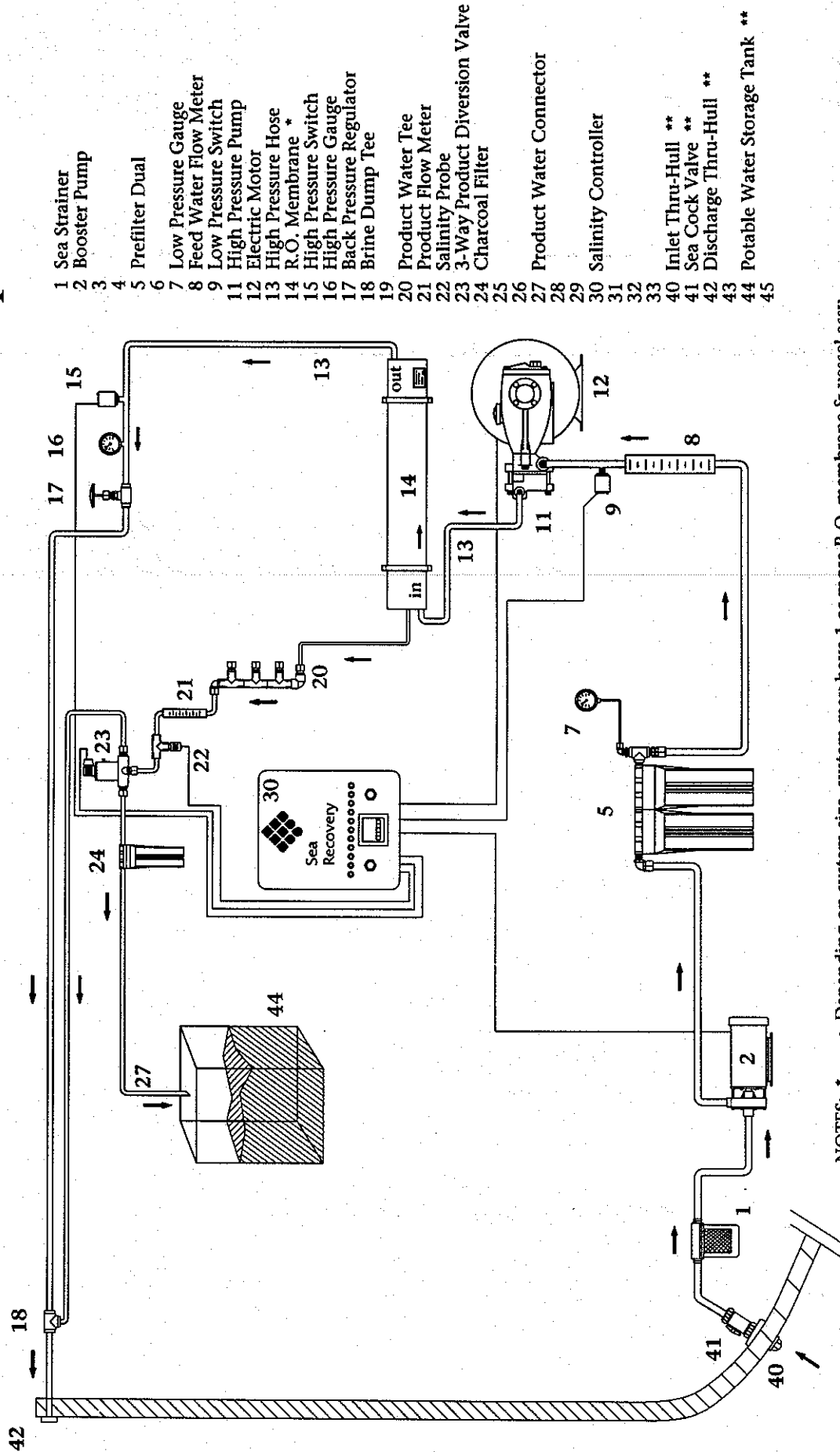
D. ELECTRONIC SUBSYSTEM:

30. System Salinity Controller
31. Remote Sound & Visual Alarm (option)
32. Remote Monitor including Light Emitting Monitor and Sound Alarm (option)
33. Remote Controller including Light Emitting Monitor, Sound Alarm, Start-Stop and Sound Alarm Mute Switch (option)

E. MISCELLANEOUS ITEMS:

19. Media Filter Waste Line with Thru-Hull Connection (option with Media Filter)
28. Clean / Rinse Inlet Valve (option)
29. Clean / Rinse Outlet Valve (option)
40. Thru-Hull Inlet Fitting, Forward Facing Scoop (user supplied)
41. System Shut-Off Valve (Sea Cock Valve) (user supplied)
42. Brine Discharge Over Board Thru-Hull Fitting (user supplied)
43. Multi Media Waste Discharge Over Board Thru-Hull Fitting (user supplied)
44. Potable Water Storage Tank (user supplied)
45. Rinse / Clean Tank (option)

Sea Recovery Aqua Frame or Compact Series 200-1500 GPD System P&ID Shown as an SRC 200 AF or AC with no options

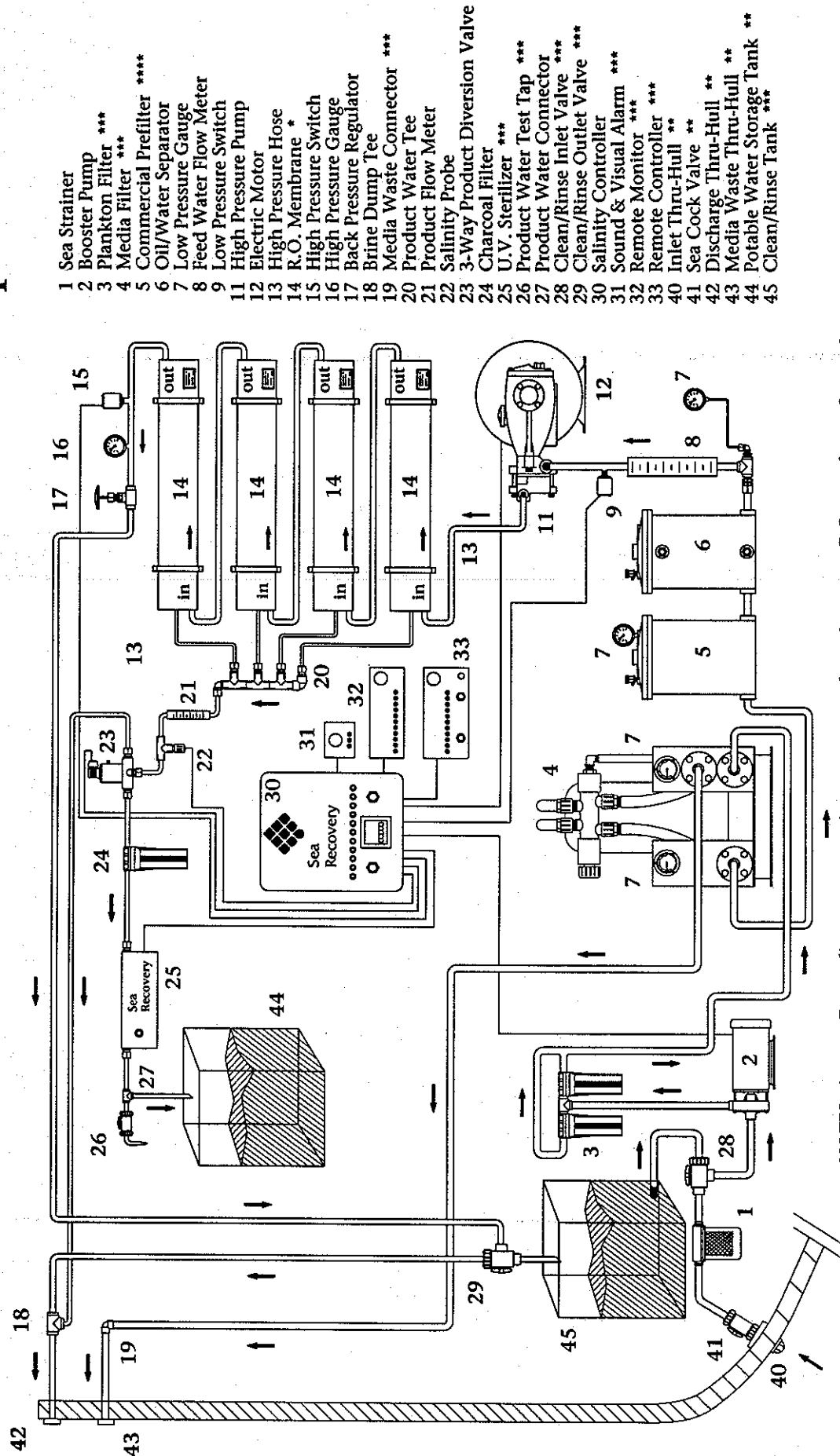


NOTES: * : Depending on system size, system may have 1 or more R.O. membrane & vessel assy
** : Items supplied by installer

**** : Can be substituted for Commercial PreFilter

DWG #A04XXXXXX0-P2 AF/AC-0,1,2
6/94

Sea Recovery Aqua Frame or Compact Series 200-1500 GPD System P&ID Shown as an SRC 1500 AF or AC with no options



- 1 Sea Strainer
- 2 Booster Pump
- 3 Plankton Filter ***
- 4 Media Filter ***
- 5 Commercial Prefilter ****
- 6 Oil/Water Separator
- 7 Low Pressure Gauge
- 8 Feed Water Flow Meter
- 9 Low Pressure Switch
- 11 High Pressure Pump
- 12 Electric Motor
- 13 High Pressure Hose
- 14 R.O. Membrane *
- 15 High Pressure Switch
- 16 High Pressure Gauge
- 17 Back Pressure Regulator
- 18 Brine Dump Tee
- 19 Media Waste Connector ***
- 20 Product Water Tee
- 21 Product Flow Meter
- 22 Salinity Probe
- 23 3-Way Product Diversion Valve
- 24 Charcoal Filter ***
- 25 U.V. Sterilizer ***
- 26 Product Water Test Tap ***
- 27 Product Water Connector ***
- 28 Clean/Rinse Inlet Valve ***
- 29 Clean/Rinse Outlet Valve ***
- 30 Salinity Controller
- 31 Sound & Visual Alarm ***
- 32 Remote Monitor ***
- 33 Remote Controller ***
- 40 Inlet Thru-Hull **
- 41 Sea Cock Valve **
- 42 Discharge Thru-Hull **
- 43 Media Waste Thru-Hull **
- 44 Potable Water Storage Tank **
- 45 Clean/Rinse Tank **

NOTES: * : Depending on system size, system may have 1 or more R.O. membrane & vessel assy
 ** : Items supplied by installer
 *** : Options
 **** : Can be substituted for 1 x 10-25 & 1 x 10-05 micron Prefilter

DWG #A04XXXXXX0-P2 AF/AC-0,1,3
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COMPONENT DESCRIPTIONS

The following is a full description of each subsystem and subassembly within the SRC AF & AC System, including the purpose and integration of the components in the system. All components supplied by SRC, both standard and optional, are described below. Components supplied separately by the user are described more fully in the System Installation Section. The identification numbers used correspond to the System Schematic numbers from page D - 4 and D - 5.

A. LOW PRESSURE PREFILTRATION SUBSYSTEM: This section of the system collects, pretreats and delivers the Feed Water into the System. The Feed Water may be collected directly from the source through a ship's Sea Chest or Inlet Thru-Hull Fitting. The raw feed water is filtered to remove suspended solids larger than 5 micron size (5/1,000,000 meter). Such controlled prefiltration protects the SRC R.O. Membrane Element from undue fouling.

The Prefiltration Subsystem must always be kept free flowing in order to allow the proper rate of System Feed Water to travel through it and into the High Pressure Pump. A plugged Prefiltration Subsystem will cause cavitation damage to the High Pressure Pump and will eventually cause permanent fouling of the R.O. Membrane Element. Therefore, always ensure that the Prefiltration Subsystem is clear and monitor it frequently.

1. **Sea Strainer (Coarse Strainer)** is a clear bowl with nylon body filter housing containing a cleanable monel fine mesh filter screen. The design allows for quick bowl removal. The Sea Strainer filters out large particulate matter and suspended particles that would otherwise enter and damage the Booster Pump. The result is lowered maintenance costs. The Sea Recovery R.O. System comes complete with Inlet Suction Hose and Tubing for connection of all Prefiltration Components from the Inlet Sea Cock to the High Pressure Pump.
2. **Booster Pump** supplies a positive pressure to the Prefilters, and in turn to the High Pressure Pump. Positive pressure will provide longer life to the Prefilters, provide longer life to the High Pressure Pump and also decrease required maintenance. Sea Recovery utilizes a high efficiency, marine quality pump which delivers approximately 15 to 35 psi (depending upon system configuration, installation and actual Booster Pump utilized) into the Prefilter. The Booster Pump is driven by it's own electric motor.
3. **Plankton Filter** is highly recommended for system operation areas which are rich in biological growth such as the Pacific North West, Arctic Waters or Fishing Grounds. This filter assembly contains a cleanable ultra fine monel mesh screen. The ultra fine mesh screen will remove suspended solids or biological growth such as plankton and thereby provide longer life to the Prefilter Elements and in turn provide lower system maintenance costs.
4. **Multi Media Filter** consists of an RFP vessel which contains a graduated media filter bed. The media traps suspended solids, that are larger than 30 micron, and thus provides further protection and longer life to the Prefilter element. The Multi Media Filter is backflushable which thereby minimizes maintenance costs. Consult the factory regarding recommended use and applications for the media filter. It is not recommended for small vessel (less than 20 meters) applications due to its size, weight and booster pump requirements.

5. **Prefilter** (standard dual 10 inch) consists of two filter housings connected in series with each other. The unique elements filter out suspended solids from the System Feed Water. The first Prefilter contains a special pleated element which filters the feed water to 25 micron. The second Prefilter contains a special pleated element which filters the feed water to 5 micron. Special applications may dictate the need for different micron retention.

Commercial Prefilter provides extended periods of time between filter element changes. The Commercial Prefilter contains a large filter element with 50 square feet of filtering area. The filter element is rated at 5 micron. Due to its high capacity this one filter replaces the two standard Prefilters.

Note: The Sea Recovery Prefilter Element may appear to be similar to commercially available elements. However, Sea Recovery manufactures their own unique filter elements to specific stringent specifications designed to withstand unique Sea Water applications and simultaneously protect the SRC R.O. Membrane Element. Only Sea Recovery filter elements, supplied by Sea Recovery, may be used as replacements. This will ensure proper flow and filtration of the System Feed Water. Use of non Sea Recovery filter elements will damage the R.O. Membrane Elements, foul them quickly and render them uncleanable.

6. **Oil/Water Separator** is recommended if system operation will be in Harbor or Coastal conditions. The unique separator element separates oil and removes suspended solids from the System Feed Water. As any oil will permanently destroy the SRC R.O. Membrane Element, it is recommended that the user avoid operating the SRC system in polluted Harbors. If it is impractical to avoid using oily intake water, then use of the Oil/Water Separator Assembly is required to keep the R.O. Membrane Element free from irreversible oil damage.
7. **Low Pressure Gauge** displays the Inlet Pressure to the High Pressure Pump after passing through all Prefiltration Sections of the System from the Booster Pump. The gauge assists the operator in diagnosing the Sea Strainer, Booster Pump, Plankton Filter Element, Prefilter Element and Oil/Water Separator Element condition. The gauge is made of high quality stainless steel and is glycerin oil filled for smooth and accurate operation.
8. **Feed Water Flow Meter** measures the rate of feed water into the system in gallons per minute. This is one of the most important visual check points of the SRC System and should be monitored on a regular basis. Proper interpretation of the Feed Water Flow Meter readings and movements will allow the owner to determine the need for maintenance or the occurrence of a malfunction in other components. This Flow Meter is, therefore, important to the proper operation of the System and must be monitored on a regular basis.
9. **Low Pressure Protection** switch will turn the System off automatically if a plugged filter element or other abnormality causes a low flow situation. This protects the High Pressure Pump, the R.O. Membrane Element and the Booster Pump from damage. The typical reason for the Low Pressure Switch to shut off the System would be a fouled (plugged, clogged, dirty) Sea Strainer Element, fouled Prefilter Element or fouled Oil/Water Separator Element.

- B. PRESSURIZATION SUBSYSTEM:** Proper pressure and proper flow across the SRC R.O. Membrane Element are two basic requirements of Reverse Osmosis. Both of these parameters must be maintained at specified levels or the System simply will not function correctly. This is why it is important that the Prefiltration Subsystem be maintained, so that the Pressurization Subsystem receives a proper flow of Feed Water. The normal operating pressure of the SRC system is 750-820 psi for Sea Water use or 200 to 400 psi for Brackish Water use. The maximum pressure the Sea Water system will develop is 950 psi, because the supplied high pressure switch automatically shuts the system off at 950 psi (+50 psi).

Proper flow into the System and across the SRC R.O. Membrane is listed in the Specification Section "B" of this Manual. Overflow will cause damage to the Membrane, and under flow will cause an increase in the salt content of the Product Water. Under flow will also cause rapid and premature fouling of the R.O. Membrane Element as a result of higher than normal recovery.

As the temperature of the Feed Water source fluctuates, it will affect System productivity. Refer to the Temperature Effect Chart in Section "M" of this Manual.

11. **High Pressure Pump** is a marine quality positive displacement ceramic plunger pump. This proven High Pressure Pump is unique to the Sea Recovery system. The pump has undergone years of research & development, is proven in thousands of installations world wide and it is manufactured to specific Sea Recovery demanding specifications. The High Pressure Pump will last for years with proper installation, use and maintenance. The major cause of failure of the High Pressure Pump is from the effects of Electrolysis to the pump manifold. Electrolysis can be controlled by properly bonding the High Pressure Pump manifold to the ships bonding system. Bonding of the High Pressure Pump is not to be confused with the ships electrical grounding system. Refer to the installation section of this manual for further information regarding bonding of the High Pressure Pump
12. **Electric Motor** is directly coupled to the High Pressure Pump. This unique direct coupling results in the most efficient and compact configuration possible.
13. **High Pressure Hose** transfers pressurized Sea Water from the High Pressure Pump to the inlet of the SRC R.O. Membrane Element. The special High Pressure Hose supplied with the System is of standard lengths (special lengths may be ordered from the factory) with swivel flare fittings for ease of installation. The hose is marine rated, reinforced and has a corrosion resistant inner tube and outer core.
14. **R.O. Membrane Element & Vessel** consists of an exclusive and unique high pressure, corrosion resistant vessel which houses a special Spiral Wound Reverse Osmosis Membrane Element. The Membrane Element rejects the salt ions present in the feed water, yet allows the potable H₂O molecules to pass through the thin membrane surface. A sufficient flow of water across the membrane surface must be continually in progress in order for the correct percentage of salt rejection to occur. Only about 5% (Sea Water Systems, per individual Membrane Element) of the System Feed Water becomes fresh Product Water. The remainder becomes a concentrated brine solution which carries the rejected salt ions out of the R.O. Membrane Element.

The proper flow of water is also essential to minimize fouling of the R.O. Membrane Element. Reducing the flow of Feed Water would cause the R.O. Membrane Element to recover a higher percentage of the Feed Water. Excessive recovery will rapidly foul the R.O. Membrane Element.

15. **High Pressure Shutdown Switch** is used in the SRC System to automatically turn the System off in case of over-pressurization during operation.
16. **High Pressure Gauge** displays the R.O. Membrane Vessel outlet pressure. The gauge is made of high quality stainless steel and is glycerin oil filled for smooth and accurate operation. The gauge assists the operator in diagnosing the R.O. Membrane Element and High Pressure Pump condition.
17. **Back Pressure Regulator** is of 316 Stainless Steel construction. By turning the valve adjustment handle clockwise, a smaller orifice is created and this results in pressure build up. By turning the valve adjustment handle clockwise and counterclockwise pressure is increased and decreased accordingly, which in turn increases and decreases productivity of the R.O. Membrane Element.
18. **Brine Dump Line with Thru-Hull Connection** consists of tubing, which is to be used for connection of the Brine Discharge water, and a connector, to tie into the Thru-Hull Fitting. Separate Product Water tubing is also supplied for connection of the Unpotable Product water from the normally open or reject port of the 3-Way Product Diversion Valve to the Brine Discharge Tee Connector.

C. PRODUCT WATER SUBSYSTEM: This section of the System gives a visual indication of the clarity and quantity of product water being produced. By corresponding the quantity of product water produced to the pressure, temperature and salinity of the System Feed Water, the user can establish whether the SRC R.O. Membrane Element requires cleaning. This also allows the user to estimate the running time required to fill or refill the Product Water Storage Tank(s). Post Filtration of the SRC system is the final step in Product Water quality control. The type and quantity of Post Filtration required is dependent on the quality of the System Feed Water. By the time the Product Water reaches the Post Filtration stage, the R.O. Membrane Element has removed most of the dissolved solids present in the Feed Water. The Sea Recovery exclusive Temperature Compensated Electronic Subsystem has rejected any high salinity Product Water, so the water is potable in regards to salinity. The Post Filtration Subsystem is designed to limit unpleasant odor, taste, and biological matter such as bacteria, viruses, and other microorganisms which may have passed through the R.O. Membrane Element and would therefore be present in the Product Water.

20. **Product Water Tee Collector** manifold conveniently collects all Product Water produced by the R.O. Membrane Elements and routes the combined production on to the Product Water Flow Meter.
21. **Product Water Flow Meter** is graduated from 5 to 70 GPH (gallons per hour). This relates to 120 to 1680 gallons per day or 454 to 6,360 liters per day. The flow-through design of the meter allows it to measure the rate of Product Water progress from the R.O. Membrane Element toward the Product Water Storage Tank. This flow meter is essential in plotting records of R.O. Membrane Element performance for maintenance purposes.

22. **Temperature Compensated Salinity Probe** is directly connected to and sends a continuous signal to the Salinity Controller. It electrically determines whether the salinity content of the Product Water is acceptable. This unique Salinity Probe compensates automatically for water temperature variations. A Salinity Meter must be temperature compensated in order to provide accurate readings and protect the health of the individuals consuming the Product Water.
23. **3-Way Product Diversion Valve** functions according to signals received from the Salinity Controller. After the controller has determined, from the temperature compensated Salinity Probe, that Potable (drinkable) water is being produced, the Controller energizes the valve to the "Potable" position which allows the potable Product Water to pass through the Post Filtration and into the Potable Water Storage Tank. If the Product Water being produced is "Unpotable" the valve will not receive a signal and thus remain in the normally open position which diverts the unpotable Product Water to discharge out the Brine Discharge Line.
24. **Product Water Charcoal Filter** is designed to assist in the removal of foul odors from the Product Water. A second charcoal filter may be added between the Product Water Storage Tank and the point of use. This would be desirable to remove impurities, sediment particles, or the taste of chlorine, all of which may be present in the Product Storage Tank, due to sources other than the SRC System.
25. **Product Water Ultra Violet Sterilizer** destroys at least 99.9% of any virus, bacteria and other micro-organisms which may pass through the SRC R.O. Membrane Element. The U.V. sterilizer is highly recommended if the Product Water Storage Tank is not otherwise treated by means such as chlorination. Use of the U.V. Sterilizer is also recommended if the System Feed Inlet is near a polluted source such as a raw sewage outlet. However, such polluted sources should always be avoided.
26. **Product Water Test Tap Valve** allows the user to draw water from the System prior to entering the Product Water Storage Tank.
27. **Product Water Tubing & Storage Tank Connection** is provided with the Sea Recovery R.O. System for connection to the Product Water Storage Tank from the R.O. System Product Water outlet connection.

D. ELECTRONIC SUBSYSTEM: This group of components includes the Salinity Controller, Sound & Visual Alarm, Remote Monitor and Remote Controller. This subsystem measures water quality, controls the direction of Product Water flow, and contains the central electrical connection point of the System. It also serves as the safeguard to ensure that only potable Product Water is allowed to pass into the Product Water Storage Tank.

30. **System Salinity Controller** is the central connection point for all electrical lines in the system. The controller monitors the salt content of the product water (by means of the Salinity Probe), and signals the 3-Way Product Diversion Valve when Potable Water is being produced. The 3-Way Product Diversion Valve, Motors, U.V. Sterilizer and Remotes are all directly connected to and governed by the Salinity Controller.

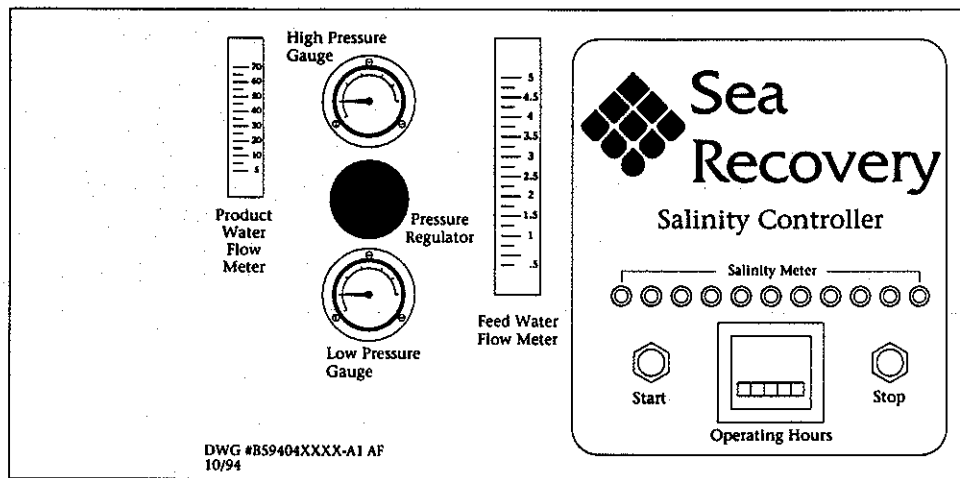
31. **Remote Sound & Visual Alarm** provides for visual and audible monitoring of the system. From the Remote Sound & Visual Alarm the user can determine if the System is in operation and whether or not the system is producing Potable Water. The Remote Sound & Visual Alarm includes an audible mute switch and a 50 foot interconnect cable.
32. **Remote Monitor including Light Emitting Monitor & Sound Alarm** provides for visual and audible monitoring of the system and the quality of the product water. From the Remote Monitor the user can determine if the System is in operation and whether or not the system is producing Potable Water as well as determining the quality of the product water from the exclusive Sea Recovery Light Emitting Monitor. The Remote Monitor a 50 foot interconnect cable.
33. **Remote Controller including Light Emitting Monitor, Sound Alarm, System Start-Stop and Sound Alarm Mute Switch** has all of the features of the Remote Monitor. Additionally, the remote start and stop switch allow for starting and stopping of the system from a remote location. The start and stop features of the Remote Controller should only be used in cases of emergency or if local operation is prohibited due to the location of the System Main Control Panel.

E. MISCELLANEOUS VALVING, CONNECTIONS AND COMPONENTS:

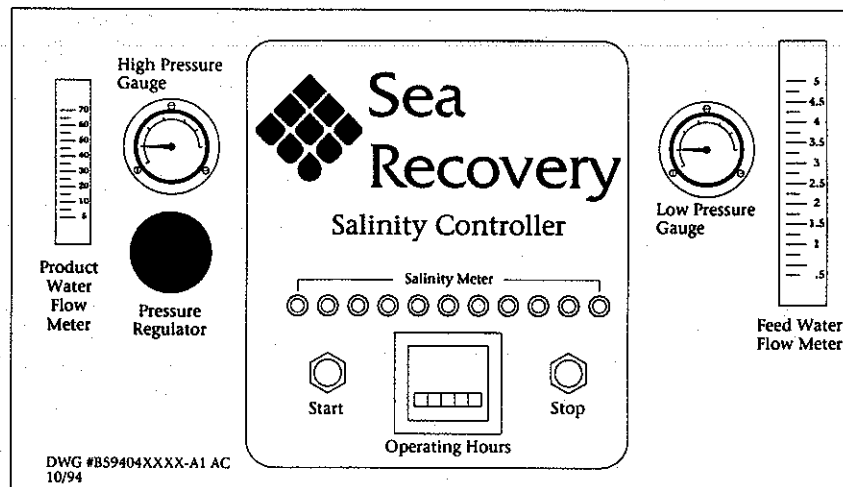
28. **Clean/Rinse Inlet Valve** is used to change the system from an operational mode to a rinse, storage or cleaning mode. This valve directs water into the Booster Pump from either the raw water feed line or the Clean/Rinse Tank.
29. **Clean/Rinse Outlet Valve** is used in conjunction with the Clean/Rinse Inlet Valve to set the System Brine Discharge Line into a normal, storage or cleaning mode.
40. **Thru-Hull Inlet Fitting, Forward Facing Scoop** attached to the ship, well below water level in order to supply an uninterrupted, air free, supply of feed water to the System.
41. **Sea Cock Valve (System Shut-Off Valve)** should be connected at the Thru-Hull Inlet Fitting to isolate Feed Water from the System.
42. **Thru-Hull Fitting (Brine Discharge Over Board)** must be provided for discharge of the Systems Brine Discharge Water (refer to Section "E" for further cautions).
43. **Thru-Hull Fitting (Multi Media Waste Discharge Over Board)** must be provided for discharge of the Multi Media Waste Discharge Water.
44. **Potable Water Storage Tank** may be any container suitable for storing Potable Water. Usually the existing potable water tank.
45. **System Clean/Rinse Tank** is used to hold rinse water, storage water or cleaning water with associated chemicals. This tank should be of 10 to 20 gallon (38 to 75 liters) size.

F. SYSTEM CONTROL PANEL FRONT VIEW:

Sea Recovery Control Panel Aqua Frame Series



Sea Recovery Control Panel Aqua Compact Series



System Start Switch is a normally open switch, momentarily push to start the system.

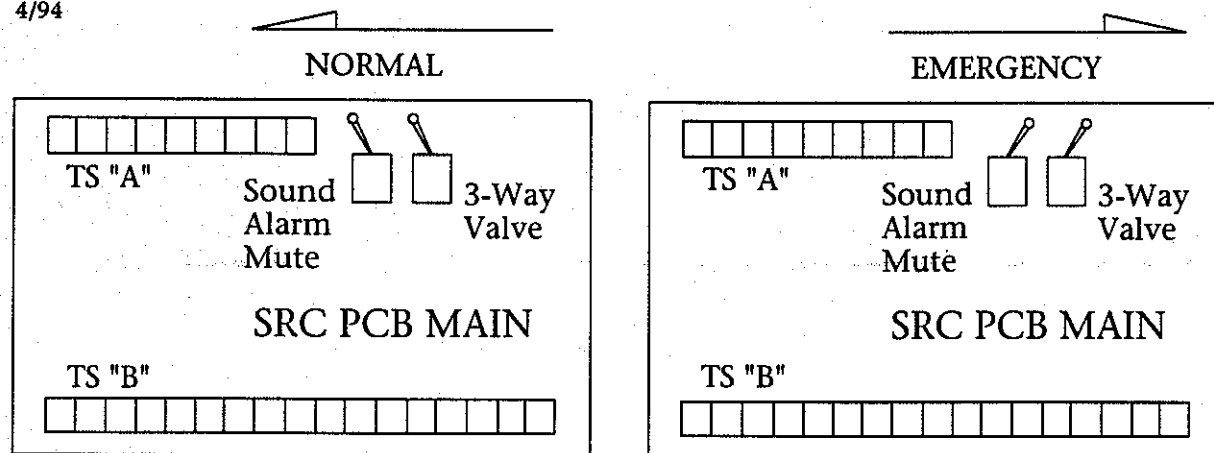
System Stop Switch is a normally closed switch, momentarily push to stop the system.

System Hour Meter (Accumulative Operational Hours) registers the total hours of system operation.

Salinity Meter, which registers the quality of the Product Water, is graphically displayed by the SRC solid state "Dot LED" meter. The first green light (on the left) indicates Power On. The remaining ten lights (7 green, 2 yellow, & 1 red) each represent 1/10th of full scale. Upon each start up, for a split second, the meter automatically registers full scale (red light on). After approximately 2 seconds, the meter will register the actual salt content of the Product Water and within 5 minutes the reading will be fully temperature compensated and accurate.

G. SYSTEM MAIN PRINTED CIRCUIT BOARD:

MAIN PRINTED CIRCUIT BOARD

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Main Printed Circuit Board, SRC PCB MAIN, located on the inside of the electrical controller lid contains two switches. Normal positioning of the lever is left, emergency use is to the right.

Sound Alarm Muting Switch in the normal "ON" (left) position allows the Sound Alarm to function normally. In the emergency "OFF" (right) position, this feature stops voltage to the Sound Alarm and thereby inactivates it.

3-Way Product Diversion Valve Bypass Switch in the normal "OFF" (left) position allows the 3-Way Valve to function automatically, dumping bad water and delivering good water. In the emergency "ON" (right) position, this feature applies voltage to the relay which controls the 3-Way Valve. This causes the valve to be activated thereby delivering product water to the storage tank regardless of quality. The "ON" (right) emergency position should only be used if the electronic controller will not automatically control the valve and yet water is required in emergency situations. The 3-Way Valve also has a manual over ride switch located on the side of the valve's coil body.

NOTES:

SECTION "E"

ON SITE STORAGE

&

SYSTEM INSTALLATION PROCEDURE

NOTES:

ON SITE STORAGE & PREPARATION FOR INSTALLATION:

A. STORAGE PRIOR TO UNCRATING:

1. Adhere to crate markings:
DO NOT store in direct sunlight;
DO NOT store above 120 degrees F / 50 degrees C;
DO NOT freeze;
STORE ONLY on base with ARROWS UP.
2. Refer to Section "J" of this manual for further cautions of the R.O. Membrane Element.

B. NECESSARY COMPONENTS SUPPLIED BY OWNER:

1. Thru-Hull Fitting [40] with Inlet Sea Cock Valve [41]: The Thru-Hull Fitting must include a 1/4 turn Sea Cock Valve with a minimum 3/4" orifice, and a 3/4" MNPT nipple exposed for the system inlet fitting. *The entire fitting and valve assembly must be of non-ferrous material.* Naval Bronze, PVC, CPVC, Stainless Steel or another noncorrosive material is correct for the fitting. Any ferrous material will cause rust fouling of the SRC R.O. Membrane Element.
2. Power cable with the proper gauge rating for this system's power consumption.
3. An electrical power source capable of supplying the proper current at the proper AC Voltage, Cycles and Phase to the Sea Recovery System.
4. Brine Thru-Hull Fitting [42] for overboard dump (above water level) for the Brine Discharge Line from the system. This fitting must be minimum 1/2" size with a 1/2" MNPT nipple exposed for coupling with the system Brine Discharge Tee [18]. It is preferred, but not absolutely necessary, that the brine discharge line terminate above water level to minimize pressure buildup on the line. *There should be no valving in the Brine Discharge Line as damage to the system will occur if the Brine Discharge Line is blocked by a closed valve during system operation.*
5. Ship's Potable Water Storage Tank [44] with Product Water Storage Tank Connection: This fitting must be minimum 3/8" FNPT size for coupling with the system product water fitting. It is preferred that the product water line terminate above water level. The product water line must be connected to a vented system to ensure no pressure build up during production. *There should be no valving in the Product Water Line as damage to the system will occur if the Product Water Line is blocked by a closed valve during system operation.*

C. TOOLS REQUIRED FOR INSTALLATION:

1. Of course, not all installations are typical. For this reason, it would be wise to have a full set of mechanic's and electrician's tools available. However, no special system tools are required for installation. Though not always necessary, a separate DS Meter, available from Sea Recovery, and a volt/ohm meter (VOM) are beneficial and useful tools for system installation and initial start-up.

D. SPECIAL CONSIDERATIONS:

1. **BONDING OF THE HIGH PRESSURE PUMP [11] AND BOOSTER PUMP [2]:**
The High Pressure Pump and Booster Pump may be isolated from the ships bonding system because of the protective coating applied to the pumps and their attached motor. As such, there may be no continuity between the pumps and the ships bonding system. The path of stray current from the electric motor may, therefore, be through the Feed Water Line. This may be particularly true if the electric motor grounding wire is insufficient. If left unbounded the High Pressure Pump and Booster Pump may become sacrificial and corrosion by electrolysis would then take effect which will destroy the High Pressure Pump manifold and the Booster Pump chamber and impeller. Such destruction can take effect and render these two pumps inoperable within just a few short months. Destruction of these pumps by electrolysis and or improper or inadequate grounding of the electric motors will not be covered under the Sea Recovery Warranty.

Therefore, the High Pressure Pump and Booster Pump should be individually and separately bonded to the ships Bonding System. The ships Bonding System is designed to provide the same electrical potential to all metal parts which come in contact with the ocean. This may not totally eliminate but rather it will minimize the potential for and effects of electrolysis.

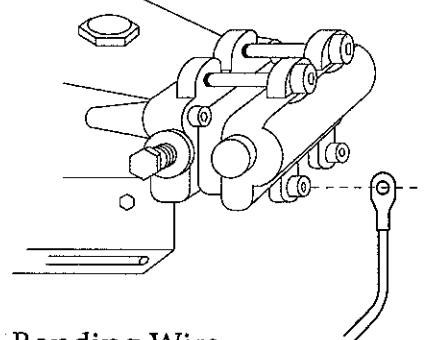
CAUTION: Do Not confuse the ships electrical ground with the ships Bonding System. These are two separate and distinct circuits which have two separate and distinct functions. Using the ships electrical ground as a means to bond the High Pressure Pump and Booster Pump would enhance corrosion and would rapidly destroy the two pumps.

High Pressure Pump Bonding:

Attach a copper crimp lug with a 10 mm (7/16 inch) diameter lug hole to a minimum 8 gauge (5 mm) copper stranded wire of sufficient length to reach from the High Pressure Pump to the ships Bonding System. Remove one of the 10mm Inlet Manifold bolts from the High Pressure Pump Inlet Manifold, place the lug under the bolt and re-tighten to 130 inch lbs. (14 Nm); Or, remove one of the 10mm Discharge Manifold bolts from the High Pressure Pump Discharge Manifold, place the lug under the bolt and re-tighten to 180 inch lbs. (20 Nm). Appropriately connect the other end of the Bonding Wire to the ships Bonding System.

BONDING OF THE HIGH PRESSURE PUMP

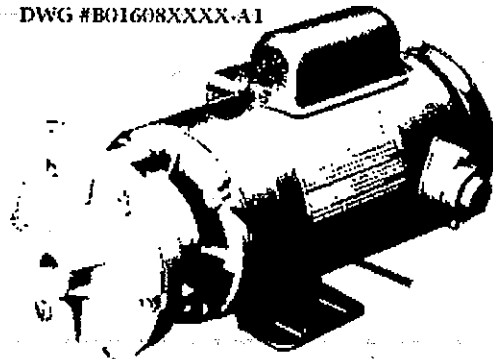
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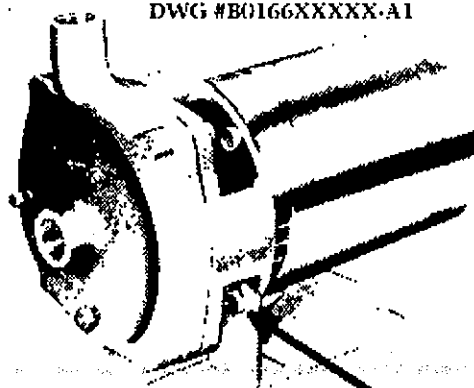
Bonding Wire
with 7/16 inch (10mm) lug

Booster Pump Bonding:

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**BOOSTER PUMP AS-25**

DWG #B0166XXXXX-A1

**BOOSTER PUMP AS-HP**

To one of the the pump-to-motor "C" face mounting bolts (indicated by the arrow in the above pictures), attach a copper crimp lug with a 7 mm (1/4 inch) diameter lug hole if your Booster Pump is the one shown above on the left, or a copper crimp lug with a 12 mm (7/16 inch) diameter lug hole if your Booster Pump is the one shown above on the right, to a minimum 8 gauge (5 mm) copper stranded wire of sufficient length to reach from the Booster Pump to the ships Bonding System. Remove one of the "C" face mounting bolts from the Booster Pump, place the lug under the bolt and re-tighten. Appropriately connect the other end of the Bonding Wire to the ships Bonding System.

2. **LENGTH OF CONNECTION LINES:** The system will operate most efficiently with interconnect lines as short and straight as possible. As the distance of suction lines increase, the feed pressure decreases. As the distance of discharge lines increase, the greater the back pressure on those lines. Maximum allowable back pressure on the brine discharge line is 20 psi at 4.2 U.S. gallons (16 liters) per minute of water flow. Maximum allowable back pressure on the product water line is 20 psi at 1 U.S. gallon (4 liters) per minute of water flow.

NOTE: Restrictions within the system feed line which result in head loss into the Booster Pump will reduce the pumps output performance. Ideal maximum output performance of the Booster Pump is important in order to maintain a proper pressure into the Prefiltration Section. Loss of pressure caused by feed line restrictions may cause the System to be inoperative due to low pressure output from the Booster Pump. Such a line loss condition will require plumbing correction to over come the loss. This would be considered an installation obstacle and any plumbing or installation correction is the responsibility of the owner. This would not be considered a warranty condition as Sea Recovery has no control over the System feed line installation.

3. **SYSTEM FEED INLET (INLET THRU-HULL FITTING [40])** must be in constant contact with the feed water. Any air suction leaks coming into the system feed line may cause the system to shut down due to low feed pressure condition. If the installation is aboard a vessel care must be taken to plumb the feed line at the bottom of the Sea Chest so that the Sea Recovery System receives an uninterrupted supply of air free feed water. The Inlet Thru-Hull Fitting should be dedicated for only the Sea Recovery R.O. System.

Avoid using one Thru-Hull Fitting for several auxiliary systems. Typical cause of system failure and continual stopping is due to air suction leaks from other systems tied into a common Thru-Hull Fitting.

4. **THE R.O. MEMBRANE VESSEL ASSEMBLY [14]** must not be exposed to heat in excess of 122°F / 50°C. At temperatures above 122°F / 50°C the Reverse Osmosis Membrane Element can experience irreversible flux loss (loss in production).
5. **GIVE SPECIAL CONSIDERATION TO ACCESS FOR MAINTENANCE** of all components. Such access would include, but not limited to: Prefiltration Element removal, High Pressure Pump oil changes, R.O. Membrane Element removal and Post Filtration Element removal. *Remember, if it is inaccessible it will not be maintained. If it is not maintained it will break. When it breaks the user will call you. You will call us and we will tell you to read this paragraph! Install it as if you were going to do the maintenance yourself!*
6. **THE CONTROL PANEL** contains System controls which must be accessible for operation and viewing. The System should also be located in an area which is open to ventilation

E. DISTANCE BETWEEN COMPONENTS:

1. **Inlet Sea Cock Valve [41] through inlet of Booster Pump [2]:** 15 feet of 3/4" ID (4.6 meters of 19 mm ID) suction tubing is supplied with the system. The Booster Pump will operate most efficiently within that distance of the Inlet Sea Cock Valve. Additional tubing may be ordered if necessary from Sea Recovery. However, caution must be exercised in extending the length of the suction tubing. As the distance of draw increases there will be greater vacuum at the inlet of the Booster Pump and, in turn, the delivered feed pressure from the booster pump will be less. Vacuum increase into the Booster Pump will cause cavitation and wear of the Booster Pump. Feed pressure loss from the Booster Pump will yield shorter Prefilter Element life and cause more frequent Prefilter Element changing.
2. **Booster Pump Outlet [2] through the Prefiltration section to Inlet of SRC System Control Panel:** 15 feet of 5/8" OD (4.6 meters of 15.9 mm OD) low pressure tubing is supplied with the System. The System will operate most efficiently within that distance of the Booster Pump Outlet. Additional tubing may be ordered if necessary from Sea Recovery. However, caution must be exercised in extending the length of the low pressure tubing. As the distance of the low pressure tubing increases, the feed pressure, delivered from the Booster Pump, decreases. Feed pressure loss from the Booster Pump will yield shorter Prefilter Element life and cause more frequent Prefilter Element changing. If the distance is greater than 15 feet and or if 90° bends are added the tubing size should be increased from 5/8" OD tube to 3/4" ID hose.
3. **High Pressure Pump [11] Outlet to R.O. Membrane Vessel [14] Inlet and R.O. Membrane Vessel Outlet to Control Panel:** The system comes complete with all high pressure hoses. If the R.O. Membrane & Vessel Assembly is removed from the system for remote mounting then two each (2 ea) high pressure hoses will be required to connect the system to the inlet and outlet of the R.O. Membrane & Vessel Assembly. These high pressure hoses can be ordered from Sea Recovery, just call us with the proper length required.

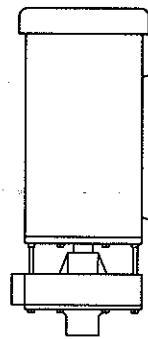
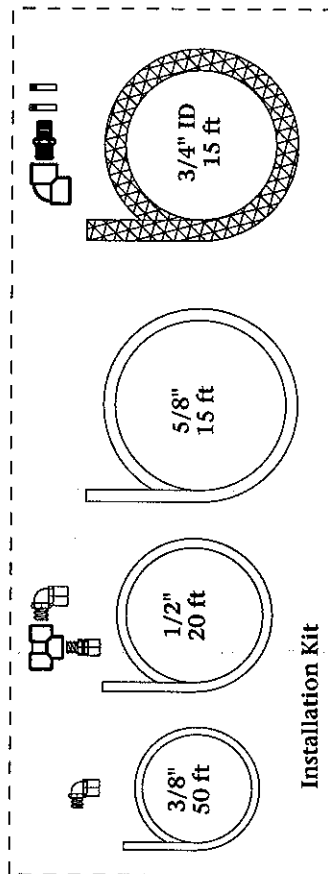
4. **Brine Dump Tubing from the System Control Panel Outlet to the Thru-Hull Overboard Dump Fitting [18]:** 20 feet of 1/2" OD (6 meters of 12.7 mm OD) tubing is supplied with the system. Additional tubing may be ordered from Sea Recovery if required and may be added without detrimental effects to the system.
5. **Product water tubing from the Product Water outlet connection to the Product Water Storage Tank Inlet [44]:** 50 feet of 3/8" OD (15.2 meters of 9.5 mm OD) tubing is supplied with the system. Plan to keep the product water tubing as straight and short as possible. This practice reduces the potential for a build-up of unnecessary back pressure in the product water section of the System

E. UNCRATING: DO NOT DISCARD ANY PACKAGING MATERIAL UNTIL YOU HAVE FOUND ALL PARTS!

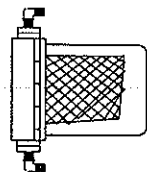
1. **Remove the Sea Recovery system from the shipping crate.** Note that some of the components are bolted to the shipping crate. Do Not discard any packaging or boxes as they may contain small mounting hardware pieces or small system components. Thoroughly check each box, bag and bundle of packing material for parts.

SRC AF & AC Basic Components

DWG #A04XXXXXX0-A1 AF/AC
10/94

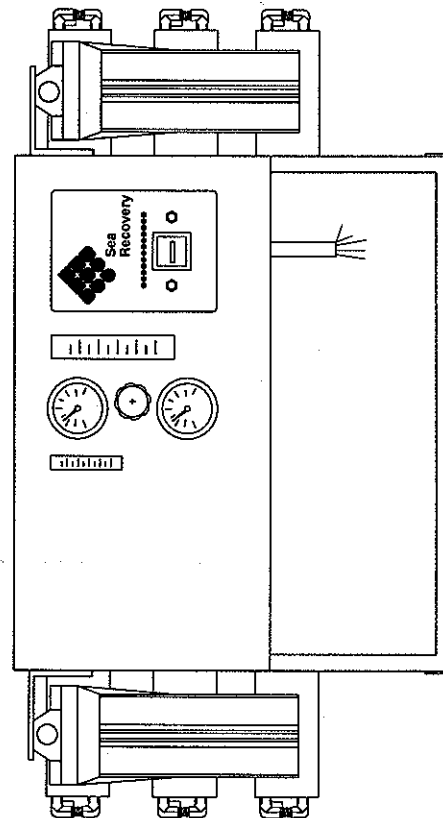


Booster Pump
with Electric Motor
Supplied External of the
Aqua Compact

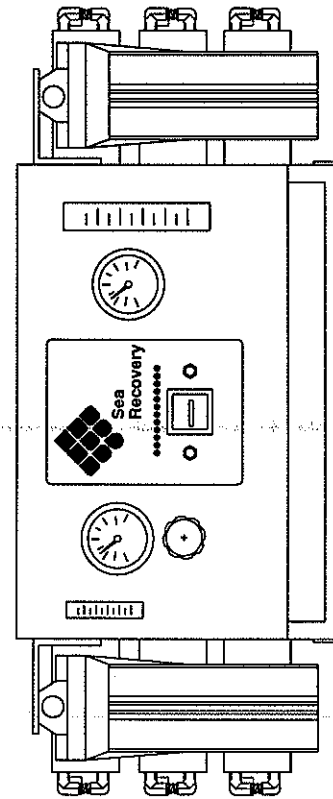


Sea
Strainer

AQUA FRAME

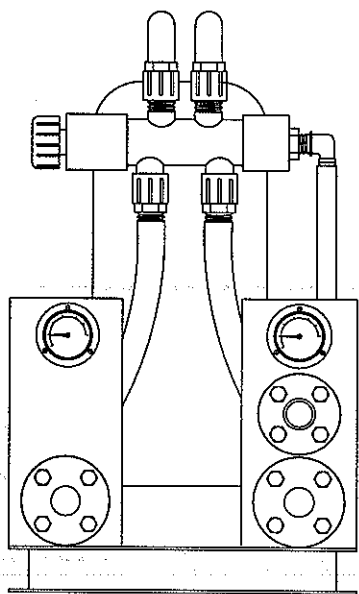


AQUA COMPACT

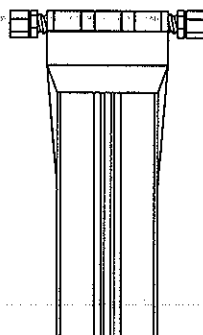


AQUA SERIES SYSTEM OPTIONAL ACCESSORIES

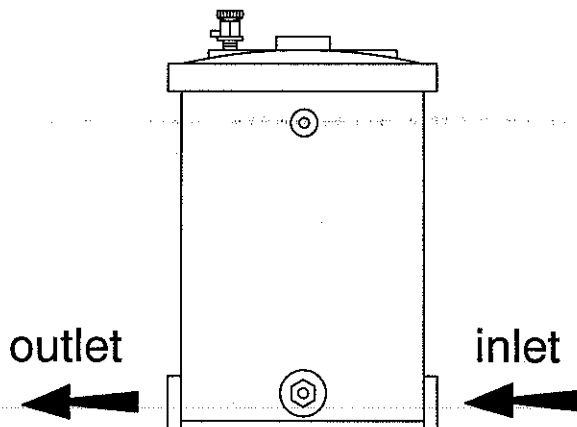
DWG #A04XXXXXX0-A2
10/94



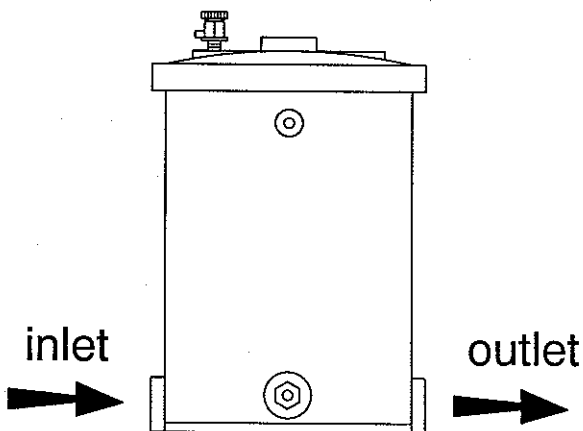
Multi Media Filter



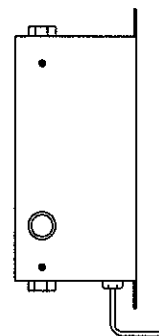
Plankton Filter



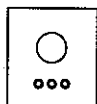
Commercial Prefilter



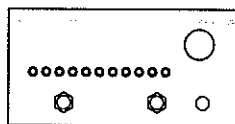
Oil/Water Separator



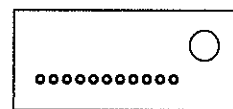
Ultraviolet Sterilizer



Panel Remote
Sound &
Visual Alarm



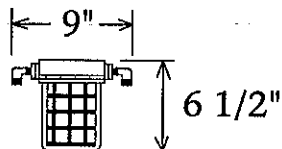
Panel Remote
Control



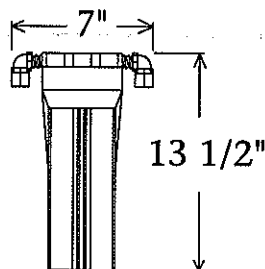
Panel Remote
Monitor

DIMENSIONS OF SEPARATE COMPONENTS SRC AF & AC SYSTEM

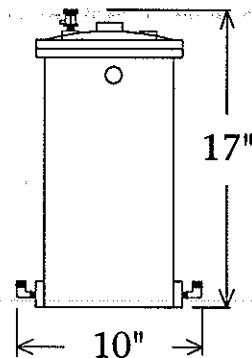
DWG #A04XXXXXX0-D1 AF/AC
10/94



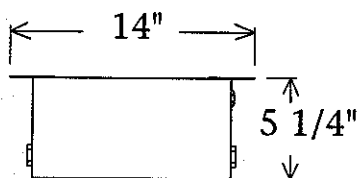
SEA STRAINER



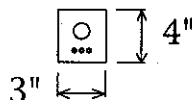
**PLANKTON FILTER
& CHARCOAL FILTER**
5" deep



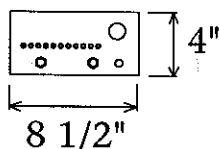
**COMMERCIAL PREFILTER
& OIL/WATER SEPARATOR**
Oil/Water Separator
Allow 12" for Filter Removal



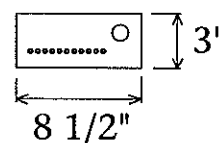
**ULTRA VIOLET
STERILIZER**
3 1/4" deep



**PANEL REMOTE SOUND
& VISUAL ALARM**
2" deep
Cutout 2 3/4" x 2"



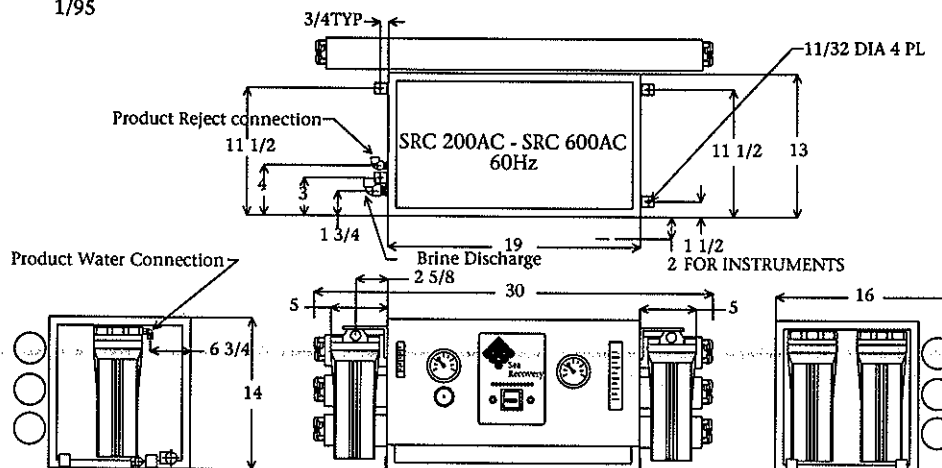
PANEL REMOTE CONTROL
2" deep
Cutout 2 3/4" x 7 3/8"



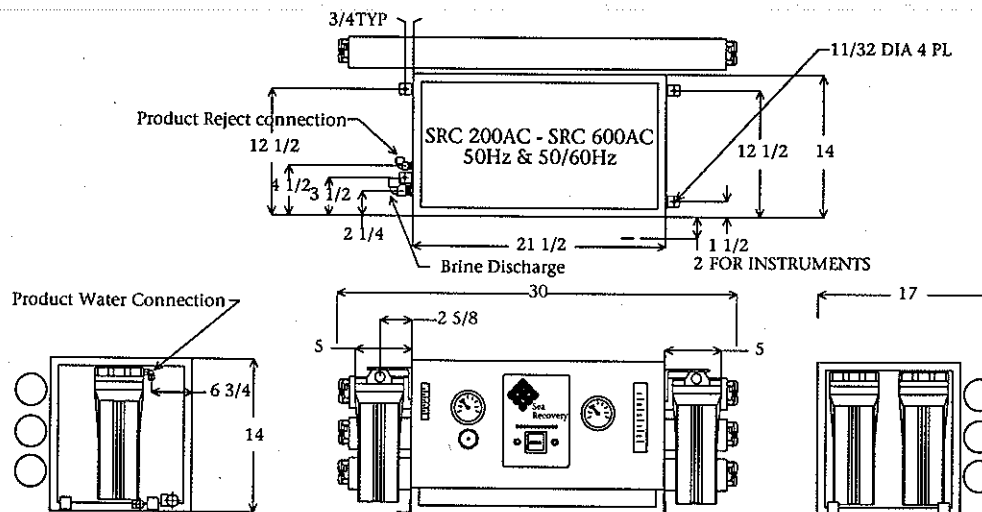
PANEL REMOTE MONITOR
2" deep
Cutout 2" x 7 3/8"

DWG #200-1500 AC DIM
1/95

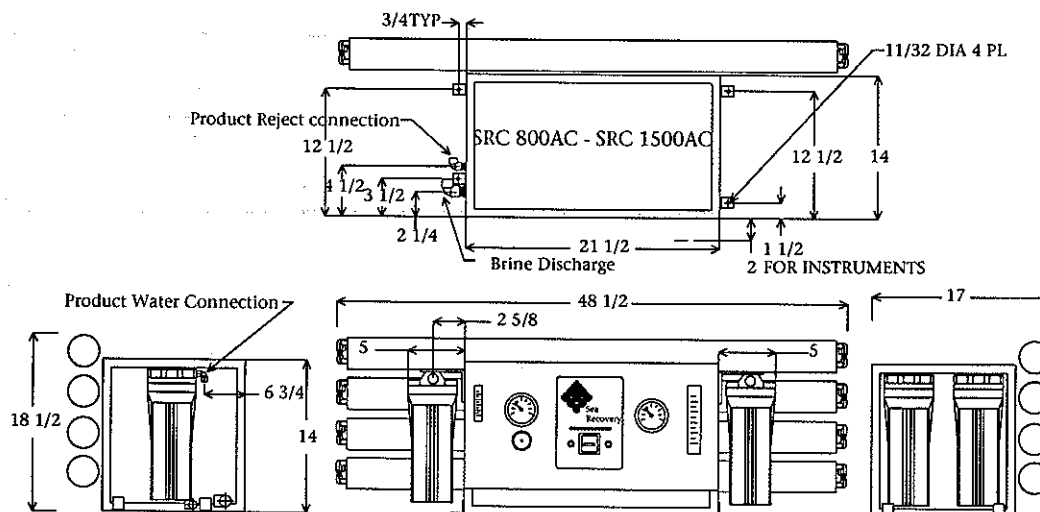
SRC 200AC - SRC 600AC 60 Hz OPERATION



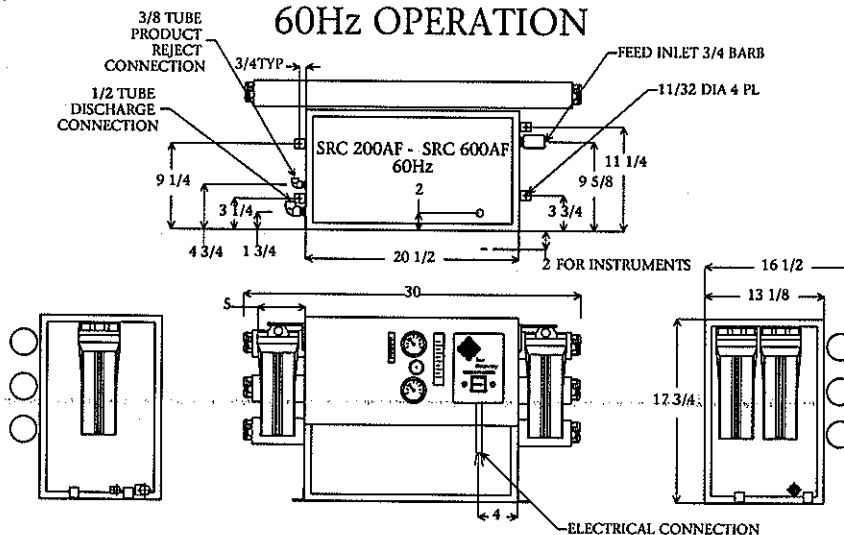
SRC 200AC - SRC 600AC 50Hz & 50/60Hz OPERATION



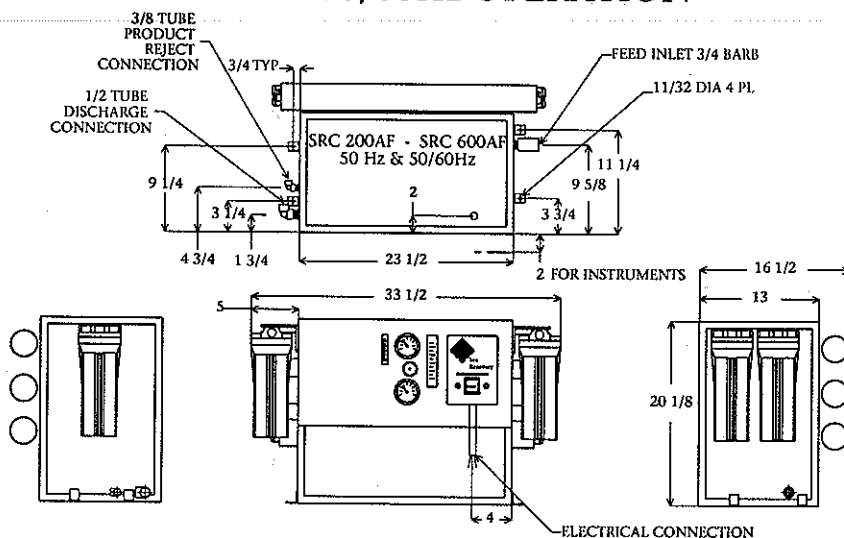
SRC 800AC - SRC 1500AC



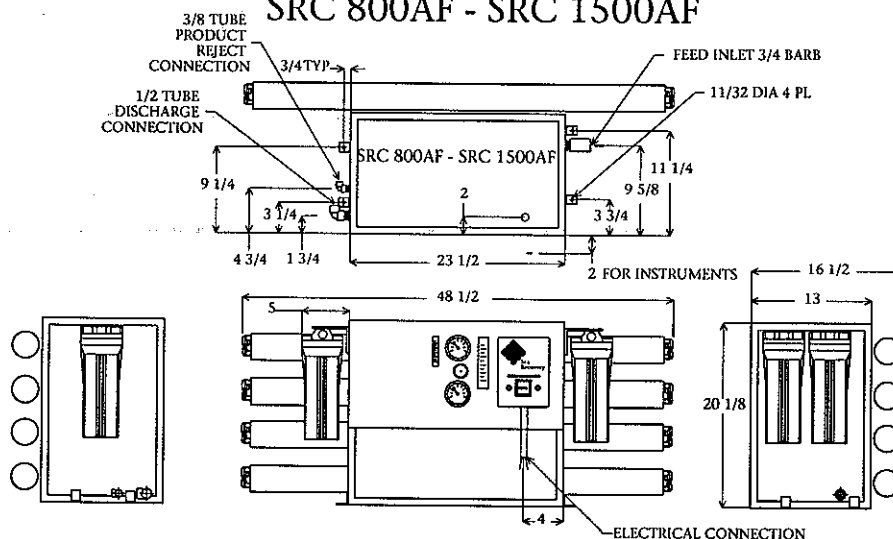
SRC 200AF - SRC 600AF 60Hz OPERATION



SRC 200AF - SRC 600AF 50 Hz & 50/60Hz OPERATION



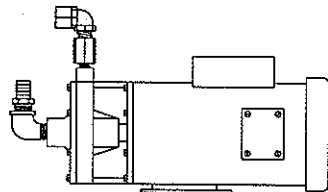
SRC 800AF - SRC 1500AF



AQUA COMPACT SYSTEMS

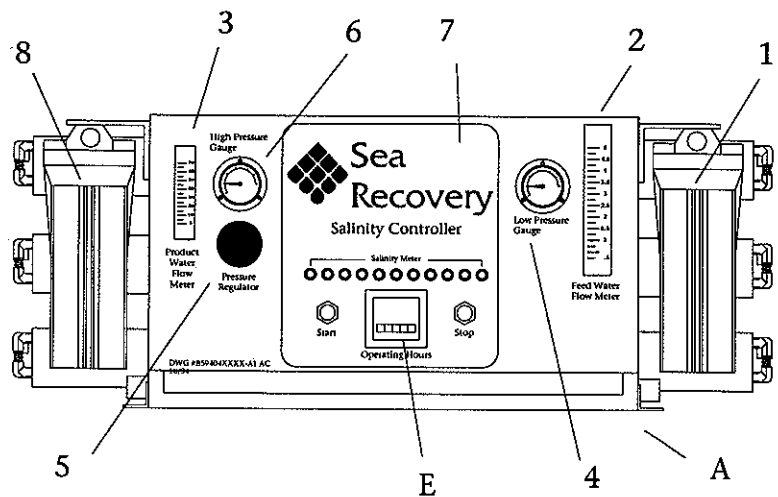
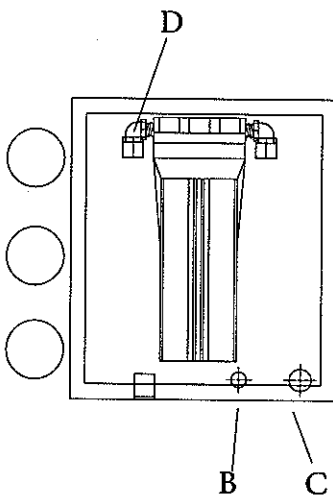
- A. AQUA COMPACT
- B. BRINE DISCHARGE OUTLET
- C. FEED WATER INLET FROM BOOSTER PUMP OUTLET- D. PRODUCT WATER OUTLET TO U.V. STERILIZER OR STORAGE TANK
- E. HOUR METER

- 1. PREFILTERS (DUAL 10 INCH)
- 2. FEED WATER FLOW METER
- 3. PRODUCT WATER FLOW METER
- 4. LOW PRESSURE GAUGE
- 5. BACK PRESSURE REGULATOR
- 6. HIGH PRESSURE GAUGE
- 7. ELECTRICAL CONTROL PANEL
- 8. PRODUCT WATER POST FILTER CHARCOAL FILTER



BOOSTER PUMP

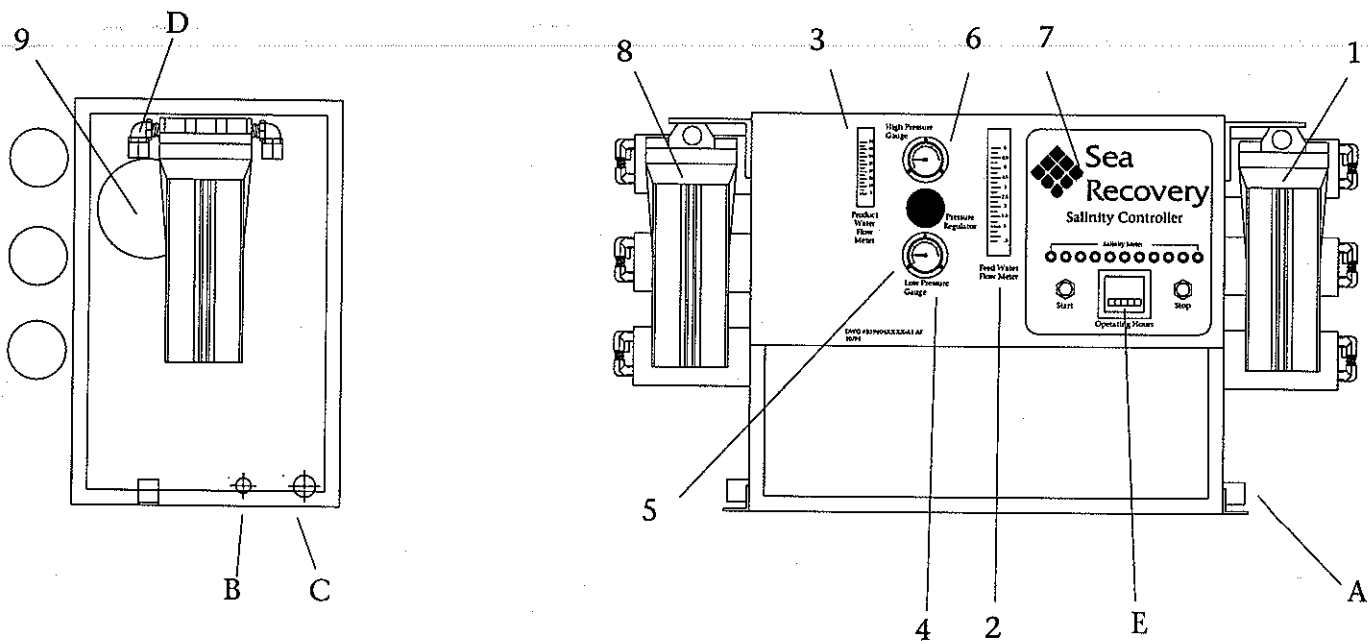
01004490
12/16/91



AQUA FRAME SYSTEMS

- A. AQUA FRAME
- B. BRINE DISCHARGE OUTLET
- C. FEED WATER INLET FROM BOOSTER PUMP OUTLET
- D. PRODUCT WATER OUTLET TO U.V. STERILIZER OR STORAGE TANK
- E. HOUR METER

- 1. PREFILTERS (DUAL 10 INCH)
- 2. FEED WATER FLOW METER
- 3. PRODUCT WATER FLOW METER
- 4. LOW PRESSURE GAUGE
- 5. BACK PRESSURE REGULATOR
- 6. HIGH PRESSURE GAUGE
- 7. ELECTRICAL CONTROL PANEL
- 8. PRODUCT WATER POST FILTER CHARCOAL FILTER
- 9. BOOSTER PUMP INTERNAL WITHIN FRAME

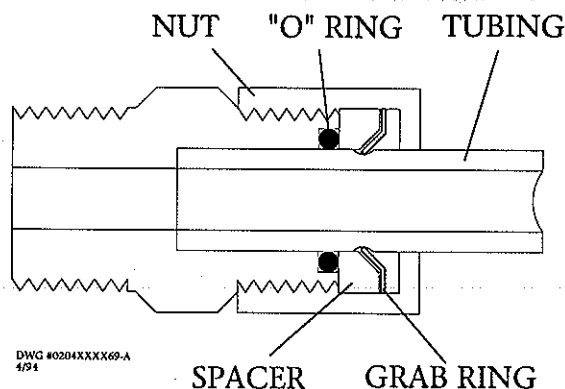


01004480
12/16/91

- F. COMPONENT INSTALLATION:** The unique installation requirements of each component are described in this section. It is important that the stated conditions be adhered to for proper operation and ease of component maintenance. All components prior to the Booster Pump [2], if possible, should be mounted below water level in order to provide positive pressure into the inlet of the Booster Pump. **CAUTION:** Do not over tighten PVC fittings. Tighten PVC fittings hand tight only. Use a wrench with extreme caution only. Do not apply excessive force when tightening PVC fittings.

1. TUBING CONNECTIONS:

CROSS SECTION OF TUBE FITTING



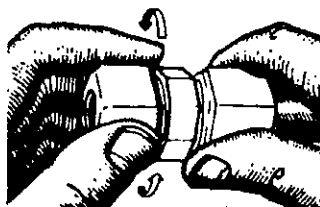
TUBE FITTING ASSEMBLY AND DISASSEMBLY INSTRUCTIONS

STEP 1

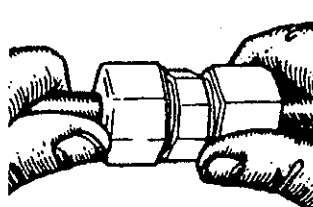


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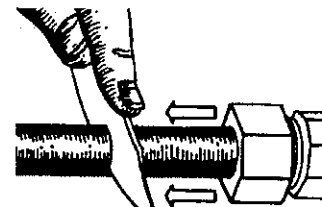
STEP 2



STEP 3



STEP 4



ASSEMBLY:

- Step 1 Cut tube end square and clean.
- Step 2 Loosen nut on fitting three turns.
- Step 3 Insert tube into fitting until it bottoms. Loosen nut completely and remove tube with attached parts from body. Check to ensure that the "O" ring is seated onto the tube under the spacer (and not pinched into the body). Insert tube with attached parts into the body and tighten nut finger tight.

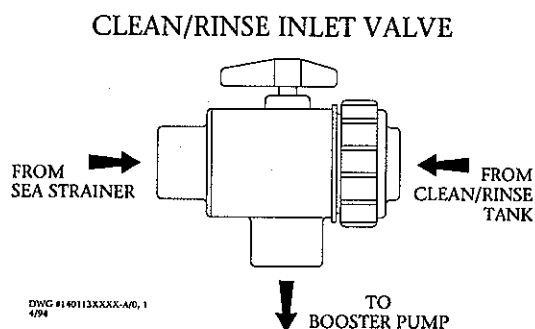
DISASSEMBLY:

- Step 4 To remove tubing in order to reuse the fitting assembly, cut tubing close to nut, push tubing through nut, grab ring and spacer.

2. **Thru-Hull Fitting [40] with Inlet Sea Cock Valve [41]** should be installed by a competent boat yard. The pipe size of the inlet must be 3/4" NPT, minimum. The Sea Cock must be fitted with 3/4" MNPT at its outlet. Special consideration in placement is necessary. The Thru-Hull Fitting must be located well below the water line so that (on a boat: in rough water, while cruising, and while at maximum tack--on a sailboat) the inlet remains in constant contact with the feed water. It must be of a forward facing scoop type. NOTE: Flush style Inlet Thru-Hull Fittings are not recommended because they may cause a reverse suction on the System Feed Line and for this reason a flush style Inlet Thru-Hull Fitting is not recommended. The system must receive a positive and uninterrupted supply of feed water. The Sea Cock Valve normally attached to the Thru-Hull Fitting must be accessible for daily and emergency closure.
3. **Inlet Connection** supplied is a 3/4" FNPT PVC, 90° elbow and 3/4" Hose Barb Fitting. Wrap Teflon tape onto the Sea Cock Valve Fitting. Thread the inlet connection hand tight to ensure a leakproof fit. Align the outlet of the fitting so that it points toward the Sea Strainer inlet.
4. **Sea Strainer [1]** must be mounted for easy access in cleaning. Allow a minimum of 2" clearance below the bottom of the bowl for screen removal. Position the Sea Strainer Outlet toward the Booster Pump Inlet.

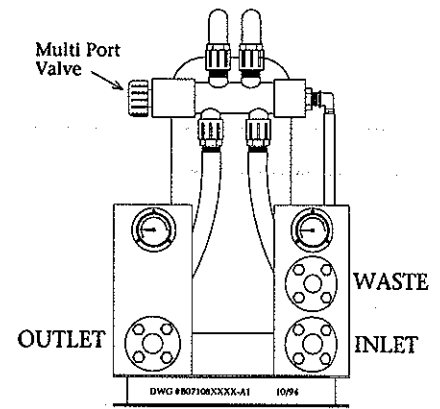
5. **Clean/Rinse Inlet Valve [28]**

if used, must be installed in the suction line after the Sea Strainer Outlet and prior to the Booster Pump Inlet. This optional valve will assist the user in rinsing of the system, storing of the system and cleaning of the R.O. Membrane Element. The valve is complete with the appropriate hose barb connectors and hose clamps. Install the valve in an accessible location.



6. **Booster Pump [2].** Two separate types of Booster Pumps are used with the SRC AM system. The Booster Pump type will depend upon the System configuration and Prefiltration options ordered with the system. The Booster Pump is a bronze head centrifugal pump. It comes pre-mounted to it's own electric motor. The Aqua Frame Booster Pump is mounted within the frame. The Aqua Compact Booster Pump is separate from the frame and must be separately mounted. Plumb the Booster Pump Inlet from the Sea Strainer Outlet and Booster Pump Outlet into the Prefilter Inlet (or Plankton Filter Inlet if used). The Sea Recovery Booster Pumps are specially designed and meet all the stringent pressure and flow requirements of the Sea Recovery System.
7. **Plankton Filter [3]** must be mounted against a flat vertical surface using the supplied mounting brackets and hardware. It is preferable to mount the assembly below water level to minimize feed pressure loss. Allow minimum 4" below the bottom of the bowl for mesh screen element removal. Connect the inlet to the Booster Pump outlet and the outlet to the Prefilter inlet (or Multi Media Filter Inlet if used).

8. **Multi Media Filter [4]** is supplied pre-mounted to it's own base. Mount the Multi Media Filter base onto a flat horizontal surface and secure the base in place using the supplied mounting hardware. It is preferable to mount the assembly below water level to minimize feed pressure loss. Connect the inlet to the Booster Pump outlet (or Plankton Filter outlet if used), the outlet to the Prefilter inlet and the waste discharge to the over board Multi Media Filter Waste Thru-Hull fitting (43).



NOTE: The Multi Media Filter is supplied with media loose in two separate bags. This media, small gravel and fine sand, must be placed into the Multi Media Filter before use.

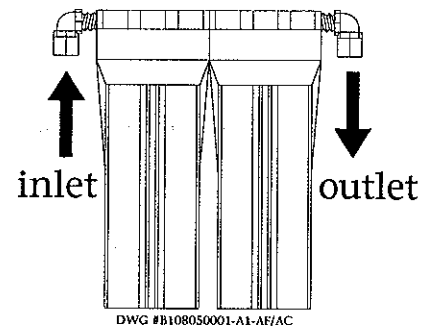
The Multi Media Filter requires approximately 15 lbs (7 kg) of small gravel (1/8 x 1/4 inch) first (on the bottom) then approximately 26 lbs (12 kg) of #20 silica sand last (on top of the small gravel).

Disconnect the union joints from the multi port valve. Unscrew the Multi Media Filter lid counter clockwise. Place a bag or cloth over the pick up pipe visible within the Multi Media Filter. Pour approximately 15 lbs (7 kg) of small gravel (1/8 x 1/4 inch) first (on the bottom) then approximately 26 lbs (12 kg) of #20 silica sand last (on top of the small gravel). While filling the Multi Media Filter with the small gravel and the silica sand support the pick up pipe in the center of the opening, do not allow it to be pushed over to one side by the gravel and sand filling. Remove the bag or cloth from the pick up pipe. Place the lid over the opening while aligning the pick up pipe into its corresponding hole in the lid. Screw the lid onto the Multi Media Filter clockwise snugly. **DO NOT** over tighten. Reconnect the multi port union joints.

NOTE: the new gravel and sand contain fines and contaminates. The Multi Media Filter must be backwashed prior to use. This backwashing procedure is explained in the Commissioning / Initial Start Up Section F of this manual.

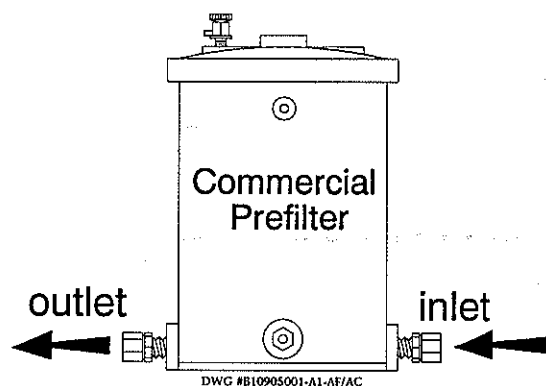
9. **Prefilter [5]** equipped with the Sea Recovery System is either the standard dual 10 inch Prefilter or the optional Commercial Prefilter.

Standard 10 inch Dual Prefilter is pre-mounted to the frame. If this Dual Prefilter is to be removed and remote mounted from the frame, it must be mounted against a flat vertical surface using the supplied mounting brackets and hardware. It is preferable to mount the assembly close to the Booster Pump (or Plankton Filter if used or Multi Media Filter if used) and the Control Panel. Allow minimum 4" below the bottom of the bowl for Prefilter Element removal. Connect the Booster Pump Outlet (or Plankton Filter Outlet if used or Multi Media Filter Outlet if used) to the Prefilter Inlet and the Prefilter Outlet to the High Pressure Pump Inlet (or Oil/Water Separator Inlet if used).

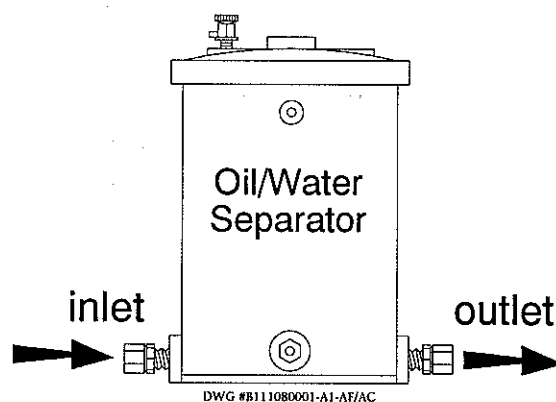


Connect the supplied length of 1/4 inch O.D. tube to the 1/4 inch tube fitting at the low pressure pick-up fitting of the Prefilter Assembly. Connect the other end of the 1/4 inch O.D. tube to the control panel low pressure pick-up fitting. Refer to page E-17 item F.12. "Control Panel".

Commercial Prefilter, if used, must be positioned on a firm, flat surface and mounted in place with the supplied hardware. Allow 12 inches above the Commercial Prefilter assembly for filter element removal. The Commercial Prefilter Inlet must be connected to the Booster Pump Outlet (or Plankton Filter Outlet if used or Multi Media Filter Outlet if used) and the Commercial Prefilter Outlet must be connected to the High Pressure Pump Inlet (or Oil/Water Separator Inlet if used). Connect the supplied length of 1/4 inch O.D. tube to the 1/4 inch tube fitting at the low pressure pick-up fitting of the Prefilter Assembly. Connect the other end of the 1/4 inch O.D. tube to the control panel low pressure pick-up fitting. Refer to item F.11. control panel. Note: If the Oil/Water Separator Assembly is used the Commercial Prefilter will then not be equipped with a low pressure pick-up fitting. Refer to page E-16 item F.10. Oil/Water Separator.



10. **Oil/Water Separator [6]**, if used, must follow the Prefilter. Position the Oil/Water Separator on a firm, flat surface and mount in place with the supplied hardware. The Oil/Water Separator Inlet must be connected to the Prefilter Outlet and The Oil/Water Separator Outlet must be connected to the High Pressure Pump Inlet. NOTE: The Oil/Water Separator Assembly is plumbed for water flow in the *opposite* manner as the Prefilter. The water flows up into the center of the Oil/Water Separator Element. Connect the supplied length of 1/4 inch O.D. tube to the 1/4 inch tube fitting at the low pressure pick-up fitting of the Oil/Water Separator Assembly. Connect the other end of the 1/4 inch O.D. tube to the control panel low pressure pick-up fitting. Refer to page E-17 item F.12. "Control Panel".



11. **High Pressure Pump with Electric Motor Assembly [11 & 12]**. is pre-mounted within the frame. When mounting the frame, give consideration for access to pump crankcase oil changes and bearing grease. Ensure that the electric motor rear fan cover is not blocked and allows ventilation of the electric motor. For internal lubrication purposes, the frame must be mounted horizontally on as flat a base as possible.

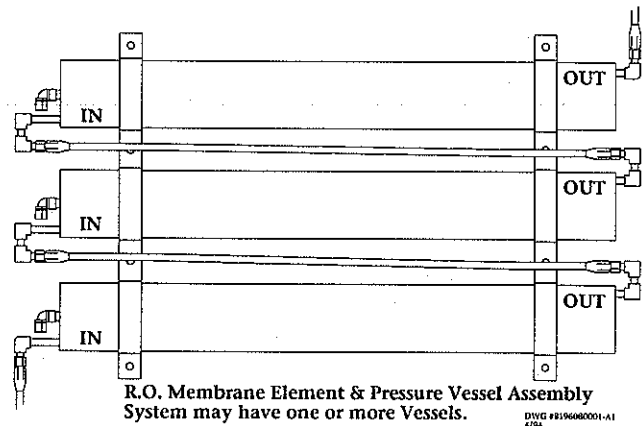
12. R.O. Membrane/Vessel Assembly [14] is premounted to its own mounting brackets onto the rear of the frame. The assembly may be remote mounted horizontally or vertically away from the system. If the R.O. Membrane/Vessel Assembly is to be mounted vertical the inlet must be at the bottom and the outlet must be at the top. This will allow air to escape from each vessel.

Additional High Pressure Hose may be ordered from the factory for extended remote mounting of the R.O. Membrane/Vessel Assembly assembly.

Note:

A 200 gpd System has one 29 inch long Membrane/Vessel Assembly;
 a 400 gpd System has two 29 inch long Membrane/Vessel Assemblies;
 a 600 gpd System has three 29 inch long Membrane/Vessel Assemblies;
 a 800 gpd System has two 49 inch long Membrane/Vessel Assemblies;
 a 1200 gpd System has three 49 inch long Membrane/Vessel Assemblies;
 and, a 1500 gpd System has four 49 inch long Membrane/Vessel Assemblies..

Connect one end of the supplied High Pressure Hose [13] to the outlet of the High Pressure Pump and the other end of the High Pressure Hose to the first R.O. Membrane/Vessel Assembly Feed Inlet Fitting. Tighten the flare swivel fittings finger tight. Hold the male elbow fitting with one wrench and the swivel nut with another wrench. Lightly snug the swivel fitting onto the male elbow fitting then tighten the swivel nut 1/4 turn maximum. Do not over tighten the swivel nut. Over tightening of the swivel nut will cause it to crack.



Connect one end of the other supplied High Pressure Hose [13] to the outlet of the last R.O. Membrane/Vessel Assembly Brine Discharge outlet Fitting and the other end of the High Pressure Hose to the Control Panel high pressure flare fitting. Tighten the flare swivel fittings finger tight. Hold the male elbow fitting with one wrench and the swivel nut with another wrench. Lightly snug the swivel fitting onto the male elbow fitting then tighten the swivel nut 1/4 turn maximum. Do not over tighten the swivel nut. Over tightening of the swivel nut will cause it to crack.

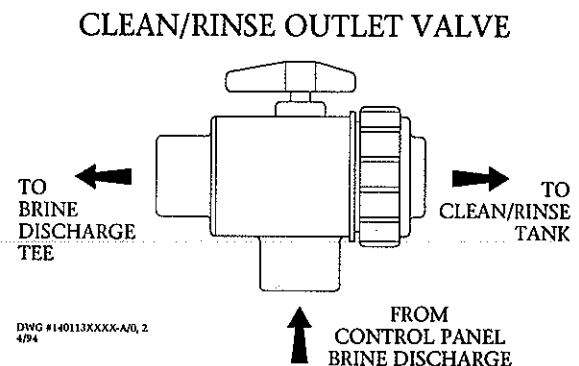
CAUTION: Temperature extremes of the R.O. Membrane mounting area are an important consideration. Do not mount the R.O. Membrane assembly in an area exposed to direct sunlight, temperatures above 120°F (40°C) or freezing temperatures. (NOTE: Any time the assembly is exposed to 140°F (60°C) while not running or running unpressurized, or to 120°F while running and pressurized, the membrane can be damaged). If the system is to be exposed to a hot environment, the membrane may be kept cool by running feed water through it with the Back Pressure Regulator Valve fully open. Of course, the system does not produce water while running with the Back Pressure Regulator Valve fully open. However, it will likely be more practical to remote mount the

R.O. Membrane/Vessel Assembly away from extreme heat rather than trying to run cool water through it constantly. Feed water temperatures below 32°F can also damage the R.O. Membrane Element. Unfiltered Sea Water may not freeze because of its salt content. However, with the salt removed, the water could freeze in the post-filtration subsystem, or product side of the membrane.

CAUTION: The Sea Recovery R.O. Membrane/Vessel Assembly is packaged with storage solution. Avoid skin and eye contact with this solution. In case of skin contact, rinse the skin thoroughly with water. In case of eye contact, flush repeatedly with water and notify a physician immediately. (THE STORAGE CHEMICAL IS SODIUM BISULFITE)

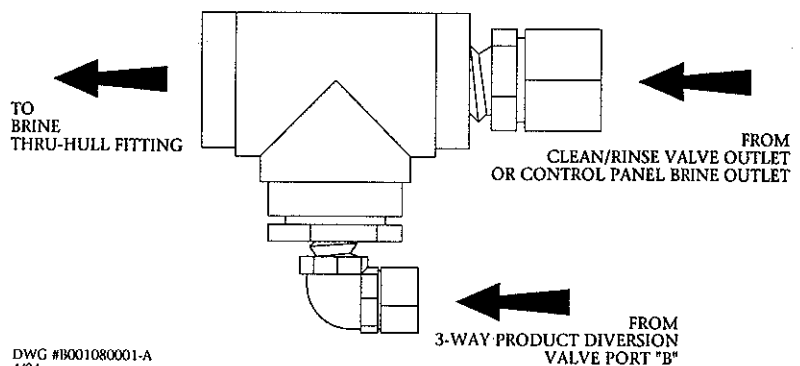
13. Clean/Rinse Outlet Valve [29]

if used, must be installed in the Brine Discharge line after the Control Panel Brine Discharge Line Output and prior to the Brine Discharge Tee [18]. This optional valve will assist the user in rinsing of the system, storing of the system and cleaning of the R.O. Membrane Element. The valve is complete with the appropriate tube connectors. Install the valve in an accessible location.



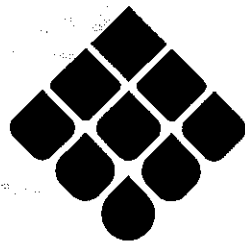
14. **Brine Thru-Hull Fitting [42]** must be minimum 1/2" NPT size and installed above the feed water level if possible. The Brine Thru-Hull Fitting may be installed below water level if above water level installation is impractical. It must have a 1/2" MNPT nipple fitting inside the hull for connection of the Brine Discharge Tee [18].

15. **Brine Discharge Tee [18]** is supplied with 20 feet of 1/2" OD tubing. Wrap Teflon tape around the 1/2" Brine Thru-Hull Fitting nipple. Screw the connector onto the Thru-Hull nipple, hand tight. No pressure is present at this point when the system is running, so a hand tightened connection should be sufficient to prevent leakage. Use a wrench to tighten this connection slightly, only if it leaks. Be careful not to over tighten with the wrench, since this may cause the connector to crack.



Connect the Control Panel Brine Discharge Outlet (or the Clean/Rinse Valve Outlet if used) line to the Brine Discharge Tee, using the 1/2" OD tubing supplied. Also connect the Unpotable Product Water (bad water) from the 3-Way Product Diversion Valve port "B" Outlet to the Brine Discharge Tee. Refer to page E-17 item F.12. "Control Panel".

16. **Product Water Tubing.** A 50 foot section of 3/8" OD tubing with a 90° elbow fitting is supplied with the system. The Product Water Tubing is used to interconnect the System Product Water Outlet to the Control Panel Product Water Outlet, 3-Way Product Diversion Valve, Charcoal Filter, U.V. Sterilizer and the Product Water Storage Tank.. The 90° elbow tube fitting supplied is to be used for the final connection into the ships Product Water Storage Tank. The fitting is a 90° elbow 3/8 inch mnpt x 3/8 inch O.D. tube. The Product Water Storage Tank must have a 3/8 inch fnpt tap to receive the fitting.
17. **Charcoal Filter [24].** The Charcoal Filter is pre-mounted to the frame. If it is to be removed from the frame and remote mounted, use the supplied mounting bracket and appropriate hardware to secure the filter to a flat vertical surface. Leave a minimum 4" space below the bowl for removal of the Charcoal Filter Element. Connect the Charcoal Filter Inlet to Port "A" of the 3-Way Product Diversion Valve using the supplied 3/8 inch O.D. tubing. Connect the Charcoal Filter Outlet to the Inlet of the Ships Potable Water Storage Tank using the supplied 3/8 inch 90° elbow tube fitting, or to the Inlet of the U.V. Sterilizer if used.
18. **U.V. Sterilizer [25],** if used, is the last component prior to the Product Water Storage Tank. Mount the U.V. Sterilizer in a vertical position, with the inlet port at the bottom and the outlet at the top. Use the incorporated screw holes at both ends of the unit to secure it. Using the supplied 3/8 inch O.D. tubing: Connect the Inlet (bottom) to the Outlet of the Charcoal Filter [24]. Connect the Outlet (top) to the Ships Potable Water Storage Tank [44] using the supplied 3/8 inch 90° elbow tube fitting. Connect the electrical line into the Salinity Controller
19. **System Remotes - SRC SVA, SRC PRM or SRC PRC:** If one of these panel mounted options is used with the System, place it in the desired location and secure it to a solid surface using the supplied hardware. Keep in mind that the unit must be connected to the System Main Controller with the supplied 50 foot cable. A cut out will have to be made or a stand-off bezel will have to be used to mount either of these options. These units are not water tight. Install in a dry location



**Sea
Recovery®**

REVERSE OSMOSIS DESALINATORS

**SRC AQUA SERIES
FRESH WATER FLUSH SYSTEM
MODEL SRC-FWF**

**INSTALLATION & SERVICE
MANUAL**

GENERAL

The SRC Fresh Water Flush System (SRC-FWF) is designed to automatically flush the SRC water-maker with fresh water each time it is used. Through an electrical interface with the electronic controller, the SRC-FWF will automatically open a 2-way valve for a predetermined period of time, each time the watermaker's stop switch is depressed. When the valve opens, the boat's pressurized water system forces fresh water into the watermaker, purging it of corrosive seawater.

A charcoal filter is supplied to protect the watermaker's seawater membranes from the damaging effects of chlorine that may be used in boat's fresh water tank for disinfection. Purging the watermaker of seawater retards corrosion in the high pressure pump and other metallic components that would normally be exposed to corrosive seawater, when the unit is not running.* Even though the pump and other metallic components in the unit are designed for use in seawater, no metal is completely impervious to the corrosive attack of seawater. The purging of seawater also retards the growth of marine organisms and reduces organic fouling of the semi-permeable membrane.**

INSTALLATION

Plumbing (See diagram on page 3)

The SRC-FWF is designed to be plumbed into the watermaker prior to the first pre-filter (but, after a media filter). The fresh water used for the flush is supplied by the boat's pressurized fresh water system. Because installations on different boats can vary widely, it is the installers responsibility to determine the best location for the placement of the flush system components.

The following guidelines should be followed during installation:

1. The SRC-FWF comes supplied with 20 feet of 3/8" O.D. tube. Do not use more than the 20 feet supplied for the installation.
2. The check valve assembly should be mounted with the flow arrow pointing up.
3. The charcoal filter housing should be mounted in an accessible location for ease of maintenance.

!!!CAUTION!!!

The inlet pressure to the watermaker must not exceed 60 psi. Pressure in excess of 60 psi will damage the SRC-FWF system components. If your boat's water system is capable of pressure higher than 60 psi, a pressure regulator must be in the inlet line of the SRC-FWF system.

!!!CAUTION!!!

When new, the carbon filter of the SRC-FWF can release carbon dust that can damage membranes. BEFORE USING THE SRC-FWF FOR THE FIRST TIME, remove the carbon filter element from the housing and rinse it under fresh water until all traces of carbon dust are gone.

Electrical (See diagrams on page 3 & 4)

No external electrical power is needed. All power for the flush controller is supplied by the SRC System controller. The 10 foot cable supplied connects between the SRC System controller and the SRC-FWF flush controller. Replace the existing stop switch in your system controller with the new switch included.

MAINTENANCE

The only maintenance required on the SRC-FWF is to change the charcoal filter element according to the following intervals:

If you use your watermaker FREQUENTLY, change your charcoal filter element EVERY 3 MONTHS.

If you use your watermaker OCCASIONALLY, change you charcoal filter element EVERY 6 MONTHS.

If the Fresh Water Flush filter canister is mounted below waterline of the vessel, be sure to close the inlet seacock prior to servicing the filter element.

!!!CAUTION!!!

Chlorine will permanently damage membranes! Failure to replace the charcoal filter element will cause the element to loose its effectiveness in removing chlorine.

*Sea Recovery Corp. does not guarantee the SRC-FWF will completely prevent all corrosion and corrosive effects of seawater on the high pressure pump and other metallic components in the water-maker. It's intended purpose is only to reduce such effects.

**Sea Recovery Corp. does not guarantee the SRC-FWF will completely prevent organic or biological fouling. It's intended purpose is only to reduce such effects. The SRC-FWF is not to be used as a substitute for long term storage with biocide (sodium bisulfate).

NOTES:

WIRING

INFORMATION CONNECTIONS & DIAGRAMS

NOTES:

AC INDUCTION MOTORS

INSTALLATION

After unpacking, check for damage. Be sure that shaft rotates freely.

CONNECTIONS

Check line voltage, frequency and phase, ensure that it agrees with system nameplate. Grounding and fusing should be done in accordance with National Electrical Code. See connection diagram on nameplate of motor or refer to the diagrams on the following pages of this manual.

RECOMMENDED COPPER WIRE & TRANSFORMER SIZE

Single Phase Motors - 115 Volts

HP	Transformer KVA	Distance of Motor to Transformer in Feet				
		100	150	200	300	500
1.5	3	8	8	6	4	2
2	3	8	8	6	4	2
3	5	8	6	4	2	2

Single Phase Motors - 230 Volts

HP	Transformer KVA	Distance of Motor to Transformer in Feet				
		100	150	200	300	500
1.5	3	10	8	8	6	4
2	3	10	8	8	6	4
3	5	8	8	6	4	2

Three Phase Motors - 230 & 460 Volts

HP	VOLTS	Transformer KVA	Distance of Motor to Transformer in Feet				
			100	150	200	300	500
1.5	230	3	12	12	12	12	10
1.5	460	3	12	12	12	12	12
2	230	3	12	12	12	10	8
2	460	3	12	12	12	12	12
3	230	5	12	10	10	8	6
3	460	5	12	12	12	12	10

ELECTRICAL POWER REQUIREMENTS:

(H.P. = Horse Power; FLA = Full Load Amperes; LRA = Locked Rotor Amperes - Start Up)

HIGH PRESSURE PUMP MOTOR:**200 to 600 GPD SYSTEMS**

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	60	115	1.5	16	89
Single	60	230	1.5	8	50
Three	60	230	1.5	5	34
Three	60	460	1.5	2.5	18
Single	50	220	2	10	65
Three	50	220	2	6	40
Three	50	380	2	3	22
Single	50/60	220/230	3	15	90
Three	50/60	220/230	3	9	55
Three	50/60	380/460	3	4.3	30

800 to 1500 GPD SYSTEMS

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	60	115	3	30	160
Single	60	230	3	15	90
Three	60	230	3	9	55
Three	60	460	3	4.3	30
Single	50	220	3	12.4	128
Three	50	220	3	9	55
Three	50	380	3	4.3	30
Single	50/60	220/230	3	15	90
Three	50/60	220/230	3	9	55
Three	50/60	380/460	3	4.3	30

BOOSTER PUMP:**1/3 horse power**

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	50/60	115	.3	6	24
Single	50/60	220/230	.3	3	12.5
Three	50/60	220/230	.3	1.5	7
Three	50/60	380/460	.3	.7	3.5

1/2 horse power

PHASE	Hz	VAC	H.P.	FLA	LRA
Single	60	115	.5	7.5	32
Single	60	230	.5	3.7	17
Three	60	230	.5	2	12
Three	60	460	.5	1	6
Single	50	220	.5	3.2	15
Three	50	220	.5	2	11
Three	50	380	.5	1	6
Single	50/60	220/230	.5	3.7	17
Three	50/65	220/230	.5	2	12
Three	50/60	380/460	.5	1	6

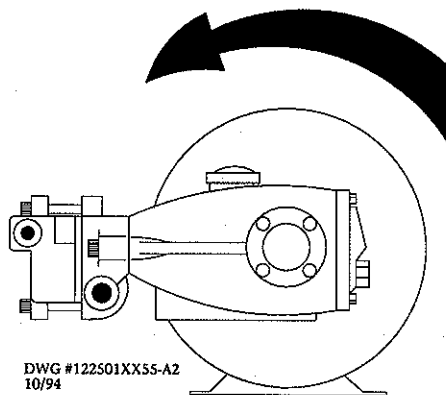
RECOMMENDED CIRCUIT BREAKER:**200 to 600 GPD SYSTEMS**

Operating Voltage Hz & Phase	Recommended Circuit Breaker Size
115 VAC, 60 Hz, Single Phase	30 Amperes
230 VAC, 60 Hz, Single Phase	15 Amperes
230 VAC, 60 Hz, Three Phase	10 Amperes
460 VAC, 60 Hz, Three Phase	7.5 Amperes
220 VAC, 50 Hz, Single Phase	20 Amperes
220 VAC, 50 Hz, Three Phase	15 Amperes
380 VAC, 50 Hz, Three Phase	7.5 Amperes
220/230 VAC, 50/60 Hz, Single Phase	20 Amperes
220/230 VAC, 50/60 Hz, Three Phase	15 Amperes
380/460 VAC, 50/60 Hz, Three Phase	7.5 Amperes

800 to 1500 GPD SYSTEMS

Operating Voltage Hz & Phase	Recommended Circuit Breaker Size
115 VAC, 60 Hz, Single Phase	40 Amperes
230 VAC, 60 Hz, Single Phase	25 Amperes
230 VAC, 60 Hz, Three Phase	15 Amperes
460 VAC, 60 Hz, Three Phase	7.5 Amperes
220 VAC, 50 Hz, Single Phase	20 Amperes
220 VAC, 50 Hz, Three Phase	15 Amperes
380 VAC, 50 Hz, Three Phase	7.5 Amperes
220/230 VAC, 50/60 Hz, Single Phase	25 Amperes
220/230 VAC, 50/60 Hz, Three Phase	15 Amperes
380/460 VAC, 50/60 Hz, Three Phase	7.5 Amperes

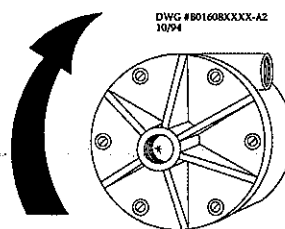
CORRECT PUMP & MOTOR ROTATION:



HIGH PRESSURE PUMP

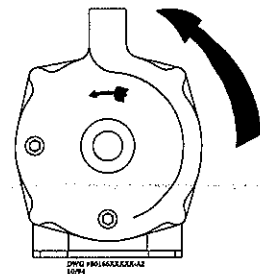
MOTOR ROTATION:

Counter Clockwise
when viewing the shaft end.
Clockwise when viewing
the fan end



AS-3 BOOSTER PUMP

Clockwise when viewing
the shaft end.
Counter clockwise when
viewing the fan end.



AS-5 BOOSTER PUMP

Counter clockwise
when viewing the
shaft end.
Clockwise when
viewing the fan
end.

Single Phase Systems Electric Motor rotation is normally pre-wired by Sea Recovery prior to shipment or pre-wired internally. However, if rotational change is incorrect and must be reset, the rotation is controlled by interchanging two specific wires at the Electric Motors wiring box connections or internal behind the rear cover.

Three Phase System Electric Motors rotation is controlled by interchanging any two of the three power lines at the Electric Motors wiring box connections.

Refer to the following wiring information and electrical connection information.

WIRING CONNECTIONS

BOOSTER PUMPS:

1/3 HP TEFC 2 POLE CAPACITOR START SINGLE PHASE MOTOR 50/60 Hz

115 VAC

LINE A 1, 3 & 8

LINE B 4

TIE TOGETHER 2, J & 5

208/220/230 VAC

LINE A 1

LINE B 4

TIE TOGETHER 2, 3 & 8

TIE TOGETHER J & 5

JOG TO CHECK ROTATION BEFORE OPERATING.

TO REVERSE ROTATION INTERCHANGE MOTOR LEADS 5 AND 8.

HOWEVER, WIRING CONNECTIONS LISTED ABOVE ARE PROPER FOR THE SEA RECOVERY SYSTEM.

1/3 HP TEFC 2 POLE THREE PHASE MOTOR 50/60 Hz

208/220/230 VAC, THREE PHASE 380/415/460 VAC, THREE PHASE

LINE A 1 & 7

LINE B 2 & 8

LINE C 3 & 9

TIE TOGETHER 4, 5 & 6

LINE A 1

LINE B 2

LINE C 3

TIE TOGETHER 4 & 7

TIE TOGETHER 5 & 8

TIE TOGETHER 6 & 9

JOG TO CHECK ROTATION BEFORE OPERATING. THREE PHASE MOTORS ONLY - TO REVERSE ROTATION INTERCHANGE ANY TWO POWER LEADS.

1/2 HP TEFC 2 POLE CAPACITOR START SINGLE PHASE MOTOR 50/60 Hz

115 VAC

LINE A 1 & 3

LINE B 4

TIE TOGETHER 2 & J

208/220/230 VAC

LINE A 1

LINE B 4

TIE TOGETHER 2 & 3

ISOLATE SEPARATELY J

JOG TO CHECK ROTATION BEFORE OPERATING.

TO REVERSE ROTATION INTERCHANGE MOTOR LEADS 5 AND 8

LOCATED INSIDE THE REAR COVER. HOWEVER, WIRING CONNECTIONS LISTED ABOVE ARE PROPER FOR THE SEA RECOVERY SYSTEM.

1/2 HP TEFC 2 POLE THREE PHASE MOTOR 50/60 Hz

208/220/230 VAC, THREE PHASE 380/ 415/460 VAC, THREE PHASE

LINE A 1 & 7

LINE B 2 & 8

LINE C 3 & 9

TIE TOGETHER 4, 5 & 6

LINE A 1

LINE B 2

LINE C 3

TIE TOGETHER 4 & 7

TIE TOGETHER 5 & 8

TIE TOGETHER 6 & 9

JOG TO CHECK ROTATION BEFORE OPERATING. THREE PHASE MOTORS ONLY - TO REVERSE ROTATION INTERCHANGE ANY TWO POWER LEADS.

SYSTEM MAIN MOTOR:

1.5 HP ODP 4 POLE CAPACITOR START SINGLE PHASE MOTOR 60 Hz
 2 HP ODP 4 POLE CAPACITOR START SINGLE PHASE MOTOR 50 Hz

115 VAC, 60 Hz
 LINE A 1, 3 & 5
 LINE B 2, 4 & 8

230 VAC, 50 & 60 Hz
 LINE A 1
 LINE B 4 & 8
 TIE TOGETHER 2, 3 & 5

JOG TO CHECK ROTATION BEFORE OPERATING.
 TO REVERSE ROTATION INTERCHANGE MOTOR LEADS 5 AND 8.
 HOWEVER, WIRING CONNECTIONS LISTED ABOVE ARE PROPER FOR THE
 SEA RECOVERY SYSTEM.

1.5 HP TEFC 4 POLE THREE PHASE MOTOR 60 Hz
 2 HP TEFC 4 POLE THREE PHASE MOTOR 60 Hz

230 VAC, 60 Hz
 LINE A 1 & 7
 LINE B 2 & 8
 LINE C 3 & 9
 TIE TOGETHER 4, 5 & 6

460 VAC, 60 Hz
 LINE A 1
 LINE B 2
 LINE C 3
 TIE TOGETHER 4 & 7
 TIE TOGETHER 5 & 8
 TIE TOGETHER 6 & 9

JOG TO CHECK ROTATION BEFORE OPERATING. TO REVERSE ROTATION
 INTERCHANGE ANY TWO POWER LEADS.

1.5 HP TEFC 4 POLE THREE PHASE MOTOR 50 Hz
 2 HP TEFC 4 POLE THREE PHASE MOTOR 50 Hz

220 VAC, 50 Hz
 LINE A 1, 6, 7 & 12
 LINE B 2, 4, 8 & 10
 LINE C 3, 5, 9 & 11

380 VAC, 50 Hz
 LINE A 1 & 7
 LINE B 2 & 8
 LINE C 3 & 9
 TIE TOGETHER 4, 5 & 6
 TIE TOGETHER 10, 11 & 12

460 VAC, 50 Hz LINE A 1 & 12
 LINE B 2 & 10
 LINE C 3 & 11
 TIE TOGETHER 4 & 7
 TIE TOGETHER 5 & 8
 TIE TOGETHER 6 & 9

JOG TO CHECK ROTATION BEFORE OPERATING.
 TO REVERSE ROTATION INTERCHANGE ANY TWO POWER LEADS.

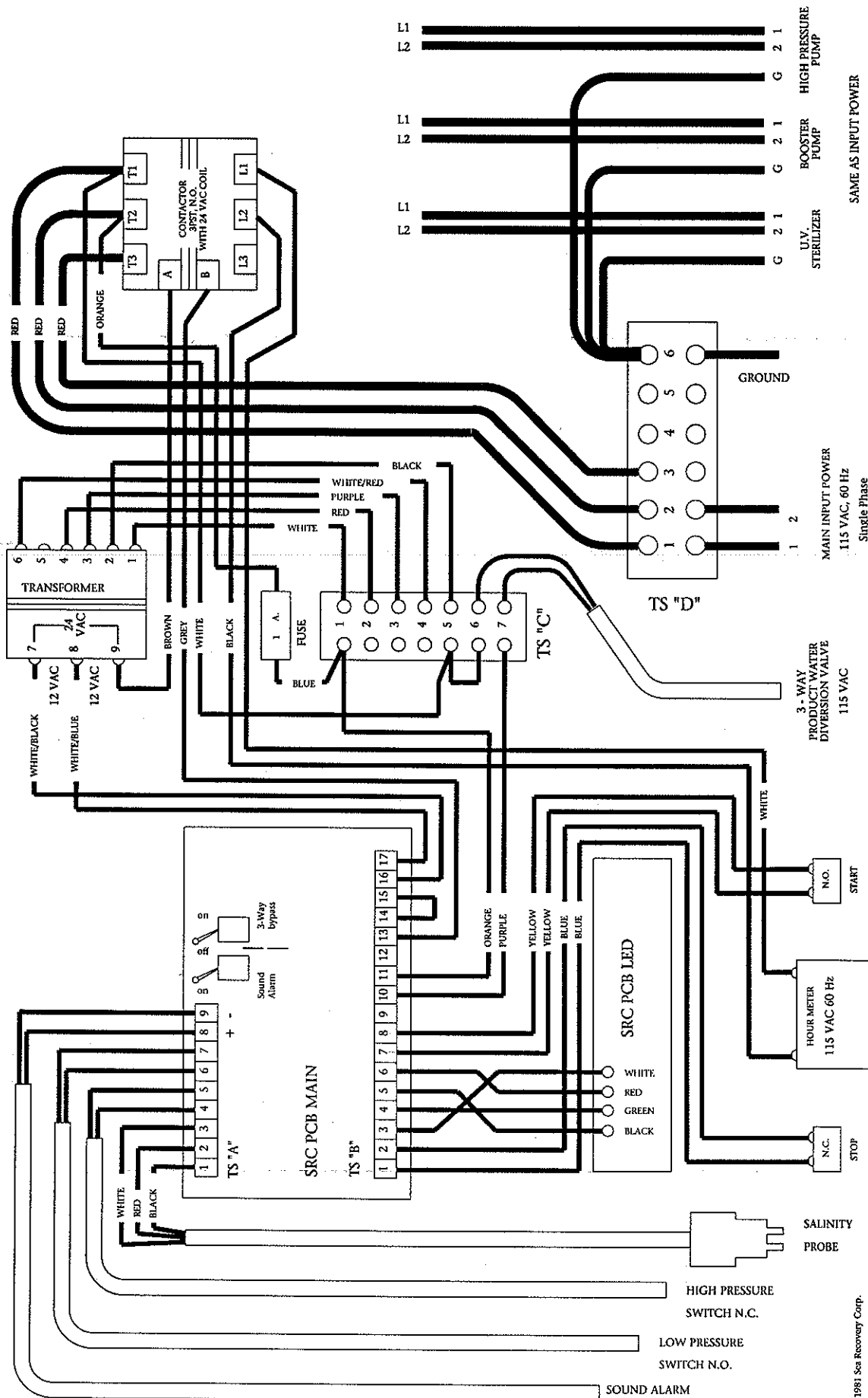
REFER TO THE FOLLOWING SALINITY CONTROLLER WIRING DIAGRAMS:

SYSTEM VOLTAGE	CYCLES	PHASE	WIRING DIAGRAM NUMBER
115 VAC	60 HZ	SINGLE	1A
230 VAC	60 HZ	SINGLE	2A
208-230 VAC	60 HZ	THREE	3A
460 VAC	60 HZ	THREE	4A
220 VAC	50 HZ	SINGLE	5A
220 VAC	50 HZ	THREE	6A
380-415 VAC	50 HZ	THREE	7A

NOTES:

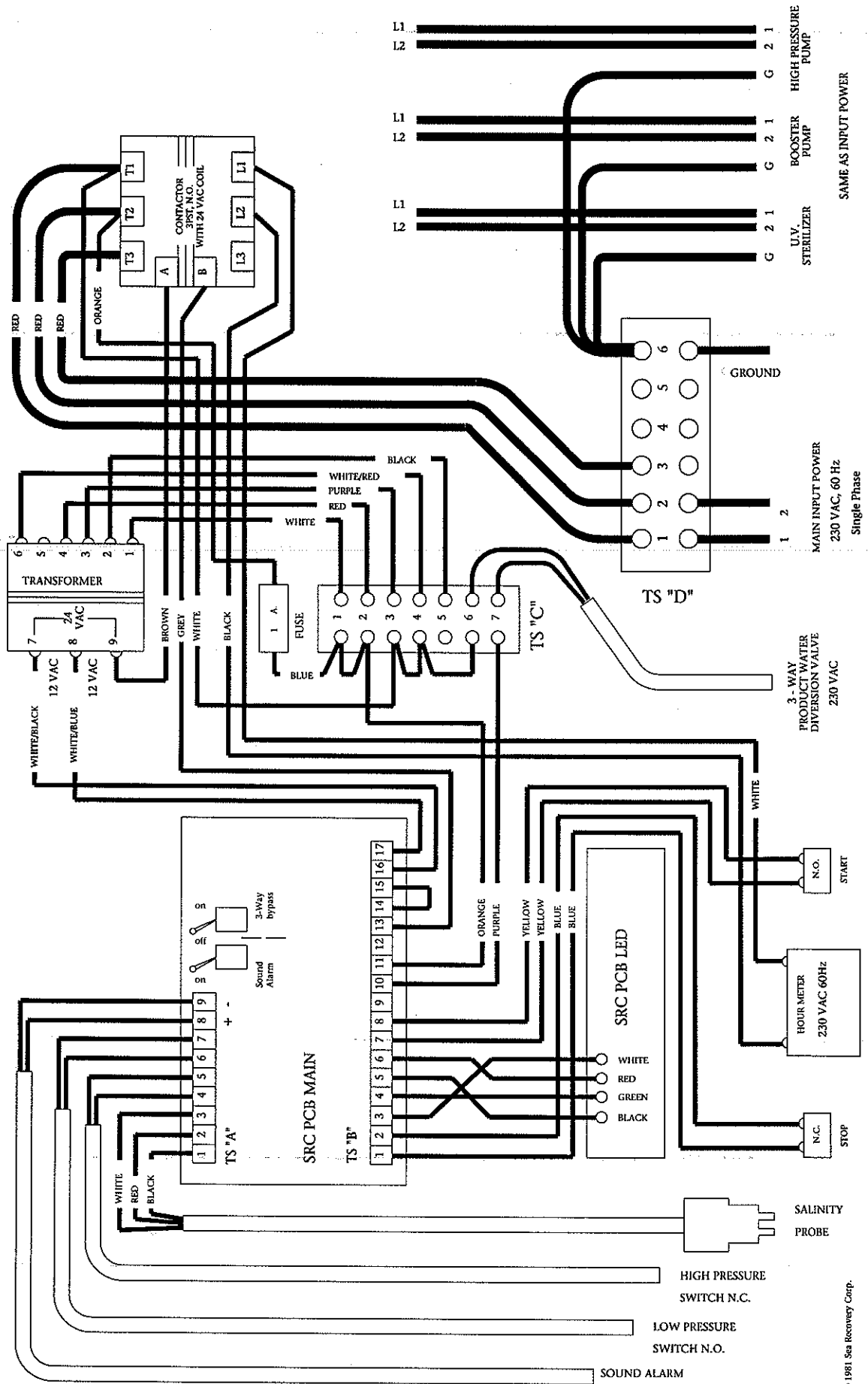
Sea Recovery™ WIRING DIAGRAM # 1A 115 VAC, 60 Hz, 1 phase

DWG #A04XXXXXXH-E1-01.2
10/94



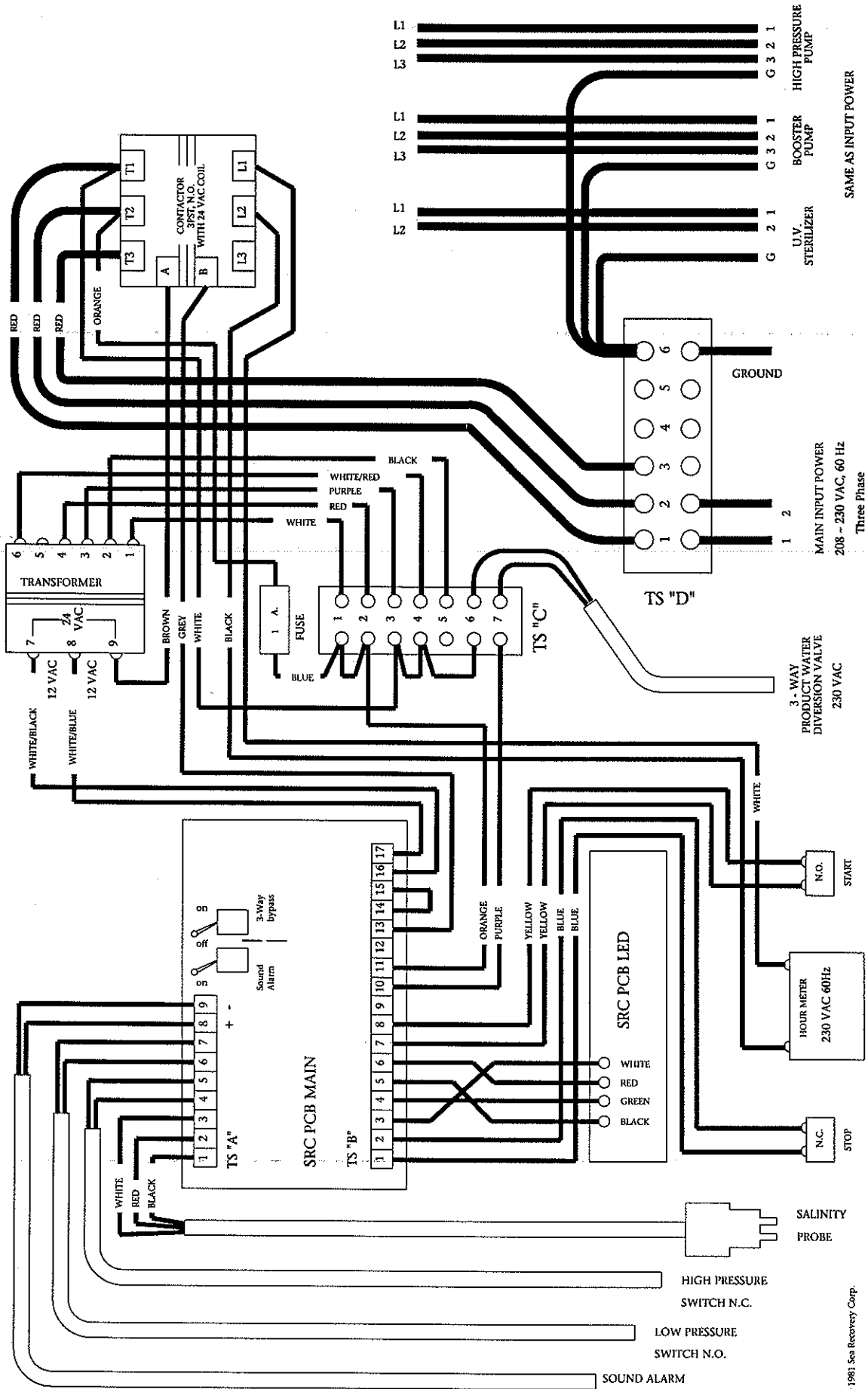
Sea Recovery™ WIRING DIAGRAM # 2A 230 VAC, 60 Hz, 1 phase

DWG #A04XXXXXXJ-EI-0,1,3
10/94



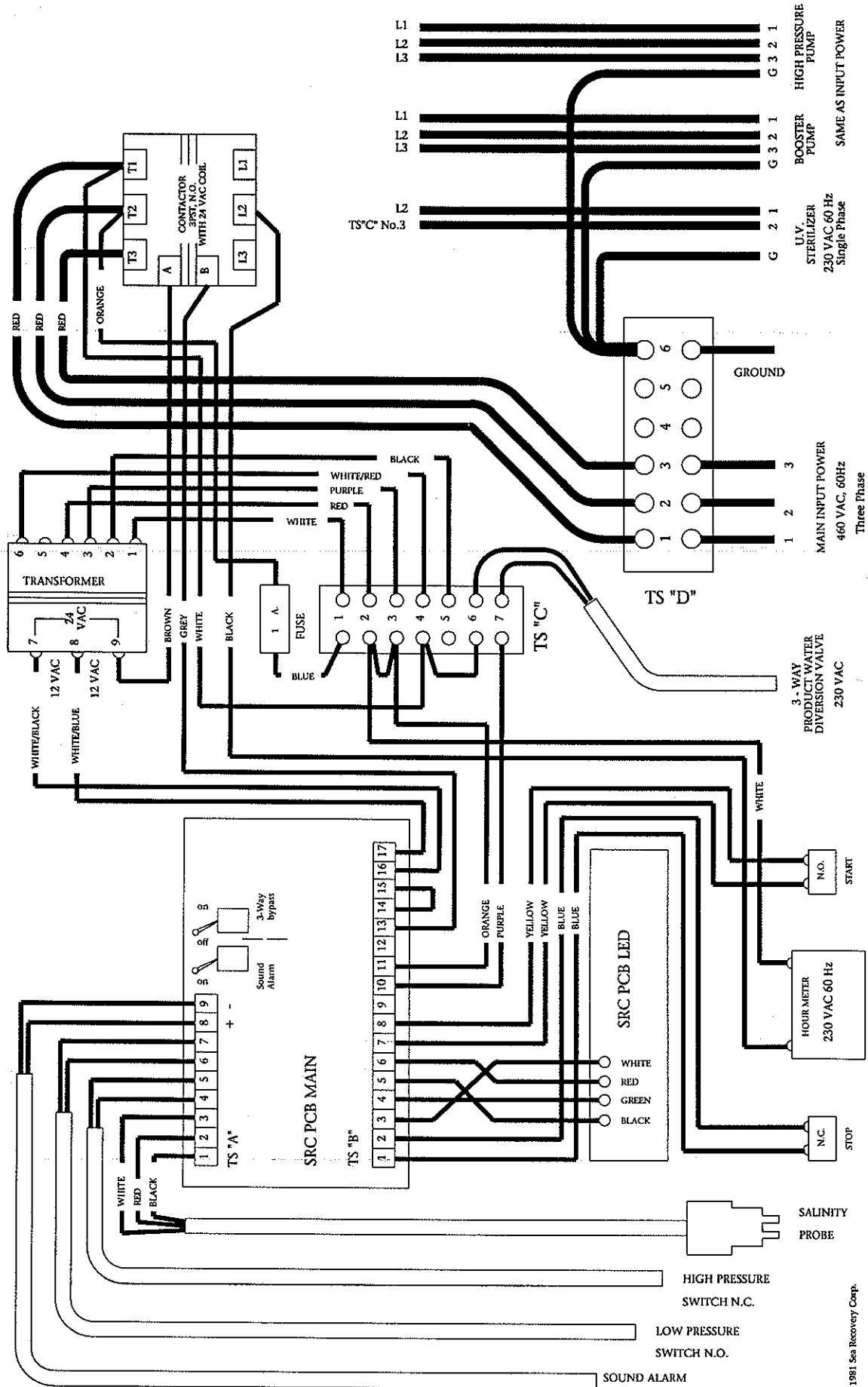
Sea Recovery™ WIRING DIAGRAM # 3A 208~230 VAC, 60 HZ, 3 Phase

DWG #A04XXXXXXM-E1-0,1,4
10/94



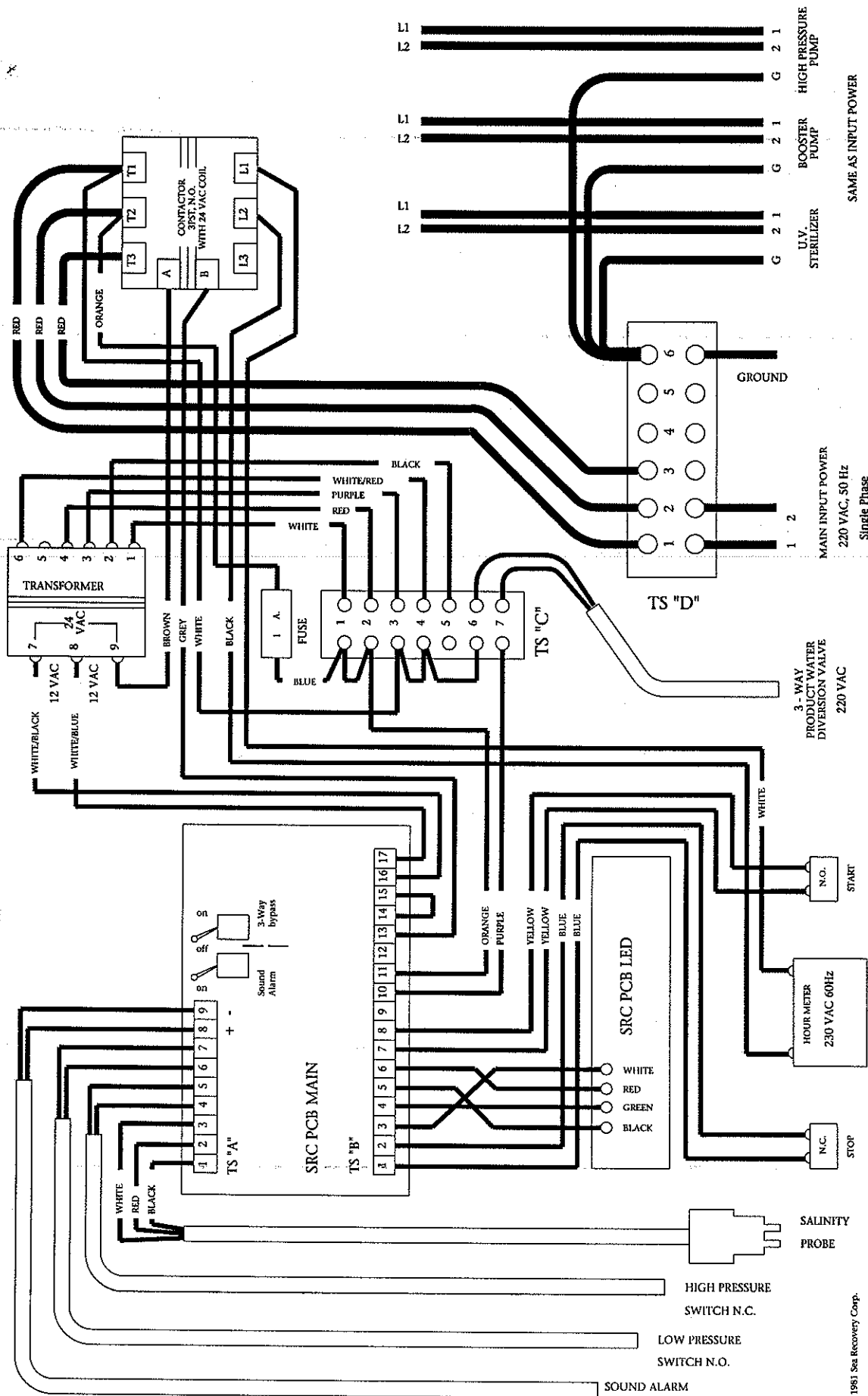
Sea Recovery™ WIRING DIAGRAM # 4A 460 VAC, 60 Hz, Three phase

DWG #A04XXXXXXO-EI-0.1.5
10/94



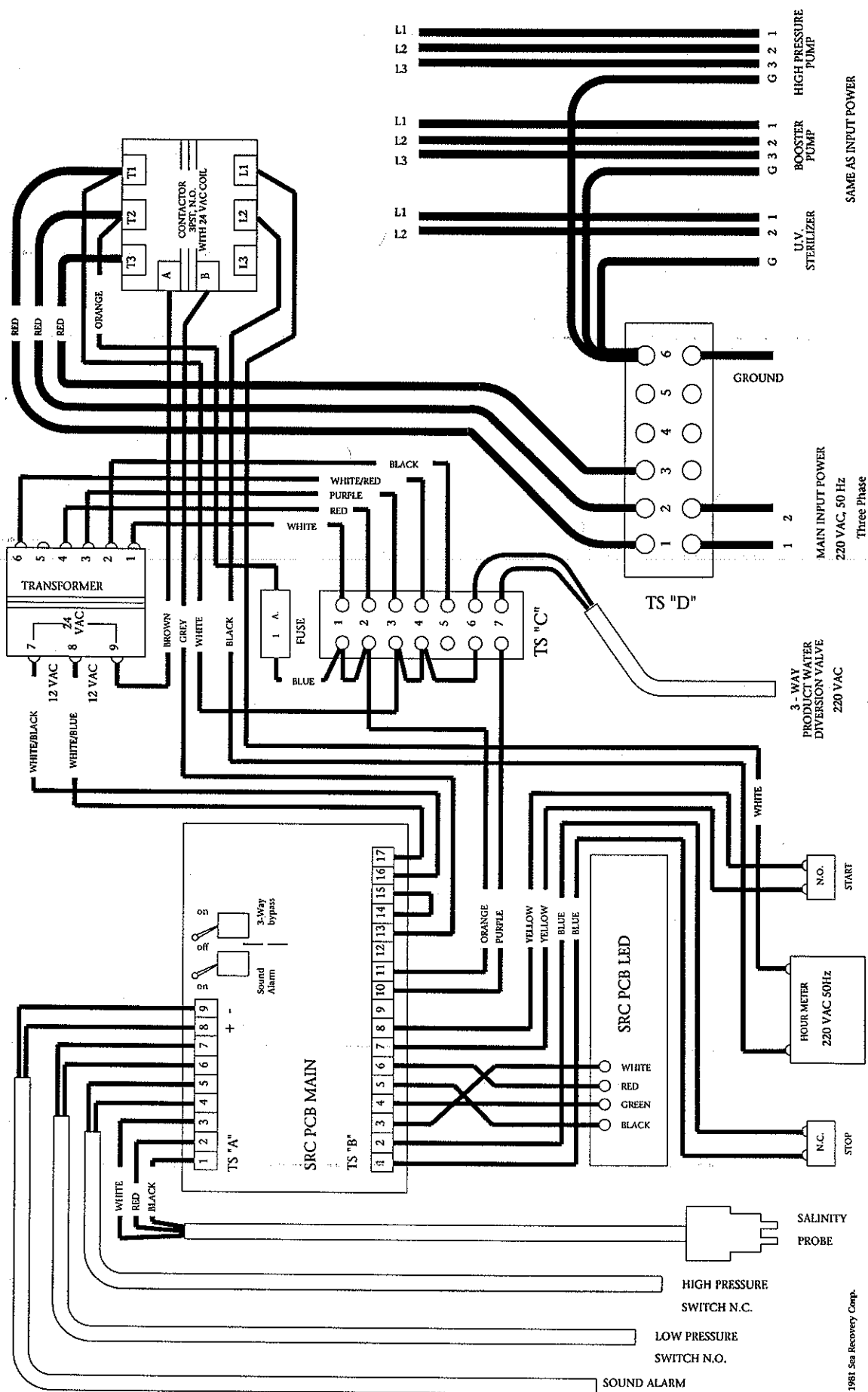
Sea Recovery™ WIRING DIAGRAM # 5A 220 VAC, 50 Hz, 1 phase

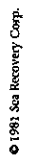
DWG #A04XXXXXXS-E1-0.1.6
10/94



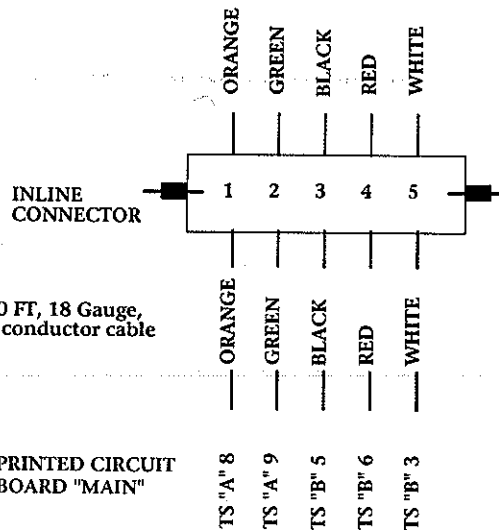
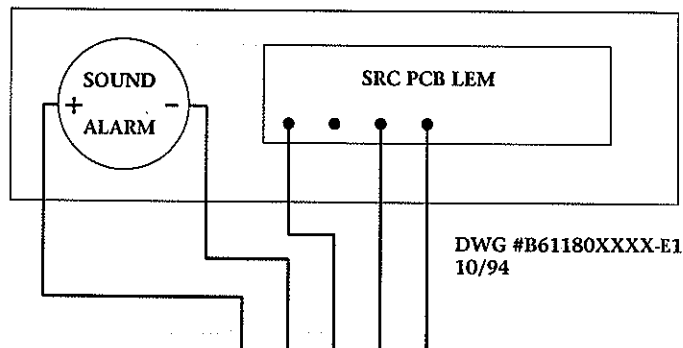
Sea Recovery™ WIRING DIAGRAM # 6A 220 VAC, 50 HZ, 3 Phase

DWG #A04XXXXXXV-E1-0.1.7
10/94

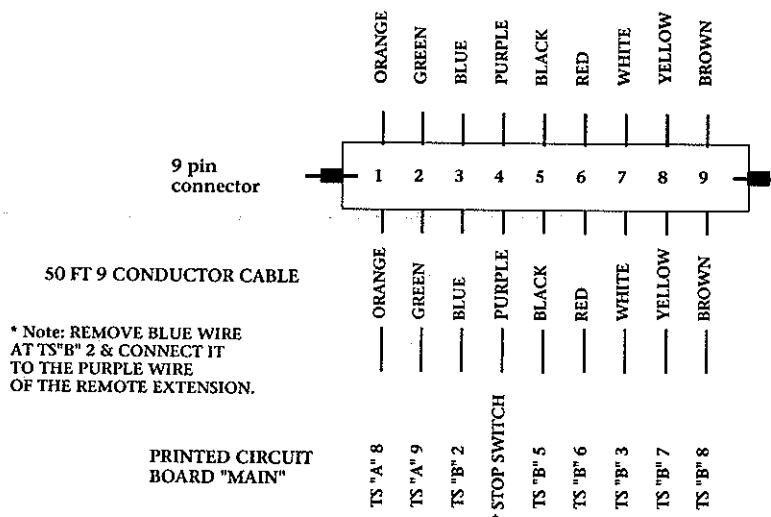
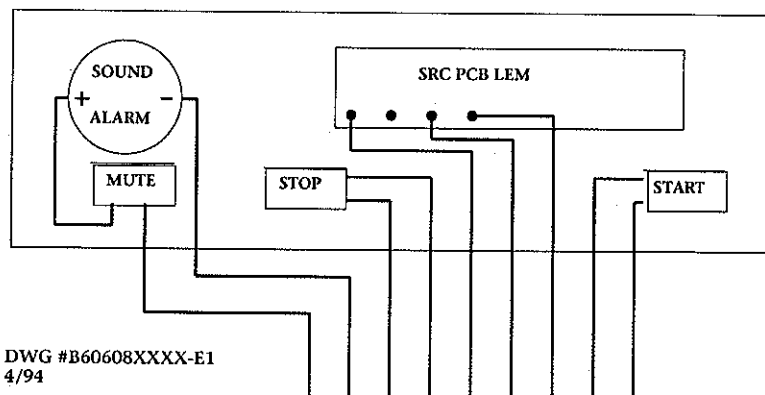




REMOTE MONITOR SRC PRM



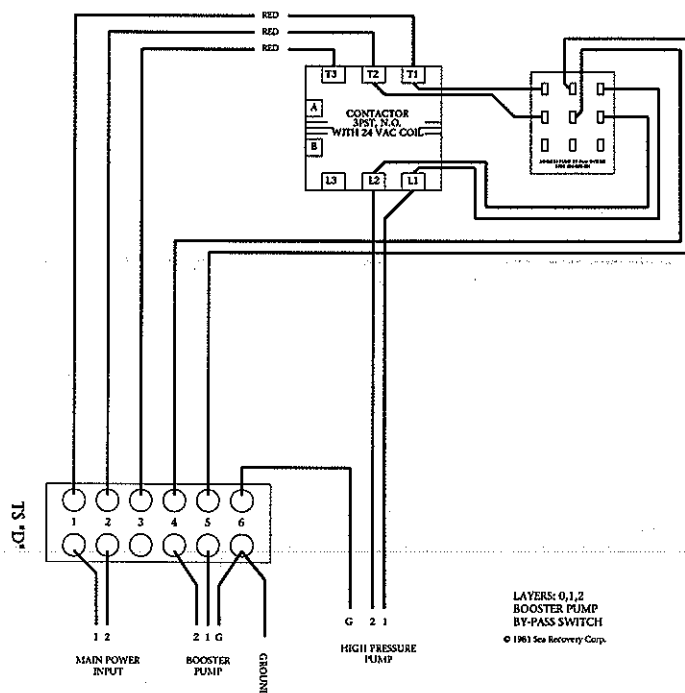
REMOTE CONTROL SRC PRC



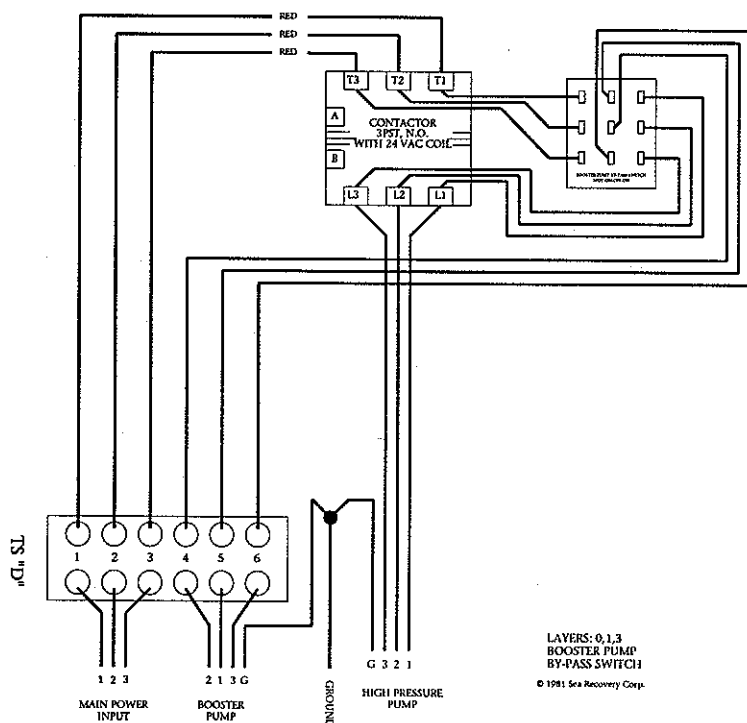
* Note: REMOVE BLUE WIRE
AT TS "B" 2 & CONNECT IT
TO THE PURPLE WIRE
OF THE REMOTE EXTENSION.

BOOSTER PUMP BY-PASS SWITCH WIRING

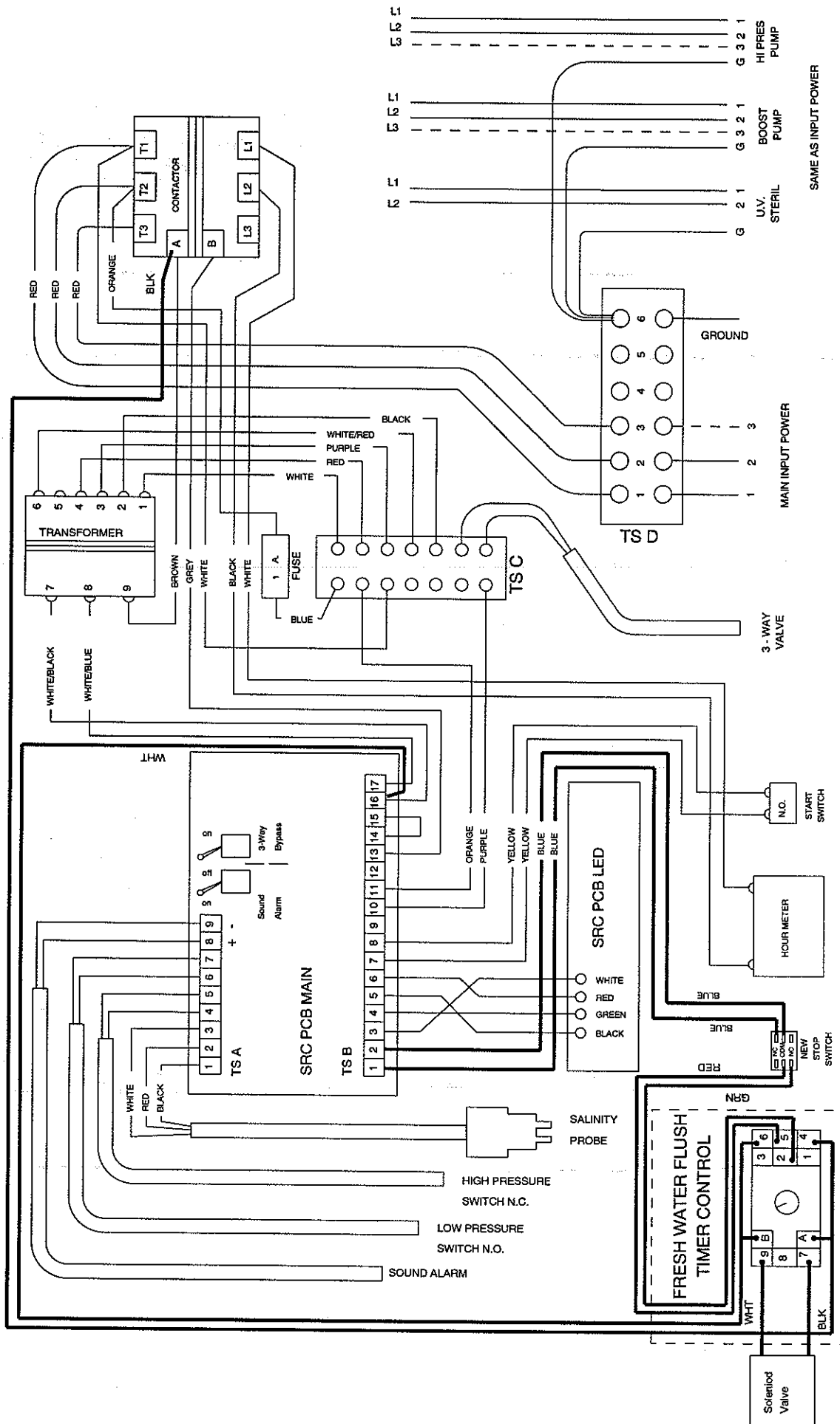
Sea Recovery BOOSTER PUMP BY-PASS SWITCH WIRING SINGLE PHASE



Sea Recovery BOOSTER PUMP BY-PASS SWITCH WIRING THREE PHASE



Sea Recovery™ **WIRING DIAGRAM - FRESH WATER FLUSH CONTROLLER TO SYSTEM CONTROLLER***



NOTES:

SECTION "F"

SYSTEM COMMISSIONING

&

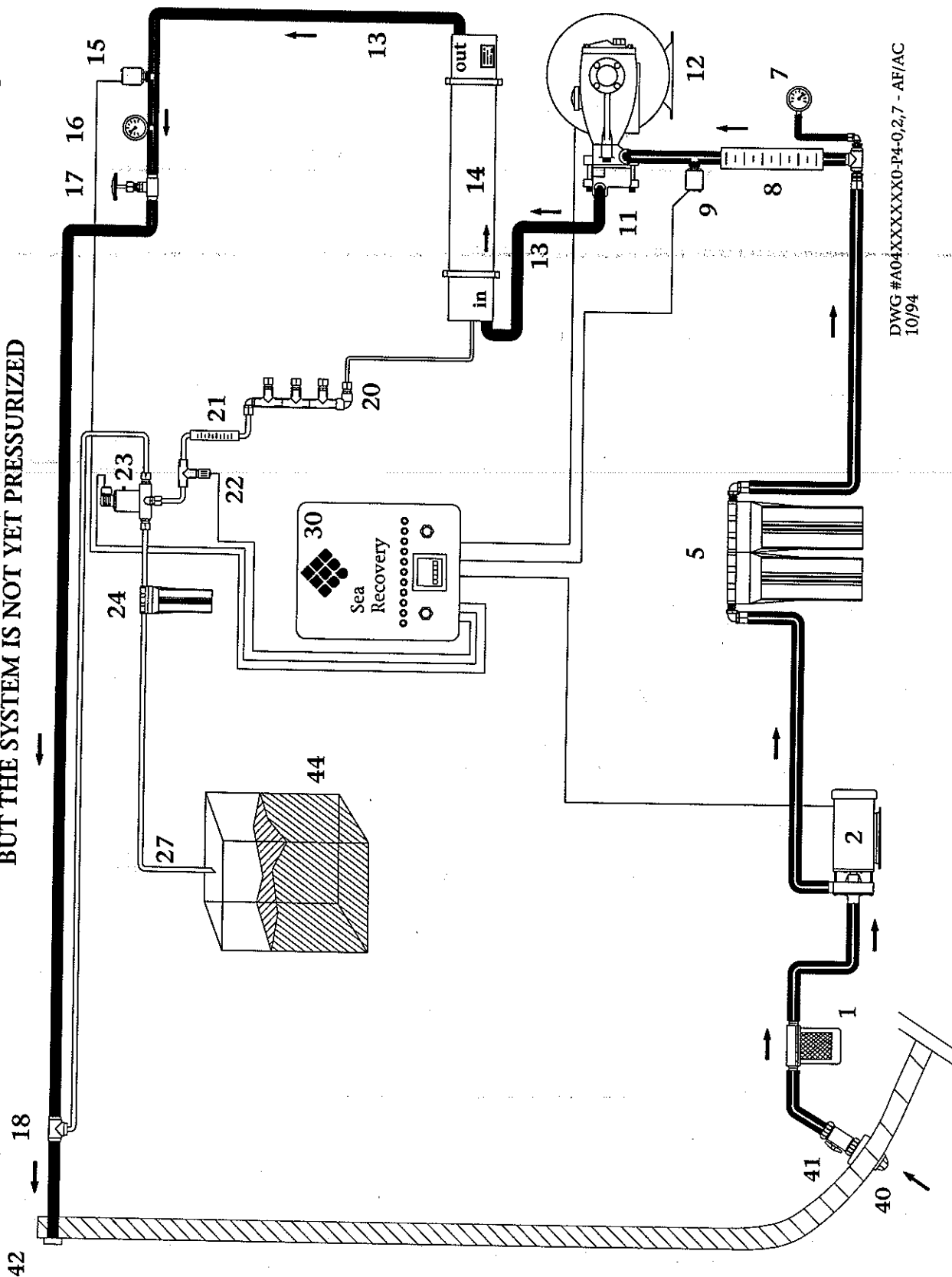
**INITIAL START UP OF A NEW
SEA RECOVERY R.O. SYSTEM**

WITH

INITIAL NEW SYSTEM READINGS FORM

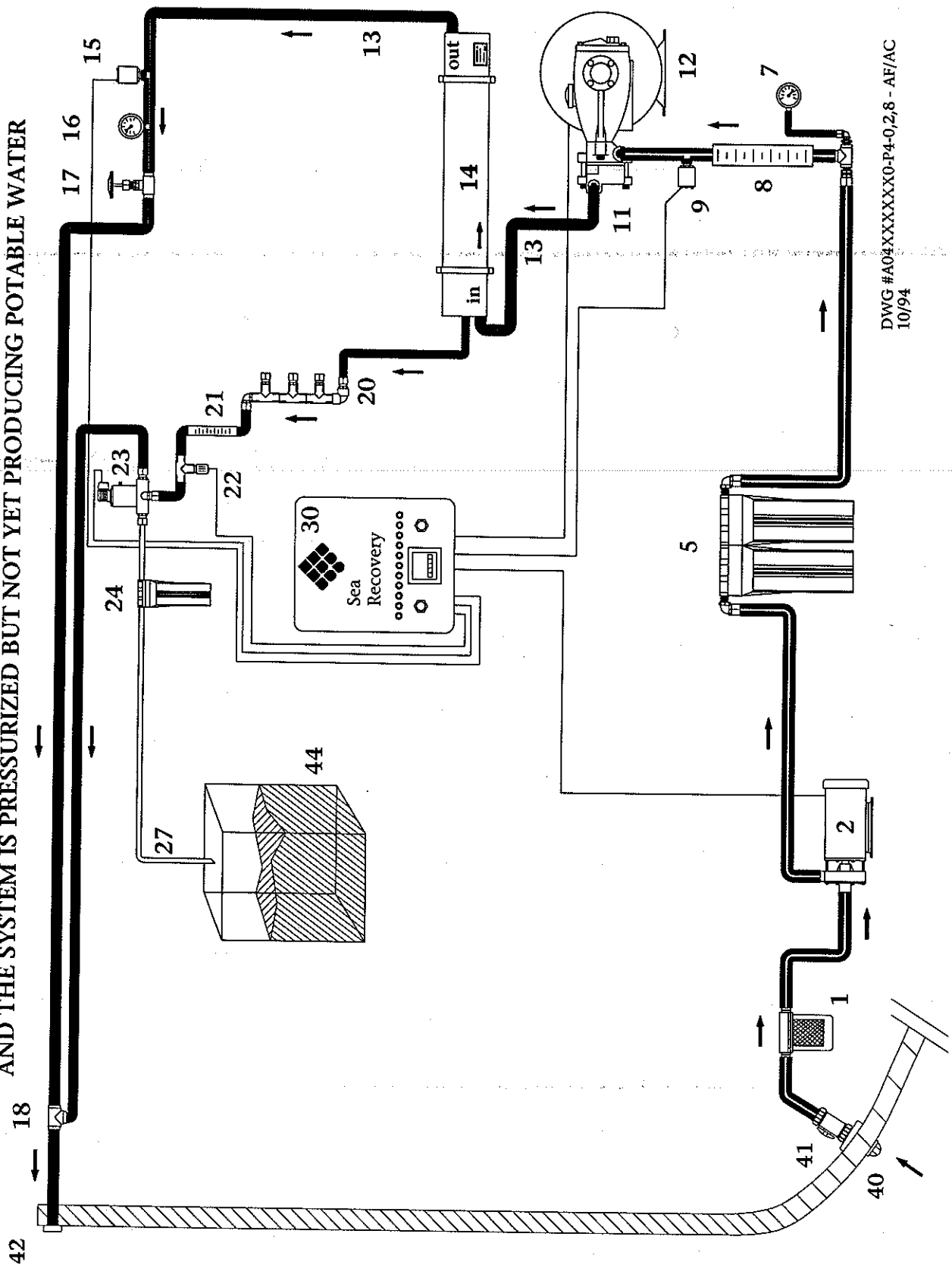
NOTES:

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 200 AF or AC with no options
 ILLUSTRATING THE FIRST FEW MINUTES OF OPERATION WITH FEED WATER FLOWING
 BUT THE SYSTEM IS NOT YET PRESSURIZED



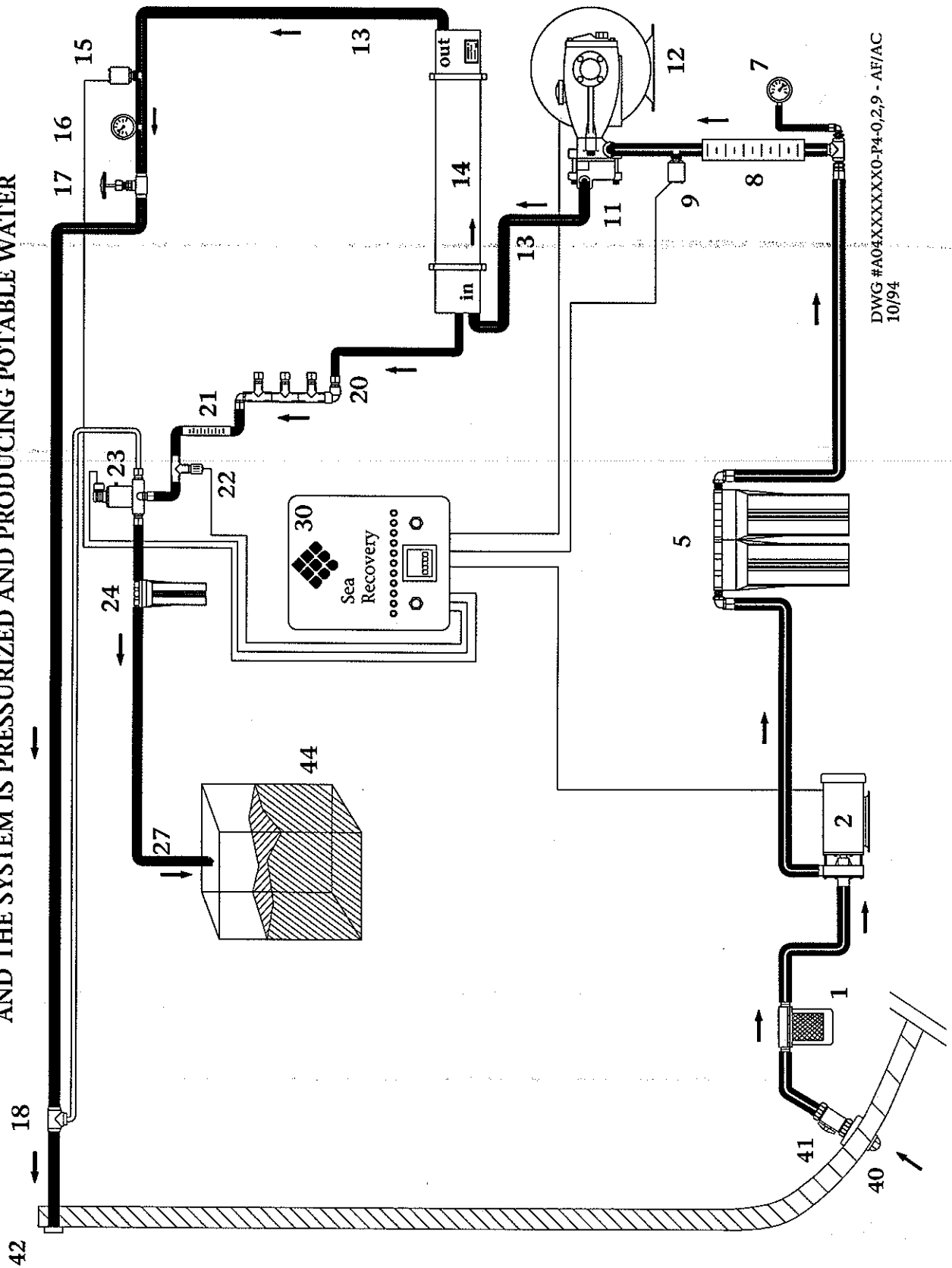
DWG #A04XXXXXX0-P4-0,2,7 - AF/AC
 10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 200 AF or AC with no options
 ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
 AND THE SYSTEM IS PRESSURIZED BUT NOT YET PRODUCING POTABLE WATER



DWG #A04XXXXXXX0-P4-0,2,8 - AF/AC
 10/94

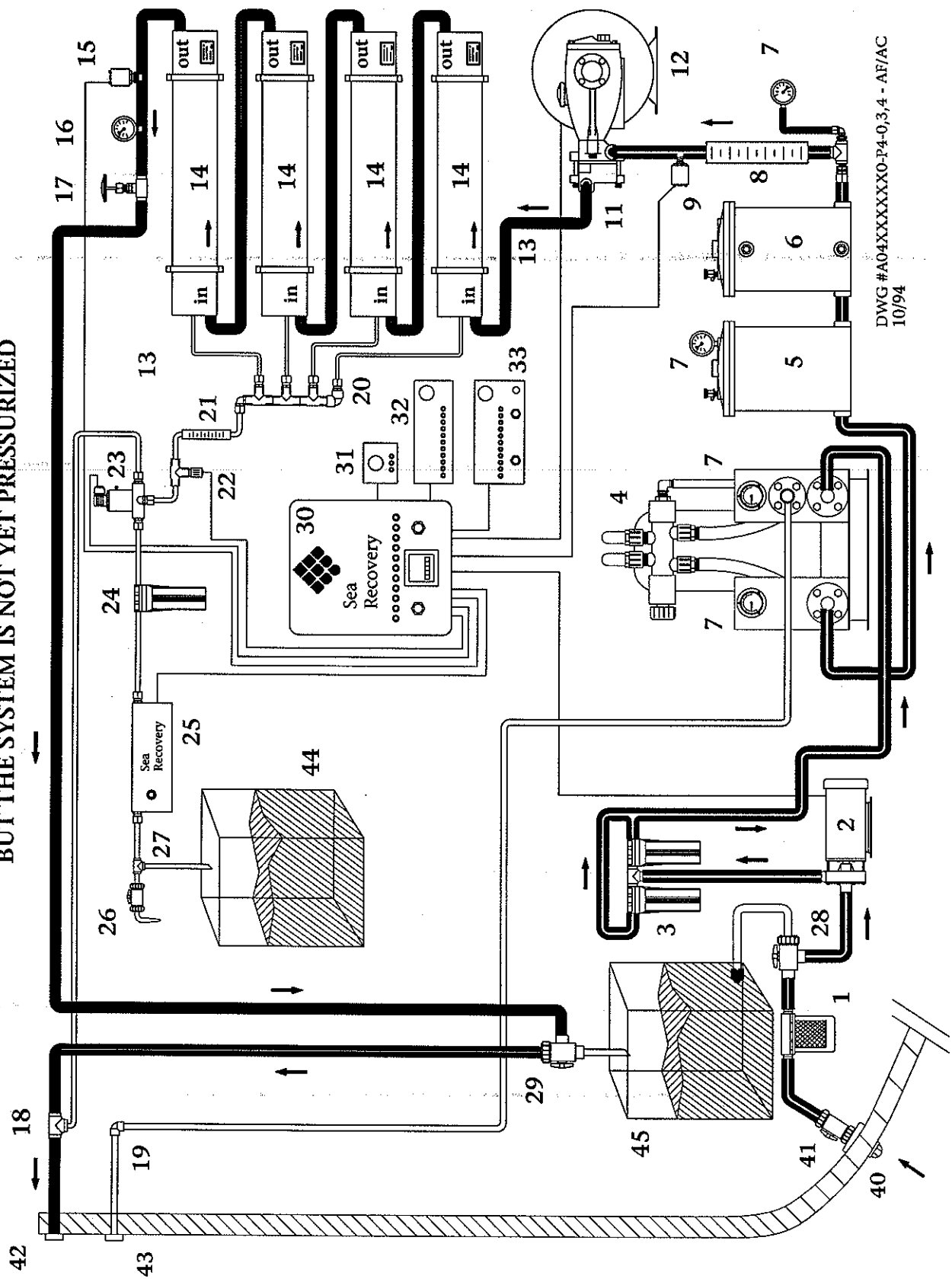
Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 200 AF or AC with no options
 ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
 AND THE SYSTEM IS PRESSURIZED AND PRODUCING POTABLE WATER



DWG #A04XXXXXX0-P4-0,2,9 - AF/AC
 10/94

Shown as an SRC 1500 AF or AC with all options

**ILLUSTRATING THE FIRST FEW MINUTES OF OPERATION WITH FEED WATER FLOWING
BUT THE SYSTEM IS NOT YET PRESSURIZED**

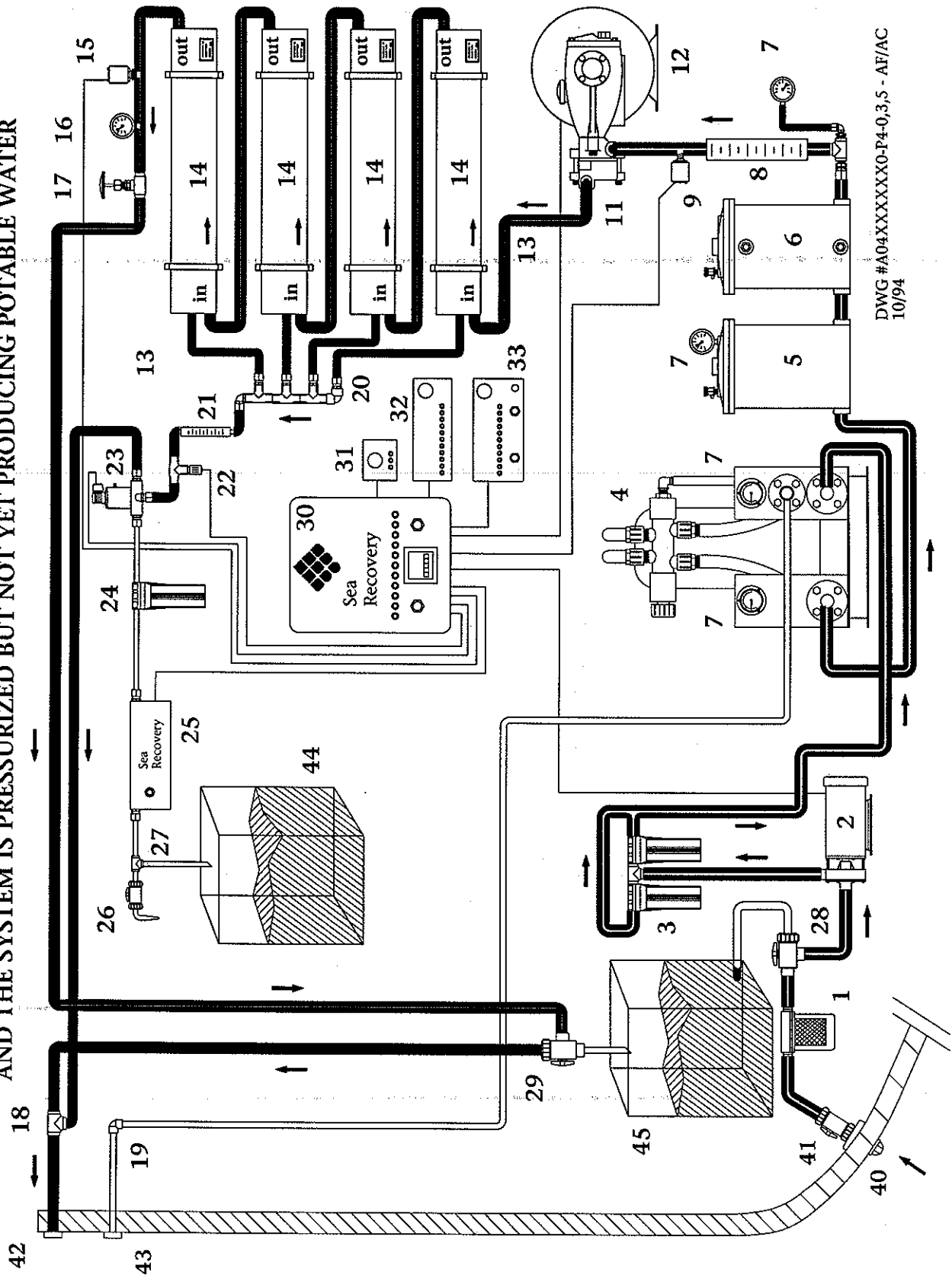


DWG #A04XXXXXX0-P4-0,3,4 - AF/AC
10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID

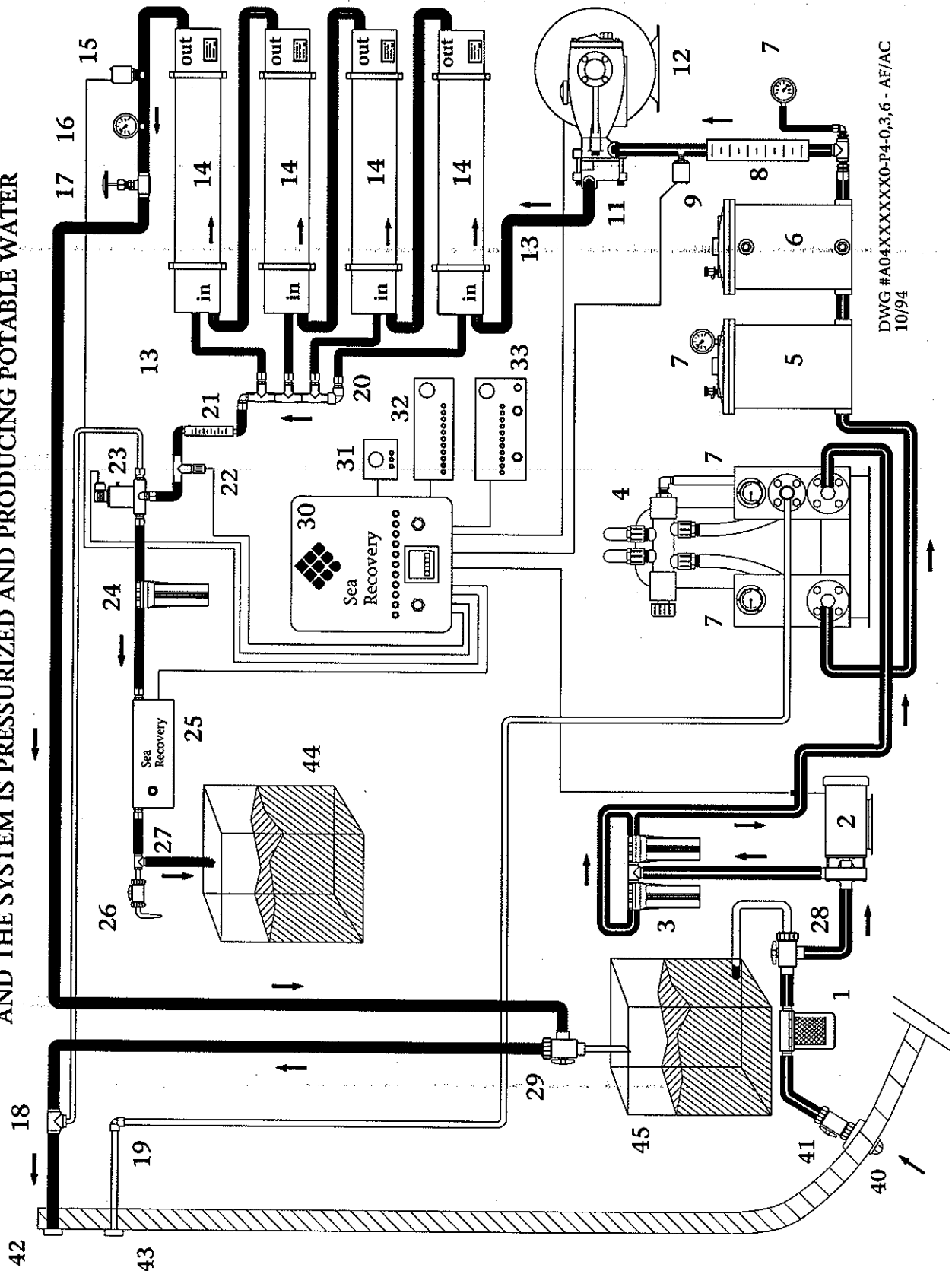
Shown as an SRC 1500 AF or AC with all options

ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
AND THE SYSTEM IS PRESSURIZED BUT NOT YET PRODUCING POTABLE WATER



DWG #A04XXXXXX0-P4-0,3,5 - AF/AC
10/94

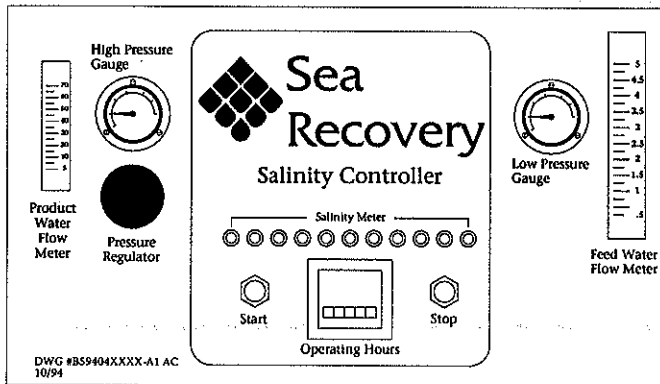
Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 1500 AF or AC with all options
 ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
 AND THE SYSTEM IS PRESSURIZED AND PRODUCING POTABLE WATER



DWG #A04XXXXXX0-P4-0,3,6 - AF/AC
 10/94

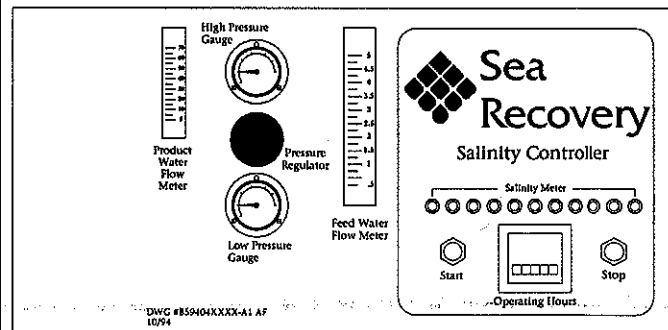
FRONT PANEL AQUA COMPACT

Sea Recovery Control Panel Aqua Compact Series



FRONT PANEL AQUA FRAME

Sea Recovery Control Panel Aqua Frame Series



INITIAL START-UP PROCEDURE OF A NEW SEA RECOVERY MODULAR SYSTEM:

The following instructions must be carried out for initial start-up of a NEW system. For every day use starting routines refer to Section "G" "Start-Up Procedure" of this manual. These instructions are written either to ensure that all connections are properly made, or because the system is new at the initial start-up.

Failure to follow the procedures exactly could lead to system failure, and cause damage to the components. Read this section and other appropriate sections of the manual, in order to gain familiarity with the requirements of the system and functions of each component.

1. Make sure that the Electrical Power Source to the System is switched "OFF". When the Electrical Power Source is turned off, no power should be present in the Salinity Controller.
2. Remove or open the front panel of the Salinity Controller. While the front panel of the controller is off (open),

check all connections for good electrical attachment and proper wiring. Refer to the proper wiring diagram in Section "E" of this manual.

3. Ensure that the 3-Way Product Diversion Valve Bypass Switch, located on the Main PCB, is "OFF" (left).
4. Ensure that the Sound Alarm Mute Switch, located on the Main PCB, is "ON" (left).
5. Replace (close) the Salinity Controller front panel.
6. Ensure that the manual By-Pass lever (gray color button) located on the side of the 3-Way Product Diversion Valve [23] is positioned outward (away from the coil body).
7. Close the Commercial Prefilter [5] Drain Valve, if installed.
8. Close the Oil/Water Separator [6] Drain Valve, if installed.

9. Close the air bleed valve located on top of the Commercial Prefilter [5], if installed.
10. Close the air bleed valve located on top of the Oil/Water Separator [6], if installed.
11. Open the Inlet Sea Cock Valve [41] fully.
12. Position the Clean/Rinse Inlet Valve [28], if installed, to the normal operating position towards the Sea Strainer Outlet [1].
13. Position the Clean/Rinse Outlet Valve [29], if installed, to the normal operating position towards the Brine Discharge Tee [18].
14. Open any auxiliary Valve within the incoming Feed Line from the Inlet Thru-Hull Fitting [40] to the System; Outgoing Brine Discharge Line from the System to the Brine Thru-Hull Fitting [42]; and Outgoing Product Water Line from the System to the Ships Potable Water Storage Tank [44].

CAUTION: Any auxiliary Valve in these lines will damage the Sea Recovery System if left closed during starting and operation of the Sea Recovery System.

15. Open the Back Pressure Regulator Valve FULL OPEN by turning the valve handle counter clockwise.

CAUTION: The Back Pressure Regulator Valve must be full open when starting the Sea Recovery R.O. System. If this valve is left closed extensive damage to the Sea Recovery R.O. System will result.

16. View the Oil Level Sight Glass at the rear crankcase cover of the High Pressure Pump [11] to ensure that the

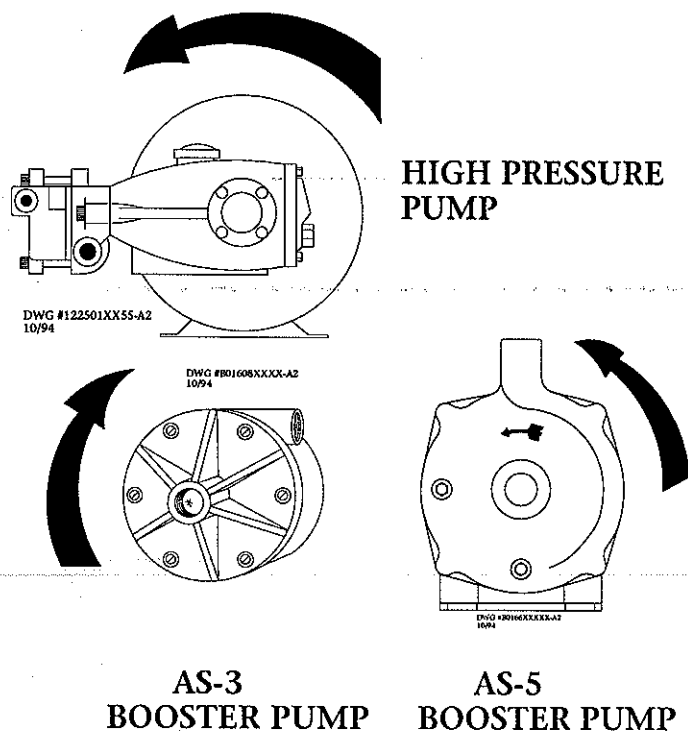
High Pressure Pump contains the proper amount of crankcase oil. The oil level must be to the center or higher of the sight glass (refer to Section "K").

17. Prior to starting the system, check to ensure that:
 - a. All Valve positions in step 7-15 are correct.
 - b. The High Pressure Pump [11] crankcase contains the proper amount of oil. The level must be to the center or higher of the sight glass (refer to Section "K").
 - c. All electrical connections are correct and tight.
 - d. All water connections are correct and tight.
18. Switch the Electrical Power Source to the Salinity Controller "ON". The Power Source should be switched "ON" at a Circuit Breaker between the Power Source and the Salinity Controller. DO NOT push the Salinity Controller START switch at this time.

19. ELECTRIC MOTOR ROTATIONAL CHECK: Ask an assistant to view the fan section of the Electric Motors, (High Pressure Pump Electric Motor [12] and Booster Pump Electric Motor [2]) while you Jog the System.

CAUTION: The Back Pressure Regulator Valve must be full open when starting or jogging the Sea Recovery R.O. System. Briefly press and release the System Start Switch. Ensure that both Electric Motors are rotating in the proper direction.

CORRECT ROTATION FOR THE SEA RECOVERY SYSTEM ELECTRIC MOTORS:



20. The Multi Media Filter should have been loaded with gravel and #20 silica sand during the installation of the system. This silica sand traps suspended solids larger than 20 micron. The top layer of the silica sand within the Multi Media Filter will become packed with suspended solids and restrict flow through it. When the silica sand becomes packed with suspended solids, as indicated by a loss of pressure across it, it must then be "backwashed" to waste. Further, when new, as is the case with this system, the gravel and sand contain contaminants which must be backwashed to waste prior to use. This backwashing procedure fluffs the silica sand and dislodges the suspended solids, fines and contaminants from the sand base. During backwashing the suspended solids are discharged to waste through the Multi Media Filter Waste outlet [43].

If either or both Electric Motors are rotating in the wrong direction:

Single Phase Systems Electric Motor rotation is controlled by interchanging two specific wires at the Electric Motors wiring box connections.

Three Phase System Electric Motors rotation is controlled by interchanging any two of the three power lines at the Electric Motors wiring box connections.

Refer to the wiring information and electrical connection information and diagrams in Section "E" of this manual. If in doubt, call Sea Recovery for assistance.

If both electric motors are rotating in the proper direction go on to step 20.

To backwash the Multi Media Filter: Open the Inlet Seacock Valve [41]. Adjust the Multi Media Filter Multi Port Valve full counter clockwise then clockwise 1/4 turn only (90°) to the Backwash position. Place the Booster Pump By-Pass Switch, located on the side of the Salinity Controller, to the manual position.

The Booster Pump [2] is now backwashing the Multi Media Filter [4] to waste. Allow this backwashing to continue for 20 minutes.

After 20 minutes of backwashing place the Booster Pump By-Pass Switch in the Automatic Position. Adjust the Multi Media Filter Multi Port Valve full clockwise to the Service Position. Close the Inlet Seacock Valve [41] if additional service is to be performed or if the System is to be placed back into operation leave the Inlet Seacock Valve open.

21. **CAUTION:** The Back Pressure Regulator Valve must be full open when starting the Sea Recovery R.O. System. Start the system by depressing the Start Switch momentarily. Hold the Start Switch in until the Low Pressure Gauge [7] registers 6 PSI or greater. Release the Start Switch when the Low Pressure Gauge [7] registers greater than 6 PSI.

CAUTION: Release the Start Switch if the High Pressure Gauge [16] registers above 100 PSI. If the High Pressure Gauge [16] registers above 100 PSI at this time it would indicate that there is a blockage or closed valve in the Brine Discharge Line or the Back Pressure Regulator Valve is not fully open. Refer to steps 7-15 above and position all valves accordingly. If all valves are positioned accordingly and the High Pressure Gauge still reads above 100 psi when attempting to start the system then check the brine discharge line plumbing and correct any blockage so that there is no back pressure on this line.

If the low pressure gauge does not register at least 6 PSI or if it registers a vacuum then the low pressure protection switch will automatically stop the system once the Start Switch is released. This would indicate that a restriction or blockage exists in the feed line and requires correction (ie: fouled Prefilter element, crimped feed line, Sea Cock valve is closed, air suction leak, etc) or, because the system is new, the feed line may require priming. Refer to steps 6-15 above and position all valves accordingly.

CAUTION: Release the Start Switch and press the Stop switch on the Salinity Controller to Stop the System if the GPM Feed Water Flow Meter does not register within 30 seconds. Non feed water flow into the GPM Feed Flow Meter indicates that the system is not priming itself.

To prime the SRC System remove the Feed Suction Line from the Inlet of the Booster Pump [2]. Remove the Prefilter Bowls, or Commercial Prefilter Lid if used, and the Oil/Water Separator Lid, if used, and fill these components with water. Replace the bowls and lids as appropriate. Fill the Suction Line with water. Replace the Suction Line onto the Inlet of the Booster Pump. Restart the system.

22. The GPM Feed Water Flow Meter will allow observation of the water passing through it. Any air passing through the meter will cause the flow reading to fluctuate. Once all air is bled and eliminated from the system, the meter may be read reliably.
23. Bleed all air from the Commercial Prefilter and or Oil/Water Separator, if the system is equipped with these options, open the air bleed valve located at the top of the respective housing until water displaces all of the air then close the air bleed valve(s).
24. Check for air suction leaks or water leaks throughout the entire system. Refer to Section "I" Troubleshooting and Section "K" Maintenance & Repair, in this manual.
25. After a minimum of 15 minutes running time, with proper feed flow in progress, slowly adjust the Back Pressure Regulator Valve [17] by turning the valve handle clockwise to increase the System operating pressure up to 800 PSI if the feed water source is full salinity sea water.

If the feed water source is **BRACKISH WATER** (not full salinity sea water) adjust the Back Pressure Regulator Valve from 100 PSI to 800 PSI. Lower or increase pressure so that the product water output, as

registered on the Product Water Flow Meter [21], is within system specifications. Product water output specifications to be considered when in Brackish Feed Water Feed Sources are:

SRC 200 AM	8.3 GPH
SRC 400 AM	16.6 GPH
SRC 600 AM	25 GPH
SRC 800 AM	33.3 GPH
SRC 1200 AM	50 GPH
SRC 1500 AM	62.5 GPH

DO NOT EXCEED PRODUCT WATER FLOW SPECIFICATIONS. PERMANENT DAMAGE TO THE R.O. MEMBRANE ELEMENT WILL RESULT IF PRODUCT WATER FLOW SPECIFICATIONS ARE EXCEEDED.

If leaks develop, decrease pressure by adjusting the Back Pressure Regulator Valve [17] full open, counter clockwise, then depress the system STOP switch. Correct any problems, then refer to steps 6 through 24 above.

26. Determine that product water is being produced. This can be assured by a noticeable flow through the Product Water Flow Meter [21]. The system operating, properly interconnected and pressurized, may not produce "potable" water for up to 30 minutes. The salinity of the Product Water diminishes gradually, until the quality of the product water reaches the factory micromho setting at which time the unpotable (red) water light will go out, and the 3-Way Product Diversion Valve [23] will energize and direct flow to the "potable" (good water) position. This allows product water to pass into the Post Filtration components, and in turn, into the Ship's Potable Water Storage Tank [44].

27. Recheck for:

- A constant and proper feed water flow.
- A constant appropriate system pressure.
- Leaks in the system: air, water or oil.
- Unusual noises or other occurrences.

28. One final initial start-up check that should be made is of the system's High and Low Pressure shutdown capabilities.

- High Pressure Shutdown: The High Pressure Switch [15] will automatically shut down the entire system in the event of over-pressurization (Sea Water Systems greater than 950 psi, $\pm 5\%$).

To test the High Pressure Switch [15], which is located on the Control Panel and plumbed in line at the Inlet of the Back Pressure Regulator [17], slowly adjust pressure upward by turning the Back Pressure Regulator Valve clockwise. Record the pressure at which the High Pressure Switch activates the Controller and shuts the system off.

CAUTION: Do not allow a system which is operating in Sea Water to exceed 1000 psi. If the High Pressure Switch will not automatically shut down the system prior to it reaching 1000 psi or shuts the system down prior to reaching 900 PSI, if operating from Sea Water, bring the pressure down to below 100 PSI by adjusting the Back Pressure Regulator Valve [17] counter clockwise, then proceed to adjust the High Pressure Switch as follows:

CAUTION: The High Pressure Switch is delicate and sensitive. Minimize adjustment and tampering with the set point.

- 1) Adjustment of the High Pressure Switch [15]: If a Sea Water system shuts down due to over pressure below 900 psi or above 1000 psi, the High Pressure Switch setting must be adjusted.

To adjust the High Pressure Switch, remove the small rubber dust cap located on the top of the switch. Using a medium size flat blade screwdriver adjust the pressure adjusting screw located inside the switch cover. Turn the adjusting screw counter clockwise to lower the trip point, or clockwise to increase it.

One quarter revolution (90°) will adjust the pressure setting approximately 100 psi. Repeat step 28.a. above to check the new setting.

After checking the High Pressure Switch shut down setting and making any required adjustments reset the Back Pressure Regulator Valve for normal 800 PSI operation.

- b. Low Pressure Shutdown: The Low Pressure Switch [9] will automatically shut down the entire system in the event of under-pressurization at the High Pressure Pump Inlet [11]. To test the Low Pressure Switch, while the system is in operation, *slowly* close the Inlet Sea Cock Valve [41]. Record the pressure at which the Low Pressure Switch activates the controller and shuts the system off.

CAUTION: Do not allow the system to operate below 2 PSI feed water pressure. Adjust the switch if it will not automatically shut down the system prior to it reaching 2 to 6 PSI or if it prematurely shuts the system down prior to reaching 6 PSI.

CAUTION: The Low Pressure Switch is delicate and sensitive. Minimize adjustment and tampering with the set point.

- 1) Adjustment of the Low Pressure Switch [9]: To adjust the Low Pressure Switch, remove the small rubber dust cap located on the top of the switch. Using a medium size flat blade screwdriver adjust the pressure adjusting screw located inside the switch cover. Turn the adjusting screw counter clockwise to lower the trip point, or clockwise to increase it. One quarter revolution (90°) will adjust the pressure setting approximately 5 psi. Repeat step 28.b. above to check the new setting.

29. Refer to Section "H" of this manual for shut down procedures.

Normal Operation: Under normal conditions, the SRC system will perform as indicated in the Specifications located in Section "B" of this Manual and as correlated to the Temperature Effects Charts in Section "M" of this Manual. Any deviation in performance will indicate that some maintenance or adjustment may be required. If the system is allowed to continue running after deviating from normal operation, the original problem component may cause subsequent damage to properly functioning components. The Warranty will be voided on components damaged as a result of operator negligence in allowing a malfunction to go uncorrected.

NOTES:

Sea Recovery Reverse Osmosis Desalination System

INITIAL NEW SYSTEM READINGS

The following information must be determined and recorded at the time of system commissioning (initial new system start up). The readings should correlate closely with normal operation specifications. By making a record of the initial new system readings the operator can correlate these with subsequent daily log readings.

Record at the time of system commissioning the following after one hour continuous proper running of the system. Maintain a copy of the completed form with the System Owners Manual for future reference and troubleshooting.

Serial Number: _____ Model Number: _____

Name of Operator: _____ Date: _____

Name of Person Commissioning System: _____

System Power: _____ VAC _____ Hz _____ Phase

Feed Water Temperature: _____ °Fahrenheit or _____ ° Celsius

Hour Meter Reading: _____ Hours

Low Pressure Switch Shutdown: _____ PSI

High Pressure Switch Shutdown: _____ PSI

PRESSURE GAUGE READINGS:

Commercial Prefilter Low Pressure Gauge Reading: _____ PSI

Control Panel Low Pressure Gauge Reading: _____ PSI

High Pressure Gauge Reading: _____ PSI

WATER FLOW METER READINGS:

Feed Water Flow Meter: _____ U.S. GPM or _____ Liters Per Minute

Product Water Flow Meter: _____ U.S. GPH or _____ Liters Per Hour

WATER QUALITY:

Feed Water Salinity: _____ PPM

Product Water Salinity: _____ PPM

Number of LED Indication on Salinity Controller: _____ LED's

Unusual occurrences: _____

Sea Recovery Reverse Osmosis Desalination System

INITIAL NEW SYSTEM READINGS

The following information must be determined and recorded at the time of system commissioning (initial new system start up). The readings should correlate closely with normal operation specifications. By making a record of the initial new system readings the operator can correlate these with subsequent daily log readings.

Record at the time of system commissioning the following after one hour continuous proper running of the system. Maintain a copy of the completed form with the System Owners Manual for future reference and troubleshooting.

Serial Number: _____ Model Number: _____

Name of Operator: _____ Date: _____

Name of Person Commissioning System: _____

System Power: _____ VAC _____ Hz _____ Phase

Feed Water Temperature: _____ °Fahrenheit or _____ ° Celsius

Hour Meter Reading: _____ Hours

Low Pressure Switch Shutdown: _____ PSI

High Pressure Switch Shutdown: _____ PSI

PRESSURE GAUGE READINGS:

Commercial Prefilter Low Pressure Gauge Reading: _____ PSI

Control Panel Low Pressure Gauge Reading: _____ PSI

High Pressure Gauge Reading: _____ PSI

WATER FLOW METER READINGS:

Feed Water Flow Meter: _____ U.S. GPM or _____ Liters Per Minute

Product Water Flow Meter: _____ U.S. GPH or _____ Liters Per Hour

WATER QUALITY:

Feed Water Salinity: _____ PPM

Product Water Salinity: _____ PPM

Number of LED Indication on Salinity Controller: _____ LED's

Unusual occurrences: _____

NOTES:

NOTES:

SECTION "G"

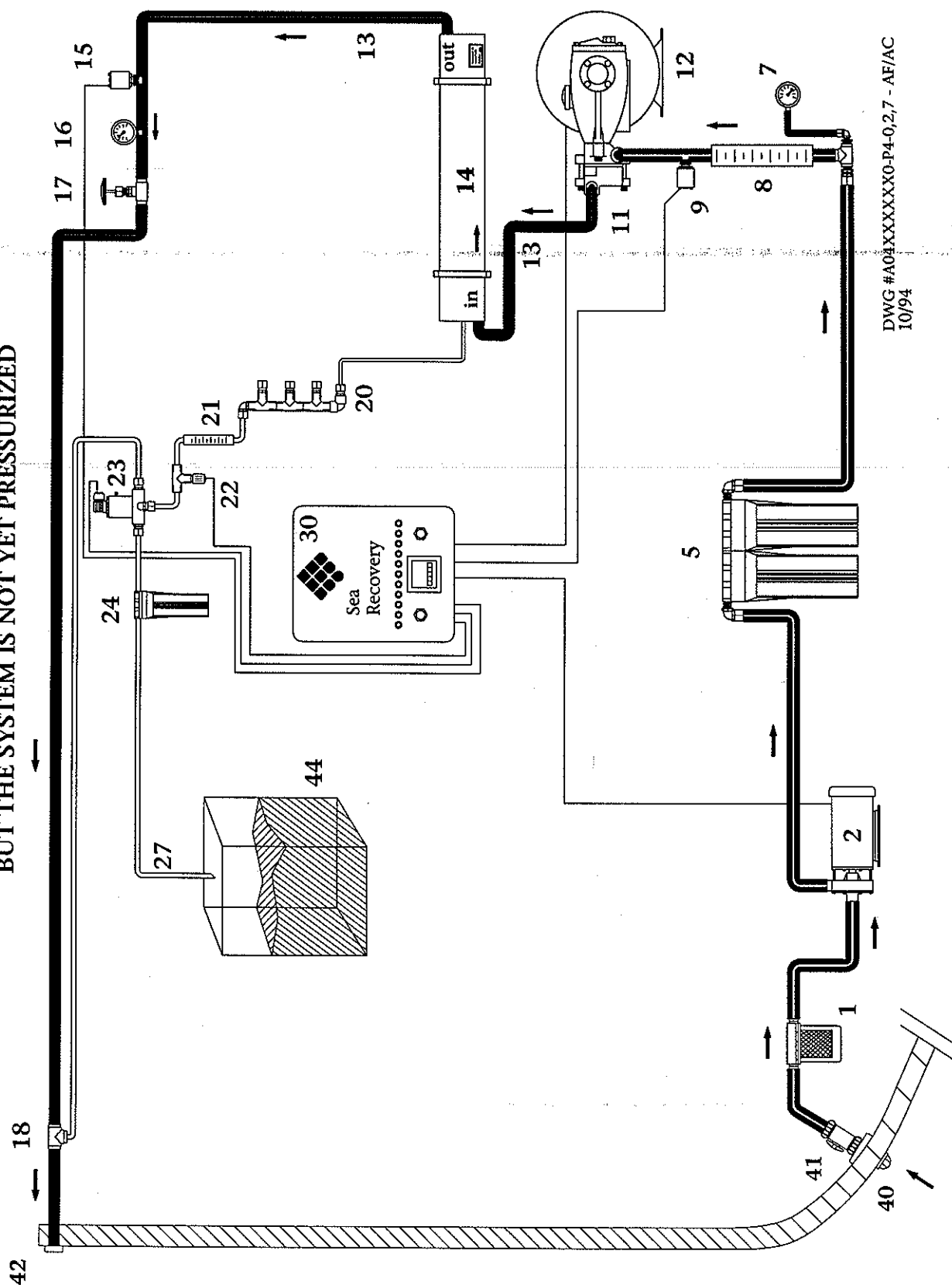
START-UP PROCEDURE

NOTES:

Sea Recovery Aqua Freme & Compact Series 200-1500 GPD System P&ID

Shown as an SRC 200 AF or AC with no options

ILLUSTRATING THE FIRST FEW MINUTES OF OPERATION WITH FEED WATER FLOWING
BUT THE SYSTEM IS NOT YET PRESSURIZED



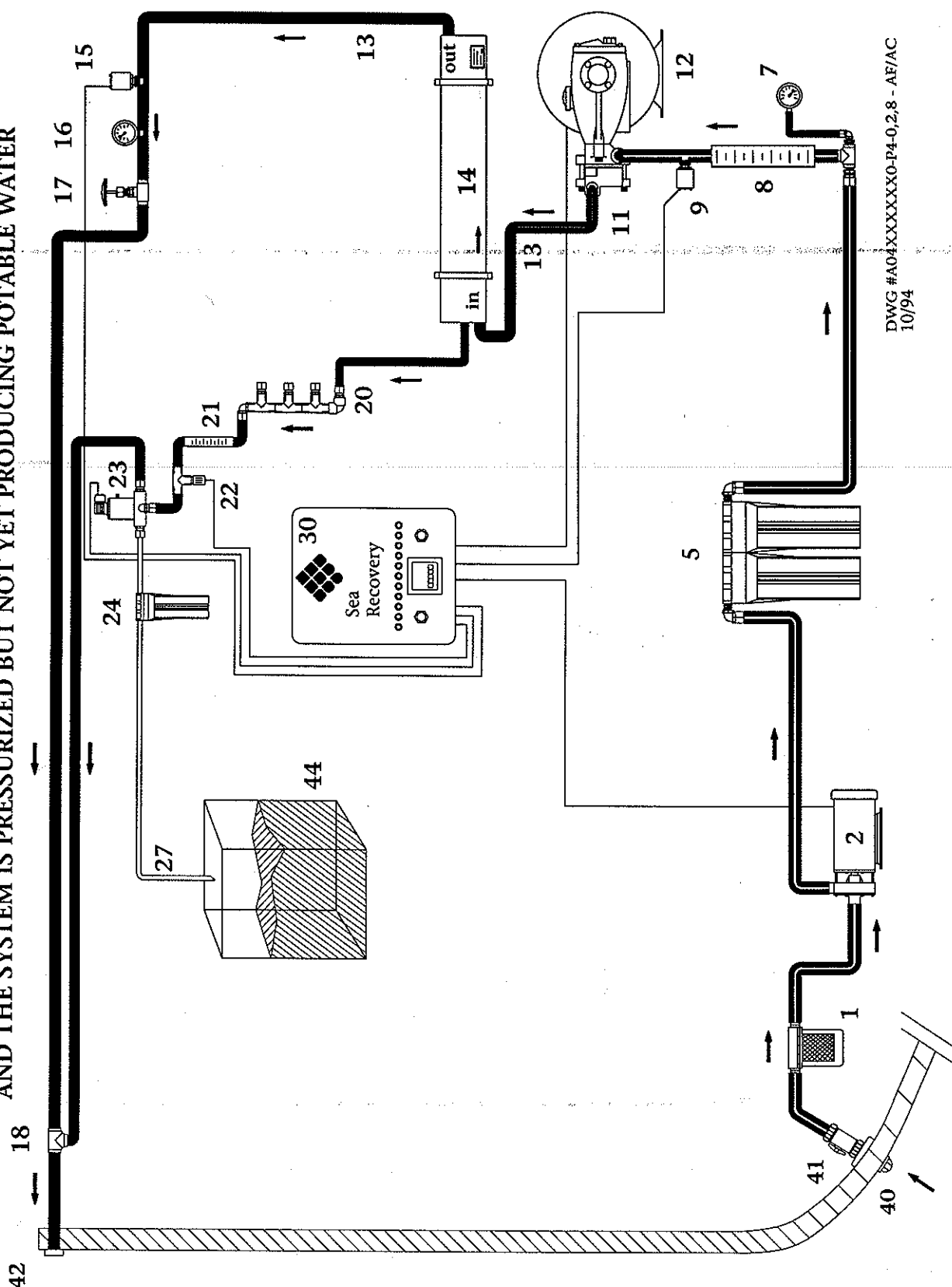
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Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID

Shown as an SRC 200 AF or AC with no options

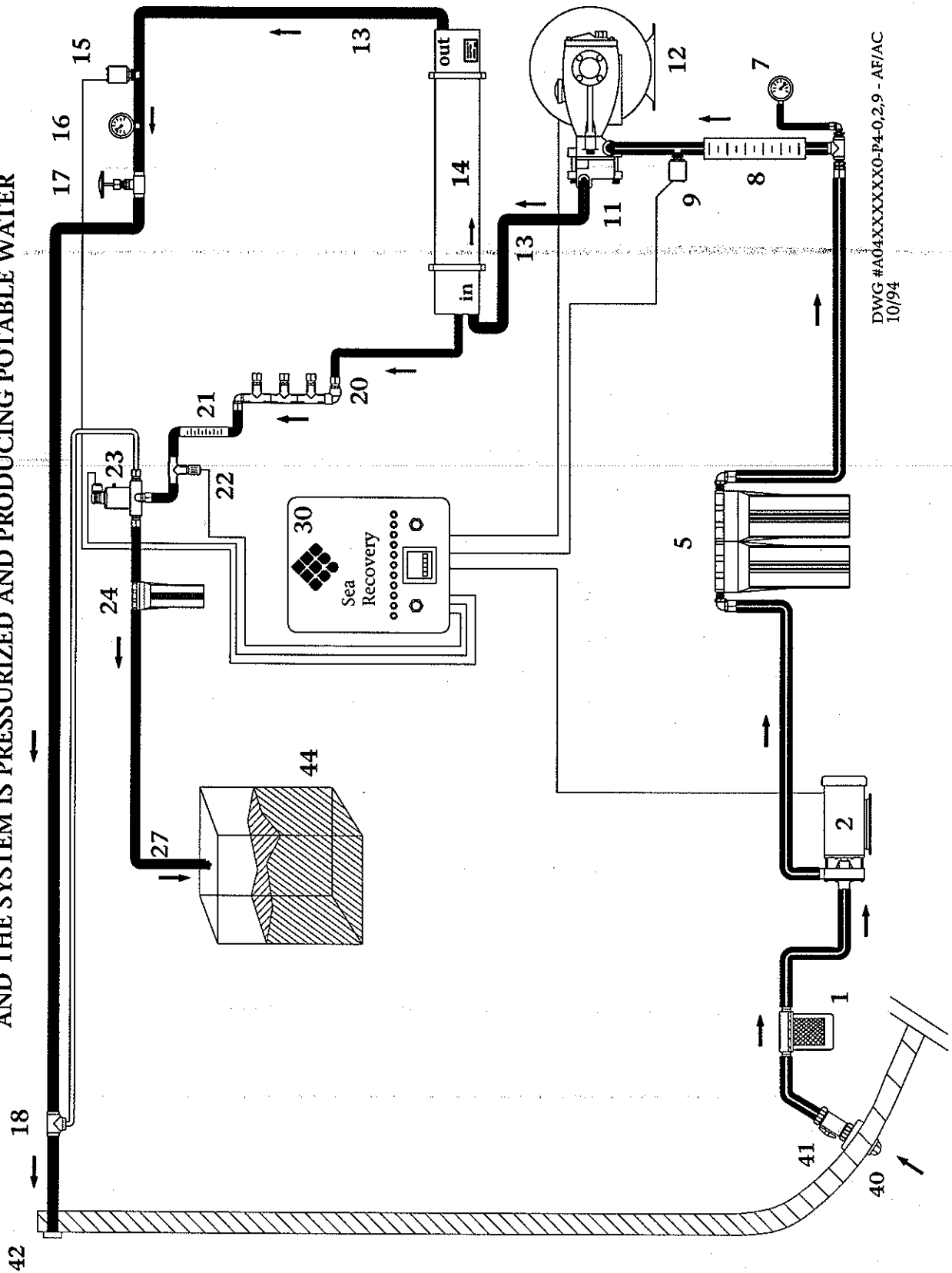
ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING

AND THE SYSTEM IS PRESSURIZED BUT NOT YET PRODUCING POTABLE WATER



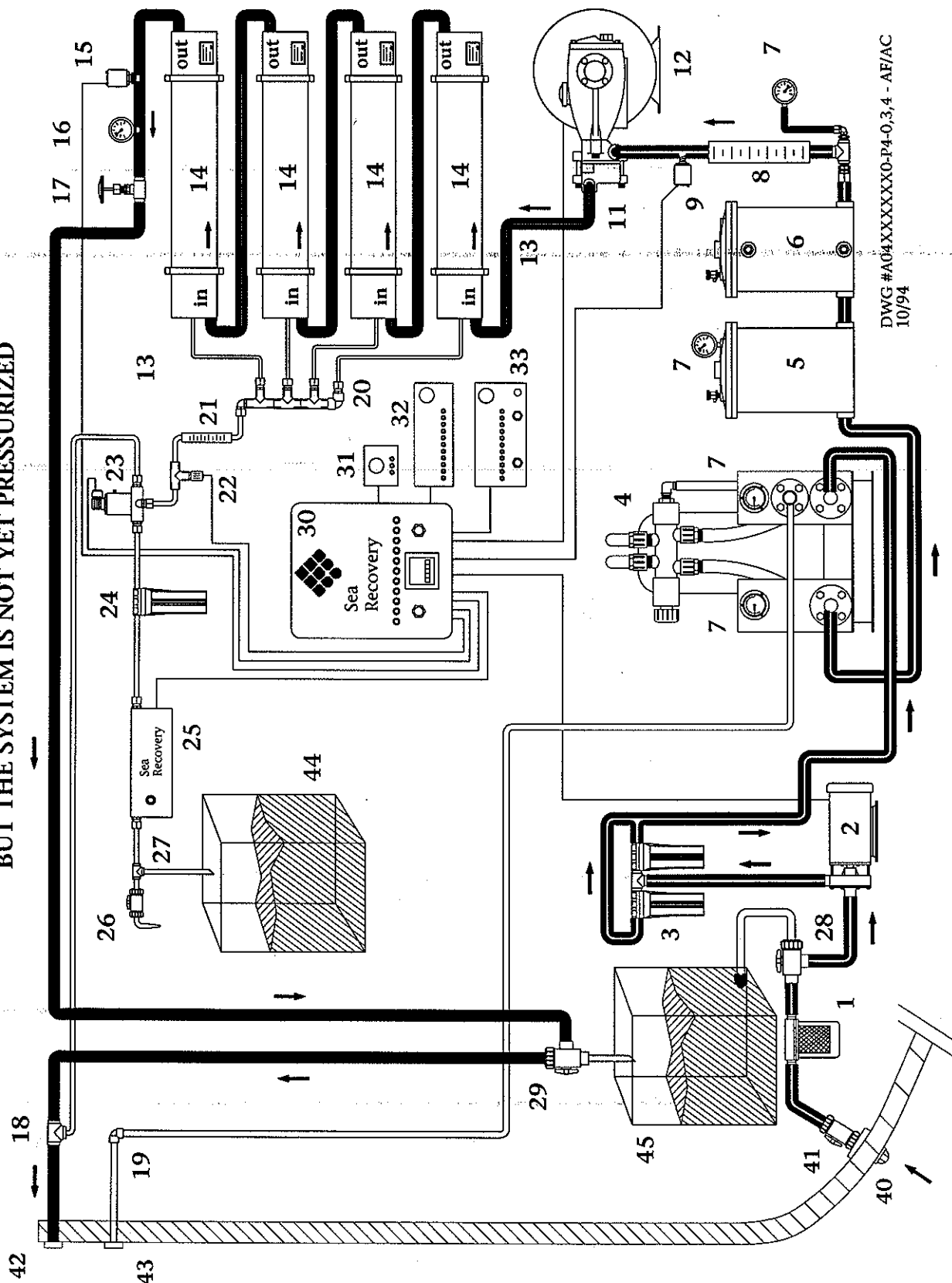
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10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 200 AF or AC with no options
 ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
 AND THE SYSTEM IS PRESSURIZED AND PRODUCING POTABLE WATER



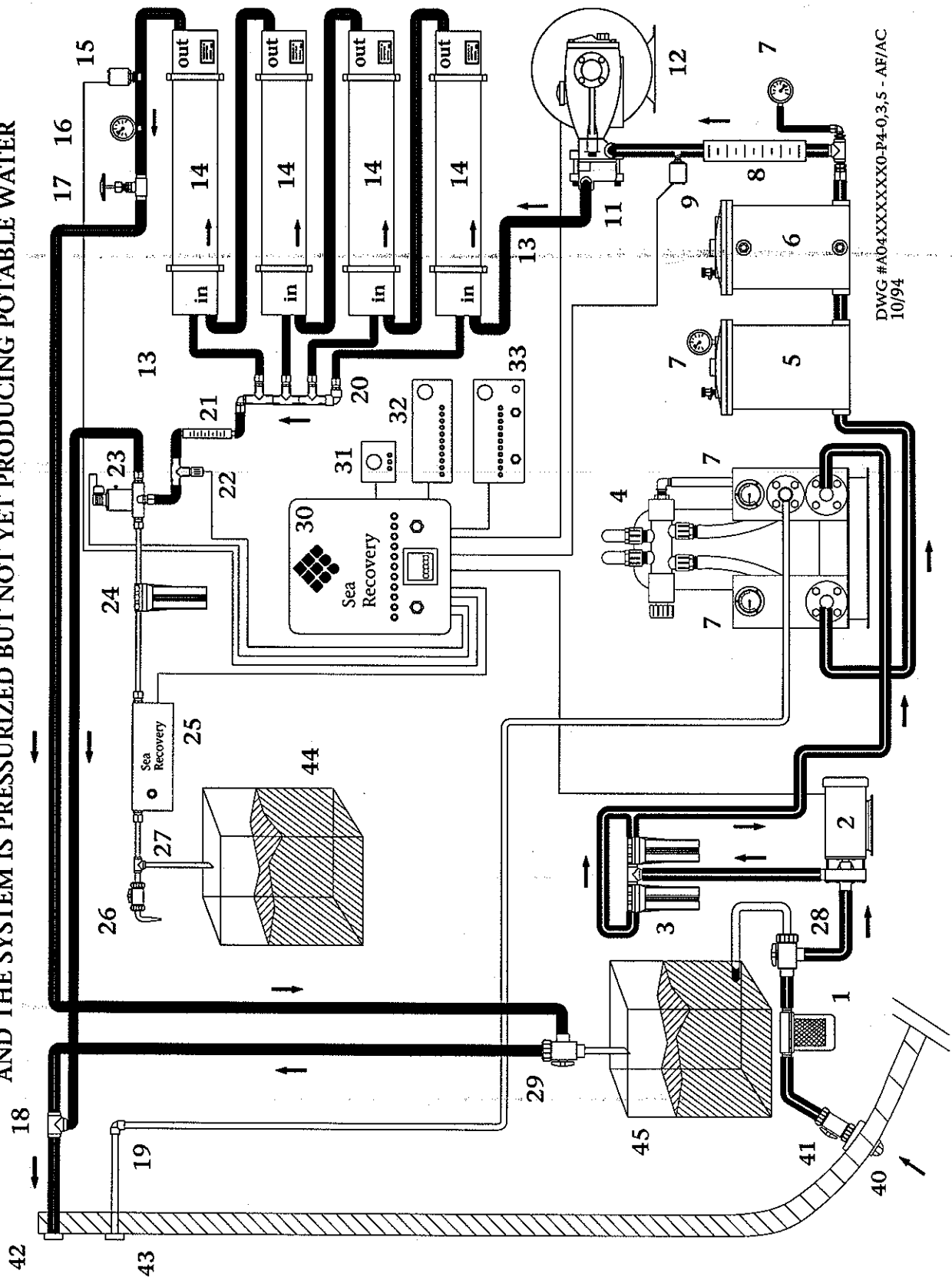
DWG #A04XXXXXX0-P4-0,2,9 - AF/AC
 10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 1500 AF or AC with all options
 ILLUSTRATING THE FIRST FEW MINUTES OF OPERATION WITH FEED WATER FLOWING
 BUT THE SYSTEM IS NOT YET PRESSURIZED



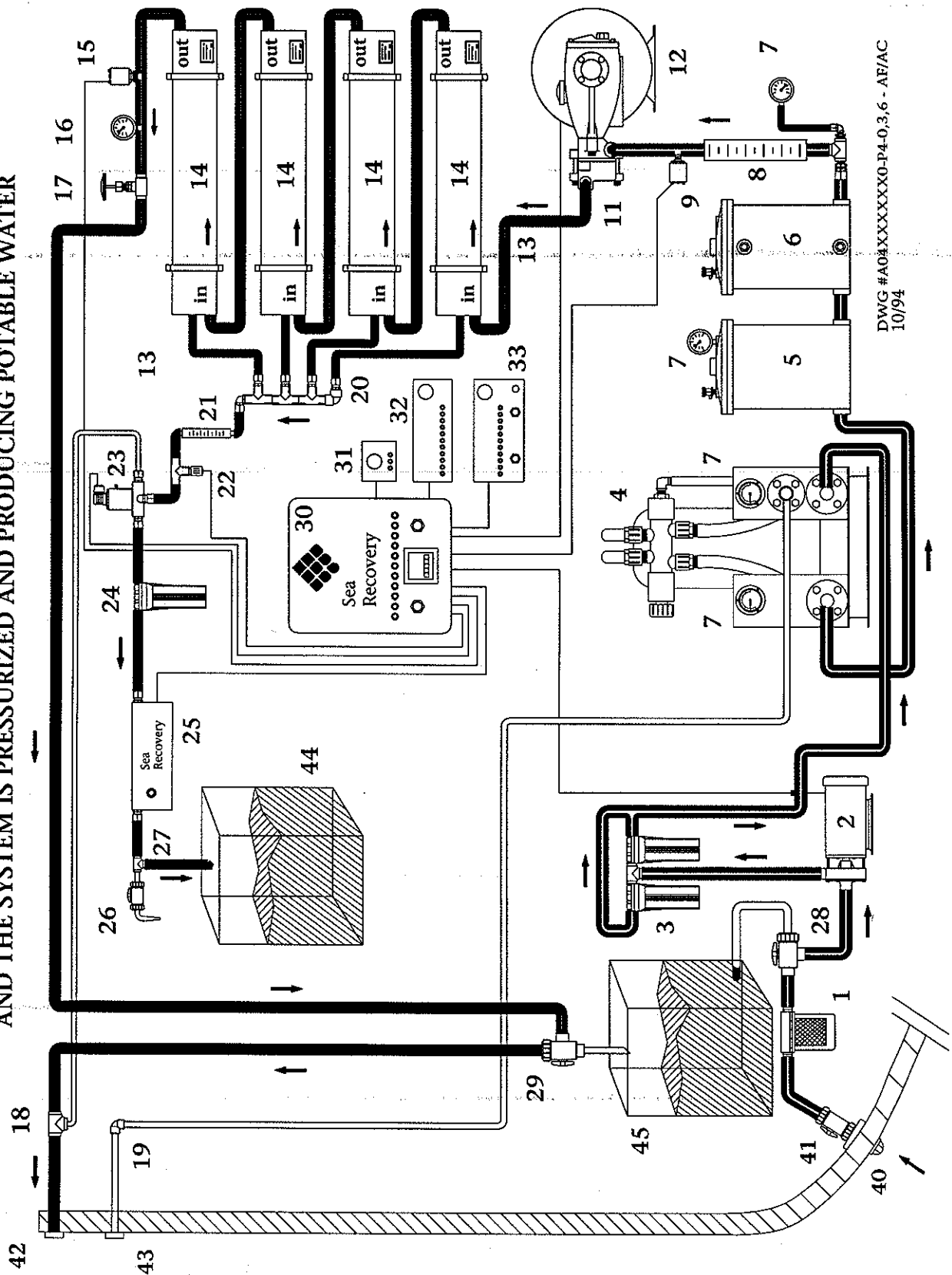
DWG #A04XXXXXXXXXO-P4-0,3,4 - AF/AC
 10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 1500 AF or AC with all options
 ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
 AND THE SYSTEM IS PRESSURIZED BUT NOT YET PRODUCING POTABLE WATER



DWG #A04XXXXXX0-P4-0,3,5 - AF/AC
 10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 1500 AF or AC with all options
 ILLUSTRATING OPERATION OF THE SYSTEM WITH FEED WATER FLOWING
 AND THE SYSTEM IS PRESSURIZED AND PRODUCING POTABLE WATER



DWG #A04XXXXXXXXX0-P4.0,3,6 - AF/AC
 10/94

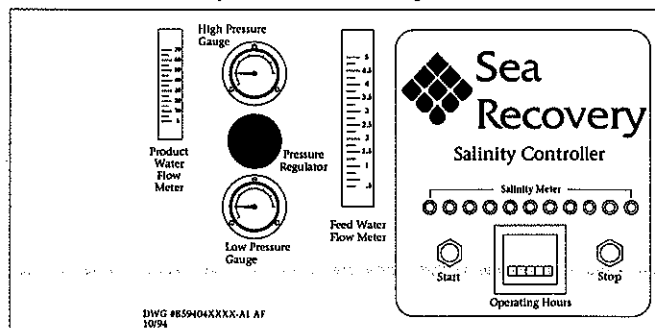
AQUA COMPACT FRONT PANEL

Sea Recovery Control Panel Aqua Compact Series



AQUA FRAME FRONT PANEL

Sea Recovery Control Panel Aqua Frame Series



START-UP PROCEDURE

The following instructions must be carried out each time the Sea Recovery system is started. Failure to follow these procedures exactly could lead to system failure and cause damage to the components. Refer to the "Commissioning / Initial Start Up" Section "F" for the first time start up of a "NEW" system.

1. Open the Inlet Sea Cock Valve [41] fully.
2. Position the Clean/Rinse Inlet Valve [28], if installed, to the normal operating position towards the Sea Strainer Outlet [1].
3. Position the Clean/Rinse Outlet Valve [29], if installed, to the normal operating position towards the Brine Discharge Tee [18].
4. Position the Multi Media Filter Multi Port Valve [4], if installed, to the Filter, normal operation, position.
5. Open any auxiliary Valve within the

incoming Feed Line from the Inlet Thru-Hull Fitting [40] to the System; Outgoing Brine Discharge Line from the System to the Brine Thru-Hull Fitting [42]; and Outgoing Product Water Line from the System to the Ships Potable Water Storage Tank [44].

CAUTION: Any auxiliary Valve in these lines will damage the Sea Recovery System if left closed during starting and operation of the Sea Recovery System.

6. Open the Back Pressure Regulator Valve FULL OPEN by turning the valve handle counter clockwise.

CAUTION: The Back Pressure Regulator Valve must be full open when starting the Sea Recovery R.O. System. If this valve is left closed extensive damage to the Sea Recovery R.O. System will result.

7. View the Oil Level Sight Glass at the rear crankcase cover of the High Pressure Pump [11] to ensure that the High Pressure Pump contains the proper amount of crankcase oil. The oil level must be to the center or higher of the sight glass
8. Prior to starting the system, check to ensure that:

- a. All Valve positions in step 1-6 are correct.
 - b. The High Pressure Pump [11] crankcase contains the proper amount of oil.
 - c. All electrical connections are correct and tight.
 - d. All water connections are correct and tight.
9. Switch the Electrical Power Source to the Salinity Controller "ON". The Power Source should be switched "ON" at a Circuit Breaker between the Power Source and the Salinity Controller.
10. Start the system by depressing the Start Switch momentarily. Hold the Start Switch in until the low pressure gauge registers 6 PSI or greater. If the low pressure gauge does not register at least 6 PSI or if it registers a vacuum then the low pressure protection switch will automatically stop the system once the Start Switch is released. This would indicate that a restriction or blockage exists in the feed line and requires correction (ie: fouled Sea Strainer Element [1]; fouled Plankton Filter Element [3], fouled Prefilter Element [5], fouled Oil Water Separator Element [6], crimped feed line, Sea Cock valve is closed, etc).

CAUTION: Release the Start Switch and press the Stop switch on the Salinity Controller to Stop the System if the GPM Feed Water Flow Meter does not register within 30 seconds. Non feed water flow into the GPM Feed Flow Meter indicates that the system is not priming itself. To prime the SRC System remove the Feed Suction Line from the Inlet of the Booster Pump [2]. Remove the Plankton Filter Bowls [3] if used, Prefilter Bowls [5], or Commercial

Prefilter Lid if used, and the Oil/Water Separator Lid [6], if used, and fill these components with water. Replace the bowls and lids as appropriate. Fill the Suction Line with water. Replace the Suction Line onto the Inlet of the Booster Pump. Restart the system.

CAUTION: Release the Start Switch if the High Pressure Gauge [16] registers above 100 PSI. If the High Pressure Gauge [16] registers above 100 PSI at this time it would indicate that there is a blockage or closed valve in the Brine Discharge Line or the Back Pressure Regulator Valve is not fully open. Refer to steps 1-6 above and position all valves accordingly. If all valves are positioned accordingly and the High Pressure Gauge still reads above 100 psi when attempting to start the system then check the brine discharge line plumbing and correct any blockage so that there is no back pressure on this line.

11. The GPM Feed Water Flow Meter will allow observation of the water passing through it. Any air passing through the meter will cause the flow reading to fluctuate. Once all air is bled and eliminated from the system, the meter may be read reliably.
12. Bleed all air from the Commercial Prefilter and or Oil/Water Separator, if the system is equipped with these options, open the air bleed valve located at the top of the respective housing until water displaces all of the air then close the air bleed valve(s).

13. Check for air suction leaks or water leaks throughout the entire system. Refer to Section "I" Troubleshooting and Section "K" Maintenance & Repair, in this manual.
14. After a minimum of 2 minutes running time, with proper feed flow in progress, slowly adjust the Back Pressure Regulator Valve [17] by turning the valve handle clockwise to increase the System operating pressure up to 800 PSI if the feed water source is full salinity SEA WATER.

If the feed water source is BRACKISH WATER (not full salinity sea water) adjust the Back Pressure Regulator Valve from 100 PSI to 800 PSI. Lower or increase pressure so that the product water output, as registered on the Product Water Flow Meter [21], is within system specifications. Maximum product water output specifications to be considered when in Brackish Feed Water Feed Sources are:

SRC 200 AM	8.3 GPH
SRC 400 AM	16.6 GPH
SRC 600 AM	25 GPH
SRC 800 AM	33.3 GPH
SRC 1200 AM	50 GPH
SRC 1500 AM	62.5 GPH

DO NOT EXCEED PRODUCT WATER FLOW SPECIFICATIONS. PERMANENT DAMAGE TO THE R.O. MEMBRANE ELEMENT WILL RESULT IF PRODUCT WATER FLOW SPECIFICATIONS ARE EXCEEDED.

If leaks develop, decrease pressure by adjusting the Back Pressure Regulator Valve [17] full open, counter clockwise, then depress the system STOP switch. Correct any problems, then refer to steps 1 through 14 above.

15. Determine that product water is being produced. This can be assured by a noticeable flow through the Product Water Flow Meter [21]. The system operating, properly interconnected and pressurized, may not produce "potable" water for up to 30 minutes. The salinity of the Product Water diminishes gradually, until the quality of the product water reaches the factory micromho setting at which time the unpotable (red) water light will go out, and the 3-Way Product Diversion Valve [23] will energize and direct flow to the "potable" (good water) position. This allows product water to pass into the Post Filtration components, and in turn, into the Ship's Potable Water Storage Tank [44].

16. Recheck for:

- A constant and proper feed water flow.
- A constant appropriate system operating pressure.
- Leaks in the system: air, water or oil.
- Unusual noises or other occurrences.

CAUTION: Do not allow a system which is operating in Sea Water to exceed 950 psi. Do not allow a system which is operating in brackish water to exceed 800 psi. If the high pressure switch will not automatically shut down the system prior to it reaching 950 psi if operating from Sea Water, bring the pressure down to 0 psi by opening the Back Pressure Regulator Valve and refer to the Commissioning / Initial Start Up section "F" for High Pressure Switch Adjustment procedures.

17. Refer to Section "H" of this manual for shutdown procedures.

Normal Operation: Under normal conditions, the SRC system will perform as indicated in the specifications located in section "B" of this manual and as correlated to the temperature effects charts in section "M" of this manual. Any deviation in performance will indicate that some maintenance or adjustment may be required. If the system is allowed to continue running after deviating from normal operation, the original problem component may cause subsequent damage to properly functioning components. The warranty will be voided on components damaged as a result of operator negligence.

NOTES:

NOTES:

SECTION "H"

SHUTDOWN PROCEDURE

NOTES:

SHUTDOWN PROCEDURE

Prior to system shutdown, it is strongly recommended that the operator observe and compare the performance of the SRC system with the normal operation specifications listed in Section "B" and "Initial New System Readings" from the end of Section "F" of this manual.

By checking the system performance prior to shutdown, any deviations from normal operation can be identified and corrected prior to the next use of the system. This will ensure a properly functioning system when it's needed. If an observed problem is easily defined as a minor one, which will not affect other system components, wait until the product water storage tank(s) is (are) full before shutdown.

High Temperature Condition: The Prefiltration Subsystem, High Pressure Pump and/or R.O. Membrane Elements may have been mounted in a location that is subject to excessive heat. As an example, overheating may occur when the components are mounted in a vessel's engine compartment, or in an unventilated building. The transfer of atmospheric heat could raise the standing water temperature in the components above 122°F/50°C. At or above this high temperature, pressurized hot water could cause irreversible damage to the SRC R.O. Membrane Elements. Therefore, the Back Pressure Regulator Valve [17] must be opened at the time of shutdown. This will ensure that, at the next start-up, new water may enter and cool the system while it is unpressurized.

Sea Recovery Reverse Osmosis Desalination System

DAILY LOG OF SYSTEM READINGS

The following information should be determined and recorded at the time of each system shut down or daily as applicable. The readings should correlate closely with normal operation specifications. By making a record of the system readings the operator can correlate these with subsequent log readings.

Make copies of this form to use in recording system performance prior to stopping the system or daily if the system is on continual duty.

Serial Number: _____ Model Number: _____

Name of Operator: _____ Date: _____

Name of Person Commissioning System: _____

System Power: _____ VAC _____ Hz _____ Phase

Feed Water Temperature: _____ °Fahrenheit or _____ °Celsius

Hour Meter Reading: _____ Hours

Low Pressure Switch Shutdown: _____ PSI

High Pressure Switch Shutdown: _____ PSI

PRESSURE GAUGE READINGS:

Commercial Prefilter Low Pressure Gauge Reading: _____ PSI

Control Panel Low Pressure Gauge Reading: _____ PSI

High Pressure Gauge Reading: _____ PSI

WATER FLOW METER READINGS:

Feed Water Flow Meter: _____ U.S. GPM or _____ Liters Per Minute

Product Water Flow Meter: _____ U.S. GPH or _____ Liters Per Hour

WATER QUALITY:

Feed Water Salinity: _____ PPM

Product Water Salinity: _____ PPM

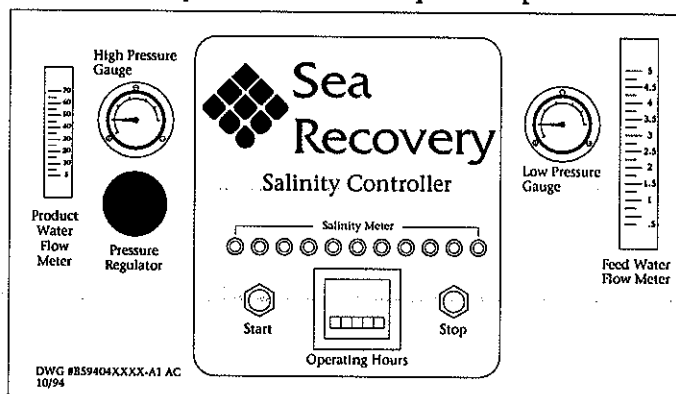
Number of LED Indication on Salinity Controller: _____ LED's

Unusual occurrences: _____

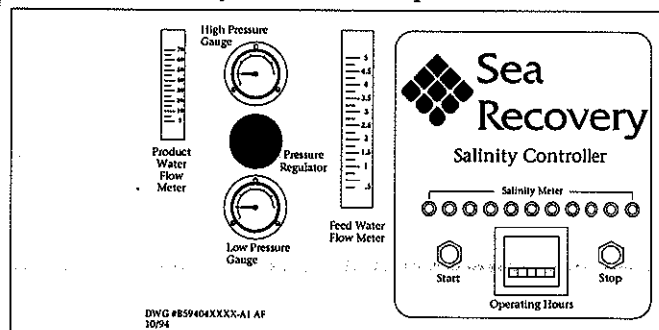
AQUA COMPACT CONTROL PANEL

AQUA FRAME CONTROL PANEL

Sea Recovery Control Panel Aqua Compact Series



Sea Recovery Control Panel Aqua Frame Series



SHUTDOWN PROCEDURES:

1. Record the Sea Recovery System readings onto a blank copy of the "DAILY LOG OF SYSTEM READINGS" form (page H-4 of this manual).
2. Release the pressure on the System by adjusting the Back Pressure Regulator Valve [17] open full counter clockwise. This is important for the following reason:

High Temperature Condition: The Prefiltration Subsystem, High Pressure Pump and/or R.O. Membrane Elements may have been mounted in a location that is subject to excessive heat. As an example, overheating may occur when the components are mounted in a vessel's engine compartment, or in an unventilated building. The transfer of atmospheric heat could raise the standing water temperature in the components above 122°F/50°C.

At or above this high temperature, pressurized hot water could cause irreversible damage to the SRC R.O. Membrane Elements. Therefore, the High Pressure By-Pass Valve must be opened at the time of shutdown. This will ensure that, at the next start-up, new water may enter and cool the system while it is unpressurized.

3. If the Salinity Controller has been opened and or if the 3-way Product Water Diversion Valve manual By-Pass button has been set to manual, then read on else go on to step 4: Ensure that the 3-Way Product Diversion Valve Emergency By-Pass switch (located on the Main Printed Circuit Board inside the Salinity Controller) is OFF and the manual By-Pass button (gray color button) located on the side of the 3-Way Product Diversion Valve coil is out (positioned away from the coil body) so that high salinity product water

produced in the first few minutes after start-up will not contaminate the product storage tank.

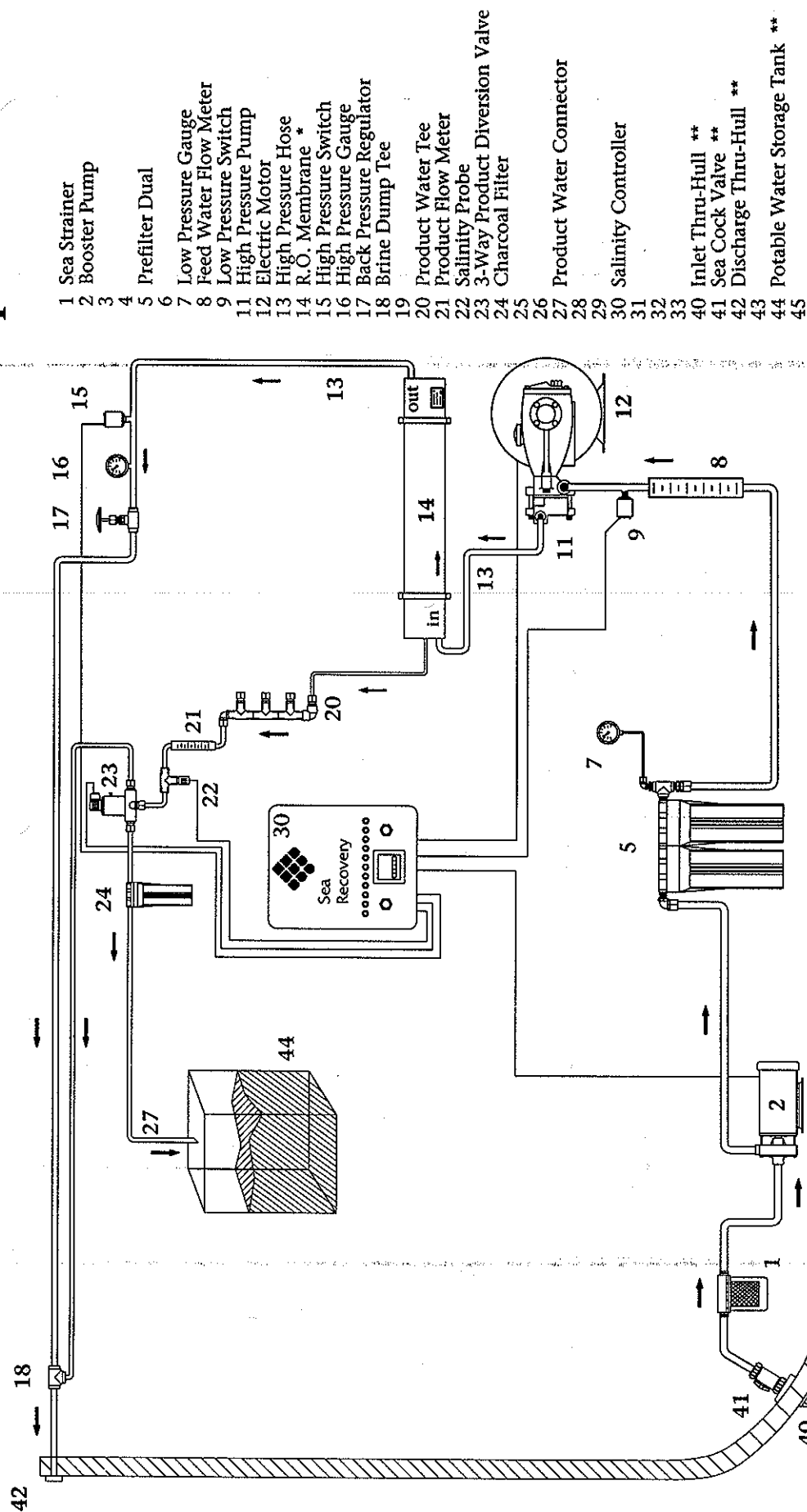
4. Momentarily depress the STOP switch on the Salinity Controller to shut down the system. Check to make sure that the High Pressure Pump has stopped rotating, and the Power light (first green LED on the left) is off.
5. Immediately after stopping the system, close the Inlet Sea Cock Valve [41]. This is a safeguard for vessel installations, as explained below:
 - a. If a water line should develop a leak while the system is shut down, and the Inlet Sea Cock Valve is open, the incoming feed water will fill the bilge.
 - b. By closing the Inlet Sea Cock Valve immediately after system shutdown, siphoning will not occur prior to the next start-up. Holding water in the system ensures immediate water to the High Pressure Pump at the next start-up.
6. Turn off the electrical power source (circuit breaker) to the system. This will eliminate the chance of accidentally starting the system should an electrical short develop, or should someone unintentionally depress the START switch.
7. Refer to Section "J", "Storage & Cleaning Procedure" of this manual.

SECTION "I"

SYSTEM TROUBLESHOOTING GUIDE

NOTES:

Sea Recovery Aqua Frame or Compact Series 200-1500 GPD System

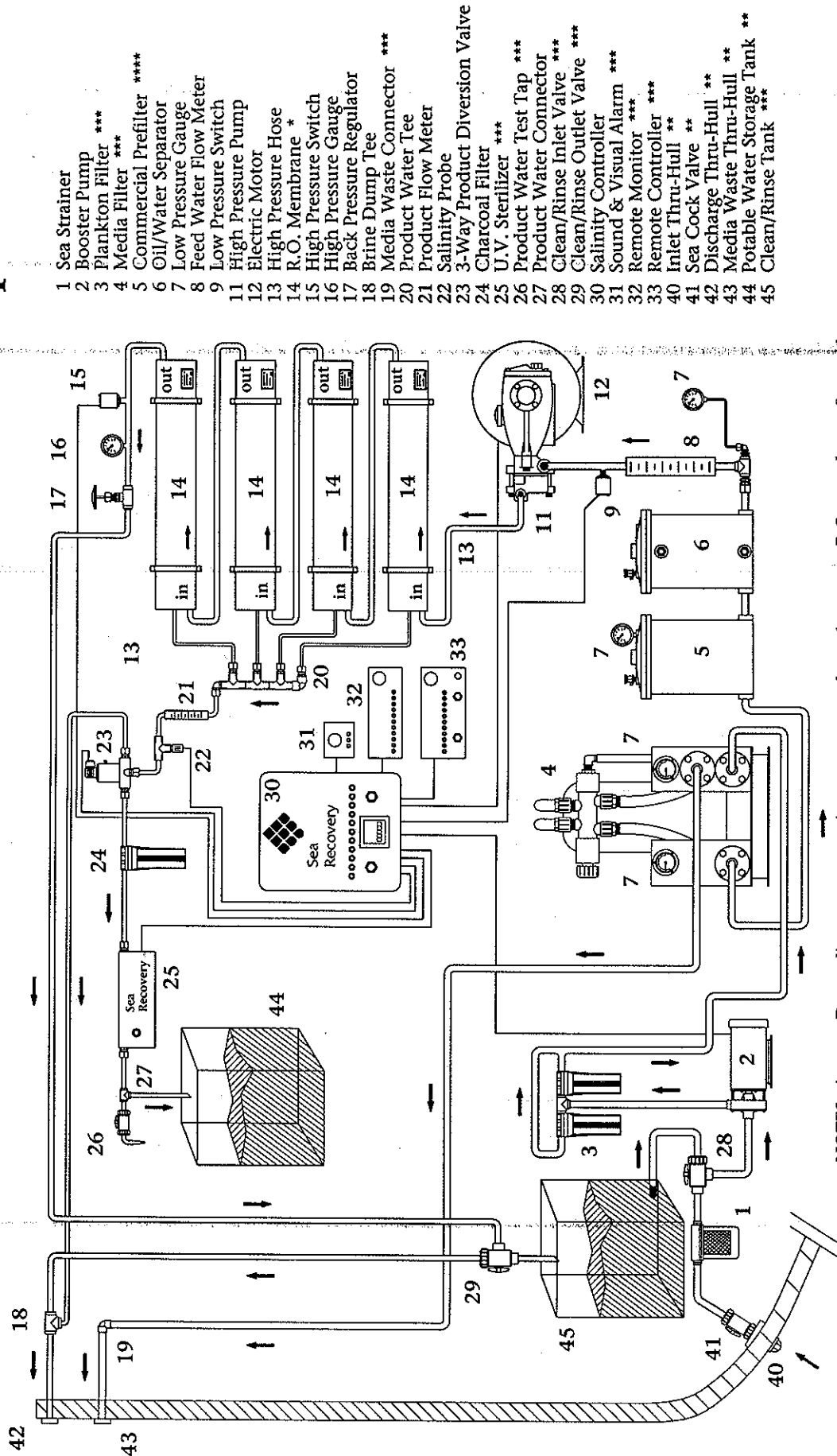


NOTES: * : Depending on system size, system may have 1 or more R.O. membrane & vessel assy
** : Items supplied by installer

**** : Can be substituted for Commercial PreFilter

DWG #A04XXXXXX0-P2 AF/AC-0,1,2
6/94

Sea Recovery Aqua Frame or Compact Series 200-1500 GPD System P&ID Shown as an SRC 1500 AF or AC with no options



- 1 Sea Strainer
- 2 Booster Pump
- 3 Plankton Filter ***
- 4 Media Filter ***
- 5 Commercial Prefilter ****
- 6 Oil/Water Separator
- 7 Low Pressure Gauge
- 8 Feed Water Flow Meter
- 9 Low Pressure Switch
- 11 High Pressure Pump
- 12 Electric Motor
- 13 High Pressure Hose
- 14 R.O. Membrane *
- 15 High Pressure Switch
- 16 High Pressure Gauge
- 17 Back Pressure Regulator
- 18 Brine Dump Tee
- 19 Media Waste Connector ***
- 20 Product Water Tee
- 21 Product Flow Meter
- 22 Salinity Probe
- 23 3-Way Product Diversion Valve
- 24 Charcoal Filter
- 25 U.V. Sterilizer ***
- 26 Product Water Test Tap ***
- 27 Product Water Connector ***
- 28 Clean/Rinse Inlet Valve ***
- 29 Clean/Rinse Outlet Valve ***
- 30 Salinity Controller
- 31 Sound & Visual Alarm ***
- 32 Remote Monitor ***
- 33 Remote Controller ***
- 40 Inlet Thru-Hull **
- 41 Sea Cock Valve **
- 42 Discharge Thru-Hull **
- 43 Media Waste Thru-Hull **
- 44 Potable Water Storage Tank ***
- 45 Clean/Rinse Tank ***

NOTES: * : Depending on system size, system may have 1 or more R.O. membrane & vessel assy

*** : Items supplied by installer

**** : Options

**** : Can be substituted for 1 x 10-25 & 1 x 10-05 micron PreFilter

DWG #A04XXXXXX0-P2 AF/AC-0,1,3
6/94

SRC SYSTEM TROUBLESHOOTING GUIDE

Some system problems have possible causes located in more than one subsystem, and are categorized here according to the subsystem in which they are indicated or most likely to be located. Where two or more possible causes are listed for a problem, it is advised that they be checked in the order listed. This Troubleshooting Guide lists the abnormal symptom and it's possible cause. In order to correct the problem or repair the part, refer to the Maintenance and Repair Section "K" of this manual.

A. PRESSURE GAUGE READINGS:

In diagnosing pressure gauge readings always troubleshoot with the path of the water flow by checking the readings of the pressure gauge first in line which is not reading normal. The symptoms and causes listed below assume that all pressure gauge readings are normal prior to the problem gauge and all pressure gauge readings are below normal after the problem gauge. For "normal" readings refer to the "Initial New System Readings" form in section "F" of this manual. The numbers in brackets [] indicate the identification number shown on pages I-3 & I-4.

1. **LOW PRESSURE GAUGE** - Systems with standard dual 10 inch 25 and 5 micron Prefilters (diagram illustrated on page I-3). Prefilter Outlet - Control Panel Inlet Low Pressure Gauge [7] reading below 6 PSI:
 - a. Prefilter element [4] is fouled, either the first (25 micron) or second (5 micron) Prefilter element.
Replace the fouled Prefilter Element(s).
 - b. Sea Strainer Mesh Screen [1] is obstructed with debris.
Clean the debris from the Sea Strainer Mesh Screen.
 - c. Inlet Sea Cock Valve [41] partially closed and should be fully open and or Inlet Sea Cock Valve packing glands are worn and allowing air to enter the feed line.
Fully Open the Inlet Sea Cock Valve & check the valve's packings.
 - d. Sea Chest, or Inlet Thru Hull Fitting [40] is obstructed with debris.
Clean the marine growth or obstruction from the inlet.
 - e. Suction Line is obstructed with debris or collapsed.
Clean the marine growth or obstruction from the Suction Line or unkink it.
 - f. Booster Pump [2] sucking air from the feed line between the Inlet Thru Hull Fitting [40] and the inlet of the Booster Pump. Check for air passing through the Feed Water Flow Meter [8]. The presence of air in the Feed Water Flow Meter would indicate that there is an air suction leak in the suction side of the system prior to or at the Booster Pump.
Tighten or change the Inlet Sea Cock Valve packings.
Tighten all hose clamps on the Suction Line.
Tighten the Sea Strainer bowl or change the "O" ring between the Sea Strainer housing and bowl.

The Sea Recovery SRC BP-AS25P Booster Pump allows for seal and seat tension adjustment. The SRC BP-AS25P Booster Pump seal and seat may be set too far apart and require closer adjustment. Or, the seal and seat may need replacement. Refer to Section "K" Maintenance & Repair of this manual.

The Sea Recovery SRC BP-AS60P Booster Pump does not allow for seal and seat tension adjustment. The SRC BP-AS60P Booster Pump seal and seat may be worn and in need of replacement. Refer to Section "K" Maintenance & Repair of this manual.

- g. **Booster Pump impeller is worn.**
Replace the impeller if it is worn.

2. LOW PRESSURE GAUGE - Systems with optional Prefiltration including one or more of the following: Plankton Filter [3]; Multi Media Filter [4]; Commercial Prefilter [5]; and or Oil/Water Separator [6] as (diagram illustrated on page I-4).

Booster Pump Outlet - Multi Media Filter [4] Inlet Low Pressure Gauge [7] reading below 10 PSI:

- a. **Plankton Filter Element [3] is obstructed with debris.**
Clean the debris from the Plankton Filter Element.
- b. **Sea Strainer Mesh Screen [1] is obstructed with debris.**
Clean the debris from the Sea Strainer Mesh Screen.
- c. **Inlet Sea Cock Valve [41] partially closed and should be fully open and or Inlet Sea Cock Valve packing glands are worn and allowing air to enter the feed line.**
Fully Open the Inlet Sea Cock Valve & check the valve's packings.
- d. **Sea Chest, or Inlet Thru Hull Fitting [40] is obstructed with debris.**
Clean the marine growth or obstruction from the inlet.
- e. **Suction Line is obstructed with debris or collapsed.**
Clean the marine growth or obstruction from the Suction Line or unkink it.
- f. **Booster Pump [2] sucking air from the feed line between the Inlet Thru Hull Fitting [40] and the inlet of the Booster Pump. Check for air passing through the Feed Water Flow Meter [8]. The presence of air in the Feed Water Flow Meter would indicate that there is an air suction leak in the suction side of the system prior to or at the Booster Pump.**
Tighten or change the Inlet Sea Cock Valve packings.
Tighten all hose clamps on the Suction Line.
Tighten the Sea Strainer bowl or change the "O" ring between the Sea Strainer housing and bowl.

The Sea Recovery SRC BP-AS25P Booster Pump allows for seal and seat tension adjustment. The SRC BP-AS25P Booster Pump seal and seat may be set too far apart and require closer adjustment. Or, the seal and seat may need replacement. Refer to Section "K" Maintenance & Repair of this manual.

The Sea Recovery SRC BP-AS60P Booster Pump does not allow for seal and seat tension adjustment. The SRC BP-AS60P Booster Pump seal and seat may be worn and in need of replacement. Refer to Section "K" Maintenance & Repair of this manual.

- g. **Booster Pump impeller is worn.**
Replace the impeller if it is worn.

Multi Media Filter [4] Outlet - Commercial Prefilter [5] Inlet Low Pressure Gauge [7] reading below 8 PSI:

- a. **Multi Media Filter [4] is obstructed with debris.**
Back wash the Multi Media Filter [4].

Commercial Prefilter [5] Outlet -Control Panel Inlet Low Pressure Gauge [7] reading below 6 PSI:

- a. **Commercial Prefilter Element [5] is obstructed with debris.**
Replace the fouled Commercial Prefilter Element.
- b. **Oil/Water Separator Element [6] is obstructed with debris.**
Replace the fouled Oil/Water Separator Element.

3. HIGH PRESSURE GAUGE [16] - High Pressure Pump Outlet - Across R.O. Membrane Elements - Back Pressure Regulator Inlet [17] (at the Control Panel) reading lower than normal:

Use caution in diagnosing the reading of the High Pressure Gauge [17]. If the gauge is reading low it may simply be that the Back Pressure Regulator requires adjustment. However, there may be a problem with the High Pressure Pump [12], Back Pressure Regulator Valve [17] and or the High Pressure Gauge [16]. If the High Pressure Pump has worn seals or eroded manifold(s) this would cause the High Pressure Gauge to read low along with a low reading at the Feed Water Flow Meter [8] and the Product Water Flow Meter [21]. If the Back Pressure Regulator Valve [17] has a worn Valve Stem or Valve Body Seat the pressure will not be attainable but the Feed Water Flow Meter [8] will read normal. Therefore, you must correlate a low High Pressure Gauge [16] reading with the Feed Water Flow Meter [8] and the Product Water Flow Meter [21].

- a. **If the Feed Water Flow Meter [8] reading is normal and the Product Water Flow Meter [21] reading is also normal (for the given pressure reading) then the Back Pressure Regulator [17] may simply require adjustment.**
While the system is in operation adjust the Back Pressure Regulator Valve clockwise until the High Pressure Gauge [16] reads 800 psi (sea water feed source).
- b. **If the Feed Water Flow Meter [8] reading drops below normal as the Back Pressure Regulator Valve is adjusted clockwise and the Product Water Flow Meter [21] reading is low or does not show a reading at all, then it is likely that the High Pressure Pump [8] is experiencing a problem.**
The High Pressure Pump internal parts may be worn or broken.
The High Pressure Pump manifold may be corroded or eroded.

- c. If the Feed Water Flow Meter [8] reading remains normal as the Back Pressure Regulator Valve is adjusted clock wise and the Product Water Flow Meter [21] reading is low or does not show a reading at all, then it is likely that the Back Pressure Regulator Valve Stem or Body Seat is worn and requires replacement.

Disassemble and inspect the Back Pressure Regulator Valve Stem and Body cavity Seat.

- d. If the Feed Water Flow Meter [8] reading remains normal as the Back Pressure Regulator Valve is adjusted clock wise and the Product Water Flow Meter [21] reading is also normal, then it is likely that the High Pressure Gauge is defective and reading lower than the actual pressure present.

Replace the High Pressure Gauge [16].

B. FLOW METER READINGS:

In diagnosing flow meter readings always correlate the reading with both the Feed Water Flow Meter [8] reading and the Product Water Flow Meter [21] reading as well as consideration to the High Pressure Gauge [16] reading and the condition of the High Pressure Pump [11]. Always check first to ensure that the pressure gauge readings are normal. The symptoms and causes listed below assume that all pressure gauge readings are normal. For "normal" readings refer to the "INITIAL NEW SYSTEM READINGS" in section "F" of this manual.

1. The Feed Water Flow Meter [8] shows the amount of Feed Water entering the system and, in turn, accepted by and discharged by the High Pressure Pump. The High Pressure Pump is a positive displacement pump. This means that it will always draw a pre-defined amount of water unless there is a problem at the High Pressure Pump. Therefore, a drop from normal reading on the Feed Water Meter [8] indicate that either the High Pressure Pump is not functioning properly or it is being driven at a lower than normal RPM from it's electric motor. Therefore, proper diagnosis of the Feed Water Flow Meter [8] reading can assist in locating a problem at the High Pressure Pump.

- a. Feed Water Flow Meter [8] reading is less than normal with no operating pressure applied to the system:

If the low pressure gauge, at the system control panel, is reading a vacuum, below 0 PSI, the High Pressure Pump is being starved by lack of feed water. Refer to pressure gauge readings above and check all prefiltration components.

The High Pressure Pump has massive corrosion or erosion within the manifold and it is in need of extensive repair or replacement.

The Cycles delivered to the High Pressure Pump Electric Motor have dropped below normal and the electric motor is turning at a slower than normal speed. Check the Power Source and correct it as necessary.

- b. Feed Water Flow Meter [8] reading is normal with no pressure applied to the system but as pressure is applied to the system the Feed Water Flow Meter [8] drops below normal flow:

High Pressure Pump has worn seals.

High Pressure Pump has worn valves.

High Pressure Pump has a worn manifold.

The power source to the system is insufficient and allowing the electric motor to slow down.

- c. **Feed Water Flow Meter [8] reading is normal with no pressure applied to the system and the Product Water Flow Meter [19] shows high Product Water Flow:**

R.O. Membrane Element or High Pressure Vessel is damaged or there is a defective "O" ring seal within one of the Vessels.

- d. **Feed Water Flow Meter [8] reading is normal with no pressure applied to the system but the bobbin is pulsating up and down and as pressure is applied to the system the Feed Water Flow Meter [8] bobbin pulsates more radically:**

High Pressure Pump has a broken or stuck valve, or a broken or stuck valve spring. There may also be debris in one of the valve chambers which is causing a valve to not properly seat.

- 2. **The Product Water Flow Meter [21] shows the amount of Product Water being produced by the R.O. Membrane Element. In Sea Water applications the Product Water Flow Meter will not register until the System Pressure exceeds 420 PSI. For each 100 PSI applied over 420 PSI the Product Water Flow Meter will register about 25% of normal production (ie: at 520 PSI 25% production is achieved; at 620 PSI 50% production is achieved; at 720 PSI 75% production is achieved; and at approximately 820 PSI full production is achieved). Therefore, if full production registers on the Product Water Flow Meter when the system is at or below 420 PSI operating pressure this would indicate that the R.O. Membrane Vessel Assembly has a problem, such as a defective "O" ring, defective Membrane Element, or damaged High Pressure Vessel. If full operating pressure of 820 PSI produces a Product Water Flow Meter reading below normal this would indicate that the system Feed Water is at a low temperature, the R.O. Membrane Element is fouled and requires cleaning, the R.O. Membrane Element has dried out and requires replacement, the R.O. Membrane Element has been subjected to chemical fouling and requires replacement, the R.O. Membrane Element has been exposed to temperatures above 140° F and requires replacement or the R.O. Membrane Element has been subjected to pressures above 1000 PSI.**

- a. **Product Water Flow Meter [21] registers substantial flow when the system operating pressure is below 420 PSI and the system is operating in Sea Water.**

The R.O. Membrane Element is defective or broken.

The Product Water "O" Rings within the High Pressure Vessel are defective.

The System has been over pressurized and the High Pressure Vessel has been elongated and destroyed.

The End Plug within the High Pressure Vessel is split or cracked.

- b. **After compensating for Temperature of the Feed Water, the Product Water Flow Meter [21] registers lower than normal flow when the system operating pressure is 820 PSI and the system is operating in Sea Water.**

R.O. Membrane Element [14] is fouled and requires cleaning.

High Pressure Gauge [16] is defective and registering higher than the actual applied pressure.

Product Water Flow Meter is out of calibration.

Temperature and Pressure correction has not been properly calculated, refer to Section "M" of this manual.

There is a restriction in the Product Water Line from the R.O. Membrane Vessel Assembly [14] to the ship's Product Water Storage Tank [44] such as a closed valve, line kink or debris clogging a component port.

C. PRODUCT WATER QUALITY:

1. **Quantity of feed water as delivered by the High Pressure Pump:** The R.O. Membrane Element requires a specified amount of Feed Water flow in order to reject impurities. Less than required Feed Water flow will cause the R.O. Membrane Element to recover a high percentage of Product Water (ratio of Feed Water to Product Water) and will also cause the R.O. Membrane Element to foul quickly. It is, therefore, important to maintain the proper amount of Feed Water Flow into the R.O. Membrane Element. This proper Feed Water Flow must be maintained in order for the R.O. Membrane Element to properly reject impurities and remain free and clear of mineral build up fouling. If the Feed Water Flow drops below normal correct the problem and do not operate the system until the Feed Flow problem is corrected.
2. **Condition and clarity (quality) of the Feed Water, as filtered by the Prefiltration Section of the System:** The clarity of the Feed Water effects the ability of the R.O. Membrane Element to remain clean and, in turn, reject the impurities of the Feed Water. If the Prefiltration Section of the System is not working properly and not trapping the suspended solids, contained in the Feed Water, the R.O. Membrane Element will quickly become fouled and lose it's ability to reject the dissolved solids or impurities in the Feed Water. Always ensure that there are Prefilter Elements within the Prefilter Housings. Never use Prefilter Elements that are not Sea Recovery supplied. Non Sea Recovery supplied Prefilter Elements may be of the wrong micron rating, wrong material, wrong size or wrong type. Use of non Sea Recovery Prefilter Elements will lead to rapid fouling of the R.O. Membrane Element and render them unusable in a short period of time.
3. **Operating Pressure of the System and the Temperature of the Feed Water:** Sea Water applications require that the System be operated at 820 PSI in order to gain optimal performance of the R.O. Membrane Element. Pressures below 820 PSI will cause low Product Water Production as well as poor Product Water Quality (increase of impurities in the Product Water). The Operating Pressure must, however, be correlated to the Feed Water Temperature. With a Feed Water Temperature below 77°F / 25°C the system may be operated at higher pressures in order to gain optimal performance. With a Feed Water Temperature above 77°F / 25°C the system must be operated at lower pressures in order to prevent excessive Product Water recovery and prevent fouling of the R.O. Membrane Element. However, with Feed Water Temperature above 77°F / 25°C there will be a decline in Product Water Quality (increase in impurities in the Product Water). This is a natural and predicted occurrence with Reverse Osmosis applications. Therefore, when operating the System with Feed Water Temperature above 77°F / 25°C a decline in Product Water Quality should not be of concern. As this would not indicate a problem. This condition will correct itself as Feed Water Temperature lowers.
 - a. **Salinity Meter [30] reads higher than normal or the red light will not go out:**
 - The system operating pressure is below normal, adjust it accordingly.
 - The R.O. Membrane Elements are fouled and require cleaning.
 - The Feed Water Flow Meter reading is low, refer to the Feed Water Flow Meter troubleshooting.

A product water "O" ring within the R.O. Membrane Element Vessel is defective and requires replacement.

The R.O. Membrane Element has developed a hole.

The End Plug within the High Pressure Vessel is split or cracked.

The Temperature of the Feed Water is higher than normal.

The Salinity Meter set point has drifted and requires calibration.

D. HIGH PRESSURE PUMP:

The high pressure pump [11] is a positive displacement pump. The pump will always deliver the normal amount of water flow unless a problem has developed within the pump or the RPM from the Electric Motor has changed due to low Cycles or low Voltage from the Power Source.

- 1. High Pressure Pump flow is normal (at the Feed Water Flow Meter [8]) when the system operating pressure is at zero, but the flow drops below normal as pressure to the system is applied by adjusting the Back Pressure Regulating Valve [17]:**

Worn High Pressure Pump seals are allowing internal by-passing and require replacement.

Worn High Pressure Pump valves, valve seats and or valve seat "O" rings are allowing internal by-passing and require replacement.

Worn, corroded or eroded discharge manifold is allowing internal by-passing and requires replacement.

The Electric Motor RPM has lowered due to improper Cycles and or Voltage to the Motor from the Power Source to the System.

- 2. High Pressure Pump flow is normal (at the Brine Discharge Flow Meter) when the system operating pressure is at zero, but the flow becomes erratic and pulsating as pressure to the system is applied:**

Worn or broken High Pressure Pump valves, valve seats, valve springs and or valve seat "O" rings are allowing internal by-passing and require replacement.

Debris is trapped within a High Pressure Pump valve chamber.

- 3. High Pressure Pump flow is normal (at the Feed Water Flow Meter [8]) when the system operating pressure is at zero, but the High Pressure Gauge [16] does not register pressure as the the Back Pressure Regulator Valve [17] is adjusted clockwise yet the Feed Water Flow Meter reads normal and normal Product Water Flow registers on the Product Water Flow Meter [21] as the Back Pressure Regulator Valve is adjusted clockwise:**

The High Pressure Gauge [16] is defective.

- 4. High Pressure Pump [8] leaks oil:**

The oil seal is worn, replace it.

The crankcase "O" ring seal is defective, replace it.

The crankcase is cracked, replace it.

The shaft cover or crankcase rear cover is loose.

The Pump to Motor adaptor plate is loose. Disassemble the High Pressure Pump from the Electric Motor, replace all bolts and reassemble using red loctite and properly torque all bolts.

5. High pressure pump [8] leaks water from its bottom, between the manifold and the crankcase housing:

Worn low pressure inlet packings, replace the packings. Look for signs of erosion or corrosion on the manifold under the packings during replacement. If signs of erosion or corrosion is present replace the manifold.

E. PRESSURE SWITCHES:

The Low Pressure Switch [9] is a normally open switch which closes as pressure builds on the Prefiltration Section of the System and it is set to open and shut the system down as the Feed Water Pressure into the inlet of the High Pressure Pump drops below 2 to 4 PSI. The High Pressure Switch [15] is a normally closed switch and it is set to open and shut the System down as the System Pressure into the Back Pressure Regulator exceeds 950 psi.

1. LOW PRESSURE SWITCH:

a. The System shuts down when the feed water pressure is greater than 6 PSI:
The low pressure switch [9] is opening prematurely or not properly closing and requires adjustment downward to maximum 6 PSI, minimum 2 PSI.

b. The System does not shut down when the feed water pressure declines below 2 psi:
The low pressure switch [9] is adjusted too low and not opening. It requires adjustment upward to maximum 6 psi, minimum 2 psi.

2. HIGH PRESSURE SWITCH:

a. The System shuts down when applying pressure to the system but operating pressure does not exceed 900 psi:
The High Pressure Switch [15] is opening prematurely and requires adjustment upward to maximum 950 psi, minimum 900 psi.
The High Pressure Gauge [16] is defective and reading low.

b. The System does not shut down when the operating pressure applied exceeds 950 psi:
The high pressure switch [15] is adjusted too high and not opening. It requires adjustment downward to maximum 950 psi, minimum 900 psi.
The High Pressure Gauge [16] is defective and reading high.

F. POST FILTRATION SUBSYSTEM:

- 1. Product water leaks from Product Water Tubing when 3 Way Product Diversion Valve [23] energizes to direct water to Post Filtration:**
The vent on the Product Water Storage Tank [44] is closed, open the vent permanently.
A valve after the SRC System is closed, remove the valve or open it permanently.
Product water pipe is blocked or crimped, locate the blockage or crimp and correct.
One or more of the post filters are plugged, change the plugged filter element(s).

2. Sulfurous (rotten egg) smell in the Product Water Storage Tank:

The system has sat for an extended period of time without operation and the biological slimes trapped within the Prefilter have decayed and are producing hydrogen sulfite. Replace the Prefilters and clean their respective housings.

Saturated Charcoal Filter Element [24], replace the element.

Contaminated product storage tank(s), clean and chlorinate storage tank(s) as required.

In existing plumbing or filters not included as part of the SRC system, isolate the origin and correct.

3. The Ultra Violet Sterilizer [25] lamp continuously flickers or does not illuminate.

The U.V. Lamp has lost it's power. Change the U.V. Lamp.

The Starter within the U.V. Sterilizer housing has become weak. Replace the Starter.

The Voltage to the U.V. Sterilizer is too low. The U.V. Sterilizer ballast is very voltage sensitive. Over voltage will destroy the ballast, under voltage will cause the lamp to continually flicker and eventually burn out. Check the Power Source to the System and ensure that the Voltage supplied is correct and within specifications.

G. ELECTRONIC SUBSYSTEM:

1. Salinity Meter registers full scale, red light on, continuously.

The R.O. Membrane Element may be fouled.

The Salinity Meter may require calibration.

2. Salinity Meter registers low scale, green or yellow light on, but the product water has a definite salt taste.

The Salinity Meter may require calibration.

The Salinity Meter printed circuit board SRC LED may be defective.

3. Start switch is depressed but the system does not attempt to start:

Power source is switched off, reset the power source (breaker or disconnect)

Blown fuse in the controller, check fuse condition.

Controller is wired improperly or there are loose wires, check wiring with proper wiring diagram

Start switch is defective and not closing to make the circuit. The Start Switch is a SPST N.O. switch.

4. Fuse in controller blows at start up:

Shorted wire, locate shorted wire and repair it.

Low or high voltage into the system, correct at the source into the system.

5. System starts when the START button is depressed, but stops when start button is released:

Dirty prefiltration system, clean or replace the appropriate filter.

Low pressure switch is not closing, allow sufficient pressure to build up to close switch.

The operating pressure is set too high. Do not allow the operating pressure to exceed 950 PSI. Open the Back Pressure Regulator Valve [17] full counter clockwise.

Defective low pressure switch, replace or calibrate the low pressure switch.
Defective high pressure switch, replace or calibrate the high pressure switch.
Loose or corroded electrical connection, clean and tighten the connections.
Improper wiring, check wiring against diagrams.

6. System will not stop when STOP button is depressed:

Defective STOP switch, replace the switch. The Stop Switch is a SPST N.C. switch.
Improper wiring, check wiring against diagrams.
Defective Printed Circuit Board. Water damage is likely.

7. 3 Way Product Diversion Valve [23] will not switch from bad water dump position to good product water position when the Unsafe water (red) LED is off:

Loose or corroded connections, clean and tighten the connections.
Defective valve coil.
Defective PCB.
3-way Product Diversion Valve is plumbed backwards, check direction of the valve plumbing and correct.
Improperly wired, check wiring connections.

8. Product water transfers to the Post Filtration Subsystem when the Unsafe water (red) LED is illuminated:

The valve's manual override lever is activated, release the lever to the normal position.
The emergency by-pass switch, located on the PCB MAIN, is ON, switch to OFF.
The PCB MAIN is defective, replace the board. Water damage is likely.
3 Way Product Diversion Valve is plumbed backwards, check direction of the valve plumbing & correct.
3 Way Product Diversion Valve is wired incorrectly at the electronic controller, check the wiring against the wiring diagrams in this manual.

NOTES:

NOTES:

SECTION "J"

SYSTEM & R.O. MEMBRANE ELEMENT

STORAGE PROCEDURE

WINTERIZING & FREEZING

TEMPERATURE STORAGE

&

CLEANING PROCEDURE

NOTES:

1. SYSTEM STORAGE:

R.O. MEMBRANE ELEMENT HANDLING & SYSTEM STORAGE CAUTIONS:

TEMPERATURE CAUTION: As pointed out in other sections of this manual, never expose the SRC R.O. membrane(s) to storage temperatures above 122°F / 50°C or below 32°F / 0°C. Never store the R.O. membrane assembly in direct sunlight. High temperature will cause up to 40% flux loss (loss of production) of the R.O. membrane element(s). This damage is irreversible to the R.O. membrane element. Freezing temperatures will cause mechanical damage to the SRC system due to the expansion of water as it freezes. This damage is irreversible to the R.O. membrane element.

DRYING OUT CAUTION: Never allow the R.O. membrane element to dry out. If the R.O. membrane element is allowed to dry out up to 40% flux loss (loss of production) will occur. This damage is irreversible to the R.O. membrane element. The R.O. membrane element(s) must remain wet at all times.

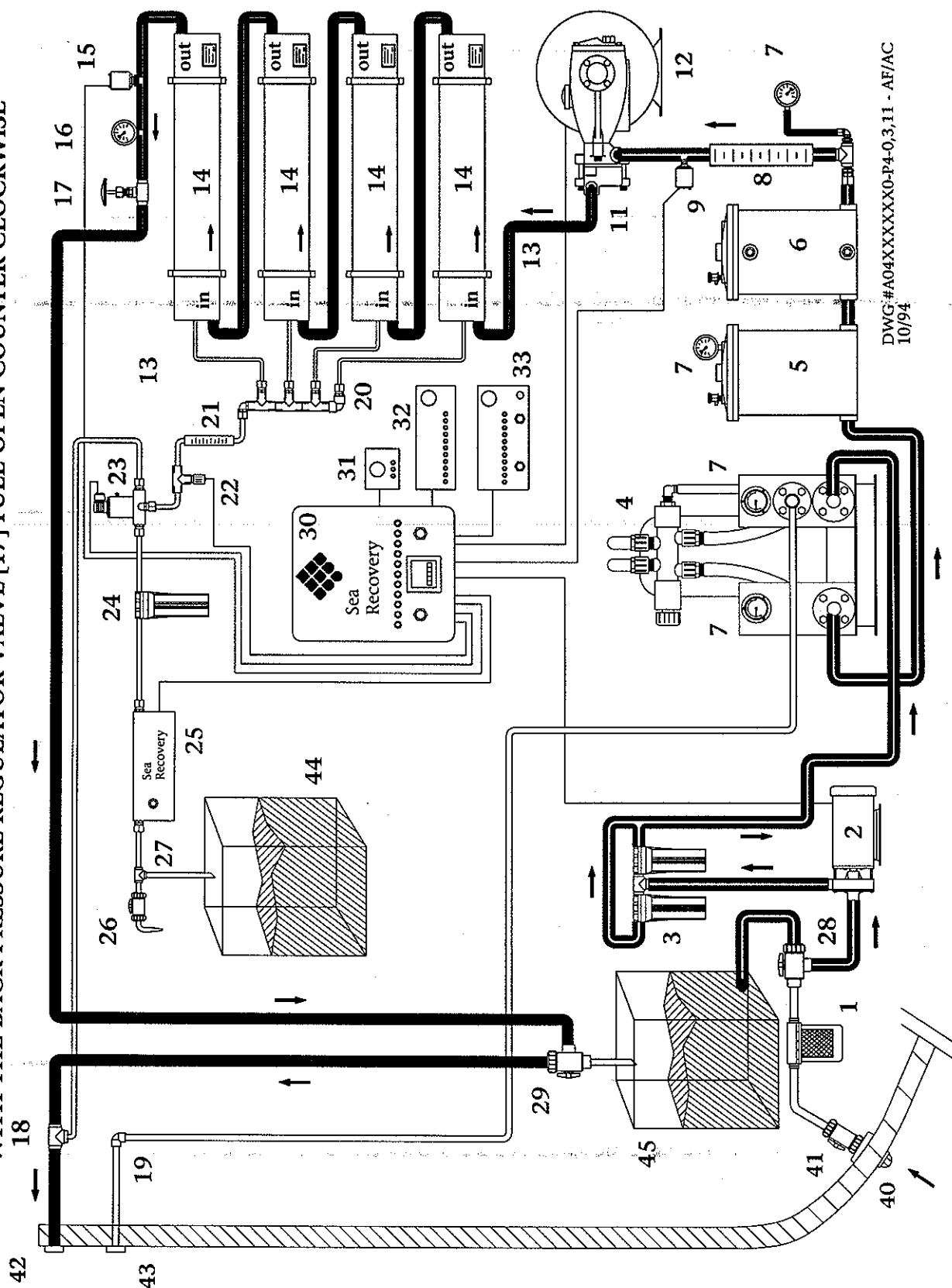
BIOLOGICAL FOULING CAUTION: Protect the R.O. membrane element from biological fouling. Up to 40% flux loss (loss of production) will occur if the element is allowed to become extensively fouled by biological slimes. Some, but not all, flux may be regained after thorough cleaning.

STORAGE CAUTION: The interior of a membrane element, being dark and moist, is an excellent breeding ground for micro-organisms. When the membrane element is used, tested or operated intermittently, it will be exposed to micro-organisms. Simply operating the system will not protect the R.O. Membrane Element(s) from biological fouling. Up to 40 percent flux loss (loss of productivity) due to biological fouling can occur in the element if it is not stored properly. During short term shutdowns the membrane element must be rinsed as explained on the following pages. During long term shutdowns the membrane element must be rinsed as well as chemically treated as explained later in this chapter.

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System

Shown as an SRC 1500 AF or AC with all options

ILLUSTRATING WATER FLOW DURING A ONCE THROUGH FRESH WATER RINSE OF THE SYSTEM WITH THE BACK PRESSURE REGULATOR VALVE [17] FULL OPEN COUNTER CLOCKWISE

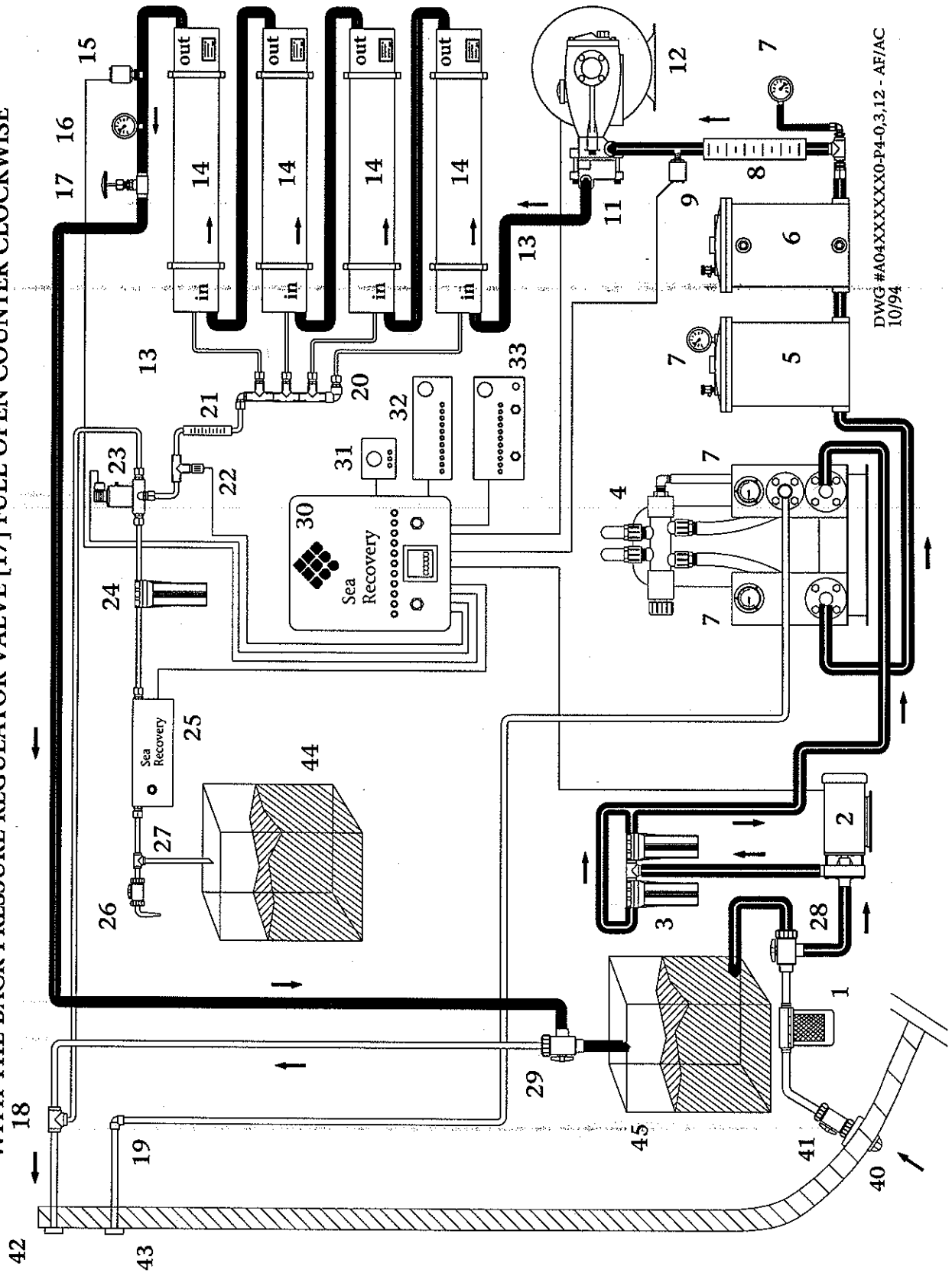


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10/94

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System

Shown as an SRC 1500 AF or AC with all options

ILLUSTRATING WATER OR CHEMICAL FLOW IN A CONTINUAL CLOSED LOOP
WITH THE BACK PRESSURE REGULATOR VALVE [17] FULL OPEN COUNTER CLOCKWISE



DWG #A04XXXXXX0-P4-0,3,12 - AF/AC
10/94

A. SHORT TERM SHUTDOWN:

A short term shutdown may be defined as a period of time in which the SRC system will not be utilized for a minimum of two days to a maximum of two weeks. During a short term shutdown, there is a simple precaution which must be taken, as follows: **ONE TIME THROUGH FRESH WATER RINSE PROCEDURE:**

An excellent, yet inexpensive, short term method of protecting the SRC system and R.O. membrane element is to perform a "once through" flush of the entire system with fresh water (product water from the system). This will prolong the system life by hindering the possibility of any electrolysis and also retarding biological growth.

Follow the directions below. This procedure will displace the system feed water with fresh water and thus render the system suitable for a short term shutdown for up to 2 weeks. A minimum of 30 gallons / 113 liters of fresh product or potable water will be required for this process. Refer to the Once Through Rinse diagram on page J - 4 above. Numbers in brackets [] correspond to the identification numbers within the diagram.

Where reference is made to the Clean/Rinse Inlet & Outlet Valves and if the system is not equipped with these optional valves simply disconnect the Inlet Hose at the Sea Strainer [1] and Brine Discharge Hose at the Brine Discharge Tee [18]. Reconnect these two hoses to the Clean/Rinse Tank appropriately.

1. Close the Inlet Sea Cock Valve [41].
2. Connect the Clean/Rinse Tank discharge line to the Clean/Rinse Inlet Valve [28].

3. Fill the Clean/Rinse Tank [45] full with non-chlorinated (chlorine free) product water. The cleaning tank must contain enough non-chlorinated product water to sustain rinsing of the system until all of the feed water is displaced. This process will require approximately 30 gallons / 113 liters, depending upon the actual system size and option configuration. If the system will be exposed to freezing temperatures add ten percent (3 gallons / 11 liters) food grade glycerin to the rinse water. This will protect the water in the system from freezing.
4. Position the Clean/Rinse Inlet Valve [28] to the Clean/Rinse Tank position [45].
5. Position the Clean/Rinse Outlet Valve [29] to the Brine Discharge position [42] normal operation position.
6. Open the Back Pressure Regulating Valve [17] full open counter clockwise. Note: The system must rinse with no High Pressure applied.
7. Operate the system by pressing the System Start Switch. The rinse water is now rinsing the entire Sea Recovery R.O. system and discharging out to waste.

After approximately 7 to 12 minutes of running the rinse water will be depleted and the system's Low Pressure Switch will stop the system.

The system is now exposed to fresh rinse water and may be left unattended for up to two weeks.

B. LONG TERM SHUTDOWN:

A Long Term or Prolonged Shutdown may be defined as a period of time in which the SRC system will not be utilized for longer than two weeks. During a prolonged shutdown, the following precaution must be taken:

FRESH WATER RINSE & STORAGE SOLUTION INJECTION PROCEDURE FOR A PROLONGED SHUTDOWN: The Sea Recovery R.O. system must first be rinsed with fresh water then stored with SRC SC System and Membrane Element Storage Chemical. This chemical inhibits bacterial growth while maintaining the high flux and salt rejection of the SRC R.O. Membrane Element. Follow the directions listed below. The SRC

System should be rinsed then flushed once through with the storage solution at the beginning of prolonged shutdowns. A minimum of 50 gallons / 189 liters of fresh product or potable water will be required for this combined process.

WINTERIZING AND FREEZING TEMPERATURE STORAGE NOTE: If the system will be exposed to freezing temperatures add twenty percent (4 gallons / 15 liters) food grade glycerin (propylene glycol) to the final rinse water. This will protect the water in the system from freezing.

Sea Recovery SRC SC Storage Chemical

WARNING: CONTAINS SODIUM METABISULFITE. HARMFUL IF SWALLOWED, AVOID BREATHING DUST & FUMES. CAUSES IRRITATION TO EYES & MUCOUS MEMBRANES. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, GIVE TAP WATER & INDUCE VOMITING. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC SC", SYSTEM & MEMBRANE STORAGE CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER:

1-800-228-5635. (Outside the U.S.A. 612-221-2113)

FOR INDUSTRIAL USE ONLY. Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. ~~Do not allow powder to become wetted~~ with small amounts of water. Adding small amounts of water to powder may liberate irritating sulfur dioxide gas. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

KEEP OUT OF REACH OF CHILDREN
NET CONTENTS 1.5 POUNDS (.68 Kg)

CAUTION: Do not use for storage, hydrogen peroxide, chloramine, chloramine-T, N-chloroisocyanurates, chlorine dioxide, hypochlorite, chlorine, iodine, phenolic disinfectants or any other specific chemical not approved in writing by Sea Recovery Corp. Use of non authorized or misuse of authorized chemicals will void any warranty.

Where reference is made to the Clean/Rinse Inlet & Outlet Valves and if the system is not equipped with these optional valves simply disconnect the Inlet Hose at the Sea Strainer [1] and Brine Discharge Hose at the Brine Discharge Tee [18]. Reconnect these two hoses to the Clean/Rinse Tank appropriately.

1. Close the Inlet Sea Cock Valve [41].
2. Connect the Clean/Rinse Tank discharge line to the Clean/Rinse Inlet Valve [28].
3. Fill the Clean/Rinse Tank [45] full with non-chlorinated (chlorine free) product water. The cleaning tank must contain enough non-chlorinated product water to sustain rinsing of the system until all of the feed water is displaced.

This process will require approximately 30 gallons / 113 liters, depending upon the actual system size and option configuration.

4. Position the Clean/Rinse Inlet Valve [28] to the Clean/Rinse Tank position [45].
5. Position the Clean/Rinse Outlet Valve [29] to the Brine Discharge position [42] normal operation position.

6. Open the Back Pressure Regulating Valve [17] full open counter clockwise. **Note:** The system must rinse with no High Pressure applied.

7. Operate the system by pressing the System Start Switch. The rinse water is now rinsing the entire Sea Recovery R.O. system and discharging out to waste.

After approximately 7 to 12 minutes of running the rinse water will be depleted and the system's Low Pressure Switch will stop the system.

NOTE: The system has now been rinsed with fresh water and is ready for a once through Storage Chemical solution injection as follows:

8. Add approximately 20 gallons of product water to the Clean/Rinse Tank [45].
9. Fill a separate plastic bucket or container (2 to 5 gallons) 3/4 full with product water. Add to the water in the plastic bucket or container 1 (one) bottle of Sea Recovery SRC SC Storage Chemical. Mix the solution thoroughly in the container. Pour the solution contents of the bucket or container into the Clean/Rinse Tank [45].

WINTERIZING AND FREEZING TEMPERATURE STORAGE

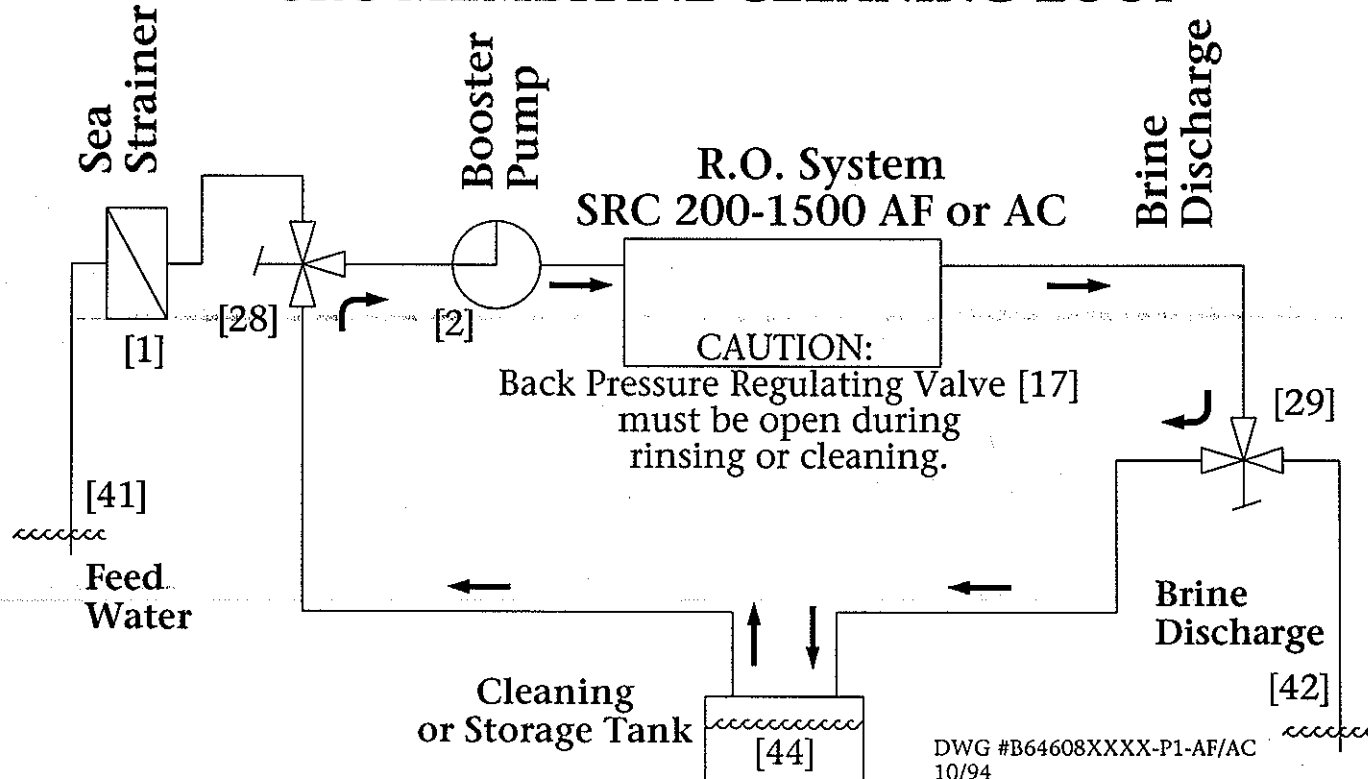
NOTE: If the system will be exposed to freezing temperatures add twenty percent (4 gallons / 15 liters) food grade glycerin (propylene glycol) to the rinse water at this time. This will protect the water in the system from freezing.

10. Operate the system by pressing the System Start Switch. The Storage Chemical mixture is now rinsing the entire Sea Recovery R.O. system and discharging out to waste.

After approximately 7 to 12 minutes of running the Storage Chemical mixture will be depleted and the system's Low Pressure Switch will stop the system.

The system is now exposed to Storage Chemical and may be left unattended for up to 3 to 4 months.

SIMPLIFIED VERSION OF SRC MEMBRANE CLEANING LOOP



2. SRC R.O. MEMBRANE ELEMENT CLEANING PROCEDURES

The membrane elements will require cleaning from time to time. Biological growth and salt accumulation will eventually make replacement necessary. The frequency of required cleaning is dependent on the rate of production loss and salt rejection loss caused by normal use. In order to properly assess performance changes, it is important that the initial flow and rejection readings be logged for comparison.

When determining the percentage of performance changes, feed water temperature and system pressure must be taken into consideration (Refer to the Temperature and Pressure Effects Chart in section "M") and compensate for those variables. After compensations, a 10% decline in productivity (GPH Flow) and/or a 10% increase in salt passage

(indicated by the Salinity Controller LED Meter) will indicate that the membrane may require cleaning.

CAUTION: If the system is allowed to continue running after the described changes in productivity and/or salt rejection have occurred, the fouling membrane will rapidly degrade, becoming more difficult and eventually impossible to clean. As with any filtering device, early detection and correction of fouling will lead to prolonged life. Irreversible fouling brought about by user neglect will void all SRC System Limited Warranty.

The cleaning compounds available from Sea Recovery are designed to clean the R.O. membrane elements in a closed-loop configuration.

Sea Recovery SRC MCC1 Membrane Cleaning Chemical

WARNING: CONTAINS SODIUM METASILICATE. HARMFUL IF SWALLOWED. MAY CAUSE BURNS. AVOID CONTACT WITH EYES. AVOID PROLONGED CONTACT WITH SKIN. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, DO NOT INDUCE VOMITING, GIVE ONE GLASS OF TAP WATER OR MILK. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC MCC1", R.O. MEMBRANE ELEMENT ALKALINE DETERGENT CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635. (Outside the U.S.A. 612-221-2113)

FOR INDUSTRIAL USE ONLY. Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

**KEEP OUT OF REACH OF CHILDREN
NET CONTENTS 1.5 POUNDS (.68 Kg)**

Sea Recovery SRC MCC2 Membrane Cleaning Chemical

DANGER: CONTAINS SULFAMIC ACID. CAUSES BURNS, EYE & SKIN IRRITATION. HARMFUL IF SWALLOWED. AVOID BREATHING DUST. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, DO NOT INDUCE VOMITING, GIVE ONE GLASS OF TAP WATER OR MILK. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC MCC2", R.O. MEMBRANE ELEMENT ACID CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635. (Outside the U.S.A. 612-221-2113)

FOR INDUSTRIAL USE ONLY. DO NOT MIX WITH CHLORINATED SOLUTIONS OR COMPOUNDS. Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

**KEEP OUT OF REACH OF CHILDREN
NET CONTENTS 1.5 POUNDS (.68 Kg)**

Sea Recovery SRC MCC3 Membrane Cleaning Chemical

WARNING: CONTAINS SODIUM METABISULFITE. HARMFUL IF SWALLOWED. AVOID BREATHING DUST AND FUMES. CAUSES IRRITATION TO EYES AND MUCOUS MEMBRANES. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, GIVE TAP WATER AND INDUCE VOMITING. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC MCC3", R.O. MEMBRANE ELEMENT RUST REMOVER CLEANING CHEMICAL ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635. (Outside the U.S.A. 612-221-2113)

FOR INDUSTRIAL USE ONLY. Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Adding small amounts of water to powder may liberate irritating sulfur dioxide gas. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

**KEEP OUT OF REACH OF CHILDREN
NET CONTENTS 1.5 POUNDS (.68 Kg)**

These Cleaning Chemicals are designed to clean common and moderate fouling. Should the R.O. Membrane Elements be excessively fouled and in field cleaning is not successful the R.O. Membrane Element(s) may be returned to Sea Recovery or one of Sea Recovery's many Service Dealers for more controlled and stronger chemical cleaning. If you wish Sea Recovery to perform cleaning of the R.O. Membrane Elements contact Sea Recovery for a Return Authorization Number.

Note: Cleaning Compound "# 3" (SRC MCC-3) is used for iron fouling only and is not included in the SRC MCC kit. If the Sea Recovery R.O. membrane elements are fouled with rust, SRC MCC-3 may be ordered from Sea Recovery for effective rust removal if the R.O. Membrane Elements are lightly or moderately fouled from rust. R.O. Membrane Elements which are heavily fouled from rust may not be recoverable.

A. R.O. MEMBRANE ELEMENT CLEANING INSTRUCTIONS: The Sea Recovery R.O. system must be rinsed with fresh water then the R.O. Membrane Element(s) may be cleaned with the SRC MCC R.O. Membrane Element Cleaning Chemical as follows. Refer to the diagram on page J-4 when rinsing the system with fresh water and the diagram on page J-5 for chemical recirculation during actual R.O. Membrane Element Cleaning.

The process of rinsing and cleaning the R.O. Membrane Elements may take up to 150 gallons / 567 liters of combined fresh non chlorinated product water depending upon the option configuration of the system and the required chemical cleaners used.

Where reference is made to the Clean/Rinse Inlet & Outlet Valves and if the system is not equipped with these optional valves simply disconnect the Inlet Hose at the Sea Strainer [1] and Brine Discharge Hose at the Brine Discharge Tee [18]. Reconnect these two hoses to the Clean/Rinse Tank appropriately.

INITIAL RINSE PROCEDURE:

1. Remove all Prefiltration Elements including the Plankton Filter Element [3], Prefilter Element(s) [5] and Oil/Water Separator Element [6]. Clean the inside of each respective Prefiltration Housing.
2. Connect the Clean/Rinse Tank discharge line to the Clean/Rinse Inlet Valve [28].
3. Connect the Clean/Rinse Tank return line to the Clean/Rinse Outlet Valve [29].
4. Fill the Rinse/Clean Tank [45] full with non-chlorinated (chlorine free) product water. The cleaning tank must contain enough non-chlorinated product water to sustain rinsing of the system until all of the feed water is displaced.

This process will require approximately 30 gallons / 113 liters, depending upon the actual system size and option configuration.

5. Position the Clean/Rinse Inlet Valve [28] to the Rinse/Clean Tank discharge position [45].
6. Position the Clean/Rinse Outlet Valve [29] to the Brine Discharge position [42] normal operation position.

7. Open the Back Pressure Regulating Valve [17]. **Note:** The system must rinse with no High Pressure applied.

8. Operate the system by pressing the System Start Switch. The rinse water is now rinsing the entire Sea Recovery R.O. system and discharging out to waste.

After approximately 7 to 12 minutes of running the rinse water will be depleted and the system's Low Pressure Switch will stop the system.

The system is now exposed to fresh rinse water and ready for R.O. Membrane Element Cleaning Chemical.

FIRST R.O. MEMBRANE ELEMENT CHEMICAL CLEANING PROCEDURE:

9. Position the Clean/Rinse Outlet Valve [29] to the Clean/Rinse Tank [44] return position.
10. Fill a separate plastic bucket or container (2 to 5 gallons) 3/4 full with product water. Add to the water in the plastic bucket or container 1 (one) bottle of Sea Recovery SRC MCC1 Alkaline Membrane Cleaning Chemical (or SRC MCC2 Acid Cleaning Chemical or SRC MCC3 Rust Remover as appropriate). Mix the solution thoroughly in the container. Pour the solution contents of the bucket or container into the Clean/Rinse Tank [45].

CAUTION: DO NOT MIX DIFFERENT CLEANING CHEMICALS TOGETHER. DO NOT USE DIFFERENT CLEANING CHEMICALS TOGETHER AT THE SAME TIME. MIX THE CLEANING CHEMICALS SEPARATELY AND USE THEM SEPARATELY.

11. Continue to fill the Clean/Rinse Tank [44] full with 20 gallons of product water. Use the fill hose to disburse and further mix the chemical.
12. Operate the system by pressing the System Start Switch. The R.O. Membrane Element Cleaning Chemical is now recirculating through the entire Sea Recovery R.O. system and returning to the Clean/Rinse Tank [44] in a closed loop cycle.
13. After approximately 60 minutes of circulation stop the system by depressing the system stop switch.
14. Position the Clean/Rinse Outlet Valve [29] to the Brine Discharge [42] position.
15. Start the system by pressing the system start switch. The cleaning chemical is now discharging out to waste. The system will stop itself once the chemical tank is empty.

The Sea Recovery R.O. membrane elements must now be rinsed twice with fresh water whether or not additional cleaning with different chemicals is necessary. Rinse the membrane elements twice with fresh water at this time, once in a closed loop and then once through as follows:

FIRST RINSE AFTER CLEANING (CLOSED LOOP):

16. Position the Clean/Rinse Outlet Valve [29] to the Clean/Rinse Tank return position [45].
17. Fill the Clean/Rinse Tank [45] full with 20 gallons / 75 liters non-chlorinated (chlorine free) product water.
18. Operate the system by pressing the System Start Switch. The rinse water is now rinsing the entire Sea Recovery R.O. system in a closed loop cycle.

Allow the system to rinse in a closed loop cycle for a minimum of 30 minutes and maximum of 60 minutes.
19. After 30 to 60 minutes of rinse stop the system by pressing the System Stop Switch.
20. Position the Clean/Rinse Outlet Valve [29] to the Brine Discharge [42] position.
21. Start the system by pressing the system start switch. The rinse water is now discharging out to waste. The system will stop itself once the chemical tank is empty.

SECOND RINSE AFTER CLEANING (ONCE THROUGH):

22. Once again, fill the Clean/Rinse Tank [45] full with 20 gallons / 75 liters non-chlorinated (chlorine free) product water.
23. Operate the system by pressing the System Start Switch. The rinse water is now rinsing once through the entire Sea Recovery R.O. system and then discharging through the brine discharge line out the Thru-Hull Fitting [42].

The system will stop itself once the Clean/Rinse Tank [44] is empty.

NOTE: The R.O. membrane elements have now been cleaned and rinsed. If additional cleaning is required refer to steps 2.A.9. through and including 2.A.23. above and repeat these procedures using SRC MCC1, SRC MCC2 or SRC MCC3 as appropriate.

NOTES:

SECTION "K"

MAINTENANCE & REPAIR

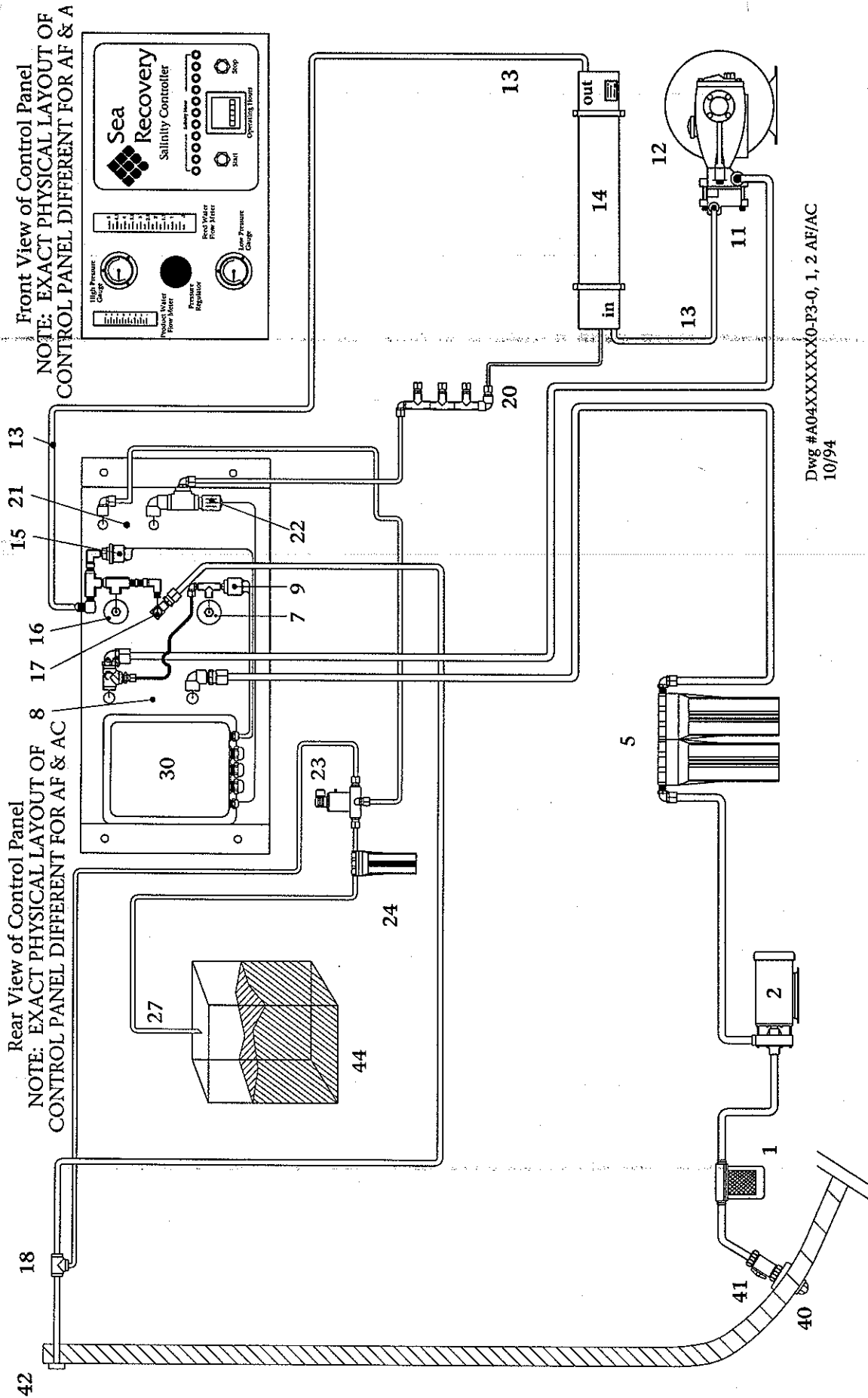
OPERATOR'S PREVENTIVE MAINTENANCE

MAINTENANCE TIME CHART

COMPONENT MAINTENANCE & REPAIR

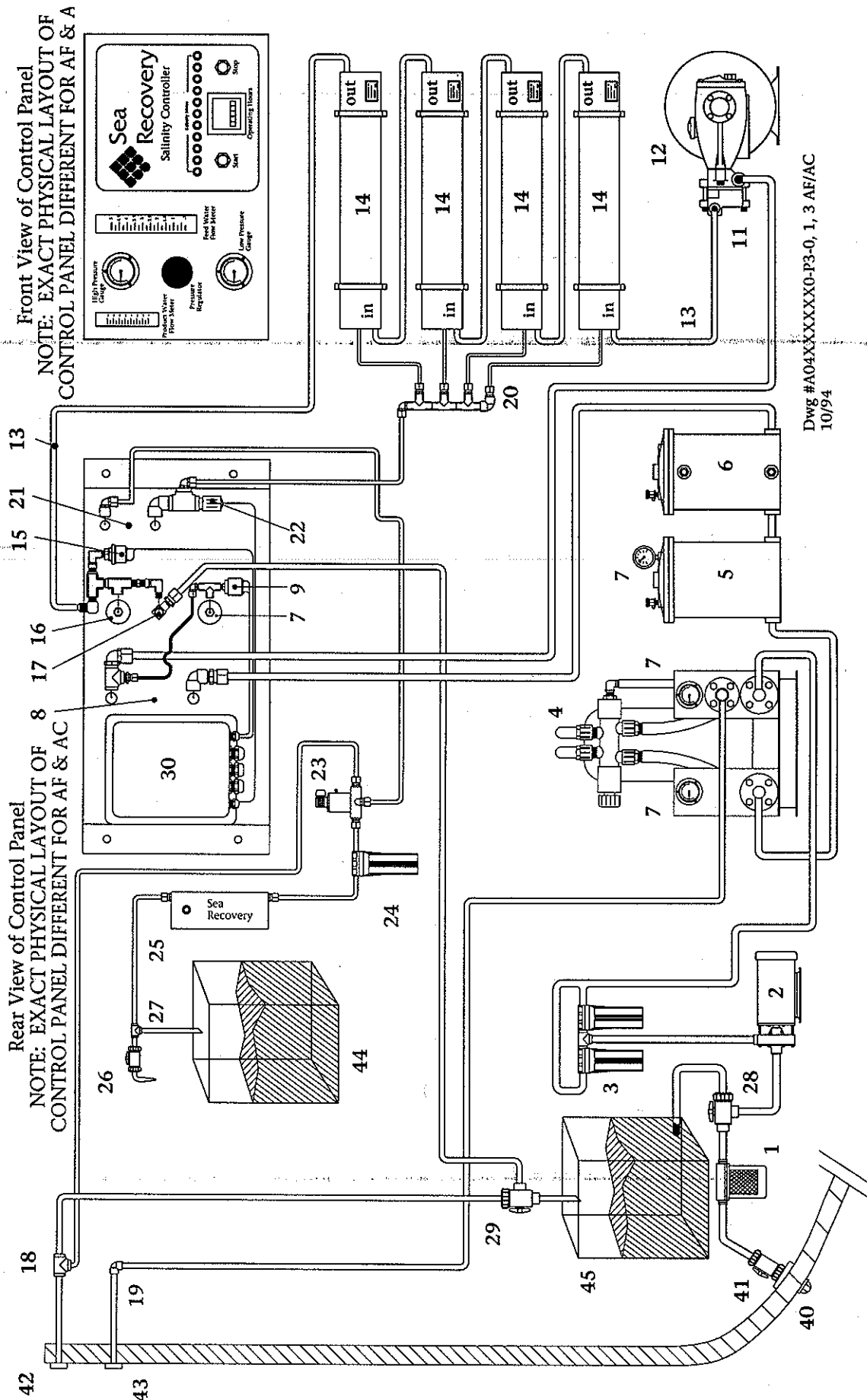
NOTES:

PLUMBING CONNECTIONS SRC 200 AF & AC WITH NO OPTIONS



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PLUMBING CONNECTIONS SRC 1500 AM WITH ALL OPTIONS



OPERATORS PREVENTIVE MAINTENANCE

Approximately every 50 hours of use, the SRC system should be inspected as part of a preventive maintenance program. The following steps should be taken to ensure that potential problems are resolved prior to leading into major repairs. Any electro mechanical pumping system requires similar preventive maintenance. Numbers in brackets [] correspond to the Sea Recovery R.O. System Schematic on pages K-3 & K-4 of this manual.

1. **Mounting Hardware:** Because the system may be subject to vibrations transferred from the ship, all mounting hardware should be inspected for tightness. Inspect all screws, brackets, nuts and bolts. Pay special attention to the mounting of the High Pressure Pump [11] to the Electric Motor [12] since this will be subject to more vibration than the rest of the system.
2. **High Pressure Pump [11]:** Regularly check the level of the crankcase oil. When the pump is horizontal, the minimum oil level should be at the center of the sight glass, located at the rear crankcase cover of the High Pressure Pump. The maximum oil level should be at the top of the sight glass. Over filling of the High Pressure Pump oil will not harm the pump. Use only Sea Recovery SRC PO High Pressure Pump crankcase oil. The Sea Recovery SRC PO High Pressure Pump crankcase oil is a hydraulic oil which contains special additives to minimize wear and corrosion. **DO NOT USE MOTOR OIL OR OTHER HYDRAULIC OIL.**
3. Regularly clean any salt water or salt deposits off any part of the system by rinsing with a rag wetted with fresh water. Dry all parts, and as protection against the salt environment, apply a

thin coating of light oil such as WD-40 to the external metal parts.

Apply grease to Booster Pump shafts if any feed water weepage is present.

4. Check regularly for fluid leaks; either oil from the High Pressure Pump or water from anywhere in the system. Do not arbitrarily tighten water fittings unless they are obviously loose or leaking. Be sure to tighten the black tube fittings by hand only, without tools. Use caution in tightening the gray PVC fittings.
5. Regularly check all tubing and high pressure hoses for wear and friction against abrasive surfaces. Hoses should not be in contact with heated or abrasive surfaces.

OPERATOR MAINTENANCE TIMETABLE

The frequency of required maintenance is dependent on the regularity of usage, the condition of the intake water, the length of time the system is exposed to water, and the total running time following each system cleaning. Because of this, it is virtually impossible to comprise an exact timetable for required maintenance. The following maintenance timetable is an estimate of the time intervals at which maintenance may be required on the various system components. This is based upon factual data compiled from SRC system installations around the world. However, this schedule must be adjusted to each actual system depending upon its use and condition.

COMPONENT	MAINTENANCE REQUIRED	TIME INTERVAL CONTINUOUS DUTY	TIME INTERVAL INTERMITTENT DUTY
Coarse Strainer	Inspect & clean screen & housing	Weekly	100 hrs
Booster Pump	Replace Seal	3 Months	2000 hrs
Plankton Filters	Clean elements & housing	Daily	24 hrs
Prefilter(s)	Replace elements & clean housing	Weekly	200 hrs
Commercial Prefilter	Replace element & clean housing	Monthly	500 hrs
Oil/Water Separator	Replace element & clean housing	Monthly	500 hrs
Flow Meters	Clean inside the clear tube	As Required When Dirty	
* High Pressure Pump	Change Crankcase Oil	Monthly	500 hrs
High Pressure Pump	Change Packings, seals and "O" rings	3 Months	2000 hrs
SRC R.O. Membrane	Clean w/SRC Cleaning Compound	When production or salt rejection decreases by 10%	
Salinity Probe	Clean Probes	Annually	Annually
Three-Way Actuator Valve	NO MAINTENANCE REQUIRED - Solid PVC		
Charcoal Filter	Replace Element	Monthly	Monthly
U.V. Sterilizer	Replace lamp & clean quartz sleeve	6 Months	4000 Hours
Other _____			
Other _____			

*Initial oil change at 50 hours, and every 500 hours or 3 months thereafter, whichever ever occurs first.

COMPONENT MAINTENANCE & REPAIR

CAUTION: Make sure that the System Feed Water Sea Cock Valve [41] is closed prior to performing maintenance on the Sea Recovery R.O. System. Additionally, make sure that the system main electrical disconnect switch is switched "OFF", LOCKED and TAGGED FOR MAINTENANCE prior to performing maintenance or repairs.

CAUTION: If you use detergents to clean the internal wetted parts of the system ensure that they are rinsed thoroughly, wiped and dried prior to reassembly. After the components have been reassembled, product water can be used to remove any feed water residue from the exterior surfaces of the components.

NOTE: Refer to Section "L" "EXPLODED PARTS VIEWS" of this Manual while performing maintenance or repairs of the individual components and subassemblies. Always observe position of all parts during disassembly.

CAUTION: Use of non Sea Recovery parts will cause damage to the Sea Recovery System and void all Warranty. USE ONLY SEA RECOVERY SUPPLIED PARTS.

A. SUCTION LINE & PRETREATMENT

1. **Inlet Thru-Hull Fitting [40]:** Keep the Inlet Thru-Hull Fitting free and clear of debris and marine growth. The Sea Recovery R.O. System must receive an uninterrupted supply of feed water. If the Inlet Thru-Hull Fitting is clogged this will restrict the feed water and result in a low feed pressure condition which will cause the System's Low Pressure Switch to shut the System off.
2. **Inlet Sea Cock Valve [41]:** The packings and connections of the Inlet Sea Cock Valve must be tight and must properly seal. If the connections or packings at the Inlet Sea Cock Valve are loose, air

may enter the feed line and result in a low feed pressure condition which will cause the System's Low Pressure Switch to shut the System off. Clean the valve cavity of debris or replace the seal and seat as required.

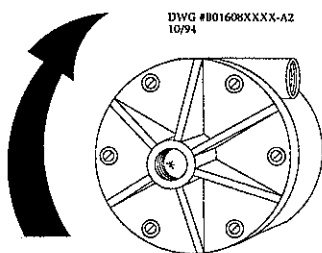
3. **Sea Strainer or Coarse Strainer [1]:** Keep the mesh screen free and clear of debris. The supplied Sea Strainer contains a very fine mesh (40 mesh) monel screen. This fine mesh screen is designed to trap marine debris prior to entering the Plankton Filter if used, Multi Media Filter if used or Prefilters. If the mesh screen becomes clogged this will result in a low feed pressure condition which will cause the System's Low Pressure Switch to shut the System off. To clean or replace the mesh screen remove the bowl from the Coarse strainer by turning the bowl counter clockwise. Remove the Sea Strainer Mesh Screen from the bowl. Remove the flat sealing gasket from the bowl and take care to not damage it. Clean the mesh screen. Ensure that the screen is intact. If the welded seam is ruptured or if the mesh screen remains plugged after cleaning, replace it with a new SRC MS3 Mesh Screen Element.

Wipe the "O" ring with a damp cloth. Lubricate it sparingly with Parker "O" ring lubricant. Place the "O" ring back onto the bowl. Seat the mesh screen back into the bowl. Screw the lid on clockwise. Hand tighten only enough to seal water in and air out.

CAUTION: If the "O" ring is missing, not properly seated or if the bowl is over tightened air will enter the feed line and cause the system to shut off due to low feed pressure.

4. **Booster Pump [2]:** Sea Recovery uses two different Booster Pumps in the SRC AM System. The type of pump which your system utilizes depends upon the final system configuration and pump rotation. Both Booster Pumps are described below.

- a. **Booster Pump SRC BP-AS3** (centrifugal; clockwise rotation as viewed from volute end {front end} of pump):



Replace the ceramic seal approximately every 2000 hours, or at the sign of leakage P/N SRC BPSK-3:

DISASSEMBLY: Remove the volute bolts. Remove the impeller locknut, located on the front center of the impeller, by turning it counterclockwise. Remove the impeller by turning it counterclockwise. Remove the seal and seat from the shaft. Two screwdrivers wedged into the seal at 180 degrees apart will serve as tools to wedge the seal out. Pry the ceramic seat with attached viton cup from the seat cavity. Do not attempt to salvage the seal or seat. Thoroughly clean the shaft and seat cavity.

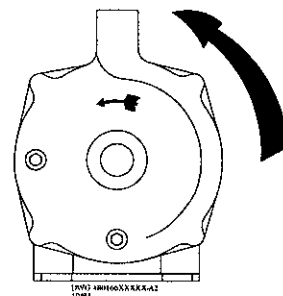
REASSEMBLY: Lubricate the cup ring of the ceramic seat with a small amount of liquid dish soap. Place the ceramic seat and cup ring into the seat cavity with the ceramic facing toward the shaft end. Do not scratch the seat with your fingers or tools. Tap it gently into place with a wooden

dowel or plastic rod. Lubricate the shaft with liquid dish soap and press the seal with the carbon facing toward the ceramic seat. Press onto the shaft evenly. Caution, do not pull the viton from below the assembly. Getting the seal started over the shaft end is simplified if a tapered device (5/8" max. O.D.) is placed over the threads.

Replace the impeller onto the shaft. Ensure that the spring holder does not slip down over the step in the shaft and impeller hub. Tighten securely and reinstall the locking nut and washer. Use a new gasket and install the pump volute.

Pump shaft adjustment is accomplished by moving the shaft toward the rear of the Electric Motor until it will move no further. Then back the shaft away from the rear of the Electric Motor approximately .010 to .015 inch (the thickness of 2 pieces of 20lb paper). A screwdriver against the shaft shoulder can be used. Tighten one setscrew slightly to hold the shaft in position. Turn the shaft by hand to determine if the impeller clears the volute. If the impeller strikes, loosen the setscrew and move back further, repeat this check. Thoroughly prime the pump.

- b. **Booster Pump SRC BP-AS5** (centrifugal; counter clockwise rotation as viewed from volute end {front end} of pump):

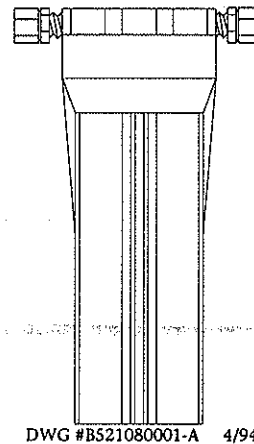


Replace the ceramic seal approximately every 2000 hours, or at the sign of leakage P/N SRC BPSK-5:

DISASSEMBLY: Remove the four 3/8-16 Bolts holding the volute to the motor bracket. To remove the impeller, remove the bearing cap on the motor to expose the screwdriver slot on the motor shaft. Hold the motor shaft with a large screwdriver and remove the impeller by grasping it with your hand and turning the impeller counter clockwise. Remove the Seal. Two screwdrivers wedged into the seal at 180 degrees apart will serve as tools to wedge the seal out. The ceramic seat may be removed by removing the end bell gasket.

REASSEMBLY: Clean the motor shaft and the bracket of any corrosion or salt deposits. Replace the end bell gasket and the tap seat portion into the bracket cavity. Use a new gasket. Place the ceramic seat into the cavity over the shaft. Make sure that the polished side is toward the end of the shaft. Tap into place evenly using a hollow piece of wood or plastic tool. If a metal tool is used to tap it into place, protect the seat with cardboard or a clean cloth. Lubricate the shaft with water, water and soap or a light oil and slip the rotating portion of the seal over the shaft with the carbon element toward the ceramic. Slide it down onto the shaft as far as possible. Apply blue Loctite to the motor shaft threads. Hold the Motor shaft and reinstall the impeller. Tighten the impeller by turning it clockwise until it is snug. Reinstall the volute. Tighten the bolts evenly. Thoroughly prime the pump.

5. Plankton Filter [3] Element Cleaning



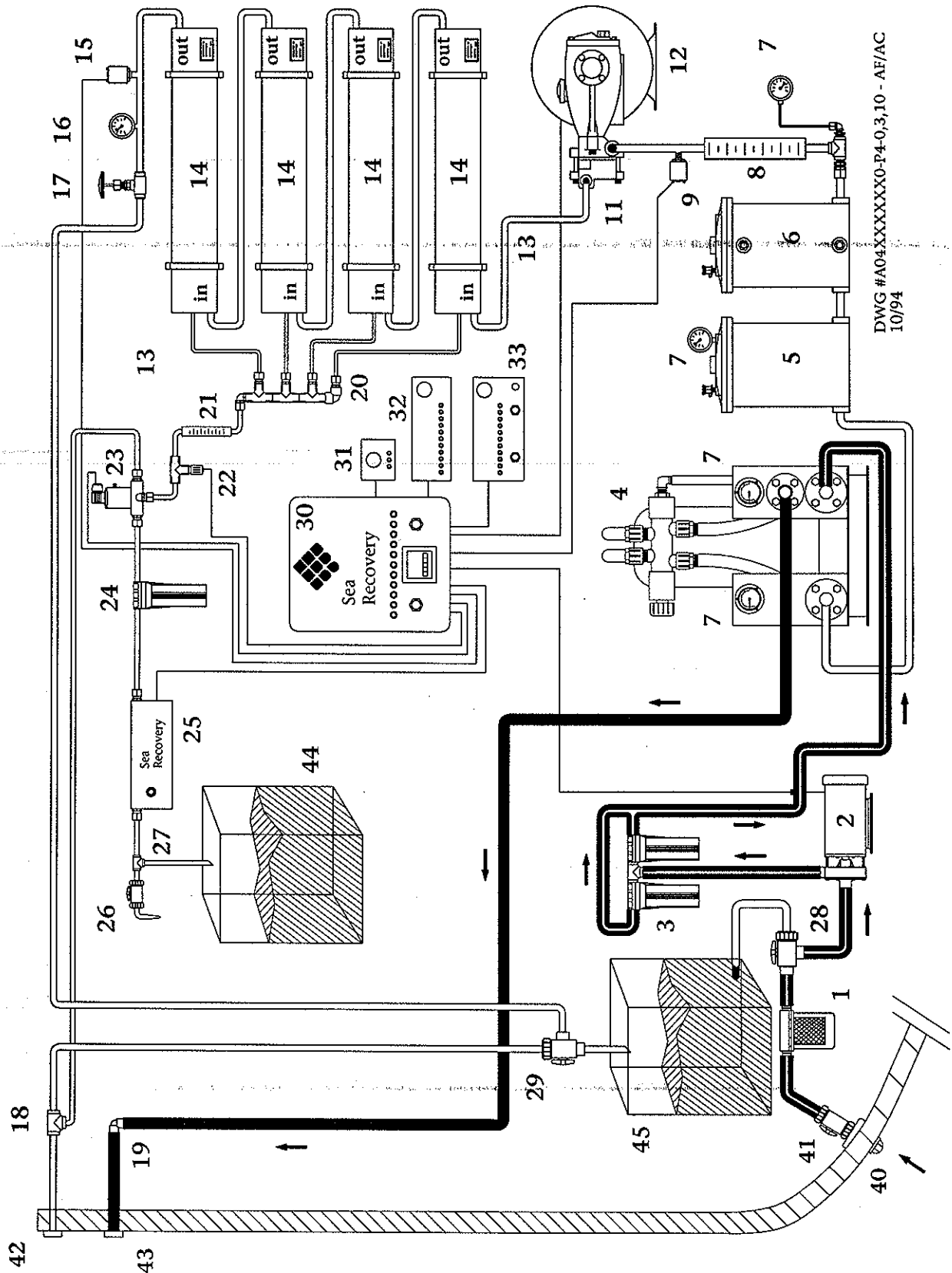
DWG #BS21080001-A 4/94

The plankton filter element can be cleaned, or it must be replaced when it is damaged or no longer cleanable. To clean the element, unscrew the blue bowl counter clockwise by hand. Take care not to spill the feed water from the bowl. Remove the Plankton Filter Element from the bowl. Remove the "O" Ring from the bowl and take care to not damage it. Clean the mesh screen filter element with a bristle brush and water spray. Clean the bowl with a mild detergent and rinse out thoroughly.

Wipe the "O" ring with a damp cloth. Lubricate it sparingly with Silicon Base "O" ring lubricant. Place the "O" ring back onto the bowl. Insert the cleaned, or a new, SRC SDPGE 10/200 plankton filter element into the bowl. Screw the bowl on clockwise. Hand tighten only enough to seat the "O" ring.

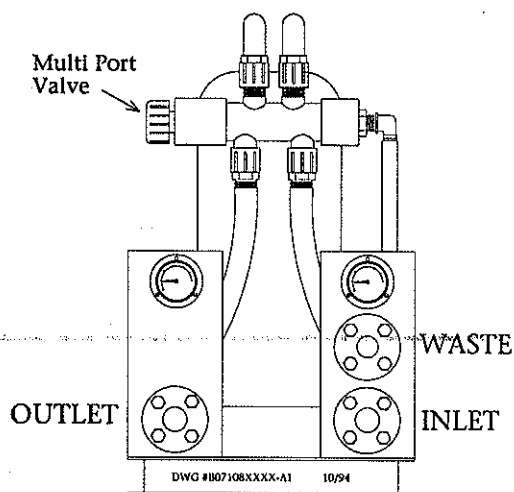
CAUTION: If the "O" ring is missing, not properly seated or if the bowl is over tightened water will leak from the bowl.

Sea Recovery Aqua Frame & Compact Series 200-1500 GPD System P&ID
 Shown as an SRC 1500 AF or AC with all options
 ILLUSTRATING BACKWASHING OF THE MEDIA FILTER



DWG #A04XXXXXX0-P4-0,3,10 - AF/AC
 10/94

6. Multi Media Filter [4] Backwashing :



The Multi Media Filter contains fine gravel and #20 silica sand. This silica sand traps suspended solids larger than 20 micron. The top layer of the silica sand within the Multi Media Filter will become packed with suspended solids and restrict flow through it. When the silica sand becomes packed with suspended solids, as indicated by a loss of pressure across it, it must then be "backwashed" to waste. This backwashing procedure fluffs the silica sand and dislodges the suspended solids from the sand base. During backwashing the suspended solids are discharged to waste through the Multi Media Filter Waste outlet [43].

If replacing the media, the Multi Media Filter requires approximately 15 lbs (7 kg) of small gravel (1/8 x 1/4 inch) first (on the bottom) then approximately 26 lbs (12 kg) of #20 silica sand last (on top of the small gravel).

To replace the media, disconnect the union joints from the multi port valve. Unscrew the Multi Media Filter lid counter clockwise. Place a bag or cloth over the pick up pipe visible within the Media Filter. Pour approximately 15 lbs

(7 kg) of small gravel (1/8 x 1/4 inch) first (on the bottom) then approximately 26 lbs (12 kg) of #20 silica sand last (on top of the small gravel). While filling the Multi Media Filter with the small gravel and the silica sand support the pick up pipe in the center of the opening, do not allow it to be pushed over to one side by the gravel and sand filling. Remove the bag or cloth from the pick up pipe. Place the lid over the opening while aligning the pick up pipe into its corresponding hole in the lid. Screw the lid onto the Multi Media Filter clockwise snugly. DO NOT over tighten. Reconnect the multi port union joints.

NOTE: the new gravel and sand contain fines and contaminants. The Multi Media Filter must be backwashed prior to use. To backwash the Multi Media Filter: Open the Inlet Seacock Valve [41]. Adjust the Multi Media Filter Multi Port Valve full counter clockwise then clockwise 1/4 turn only (90°) to the Backwash position. Place the Booster Pump By-Pass Switch, located on the side of the Salinity Controller, to the manual position.

The Booster Pump [2] is now backwashing the Multi Media Filter [4] to waste. Allow this backwashing to continue for 20 minutes. After 20 minutes of backwashing place the Booster Pump By-Pass Switch in the Automatic Position. Adjust the Multi Media Filter Multi Port Valve full clockwise to the Service Position.

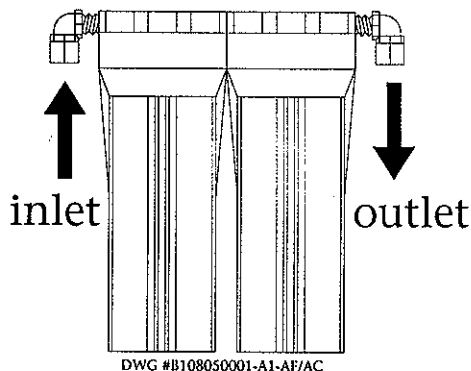
Close the Inlet Seacock Valve [41] if additional service is to be performed or if the System is to be placed back into operation leave the Inlet Seacock Valve open.

7. Prefilter [5] Element Replacement:

The prefilter elements must be cleaned, or replaced, when plugged to the extent that the Low Pressure Gauge at the control panel reads below 2-6 PSI. At or slightly below 2-6 PSI the Low Pressure Switch will shut down the System. The standard dual 10 inch prefilter and the commercial prefilter are both discussed below.

CAUTION: Use of non Sea Recovery filter elements will allow suspended solids to enter the R.O. Membrane Element(s) and damage or foul them. **USE ONLY SEA RECOVERY FILTER ELEMENTS.**

a. 10 inch Prefilters:



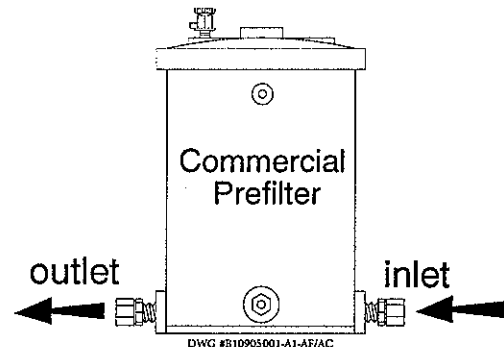
The standard prefilter consists of two individual filter housings connected in series. The first in line contains a 25 micron Prefilter Element (SRC PFE 10/25) and the second in line contains a 5 micron Prefilter Element (SRC PFE 10/05).

To replace the individual element, unscrew the blue bowl counter clockwise by hand. Take care not to spill the feed water from the bowl. Remove the Prefilter Element from the bowl. Remove the "O" Ring from the bowl and take care to not damage it. Clean the bowl with a mild detergent and rinse out thoroughly. Wipe the "O" ring with a damp cloth.

Lubricate it sparingly with silicon base "O" ring lubricant. Place the "O" ring back onto the bowl. Use **ONLY** Sea Recovery supplied Prefilter Elements SRC PFE 10/25 & SRC PFE 10/05 Prefilter Element, as appropriate. Use of non Sea Recovery prefilter elements will allow suspended solids to enter the R.O. Membrane Element(s) and damage or foul them. Screw the bowl on clockwise. Hand tighten only enough to seat the "O" ring.

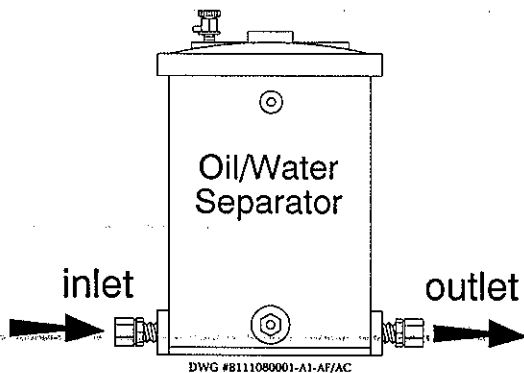
CAUTION: If the "O" ring is missing, not properly seated or if the bowl is over tightened air will enter the feed line or water will leak from the bowl.

b. Commercial Prefilter:



Open the air release valve on top of the housing. Open the drain valve located near the bottom of the base. After the water and residue have drained from the housing, use the supplied spanner tool to unscrew the lid counter clockwise. Remove the lid and "O" ring located under the lid. Remove the prefilter element and discard it. Clean the assembly with product water and a cloth. Insert a new prefilter element into the housing, lubricate sparingly the "O" ring with Parker "O" ring lubricant and replace the lid hand tight - **DO NOT OVER TIGHTEN** the lid. Close the drain valve.

8. Oil/Water Separator [6] Element Replacement:



Open the air bleed valve on top of the housing. Open the drain valve located near the bottom of the base. After the water and residue have drained from the housing, use the supplied spanner tool to unscrew the lid counter clockwise. Remove the lid and "O" ring located under the lid. Remove the Oil/Water Separator element. Discard the old filter element. Clean the assembly with product water and a cloth. Insert a new Oil/Water Separator element into the housing, P/N SRC OWSE-AS. Lubricate sparingly the "O" ring with silicon base "O" and replace the lid hand tight. **DO NOT OVER TIGHTEN THE LID.** Close the drain valve.

9. Low Pressure Gauge [7] :

The pressure gauges used in the Sea Recovery R.O. system are non repairable. Replace the gauge should it loose calibration, develop a defect or malfunction or fail to operate.

10. GPM Feed Water Flow Meter [8]:

Since the flow meter body is clear acrylic, light can penetrate it and support biological growth within. To clean the flow meter body, remove the top access fitting and clean the interior of the tube using a bottle brush. Reassemble the unit.

11. Low Pressure Switch [9]:

The Low Pressure Switch contains one N.O. (Normally Open) contact. As the Booster Pump builds pressure on the Prefiltration Section the Low Pressure Switch will close at 6 PSI. After the Low Pressure Switch closes, the system will then remain in operation. The Low Pressure Switch will open and shut the system off, as pressure decreases below 4 PSI (± 2 PSI).

The internal switching mechanism is very sensitive and improper adjustment may damage the switch and render it inoperable. In field, on site, adjustment of the Low Pressure Switch is, therefore, not recommended.

However, if in field adjustment is necessary: Stop the Sea Recovery system. Remove the calibration sealing cap located in the center top of the pressure switch canister to expose the calibration hole and calibration screw. Insert a medium size flat blade screwdriver into the calibration hole. Gently adjust the calibration screw, maximum 1/8 th turn (45 degrees) at a time, clockwise to increase the set point or counter clockwise to decrease the set point as appropriate to adjust the switch. Restart the system and check the Low Pressure Switch setting by slowly closing the Inlet Sea cock Valve while observing the Low Pressure Gauge at the point of shut down. Repeat this procedure as necessary to properly calibrate the switch.

B. PRESSURIZATION SUBSYSTEM MAINTENANCE

1. High Pressure Pump [11]:

- a. **Disassembly of Valves:** Remove the four socket head bolts and split ring lock washers from the end of the manifold. Support the discharge manifold from the underside and tap with a soft mallet to separate it from the inlet manifold. Carefully place discharge manifold onto work surface with valve chambers up. From the three smaller diameter shallow inlet chambers, remove the inlet valve adaptors with inner and outer o-rings. These adaptors are not held securely in position and may fall out as the discharge manifold is removed. Next remove the valve seats, valves, springs and retainers from the inlet chambers. From the three larger diameter and deeper discharge chambers, remove the discharge valve spacers with o-rings. These spacers generally remain with the discharge manifold as it is removed. Reverse pliers fitted into the center bore and hooked onto the side ports of the spacer will assist in removal. Next remove the valve seats, valves, springs and retainers from the discharge chambers.

(NOTE: The inlet and discharge manifolds use the same retainers, springs, valve seats and valves. The o-rings and valve spacers/adaptors are different). Keep parts in order as they are removed.

- b. **Reassembly of Valves - discharge side:** With crankcase side of discharge manifold facing up, insert the springs into the spring retainers.

Place valve spring retainers in deeper valve chambers. They will rest on the machined ridge in each chamber. Examine the valves for wear or pitting and replace them if necessary. Install valves over the springs with recessed (dish) side down. Examine valve seat o-rings for wear and replace them if necessary. Lubricate and place o-rings on lip of retainers. Carefully square o-rings in valve chamber to avoid cutting o-ring when valve seat is installed. Examine valve seats for pitting, scale or ridges and replace if necessary. Install valve seat with grooved side down, so that the o-ring fits snugly into groove on seat.

Examine both o-rings on the discharge valve spacer and replace if necessary. Lubricate o-rings and fit into grooves on outside of spacer. Lubricate spacer and with small diameter side down, carefully press into valve chambers until spacer snaps tightly into position.

- c. **Reassembly of Valves - inlet side:** Place valve spring retainers into the shallow valve chambers. They will rest on the machined ridge in each chamber. Insert valve springs into retainers. Inspect the valves for wear, ridges or pitting and replace if necessary. Insert valves over the springs with recessed (dish) side down. Examine the valve seat o-rings for wear and replace them if necessary. Lubricate and place o-ring on lip of retainers. Carefully square o-rings in valve chamber to avoid cutting o-ring when valve seat is installed. Examine valve seats for pitting, scale or ridges and replace if necessary. Install valve seat with grooved

side down, so that o-ring fits snugly into groove on seat. Examine the adapter inner "O" rings and replace if worn. Lubricate and install o-rings into inlet valve adaptors. Examine the adapter outer o-rings and replace if worn. Lubricate and install o-rings onto inlet valve adapters. Lubricate inlet valve adapter and press into chamber. Carefully square inlet valve adapter into chamber to avoid cutting or extruding o-ring. Replace discharge manifold over plunger ends matching discharge valve spacers with inlet chambers and press into position. Tap with a soft mallet until completely seated in chambers. Replace all four washers and socket head bolts. Hand tighten each then torque to 180 inch Lbs.

- d. **Disassembly of Seals:** With discharge manifold removed from the pump, remove the two socket head bolts and split lock washers from end of inlet manifold. Rotate crankshaft to loosen inlet manifold. Support inlet manifold from underside and tap with a soft mallet to separate manifold from crankcase. With crankcase side of manifold down, remove high pressure seals using reverse pliers. Invert manifold so that the crankcase side is up and with reverse pliers remove low pressure seals.

- e. **Reassembly of Seals:** Examine low pressure seal for seal wear or spring failure and replace if necessary. With crankcase side of inlet manifold up, lubricate seal and press into valve chamber with garter spring down. Carefully square seal into position. Examine high pressure seal for wear and replace if necessary.

Invert inlet manifold with crankcase side down, lubricate seal and press into chamber with "V" side up. Carefully square into position. Rotate shaft until the two outside plungers are extended and lined up. Lubricate plungers and discharge valve adapter o-rings. Carefully line up and join the inlet and discharge manifolds by pressing the protruding discharge valve adaptors into the inlet manifold seal chambers. Replace all four discharge manifold socket head bolts and washers and hand tighten. Then carefully slip manifold assembly onto plungers and tap with soft mallet until flush with crankcase. Replace the two inlet manifold socket head bolts and washers and hand tighten. Torque to 132 inch Lbs. Then torque the four discharge manifold socket head bolts to 180 inch Lbs.

- f. **Disassembly of Plungers:** Remove discharge and inlet manifold as described. Using a wrench loosen plunger retainers approximately three to four turns. Grasp ceramic plunger and push towards crankcase until plunger retainers with stud pop out. Remove plunger retainer and copper gasket. Remove ceramic plunger from plunger rod. Remove barrier slinger from plunger rod.
- g. **Reassembly of Plungers:** Replace barrier slinger if necessary and position onto plunger rod. Carefully examine ceramic plunger for scoring or cracks and replace if worn. Slip plunger onto rod. (*NOTE: Ceramic plunger can only be installed one way [front to back]. Do not force onto rod*). Examine o-ring and back up ring on plunger retainer and replace if worn or cut.

Lubricate o-ring for ease of installation and to avoid damage to o-rings. **(NOTE: First install NEW copper gaskets onto plunger retainers, then back-up rings and o-rings).** Install short threaded end of stud into plunger retainer. Thread plunger retainer and stud assembly into plunger rod (long threaded end of stud into plunger rod) and torque to 80 inch Lbs. **(NOTE: Exercise caution not to over torque the plunger).** Rotate shaft so the two outside plungers are extended and lined up. Then lubricate plungers. Replace all four discharge manifold socket head bolts and washers and hand tighten. Then carefully slip manifold assembly onto plungers and tap with soft mallet until flush with crankcase.

Replace the two inlet manifold socket head bolts and washers and hand tighten. Then torque to 132 inch Lbs. Then torque the four discharge manifold socket head bolts to 180 inch Lbs.

h. High Pressure Pump Crankcase:

While inlet manifold, plungers and seal retainers are removed, examine crankcase seals for wear. Check oil level and for evidence of water in oil. Rotate crankshaft by hand to feel for smooth bearing movement. Examine crankshaft oil seal externally for drying, cracking or leaking. Consult factory or your local distributor if crankcase service is required.

- i. High Pressure Pump Lubrication: (Crankcase Oil)** After the first 50 hours of operation of a new system, the high pressure pump crankcase oil must be changed. After the first change, the oil must be drained and replaced every three months or 500 hours of system use. If the oil is not changed on this schedule, rapid wear of the crankcase will result and lead to extensive damage. Remove the oil drain plug located on the rear of the pump crankcase cover. Be sure to drain the oil into a container large enough to hold 21 ounces. Replace and re-tighten the oil drain plug. Refill the crankcase to the top of the sight glass or higher.

CAUTION: Use only SRC PO Pump Crankcase Oil. This is an application specific oil. Do Not use any other oil including motor oil.

High Pressure Pump Bolt Torque chart:

Item	Thread	Tool Size	Torque
Plunger Retainer	M 5	11 mm Hex	40 in. lbs 4.5 Nm
Inlet Manifold Bolts	M 10	8 mm Allen	130 in. lbs 14 Nm
Discharge Manifold Bolts	M 10	8 mm Allen	180 in. lbs 20 Nm

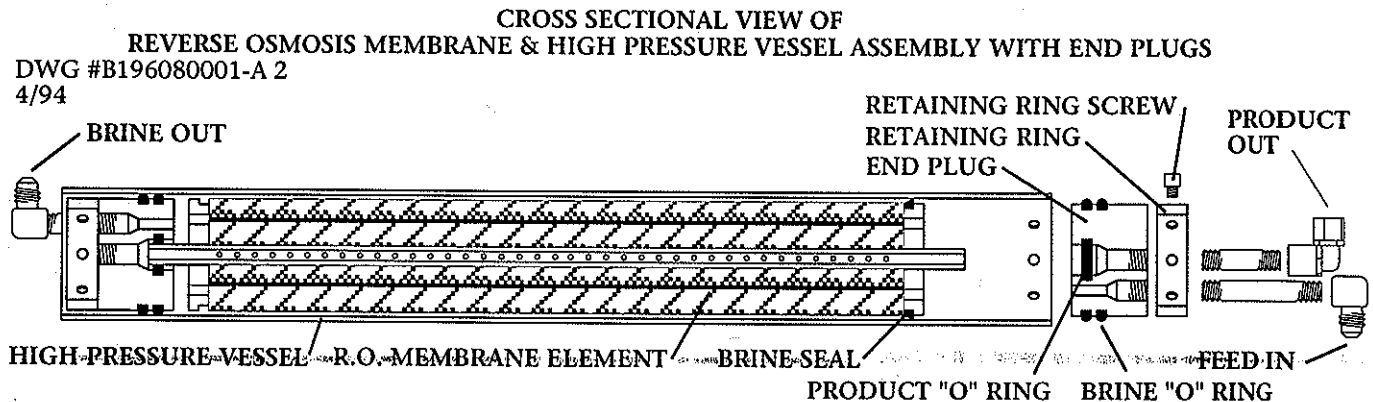
2. **Electric Motor [12]:** The Electric Motor requires front and rear shaft bearing lubrication every 6 months. Give three pumps into each grease jerk.

3. **High Pressure Hose [10]:** The High Pressure Hoses have no adjustment or repairable parts. Refer to Section "L" of this Manual for an exploded parts view of the High Pressure Hoses. For removal and replacement of a High Pressure Hose continue here.

a. **Removal:** When removing a High Pressure Hose use two open end wrenches. Hold the male flare fitting with one wrench while loosening the female flare swivel nut counter clock wise.

b. **Replacement:** When replacing a High Pressure Hose use two open end wrenches. Hold the male flare fitting with one wrench while tightening the female flare swivel nut clock wise. Snug finger tight then, with the open end wrench, tighten 1/4 turn (90°) to obtain a "metal-on-metal" seal. Never use Teflon tape or pipe sealant on the flare surface or on the swivel nut threads. **CAUTION: Do Not over tighten the female swivel nut as over tightening will crack the female swivel nut.**

4. R.O. Membrane Element and High Pressure Vessel Assembly [14]:



For cleaning of the Reverse Osmosis Membrane Element refer to Section "J" of this Manual. For removal and replacement of the Reverse Osmosis Membrane Element continue here.

- a. **Removal of the Reverse Osmosis Membrane Element:** **NOTE:** It is highly recommended to replace all "O" rings within the High Pressure Vessel assembly each time the Reverse Osmosis Membrane Element is removed or replaced. Each single High Pressure Vessel assembly contains a total of 6 "O" rings (4 each Brine "O" rings and 2 each Product Water "O" rings). Ensure that you have these "O" rings on hand prior to removing End Plugs from the High Pressure Vessel. If your system has one High Pressure Vessel (200 gpd system) you will need one set of 6 "O" rings; if your system has two High Pressure Vessels (400 or 800 gpd system) you will need two sets of 6 "O" rings; if your system has three High Pressure Vessels (600 or 1200 gpd system) you will need three sets of 6 "O" rings; and if your system has four High Pressure Vessels (1500 gpd system) you will need four sets of 6 "O" rings.

Disconnect the High Pressure Hose from both the leading end and discharge end of the High Pressure Vessel. When removing a High Pressure Hose use two open end wrenches. Hold the male flare fitting with one wrench while loosening the female flare swivel nut counter clock wise.

Disconnect the Plastic Product Water Tube Fitting. When removing a Plastic Tube Fitting loosen the hex nut by hand only. Unscrew the nut counter clock wise. Pull the Plastic Product Water Tube (with hex nut, grab ring, spacer and O-ring attached) away from the Tube Fitting body.

Using a 5/16 inch Hex allen wrench remove the 6 (six) each Retaining Ring Allen Head Screws from each end of the High Pressure Vessel. Unscrew the 12 each allen head screws counter clock wise.

The End Plug assemblies are held in place by the Retaining Rings & Screws. With the Retaining Ring Screws removed, the End Plugs are now being supported in place with only the assistance of 2 (two) each Brine "O" rings.

Grasp the High Pressure Nipple and Male Flare Elbow with your hand and pull the End Plug straight out from the High Pressure Vessel end. Pull the End Plug assembly out of the vessel slowly.

CAUTION: If the End Plug assembly is removed rapidly from the High Pressure Vessel damage may occur to the 2 each Brine "O" rings as they pass over the 6 each retaining ring screw holes. **NOTE:** If the End Plug Assembly will not dislodge from its position use a tool (such as the flat handle of a crescent wrench or a piece of wood) to lever the end plug out. Protect the High Pressure Vessel lip end with a piece of wood, plastic or material. Rest the tool on the lip end (with the wood, plastic or material between the tool and the High Pressure Vessel lip end) of the High Pressure Vessel and place the tool end under the Male Flare Elbow. Press down on the tool to lever the end plug loose. Take caution to lever the end plug out parallel with the High Pressure Vessel. If side force is applied to the High Pressure Nipple this can cause the End Plug to split at the Feed/Brine Port of the End Plug. The End Plug is not repairable. If it is damaged it then must be replaced.

CAUTION: At each end of the Reverse Osmosis Membrane Element is a product water tube approximately 3/4 inch diameter by 1 inch long. The outside diameter surface of this product water tube is a sealing surface which isolates the Product Water from the Feed Water.

This outside diameter surface of the product water tube must be kept free of scratches. Never use pliers or other grabbing tools on or near the Reverse Osmosis Membrane Element Product Water Tube.

With the End Plug removed from the High Pressure Vessel the Reverse Osmosis Membrane Element can now be seen in the exposed end of the High Pressure Vessel. With your hand in the discharge (down stream) end push the Reverse Osmosis Membrane Element out of the inlet (feed) end.

Run a rag through the High Pressure Vessel several times to remove any biological or oil build up.

- b. **Inspection and "O" ring replacement:** Inspect the inside of the High Pressure Vessel(s). If the coating inside the High Pressure Vessel is chipping replace the High Pressure Vessel. Inspect each End Plug assembly and it's associated High Pressure Fittings. Any High Pressure Fitting which shows signs of excessive wear or if the mating surface of the flare fitting is eroded or deformed, the effected fitting should be replaced.

Remove the 4 brine "O" rings and 2 product water "O" rings from the two end plugs. Clean the end plugs with a cloth. Sparingly lubricate 4 new brine "O" rings and 2 new product water "O" rings with Parker "O" ring lubricant and place them onto the end plugs.

If the pipe fittings attached to the end plugs are loose (can easily turn by two fingers with little or

slight force) remove them and clean the male threads of all old Teflon tape. Reapply 4 wraps of Teflon tape. Replace the fitting and screw it into its respective hole with hand force only using no tools. Tighten only the High Pressure fitting an additional 1/2 to 1 turn using a wrench. Do not additionally tighten the plastic product water fitting by wrench.

CAUTION: *The plastic product water fitting must be placed into the center threaded hole of the end plug. The high pressure fitting must be placed into the outer threaded hole of the end plug.*

- c. **Replacement of the Reverse Osmosis Membrane Element:** A new Sea Recovery Reverse Osmosis Membrane Element will come from Sea Recovery complete with a "U" cup Brine Seal at one end of the Element. This Brine Seal must be at the leading (inlet) end of the High Pressure Vessel. Refer to the Cross Sectional View on page K-16 above.

Insert the down stream end (end without a brine seal) of the Reverse Osmosis Membrane Element into the upstream inlet end of the High Pressure Vessel. Slide the Membrane Element into the High Pressure Vessel, past the brine seal, until the Membrane Element product water tube is inside the vessel approximately 3 inches past the end lip of the High Pressure Vessel.

5. **High Pressure Switch [15]:** The High Pressure Switch contains one N.C. (Normally Closed) contact. The High Pressure switch will remain closed and keep the system in operation when the high

pressure is below 950 PSI (+-50 PSI). When the high pressure reaches 950 PSI (+- 50 PSI) the High Pressure Switch will open and shut the system off.

The internal switching mechanism is very sensitive and improper adjustment may damage the switch and render it inoperable. In field, on site, adjustment of the High Pressure Switch is, therefore, not recommended.

However, if in field adjustment is necessary: Start the Sea Recovery system. Open the High Pressure By-Pass Valve so that the system is in operation with no pressure reading at the High Pressure Gauge. Remove the calibration sealing cap located in the center top of the pressure switch canister to expose the calibration hole and calibration screw. Insert a medium size flat blade screwdriver into the calibration hole. Gently adjust the calibration screw, maximum 1/8 th turn (45 degrees) at a time, clockwise to increase the set point or counter clockwise to decrease the set point as appropriate to adjust the switch. Close the High Pressure By-Pass Valve and check the High Pressure Switch setting by adjusting the hex head adjustment screw on the Back Pressure Regulator. Adjust the Back Pressure Regulator hex head adjustment screw clock wise while observing the High Pressure Gauge. The High Pressure Switch should shut the system off at 950 PSI (+- 50 PSI). If the system shuts off below 900 PSI or above 1000 PSI, open the High Pressure By-Pass Valve, further adjust the High Pressure Switch and check the shut down pressure again.

Once the High Pressure Switch is properly set adjust the Back Pressure Regulator Valve hex head adjustment screw counter clockwise until the system is operating at 800 PSI (Sea Water Systems).

6. **High Pressure Gauge [16]:** The pressure gauges used in the Sea Recovery R.O. system are non repairable. Replace the gauge should it loose calibration, develop a defect or malfunction or fail to operate.

7. **Back Pressure Regulator [17]:** Due to the high velocity of brine water at the valve seat, continual wear over time will make the valve inoperable. The Back Pressure Regulator should be replaced if leaks occur or if it fails to maintain desired pressure.

C. **Post-Filtration Subsystem Maintenance**

1. **GPH Product Water Flow Meter [21]:** Since the flow meter body is clear acrylic, light can penetrate it and support biological growth within. To clean the flow meter body, remove the top access fitting and clean the interior of the tube using a bottle brush. Reassemble the unit.

2. **Salinity probe [22]:** The salinity probe will require cleaning approximately once a year. To clean the probe, disconnect the three electrical salinity probe leads from the electrical controller. Unscrew, counter clockwise, the probe from it's tee housing. Using a soft bristle brush scrub the monel probes to remove any built up debris. Remove all old Teflon tape from the male pipe threads of the Salinity Probe and clean the threads of debris.

Place 4 wraps of new Teflon tape to the male threads. Replace the probe assembly into the tee housing and reconnect the electrical wires.

3. **Charcoal Filter [24]:** A sulfurous smell (like rotten eggs) from the product water indicates that replacement of the Charcoal Filter Element is necessary. If no such smell develops beforehand, the Charcoal Filter Element should be replaced monthly. The Charcoal Filter Element is not cleanable.

To replace the element, unscrew the blue bowl counter clockwise by hand. Take care not to spill the feed water from the bowl. Remove the Charcoal Filter Element from the bowl. Remove the "O" Ring from the bowl and take care to not damage it. Clean the bowl with a mild detergent and rinse out thoroughly.

Wipe the "O" ring with a damp cloth. Lubricate it sparingly with silicon base "O" ring lubricant and place the "O" ring back onto the bowl.

Insert a new SRC CFE Charcoal Filter Element into the bowl. Screw the bowl on clockwise. Hand tighten only enough to seat the "O" ring.

CAUTION: If the "O" ring is missing, not properly seated or if the bowl is over tightened water will leak from the bowl.

4. Ultraviolet Sterilizer [25]:

Maintenance of the U.V. Sterilizer will consist of lamp replacement and quartz sleeve cleaning. Replace the lamp at the intervals suggested in the Maintenance Timetable, or if the lamp fails to start, whichever comes first. The lamp becomes progressively weaker over time, so after six months of use, it may be ineffective though it still is emitting light.

CAUTION: *Make sure that system power is turned off before beginning sterilizer maintenance.*

Removal of the slot head screw on the top edge of the cover of the unit will release the cover. Set the cover aside and protect the attached reflector from scratches.

If the U.V. light is ever lit when the cover is off, do not look at it. Exposure to the ultraviolet rays from this light can be harmful to both eyes and skin. The black colored spring-loaded button beneath the cover will turn the light on when pushed down (if the system power source is on), and off when released.

Holding the UV lamp by the metal ends, twist it 90° in either direction and lift it out of the unit. With the lamp removed, inspect the quartz tube for clarity. If there are deposits on the interior of the tube, it should be removed for cleaning.

Use the one-inch end wrench provided with the unit to loosen the interior compression nuts; unscrew counter clockwise.

When loose, slide the nuts and washers toward the center of the tube, but keep them away from and off of the reflector. Remove the tube by moving it to the right or left until one end is free, lifting that end slightly and moving the tube in the opposite direction.

CAUTION: *The quartz tube is fragile, handle it carefully with gloves or a cloth. Be as careful with the aluminum reflectors, as they are very easily scratched.*

The interior of the tube can be cleaned with water and a bottle brush, or by pulling a damp, clean cloth through it. The reflectors and the exterior of the tube can be cleaned with a soft cloth.

To reinstall the quartz tube, put the compression nuts and washers over the tube and reverse the removal procedure. Once it is installed, center the tube so that equal length of the ends are in both fittings. Hold the tube steady and screw one nut at a time into the fittings. After the nuts are hand snug, use the end wrench provided to tighten them a little further and assure a good seal.

@CAUTION: *The quartz tube will crack or shatter if the compression nuts are over tightened.*

Replace the ultraviolet lamp.

With all components back together, replace the cover and the screw that holds it down.

SECTION L

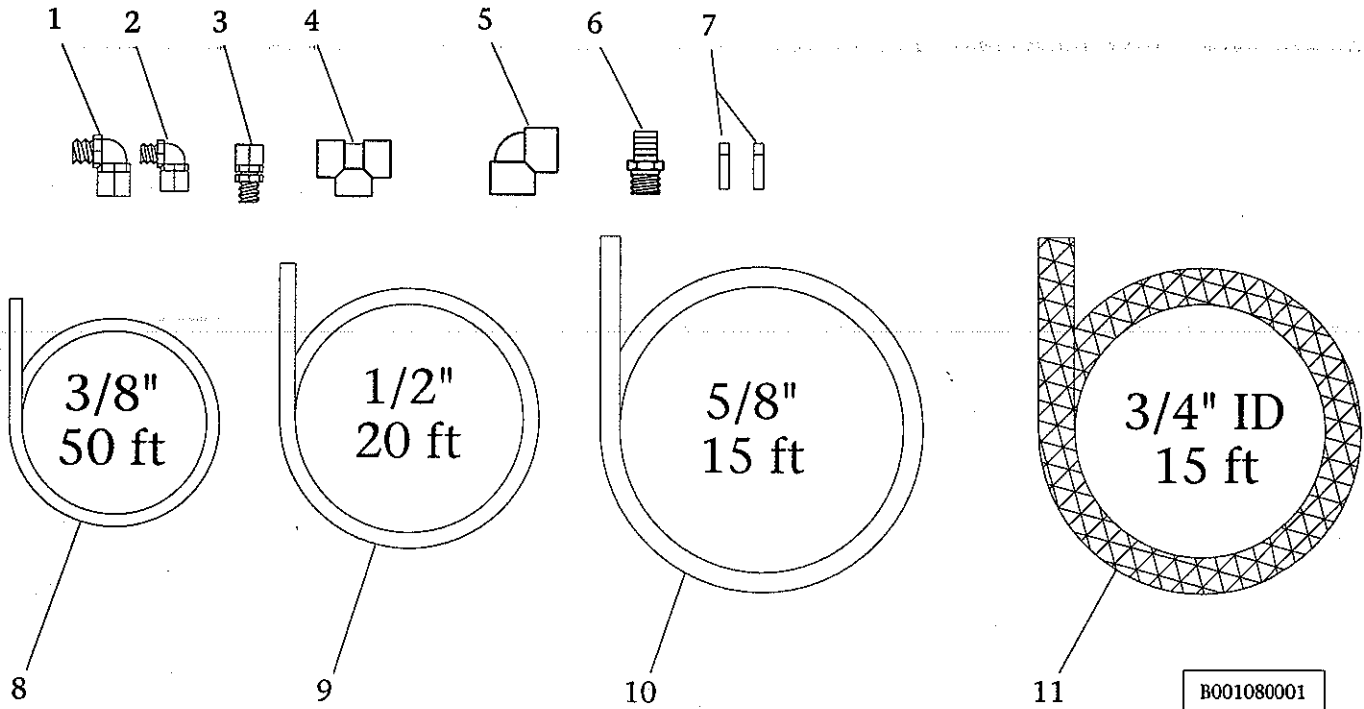
EXPLODED PARTS VIEWS

WITH

DESCRIPTION & PART NUMBERS

NOTES:

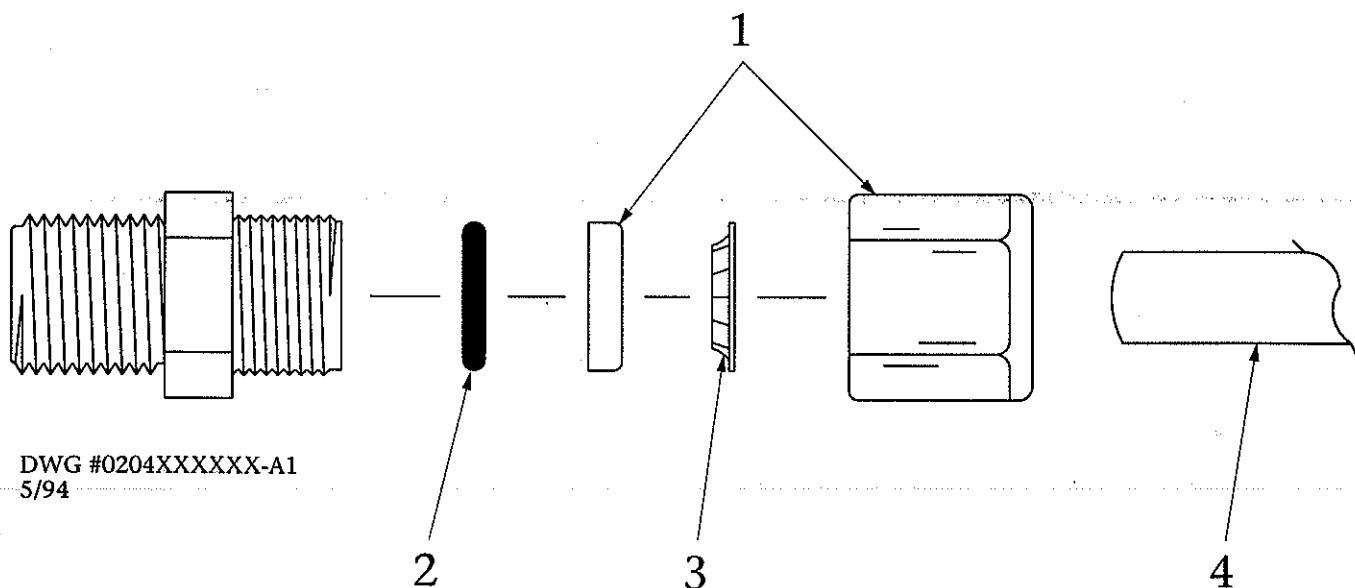
INSTALLATION KIT ASSEMBLY NO. B001080001



B001080001

ITEM.....	QTY	DESCRIPTION	PART NUMBER
1.....	1	ELBOW, 90°, 3/8" TUBE X 1/2" MNPT	0204021969
2.....	1	ELBOW, 90°, 3/8" TUBE X 3/8" MNPT	0204021869
3.....	1	CONNECTOR, 1/2" TUBE X 1/2" MNPT	0204092569
4.....	1	TEE, 1/2" FNPT	0101422583
5.....	1	FEMALE ELBOW, 90°, 3/4" NPT	0101013783
6.....	1	ADAPTER, 3/4" MNPT X 3/4" HOSE BARB	0101653783
7.....	2	HOSE CLAMP, SPEEDY, 3/4"	0513053100
8.....	50 ft	TUBE, 3/8", BLACK	0312123569
9.....	20 ft	TUBE, 1/2", BLACK	0312124269
10.....	15 ft	TUBE, 5/8", BLACK	0305125169
11.....	15 ft	HOSE, CLEAR BRAID, 3/4" ID	0328066666

TUBE COMPRESSION FITTINGS REPLACEMENT PARTS

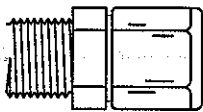


DWG #0204XXXXXX-A1
5/94

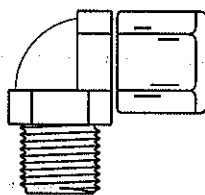
ITEM.....	DESCRIPTION.....	PART NUMBER
FOR 1/4" O.D. TUBE		
1	NUT & SPACER, 1/4" TUBE	0204380869
2	O-RING, 1/4" TUBE.....	2614011369
3	GRAB RING, 1/4" TUBE.....	0204360869
4	TUBING, 1/4" O.D., BLACK.....	0312121969
FOR 3/8" O.D. TUBE		
1	NUT & SPACER, 3/8" TUBE.....	0204381869
2	O-RING, 3/8" TUBE.....	2614011569
3	GRAB RING, 3/8" TUBE.....	0204361869
4	TUBING, 3/8" O.D., BLACK.....	0312123569
FOR 1/2" O.D. TUBE		
1	NUT & SPACER, 1/2" TUBE.....	0204382569
2	O-RING, 1/2" TUBE.....	2614011669
3	GRAB RING, 1/2" TUBE.....	0204362569
4	TUBING, 1/2" O.D., BLACK.....	0312124269
FOR 5/8" O.D. TUBE		
1	NUT & SPACER, 5/8" TUBE.....	0204383069
2	O-RING, 5/8" TUBE.....	2614011769
3	GRAB RING, 5/8" TUBE.....	0204363069
4	TUBING, 5/8" O.D., BLACK.....	0305125169

AVAILABLE TUBE COMPRESSION FITTINGS

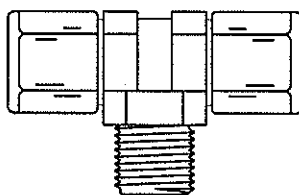
Connector Male



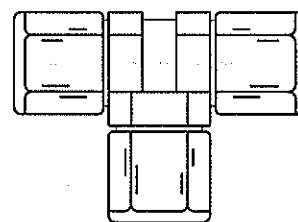
Elbow 90° Male



Tee Branch Male



Tee Union



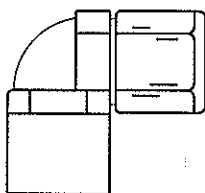
Union Bulkhead



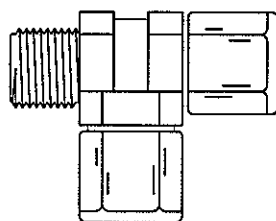
Connector Female



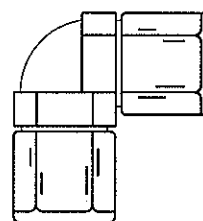
Elbow 90° Female



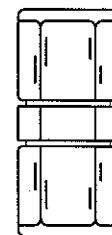
Tee Run Male



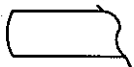
Elbow 90° Union



Union



Tube



DWG #0204XXXXXX-A2

DESCRIPTION

P/N

Connector Male

1/4 inch tube x 1/8 inch mnpt
 1/4 inch tube x 1/4 inch mnpt
 3/8 inch tube x 1/8 inch mnpt
 3/8 inch tube x 1/4 inch mnpt
 3/8 inch tube x 3/8 inch mnpt
 3/8 inch tube x 1/2 inch mnpt
 3/8 inch tube x 3/4 inch mnpt
 1/2 inch tube x 1/8 inch mnpt
 1/2 inch tube x 1/4 inch mnpt
 1/2 inch tube x 3/8 inch mnpt
 1/2 inch tube x 1/2 inch mnpt
 1/2 inch tube x 3/4 inch mnpt
 5/8 inch tube x 1/8 inch mnpt
 5/8 inch tube x 1/4 inch mnpt
 5/8 inch tube x 3/8 inch mnpt
 5/8 inch tube x 1/2 inch mnpt
 5/8 inch tube x 3/4 inch mnpt

0204090669
 0204090869
 0204091669
 0204091769
 0204091869
 0204091969
 0204092069
 0204092269
 0204092369
 0204092469
 0204092569
 0204092669
 0204099069
 0204099169
 0204092869
 0204092969
 0204093169

Connector Female

1/4 inch tube x 1/8 inch fnpt
 1/4 inch tube x 1/4 inch fnpt
 3/8 inch tube x 1/4 inch fnpt
 3/8 inch tube x 3/8 inch fnpt
 3/8 inch tube x 1/2 inch fnpt
 1/2 inch tube x 1/2 inch fnpt
 1/2 inch tube x 3/4 inch fnpt
 5/8 inch tube x 1/2 inch fnpt

0204120669
 0204120869
 0204121769
 0204121869
 0204121969
 0204122569
 0204122669
 0204122969

DESCRIPTION

P/N

Elbow 90° Male

1/4 inch tube x 1/8 inch mnpt
 1/4 inch tube x 1/4 inch mnpt
 1/4 inch tube x 3/8 inch mnpt
 3/8 inch tube x 1/4 inch mnpt
 3/8 inch tube x 3/8 inch mnpt
 3/8 inch tube x 1/2 inch mnpt
 3/8 inch tube x 3/4 inch mnpt
 1/2 inch tube x 3/8 inch mnpt
 1/2 inch tube x 1/2 inch mnpt
 5/8 inch tube x 1/2 inch mnpt

0204020669
 0204020869
 0204020969
 0204021769
 0204021869
 0204021969
 0204022069
 0204022469
 0204022569
 0204022969

Elbow 90° Female

1/4 inch tube x 1/8 inch fnpt
 1/4 inch tube x 1/4 inch fnpt
 3/8 inch tube x 1/4 inch fnpt
 3/8 inch tube x 3/8 inch fnpt
 1/2 inch tube x 3/8 inch fnpt
 1/2 inch tube x 1/2 inch fnpt
 5/8 inch tube x 1/2 inch fnpt

0204010669
 0204010869
 0204011769
 0204011869
 0204012469
 0204012569
 0204012969

Branch Tee Male

1/4 inch tube x 1/8 inch mnpt
 3/8 inch tube x 1/4 inch mnpt
 1/2 inch tube x 3/8 inch mnpt
 5/8 inch tube x 1/2 inch mnpt

0204150669
 0204151769
 0204152469
 0204152969

Continued on page L-6

AVAILABLE TUBE COMPRESSION FITTINGS CONTINUED

DESCRIPTION	P/N
Run Tee Male	
1/4 inch tube x 1/8 inch mnpt	0204170669
1/4 inch tube x 1/4 inch mnpt	0204170869
3/8 inch tube x 1/4 inch mnpt	0204171769
3/8 inch tube x 3/8 inch mnpt	0204171869
1/2 inch tube x 3/8 inch mnpt	0204172469
1/2 inch tube x 1/2 inch mnpt	0204172569
5/8 inch tube x 1/2 inch mnpt	0204172969

Union Tee	
1/4 inch tube	0204240869
3/8 inch tube	0204241869
1/2 inch tube x 3/8 inch tube	0204242469
1/2 inch tube	0204242569
5/8 inch tube x 3/8 inch tube	0204242869
5/8 inch tube	0204243069

Union	
1/4 inch tube	0204210869
3/8 inch tube x 1/4 inch tube	0204211769
3/8 inch tube	0204211869
1/2 inch tube x 3/8 inch tube	0204212469
1/2 inch tube	0204212569
5/8 inch tube x 3/8 inch tube	0204212869
5/8 inch tube x 1/2 inch tube	0204212969
5/8 inch tube	0204213069

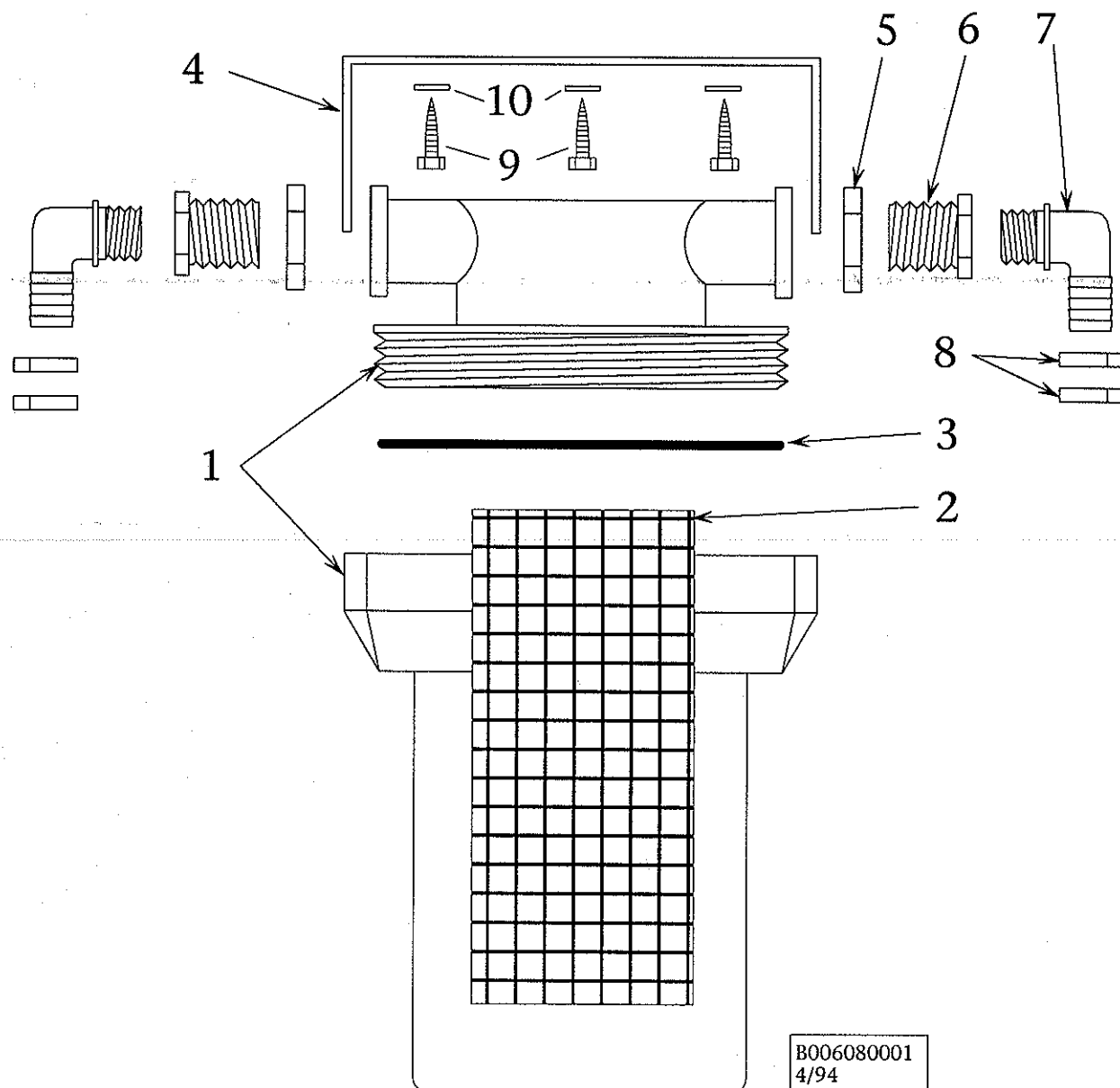
Union Elbow 90°	
1/4 inch tube	0204220869
3/8 inch tube x 1/4 inch tube	0204221769
3/8 inch tube	0204221869
1/2 inch tube	0204222569
5/8 inch tube	0204223069

Union Bulkhead	
1/4 inch tube	0204270869
3/8 inch tube	0204271869
1/2 inch tube	0204272569

Tube	
1/4 inch tube Black Nylon	0312121969
3/8 inch tube Black Nylon	0312123569
1/2 inch tube Black Nylon	0312124269
5/8 inch tube Black Polypropylene	0305125169

COARSE STRAINER ASSEMBLY

ASSEMBLY NO. B006080001

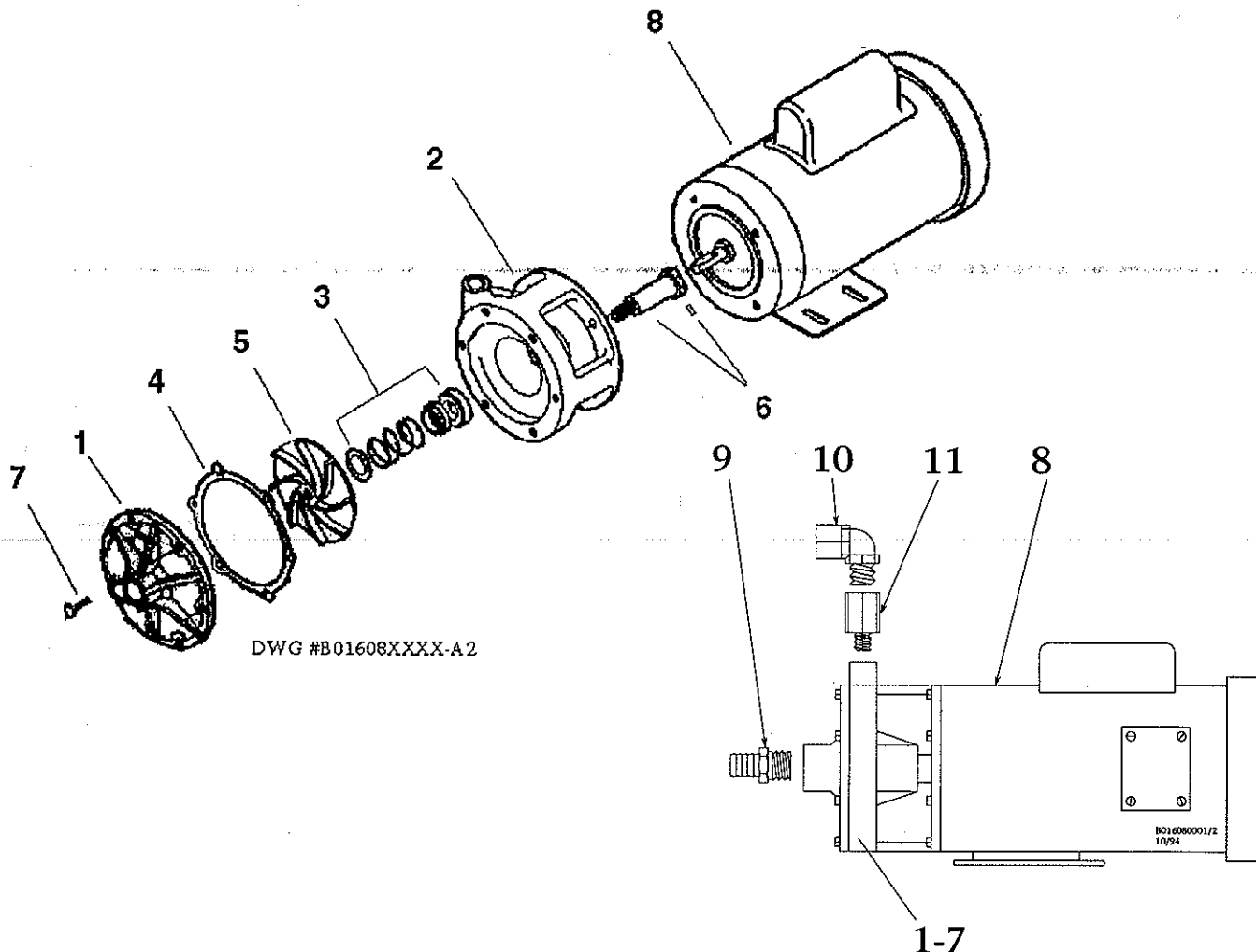


ITEM	QTY	DESCRIPTION	PART NUMBER
1-3	1	COARSE STRAINER HOUSING	0412061278
2	1	MESH SCREEN	0804702578
3	1	O-RING	2614100178
4	1	MOUNTING BRACKET	20200402010
5	2	LOCK NUT, 1"	063200084000
6	2	REDUCER BUSHING, 1" MNPT X 3/4" FNPT, PVC	0101294383
7	2	ELBOW, 90°, 3/4" MNPT X 3/4" BARB	0101073783
8	4	HOSE CLAMP, SPEEDY, 3/4"	0513053100
9	3	SCREW HEX HEAD TYPE "A" 1/4 x 1 STAINLESS STEEL	061172143016
10	3	WASHER FLAT 1/4 STAINLESS STEEL	061080043000

BOOSTER PUMP SRC BP-AS CLOCKWISE ROTATION 1/3 HORSE POWER

ASSY NO. B016080001 SINGLE PHASE

ASSY NO. B016080002 THREE PHASE



ITEM	QTY	DESCRIPTION	PART NUMBER
1-7.....1	1	BOOSTER PUMP ASSY -AS SINGLE PHASE.....	B016080001
.....	.....	BOOSTER PUMP ASSY -AS THREE PHASE.....	B016080002
1-7.....1	1	CENTRIFUGAL PUMP ASSY-AS.....	1221523272
1.....1	1	COVER, VOLUTE.....	1221533372-1
2.....1	1	BRACKET, VOLUTE.....	1221533372-2
3.....1	1	SEAL AND SEAT.....	2625130172
4.....1	1	GASKET.....	2625120172
5.....1	1	IMPELLER & LOCK NUT.....	29210133572
6.....1	1	SHAFT & SETSCREW, 1/4-20 X 1/2.....	1221523272-6
.....1	1	SHAFT KEY, 3/16" X 1" LONG.....	4416010200
7.....6	6	BOLT, HEX HEAD, 1/4-20 X 5/8.....	061142145010
8.....1	1	ELECTRIC MOTOR 1/3 HP TEFC SINGLE PHASE.....	1511080220
.....	.....	ELECTRIC MOTOR 1/3 HP TEFC THREE PHASE.....	1512080220
.....1	1	STRAIN RELIEF.....	1920020732
9.....1	1	MALE ADAPTER, 1/2 MNPT X 3/4 BARB.....	0121652635
10.....1	1	ELBOW, 90°, 5/8 TUBE X 1/2 MNPT.....	0204022969
11.....1	1	REDUCER, 1/2 FNPT X 1/4 MNPT.....	0121842369
.....4	4	BOLT, HEX HEAD 1/4 -20 X 3/4.....	061142145012

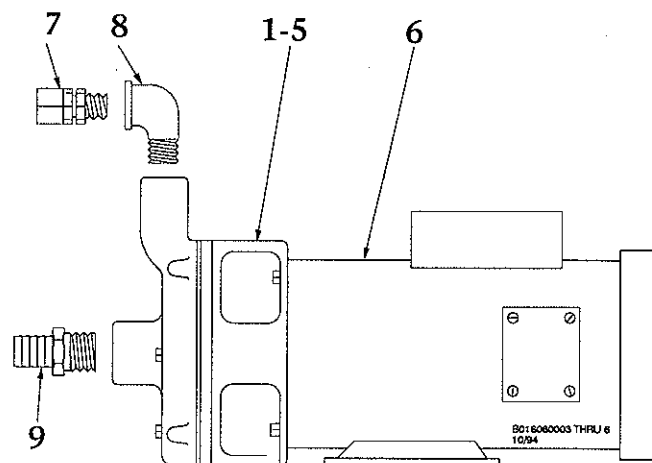
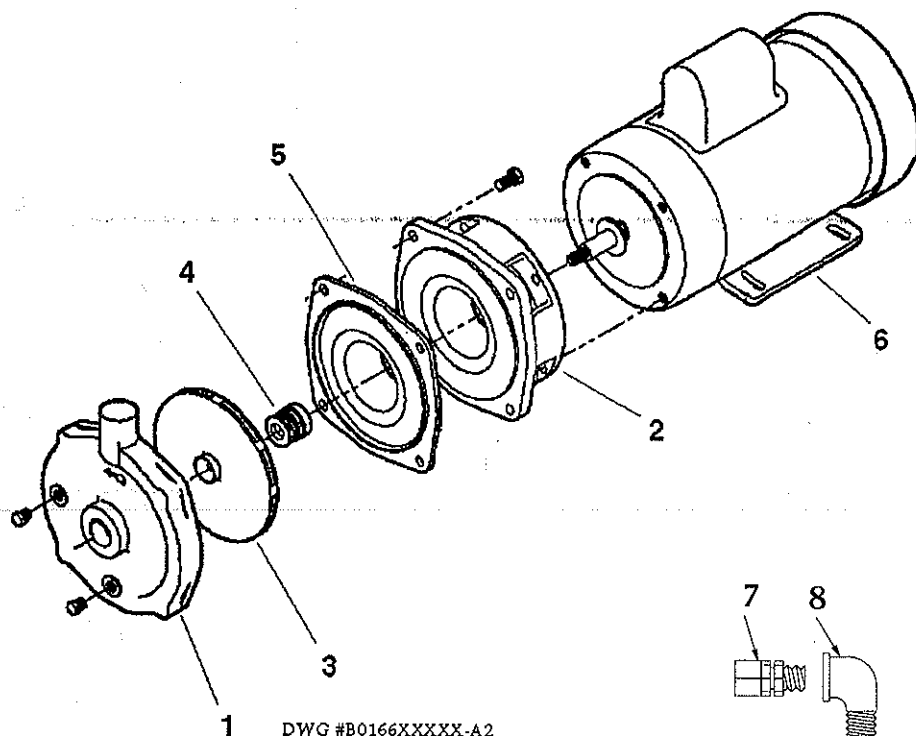
BOOSTER PUMP SRC BP-AS CLOCKWISE ROTATION 1/2 HORSE POWER

ASSY NO. B016080003 50 Hz SINGLE PHASE

ASSY NO. B016080004 60 Hz SINGLE PHASE

ASSY NO. B016080005 50 Hz THREE PHASE

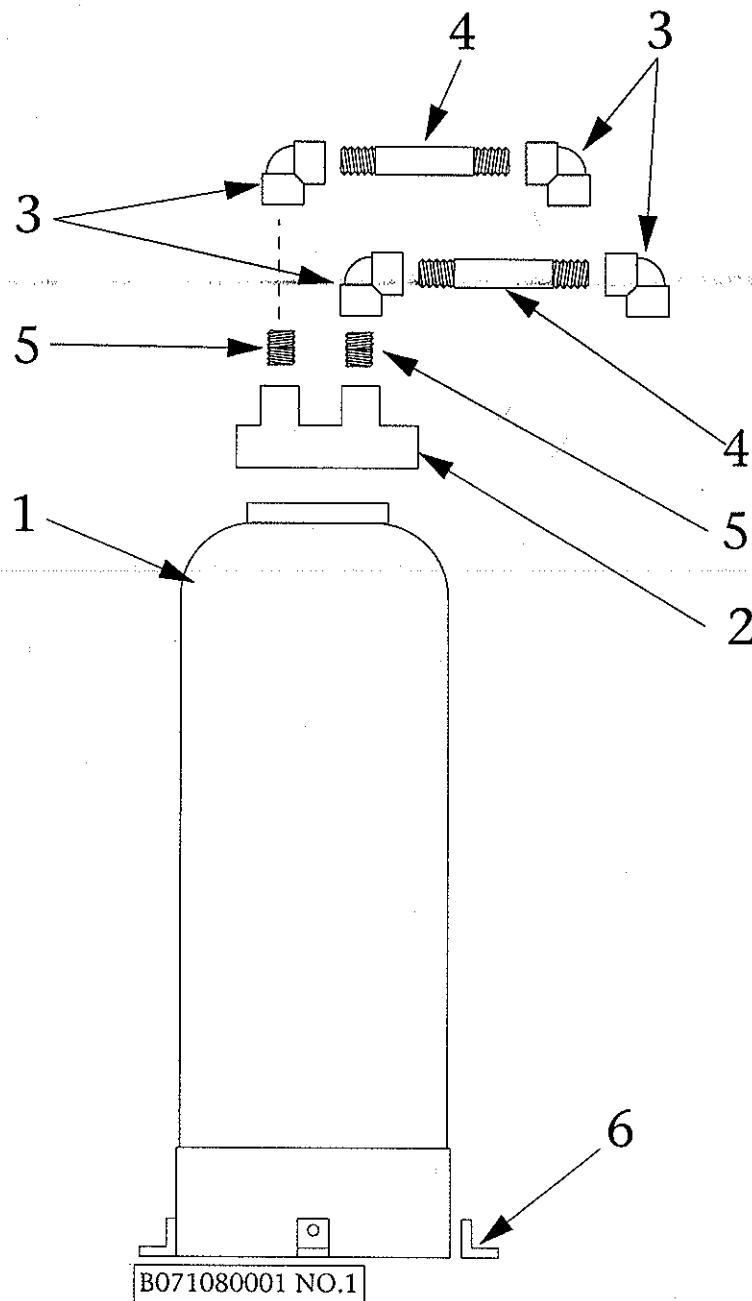
ASSY NO. B016080006 60 Hz THREE PHASE



ITEM	QTY	DESCRIPTION	PART NUMBER
1-10	1	BOOSTER PUMP ASSY /AS-5 50Hz SINGLE PHASE	B016080003
		BOOSTER PUMP ASSY /AS-5 60Hz SINGLE PHASE	B016080004
		BOOSTER PUMP ASSY /AS-5 50Hz THREE PHASE	B016080005
		BOOSTER PUMP ASSY /AS-5 60Hz THREE PHASE	B016080006
1-5	1	CENTRIFUGAL PUMP AS-5	1221514772
1	1	COVER, VOLUTE	1221514772-1
2	1	BRACKET, VOLUTE	1221514772-2
3	1	IMPELLER 50Hz 5.00 inch	29020350072
		IMPELLER 60Hz 4.25 inch	29020342572
4	1	SEAL/SEAT	2625130272
5	1	GASKET	2625120272
6	1	MOTOR 50/60 Hz SINGLE PHASE	1519081110
		MOTOR 50/60 Hz THREE PHASE	1520181110
7	1	MALE CONNECTOR, 5/8" TUBE X 3/4" MNPT	0204093169
8	1	STREET ELBOW, 90°, 3/4" MNPT X 3/4" FNPT	0121233700
9	1	ADAPTER 3/4" MNPT X 3/4" BARB BRASS	0121653735

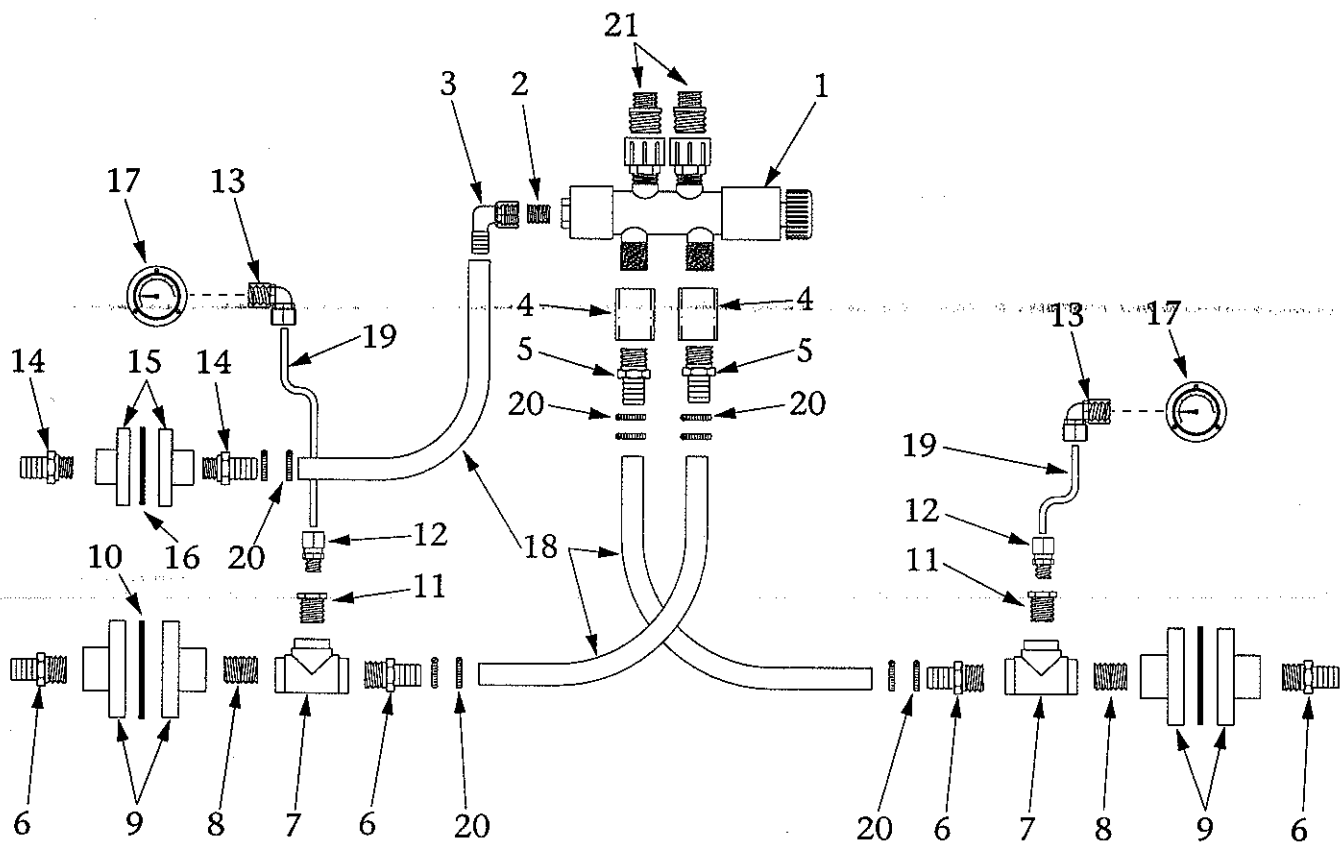
MULTI MEDIA FILTER ASSEMBLY

ASSEMBLY NO. B071080001



ITEM	QTY	DESCRIPTION	PART NUMBER
1-6.....	1.....	MULTI MEDIA FILTER ASSEMBLY -AS	B071080001
1.....	1.....	TANK WITH BASE, 8 x 18 IN. MULTI MEDIA FILTER -AS .....	.0708040468-1
2.....	1.....	TOP STEM, MULTI MEDIA FILTER -AS .....	.0708040468-2
3.....	4.....	EL 90° 3/4" FNPT PVC.....	.0101013783
4.....	2.....	NIPPLE 3/4" x 4" NPT PVC.....	.0101373740
5.....	2.....	NIPPLE 3/4" NPT x CLOSE PVC.....	.01013737CL
6.....	3.....	BRACKET "L" MOUNTING FEET .....	.20200404010

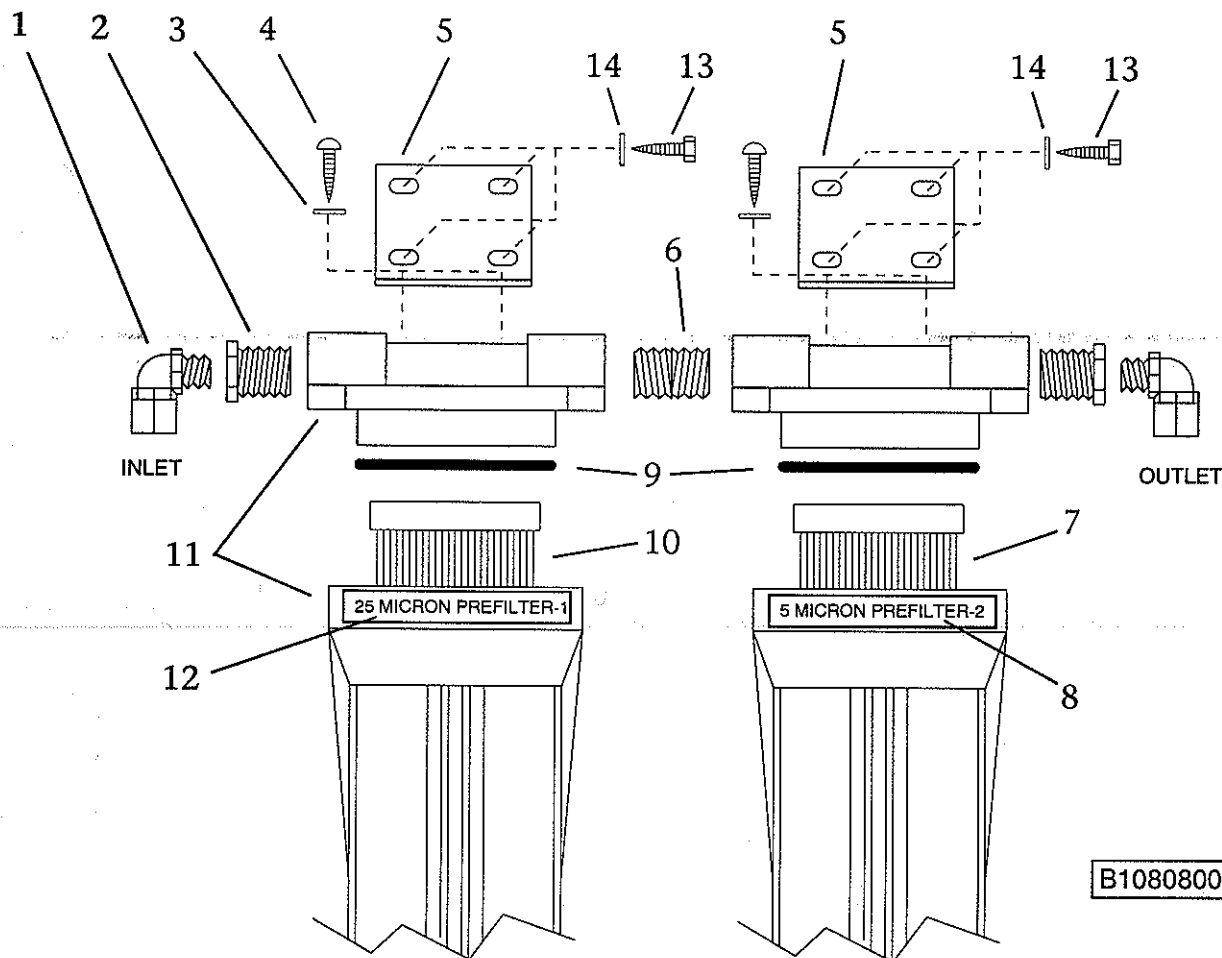
MULTI MEDIA FILTER VALVING & PLUMBING



B071080001 NO.2

ITEM	QTY	DESCRIPTION	PART NUMBER
1.....	1	VALVE, BACKFLUSH, MULTI MEDIA FILTER -AS.....	1407477355
2.....	1	NIPPLE 1/2" NPT x CLOSE PVC.....	01013725CL
3.....	1	EL 90° 1/2" FNPT x 3/4" BARB PVC.....	0101062683
4.....	2	COUPLING FEMALE 1" FNPT PVC.....	0101554483
5.....	2	ADAPTOR 1" MNPT x 3/4" BARB PVC.....	0101654383
6.....	4	ADAPTOR 3/4" MNPT x 3/4" BARB PVC.....	0101653783
7.....	2	TEE 3/4" FNPT.....	0101423783
8.....	2	NIPPLE 3/4" NPT x 2 1/2" PVC.....	0101373725
9.....	4	FLANGE 3/4" FNPT PVC.....	0101783783
10.....	2	GASKET, FLANGE.....	2635103700
11.....	2	REDUCER BUSHING 3/4" MNPT x 1/4" FNPT PVC.....	0101293483
12.....	2	CONNECTOR 1/4" TUBE x 1/4" MNPT.....	0204090869
13.....	2	EL 90° 1/4" TUBE x 1/4" FNPT.....	0204010869
14.....	2	ADAPTER 1/2" MNPT x 3/4" BARB PVC.....	0101652683
15.....	2	FLANGE 1/2" FNPT PVC.....	0101782583
16.....	1	GASKET, FLANGE.....	2635102000
17.....	2	GAUGE LOW PRESSURE -30-0-60 CBM.....	1018060141
18.....	15 FT.	HOSE, CLEAR BRAID 3/4" I.D.....	0328066666
19.....	3 FT.	TUBE 1/4" O.D. BLACK.....	0312121969
20.....	18	CLAMP, SPEEDY 1".....	0513053100

PREFILTER ASSEMBLY **ASSEMBLY NO B108080001**

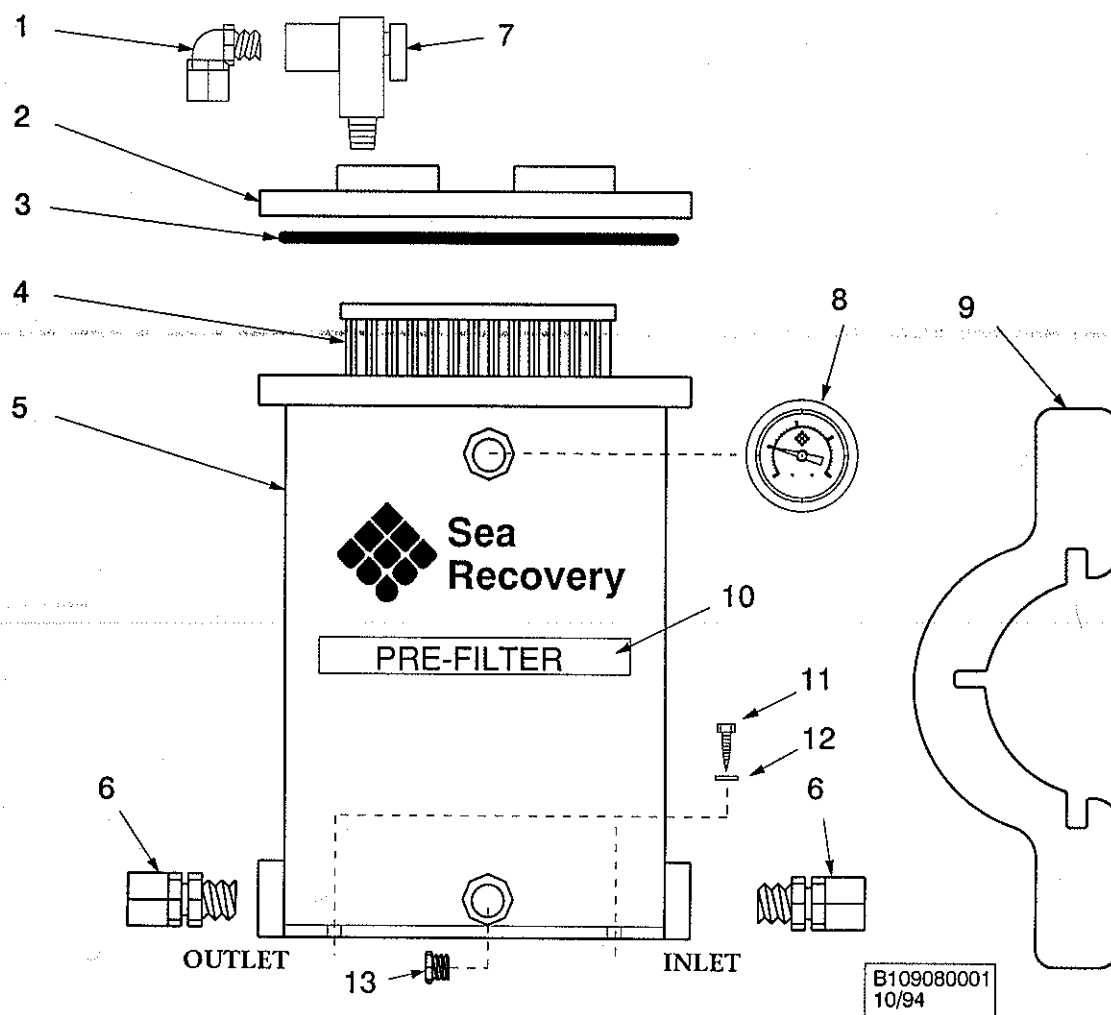


B108080001

**CAN BE USED WITH OIL/WATER SEPARATOR,
 BUT IS NOT TO BE USED IN CONJUNCTION WITH COMMERCIAL PREFILTER**

ITEM	QTY	DESCRIPTION	PART NUMBER
1.....2.....		ELBOW, 90°, 5/8 TUBE X 1/2 MNPT.....	0204022969
2.....2.....		REDUCING BUSH, 3/4 MNPT X 1/2 FNPT, PVC.....	0101293683
3.....8.....		WASHER, #10, NYLON.....	065080028000
4.....8.....		SCREW, #10, PAN HD, PHILLIPS, TYPE "A".....	061170628016
5.....2.....		BRACKET, #10 FILTER HOUSING.....	20200402100
6.....1.....		NIPPLE, 3/4 NPT X CLOSE, PVC.....	01013737CL
7.....1.....		FILTER ELEMENT, 5 MICRON.....	0801060157
8.....1.....		LABEL, "5 MICRON PREFILTER #2".....	2234012460
9.....2.....		O-RING, #10 FILTER HOUSING.....	2614010473
10.....1.....		FILTER ELEMENT, 25 MICRON.....	0801130257
11.....2.....		FILTER HOUSING/LID, 3/4 X 10.....	0713020473
12.....1.....		LABEL, "25 MICRON PREFILTER #1".....	2234012360
13.....8.....		SCREW HEX HEAD TYPE "A" 1/4 x 1" STAINLESS STEEL.....	061172143016
14.....8.....		WASHER FLAT 1/4 STAINLESS STEEL.....	061080043000

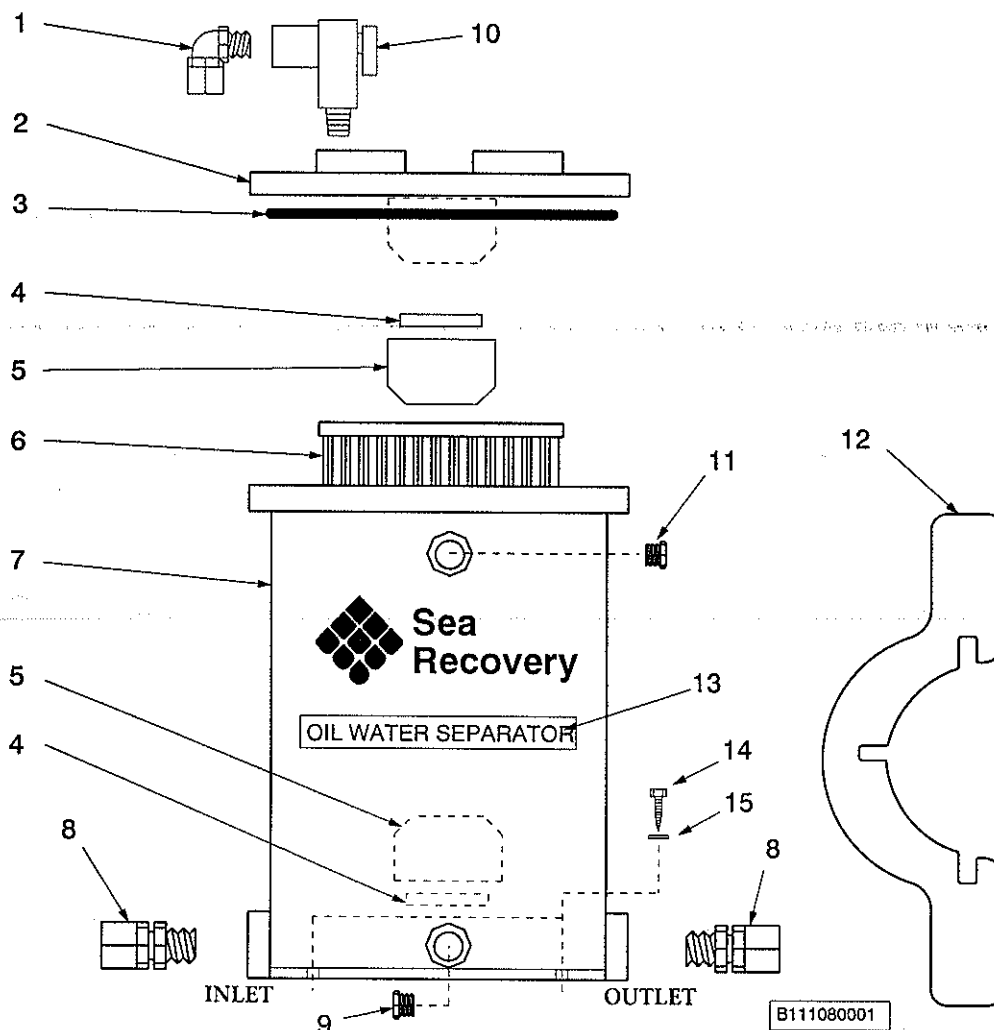
COMMERCIAL PREFILTER ASSEMBLY NO. B109080001



**CAN BE USED WITH OIL/WATER SEPARATOR,
BUT IS NOT TO BE USED IN CONJUNCTION WITH DUAL 10 INCH PREFILTER**

ITEM	QTY	DESCRIPTION	PART NUMBER
1.....	1.....	ELBOW, 90°, 1/4 TUBE X 1/4 MNPT.....	0204020869
2.....	1.....	LID, COMMERCIAL PREFILTER.....	0700100300-03
3.....	1.....	O-RING, LID.....	2614011100
4.....	1.....	COMMERCIAL PREFILTER ELEMENT, 5 MICRON.....	0801061657
5.....	1.....	BASE, COMMERCIAL PREFILTER.....	0700100300-01
6.....	2.....	CONNECTOR, 3/8 TUBE X 3/4 MNPT.....	0204093169
7.....	1.....	VALVE, AIR BLEED, 90°.....	14015506AR-02
8.....	1.....	LOW PRESSURE GAUGE -30 TO +60 CBM.....	1018060141
9.....	1.....	LID WRENCH.....	0700100300-04
10.....	1.....	LABEL, "PREFILTER".....	2234012660
11.....	4.....	SCREW HEX HEAD TYPE "A" 1/4 x 1 STAINLESS STEEL...	061172143016
12.....	4.....	WASHER FLAT 1/4 STAINLESS STEEL.....	061080043000
13.....	1.....	PLUG, 1/2 MNPT, PVC SCH 40.....	0103342583

OIL WATER SEPARATOR ASSEMBLY NO. B111080001

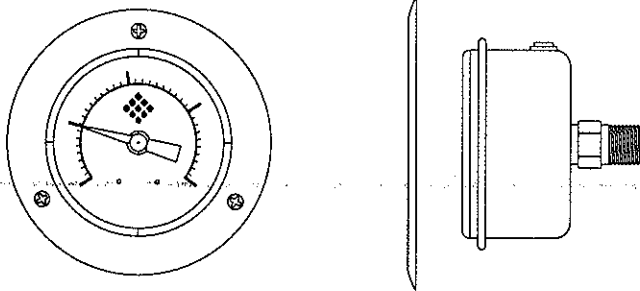


**MAY BE USED IN CONJUNCTION WITH
DUAL 10 INCH PREFILTER OR OIL/WATER SEPARATOR**

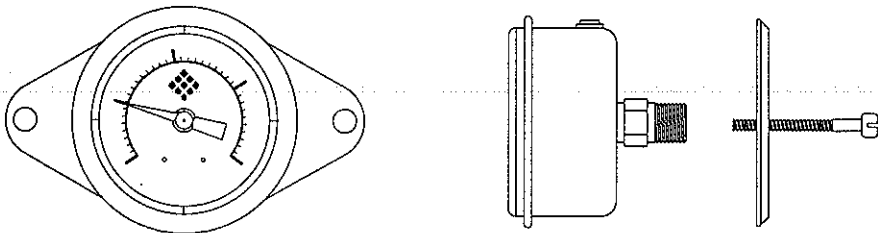
ITEM	QTY	DESCRIPTION	PART NUMBER
1.....	1.....	ELBOW, 90°, 1/4 TUBE X 1/4 MNPT.....	0204020869
2.....	1.....	LID, INCLUDES #4 AND #5.....	0700100300-03
3.....	1.....	O-RING, LID.....	2614011100
4.....	2.....	ADAPTER RING.....	09011371000
5.....	2.....	ADAPTER SEAL.....	09011271000
6.....	1.....	OIL WATER SEPARATOR ELEMENT -AS.....	0802062188
7.....	1.....	BASE, INCLUDES #4 AND #5.....	0700100300-01
8.....	2.....	CONNECTOR, 5/8 TUBE X 3/4 MNPT.....	0204093169
9.....	1.....	PIPE PLUG, 1/2 MNPT, PVC.....	0103342583
10.....	1.....	VALVE, AIR BLEED, 90°.....	14015506AR-02
11.....	1.....	PIPE PLUG, 1/4 MNPT, PVC.....	0101340883
12.....	1.....	LID WRENCH.....	0700100300-04
13.....	1.....	LABEL, "OIL WATER SEPARATOR".....	2234012560
14.....	4.....	SCREW HEX HEAD TYPE "A" 1/4 x 1 STAINLESS STEEL.....	061172143016
15.....	4.....	WASHER FLAT 1/4 STAINLESS STEEL.....	061080043000

PRESSURE GAUGES

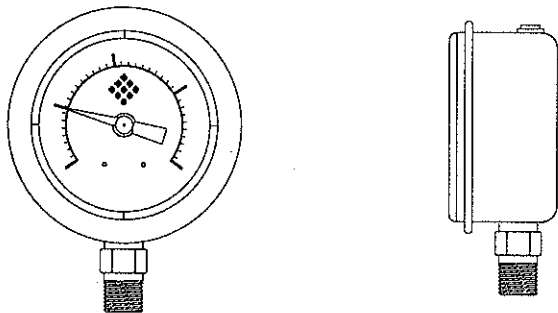
A.



B.



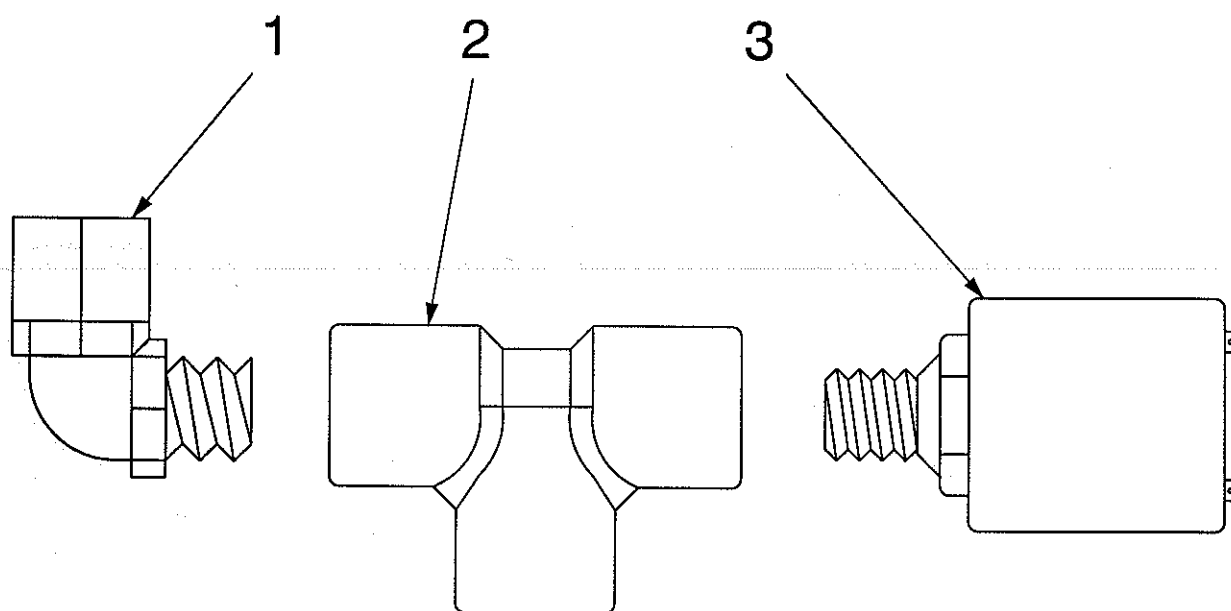
C.



01004130
2-1-91

ITEM	QTY	DESCRIPTION	PART NUMBER
A & B.....	A/R	GAUGE VACUUM/PRESSURE,CBM, -30 TO 60 PSI	1018060141
A & B.....	A/R	GAUGE HIGH PRESSURE, CBM, 0-1500 PSI, HI PRES.....	1018061741
A.....	A/R	FLANGE, FRONT PANEL MOUNT.....	0516055241
B.....	A/R	FLANGE, REAR PANEL MOUNT.....	0516055141
C.....	A/R	GAUGE VACUUM/PRESSURE, BPM, -30 TO +60.....	1018010141
C.....	A/R	GAUGE HIGH PRESSURE, BPM, 0-1500 PSI, HI PRES.....	1018011741

LOW PRESSURE SWITCH ASSEMBLY ASSEMBLY NO. B146040001

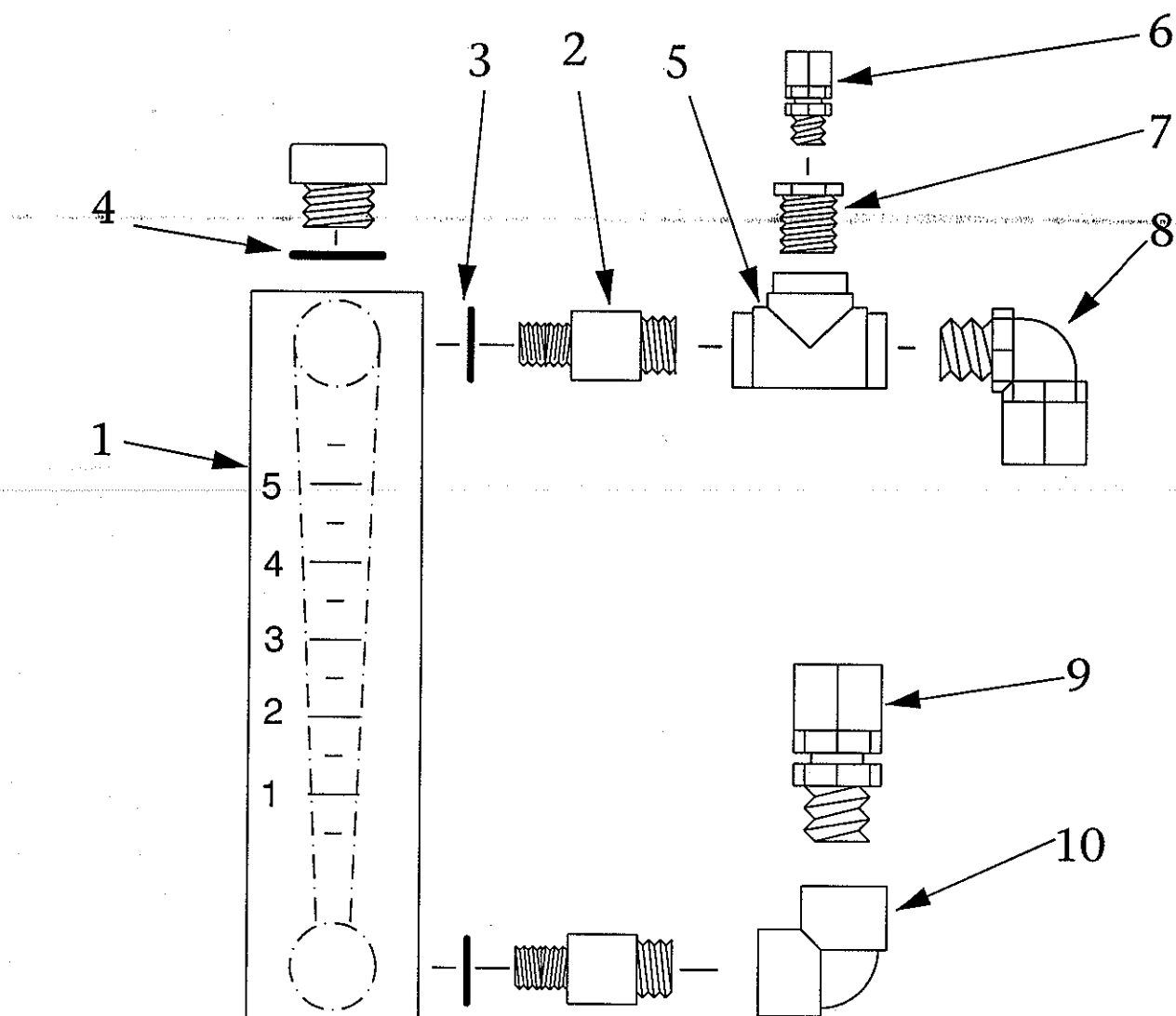


B146040001
5/94

ITEM	QTY	DESCRIPTION	PART NUMBER
1.....	1	ELBOW, 90°, 1/4 TUBE X 1/4 MNPT.....	0204020869
2.....	1	TEE, 1/4 FNPT, PVC.....	0101420883
3.....	1	LOW PRESSURE SWITCH.....	2305020158

FEED WATER FLOW METER ASSEMBLY P/N B141040001

.5 - 5 GPM PANEL MOUNT STYLE

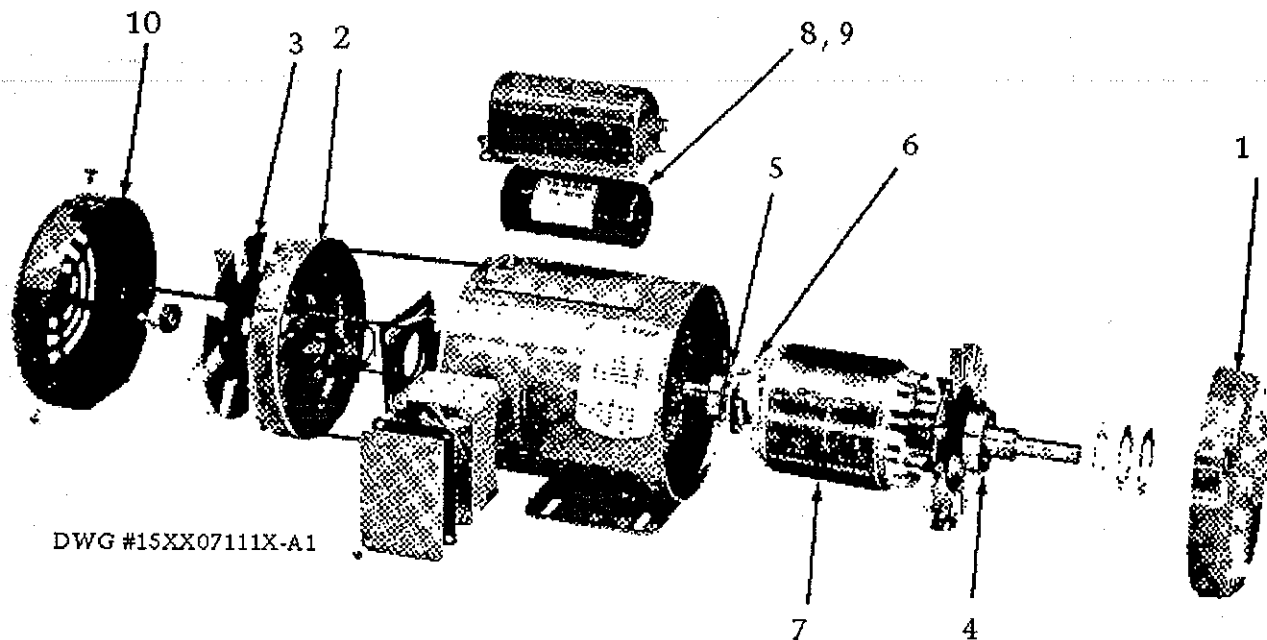


B141040001
10/94

ITEM	QTY	DESCRIPTION	PART NUMBER
1-4	1	FLOW METER .5 TO 5 GPM PANEL MOUNT	1107536653
2	2	PORT ADAPTOR .5 TO 5	1107536653-2
3	2	"O" RING PORT ADAPTOR .5 TO 5	2614014153
4	1	"O" RING, TOP CAP .5 TO 5	2614014553
5	1	TEE, 1/2 FNPT, PVC	0101422583
6	1	MALE CONNECTOR 1/4" TUBE x 1/4" MNPT	0204090869
7	1	REDUCING BUSHING 1/2" MNPT x 1/4" FNPT PVC	0101292383
8	1	MALE EL 90° 5/8" TUBE x 1/2" MNPT	0204022969
9	1	MALE CONNECTOR 5/8" TUBE x 1/2" MNPT	0204092969
10	1	FEMALE EL 90° 1/2" FNPT PVC	0101012583

ELECTRIC MOTOR ASSEMBLY

1.5 HP 115/230 VAC, 60 Hz, SINGLE PHASE	PART NO. 1543072117
1.5 HP 230/460 VAC, 60 Hz, THREE PHASE	PART NO. 1544072117
2 HP 220 V AC, 50 Hz, SINGLE PHASE	PART NO. 1545032110
2 HP 220/380 V AC, 50 Hz, THREE PHASE	PART NO. 1554072117
3 HP 115/230 V AC, 60 Hz, SINGLE PHASE	PART NO. 1559073110
3 HP 230/460 V AC, 60 Hz, THREE PHASE	PART NO. 1560072610
3 HP 220 V AC, 50 Hz, SINGLE PHASE	PART NO. 1561073110
3 HP 220/380 V AC, 50 Hz, THREE PHASE	PART NO. 1562072610



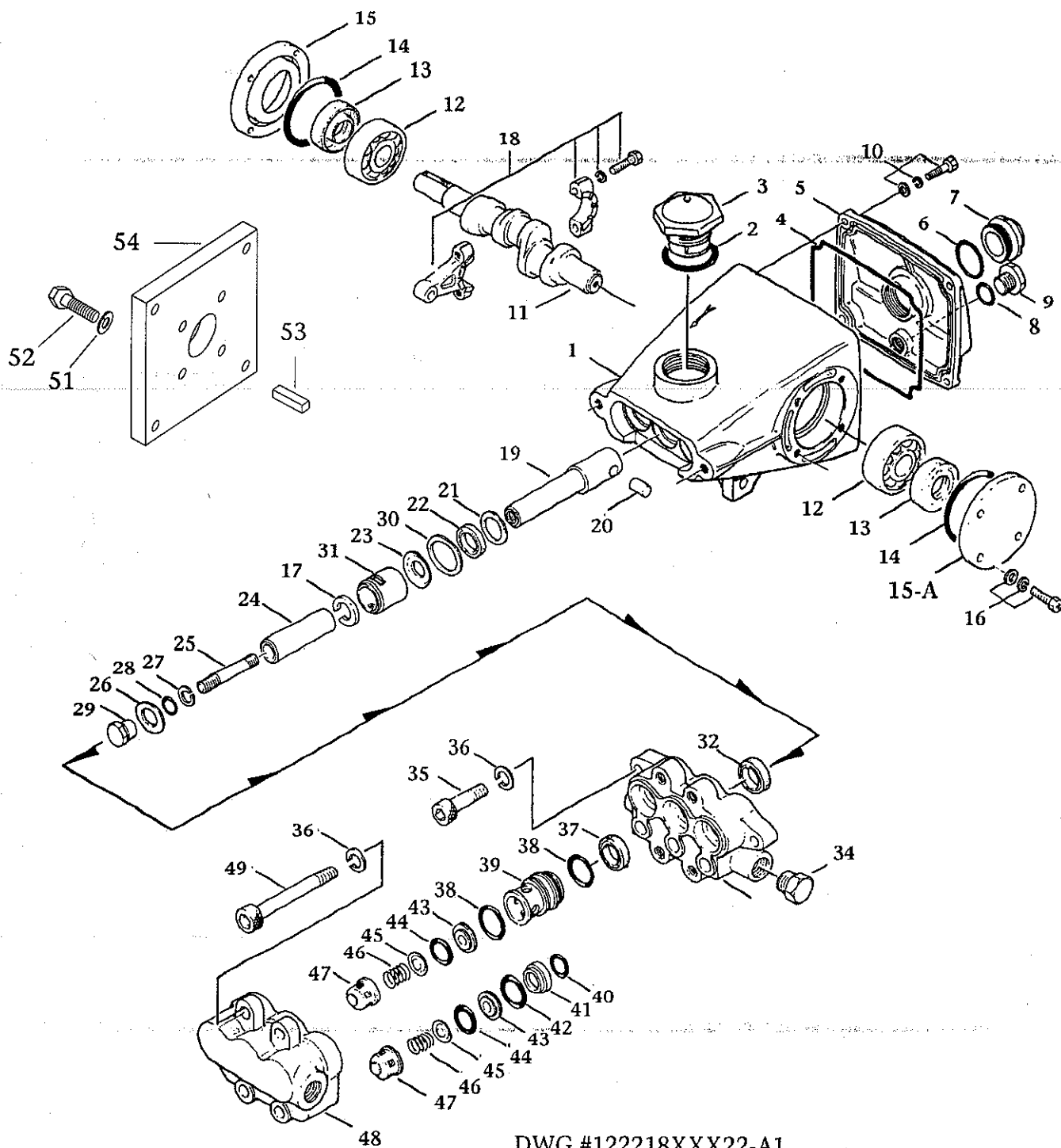
ITEM	QTY	DESCRIPTION	PART NUMBER
1.....1.....		END PLATE, SHAFT END.....	-05
2.....1.....		END PLATE, FAN END.....	-04
3.....1.....		FAN.....	-06
4.....1.....		BEARING, SHAFT END.....	-specify motor
5.....1.....		BEARING, FAN END.....	-specify motor
6.....1.....		ROTARY SWITCH.....	-02
7.....4.....		ROTOR AND SHAFT ASSEMBLY.....	-01
8.....1.....		CAPACITOR, START.....	-specify motor
9.....1.....		CAPACITOR, RUN.....	-specify motor
10.....1.....		FAN COVER.....	-07

HIGH PRESSURE PUMP

P/N 1222181122 FOR SRC 200-600 AF/AC, 60 Hz SYSTEMS

P/N 1222180722 FOR SRC 200-600 AF/AC, 50 Hz & 50/60 Hz SYSTEMS

P/N 1222180322 FOR SRC 800-1500 AF/AC SYSTEMS



DWG #122218XXX22-A1

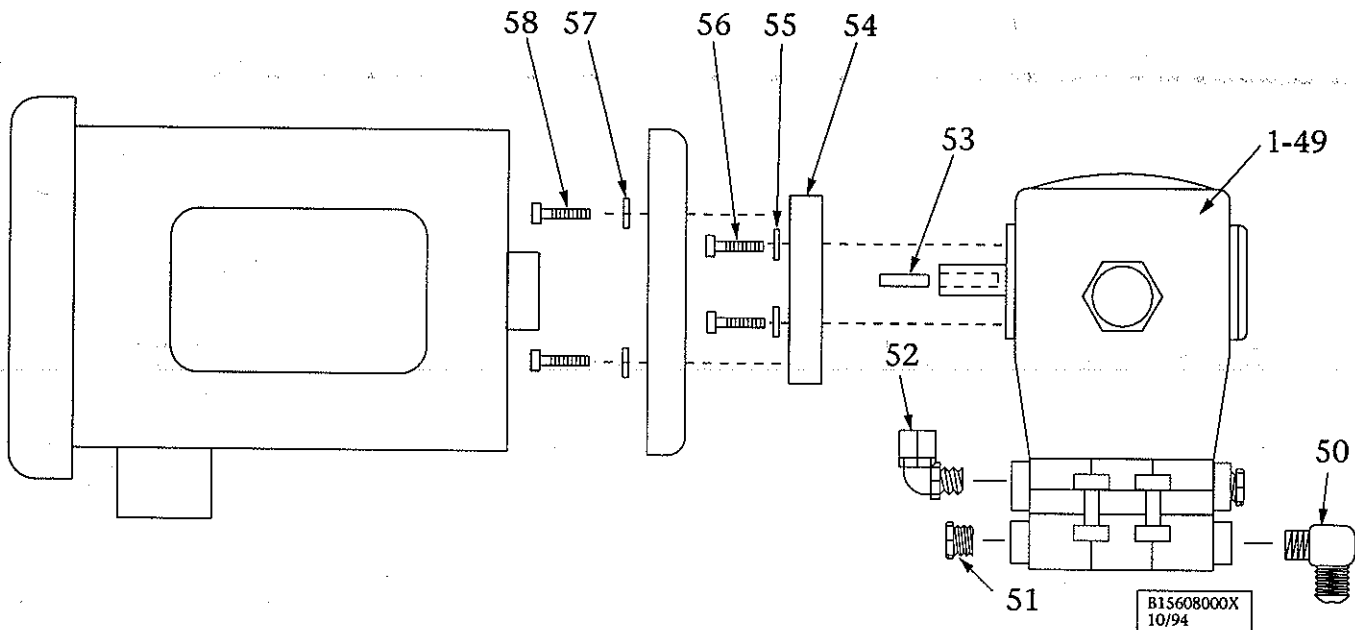
HIGH PRESSURE PUMP PARTS LISTING

ITEM	QTY	DESCRIPTION	PART NUMBER
1-49	1	HIGH PRESSURE PUMP ASSEMBLY	
		SRC 200 - 600 AM 60Hz SYSTEMS	1222181122
		SRC 200 - 600 AM 50Hz & 50/60 Hz SYSTEMS	1222180722
		SRC 800 - 1500 AM SYSTEMS	1222180322
1	1	CRANKCASE	12221XXX22-1
		CRANKCASE STUFFED INCLUDING #1-31	
		FOR SRC 200-600 AM 60Hz SYSTEMS	1222181122-1+
		FOR SRC 200-600 AM 50Hz or 50/60Hz SYSTEMS	1222180722-1+
		FOR SRC 800-1500 AM SYSTEMS	1222180322-1+
2	1	"O" RING OIL FILL CAP	12221XXX22-2
3	1	OIL FILL CAP	12221XXX22-3
4	1	"O" RING CRANKCASE COVER	12221XXX22-4
5	1	CRANKCASE COVER	12221XXX22-5
6	1	ELAT GASKET OIL SIGHT GAUGE	12221XXX22-6
7	1	OIL SIGHT GAUGE	12221XXX22-7
8	1	"O" RING OIL DRAIN PLUG	12221XXX22-8
9	1	OIL DRAIN PLUG	12221XXX22-9
10	4	SCREW CRANKCASE COVER (M6X20 SS)	12221XXX22-10
11	1	CRANKSHAFT -SRC 200-600 AM 60Hz SYSTEMS	1222181122-11
		CRANKSHAFT -SRC 200-600 AM 50 Hz & 50/60 Hz SYSTEMS	1222180722-11
		CRANKSHAFT -SRC 800-1500 SYSTEMS	1222180322-11
12	2	BEARING	12221XXX22-12
13	2	OIL SEAL (BUNA-N)	12221XXX22-13
14	2	"O" RING OIL SEAL CASE	12221XXX22-14
15	1	BEARING CASE	12221XXX22-15
15A	1	BEARING CASE, BLIND (NO CENTER HOLE)	12221XXX22-15A
16	4	SCREW BEARING CASE (M6X16 SS)	12221XXX22-16
17	3	KEYHOLE WASHER (M18)	12221XXX22-17
18	3	CONNECTING ROD ASSY	12221XXX22-18
19	3	PLUNGER ROD	12221XXX22-19
20	3	ROD PIN	12221XXX22-20
21	3	WASHER PLUNGER	12221XXX22-21
22	3	OIL SEAL PLUNGER	12221XXX22-22
23	3	BARRIER SLINGER	12221XXX22-23
24	3	CERAMIC PLUNGER	12221XXX22-24
25	3	RETAINER STUD (M6X40 SS) PLUNGER	12221XXX22-25
26	3	GASKET (316SS) PLUNGER	12221XXX22-26
27	3	BACK UP RING PLUNGER	12221XXX22-27
28	3	"O" RING PLUNGER RETAINER	12221XXX22-28
29	3	PLUNGER RETAINER (316SS)	12221XXX22-29
30	3	WASHER SEAL RETAINER	12221XXX22-30
31	3	SEAL RETAINER	12221XXX22-31
32★	3	LOW PRESSURE SEAL	12221XXX22-32
33	1	INLET MANIFOLD EMPTY	12221XXX22-33
		INLET MANIFOLD STUFFED INCLUDING #32-37	12221XXX22-33+
34	1	PIPE PLUG 1/2 MNPT	0101342500
35	2	SOCKET HEAD BOLT (M10X35 SS)	12221XXX22-35
36	6	SPLIT LOCK WASHER (M10 SS)	12221XXX22-36
37★	3	HIGH PRESSURE SEAL	12221XXX22-37
38★♦	6	"O" RING, VALVE SPACER	12221XXX22-38
39	3	DISCHARGE VALVE SPACER	12221XXX22-39
40★♦	3	"O" RING, VALVE ADAPTER	12221XXX22-40
41	3	INLET VALVE ADAPTER	12221XXX22-41
42★♦	3	"O" RING INLET VALVE ADAPTER	12221XXX22-42
43♦	6	VALVE SEAT	12221XXX22-43
44★♦	6	"O" RING VALVE SEAT	12221XXX22-44
45♦	6	VALVE	12221XXX22-45
46♦	6	VALVE SPRING	12221XXX22-46
47♦	6	VALVE SPRING RETAINER	12221XXX22-47
48	1	DISCHARGE MANIFOLD EMPTY	12221XXX22-48
		DISCHARGE MANIFOLD STUFFED INCLUDING #36-49	12221XXX22-48+
49	4	SOCKET HEAD BOLT (M10X55 SS)	12221XXX22-49
48	1	MANIFOLD COMPLETE INLET & DISCH STUFFED #32-49	12221XXX22-48
♦		VALVE KIT, SRC HPPVK-AS	B654080001
★		SEAL KIT, SRC HPPSK-AS	B653080001
♦★		PUMP REBUILD KIT, SRC HPPK-AS	B652080001

HIGH PRESSURE PUMP & MOTOR ASSEMBLY

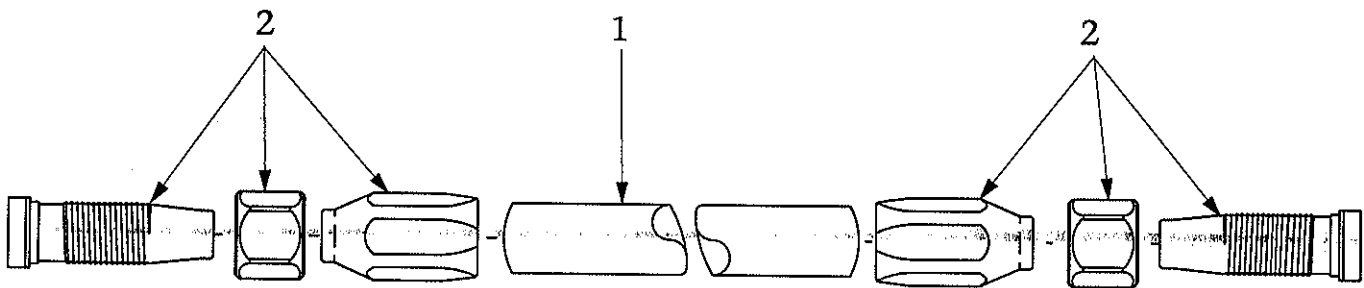
WHEN ORDERING ASSEMBLY SPECIFY:

1. FULL SYSTEM MODEL NUMBER
2. OPERATING VOLTAGE, CYCLES & PHASE
3. SYSTEM SERIAL NUMBER



ITEM	QTY	DESCRIPTION	PART NUMBER
1-49.....1		HIGH PRESSURE PUMP ASSEMBLY	
		.....SRC 200 - 600 AM 60Hz SYSTEMS	1222181122
		.....SRC 200 - 600 AM 50Hz & 50/60 Hz SYSTEMS	1222180722
		.....SRC 800 - 1500 AM SYSTEMS	1222180322
50.....1		EL 90° -6 FLARE X 3/8 MNPT (200-600 GPD SYSTEMS)	1321021969
		.....EL 90° -8 FLARE X 3/8 MNPT (800-1500 GPD SYSTEMS)	1321022569
51.....1		PIPE PLUG 3/8 MNPT	0121341869
52.....1		EL 90° 5/8 TUBE X 1/2 MNPT	0204022969
53.....1		KEY	SPECIFY SYSTEM
54.....1		ADAPTER PLATE -AS PUMP TO MOTOR	20200702140
55.....4		WASHER SPLIT LOCK M6	061120091000
56.....4		BOLT HEX HEAD M6 X 25MM	061142191175
57.....4		WASHER SPLIT LOCK 1/4 INCH	061120043000
58.....4		BOLT HEX HEAD 1/4-20 X 3/4	061142145010

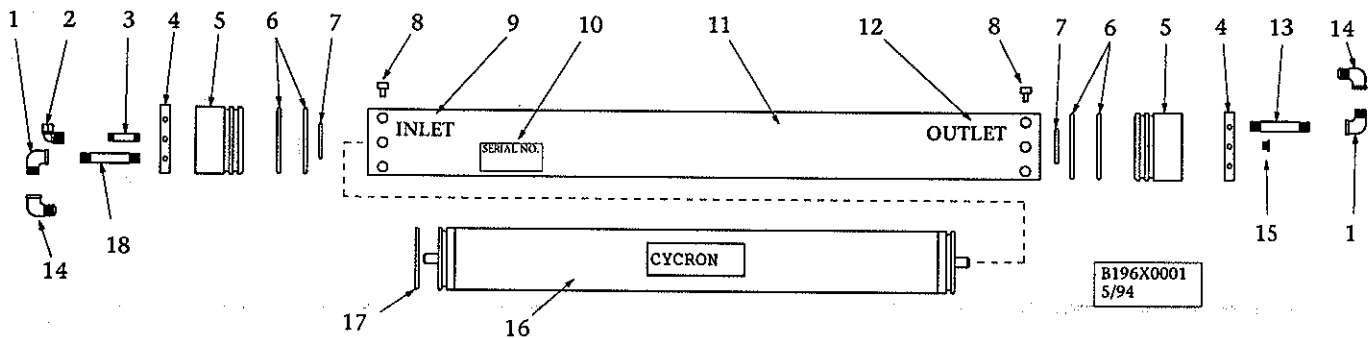
HIGH PRESSURE HOSE ASSEMBLY



DWG #B39008XXXX-A1
5/94

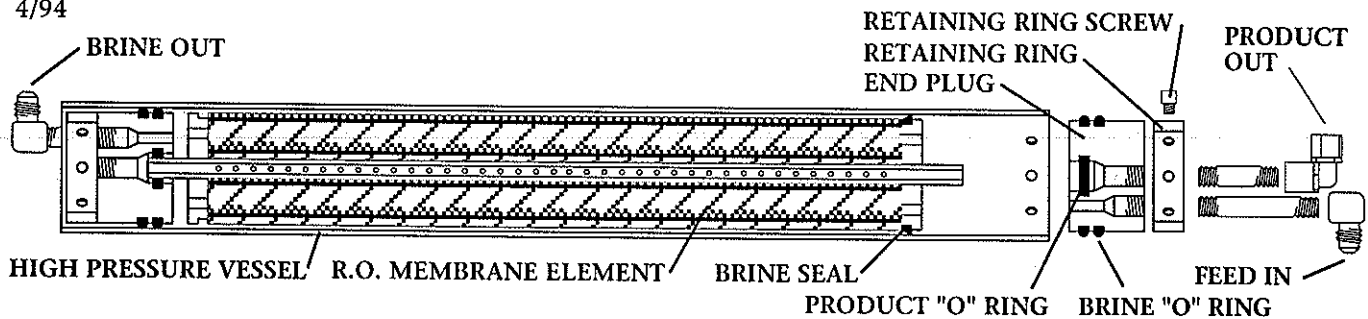
ITEM	QTY	DESCRIPTION	PART NUMBER
<u>PRE-ASSEMBLED HOSE ASSEMBLIES:</u>			
FOR 200 TO 600 GPD SYSTEMS			
		.....HP HOSE -6 MVA INTERCONNECT	B411080001
		.....HP HOSE -6 HP PUMP OUTLET TO MVA INLET	B406040001
		.....HP HOSE -6 MVA OUTLET TO BPR INLET	B456040001
FOR 800 TO 1500 GPD SYSTEMS			
		.....HP HOSE -8 MVA INTERCONNECT	B411080002
		.....HP HOSE -8 HP PUMP OUTLET TO MVA INLET	B406040002
		.....HP HOSE -8 MVA OUTLET TO BPR INLET	B456040002
<u>INDIVIDUAL PARTS, HOSE AND FITTINGS:</u>			
FOR 100 TO 600 GPD SYSTEMS:			
1	.....A/R*	.....HP HOSE, -6 SIZE, 3/8 INCH	2404013701
2	.....2	.....SWIVEL FITTING, -6 SIZE	1321481901
FOR 800 TO 1500 GPD SYSTEMS:			
1	.....A/R*	.....HP HOSE, -8 SIZE, 1/2 INCH	2404013801
2	.....2	.....SWIVEL FITTING, -8 SIZE	1321482601
*SPECIFY MODEL NUMBER OF SYSTEM AND LOCATION OF HOSE FOR ACCURATE SIZE OR SPECIFY EXACT LENGTH OF HOSE END TO END (END OF FITTING TO END OF FITTING)			

MEMBRANE AND VESSEL ASSEMBLY



CROSS SECTIONAL VIEW OF REVERSE OSMOSIS MEMBRANE & HIGH PRESSURE VESSEL ASSEMBLY WITH END PLUGS

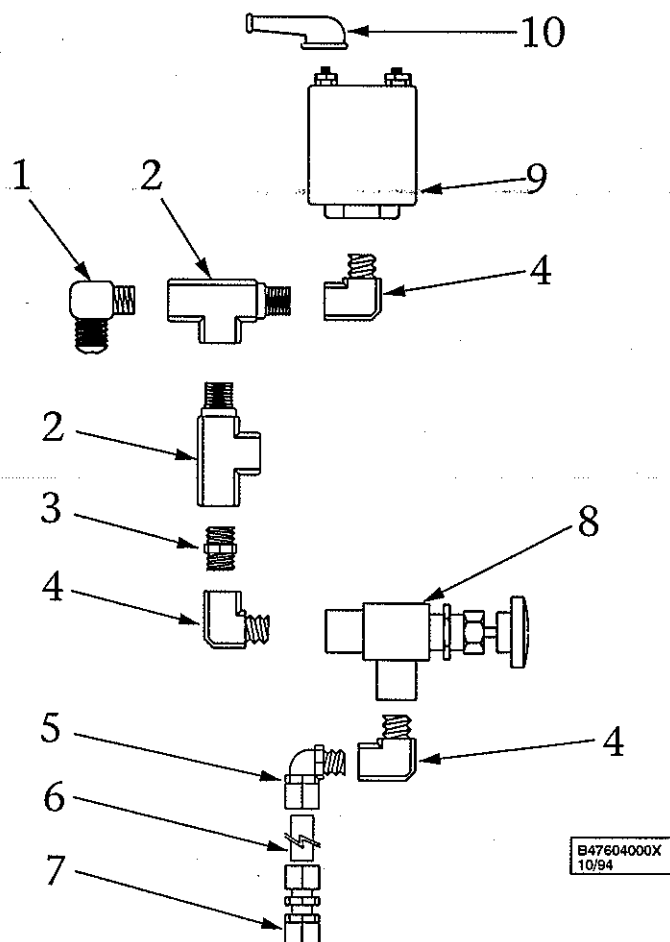
DWG #B196080001-A 2
4/94



ITEM	QTY	DESCRIPTION	PART NUMBER
1-18	1	MEMBRANE AND VESSEL ASSY, 200 GPD	B196060001
	OR	MEMBRANE AND VESSEL ASSY, 400 GPD	B196070001
1	2	STREET ELBOW, 90°, 1/4 FNPT X 1/4 MNPT, BRASS	0121230869
2	1	ELBOW, 90°, 1/4 TUBE X 1/4 FNPT	0204010869
3	1	NIPPLE, 1/4 NPT X 2", PVC	0101370820
4	2	RETAINING RING	20201102190
5	2	END PLUG, 2.5"	2433407100
6	4	O-RING, BRINE, 2.5"	2614010200
7	2	O-RING, PRODUCT	2614010100
8	12	CAP SCREW, SOCKET HEAD	061162345004
9	1	LABEL, "INLET"	2234011260
10	1	LABEL, "SERIAL NUMBER"	2220010660
11	1	PRESSURE VESSEL, 200 GPD	24201072000
	OR	PRESSURE VESSEL, 400 GPD	24201172000
12	1	LABEL, "OUTLET"	2234011360
13	1	NIPPLE, HEX, 1/4 NPT X 2", BRASS	0121380820
14	2	ELBOW, 90°, 1/4 FNPT X -6 -37° FLARE (200 GPD ROM)	1321011769
	OR	ELBOW, 90°, 1/4 FNPT X -8 -37° FLARE (400 GPD ROM)	1321012469
15	1	PIPE PLUG, 1/4 MNPT	0101340883
16	1	SRC 200 GPD RO MEMBRANE ELEMENT (ROM)	2724010633
	OR	SRC 400 GPD RO MEMBRANE ELEMENT (ROM)	2724011133
17	1	BRINE SEAL, 2.5"	2614050133
18	1	NIPPLE, HEX, 1/4 NPT X 3", BRASS	0121380830
NOT SHOWN		INTERCONNECT HOSE, -6 MVA, 200-600 GPD	B411080001
NOT SHOWN		INTERCONNECT HOSE, -8 MVA, 800-1500 GPD	B411080002

BACK PRESSURE REGULATOR ASSEMBLY
ASSEMBLY NO. B476040001 SRC 200-600 AM SYSTEMS
ASSEMBLY NO. B476040002 SRC 800-1500 AM SYSTEMS

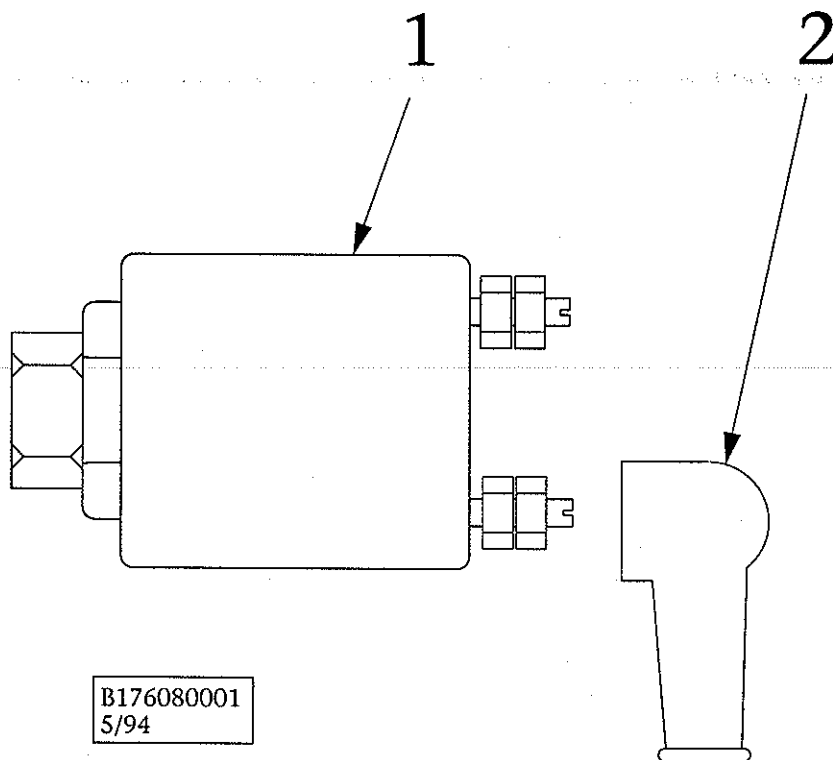
***The High Pressure Switch (#9) is not included with the Back Pressure Regulator Assembly, it must be ordered separately.**



ITEM	QTY	DESCRIPTION	PART NUMBER
1-8.....	1	BACK PRESSURE REGULATOR ASSEMBLY NUMBER	
		FOR SRC 200-600 AM SYSTEMS.....	B476040001
		FOR SRC 800-1500 AM SYSTEMS.....	B476040002
1.....	1	ELBOW, 90°, -6 FLARE X 1/4 MNPT, BRASS.....	1321021769
	1	ELBOW 90°, -8 FLARE X 1/4 MNPT, BRASS.....	1321022469
2.....	2	STREET TEE 1/4 NPT, BRASS.....	0121490869
3.....	1	NIPPLE HEX 1/4 X CLOSE, BRASS.....	012113808CL
4.....	3	STREET ELBOW, 90°, 1/4 NPT, BRASS.....	0121230869
5.....	1	ELBOW 90° 3/8 TUBE X 1/4 MNPT.....	0204021769
6.....	A/R	TUBING 3/8 INCH O.D.....	0312123569
7.....	1	UNION 3/8 TUBE X 1/2 TUBE.....	0204212469
8.....	1	BACK PRESSURE REGULATOR -AS.....	1417017896
9*	1	HIGH PRESSURE SWITCH -AS.....	2317020158
10.....	2	TERMINAL ISOLATOR.....	2132051379

* The High Pressure Switch (#9 & 10) is not included with the back pressure regulator assy.
It must be ordered separately.

HIGH PRESSURE SWITCH ASSEMBLY ASSEMBLY NO. B176080001



ITEM	QTY	DESCRIPTION	PART NUMBER
1.....1.....		HIGH PRESSURE SWITCH, /AS	2317020158
2.....2.....		TERMINAL ISOLATOR.....	2132051379

PRODUCT WATER MANIFOLD ASSEMBLY

ASSEMBLY NO. B50104000__

*Quantities of Items 5 & 6 will vary depending on the product water capacity and the number of membranes on your system.

200 GPD SYSTEM WITH 1 R.O. MEMBRANE/VESSEL:

ASSY NO. B5010400001

400 OR 800 GPD SYSTEM WITH 2 R.O. MEMBRANE/VESSELS:

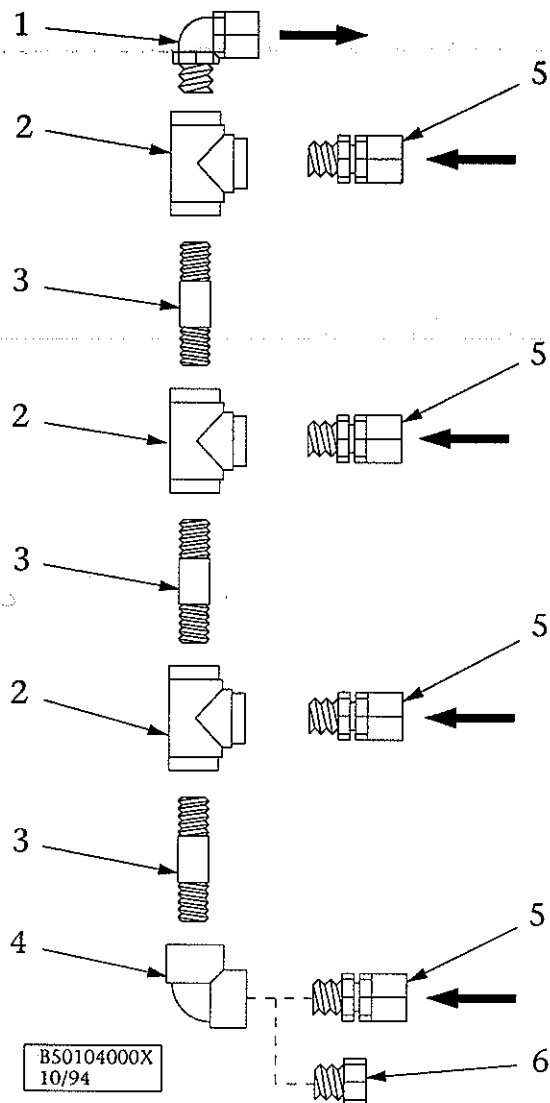
ASSY NO. B5010400002

600 OR 1200 GPD SYSTEM WITH 3 R.O. MEMBRANE/VESSELS:

ASSY NO. B5010400003

1500 GPD SYSTEM WITH 4 R.O. MEMBRANE/VESSELS:

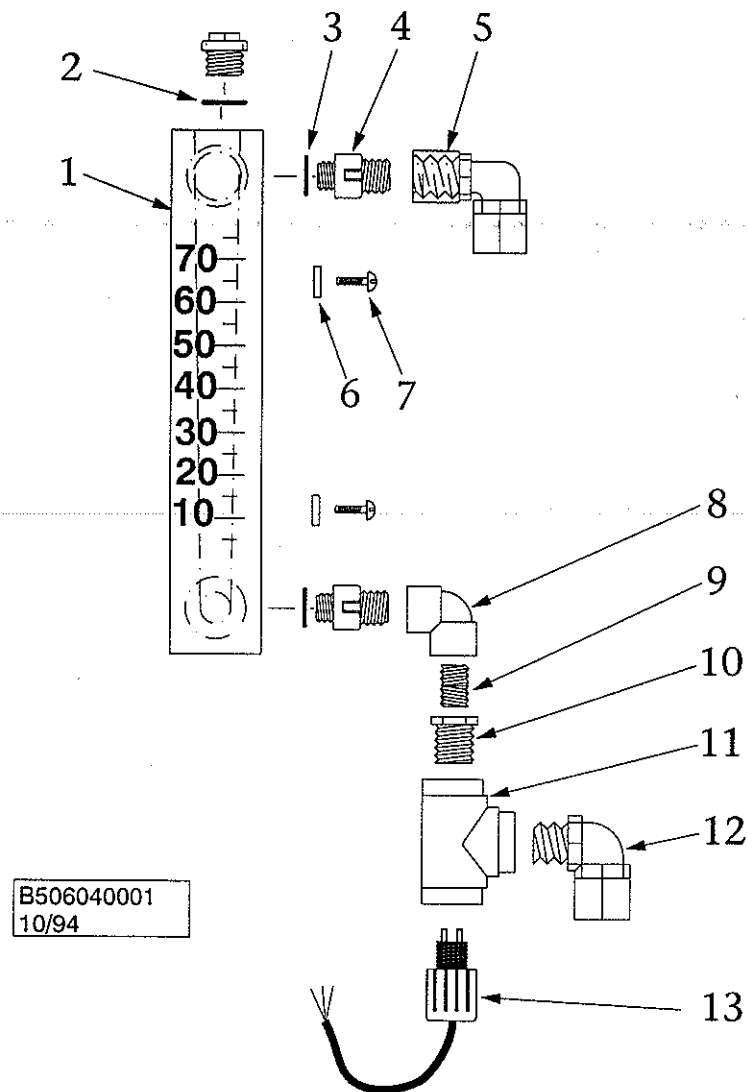
ASSY NO. B5010400004



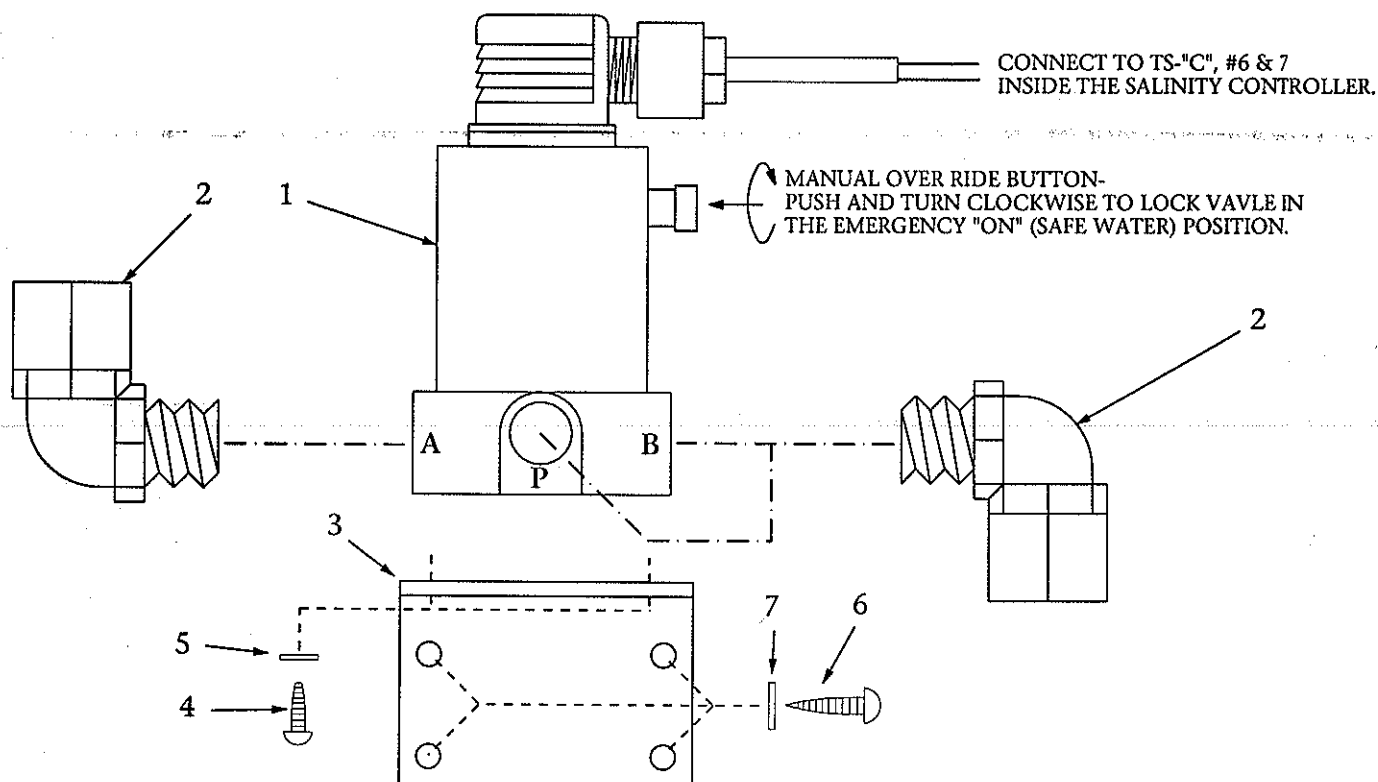
ITEM	QTY	DESCRIPTION	PART NUMBER
1.....	1.....	ELBOW, 90°, 3/8 TUBE X 1/4 MNPT.....	0204021769
2.....	3.....	TEE, 1/4 FNPT, PVC.....	0101420883
3.....	3.....	NIPPLE, 1/4 MNPT X 2 1/2.....	0101370825
4.....	1.....	ELBOW, 90°, 1/4 FNPT, PVC.....	0101010883
5.....	A/R*	CONNECTOR, 1/4 TUBE X 1/4 MNPT.....	0204090869
6.....	A/R*	PIPE PLUG, 1/4 NPT.....	0101340883

PRODUCT WATER FLOW METER ASSEMBLY .5 - 75 GPH **ASSEMBLY NO. B506040001***

***The SALINITY PROBE is not included with the Product Water Flow meter Assembly, it must be ordered separately.**



ITEM	QTY	DESCRIPTION	PART NUMBER
1-4	1	PRODUCT WATER FLOW METER, 5-75 GPH, /AS	1107356253
2	1	O-RING, CAP, 5-75	2614014653
3	2	O-RING, PORT ADAPTER, 5-75	2614014053
4	2	PORT ADAPTER, 5-75	1107356253-2
5	1	EL-90° 1/4-TUBE X 1/4 FNPT	0204011769
6	2	WASHER, #10, NYLON	065080028000
7	2	SCREW, 10-32 X 3/8	061160631006
8	1	ELBOW, 90°, 1/4 FNPT X 1/4 FNPT, PVC	0101010883
9	1	NIPPLE 1/4 NPT X CLOSE PVC	01013708CL
10	1	REDUCING BUSHING, 1/2 MNPT X 1/4 FNPT, PVC	0101292383
11	1	TEE, 1/2 FNPT, PVC	0101422583
12	1	ELBOW, 90°, 3/8 TUBE X 1/2 MNPT	0204021969
13	1	SALINITY PROBE*	B511080001

3-WAY DIVERSION VALVE ASSEMBLY -AM**ASSEMBLY NO. B51604H001 115 VAC****ASSEMBLY NO. B51604J001 220 VAC****PLUMBING CONNECTIONS**

"P" = INLET (COMMON)

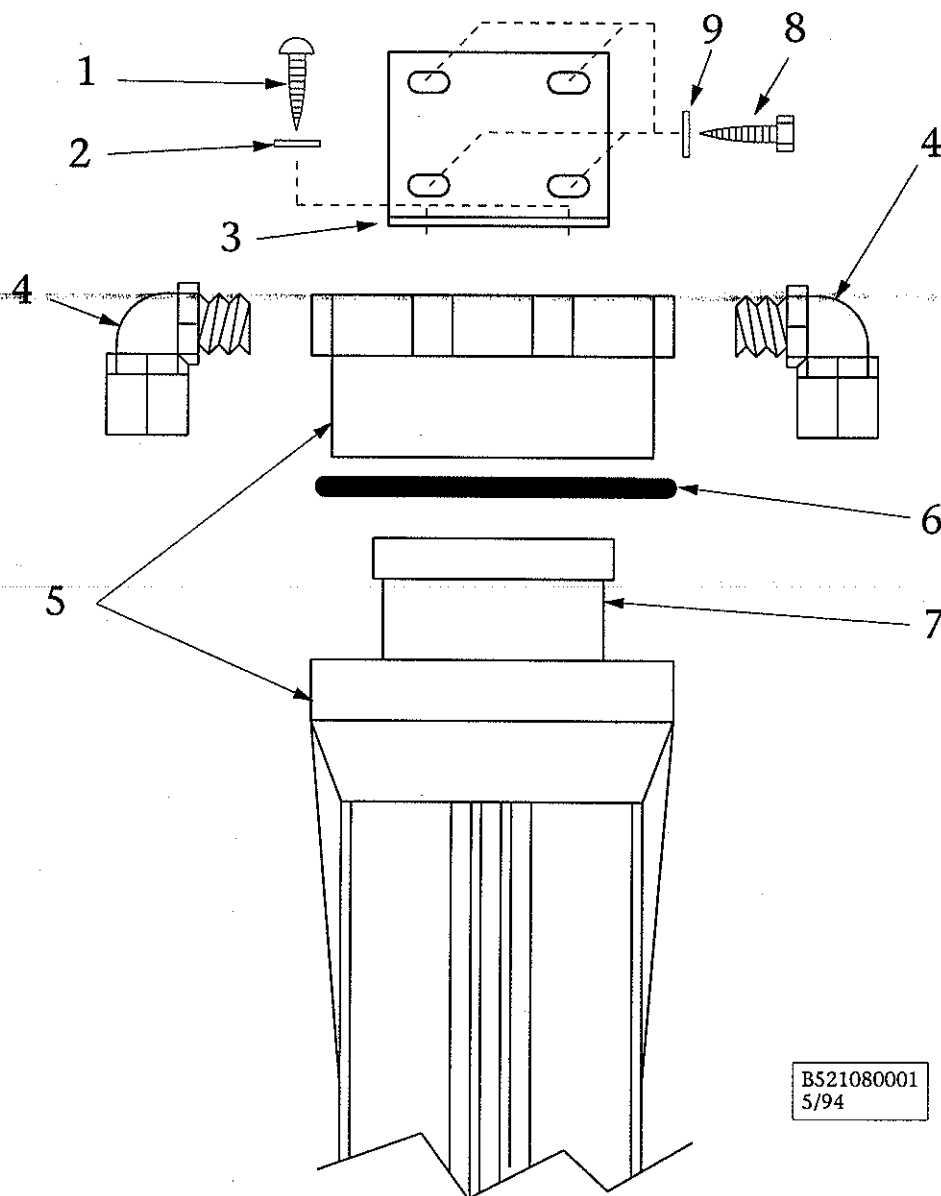
"B" = NORMALLY OPEN -TO DISCHARGE (BAD WATER)

"A" = NORMALLY CLOSED -TO CHARCOAL FILTER INLET (GOOD WATER)

B51604X001
10/94

ITEM	QTY	DESCRIPTION	PART NUMBER
1.....1.....		SOLENOID VALVE, 115 VAC	1401095798
.....		SOLENOID VALVE, 220 VAC	1401095898
2.....3.....		ELBOW, 90°, 3/8 TUBE X 1/4 MNPT	0204021769
3.....1.....		BRACKET, DIVERSION VALVE.....	20200402090
4.....4.....		SCREW PHIL PAN HEAD TYPE "B" #8 x 5/8 STAINLESS.....	061170623010
5.....4.....		WASHER FLAT #8 STAINLESS STEEL	061080023000
6.....4.....		SCREW PHIL PAN HEAD TYPE "A" #10 x 1 STAINLESS	061170628016
7.....4.....		WASHER FLAT #10 NYLON WHITE.....	065080028000

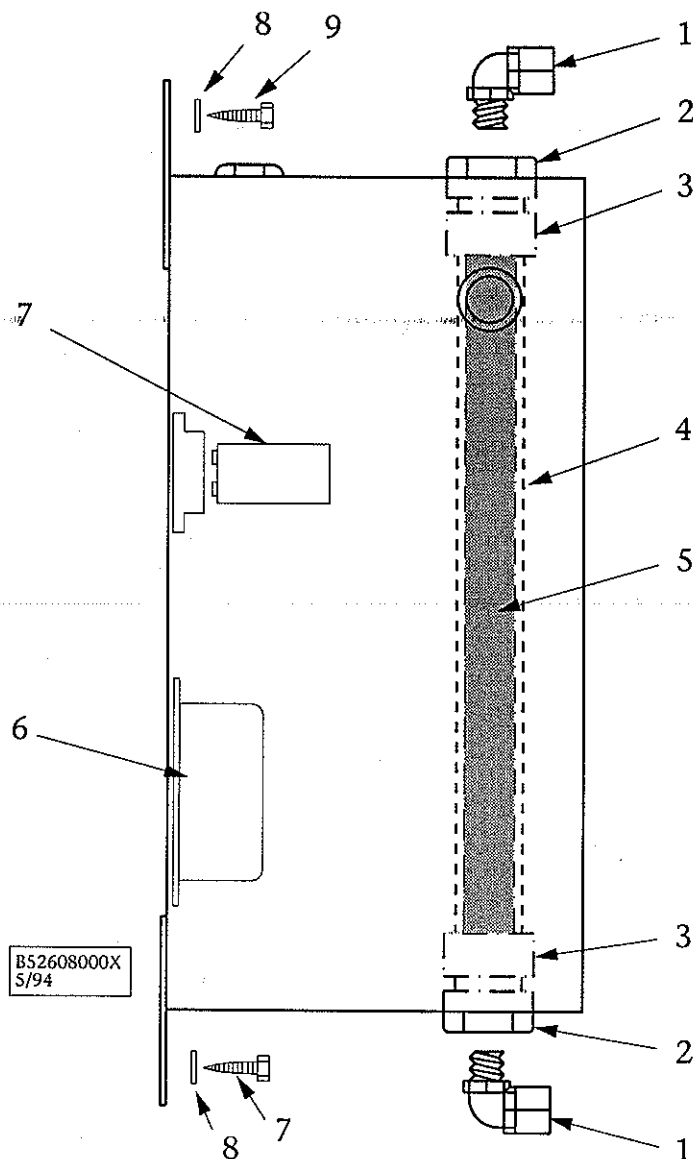
CARBON FILTER ASSEMBLY - AS **ASSEMBLY NO. B521080001**



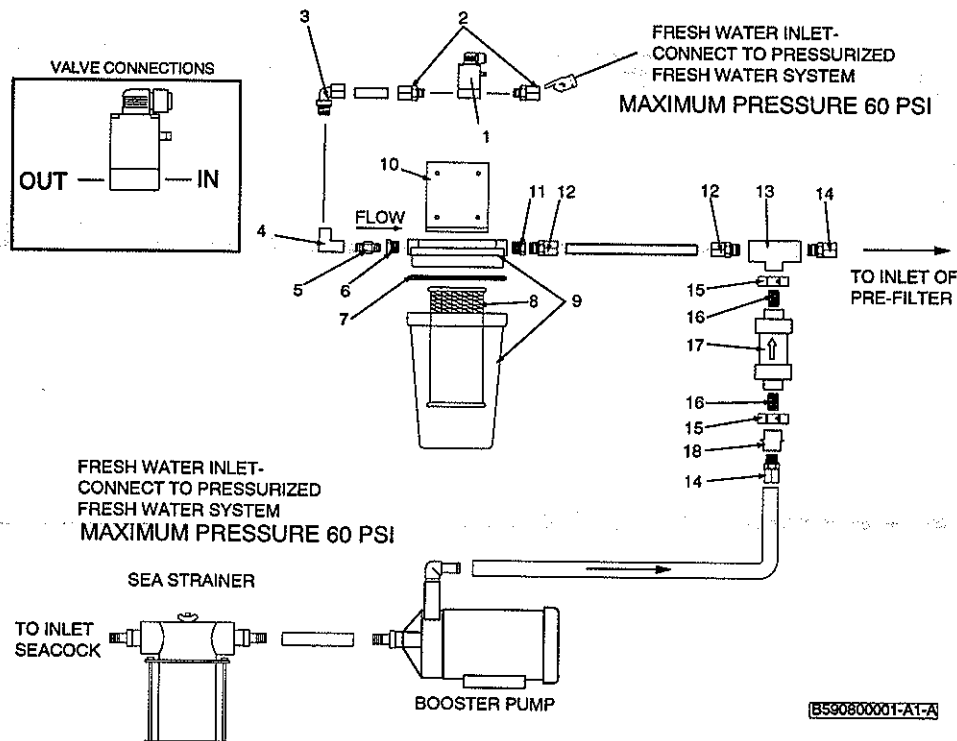
B521080001
5/94

ITEM	QTY	DESCRIPTION	PART NUMBER
1.....	4.....	SCREW, PHILLIPS PAN HD, TYPE "A", #10 X 1"	061170628016
2.....	4.....	FLAT WASHER, NYLON, #10.....	065080028000
3.....	1.....	BRACKET, #10 FILTER HOUSING.....	20200402100
4.....	2.....	ELBOW, 90°, 3/8 TUBE X 3/8 MNPT.....	0204021869
5.....	1.....	FILTER HOUSING/LID, 3/8 X 10.....	0713020573
6.....	1.....	O-RING, #10 FILTER HOUSING.....	2614010473
7.....	1.....	CARBON FILTER ELEMENT.....	0803004773
8.....	4.....	SCREW HEX HEAD TYPE "A" 1/4 X 1 STAINLESS STEEL ...	061172143016
9.....	4.....	WASHER FLAT 1/4 STAINLESS STEEL.....	061080043000

ULTRAVIOLET STERILIZER ASSEMBLY -AM **ASSEMBLY NO. B52608000_**

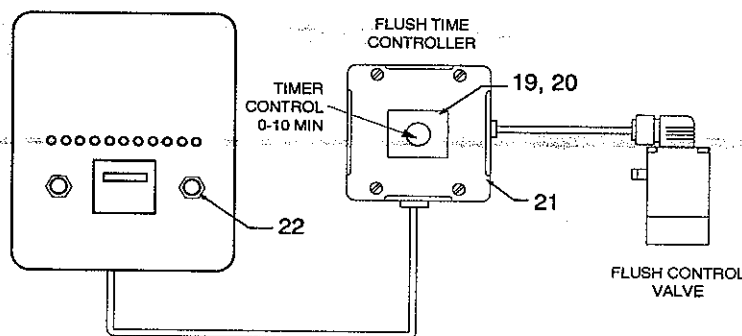


ITEM	QTY	DESCRIPTION	PART NUMBER
1-7.....	1	ULTRAVIOLET STERILIZER	
		.....SRC UV AS-3 115 VAC, 60 Hz	B52608000H
		.....SRC UV AS-3 230 VAC, 60 Hz	B52608000J
		.....SRC UV AS-3 220 VAC, 50 Hz	B52608000S
1.....	2	ELBOW, 90°, 3/8 TUBE X 3/8 MNPT.....	0204021869
2.....	2	INLET/OUTLET PORT, UV-AS (3/8 FNPT).....	4000100109
3.....	2	COMPRESSION NUT, UV-AS.....	4000140109
4.....	1	QUARTZ TUBE, UV-AS.....	4000040109
5.....	1	ULTRAVIOLET LAMP, UV-AS.....	4000010109
6.....	1	BALLAST, 115 VAC, 60 Hz -AS.....	4031020180
		.....BALLAST, 230 VAC, 60 Hz -AS.....	4031020280
		.....BALLAST, 220 VAC, 50 Hz -AS.....	4031020380
7.....	1	STARTER	4031050100
8.....	2	SCREW HEX HEAD TYPE "A" 1/4 x 1 STAINLESS STEEL	061172143016
9.....	2	WASHER FLAT 1/4 STAINLESS STEEL.....	061080043000



SRC-FWF PLUMBING CONNECTIONS AND PARTS LIST

ITEM	QTY	DESCRIPTION	PART NO
1	1	VALVE SOLENOID, 24 VAC	1401085698
2	2	CONNECTOR, 3/8 TUBE X 1/4 MNPT	0204091769
3	1	ELBOW, 1/4 MNPT X 3/8 TUBE	0204021769
4	1	ELBOW, 1/4 FNPT, PVC	0101010883
5	1	CHECK VALVE, 1/4 MNPT, S/S	14172105AT
6	1	REDUCING BUSHING, 1 MNPT X 1/4 FNPT	0101294083
7	1	SEAL, BIG BLUE HOUSING	2614016106
8	1	ELEMENT, CARBON BRICK	0803004906
9	1	FILTER HOUSING, BIG BLUE	0713020606
10	1	BRACKET, CARBON FILTER HOUSING, FWF	2020040001
11	1	REDUCING BUSHING, 1 MNPT X 1/2 FNPT	0101294283
12	2	CONNECTOR, 3/8 TUBE X 1/2 MNPT	0204091969
13	1	TEE, 1/2" FNPT, PVC	0101422583
14	2	CONNECTOR, 5/8 TUBE X 1/2 MNPT	0204092969
15	2	PIPE SUPPORT, 1"	0501164400
16	2	NIPPLE, 1/2" X CLOSE, PVC	01013725CL
17	1	VALVE, CHECK, TRU UNION 1/2 NPT, PVC	1401271442
18	1	COUPLER 1/2" NPT, PVC	0101552583
19	1	TIMER RELAY, 24 VAC/DC	3131120200
20	1	MOUNTING BASE, TIMER RELAY	3131190100
21	1	RELAY HOUSING, FWF	3111220444
22	1	SWITCH, STOP/AS-FWF	2325010300
NOT SHOWN	1	CHECK VALVE BRACKET	2020040002



SRC-FWF CABLE CONNECTIONS

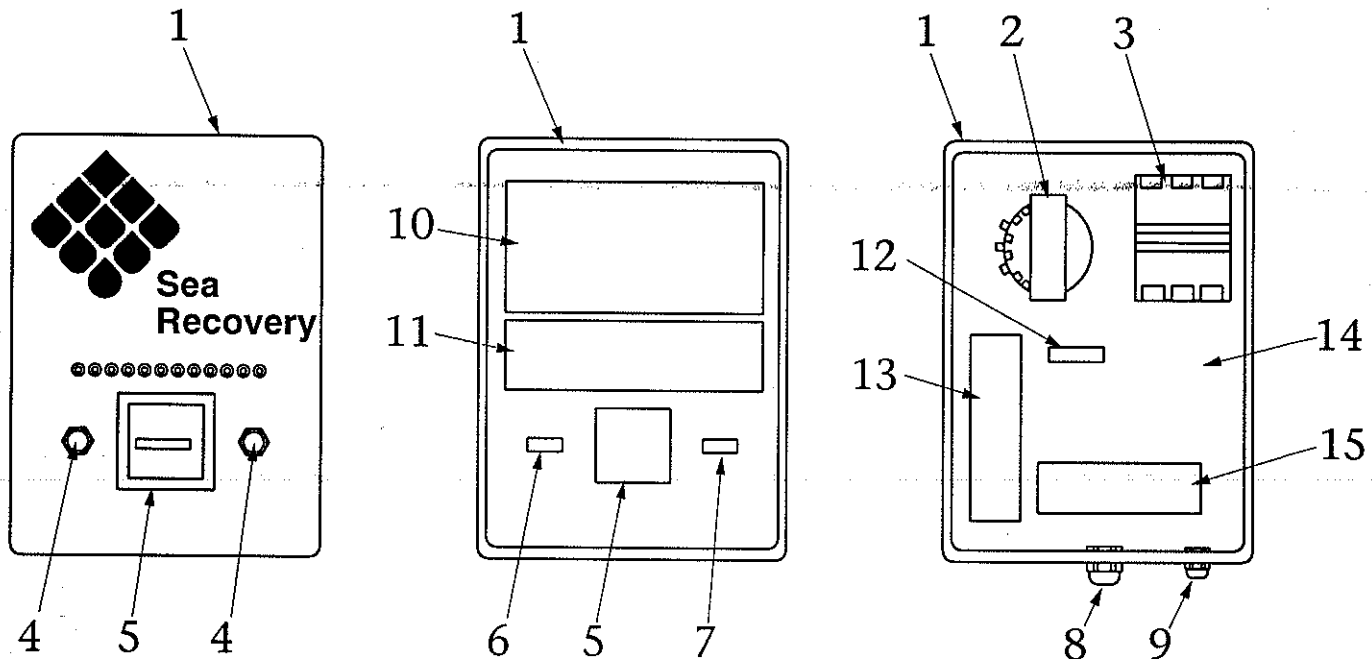
L-31.a.

SALINITY CONTROLLER ASSEMBLY - AM **ASSEMBLY NO.**

115 VAC, 60 Hz, SINGLE PHASE B595080001

230 VAC, 60 Hz, 1 PHASE; 208/230/460 VAC, 60 Hz, 3 PHASE B595080002

220 VAC, 50 Hz, 1 PHASE; 220/380 VAC, 50 Hz, 3 PHASE B595080003

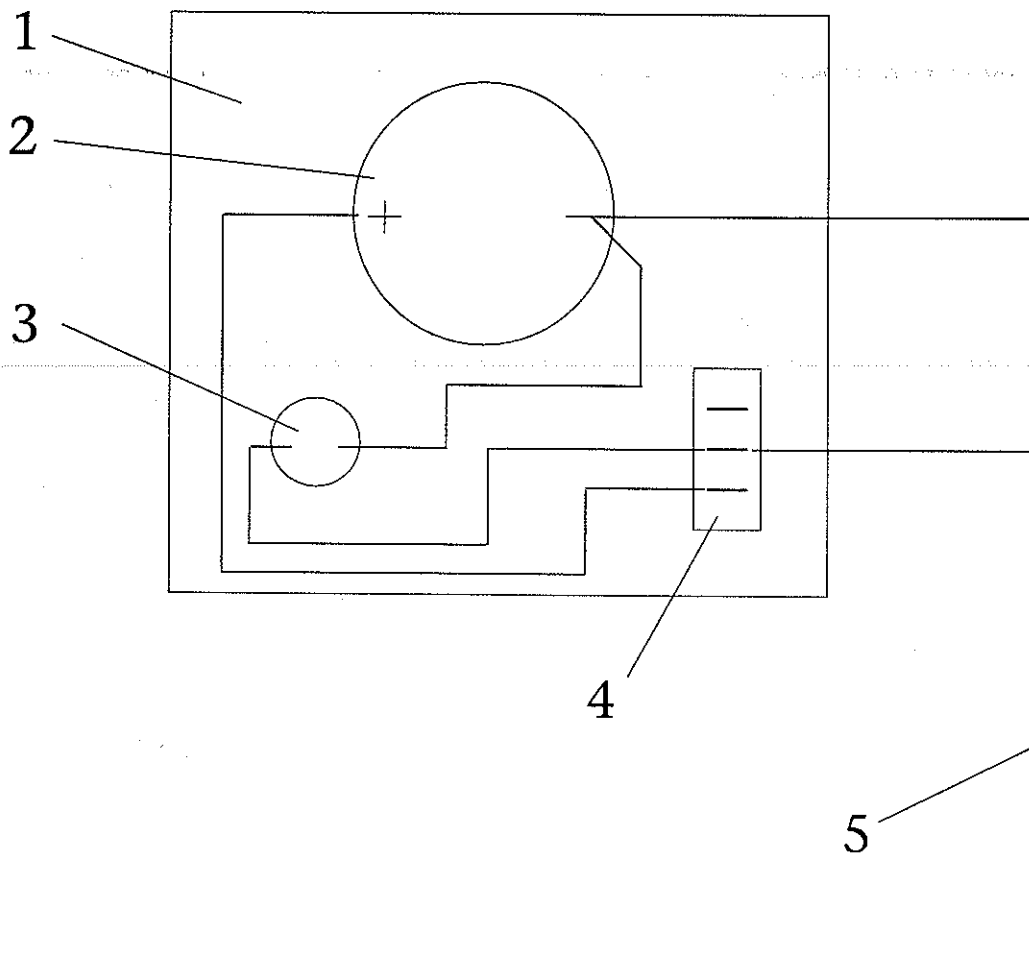


B59508000X
10/94

ITEM	QTY	DESCRIPTION	PART NUMBER
1-10.....	1.....	SYSTEM SALINITY CONTROLLER AC NO HINGE	
		115 VAC, 60 Hz, SINGLE PHASE.....	B595080001
		230 VAC, 60 Hz, SINGLE PHASE.....	B595080002
		220 VAC, 50 Hz, 1 PH; 220/380 VAC, 50 Hz, 3 PH.....	B595080003
1.....	1.....	ENCLOSURE NO HINGE.....	31112201AB
2.....	1.....	TRANSFORMER 115/220/380/460 VAC TO 12/24 VAC.....	31311301AC
3.....	1.....	CONTACTOR 3PST N.O. 24 VAC COIL.....	3131060100
4.....	2.....	BOOT SWITCH.....	2315070100
5.....	1.....	HOUR METER 115 VAC, 60 Hz.....	3131180200
		HOUR METER 230 VAC, 60 Hz.....	3131180300
		HOUR METER 220 VAC, 50 Hz.....	3131180400
6.....	1.....	SWITCH N.C. STOP.....	2325010200
7.....	1.....	SWITCH N.O. START.....	2325010100
8.....	3.....	STRAIN RELIEF LARGE.....	1904010343
9.....	2.....	STRAIN RELIEF SMALL.....	1904010043
10.....	1.....	PRINTED CIRCUIT BOARD SRC PCB MAIN.....	B596800001
11.....	1.....	PRINTED CIRCUIT BOARD SRC PCB LED.....	B597800001
12.....	1.....	FUSE 1/2 AMPER SLOW BLOW 220 VAC.....	3131300400
13.....	1.....	TERMINAL STRIP "C" 7 POSITIONS.....	3131140251
14.....	1.....	CHASSIS FOR -AS/VAC CONTROLLER.....	3131230800
15.....	1.....	TERMINAL STRIP "D" 6 POSITIONS.....	3131140151

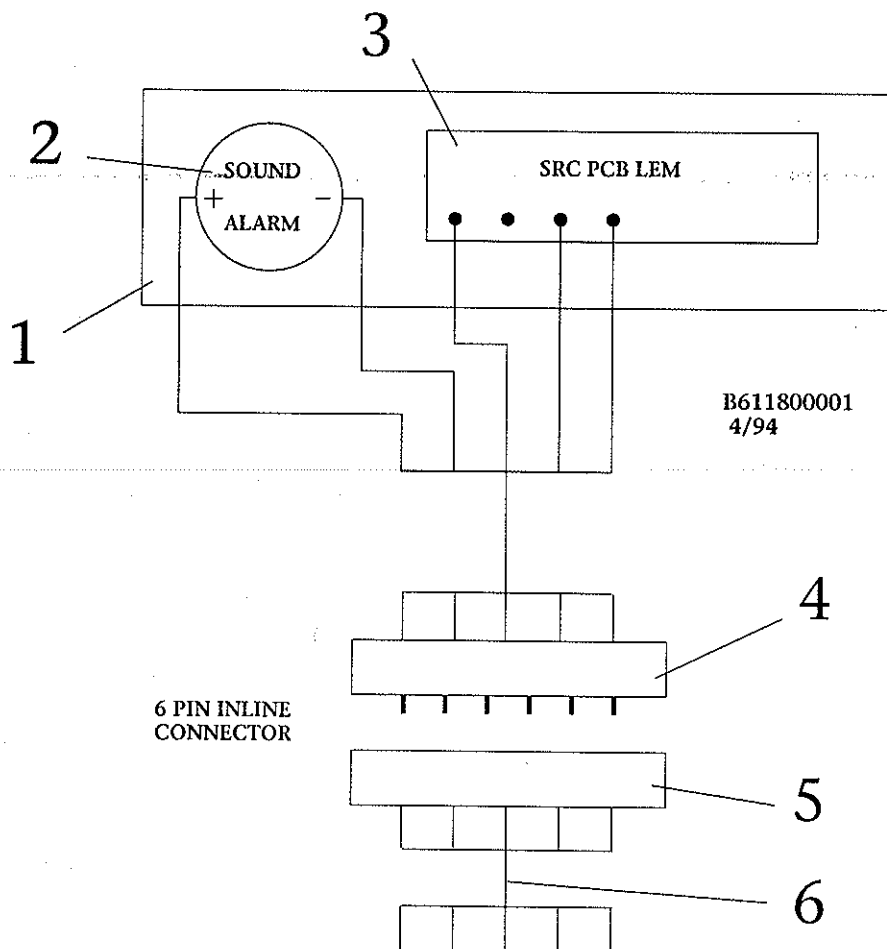
SOUND & VISUAL ALARM SRC PRSVA

ASSEMBLY NO. B601800001



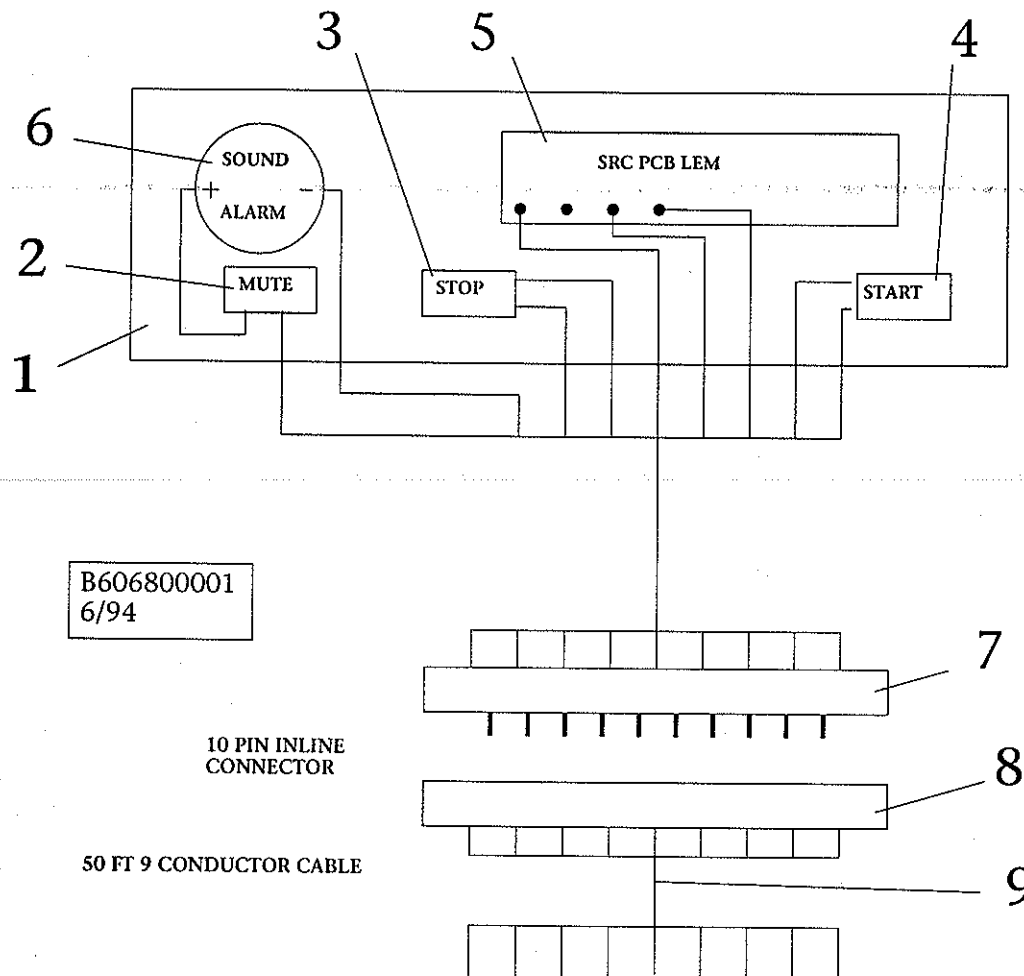
ITEM	QTY	DESCRIPTION	PART NUMBER
1-5		PANEL REMOTE SOUND & VISUAL ALARM SRC PRSVA...	B601800001
1.....1		BEZZEL SRS PRSVA	20200502100
2.....1		SOUND ALARM 12 VDC	31314901AN
3.....1		LAMP RED 12 VDC	3131240700
4.....1		SWITCH SPST ON-OFF.....	2325010404
5.....1		CABLE 2 CONDUCTOR 50 FEET	4942220808

PANEL REMOTE MONITOR SRC PRM ASSEMBLY NO. B611800001



ITEM	QTY	DESCRIPTION	PART NUMBER
1-5		PANEL REMOTE MONITOR SRC PRM	B611800001
1.....1		BEZZEL SRS PRM	20200502020
2.....1		SOUND ALARM 12 VDC.....	31314901AN
3.....1		PRINTED CIRCUIT BOARD SRC PCB LEM	B597800002
4.....1		INLINE CONNECTOR 6 PIN MALE	3131100400
5.....1		INLINE CONNECTOR 6 PIN FEMALE.....	3131100300
6.....1		CABLE 6 CONDUCTOR 50 FEET	4942250725

PANEL REMOTE CONTROLLER SRC PRC ASSEMBLY NO. B606800001



ITEM	QTY	DESCRIPTION	PART NUMBER
1-8.....		PANEL REMOTE CONTROLLER SRC PRC	B606800001
1.....1		BEZEL SRS PRC.....	20200502030
2.....1		SWITCH TOGGLE SPST NO MUTE.....	23250103AL
3.....1		SWITCH SPST NC STOP.....	2325010200
4.....1		SWITCH SPST NO START	2325010100
5.....1		PRINTED CIRCUIT BOARD SRC PCB LEM	B597800002
6.....1		SOUND ALARM 12 VDC.....	31314901AN
7.....1		INLINE CONNECTOR 10 PIN MALE	3131100600
8.....1		INLINE CONNECTOR 10 PIN FEMALE.....	3131100500
9.....1		CABLE 10 CONDUCTOR 50 FEET	4942290726

NOTES:

SECTION "M"

CONVERSION CHARTS

NOTES:

MICRON / INCH / MESH

COMPARISON MEASUREMENTS

MICRON	INCH	INCH (opening)	MESH
1	.00003937	.0070	100
5	.00019685	.0075	90
10	.00039370	.0075	80
15	.00059055	.0078	70
20	.00078740	.011	60
25	.00098425	.013	50
30	.00118110	.018	40
40	.00157480	.026	30
50	.00196850	.041	20
75	.00295275	.085	10
100	.0039370	.177	5
200	.0078740	.937	1

TEMPERATURES CELSIUS vs FAHRENHEIT

CONVERSION CHART

°F	°C	°F	°C
0	-32	122	50
32	0	131	55
41	5	140	60
50	10	149	65
59	15	158	70
68	20	167	75
78	25	176	80
86	30	185	85
95	35	194	90
104	40	203	95
113	45	212	100

$$^{\circ}\text{CELSIUS} = 0.556 (^{\circ}\text{F} - 32)$$

$$^{\circ}\text{FAHRENHEIT} = (1.8^{\circ}\text{C}) + 32$$

Sea Recovery® TEMPERATURE EFFECT COMPARISON CHART

(At 820 psi & 35,000 ppm TDS NaCl feed water conditions)

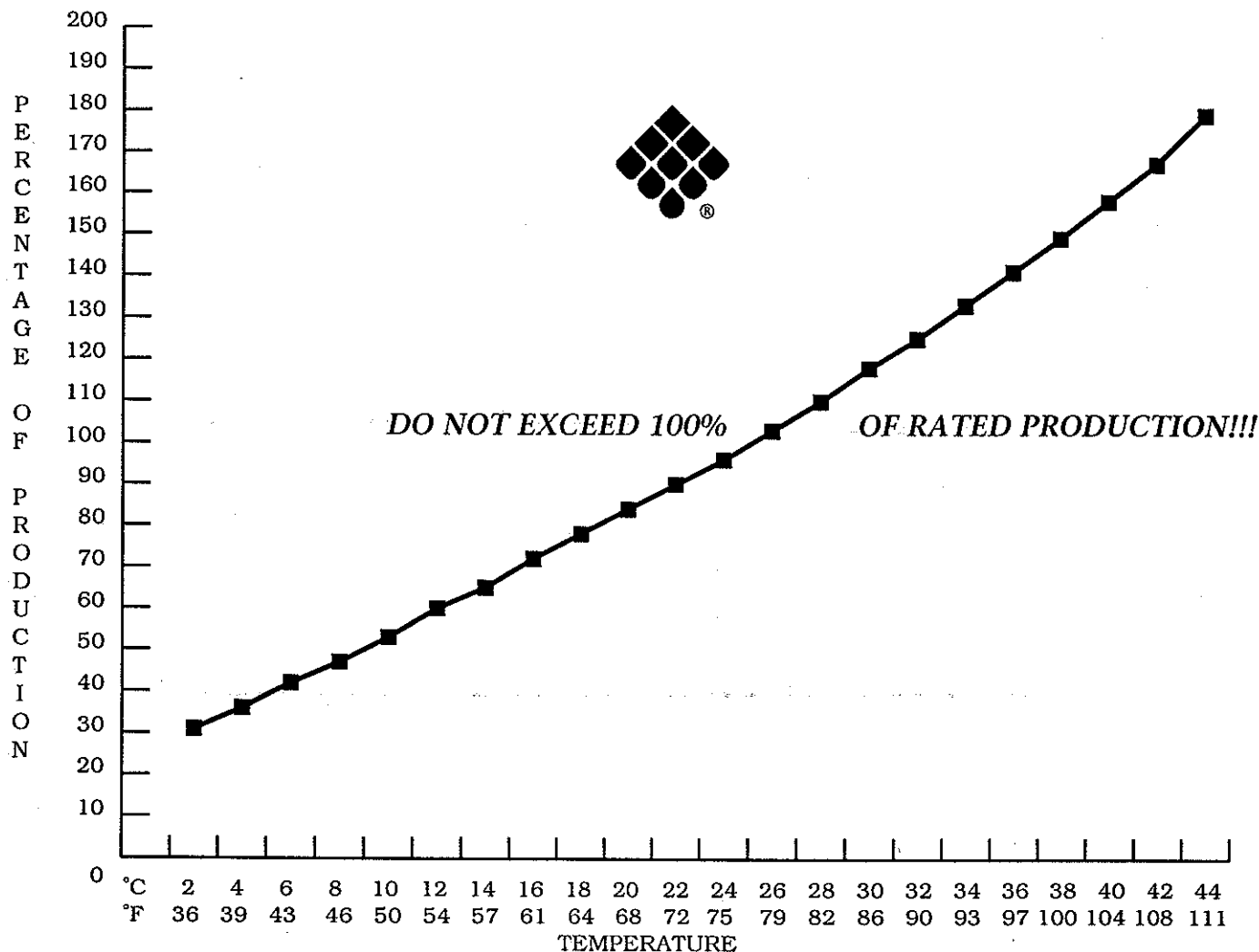
The Temperature Effect Chart on this page illustrates the loss or gain of productivity across the RO membrane.

To determine what normal (in spec.) flow of the RO membrane would be at 77° F / 25° C follow these directions:

- 1) Determine feed source temperature.
- 2) Locate the corresponding temperature on the chart
- 3) Follow the corresponding temperature in a vertical line up to the plotted production line.
- 4) From this temperature point at the production line, move left horizontally to the plotted productivity percent.
- 5) Calculate the system's present productivity in U.S. gallons per day by multiplying the gallon per hour product water flow meter reading by 24.
- 6) Divide the figure reached in step 5 above, present gallon per day productivity, by the plotted productivity percentage from step 4 above. The answer will be equivalent to the membranes present productivity at specification test parameters, 820 psi & 77° F / 25° C.

Example:

- 1) With the system operating at 820 psi.
- 2) Present feed temperature is 61°F or 16° C.
- 3) Plotted productivity is therefore 72% of normal.
- 4) The system is a 600 gallon per day model and it is presently producing 425 gallons per day.
- 5) 425 gallons per day divided by .72 equals 590 gallons per day calculated productivity. The system is rated at 600 gallons per day $\pm 15\%$ (510 to 690 gallons per day). Therefore, the system is within specifications at 425 gallons per day actual productivity at 61° F/16° C, 820 psi and 35,000 ppm feed.



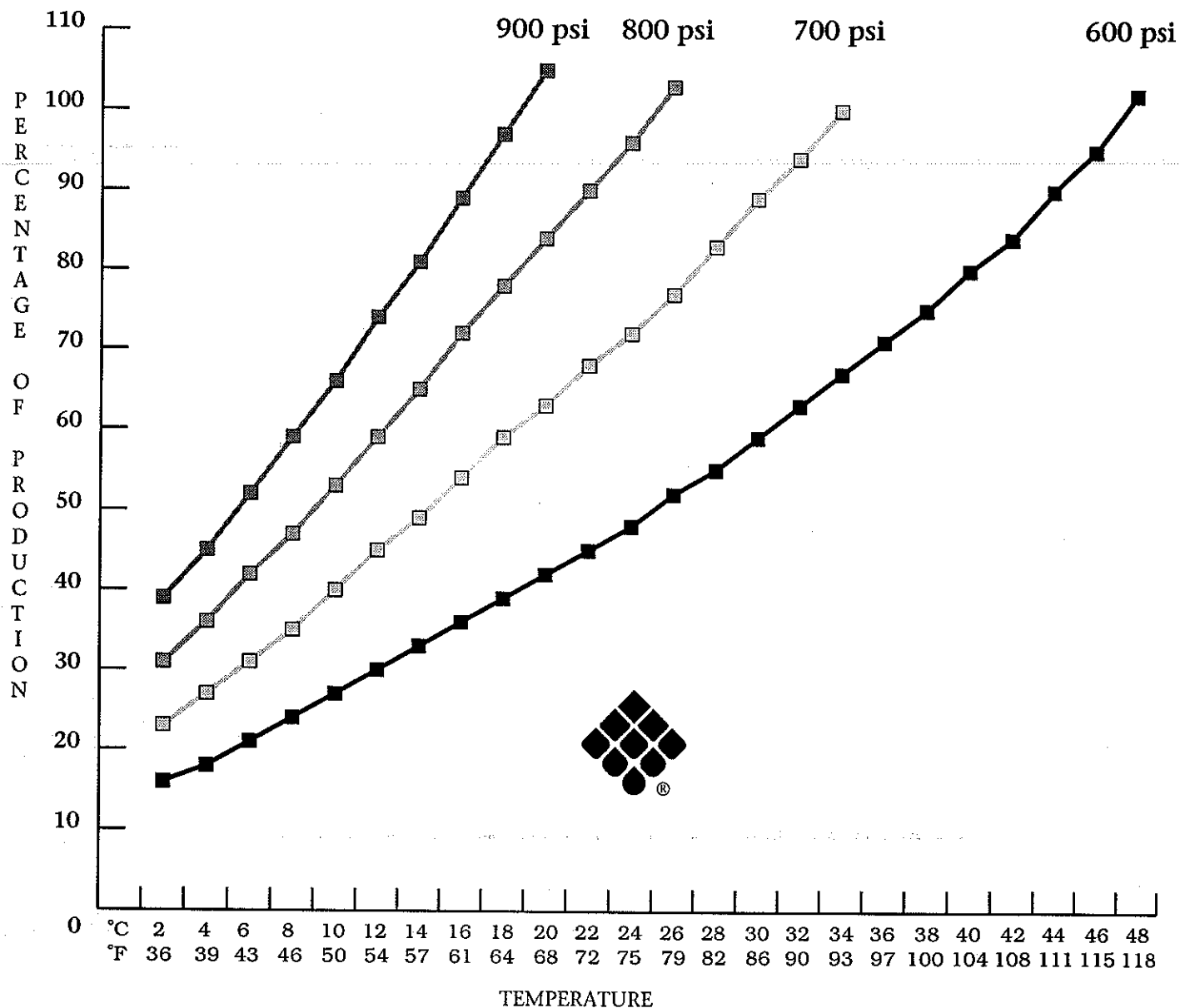
Sea Recovery[®]

SEAWATER TEMPERATURE & PRESSURE EFFECTS CHART

(Do not use this chart for brackish water systems & applications)

As the seawater temperature increases, the Sea Recovery system pressure must be adjusted so that the system achieves no greater than 100% of rated product water flow. Product water flow greater than 100% of rated product water flow will cause premature fouling of the SRC RO membrane element. This will lead to more frequently required cleaning and void all warranties of the SRC RO membrane element.

DO NOT EXCEED 100% OF RATED PRODUCTION!!!



WATER COMPARISON CHART

GALLONS / VOLUME / WEIGHT

U.S. GALLON	CUBIC FEET	CUBIC YARD	CUBIC METER	TON SHORT	TON METRIC
1	.13	.005	.004	.004	.004
5	.67	.025	.019	.021	.019
10	1.34	.050	.038	.041	.038
25	3.34	.129	.10	.104	.094
50	6.68	.248	.19	.208	.189
100	13.37	.50	.38	.42	.38
200	26.74	.99	.76	.83	.76
300	40.10	1.49	1.14	1.25	1.13
400	53.47	1.98	1.51	1.67	1.51
500	66.84	2.48	1.89	2.08	1.89
600	80.21	2.97	2.27	2.50	2.27
700	93.58	3.47	2.65	2.92	2.65
800	106.94	3.96	3.03	3.33	3.02
900	120.31	4.46	3.41	3.75	3.40
1,000	133.68	4.95	3.79	4.17	3.78
2,500	334.20	12.38	9.46	10.41	9.45
5,000	668.40	24.76	18.93	20.83	18.89
7,500	1002.60	37.13	28.39	31.24	28.34
10,000	1336.81	49.51	37.85	41.65	37.79
25,000	3342.00	123.80	94.60	104.10	94.50
50,000	6684.00	247.60	189.30	208.30	188.90
75,000	1006.00	371.30	283.90	312.40	283.40
100,000	13368.06	495.11	378.54	416.50	377.85

1 U.S. GALLON	=	231. CU. INCH
1 U.S. GALLON OF WATER	=	8.33 LBS.
1 SHORT TON	=	2000 LBS.
1 METRIC TON	=	2204.6 LBS.
1 CU. INCH OF WATER	=	0.0360 LBS.
1 CU. FOOT OF WATER	=	62.4 LBS.
1 IMPERIAL GALLON OF WATER	=	10.0 LBS.
1 GALLON	=	3.7854 LITERS
1 CUBIC METER	=	1000 LITERS
1 CUBIC METER	=	264 GALLONS

PPM CONVERSION CHART

SPECIFIC CONDUCTANCE IN MICROMHOS	SPECIFIC RESISTANCE IN OHMS	DISSOLVED SOLIDS P.P.M.	RESISTANCE MHOS	RESISTANCE OHMS	* P.P.M.
.0385	26,000,000	NONE	250.0	4,000	125
.0556	18,000,000	.02777	256.4	3,900	128
.0625	16,000,000	.03125	263.2	3,800	132
.0714	14,000,000	.03571	270.3	3,700	135
.0833	12,000,000	.04166	277.8	3,600	139
.1	10,000,000	.05	285.7	3,500	143
.125	8,000,000	.0625	294.1	3,400	147
.167	6,000,000	.08333	303.0	3,300	152
.2	5,000,000	.1	312.0	3,200	156
.25	4,000,000	.125	322.5	3,100	161
.5	2,000,000	.25	333.3	3,000	166
1	1,000,000	.5	344.8	2,900	172
2	500,000	1	357.0	2,800	179
4	250,000	2	370.4	2,700	185
6	166,666	3	384.6	2,600	192
8	125,000	4	400.0	2,500	200
10	100,000	5	416.6	2,400	208
12	83,333	6	434.8	2,300	217
14	71,428	7	454.5	2,200	227
16	62,500	8	476.2	2,100	238
18	55,555	9	500.0	2,000	250
20	50,000	10	526.3	1,900	263
22	45,454	11	555.5	1,800	278
24	41,666	12	588.2	1,700	294
26	38,461	13	625.0	1,600	312
28	35,714	14	666.6	1,500	333
30	33,333	15	714.2	1,400	357
40	25,000	20	769.2	1,300	384
50	20,000	25	833.3	1,200	416
60	16,666	30	909.0	1,000	500
70	14,286	35	1,000	1,000	500
80	12,500	40	1,111	900	555
100	10,000	50	1,250	800	625
120	8,333	60	1,428	700	714
140	7,142	70	1,666	600	833
160	6,250	80	2,000	500	1,000
180	5,555	90	2,500	400	1,250
200	5,000	100	3,333	300	1,667
			5,000	200	2,500
			10,000	100	5,000

*Approximate dissolved solids expressed as Calcium Carbonate (CaCO₃)

METRIC / U.S. CUSTOMARY UNIT EQUIVALENTS

Multiply: by: to get: Multiply: by: to get:

LINEAR

inch	x	25.4	=	millimeters (mm)	x	0.03937	=	inch
foot	x	0.3048	=	meters (m)	x	3.281	=	feet
yard	x	0.9144	=	meters (m)	x	1.0936	=	yard
mile	x	1.6093	=	kilometers (km)	x	0.6214	=	mile
inch	x	2.54	=	centimeters (cm)	x	0.3937	=	inch

VOLUME

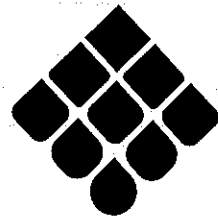
fluid oz	x	29.57	=	milliliters (ml)	x	0.03381	=	fluid oz
U.S. quart	x	0.94635	=	liters(l)	x	1.0567	=	quarts
U.S. gallon	x	3.7854	=	liters(l)	x	0.2642	=	gallons
feet ³	x	28.317	=	liters	x	0.03531	=	feet ³
feet ³	x	0.02832	=	meters ³	x	35.315	=	feet ³
yard ³	x	0.7646	=	meters ³	x	1.3080	=	yard ³

MASS

ounces	x	28.35	=	grams(g)	x	0.03527	=	ounces
pounds	x	0.4536	=	kilograms (kg)	x	2.2046	=	pounds
tons (2000lb)	x	907.18	=	kilograms (kg)	x	0.001102	=	tons
tons (2000lb)	x	0.90718	=	metric tons(t)	x	1.1023	=	tons

SERVICE

ADDENDUM SECTION



**Sea
Recovery®**

REVERSE OSMOSIS DESALINATORS

**SRC AQUA SERIES
FRESH WATER FLUSH SYSTEM**

MODEL SRC-FWF

**INSTALLATION & SERVICE
MANUAL**



**Sea
Recovery®**

REV. 8/97

REVERSE OSMOSIS DESALINATORS

P.O. BOX 2560, GARDENA CA 90247-0560

TEL: 310-637-3400 • FAX: 310-637-3430

E-MAIL: <searecovery@searecovery.com>

MADE IN THE U.S.A.

GENERAL

The SRC Fresh Water Flush System (SRC-FWF) is designed to automatically flush the SRC watermaker with fresh water each time it is used. Through an electrical interface with the electronic controller, the SRC-FWF will automatically open a 2-way valve for a predetermined period of time, each time the watermaker's stop switch is depressed. When the valve opens, the boat's pressurized water system forces fresh water into the watermaker, purging it of corrosive seawater. A charcoal filter is supplied to protect the watermaker's seawater membranes from the damaging effects of chlorine that may be used in a boat's fresh water tank for disinfection. Purging the watermaker of seawater retards corrosion in the high pressure pump and other metallic components that would normally be exposed to corrosive seawater when the unit is not running.* Even though the pump and other metallic components in the unit are designed for use in seawater, no metal is completely impervious to the corrosive attack of seawater. The purging of seawater also retards the growth of marine organisms and reduces organic fouling of the semi-permeable membrane.†

INSTALLATION

Plumbing (See diagram on page 3)

The SRC-FWF is designed to be plumbed into the watermaker before the first prefilter (but after a media filter). The fresh water used for the flush is supplied by the boat's pressurized fresh water system. Because installations on different boats can vary widely, it is the installers responsibility to determine the best location for the placement of the flush system components.

The following guidelines should be followed during installation:

1. The SRC-FWF comes supplied with 20 feet of 1/4" I.D. hose. Additional hose may be ordered from the factory.
2. The check valve assembly should be mounted with the flow arrow pointing up.
3. The charcoal filter housing should be mounted in an accessible location for ease of maintenance.

!!!CAUTION!!!

The inlet pressure to the watermaker must not exceed 35 psi. Pressure in excess of 35 psi will damage the SRC-FWF system components. If your boat's water system is capable of pressure higher than 35 psi, a pressure regulator must be in the inlet line of the SRC-FWF System.

!!!CAUTION!!!

The carbon filter of the SRC-FWF will release carbon dust that will damage membranes. BEFORE USING THE SRC-FWF FOR THE FIRST TIME, remove the carbon filter element from the housing and rinse it under fresh water until all traces of carbon dust are gone and rinse water runs clear. NEVER use any element other than the special fresh water flush element supplied by Sea Recovery as other elements will permanently damage the R.O. membrane element.

Electrical (See diagrams on page 4 and 5)

No external electrical power is needed. All power for the flush controller is supplied by the SRC system controller. The 10 foot cable supplied connects between the SRC system controller and the SRC-FWF flush controller. Replace the existing stop switch in your system controller with the new switch included.

MAINTENANCE

The only maintenance required on the SRC-FWF is to change the charcoal filter element according to the following intervals:

- If you use your SRC system FREQUENTLY, change your charcoal filter element EVERY 3 MONTHS.
- If you use your SRC system OCCASIONALLY, change you charcoal filter element EVERY 6 MONTHS.

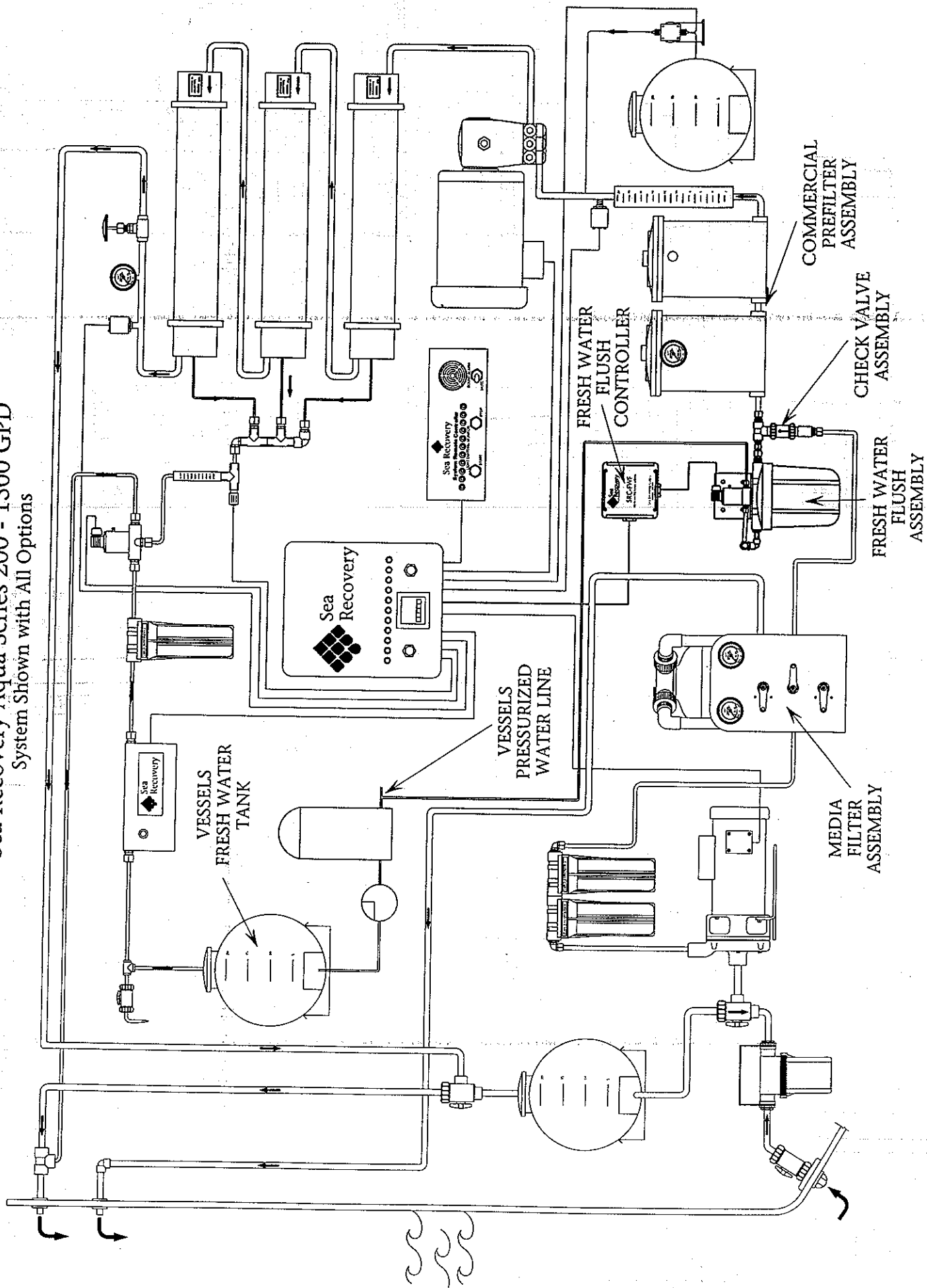
*Sea Recovery Corp. does not guarantee that the SRC-FWF will completely prevent all corrosion and corrosive effects of seawater on the high pressure pump or any other metallic component in the watermaker. It's intended purpose is only to reduce such effects.

†Sea Recovery Corp. does not guarantee that the SRC-FWF will completely prevent organic or biological fouling. It's intended purpose is only to reduce such effects. The SRC-FWF is not to be used as a substitute for long term storage with biocide (sodium bisulfate).

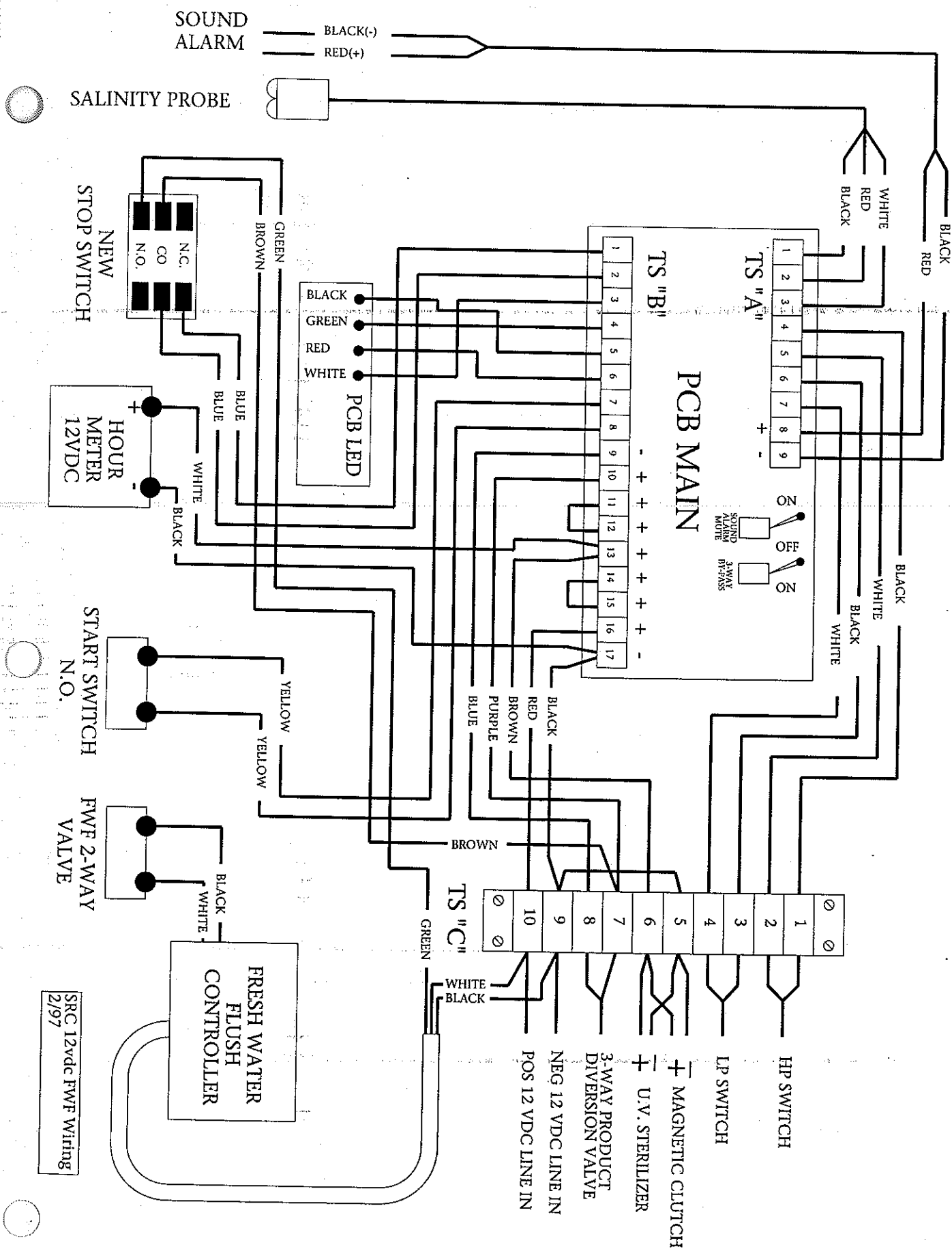
Typical Fresh Water Flush Installation

Sea Recovery Aqua Series 200 - 1500 GPD

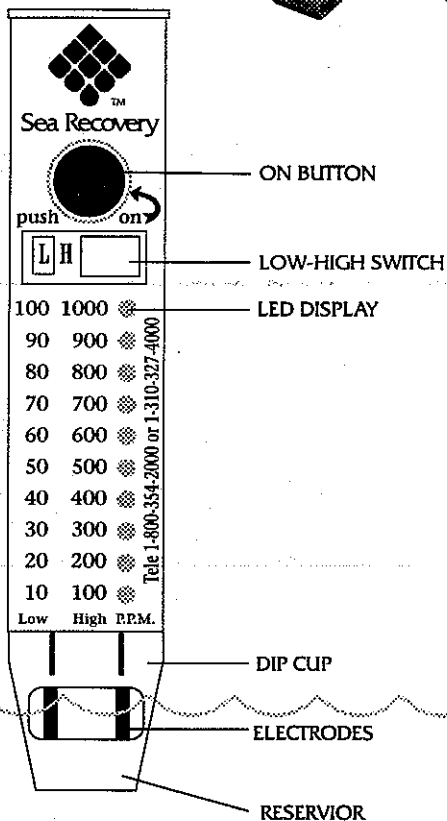
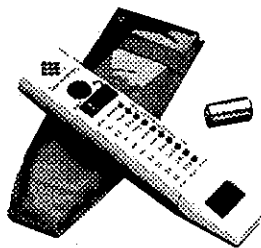
System Shown with All Options



Sea Recovery AED Wiring Diagram 12 Volt D.C. With Fresh Water Flush

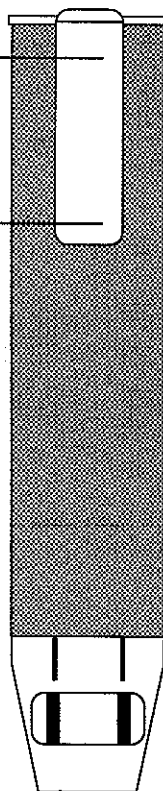


Sea Recovery SRC PDSM Pocket DS Meter



ACCESS TO BATTERY,
PULL BACK WITH
THUMB NAIL HERE

DO NOT PULL
ON POCKET CLIP



Sea Recovery SRC PDSM Pocket DS Meter

This instrument is designed to measure the mineral content of water by determining the electrical current that the water will pass between the two probe sensors; the greater the minerals, the greater the current flow. A small battery provides the electrical current source. The Tester is accurate between 50° and 104°F. The scale readings are in equivalent sodium chloride strength in PPM (parts per million). The highest red LED lit corresponds to the salinity content of the water tested. This meter is designed to register minimum 10 PPM and maximum 1000 PPM which are the typical variances of drinking water. It will not measure distilled water, brackish water or sea water.

TO USE:

1. Select H (High) or L (Low) range by moving the slide switch right or left to expose either H or L. Tap water and Sea Recovery system product water will usually be in the High range and product water from secondary purifying sources will be in the Low range.

2. Hold the Meter vertical, with dip cup attached, and dip only the lower portion of the dip cup into the water to fill the dip cup reservoir.

3. Press the "Push ON" button to energize and observe lights.

NOTE: If you have selected Low range and the 100 light is lit, switch to High range to verify if reading is only 100.

CAUTIONS DURING USE:

Keep probes clean. Keep dip cup on while using. Do not submerge the meter body in water. This DS Meter is not water tight. If water enters the body disassemble and dry thoroughly for several hours before reassembly.

CAUTIONS AFTER USE:

Remove the dip cup from meter body. Clean and dry probes and dip cup with a tissue or soft cloth. Replace the dip cup onto the meter body. Store in a cool dry place when not in use.

TO REPLACE BATTERY:

1. Grasp the top of the pocket clip with your thumbnail and pull to the rear. This may take some moderate force in order to free the two lock tabs allowing the top of the clip to pull away from and to the rear of the meter body. Do not pull on the lower portion of the pocket clip tab as it is fragile and not designed for pulling.

The battery life is estimated at approximately 1500 tests. The battery, 4LR-44, is available at camera stores and electronic stores.

WARRANTY:

Sea Recovery Corp. warrants that the Sea Recovery Pocket DS Meter (product) shall be free of defects and will perform according to specifications for a period of 90 days from the date of shipment. Sea Recovery's liability under this warranty shall be limited to repair or replacement of the product at Sea Recovery's option, and under no circumstances shall Sea Recovery be liable for consequential damages arising out of or in any way connected with the failure of the product to perform as set forth herein. This limited warranty is in lieu of all other expressed or implied warranties, including those of merchantability and fitness for a particular purpose. To obtain warranty service, the defective product must be returned with a letter of explanation of failure to Sea Recovery freight prepaid. The repaired product will be returned by UPS ground service within the Continental U.S.A. or by U.S. Air Parcel Post outside the U.S.A. The letter must include a return shipping address and telephone number. No warranty will be honored if the serial number is missing or altered.

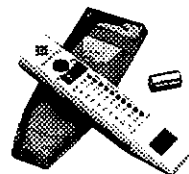
The battery is a consumable and not a warranted item.

Sea Recovery Corp.

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