



# SeaMach™

## Reverse Cycle Self Contained and Split System Conditioners

Self-Contained Models SP/SC 05-07-10-12-16-18-24 and  
Split System Models CP and CC (Compressor Section) and DEAH (Evaporator Section)

# Installation & Service Manual



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*Manufactured By:*


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# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Chapter 1

This is the safety alert symbol . When you see this symbol on the GPac unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal word DANGER, WARNING and CAUTION. These words are used to identify levels of the seriousness of the hazard.

** DANGER** Failure to comply will result in death or severe personal injury and/or property damage.

** WARNING** Failure to comply could result in death or severe personal injury and/or property damage.

** CAUTION** Failure to comply could result in minor personal injury and/or property damage.

IMPORTANT is used to point out helpful suggestions that will result in improved installation, reliability or operation.

### 1.1 General Description

#### *Self-Contained Units*

The SeaMach™ line of reverse cycle air conditioners built by Marvair® are self-contained, water-cooled units designed for use with either fresh or sea water. The SP models are built in four sizes with capacities of 5,000, 7,000; 10,000; 12,000, 16,000, 18,000 and 24,000. BTUH. Both 115 volt and 230 volt models are available. The S\*M models are designed to be used with a 24 volt wall mounted thermostat. The S\*B models have an electronic control board which allows the use of a multi-function controller. SP models use R-22 refrigerant, SC models use R-407c refrigerant.

#### *Split System Units*

SeaMach split system air conditioners are comprised of two sections – the evaporator section or air handler and the condenser section or the compressor section. Split systems are built in capacities of 7,000; 10,000; 12,000; 16,000; 18,000 and 24,000 BTUHs. Both 115 volt and 230 volt units are available. The C\*M condensing section are designed to be used with a 24 volt wall mounted thermostat; the C\*B models use a multi-function thermostat controller. CP\* condensing sections use R-22 refrigerant; CC\* units use R-407C refrigerant. The air handlers must be ordered by cooling capacity and voltage, but are not refrigerant specific. Multiple air handlers may be used with a single condensing section. For example, a 24,000 BTUH condensing section may be used with a single 24,000 air handler OR two 12,000 BTUH air handlers. Please consult the factory when using multiple air handlers.

The performance of the self contained and split system units are virtually identical. However, there are important differences in the installation. The SeaMach™ units are designed for easy installation and years of reliable operation.

Please refer to the model ID chart below for a complete description of the models.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Model Identification – Reverse Cycle Air Conditioners

<b>S</b> SeaMach™	● <u>Refrigerant</u> P = R22 C = 407c	● <u>Controller</u> M = Manual B = Electronic Control Board	●● <u>Nominal Capacity</u> 05 = 5,000 BTUH 07 = 7,000 BTUH 10 = 10,000 BTUH 12 = 12,000 BTUH 16 = 16,000 BTUH 18 = 18,000 BTUH 24 = 24,000 BTUH	●● <u>System Type</u> AC = Air Conditioner RC = Reverse Cycle	● - <u>Voltage</u> A = 208/230V-1ø-60 Hz B = 115V-1ø-60 Hz F = 220V-1ø-50 Hz	●● <u>Electric Heat</u> 00 = No Heat
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## Model Identification – Condenser Section of Split System Air Conditioner

<b>C</b> SeaMach™	● <u>Refrigerant</u> P = R22 C = 407c	● <u>Controller</u> M = Manual B = Control Board	●● <u>Nominal Capacity</u> 07 = 7,000 BTUH 10 = 10,000 BTUH 12 = 12,000 BTUH 16 = 16,000 BTUH	●● <u>System Type</u> AC = Air Conditioner RC = Reverse Cycle	● - <u>Voltage</u> A = 208/230V-1ø-60 Hz B = 115V-1ø-60 Hz F = 220V-1ø-50 Hz	●● <u>Electric Heat</u> 00 = No Heat
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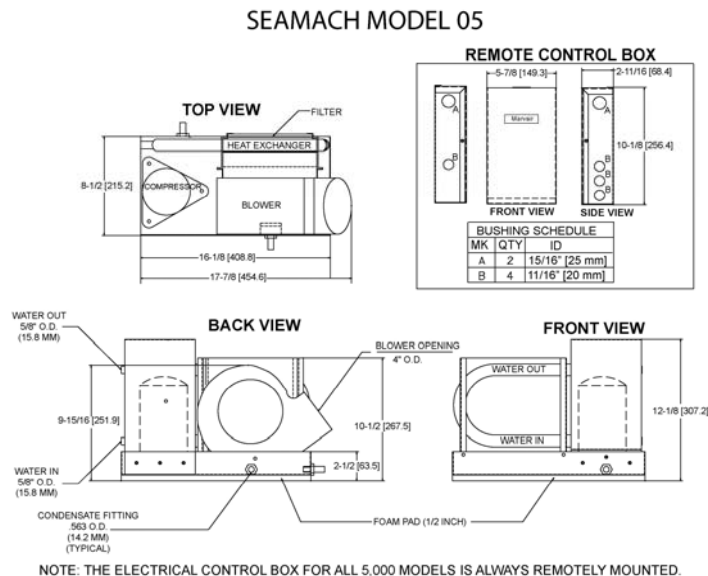
## Model Identification – Air Handler Section of Split System Air Conditioner

<b>DEAH</b> Direct Expansion Air Handler	●● <u>Nominal Capacity</u> 07 = 7,000 BTUH 10 = 10,000 BTUH 12 = 12,000 BTUH 16 = 16,000 BTUH	●● <u>System Type</u> AC = Air Conditioner RC = Reverse Cycle	● - <u>Voltage</u> A = 208/230V-1ø-60 Hz B = 115V-1ø-60 Hz F = 220V-1ø-50 Hz	●● <u>Electric Heat</u> 00 = No Heat
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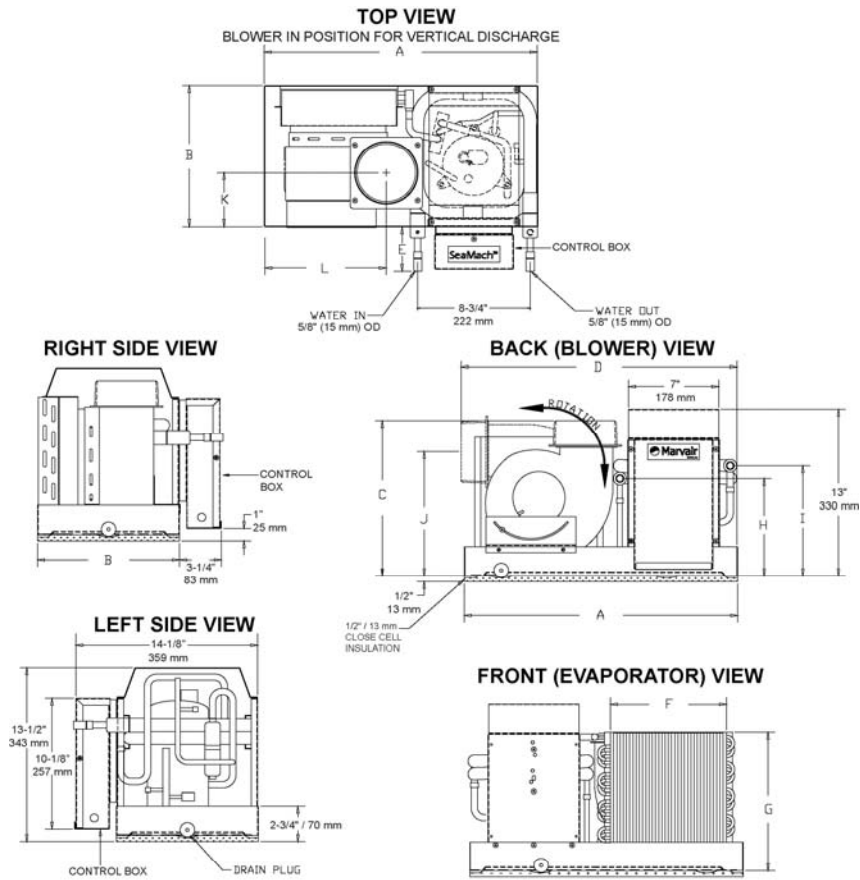
## 1.2 Operating Range

The SeaMach reverse cycle units are designed to operate over a wide variety of air and water temperatures. If you have a question about a specific operating condition, please contact the factory.

## 1.3 Dimensional Data – Self-Contained Reverse Cycle Air Conditioner



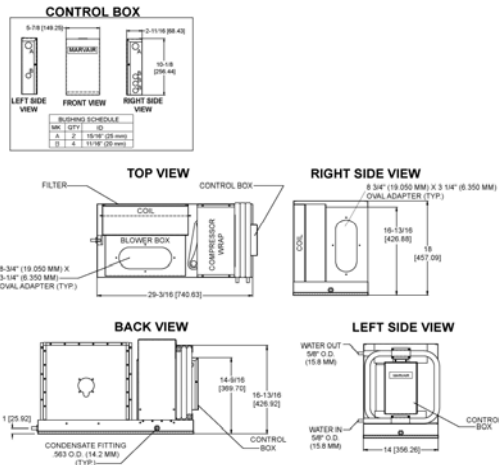
# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners



DIMS	SP07/SC07	SP10/SC10	SP12/SC12	SP16/SC16	SP18/SC18
A	21-1/4" (540mm)	22-7/8" (581mm)	22-7/8" (581mm)	23-3/4" (603mm)	23-3/4" (603mm)
B	11" (279mm)	11" (279mm)	11" (279mm)	11" (279mm)	11" (279mm)
C	12-1/4" (311mm)	13-5/8" (346mm)	13-7/8" (352mm)	13-5/8" (346mm)	13-5/8" (346mm)
D	22-3/8" (568mm)	24-1/2" (622mm)	24-3/4" (629mm)	25-3/4" (654mm)	25-3/4" (654mm)
E	3-1/2" (89mm)	3-3/8" (86mm)	3-3/8" (86mm)	3-3/8" (86mm)	3-3/8" (86mm)
F	9-1/8" (232mm)	11" (279mm)	11" (279mm)	11-1/2" (292mm)	11-1/2" (292mm)
G	10-7/8" (276mm)	13" (330mm)	13" (330mm)	13-1/8" (333mm)	13-1/8" (333mm)
H	7-1/2" (191mm)	7" (178mm)	7" (178mm)	8-3/4" (171mm)	8-3/4" (171mm)
I	9" (229mm)	9-3/4" (248mm)	9-3/4" (248mm)	9-3/8" (238mm)	9-3/8" (238mm)
J	10" (254mm)	10-3/4" (273mm)	10-3/4" (273mm)	10-1/2" (267mm)	10-1/2" (267mm)
K	4" (102mm)	3-1/2" (89mm)	3-1/2" (89mm)	3-1/2" (89mm)	3-1/2" (89mm)
L	9" (229mm)	10-3/8" (264mm)	10-3/8" (264mm)	10-1/8" (257mm)	10-1/8" (257mm)

CONTROL BOX DIMENSIONS - 11 x 3-1/2 x 6-1/4 (279 x 79 x 159 mm)  
 BLOWER DISCHARGE DIAMETER - MODEL SP07/SC07: 5-1/8" (130 mm)  
 MODEL SP10/12/SC10/12: 5-15/16" (150 mm)  
 MODEL SP16/18SC16/18: 7-1/16" (180 mm)

## SEAMACH MODEL 24



# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

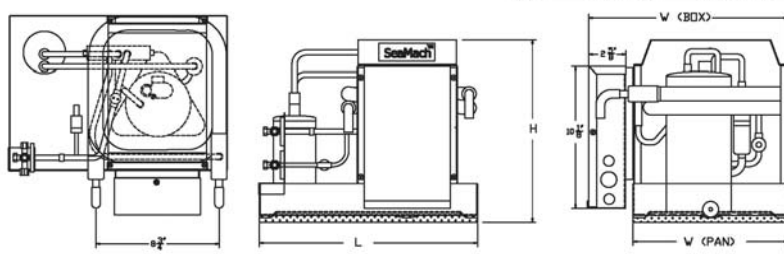
## Dimensional Data – Split System Reverse Cycle Air Conditioner

### Models CUB/M, CCB/M Dimensional Data (inches/mm) & Weight (lbs/kg)

Model	Dimensions - inches (mm)				Weight Lbs(kg)
	H	L	W (Pan)	W (Box)	
CP*07RC	13.13 (333.38)	15.50 (393.70)	11.03 (280.11)	14.28 (362.66)	42 (19)
CP*10RC	13.13 (333.38)	15.50 (393.70)	11.03 (280.11)	14.28 (362.66)	48 (22)
CP*12RC	13.13 (333.38)	15.50 (393.70)	11.03 (280.11)	14.28 (362.66)	48 (22)
CP*16RC	13.13 (333.38)	15.50 (393.70)	11.03 (280.11)	14.28 (362.66)	49 (22)

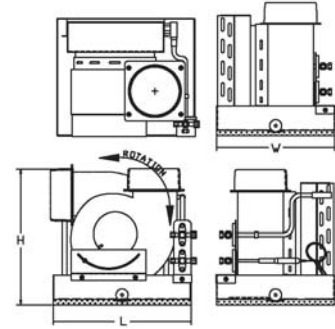
\*B or M

Unit Capacity (Btu/Hr)	Refrigerant Conn. (Male Flare) - in(mm)		SeaWater Flow Rate (GPM)
	Liquid	Suction	
7,000	1/4" (6.35)	3/8" (9.525)	1.7
10,000	1/4" (6.35)	3/8" (9.525)	2.1
12,000	1/4" (6.35)	3/8" (9.525)	2.6
16,000	1/4" (6.35)	1/2" (12.7)	3.3



### Model DEAH Dimensional Data (inches/mm) & Weight (lbs/kg)

Model	Dimensions - inches(mm)			Weight Lbs(kg)
	H	L	W	
DEAH07RC	11.50 (292.10)	12.88 (327.03)	11.03 (280.11)	18(8)
DEAH10RC	13.50 (342.90)	14.88 (377.83)	11.03 (280.11)	20(9)
DEAH12RC	13.50 (342.90)	14.88 (377.83)	11.03 (280.11)	20(9)
DEAH16RC	13.50 (342.90)	15.38 (390.53)	11.03 (280.11)	23(10)



DEAH Unit Capacity (Btu/Hr)	Min. Return Air Grille Size in <sup>2</sup> (cm <sup>2</sup> )	Min. Discharge Grille Size in <sup>2</sup> (cm <sup>2</sup> )	Recomm. Duct Size in (cm)
7,000	72 (464.4)	49 (316.05)	5" (12.7)
10,000	100 (645)	60 (387)	6" (15.24)
12,000	120 (774)	70 (451.5)	6" (15.24)
16,000	144 (928.8)	80 (516)	7" (17.78)

## 1.4 Standards & Codes

Various codes & standards published by organizations are referenced in this manual. Some of the organizations may be contacted in order to obtain complete copies of the code or standard.

American Boat & Yacht Council (ABYC)  
 613 Third Street, Suite 10  
 Annapolis, MD 21403  
 PH. (410) 990-4460  
[www.abycinc.org](http://www.abycinc.org).

National Electric Code  
 National Fire Protection Association  
 1 Battery March Park  
 PO Box 9101  
 Quincy, MA 02269-9904

CE Directives

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 1.5 General Operation

The SeaMach™ reverse cycle air conditioner has both a heating and cooling mode of operation. It uses R-22 or R407c refrigerant in a conventional vapor compression cycle to transfer heat from the air in the boat to the water. In the cooling mode, a blower blows air through the indoor or evaporator coil. Liquid refrigerant passing through the evaporator is boiled into a gas by heat removed from the air. The warmed refrigerant gas enters the compressor where its temperature and pressure are increased. The hot refrigerant gas travels to the water coil or condenser where it is cooled by the water and condenses to a liquid. Liquid refrigerant is metered back into the evaporator coil to repeat the process.

In the heating mode, the process is reversed. A special reversing valve reverses the flow of the refrigerant throughout the system exchanging the roles of the condenser and evaporator. The refrigerant flows through the water or evaporator coil, picks up heat from the water and becomes a vapor. The vapor then enters the compressor where it is compressed to a higher temperature. It is then pumped to the indoor coil where the air moving across the coil picks up the heat and is blown into the room. The compressed refrigerant vapor condenses to a liquid as it gives up heat. Finally, liquid refrigerant flows into the capillary tubes into the indoor coil where the cycle is repeated.

The SeaMach™ reverse cycle air conditioner is controlled by a thermostat or controller mounted on the wall.

In the self-contained units, all the components are in a single package. In a split system, the compressor and the water coil are one unit, called the compressor or condensing section, and the air coil and the blower are in another, called the evaporator or blower section. Field installed copper refrigerant lines and control wiring connect the two units. Performance of the two units is virtually identical. However, there are important differences in the installation.

## 1.6 Standard Controls

**A. High Pressure Switch.** Located on the liquid refrigerant line, it is electrically connected to a lock-out relay which shuts the unit off if the refrigerant pressure rises to 400 psig. This protects the SeaMach™ reverse cycle air conditioner if air flow is reduced or water flow is restricted.

The contacts on the high pressure switch close when the refrigerant pressure fall to 300 psig. The system must be checked for sufficient water flow in the cooling mode and air flow in the heating mode. See Section 4.16 – Fail Safe & Fault Handling Modes.

**B. Low Pressure Switch.** Located on the liquid refrigerant line, it is electrically connected to a lock-out relay which shuts the system off if the refrigerant pressure drops to 20 psig. This protects the SeaMach™ reverse cycle air conditioner if air flow is reduced in the cooling mode or water flow is restricted in the heating mode or there is a substantial loss of refrigerant.

The contacts on the low pressure switch close when the refrigerant pressure rises to approximately 45 psig. See Section 4.16 – Fail Safe & Fault Handling Modes.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

- C. **Compressor time delay.** Prevents compressor from destructive short cycling by delaying the compressor from starting when compressor contactor is energized. For S\*B models the delay is set at the factory from 10-15 seconds. On SPM models, it is adjustable from .2 to 6 minutes. The recommended setting is 2-1/2 minutes.

## 1.7 Sizing the Air Conditioner

Room	“K” Factor (English)	“K” Factor (Metric)
Below decks with conditioned areas above and on three sides	7	250
Below decks with conditioned areas above and on two sides	12	425
Below decks	14	495
Galley	17	600
Above decks with large window areas	19	670
Above decks with large window areas and heavy outdoor traffic	21	740
Bridge or pilot house, all windows and heavy traffic	24	850

### Calculation of BTU Load:

- Determine cubic feet or meters by multiplying height by width by length of area to be cooled.
- Determine BTUs by multiplying cubic feet or cubic meters by the “k” factor.

**English Example:** Room is below deck with conditioned areas above and on three sides. Room dimensions are 7ft. high by 10 ft. wide by 15 ft. long

1.  $1,050 \text{ ft}^3 (7 \times 10 \times 15)$
2.  $1,050 \text{ ft}^3 \times 7 \text{ (k factor)} = 7,350 \text{ BTU}$

Based upon a load of 7,350 BTUH, a SP10 or SC10 would be required

**Metric Example:** Room is below deck with conditioned areas above and three sides. Room dimensions are 213 cm high by 305 cm wide by 457cm long.

1.  $29.69 \text{ m}^3 (213 \times 305 \times 457)$
2.  $29.69 \text{ m}^3 \times 250 \text{ (k factor)} = 7,420 \text{ BTU}$

Based upon a load of 7,420 BTUH, a SP10 or SC10 would be required

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Chapter 2 - Installation

### 2.1 Equipment Inspection

#### Concealed Damage

Inspect all cartons and packages upon receipt for damage during transit. Remove shipping cartons and boxes and check for concealed damage. **Important: Keep unit upright at all times.** Inspect refrigerant circuit for fractures or breaks. The presence of refrigerant oil usually indicates a rupture in the refrigerant circuit.

Units that have been turned on their sides or upside down may have concealed damage to a compressor, other components or to the refrigerant system. If the unit is not upright when you receive it, immediately file a claim with the freight carrier for concealed damage and follow these steps:

1. Set unit upright and allow to stand for 24 hours with primary power turned on.
2. Attempt to start the unit after 24 hours.
3. If the unit will not start or makes excessive noise, return the unit to the freight carrier.

### 2.2 Installation Requirements.

#### **L WARNING**

**If the information in these instructions are not followed exactly, a fire, carbon monoxide poisoning or explosion may result causing property damage, personal injury or loss of life.**  
• **Read all instructions carefully prior to beginning the installation. Do not begin installation if you do not understand any of the instructions.**  
• **Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.**  
• **Installation and service must be performed by a qualified installer, service agency in accordance with these instructions and in compliance with all codes and requirements of authorities having jurisdiction.**

#### A. Location Requirements

- Do not install the SeaMach™ reverse cycle air conditioner in an engine room, the bilge or any areas where it may introduce deadly or noxious vapors into the boat's living space. Do not install the unit in any room or compartment that contains an internal combustion engine. Note: The compressor section of the split systems are ignition protected and may be located in an engine room. However, do not install the blower section in areas containing internal combustion engines, fuel tanks, LPG/CPG cylinders, regulators, valves or fuel line fittings.
- The condensate drain line must not terminate within three (3) feet of the exhaust of any engine or generator nor any room that contains an engine or generator. Under some circumstances, carbon monoxide can be pulled through the condensate tubing and introduced into the conditioned air.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

- It is recommended not to install the SeaMach™ reverse cycle air conditioner above an electronic or electrical panel, circuit breakers or anything electrical. If installed in this or an overhead location, a secondary drain pan should be used.
- Select a location for noise considerations. Putting the unit under a bunk may not be desirable for sound reasons. A better location may be at the bottom of a hanging locker. In some installation, acoustic baffles may be required.
- SeaMach™ self-contained reverse cycle air conditioners do **NOT** meet Federal requirements for ignition protection. Never install the unit in areas containing internal combustion engines, fuel tanks, LPG/CPG cylinders, regulators, valves or fuel line fittings. Note: The compressor section of the split systems are ignition protected and may be located in an engine room. However, do not install the blower section in areas containing internal combustion engines, fuel tanks, LPG/CPG cylinders, regulators, valves or fuel line fittings.
- The unit must be installed in a space with sufficient clearance on all sides for proper air circulation and for services. A minimum of three (3) inches must be provided from the face of the air coil to any obstruction, wall or bulkhead. Sufficient air flow is critical to the proper operation of the unit.
- Before placing the unit(s) into the space, make certain that there is sufficient room for all duct work, condensate line connections, water in and out, electrical power connections and control power connections.
- The unit must be installed on level surface on a minimum of ½” plywood or equivalent.
- The condensate line must, at all times, be lower than the base pan.
- For optimum air circulation, it is good practice to install the supply air grilles near the top of the cabin and the return air grille near the floor. This normally provides good circulation of the conditioned air throughout the cabin. The location should provide easy access to the filter. If the filter is not readily accessible, it probably will not be changed, shortening the life of the unit and operating at less than designed performance.
- To save space & facilitate installation, the SeaMach™ reverse cycle air conditioner has a detachable electrical box. The box can be mounted on the unit’s water connection side, the return air side, above the compressor or remote from the unit.

## **B. Electrical Requirements**

### **⚠ WARNING ELECTRICAL SHOCK HAZARD**

**Failure to follow safety warnings exactly could result in serious injury, death, and/or property damage. Turn off electrical power at fuse box or service panel BEFORE making any electrical connections and ensure a proper ground connection is made before connecting line voltage.**

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

All electrical work must meet the requirements of all applicable codes and ordinances. Work should only be done by qualified persons.

If the wiring diagram that is on or was shipped with the unit is different from the one in this manual, refer to and use the wiring diagram that is on or was shipped with the unit.

- 1. High Voltage Wiring (115V or 230V).** The power supply must have the proper voltage, phase and ampacity for the selected model.
  - a. Refer to the data label on the unit for field wiring requirements. The electrical data lists fuse and wire sizes for the unit.
  - b. Each unit has a Minimum Circuit Ampacity (MCA). Field wiring must be used that is of sufficient size to carry that amount of current. Use copper conductors only. Refer to the National Electrical Code for complete current carrying capacity data on the various insulation grades of wiring materials.
  - c. Power supply must be within allowable range of  $\pm 10\%$  of rated voltage. For SPM models, the transformer is factory wired for a 230V supply.
  - d. The unit must be properly grounded to reduce the risk of shock or electrocution.
  - e. A properly sized circuit breaker must be used. Information required to size the breaker is on the unit. The water pump does not require a separate breaker if there is only one reverse cycle air conditioner. However, the breaker must be sized for both the water pump and the SeaMach unit. A separate breaker is required for the water pump if multiple SeaMach units are installed.
  - f. Connections between the ship's alternating current grounding conductor and the ship's negative or bonding system must be made as part of the ship's wiring as per ABYC standard E-11 or equivalent.
  - g. When servicing or replacing existing equipment that contains a chassis mounted ground lug, the service person or installed must verify the ship's wiring for the connection required in item f. above.
  - h. All electrical connections must be made within the electrical junction boxes supplied with the unit. A terminal strip and/or electrical connectors are provided for component installation.
- 2. Low Voltage/Control Wiring.** The thermostat/controller requires 24 volts to operate. The internal transformer in the SeaMach™ reverse cycle air conditioner provides power to the thermostat/controller. The internal transformer is not designed to power any other external devices. Instructions for installing the thermostat controller are detailed in Chapter 4.
- 3. Bonding.** To prevent corrosion due to stray electrical current or voltage, all metallic parts in contact with water must be connected to the ship's bonding system. This includes the SeaMach™ reverse cycle air conditioner, all pumps, metallic valves, fittings, strainers and thru-hulls. If any of these parts are isolated by PVC, vinyl, or rubber hoses, they

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

must be individually bonded to the ship's bonding system. Failure to properly ground and bond the system will void the warranty.

## **2.3 Mounting of the SeaMach™ Reverse Cycle Air Conditioner.**

Select a surface that is firm and level, with sufficient clearances. Mount the unit on a minimum of ½" plywood or equivalent. The unit will be secured to the surface with four hold down brackets. Secure the bracket with suitable fasteners; e.g., lag screws. Note: To facilitate installation, the hold down fasteners may be installed after all duct, water, condensate, and electrical connections are made.

## **2.4 Condensate Drains (Applies to all self contained units and the blower section of all split units.)**

### **⚠ WARNING CARBON MONOXIDE POISONING HAZARD**

**Failure to follow safety warnings could result in serious injury, death, or property damage.**

The stainless steel base pan has multiple openings for condensate drains. It is highly recommended that two of the openings be utilized – one for back-up in case the other one becomes clogged or blocked. The other openings should be sealed and plugged. The SeaMach™ reverse cycle air conditioner can produce significant quantities of condensate that may cause extensive damage to the vessel if not disposed of properly.

- A. Select the two openings that will NOT be used for condensate lines.
- B. Plug and seal them.
- C. Install the condensate drain fittings through the base pan. Make sure the fitting is water tight.
- D. Attach a 5/8" ID reinforced hose to the hose barb and secure with two stainless steel hose clamps.
- E. Route the condensate hose down from the SeaMach™ reverse cycle air conditioner to a sump or to an overboard fitting. If the drain runs overboard, it must not be within three (3) feet from the exhaust from the engine or generator. Double clamp all connections.
- F. If the condensate line is run through a room or compartment containing an engine or fossil fueled device, it is imperative that the line be air tight to prevent carbon monoxide or any other hazardous gases or vapors from being introduced into the conditioned air system.

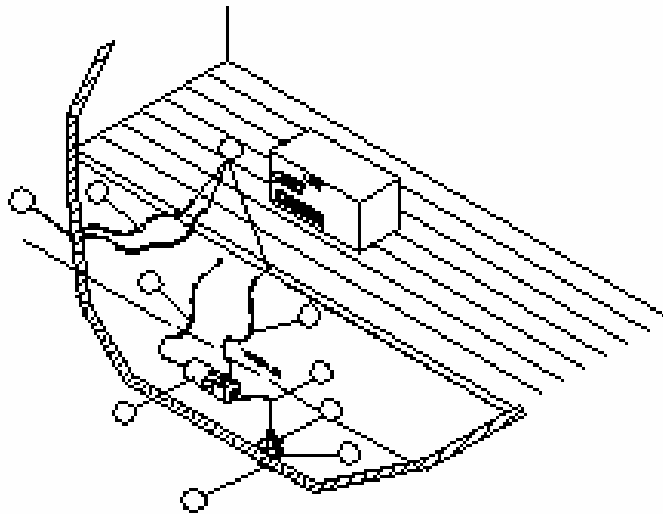
## **2.5 Sea or Fresh Water System**

Proper water flow is absolutely critical to the operation of the SeaMach™ reverse cycle air conditioner. If the pipe is too small, back pressure is created causing a drop in water flow, even if the pump is correctly sized. If the piping is too large, the slow velocity of the water may cause silt build-up and barnacle growth inside the piping, eventually restricting water flow. See Fig. 3 - Recommended Pipe Sizes.

The best material for sea water piping and fittings is cupronickel. Suitable materials for piping are hi-grade bronze cupro-nickel and schedule 80 PVC pipe. Materials to avoid are yellow brass, copper, poor grades of aluminum, stainless steel or steel pipe. Use Teflon® tape or other appropriate sealant on all threaded fittings to prevent leaks.

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When using a centrifugal pump, the SeaMach™ reverse cycle air conditioner must be higher than the thru-hull fitting, but lower than the heeled water line. The overboard fitting may be either higher or lower than the unit. The tubing must never have any loops or kinks. If there is any place that water can be trapped, damage may result during freezing temperatures. The pump and strainer must always be below the heeled water line since centrifugal pumps cannot pump air.



*Figure 1. Pump & Plumbing Drawing*

1. **Thru-hull fitting.** Install a scoop-type thru-hull fitting as close to the keel and as far below the water line as possible to eliminate any possibility of air entering the system. Do not share the thru-hull with any other device; i.e., an engine or generator. When using one thru-hull for multiple SeaMach™ units, the thru-hull must be sized for proper water flow.

The scoop-type thru-hull should face forward. On a fast planning board, locate the thru-hull at the transom to ensure water flow.

2. **Seacock.** A bronze, full flow seacock or ball valve should be installed directly onto the thru-hull fitting. The seacock must be closed to clean the strainer and in an emergency. Therefore, make it easily accessible.
3. **Strainer.** The strainer must be installed so that it is always below the water line and below the pump. It should be easily accessible for cleaning. Verify that the water flow is in the correct direction. Secure the strainer to a bulk head. Failure to install a strainer will void the warranty on the SeaMach unit.
4. **Water Pump.** Centrifugal pumps cannot pump air; i.e., they are not self-priming. Therefore, they must be mounted so that they are below the heeled water line at all times. For service & maintenance, the pump should be easily accessible. The pump should be installed with the outlet pointed upward so that if air enters the system it can pass through the pump. The pump heads on some pumps can be rotated to allow for mounting on a vertical surface. Self-priming pumps are available if the pump cannot be installed below the water line.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

5. **Manifolds.** When a water pump supplies water to two or more SeaMach™ units, a manifold with balancing valves is required. It is mandatory when using a manifold that each SeaMach unit have the correct water flow. See Figure 3 - Recommended Water Pipe Sizes. A manifold can also be used on the discharge of the SeaMach units if a single overboard fitting is used.



*Figure 2. Pipe Manifolds*

6. **Overboard Discharge.** The overboard discharge should be no more than 2” above the water line. This will minimize sound yet allow visual confirmation of water flow. If the overboard discharge fitting must be installed below the water line, a valve must be installed per ABYC standards.

<b>Recommended Water Pipe Sizes</b>		
Flow Rate (GPM)	Pump Inlet Pipe Size	Pump Discharge Pipe Size
1 through 4	5/8”	5/8”
4 through 7	3/4”	5/8”
7 through 11	1”	3/4”
11 through 15	1”	1”
15 through 20	1-1/4”	1”

*Figure 3. Recommended Water Pipe Sizes*

The sea water pump charts provide a guideline for adequate water flow based on BTUs and lift.

Figure 4 determines appropriate pump size per BTU assuming 5ft. (1.52m) lift. See Figure 5 for more information for pump output when lift varies, multiple bends or long pipe runs.

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SEA WATER PUMPS			
TOTAL BTUH'S	320 GPH/1,210 LPH	580 GPH/2,200 LPH	1200 GPH/4,540 LPH
5,000	•		
7,000	•		
10,000		•	
12,000		•	
16,000		•	
24,000			•
36,000			•

*Figure 4. Sea Water Pump Sizes*

CAL PUMP 115V/60Hz (GPH/LPH)			
The chart below indicates gallons/liters per hour at various feet of lift.			
<ul style="list-style-type: none"> <li>• As a guide, use 240 gallons (910 liters) per hour of water, per ton (12,000 BTUs = 1 ton)) required at the unit and then account for the drop in water flow due to amount of lift.</li> <li>• A 90° fitting or bend is equivalent to 1ft. (.3m) of lift</li> <li>• 10' (3m) of horizontal run is equivalent to 1ft. (.3m) of lift.</li> </ul>			
PUMP (GPH/LPH)	320/1,210	580/2,200	1200/4,540
AMPS	1.5	2.2	3.3
MAX HT (FT/M)	12/3.66	15/4.57	19/5.79
1ft/.3m	320/1,200	580/2,200	1080/4,550
3ft/.91m	260/990	425/1,610	1,120/4,240
5ft/1.52m	200/760	390/1,475	950/3,595
7ft/2.13m	170/645	355/1,345	870/3,295
9ft/2.74m	140/530	320/1,210	780/2,955
11ft/3.35m		290/1,100	680/2,575
13ft/3.96m		260/985	575/2,180

*Figure 5. Cal Pump 115V/60 Hz (GPH/LPH)*

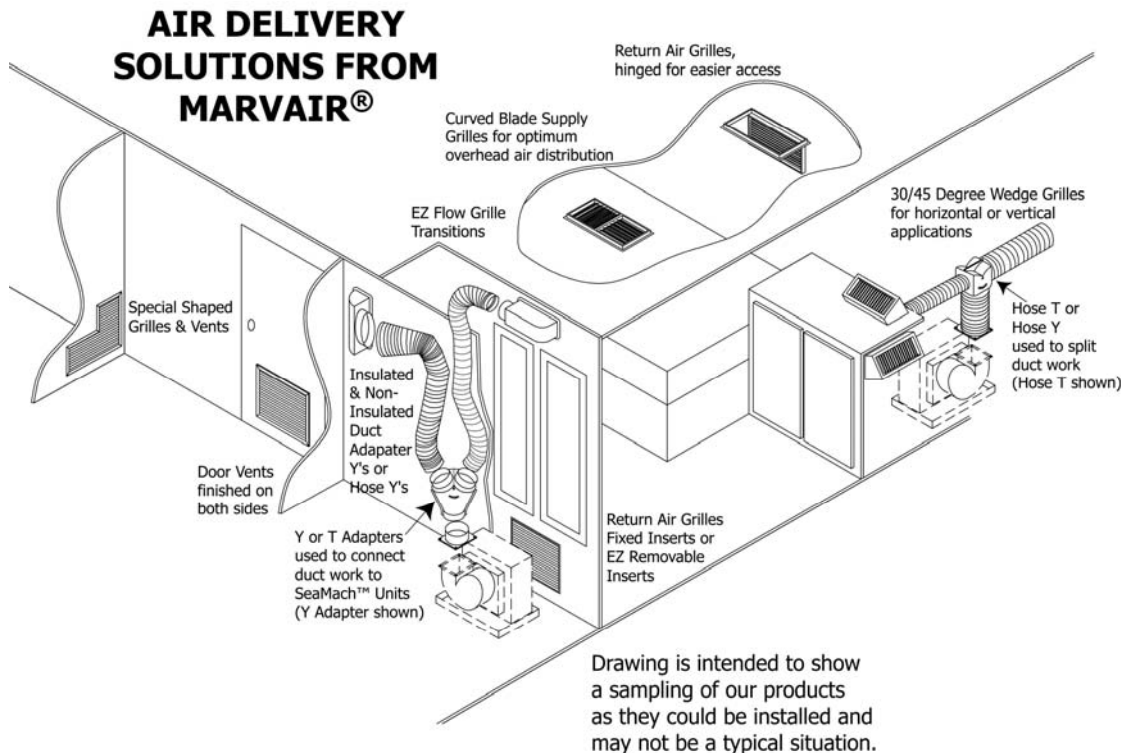
## 2.6 The Conditioned Air Duct & Grille System

**L MONOXIDE POISONING HAZARD**

Failure to follow safety warnings could result in serious injury, death, or property damage.  
**Do NOT operate furnace in a corrosive atmosphere containing chlorine, flourine or any other damaging chemicals which could harm the unit and duct system, and permit spillage of combustion products into an occupied space.**

Inadequate air flow is a leading cause of complains and can significantly shorten the life of the SeaMach™ unit. The air distribution system must be engineered to ensure sufficient air flow throughout the system. This includes proper duct sizing and sufficient open area on the supply and return grilles.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners



*Figure 6. Typical Water & Air System Installation Schematic*

## Duct work guidelines

- Duct work must be firmly attached, secured and sealed to prevent air leakage.
- Use transition boxes and/or plenums with duct to split and route the conditioned air as required.
- When using insulated flexible duct, make sure that the inner duct is secured and sealed to an adapter before pulling the insulation over the connection
- Install the supply air grilles high on the cabin wall to create good air circulation.
- Stretch the duct tight in straight runs.
- Make the bends and turns as large as possible. Secure the duct so that it remains in its installed position.
- Always use insulated duct to prevent condensation.
- Insulate all transitions and plenums.
- If duct is in a storage or other high traffic area, protect it from being crushed by a shield or box.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

- If the duct must be run through areas containing engines or fossil fueled devices, it is absolutely mandatory that the duct system be air tight to prevent carbon monoxide and any other hazardous gases or vapors from being introduced into the conditioned air system.

**Blower Rotation.** The blower in the SeaMach unit is designed to be easily rotated by the installer to facilitate the connection of duct work. To rotate the blower, remove the screw that secures the plastic ring to the evaporator coil. Next, loosen the screw on the front face of the blower. Rotate the blower to the desired orientation, replace the screw in the blower ring and tighten the screw on the face of the blower.

**Return Air Grilles.** The return air grille should be located to ensure unimpeded air flow to the air coil on the SeaMach™ reverse cycle air conditioner. The grille may be located on the opposite the coil provided there is a space around the unit for sufficient air flow. Maintain at least 4” between the grille and the SeaMach reverse cycle air conditioner. For good air distribution throughout the cabin, the return grille should be located near the floor when the supply grilles are high on the cabin wall. The return air grille must have sufficient open air to permit adequate air to the SeaMach unit.

The SeaMach™ reverse cycle air conditioner has a factory provided filter located in front of the air coil. If a return air filter grille is used, it is recommended that the filter on the unit be removed.

**Supply Air Grille.** The supply air grille must have sufficient open area to permit adequate air flow. To prevent short circuiting of the conditioned air, adjust the vanes of the supply grille so that the discharge air is not directed to the return air grille or to the thermostat/ controller.

UNIT (BTUH)	5,000	7,000	10,000	12,000	16,000	24,000	36,000
MINIMUM GRILLE (in <sup>2</sup> /cm <sup>2</sup> )	64/415	100/645	100/645	140/900	168/1,100	240/1,550	400/2,580

*Figure 7. Return Air Grilles*

UNIT (BTUH)	5,000	7,000	10,000	12,000	16,000	24,000	36,000
SIZE in/cm	4/10.2	5/12.7	5 or 6/12.7 or 15.2	6/15.2	6 or 7/15.2 or 17.8	8 or 10/20.3 or 25.4	10/25.4

*Figure 8. Fan to Hose Adapter*

BTUH	CFM/ m <sup>3</sup> hr.	HOSE SIZE (in/cm)	MINIMUM GRILLE (in <sup>2</sup> /cm <sup>2</sup> )
5,000	167/284	4/210.2	32/210
7,000	233/396	5/12.7	40/260
10,000	333/566	5 or 6/ 12.7 or 15.2	60/390
12,000	400/680	6/15.2	70/450
16,000	530/900	6 or 7/15.2 or 17.8	84/540
24,000	800/1,360	8 or 10/20.3 or 25.4	144/930
36,000	1198/2,040	10/25.4	192/1,240

Above chart indicates minimum supply air grille and hose sizes for ducting coming off the fan discharge. Use the next larger size if the run of ducting is longer than 10 feet (3 m).

*Figure 9. Supply Air Grilles*

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 2.7 Electrical

### **⚠ WARNING ELECTRICAL SHOCK HAZARD**

**Failure to follow safety warnings exactly could result in serious injury, death, and/or property damage. Turn off electrical power at fuse box or service panel BEFORE making any electrical connections and ensure a proper ground connection is made before connecting line voltage.**

**High Voltage.** Prior to doing any work on the unit, turn the electrical power off at the breaker of fuse panel. Line voltage is hazardous and can kill you. All electrical work must meet the requirements of all codes and ordinances. All work should be done only by qualified persons. The power supply should have the proper voltage, phase and ampacity for the selected model. Refer to the data label on the unit. Each SeaMach™ reverse cycle air conditioner requires an appropriately sized, dedicated circuit breaker. If there is only one SeaMach unit, the water pump does not require a separate breaker, but the breaker must be sized for the combined load of the pump and the SeaMach unit. If multiple SeaMach units are supplied by a single pump, a pump relay will be required and will require a dedicated circuit breaker.

1. To facilitate installation, the SeaMach™ reverse cycle air conditioner has a detachable electrical box. The box can be mounted on the unit's water connection side, the return air side, above the compressor or remote from the unit. Prior to placing the unit in the desired location, mount the control box in the preferred position and connect the two cords. The electrical box can be mounted up to 5' from the unit with the five foot extension harness (Marvair part number k/02659).
2. Size the incoming power supply conductors according to the code requirements. Run the power conductors through the knockouts on the side of the electrical box. Use appropriate conduit and strain relief.
3. Connect the conductors to the input side of the terminal block.
4. Install the ground wire on the ground lug.

The SeaMach™ units and all metallic fittings in the water system that are isolated by rubber or vinyl hose must be individually bonded.

## 2.8 Refrigerant Line Set and Charging (Split Systems only)

### **⚠ CAUTION**

**Keep refrigerant tubing clean prior to and during the installation.**

Once the condensing section and the evaporator sections are located and secured, the two sections are ready to be connected and charged with refrigerate, using the refrigerant tubing sizes shown in Figure 10, "Refrigerant Line Sizes".

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

Condensing unit (BTUHs)	Shutoff valve Discharge Line	Shut off Valve Suction Line	0-24 ft.(0- 7.3m)		25-49 ft. (7.4-15m)	
			Liquid	Suction	Liquid	Suction
7,000	¼” flare	3/8” flare	¼:	”1/2	¼”	½”
10,000	¼” flare	3/8” flare	¼”	½”	5/16”	5/8”
12,000	¼” flare	3/8” flare	¼”	½”	5/16”	5/8”
16,000 & 18,000	¼” flare	½” flare	5/16”	5/8”	3/8”	5/8”
24,000	3/8” flare	5/8” flare	5/16”	5/8”	3/8”	¾”

**Figure 10. Refrigerant Line Sizes**

Insulate the vapor line with a minimum of ½” refrigerant pipe insulation to prevent condensation when in the cooling mode and heat loss in the heating mode. The insulation should be installed on the tubing prior to installation of the tubing and should run the entire length of the tube. The end of the tubing over which the insulation is being slipped should be covered to prevent any insulation or foreign material from entering the tube. When installing the tubing, be careful when bending the tubing to avoid any kinks in the tubing. Secure the tubing as required (minimum every 3 ft.).

#### Line set installation

1. Tubing must be cut square. Make certain that it is round and free of burrs. Clean the tubing to prevent contaminants from entering the system.
2. Flare both ends of the tubing.
3. The evaporator section has a factory holding charge of nitrogen. Open the valves to release the nitrogen before connecting the tubing.
4. Connect the suction and discharge lines to the shut off valves on the condenser and the evaporator section.
5. Remove valve cap. Keep the cap in a clean place to ensure proper sealing and preventing contaminants from entering the system.
6. Place refrigerant gauges on the shut off valve on the condenser section. Insert sufficient refrigerant and check for leaks using soap suds or a liquid detergent. Bubbles indicate a leak. If a leak is found, repair before proceeding.
7. After determining that the refrigerant is leak free, release the refrigerant.
8. Connect a vacuum pump to the refrigerant gages and pull a vacuum to 29.99 In. Hg.
9. Close gauges and turn pump off.
10. Remove the large hex head cap on the liquid line and using an Allen wrench, turn the Counterclockwise until it stops. Repeat on suction line.
11. Replace the hex head caps. The unit is ready to be charged.

Add refrigerant using standard charging procedures.

## 2.9 Thermostat/Controller Installation

The SeaMach™ SPM and SCM models are designed to be controlled by a 24 vac digital thermostat. Models SPB and SCB can use the MachAir™ OLED digital controller. Please refer to the instructions for the appropriate thermostat or controller.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Chapter 3 - Start-Up

Double check all electrical connections and all hose connections. Sections 3.1 & 3.2 are for start-up of the Manual Thermostat. For programming and start-up of the MachAir™ 1 Controller/Thermostat refer to Chapter 4. For programming and start-up of the MachAir OLED Controller/Thermostat refer to Chapter 5.

### 3.1 Cooling Cycle

1. Turn the seacock valve to the open position.
2. On SPB models, there is a 2-3 minute delay on starting. On SPM models, set the delay to 15 seconds. If there is more than one unit, set the delays to different times.
3. If the water pump has a dedicated breaker, turn it on. Verify that water is being discharged overboard.
4. Turn on the circuit breaker to the SeaMach™ unit.
5. Refer to the operating instructions in this manual for the MachAir controller or the thermostat & set the system for cooling by using the display module or the thermostat.
6. Adjust the cooling temperature set point on the display module or the thermostat higher than the cabin temperature.
7. Slowly lower the thermostat's cooling set point until the set point is below the cabin temperature. The blower, compressor and pump should be operating.
8. Close all doors and hatches.
9. Allow the unit to operate 10 minutes.
10. After 10 minutes, there should be a 15°F (8°C) to 20°F (9°C) difference in the supply and return air temperatures.

### 3.2 Heating Cycle

**Note: Do not turn unit “OFF” and then immediately back “ON”. Wait three minutes to allow refrigerant pressures to equalize.**

1. Follow steps 1, 2 & 3 as outlined above in the Cooling Cycle section.
2. Refer to the operating instructions in the manual & set the system for heating by using the display module or the thermostat.
3. Adjust the heating temperature set point on the display module or the thermostat higher than the cabin's temperature.
4. Slowly raise the thermostat's heating set point until the set point is above the cabin temperature. The blower, compressor and pump should be operating.
5. Close all doors and hatches.
6. Allow the unit to operate 5 minutes.
7. After 5 minutes there should be a 15°F (8°C) to 25°F (9°C) difference in the supply and return air temperature.

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

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## **3.3 Operation Checklist**

1. Verify that all tie downs clamps have been correctly installed
2. Make sure all electrical cover plates are in place
3. Test for continuity between the ground and the boat's bonding system or the engine's DC negative connection
4. Make sure that there are zero volts between the boat's ground and the ground in the SeaMach reverse cycle air conditioner with the unit operating.
5. Check all water hoses for leaks.
6. Make certain that poisonous gases or noxious fumes are NOT being introduced into the vessel via the HVAC system.
7. Check for proper condensate drainage.

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

## **Chapter 4 – MachAir™ 1 Controller Operation & Programming**

### **4.1 Introduction**

The SeaMach™ reverse cycle air conditioner utilizes the MachAir™ 1 Controller and Display which has a universal power supply that operates on 115, 230, 50 or 60 hertz AC power.

#### **Standard Features**

- User friendly 6 button display panel requires no manual for basic operation
- Five-volt logic and micro controller located on the display
- 3-digit, 7-segment display panel indicates degrees Fahrenheit or Centigrade
- Paintable Face Plate Cover with recess for matching wall covering insert
- Automatic fan speed reduction as set point is approached
- Six (6) programmable manual fan speeds
- AC voltmeter to protect valuable electrical components
- 16 programmable parameters for custom installations
- High and low refrigerant pressure switch inputs
- Moisture Mode for controlling relative humidity
- De-Icing cycle to prevent evaporator coil icing
- Universal AC Power Supply
- Non-volatile memory retains settings without batteries
- Programmable display brightness control for night use

### **4.2 Optional Features**

The following optional items can be added by plugging the device into the appropriate jack and making the necessary programming changes.

- Outside Air Temperature Sensor - No Programming Necessary
- Alternate Air Temperature Sensor - No Programming Necessary
- Custom Paintable Display Panels
- Pump Guard Water Sensor - Program Setting of P-8 is Required

This manual is intended to provide the information necessary to ensure proper installation and operation of MachAir Controller. Improper installation and/or misunderstood operating parameters will result in unsatisfactory performance and premature failure of the MachAir Controller.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 4.3 Basic Operation

**POWER BUTTON** Press the **POWER button** once to toggle the unit to the "ON" mode. Press the **POWER button** again to toggle the unit to the "OFF" mode.

**FAN SPEED BUTTON** Press and release the **FAN SPEED button** to advance from "AUTO" to "MANUAL" fan operation. Press and release to increase the manual fan speeds, to settings "1 through 6". Press and release again, returns it to the "AUTO" fan mode. The selected fan mode is identified by the LED's for "AUTO" and "MANUAL".

**UP BUTTON** Momentarily press and the set point will appear in the temperature display. The set point increases one degree each time the **UP arrow button** is pressed and released.

**DOWN BUTTON** Momentarily press and release to display the set point. The set point is decreased one degree each time the **DOWN arrow button** is pressed and released.

**MODE BUTTON** The **MODE button** is used to select one of 4 Operating Modes. Press and release to advance to the next mode. Continue to press and release until the desired Operating Mode is reached. The mode selected is indicated by the Mode LED.

**TEMP SELECT BUTTON** Press and release to view the inside (supply) air temperature, outside (return) air temperature or set point. The appropriate LED will be lit indicating that temperature is being displayed.

**THREE DIGIT DISPLAY** The inside (supply) temperature is displayed whenever the control is turned on. The display provides a readout of the inside air temperature which is located in the supply duct.

**HEAT MODE LED** The "HEAT" mode LED is lit when Heating is selected.

**COOL MODE LED** The "COOL" mode LED is lit when Cooling is selected.

**AUTO LED** The "AUTO" mode LED is lit when the Automatic Heating or Cooling mode is selected. The control will automatically switch to heating or cooling when this mode is selected.

**MOISTURE CONTROL LED** The "MOISTURE CONTROL" LED is lit when Moisture Control is selected.

**MANUAL FAN LED** The "MANUAL" Fan Speed LED is lit when the fan speed has been manually selected.

**AUTO FAN LED** The "AUTO" Fan Speed LED is lit when the fan speed has been automatically selected.

**FAN SPEED BAR GRAPH** There are six (6) individual fan speed LED's. Each LED represents one (1) fan speed. The lowest fan speed setting is indicated by illuminating the first LED. The highest fan speed setting is indicated by illuminating all six LED's.

**LED** The system operating status (Compressor On or Off) is indicated by turning on the right most decimal point in the 3 Digit Display.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 4.4 System Overview

Press the POWER button once to engage the system. The Display indicates room temperature when the system is on and the display is blank when the system is off.

Press and release the MODE Button until the desired Mode LED is illuminated.

Set the desired room temperature by pressing the Up or Down arrow buttons. The set point can viewed by momentarily pressing and releasing the Up or Down arrow buttons.

Fan speed operation is automatic allowing fan speed to decrease as room temperature is approached. The fan speed decreases as the set point is approached. The fan will operate at low speed when the set point is satisfied. Manual fan speeds can be selected by pressing and releasing the FAN SPEED button to select the desired manual fan speed. The fan will operate at the speed selected and will not change speeds with room temperature.

The fan can be programmed to cycle on and off with demand, allowing the fan to run only when cooling or heating is required. Normally the automatic fan speed operation is reversed in the heating mode, however, the fan can be programmed to operate the same as in the cooling mode.

## 4.5 Normal Heating or Cooling Cycle

Select COOL mode and cooling only will be provided. The cabin temperature will be maintained within 2°F of the set point. Select HEAT mode and heating only will be supplied. The cabin temperature will be maintained within 2°F of the set point.

Select AUTO and either heating or cooling will be supplied when it is required. While in the automatic mode the controller will maintain the set point with in a 2°F temperature variation. A four degree swing is required to cause the unit to shift to the opposite mode. Once in a given mode, heating or cooling, the controller will maintain a 2 degree differential.

When the heating or cooling demand is satisfied, the compressor cycles off and the automatic fan returns to low speed. The fan speed will remain constant if MANUAL Fan Speed had been selected.

## 4.6 Reversing Valve Operation

The reversing valve is toggled to the opposite mode (for pressure equalization) when heating or cooling is required to reduce the compressor's starting requirements and the electrical power surge. The valve will only toggle to the opposite mode when a cooling or heating cycle is called for and if the system has been off for less than seventy-five (75) seconds. The valve will also toggle if a cycle is interrupted from the display panel by pressing the POWER button On/Off, or by changing the set point. Unnecessary valve toggling has been limited to reduce reversing valve noise. Valve toggling can be totally eliminated by programming the minimum compressor staging delay at seventy-five (75) seconds or greater.

**Power on reset**, which occurs when the system is powered up, will always initiate a valve toggle.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 4.7 Controller Memory

The MachAir Controller has non-volatile memory which requires no batteries or any form of backup power. When power is lost, the operating parameters are retained indefinitely. When power is restored, the controller resumes operation as last programmed. All operating and programming parameters are entered into non-volatile memory instantly and are retained indefinitely.

## 4.8 Operator Controls and Display Panel

1. **POWER BUTTON** The **POWER** button is used to toggle between the **On** and **Off** modes. Press the **POWER** button once to toggle the unit to the **On** mode. Press the **POWER** button again to toggle the unit to the **Off** mode.
2. **FAN SPEED BUTTON** Press and release the **FAN SPEED** button to advance from **AUTO** to **MANUAL** fan. Press and release the **FAN SPEED** button to advance the manual fan speeds, from 1 through 6. Press and release again to return to the **AUTO** fan mode. The selected fan mode is indicated by the **AUTO** and **MANUAL** fan LED's.
3. **UP ARROW BUTTON** Momentarily press the **UP** arrow button and the set point will appear in the temperature display. Press and release the **UP** arrow button to increase the set point one degree. The set point is increased by one degree each time the **UP** arrow button is pressed and released. The highest set point allowed is 85° Fahrenheit. The **UP** arrow button is used in conjunction with the **DOWN** arrow button to display the outside air temperature when the control is on. The **UP** arrow button is also used to increase program values in the program mode.
4. **DOWN ARROW BUTTON** Momentarily press and release the **DOWN** arrow button to display the set point. Press and release the **DOWN** arrow button to decrease the set point. The set point is decreased one degree each time the **DOWN** arrow button is pressed and released. The lowest set point allowed is 55° Fahrenheit. The **DOWN** arrow button is used in conjunction with the **UP** arrow button to display the outside temperature when the control is on. The **DOWN** arrow button is also used to reduce program values in the program mode.
5. **MODE BUTTON** The **MODE** button is used to select one of the four operating modes. Press and release the **MODE** button and the controller will advance to the next mode. Continue to press and release the **MODE** button until the desired operating mode is reached. The mode selected is indicated by the **MODE** LED, i.e., **COOL**, **HEAT**, **AUTO** or **MOISTURE CONTROL**.
6. **TEMP SELECT BUTTON** Press and release the **TEMP SELECT** button to view inside air temperature, outside air temperature or the set point. The appropriate LED, **INSIDE**, **OUTSIDE** or **SET POINT** will be illuminated indicating which temperature is being displayed. If no outside air sensor is installed three (3) dashes will appear in the Three Digit Display.
7. **THREE DIGIT SEVEN SEGMENT DISPLAY** The inside air temperature is displayed in the window whenever the control is turned on. The three digit 7 segment display provides a readout of the inside air temperature which is located in the face plate. An optional alternate air sensor is available for installations that can not use the face plate sensor.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

The display also indicates program information, fault codes and outside air temperature when the optional alternate air sensor is installed.

The display momentarily indicates the **SET POINT** when the **UP** or **DOWN** arrow button is pressed.

When the control resumes operation after a power interruption all the display LED's will turn on for one second. This is a normal operating condition and is referred to as "Power On Reset".

8. **HEAT MODE LED** The **HEAT** mode LED will be illuminated when the Heating Mode has been selected. The **HEAT** mode LED is also illuminated when optional electric heat is installed and the Heating Mode has been selected. Electric heater status, On or Off, is indicated by the right most decimal point (see Item 18).
9. **COOL MODE LED** The **COOL** mode LED will be illuminated when the Cooling Mode has been selected.
10. **AUTO LED** The **AUTO** LED is illuminated when the Automatic Heating or Cooling Mode has been selected. The controller will automatically switch to Heating or Cooling when this mode is selected.
11. **MOISTURE CONTROL LED** The **MOISTURE CONTROL** mode LED is illuminated when Moisture Control has been selected. This mode is used to control humidity during periods when the vessel is unoccupied.
12. **MANUAL FAN SPEED LED** The **MANUAL** Fan Speed LED will be illuminated when one of the six (6) Manual Fan Speeds has been selected.
13. **AUTO FAN SPEED LED** The **AUTO** Fan Speed LED is illuminated when Automatic Fan Speed
14. **FAN SPEED BAR GRAPH** There are six (6) individual Fan Speed LED's in the Fan Speed Bar Graph. Each LED represents one (1) Fan Speed. Low Fan Speed **1** is indicated by illuminating the first LED. High Fan Speed **6** is indicated by illuminating all six (6) LED's. Any of the six (6) Fan Speeds available are displayed by illuminating the corresponding number of LED's.
15. **INSIDE LED** The **INSIDE** LED is illuminated when the Inside Air Temperature is being displayed.
16. **OUTSIDE LED** The **OUTSIDE** LED is illuminated when the outside air temperature is displayed.
17. **SET POINT LED** The **SET POINT** LED is illuminated when the Set Point is displayed.
18. **COMPRESSOR LED** The system operating status (Compressor On or Off) is indicated by turning on the right most decimal point in the 3 Digit Display.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 4.9 Dual Button Functions

**UP & DOWN ARROW BUTTONS** Press the **UP** and **DOWN** arrow buttons together and the outside air temperature will be displayed, providing the Optional Outside Air Temperature Sensor has been installed. No programming is required. Press the **UP** and **DOWN** arrow buttons simultaneously, while in the program mode, to set new custom programming defaults.

**POWER BUTTON & DOWN ARROW BUTTON** Simultaneously press the **POWER** button and the **DOWN** arrow button while viewing the Service Fault History Log clears the fault History Log.

## 4.10 Special Button Functions

Special button functions are implemented by pressing and holding a particular button while the control's AC power is turned on.

1. **Service History Log** View the service history log by pressing and holding the **MODE** button while turning on the AC power. Exit the service history log by pressing the **POWER** button once. Clear the service history log by simultaneously pressing the **POWER** button and the **DOWN** arrow button.
2. **Self Test Mode** Press and hold the **POWER** button while AC power is applied to enter the self test mode. The self test mode is used to diagnose problems and to test the air conditioning system.
3. **View Hour Meter** To view the compressor hour meter, press and hold the **DOWN** arrow button while applying AC power. Maximum recorded time is 10,000 hours. The hour meter stops at maximum (10,000 hrs) and can only be reset by the Manufacturer.

## 4.11 Modes of Operation

### **Off Mode**

When the controller is in the **Off Mode**, all control outputs are turned off. Program parameters and user settings are saved in a non-volatile memory. The program mode can only be accessed from the **Off Mode**.

### **On Mode**

When the controller is in the **On Mode**, power will be supplied to the appropriate control outputs and the display will indicate the current state of operation. The operating and program parameters resume based on those stored the last time the unit was operating.

### **Cool Only Mode**

When the **COOL** LED is on, only the Cooling systems are selected and operated as required. When the temperature drops below the set point, the system will not automatically switch to the Heating Mode. Cooling only is available for customers that do not want automatic Cooling and Heating operation. Systems without reverse cycle heating can have an optional electric heater installed should heating be required.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Heat Only Mode

When the **HEAT** LED is on, only the Heating systems are selected and operated as required. Should the temperature rise above the set point, the system will not automatically switch to the Cooling mode. Heating only is supplied for customers that require the system to not automatically switch from the Heating to the Cooling mode.

## Automatic Mode

When the **AUTO** LED is on, either Heating or Cooling are supplied as required. The **HEAT** and **COOL** LED's will be illuminated according to the mode required. When the system requires compressor operation for Heating or Cooling the right most decimal point will turn on when the compressor is on.

Temperature in a given mode will be maintained at two degrees Fahrenheit (2°F), however, a four degree difference is required to allow the controller to change modes. Once in a new mode, the temperature will remain within two degrees Fahrenheit (2°F) of the set point.

## Moisture Control Mode

While in the on mode, press the **MODE** button until the **MOISTURE CONTROL** mode LED is illuminated. Every four (4) hours, the fan is started and air is circulated for thirty (30) minutes. During this time the air temperature is sampled and entered into memory. The cooling cycle is started and continues until the temperature is lowered 2°F. The compressor is allowed a maximum of one hour running time to reach the desired temperature. Four (4) hours after the temperature is satisfied on the compressor the cycle will be repeated. The right most decimal point is illuminated while the compressor is running.

## 4.12 Fan Speed Modes

### Auto Fan Speed Mode

The controller has six automatic fan speeds available. Speed **6** is high, **3** is medium and **1** is low or the slowest speed. **AUTO** Fan Speed mode allows the controller to determine the required fan speed based on room temperature. The closer the room temperature is to the set point, the slower the fan will run. This permits a balance between the most efficient temperature control and the slower/quieter fan speeds. Automatic Fan Speed operation is the **factory default**, however, **MANUAL** Fan Speed mode is available.

### Manual Fan Speed Mode

The controller has six automatic fan speeds available. Speed **6** is high, **3** is medium and **1** is low or the slowest speed. **MANUAL** Fan Speed mode allows the user to select and maintain the desired fan speed manually. When a **MANUAL** Fan Speed has been selected, the Fan Speed Bar Graph will indicate the speed selected by the number of LED's illuminated. Select Fan Speed **3**, for example, and the first three LED's in the Fan Speed Bar Graph will turn on. **MANUAL** Fan Speed mode is sometimes preferred when room temperature is constantly changing due to varying heat loads.

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## 4.13 Program Mode

### Program Mode Overview

The program mode is used to adjust the systems operating parameters to suit the particular needs of individual users. The program mode is also used to tailor the air conditioning system for the most efficient operation within an installation. Installation variables such as ducting, sensor location and system layout effect the perceived operation of the overall system. The program mode allows the system to operate as efficiently as possible under all conditions. The controller is shipped with factory programmable default settings which are stored in permanent memory and can be recalled at any time.

### Warning

Severe electrical disturbances can sometimes upset the controller operating sequences. Operator confusion related to program parameters can also cause, what seem to be, operational problems. Whenever there is any doubt as to the proper operation of the controller, Factory Default Parameters, should be re-initialized.

## 4.14 Entering Program Mode

The program mode can only be entered from the Off Mode. From the Off Mode and in the following order, press the **TEMP SELECT**, **UP** arrow, **DOWN** arrow and **TEMP SELECT** buttons. These buttons have to be pressed and released in the order given. The numerals "85" which represent the high Fan Speed limit, appear in the display. The "85" is followed by the characters "P1" followed again by the parameter setting ("85"). **P1** represents the first programmable parameter. The controller is now in the program mode. Exit the program mode, to the Off Mode, by pressing and releasing the **POWER** button.

NOTE: The controller will exit the program mode and return to the Off Mode if no programming is attempted for one (1) minute.

### Restore Memorized Default Settings

The memorized default settings can be restored by entering the program mode and setting P-16 to rSt. Exit the program mode and software version number appears in the display. The memorized default settings are restored and the controller returns to the Off Mode. The software version number is always displayed when you exit the program mode.

Increment from one parameter to the next by pressing and releasing the **MODE** button while in the program mode. Use the **UP** arrow and **DOWN** arrow buttons to change the program parameter values. The programmable parameters range from P-1 through P-16.

### Up and Down Buttons

The **UP** arrow and **DOWN** arrow buttons are used to select the data or set the desired limits for the parameters being programmed. This method is followed throughout the program mode, however, special instructions are included for individual functions that require them.

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## Exiting the Program Mode

There are two methods to exit the program mode. Press the **POWER** button and the controller will return to the Off Mode. Not pressing any buttons or attempting any program changes for sixty (60) seconds will allow the controller to exit the Program Mode to the Off Mode. Any programming changes that were made while in the program mode will be memorized and put into operation when the program mode is exited and the controller is returned to the On Mode.

## 4.15 Programming

### Programmable Parameters

There are sixteen (16) programmable parameters with their Factory Default Settings listed in this section. The table below indicates what these parameters are, along with the permitted values and the original Factory Default Settings.

Program Number	Description	Default	Range
P-1	High Fan Speed Limit (arbitrary units)	85	56 to 85
P-2	Low Fan Speed Limit (arbitrary units)	50	30 to 55
P-3	Compressor Staging Time Delay	15	5 to 135 seconds
P-4	Temperature Sensor Calibration	0	Ambient $\pm$ 10°F
P-5	Failsafe Modes and Mnemonic High refrigerate Pressure (HPF) Low refrigerate Pressure (LPF) Low AC Line Voltage (LAC)	3 = 4 Failures With 90 Second Restart Delay. Manual Reset is Required	Off 1 = Continuous No Display 2 = Continuous With Display 3 = 4 Failures Reset Required
P-6	Low AC Voltage Cut-Off	85 VAC (115 vac) 185 VAC (230 vac)	Off - 75 to 100 (115 vac Units) Off - 175 to 200 (220 vac Units)
P-7	De-Icing Cycle	0	0 = Off 1 to 3 Minutes
P-8	Pump Sentry - Protects Pump and Compressor From Loss of Water	Off	OFF ON = Select 100°F to 150°F
P-9	Display Brightness Control	13 = Maximum	4 = Low 13 = Maximum
P-10	Display °Fahrenheit or °Centigrade	°F	°F = Fahrenheit Displayed °C = Centigrade Displayed
P-11	Cycle Pump With Compressor or Continuous Pump	OFF = Cycle With Compressor	OFF = Cycle With Compressor ON = Continuous Pump
P-12	Reverse Fan Speeds During Heating Mode	rEF = Reversed	nor = Normal Fan Operation rEF = Reversed Fan in Heating
P-13	Continuous Fan or Cycle Fan With Compressor	con = Continuous Fan Operation	CYC = Cycle Fan w/Compressor rEF = Reversed Fan In Heating
P-14	Reverse Cycle Heating or Electric Heat Only Option Installed (Cooling Only Units)	nor = Reverse Cycle Heating	nor = Reverse Cycle Heating ELE = Electric Heater Installed
P-15	Fan Motor Type Selection - Shaded Pole or Split Capacitor	SP = Shaded Pole	SP = Shade Pole Fan Motor SC = Split Cap. Fan Motor
P-16	Reset Memorized Programming Defaults	nor = Normal	rSt = Reset Defaults

Should any programming problems or confusion occur, reset the Memorized Default Settings by entering the program mode and setting P-16 to rSt.

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## **P-1 High Fan Limit**

The upper fan speed limit can be changed to suit different motors and operating conditions. The **high fan limit** is adjusted with the system installed and operational. The range of values are 56 through 85 and represent arbitrary units. Setting a higher number, results in a higher fan speed, setting a lower number, lowers the fan speed. Use the **UP** and **DOWN** arrow buttons to select the desired fan speed limit. The factory default is eighty-five (85).

## **P-2 Low Fan Limit**

The **low fan limit** determines the lowest output allowed for the low fan speed. The range of values for the low fan speed are 30 through 55, in arbitrary units. Use the **UP** and **DOWN** arrow buttons to select the desired low fan speed limit. Setting a higher number, results in a higher fan speed, setting a lower number, lowers the low fan speed limit. The factory default setting is fifty (50).

Once the high and low fan speed limits are set, the unit will automatically readjust the four (4) remaining fan speeds to produce six (6) equally spaced fan speeds in both the **AUTO** and **MANUAL** fan speed modes.

## **P-3 Compressor Staging Time Delay**

**NOTE: This feature is not being used on the SeaMach™ reverse cycle air conditioners.**

The **compressor staging relay** is provided for installations where more than one system is being operated from the same power source. Setting the staging delays at different intervals allows only one compressor to start at a time. The units should be staged at least five (5) seconds apart. The minimum delay is five (5) seconds and the maximum is one hundred thirty-five (135) seconds. The factory default setting is fifteen (15) seconds.

## **P-4 Temperature Calibration**

Use this feature to calibrate the air sensor within a range of  $\pm$  ten (10)°F. Enter the program mode and the ambient temperature appears in the display. Use the **UP** and **DOWN** arrow buttons to select the desired offset. The temperature in the display will increase or decrease according to the offset programmed. The factory default setting is zero.

## **P-5 Fail-Safe Level**

The system can be configured for one of four fail-safe levels. Selecting **OFF** turns off all fail-safe protection and mnemonic display codes. Level **ONE (1)** shuts down the system, allows the system to restart after a 90 second delay and displays no failure code. Level **TWO (2)** shuts down the system but allows continual restarts after the 90 second delay and displays the appropriate mnemonic failure code. Level **THREE (3)** operates the same as level **TWO (2)** with the addition of a system shutdown after four (4) consecutive failures. Manual reset is required to restart the system.

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## **P-6** Low Voltage Cut-Off

The controller can be programmed to protect the system against sustained low AC line voltage conditions. The compressor will be shut down and "LAC" flashed in the display if the line voltage goes below the programmed value for more than ten (10) minutes. Programmable values are 75 VAC to 100 VAC for 120 volt units and 175 VAC to 200 VAC for 220 volt systems. The factory default is 85 VAC for 120 volt units and 185 VAC for 220 volt systems. **NOTE:** Low Voltage Protection can be turned off by programming **OFF** instead of selecting a voltage value.

## **P-7** De-Icing Cycle

The controller is equipped with a De-Icing Cycle to prevent ice build up on the evaporator coil during extended periods of cooling operation. Installation variables such as grille sizes, length of ducting, insulation "R" factors and ambient temperatures determine the cooling run time required to achieve the set point. Customer usage may substantially increase run times by operating the system with the hatches and doors open. Programming an unrealistic set point (55°F) and leaving the salon door open will usually cause the evaporator to ice up on warm muggy days.

De-Icing is accomplished by switching the reversing valve into the **HEAT** mode while the system is cooling. The valve will remain energized for the programmed cycle time. The cycle is programmable from OFF through a period of 3 minutes. The factory default setting is OFF.

## **P-8** Optional Pump Sentry

**NOTE: This feature is not being used on the SeaMach™ reverse cycle air conditioners.**

The controller can be equipped with an optional temperature sensor that is used to monitor the heat exchanger temperature. The sensor is plugged into the outside air sensor jack and programmed for a temperature between 100 and 150 °F depending on water temperature and the system type. When the heat exchanger temperature rise above the programmed value the pump and compressor are shut down and "PPP" is flashed in the display. The factory default is OFF, no Pump Sentry installed.

## **P-9** Display Brightness Control

The display brightness can be adjusted to suit ambient cabin lighting conditions. The allowed settings are four (4) to thirteen (13) the brightest. Typically a dark cabin will require a setting of four or five. A very bright cabin will require a setting of twelve or thirteen. The factory default setting is thirteen (13).

## **P-10** Fahrenheit or Celsius Selection

The unit can be programmed to display either Fahrenheit or Celsius. Programming °F displays degrees Fahrenheit and programming °C, displays degrees Celsius. The factory default setting is °F, Fahrenheit. When degrees Celsius (°C) is selected the readings are displayed in tenths, i.e. 22.2 °C.

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## **P-11** Cycle Pump With Compressor

To increase pump life and conserve electricity the pump can be programmed to cycle on and off with the compressor. The pump can also be programmed to operate continuously whenever the system is on. To program the pump for continuous operation, turn "P-11" **ON**. The factory default setting is **OFF**, which cycles the pump with the compressor.

## **P-12** Reverse Automatic Fan Speeds During Heating

The automatic fan speeds can be reversed during the heating mode to improve heat output in cooler climates. The fan speed is decreased as the temperature spread increases. The fan will speed up as the set point is approached. Lowering the fan speed when the cabin is cold increases head pressure and raises the supply air temperature. Increasing the fan speed as the set point is approached also reduces unnecessary high pressure faults. The fan switches to low speed when the set point is satisfied and the compressor cycles off. The fan can be programmed to operate the same as in cooling by programming "P-12" **nor** which represents normal fan operation during reverse cycle heating. The factory default setting is **rEF**, which reverses the automatic fan speeds during heating.

## **P-13** Cycle Fan With Compressor

The fan can be programmed to run continuously when the system is on or can be allowed to cycle with the compressor. When cycled with the compressor, the fan will operate only when heating or cooling is called for. To cycle the fan with the compressor select **CYC** which stands for cycle the fan with the compressor. To operate the fan continuously select **con** which represents continuous fan operation. The factory default setting is **con** continuous fan operation when the system is on.

## **P-14** Reverse Cycle or Electric Heat

Electric heat is not currently available on SeaMach units.

## **P-15** Fan Motor Selection

There are two basic fan motor types, shaded pole and split capacitor. Each motor reacts differently to speed control and each motor requires different timing for optimum fan speed control. The default setting is "SP" which selects the shaded pole motor type, however, "SC" should be selected if a split capacitor type motor is used in the system. The SeaMach™ direct expansion systems are supplied with a split capacitor type fan motor so "SC" should be selected. The factory default setting is "SP" for the shaded pole type fan motor. **IMPORTANT:** The factory default setting "SP" should not be used on the SeaMach™ reverse cycle air conditioners.

## **P-16** Reset Memorized Defaults

The default programming parameters can be reset by entering the program mode and selecting "rST". This will restore the programmable parameters to the values selected when the system was shipped.

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## Why Memorize New Defaults?

Once the desired programming changes have been made and the system tests satisfactorily, your work can be saved as the **new factory defaults**. Your new defaults are initiated by **simultaneously** pressing and releasing the **UP** and **DOWN** arrow buttons prior to exiting the **program mode**. New defaults can be initialized at any time by entering the program mode and following the above instructions. Once **new defaults** have been initialized the control will revert back to the new defaults whenever factory defaults are restored as previously described in "P-16".

## 4.16 Fail-Safe and Fault Handling Codes

When a fault is detected the controller will display one of the following Mnemonic fault codes:

<b>HPF</b>	Indicates high Refrigerant pressure, 15 second delay, Ignored in HEAT mode.
<b>LPF</b>	Indicates low Refrigerant pressure. There is a ten minute charge time delay.
<b>LAC</b>	Indicates low AC line power
<b>AAA</b>	Indicates failed air sensor. Unit will not run until repaired.
<b>PPP</b>	Indicated the water pump has failed.

### Fail-Safe

There are four levels of fail-safe protection including the fail-safe **OFF** mode. Level **1** monitors the sensors, takes appropriate action and allows continuous restarts after a 90 second delay and **does not display the fault code**. Level **2** works the same as Level **1**, however, the appropriate fault code mnemonic is displayed during the time-out between restarts. Level **3** is identical to Level **2** with the inclusion of a three successive failures lockout routine. After four (4) consecutive failures the system is shutdown and a manual reset is required.

### Lockout

**Lockout** occurs if "P-5" is programmed for Level **3** and four consecutive faults are detected within a heating or cooling cycle. Lockout causes the system to shut down and flash the mnemonic fault code. Lockout can only be cleared by turning the unit **OFF** and then **ON** by using the **POWER** button.

### Fault Display

When a fault occurs the appropriate mnemonic code is flashed in the display. The flashing mnemonic can be removed from the display by pressing and releasing the **POWER** button to reset the controller. Resetting the controller does not solve the problem caused by the fault.

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Fail-Safe Level	Action	Description of Action Taken
<b>OFF</b>	All Protection is Turned Off	FAIL-SAFE PROTECTION LEVELS TURNED OFF: Air Sensor Fault: Heating/Cooling Immediately Suspended; Normal Operation Not Resumed Until Fault is Cleared. Air Sensor Fault Code "Flashing Display" NO OTHER FAIL-SAFE PROTECTION IS PROVIDED.
<b>1</b>	No Mnemonic Fault Code Displayed Continuous 90 Sec. Re-Starts Allowed !	MINIMUM PROTECTION LEVEL All Actions Taken in Fail-Safe Protection Level "0" Plus: In Addition, Continuous 90 Second Compressor Restarts are Allowed. FAULT Mnemonic CODE NOT DISPLAYED NO OTHER FAIL-SAFE PROTECTION IS PROVIDED
<b>2</b>	Display Fault & Shut Down Compressor With Continuous 90 Second Delay Between Starts	INTERMEDIATE PROTECTION LEVEL All Actions Taken in Fail-Safe Protection Levels "0" & "1" Plus: In Addition, The FAULT MNEMONIC CODE Message Will Be Displayed With Continuous 90 Second Compressor Restarts Allowed. NO OTHER FAIL-SAFE PROTECTION IS PROVIDED
<b>3</b>	Display Fault and Require Manual Reset After 4 Failures.	MAXIMUM PROTECTION LEVEL FAULT CODE MESSAGES ARE DISPLAYED and The Appropriate Action is Taken According to The Problem Encountered. After 4 Consecutive Failures Manual Reset is Required.

## 4.17 Specification Notes

Custom cable lengths available on special request in 5 foot increments. Maximum length of display cable is 50 feet. Sensor cable lengths should be limited to 50 feet. The **outside air sensor**, **alternate air sensor** and **condenser coil sensor** are optional items and are not included with the standard control package.

## 4.18 Automated Factory Self Test Program

### Self-Test Mode

The controller software contains a self-test program to facilitate factory testing of the entire air conditioning system. Once the **Self-Test** mode is activated, the test cycle will continue until the AC power is interrupted or the On/Off **POWER** button is pressed once which returns the system to the Off mode.

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Activate the self-test mode by pressing and holding the On/Off POWER button while turning on the AC power. Be sure to continue to hold the **POWER** button until the power on reset is completed. The controller is now in the **Self-Test** mode.

Once activated the self-test software will continuously execute the following procedure:

- 1 - Turn on in the **HEAT** mode and supply heating for ten (10) minutes.
- 2 - Stop heating and run the **fan only** for five (5) minutes.
- 3 - Switch to **COOL** and continue cooling for ten (10) minutes.
- 4 - Stop cooling and run the **fan only** for five (5) minutes.
- 5 - Return to step one (1) and continue until interrupted.

The test mode will continue until the power is interrupted or the test is halted by pressing the On/Off POWER button once.

## 4.19 Service Tools

### Hour Meter

Total compressor cycle time is saved in **EEPROM** every 6 minutes of continuous compressor running time. Cycles less than 6 minutes will be discarded to conserve memory and to allow for the most flexible hour-meter possible.

To view the hour meter turn off the power at the AC breaker and hold the **DOWN** arrow button depressed. While depressing the **DOWN** arrow button, restore AC power. After the power on reset routine is complete, the following will appear on the display.

<b>HOUR METER</b>	<b>THOUSANDS</b>	<b>HOURS</b>
H	r	
		1
2	2	4

1. The hour meter mnemonic (Hr) is displayed for one (1) second.
2. The display blanks out for one second and then displays the THOUSANDS units for three (3) seconds.
3. The display blanks out for one (1) second and then displays the hours for three (3) seconds.
4. The unit returns to the last operating state before power was removed.

The example shown is displaying twelve-hundred twenty-four (1,124) hours.

Maximum recorded time is 10,000 hours. The hour meter stops at the maximum (10,000 hrs) and can only be reset by **Marvair**.

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## Service History

The controller will record and remember the last eight (8) service problems or service faults detected. Each time a fault is detected, a one hour timer is started. During that hour the same recurring fault will not be recorded. Should a different fault be detected during that hour, it will be entered into the service history log.

The following events are entered into the service history log:

1. High Refrigerant Pressure
2. Low Refrigerant Pressure
3. Air Sensor Fault
4. Low AC Voltage
5. Pump or Loss of Water Fault

To view the service log, turn off the AC power and depress the **MODE** button. With the **MODE** button depressed turn on the AC power. Once the **power on reset** is completed, the display will flash the most recent mnemonic for the fault detected, followed by the event number. To view the other events detected press either the **UP** or **DOWN** arrow buttons.

To exit the service history log press the **POWER** or the **MODE** button or wait 30 seconds without pressing any buttons.

The service log can be cleared by simultaneously pressing the **POWER** and **DOWN** arrow buttons while you are viewing the service log mode.

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## Chapter 5 – MachAir™ OLED Controller Operation & Programming

### 5.1 Set-up and Programming of MachAir™ OLED Thermostat/Controller

#### General Description

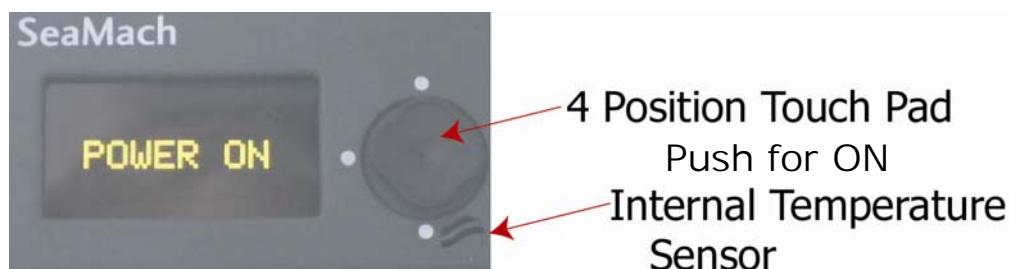
The MachAir™ OLED is a digital thermostat/controller that provides temperature and humidity control, allows for fan speed adjustment and shows fault conditions in a compact, yet easily readable display. The MachAir™ OLED thermostat/controller is designed to operate with SeaMach™ self contained models SPB and SCB and split systems models, CPB and CCB. The SeaMach OLED (Organic Light Emitting Diode) is the latest in display technology with features not available in other, less advanced systems. OLED (Organic Light Emitting Diode) displays are brighter, thinner, lighter and use less power than older LCDs. In addition, OLED's offer wider viewing angles and higher contrast than LCDs.

The thermostat/controller is easily programmed to allow the user to customize the operation of the SeaMach unit. Intuitive icons enable the viewer to see at a glance the operating status of the unit and the cabin temperature. If the display has not been touched for 4-1/2 minutes, the display dims. After another 4-1/2 minutes, the display enters QUIET mode. By touching the touch pad, the screen will light back up. During this time, a small light will rotate around the display's perimeter, showing that the system is functioning. To protect the board from voltages fluctuations, there are fuses on the board in the SeaMach unit. Prior to calling for service, please check these fuses and replace if required.

#### Set Up (Programming)

The following instructions provide a step by step procedure for setting up (programming) the MachAir™ OLED thermostat/controller. Before starting, it is advisable to completely read the Set Up instructions. Also, make sure that SeaMach™ unit has been installed properly and power is connected to the SeaMach unit. There is a factory installed 10-15 second time delay from when the display is activated until the compressor turns on. This delay prevents destructive short cycling of the compressor. While the time delay is in effect, a bar in the lower left hand corner of the display rotates. This rotating bar indicates that the delay is in process. When the compressor time delay has elapsed, the compressor will turn on, COMP will be displayed, and the bar will disappear. Changing the Mode selection will start the delay timer. Also, if the unit is in the AUTO or HEAT or COOL Mode and a temperature selection is made so that the unit goes into the opposite Mode, e.g., from Cooling to Heating, the delay timer will start.

**To turn the display on**, gently push on the 4 position touch pad for 3 seconds. The display will illuminate and Set Point will be displayed.



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**To enter the Set Up mode**, gently push and release on the right arrow center of the 4 position touch pad. During SET UP, if the touch pad is not pressed for 4 seconds, the thermostat /controller will exit the SET UP mode. To return to SET UP, press the center of the touch pad. Press and release the right side of the touch pad repeatedly to return to your previous point in the SET UP mode.

There are 6 user selections. A complete description of each user selection is in the section for each of the Setup Modes. The 6 User selections are:

1. Temperature Set point. This is desired temperature in the cabin.
2. Operating Mode.
  - a. AUTO (automatically switches form heating to cooing and visa versa).
  - b. COOL (cooling only).
  - c. HEAT (heating only).
  - d. FAN ONLY (the fan will operate but there is no heating or cooling).
  - e. DEHUM (Dehumidification).
3. Fan Mode. The three choices are:
  - a. Manual
  - b. Auto
  - c. On
4. Fan Speed
5. Temperature scale: °F or °C
6. Air Sensor Internal (standard) or Remote

**To program or change the set point or the selection with in each mode**, gently press on the top or bottom of the 4 position touch pad.

**To move to the next Set up selection**, press the right side of the touch pad to move. Press the left side of the 4 position touch pad to return to the previous selection.

When programming is complete, do not touch the touch pad for 10 seconds or touch the center of the touch pad and the controller will automatically accept your inputs.

## Temperature Set Point Set Up

To adjust the temperature set point, gently push on the top of the touch pad to raise the set point temperature or on the bottom to lower the set point temperature. Note: the temperature scale – °F or °C – can be selected in step 5.

After selecting the desired set point, press one time on the right side once of the touch pad to move to Operating Mode Set Up.



## Operating Mode Set Up

The SeaMach™ unit has five modes of operation – Auto, Cool Only, Heat Only, Fan Only and the Dehumidification Mode. Press either the top or the bottom of the touch pad to select the desired mode. Note: the Auto mode is recommended for normal operation.

**Auto** – The SeaMach™ unit will automatically heat or cool, depending upon the set point temperature.

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**Cool** – The SeaMach™ unit will only operate in the cooling mode.

**Heat** - The SeaMach™ unit will only operate in the heating mode.



**Fan Only** – The fan in the SeaMach™ unit will run to provide air circulation in the cabin, but no heating or cooling will be provided.



**Dehumidification Mode** – This mode is recommended when the boat is going to be unoccupied for more than 48 hours during warm or hot seasons. In the Dehumidification mode, the SeaMach™ unit will operate in the cooling mode for 15 minutes every 6 hours to remove moisture from the cabin. The unit will only operate if the cabin temperature is 67°F (19°C) or above.



To proceed to Fan Mode Set Up, press the right side of the touch pad.

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## Fan Mode Set Up

In the Fan Mode, there are three selections – Manual, Auto and On. Select Manual, Auto or On by pressing on the top or the bottom of the touch pad.

In the Manual mode, a constant fan speed is selected and the fan cycles with the compressor. The constant fan speed is selected in Fan Speed Selection Set Up (next screen). Note: If Fan Only was selected as the Operating mode previously, Manual Fan is the only choice available in the Fan Mode Set up.

If Auto is selected, the fan will automatically change speeds, depending on the difference between the temperature in the cabin and the set point temperature. In the cooling mode, the fan will start on maximum speed. As the cabin temperature approaches the set point temperature, the fan will slow down to the minimum set speed. The minimum speed is selected in Fan Speed Selection (next screen). In the heating mode, the fan will start on the minimum speed. As the

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cabin temperature approaches the set point temperature, the fan speed increases to the maximum speed. Auto is the recommended Fan Mode selection.

In the On mode the fan will run continuously, the compressor will cycle on and off depending on the temperature in the cabin..



To move to Fan Speed Set Up, press on the right side of the touch pad.

## Fan Speed Set Up

In the previous Fan Mode, either Manual, Auto or On was selected.

If Manual was selected, set the desired fan speed by pressing the top or bottom of the touch pad. In this mode the fan remains at a constant speed and does not vary. The number indicates the fan speed on a scale from 1-28.



If Auto or On, was selected in the Fan Mode, now select the Low Fan Speed. The number indicates the fan speed on a scale for 1-28 with 1 being the lowest fan speed. Typical low fan speed settings are 10 to 15. Note: Under some conditions, restricted air flow due to long duct work and/or cool inlet water temperature, may cause ice to form on the coil when the SeaMach unit is in the cooling mode. When this happens, the unit enters into the defrost mode and “DEFROST” is displayed on the OLED screen. If the unit is going into Defrost regularly, the Low Fan Speed setting should be raised to ensure adequate air flow. If the unit has been functioning normally and then begins to enter the defrost more frequently, check the filter and clean/replace if required.



To move to Temperature Scale Set Up, press on the right side of the touch pad.

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## Temperature Scale Set Up

The temperature can be displayed in either Fahrenheit or Centigrade by pressing the top or bottom of the touch pad.



To move to Air Sensor Set Up, press the right side of the touch pad.

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## Air Sensor Set up

The SeaMach™ OLED display has an internal temperature sensor. In some installations this sensor may be affected by an external heat source. An optional remote sensor can be installed to provide a more accurate sensing of the cabin temperature. If you do **not** have a remote air sensor, select “INT” by pressing the top or bottom of the touch pad. If there is a remote sensor, select “OPT”.

Note: If OPT is selected without connecting the remote sensor, an alarm notice will be displayed.

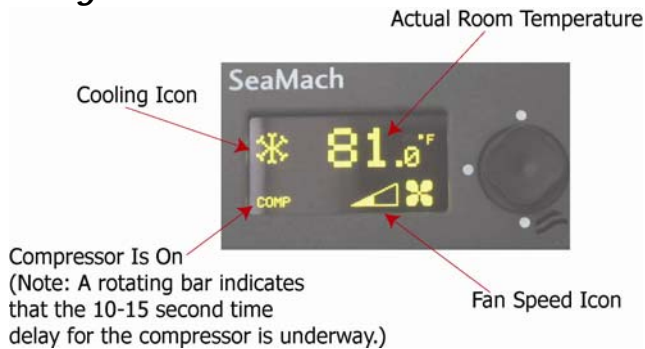


This completes the set up of your MachAir™ OLED controller. To have the controller accept your selections, do not press the 4 position touch pad for 10 seconds and the controller will automatically exit the program mode.

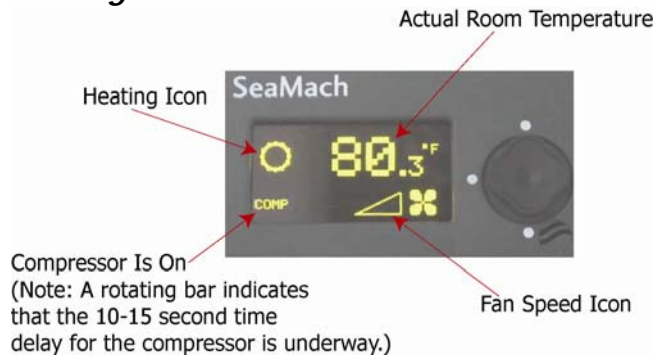
# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Operating Screens

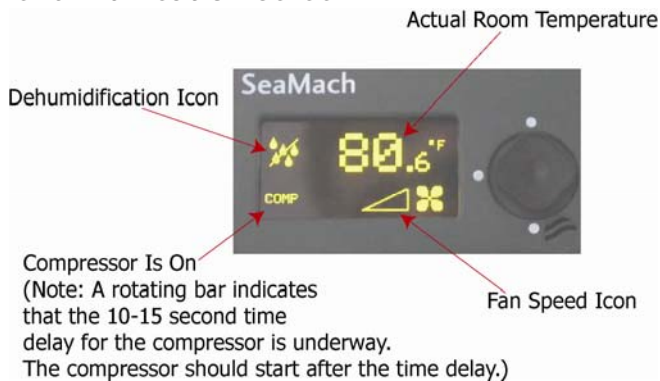
### Cooling Screen



### Heating Screen



### Dehumidification Screen



### Auto Screen



**Defrost** - Under certain conditions in the cooling mode, ice may form on the indoor coil. A dirty filter, restricted air flow or a low cooling set point temperature can cause ice to form on the coil. To prevent excessive ice formation, the fan will continue to run, but the compressor will automatically turn off until the temperature of the coil rises to the factory set temperature. When this temperature is reached, the SeaMach™ unit will automatically resume normal operation.

### Defrost Screen



## Alarms

In addition to controlling the temperature, the MachAir™ OLED controller also monitors the operation of the SeaMach™ unit and will display fault conditions. If a problem is detected, a message will be displayed on the screen. Once an alarm has been detected, it is necessary to turn power off to the SeaMach unit at the breaker and then restore power to the unit to clear the alarm.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

**Low Voltage** - The display will show POWER SUPPLY if voltage is insufficient to start the unit.

**Sensor INT** - The display will show SENSOR INT when the built-in sensor in the MachAir OLED display is defective. If this display persists, contact Marvair or your local SeaMach service center.

**Sensor OPT** - The display will show SENSOR OPT (optional) when the remote sensor is defective or if the remote sensor was selected in the Air Sensor set up, but a remote sensor is not connected. If this display persists, contact Marvair or your local SeaMach service center.



**LP (Low Refrigerant Pressure) or HP (High Refrigerant Pressure)** - When either LP or HP is displayed, the SeaMach unit will turn off and try to restart after 3 minutes. If there is a second LP or HP fault, the SeaMach unit will shut down and LP or HP will be displayed. High pressure is most often due to inadequate water flow. Check the overboard water discharge and the pump fuse.

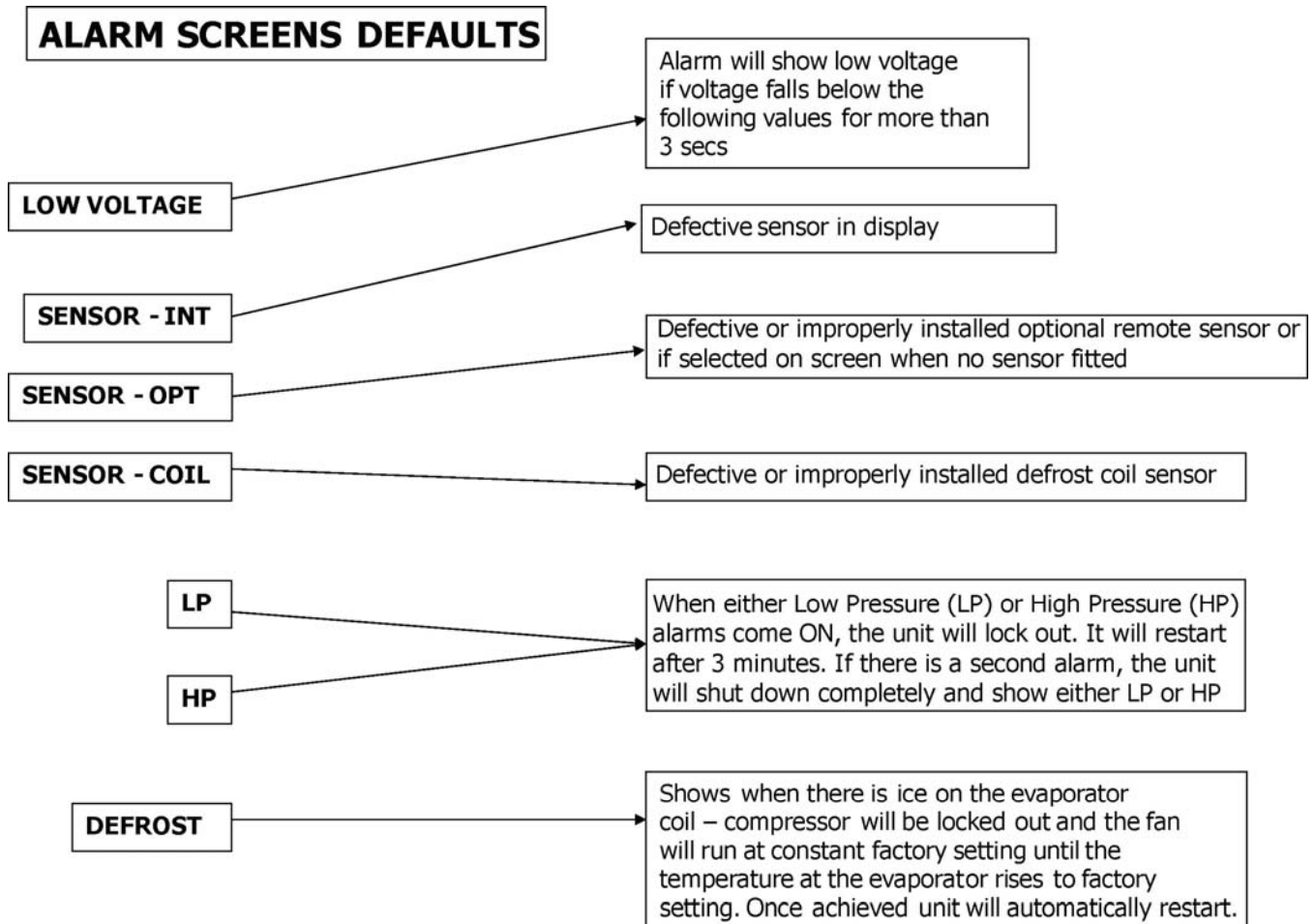
Low pressure is frequently due to inadequate or restricted air flow, e.g., a dirty filter or closed supply air grilles. Contact Marvair or your local SeaMach service center.

**Sensor Coil** - The display will show COIL SENSOR when the defrost sensor is defective or not properly installed. If this display persists, contact Marvair® or your local SeaMach™ service center.



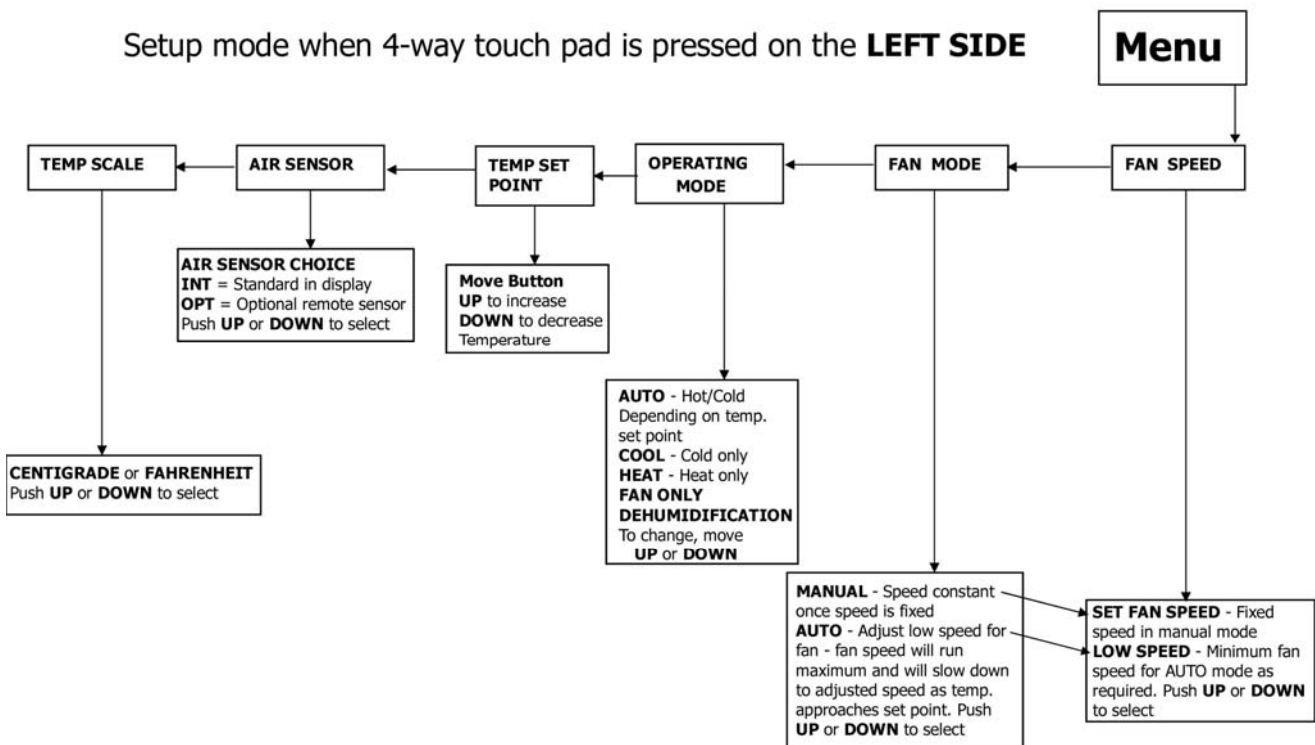
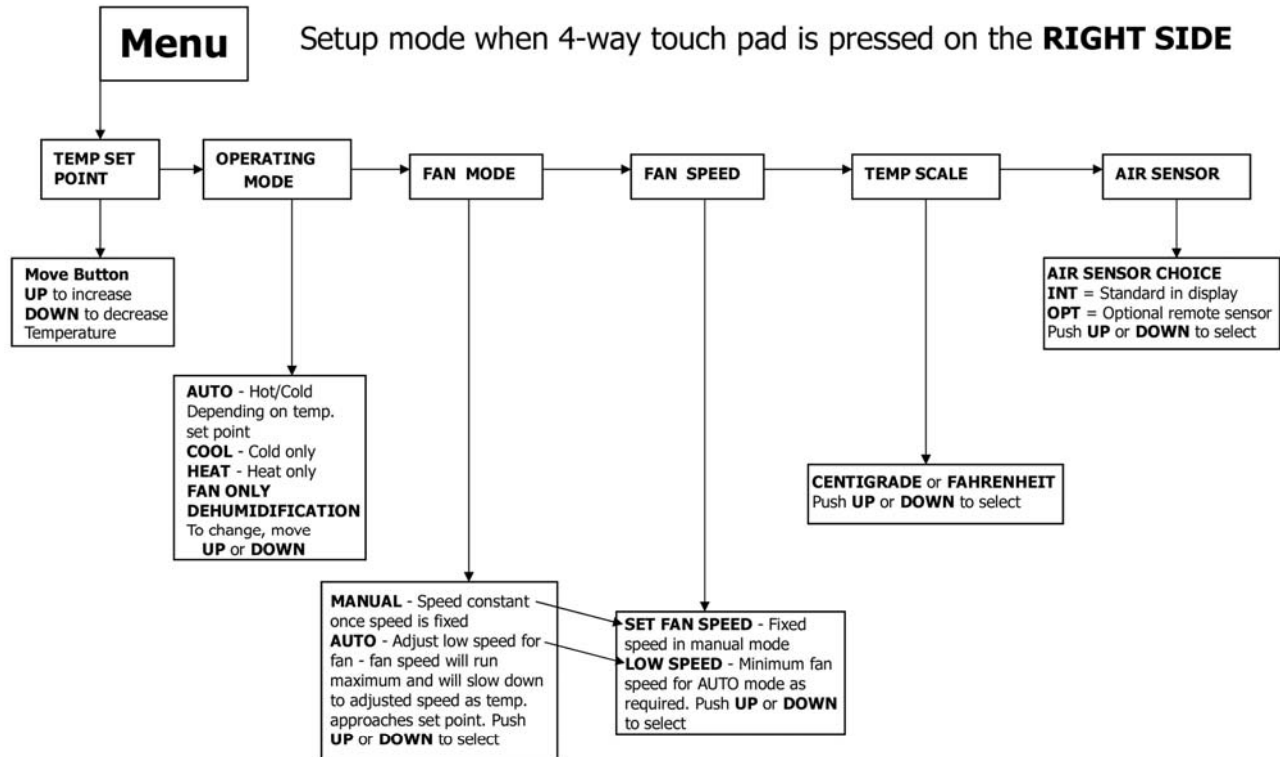
# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## ALARM SCREENS DEFAULTS

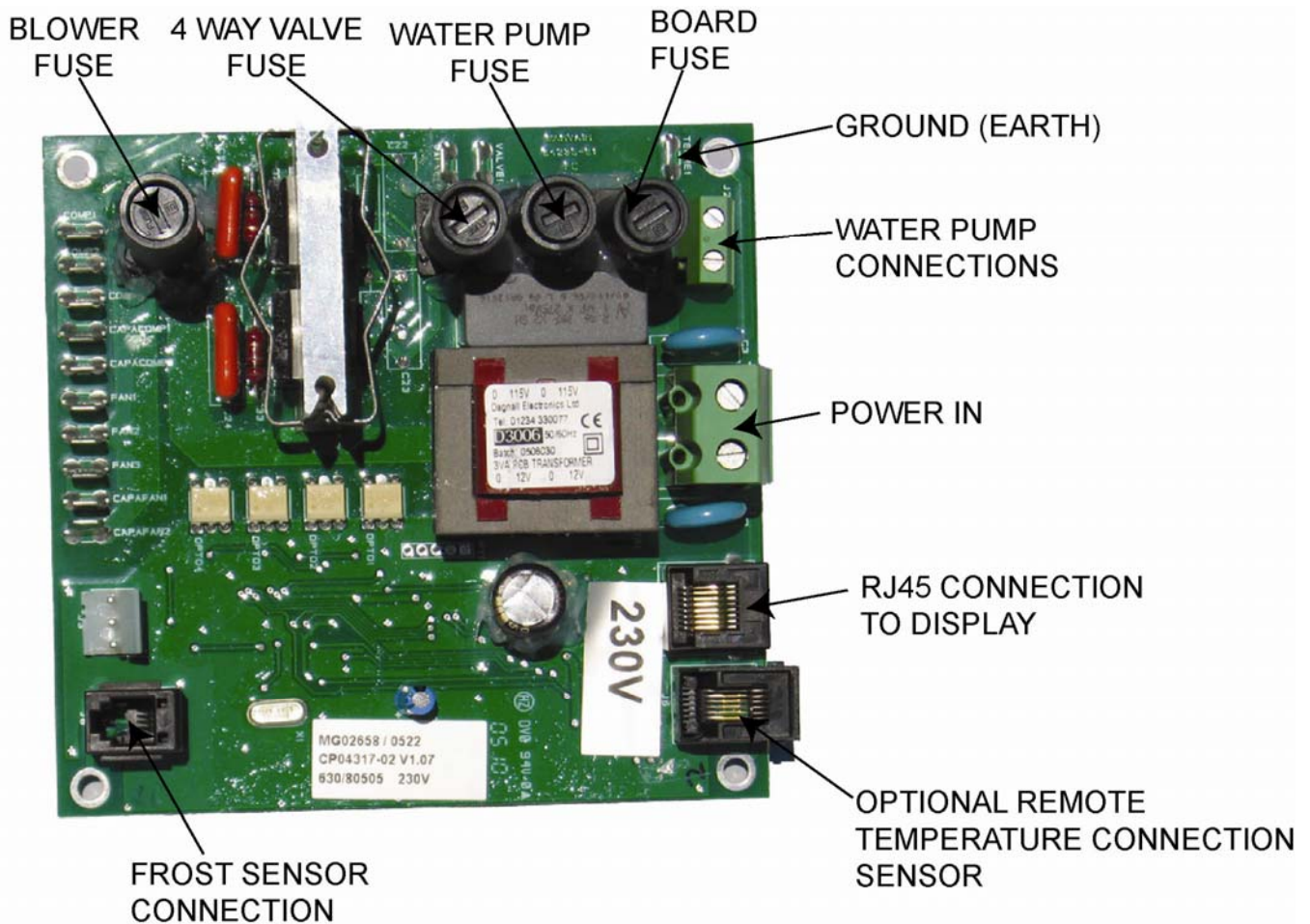


# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## MachAir™ OLED Marine Controller



# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners



***Fuse Size (Amps)***

	<b>Blower</b>	<b>4 Way Valve</b>	<b>Water Pump</b>	<b>Board</b>
<b>115 volt</b>	3.0	0.5	4.0	0.5
<b>230 volt</b>	2.5	0.5	2.0	0.5

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

## **Chapter 6 – Owner’s Maintenance**

### **6.1 Maintenance**

#### **Air Filter**

The air filter is located on the face of the indoor coil of the SeaMach™ reverse cycle air conditioner. The indoor coil may be located behind a return air grille. The air filter should be checked monthly and cleaned, if necessary, with dishwasher soap and warm water.

#### **Condensate Drains**

The condensate drain(s) on the SeaMach™ reverse cycle air conditioner should be checked every three months for obstructions. This can be accomplished by pouring a gallon of water into the condensate pan and observing that the water will drain down to its original level within one minute. If the unit has more than one drain outlet, it is important to verify that both drain outlets are working.

#### **Water Strainer**

The water strainer should be checked daily. Remove any debris that is collected in the strainer.

#### **Water Pump**

Systems that utilize the "rubber impeller" water pump should be inspected every 400 hours. The rubber impeller or water pump should be replaced if excessive wear is evident. Systems that utilize a centrifugal water pump should not require regular maintenance.

#### **Water Connections**

It is important to verify that all water connections are water tight and that the water flow from each unit's overboard discharge is evident when the units are running to ensure proper drainage.

#### **Refrigerant Charge**

The refrigerant used in your self-contained SeaMach™ reverse cycle air conditioner is factory charged and sealed. The refrigerant charge should not require adjustment and should be adequate for the life of the air conditioning system. Split system units are charged in the field, and should not require additional refrigerant after the unit is installed.

#### **Winterizing the System**

There are two scenarios for winterizing the system – the boat remains in the water or the boat is out of the water, in dry dock storage. Please follow the procedures described below for your situation.

##### **A. Boat remains in the water.**

In water storage requires the use of a potable anti-freeze solution throughout the system's water supply and discharge lines. Be sure to follow all state, local and federal ordinances before discharging an anti-freeze solution overboard.

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

1. Close ball valve.
2. Disconnect water line at ball valve.
3. Insert line into a bucket of potable anti-freeze.
4. Run air conditioner until a solid stream of anti-freeze is being discharged overboard.
5. Reconnect water line at ball valve.

Follow the procedures detailed in sections 3.1 and 3.2 when starting the SeaMach™ unit after winterizing the system.

## **B. Boat is out of water in dry dock.**

With the boat out of the water:

1. Open the seacock to permit all the water to drain out of system via the thru-hull fitting.
2. Remove and empty the sea water strainer basin.
3. Loosen the screws on the pump head to allow the water to drain from the pump and from the water line between the pump and strainer.

Prior to launching the boat in the spring, replace the screws on the pump head.

Follow the procedures detailed in sections 3.1 and 3.2 when starting the SeaMach™ unit after winterizing the system.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Chapter 7 – Troubleshooting

### 7.1 Troubleshooting Guide

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
The unit does not operate.	1. Power supply problem.	1. Check voltage at power supply. Check wiring to unit and external breakers or fuses.
	2. Tripped breaker/disconnect.	2. Check circuit protection devices for continuity.
	3. Thermostat	3. Setpoint may be too high if in cooling mode or too low if in heating mode; check unit and reset. Thermostat may be out of calibration or otherwise defective. Also check for loose connection(s).
Blower runs but compressor does not start.	1. Power supply problem.	1. Check voltage at power supply. Voltage at unit must be + 10% of rated nameplate voltage.
	2. Thermostat	2. Check the thermostat and unit for loose wires. Secure any loose connection. Check location of sensor and make sure that it does not touch the indoor coil. The sensor and/or thermostat should be replaced if defective.
	3. Safety switches are tripping out unit.	3. Check for water flow. Check refrigerant charge. Check switches for loose wire connection, broken or burned contacts.
	4. Loose or defective wires.	4. Tug on wires to see if they will separate from their connections. Replace terminals if they are loose or weak.
	5. Compressor	5. Check for electrical shorts, ground and open circuits. Replace compressor if defective. If electrical checks are ok, install a start capacitor and direct wire to see if the compressor will start. If this fails, remove and replace the compressor.
	6. Refrigerant leakage or loss.	6. Locate leak(s), reclaim, repair, evacuate and recharge unit with refrigerant.
	7. Control board	7. Verify that power is being provided from the control board. Replace control board if defective.
	8. Compressor Run Capacitor	8. Verify capacitance, check for electrical shorts and ground. If defective, replace.
Compressor runs, but blower will not run.	1. Blower motor capacitor	1. Verify capacitance, check for electrical shorts and ground. If defective, replace.
	2. Blower motor.	2. Check for electrical shorts, ground and open circuits. Replace blower motor if it is defective.
	3. Power supply problem.	3. Check voltage at power supply. Voltage at unit must be + 10% of rated nameplate voltage.
	4. Control board	4. Verify that power is being provided from the control board. Replace control board if it is defective.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
Unit provides insufficient cooling.	1. Restriction in water system.	1. Strainer or thru-hull fitting are clogged. Clean and check for water flow. Make sure seacock (ball valve) is open.
	2. Water pump.	2. Check for electrical shorts, ground and open circuits. Replace water pump if it is defective. Replace water pump if it is undersized.
	3. Air filter.	3. Clean or replace the air filter if it is dirty.
	4. Indoor coil.	4. The indoor coil may require cleaning if the unit was operated without a filter.
	5. Ice on indoor coil.	5. Thermostat setting is too low. Shut down unit until ice has melted and restart at a higher temperature setting.
	6. Unit is undersized	6. Check if the unit is undersized for the load. Replace with larger unit or add additional unit(s) if necessary.
	7. Low refrigerant	7. Add refrigerant
Unit provides insufficient heating.	1. Restriction in water system.	1. Strainer or thru-hull fitting are clogged. Clean and check for water flow. Make sure seacock (ball valve) is open.
	2. Water pump.	2. Check for electrical shorts, ground and open circuits. Replace water pump if it is defective or undersized.
	3. Air filter.	3. Clean or replace the air filter if it is dirty.
	4. Indoor coil.	4. The indoor coil may require cleaning if the unit was operated without a filter.
	5. Unit is undersized.	5. Check if the unit is undersized for the load. Replace with larger unit or add additional unit(s) if necessary.
	6. Water temperature.	6. Check water inlet temperature using a thermometer. The inlet water temperature should never be below 50°F.
	7. Reversing valve.	7. Check for power to the solenoid coil, verify that the coil is functional. If the unit still does not switch to heating, replace the reversing valve, evacuate and recharge the unit.
	8. Low refrigerant	8. Add refrigerant

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

<b>PROBLEM/SYMPTOM</b>	<b>LIKELY CAUSE(S)</b>	<b>CORRECTION</b>
Noise operation.	<ol style="list-style-type: none"> <li>1. Copper tubing is vibrating.</li> <li>2. Indoor blower assembly.</li> <li>3. Loose cabinet or components.</li> <li>4. Improper unit installation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust by bending slightly to a more stable position. Separate any tubing that is making contact with other tubing or components.</li> <li>2. If blower wheel is hitting housing, adjust the wheel position in the housing. Replace blower motor or assembly if the bearing(s) are defective.</li> <li>3. Check and tighten loose screws.</li> <li>4. Make sure unit is level and secure to deck.</li> </ol>
Water is leaking from unit.	<ol style="list-style-type: none"> <li>1. Condensate pan.</li> <li>2. Condensate drain line or pump.</li> <li>3. Loose fittings or connections.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for leaks and repair as required.</li> <li>2. Check for leaks and repair as required.</li> <li>3. Tighten fittings and connections. Check the condensate drain line for leaks.</li> </ol>
Electrical shock at unit.	<ol style="list-style-type: none"> <li>1. Electrical component is shorted to ground.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check control board, blower motor, compressor and pumps with an ohmmeter or high potential tester. Determine what is grounded and replace or rewire.</li> <li>2. Line trip is too sensitive</li> </ol>

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

## **Alarm Screens – MachAir™ OLED only**

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
Low Voltage	1. Insufficient power to unit.	1. Check power supply to the unit.
Int. Air Sensor	1. The internal air sensor in the display is defective.	1. Replace display. Contact Marvair or your local SeaMach representative.
Sensor OPT	1. The optional remote sensor is not connected. 2. Internal sensor was selected in the programming mode, but a remote sensor is not installed. 3. Remote sensor is not properly connected. 4. Remote sensor is defective.	1. Install the remote sensor. 2. Change OPT to INT in the air sensor SET UP. 3. Connect remote sensor properly. 4. Replace sensor. Contact Marvair or your local SeaMach representative.
LPS (low refrigerant pressure) in cooling mode or HPS (high refrigerant pressure) in heating mode	1. Blocked or severely restricted air flow. 2. Improper refrigerant charge	1. Clean filter, open any closed grilles and checked for kinks in duct work. 2. Contact Marvair or your local SeaMach representative.
LPS (low refrigerant pressure) in heating mode or HPS (high refrigerant pressure) in cooling mode	1. Inadequate water flow 2. Defective pump	1. Check strainer. Clean if necessary. Check for kinked water lines. Make sure the pump is primed. 2. Replace pump
Coil Sensor	1. Frost sensor not properly installed. 2. Defective frost sensor	1. Properly attach the frost sensor. 2. Replace the frost sensor.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Chapter 8 – Spare Parts List

### 8.1 SeaMach™ Parts List

#### THERMOSTAT PARTS LIST

	DESCRIPTION	SPBxxRCB	SPBxxRCA	SPBxxRCF
		SCBxxRCB	SCBxxRCA	SCBxxRCF
<b>MACHAIR™ 1</b>	Control Board	80525	80525	80525
	Display, Black	80527	80527	80527
	Display, White	80528	80528	80528
	Display, Beige with Cover	80529	80529	80529
	Display, Manual	---	---	---
	Display Cable, 15 Ft.	80526	80526	80526
	Air Sensor	70347	70347	70347
<b>MACHAIR™ OLED</b>	Control Board	80505	80506	80506
	Display	80518	80518	80518
	Frost Sensor	70331	70331	70331
	Remote Mount Temperature Sensor and 20 Ft. Cable	80510	80510	80510

#### REPLACEMENT PARTS LIST - SPBxxRCB

ITEM	DESCRIPTION	SPB05RCBL	SPB07RCBR SPB07RCBL	SPB10RCBR SPB10RCBL	SPB12RCBR SPB12RCBL	SPB16RCBL SPB16RCBL	SPB18RCBR SPB18RCBL
1	Compressor	10257	10239	10012	10067	10229	10256
2	Capacitor, Compressor	50296	50296	50265	50265	50265	50315
3	Motor Protector, Compressor Texas Instruments P/N		MRA5731-114	MRA4761-114	MRA4760-114	MRA4759-117	Internal
4	Indoor Coil, R.H. Unit	n/a	60087	60088	60089	60090	60090
	Indoor Coil, L.H. Unit	60127	60119	60121	60122	60123	60123
5	Motor/Blower Assembly, Standard	30061	30053	30049	30049	30052	30056
	Motor/Blower Assembly, High Static	n/a	30047	n/a	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50308	50308	50301	50301	50298	50298
	Capacitor, Blower Motor, High Static	n/a	50303	n/a	n/a	n/a	n/a
7	Distributor, with Screen	None	20276	20276	20275	20275	20294
8	Tube, Capillary (Qty)	81224	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)	80950 (Three)
9	Heat Exchanger	60126	60091	60092	60092	60092	60092
10	Valve, Reversing	20279A	20279A	20280A	20280A	20280A	20280A
11	Coil, Reversing Valve	20278A	20278A	20278A	20278A	20278A	20278A
12	Switch, High Pressure	70080	70080	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047	70047	70047
14	Plenum, Adapter Ring	None	01316	01317	01317	01317	01317
15	Hose Adapter, Blower (Optional)	None	90134 (5")	90135 (6")	90135 (6")	90136 (7")	90136 (7")
16	Filter, Return Air		81291	81289	81289	81288	81288

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## REPLACEMENT PARTS LIST - SPBxxRCA

ITEM	DESCRIPTION	SPB07RCAR	SPB10RCAR	SPB12RCAR	SPB16RCAL	SPB18RCAR	SPB24RCAR
		SPB07RCAL	SPB10RCAL	SPB12RCAL	SPB16RCAL	SPB18RCAL	SPB24RCAL
1	Compressor	51450	10081	10082	10228	10007	10223
2	Capacitor, Compressor	50306	50306	50265	50265	50265	50280
3	Motor Protector, Compressor Texas Instruments P/N	MRA5472-114	MRA4765-114		MRA4763-114		Internal
4	Indoor Coil, R.H. Unit	60087	60088	60089	60090	60090	60118
	Indoor Coil, L.H. Unit	60119	60121	60122	60123	60123	60124
5	Motor/Blower Assembly, Standard	30054	30048	30048	30051	30057	30059
	Motor/Blower Assembly, High Static	30046	n/a	n/a	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50307	50299	50299	50297	50297	
	Capacitor, Blower Motor, High Static	50302	n/a	n/a	n/a	n/a	n/a
7	Distributor, with Screen (Qty)	20276	20276	20275	20275	20294	20275 (Two)
8	Tube, Capillary (Qty)	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)	80950 (Three)	81032 (Six)
9	Heat Exchanger	60091	60092	60092	60092	60092	60117
10	Valve, Reversing	20279A	20280A	20280A	20280A	20280A	20220A
11	Coil, Reversing Valve	50232A	50232A	50232A	50232A	50232A	50232A
12	Switch, High Pressure	70080	70080	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047	70047	70047
14	Plenum, Adapter Ring	01316	01317	01317	01317	01317	01317
15	Hose Adapter, Blower (Optional)	90134 (5")	90135 (6")	90135 (6")	90136 (7")	90136 (7")	90136 (7")
16	Filter, Return Air	81291	81289	81289	81288	81288	81288

## REPLACEMENT PARTS LIST - SCBxxRCB

ITEM	DESCRIPTION	SCB07RCBR	SCB10RCBR	SCB12RCBR	SCB16RCBL
		SCB07RCBL	SCB10RCBL	SCB12RCBL	SCB16RCBL
1	Compressor	10247	10250	10248	10249
2	Capacitor, Compressor	50296	50296	50265	50265
3	Motor Protector, Compressor Texas Instruments P/N	MRA5731-114	MRA5723-114	MRA5784-113	MRA4759-117
4	Indoor Coil, R.H. Unit	60087	60088	60089	60090
	Indoor Coil, L.H. Unit	60119	60121	60122	60123
5	Motor/Blower Assembly, Standard	30053	30049	30049	30052
	Motor/Blower Assembly, High Static	30047	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50308	50301	50301	50298
	Capacitor, Blower Motor, High Static	50303	n/a	n/a	n/a
7	Distributor, with Screen	20276	20276	20275	20275
8	Tube, Capillary (Qty)	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)
9	Heat Exchanger	60091	60092	60092	60092
10	Valve, Reversing	20279A	20280A	20280A	20280A
11	Coil, Reversing Valve	20278A	20278A	20278A	20278A
12	Switch, High Pressure	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047
14	Plenum, Adapter Ring	01316	01317	01317	01317
15	Hose Adapter, Blower (Optional)	90134 (5")	90135 (6")	90135 (6")	90136 (7")
16	Filter, Return Air	81291	81289	81289	81288

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## REPLACEMENT PARTS LIST - SCBxxRCF

ITEM	DESCRIPTION	SCB07RCFR SCB07RCFL	SCB10RCFR SCB10RCFL	SCB12RCFR SCB12RCFL	SCB16RCFL SCB16RCFL
1	Compressor	10245	10246	10243	10244
2	Capacitor, Compressor	50265	50265	50265	50265
3	Motor Protector, Compressor Texas Instruments P/N	MSP28APW-114	MRA1723-114	MST16AHZ-112	MST16AHW-112
4	Indoor Coil, R.H. Unit	60087	60088	60089	60090
	Indoor Coil, L.H. Unit	60119	60121	60122	60123
5	Motor/Blower Assembly, Standard	30054	30048	30048	30051
	Motor/Blower Assembly, High Static	30046	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50307	50299	50299	50297
	Capacitor, Blower Motor, High Static	50302	n/a	n/a	n/a
7	Distributor, with Screen (Qty)	20276	20276	20275	20275
8	Tube, Capillary (Qty)	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)
9	Heat Exchanger	60091	60092	60092	60092
10	Valve, Reversing	20279A	20280A	20280A	20280A
11	Coil, Reversing Valve	50232A	50232A	50232A	50232A
12	Switch, High Pressure	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047
14	Plenum, Adapter Ring	01316	01317	01317	01317
15	Hose Adapter, Blower (Optional)	90134 (5")	90135 (6")	90135 (6")	90136 (7")
16	Filter, Return Air	81291	81289	81289	81288

## REPLACEMENT PARTS LIST - SPMxxRCB

ITEM	DESCRIPTION	SPM05RCBL	SPM07RCBR SPM07RCBL	SPM10RCBR SPM10RCBL	SPM12RCBR SPM12RCBL	SPM16RCBL SPM16RCBL	SPM18RCBR SPM18RCBL
1	Compressor	10257	10239	10012	10067	10229	10256
2	Capacitor, Compressor	50296	50296	50265	50265	50265	50315
3	Motor Protector, Compressor Texas Instruments P/N		MRA5731-114	MRA4761-114	MRA4760-114	MRA4759-117	Internal
4	Indoor Coil, R.H. Unit	n/a	60087	60088	60089	60090	60090
	Indoor Coil, L.H. Unit	60127	60119	60121	60122	60123	60123
5	Motor/Blower Assembly, Standard	30061	30053	30049	30049	30052	30056
	Motor/Blower Assembly, High Static	n/a	30047	n/a	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50308	50308	50301	50301	50298	50298
	Capacitor, Blower Motor, High Static	n/a	50303	n/a	n/a	n/a	n/a
7	Distributor, with Screen	None	20276	20276	20275	20275	20294
8	Tube, Capillary (Qty)	81224	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)	80950 (Three)
9	Heat Exchanger	60126	60091	60092	60092	60092	60092
10	Valve, Reversing	20279A	20279A	20280A	20280A	20280A	20280A
11	Coil, Reversing Valve	20278A	20278A	20278A	20278A	20278A	20278A
12	Switch, High Pressure	70080	70080	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047	70047	70047
14	Plenum, Adapter Ring	None	01316	01317	01317	01317	01317
15	Hose Adapter, Blower (Optional)	None	90134 (5")	90135 (6")	90135 (6")	90136 (7")	90136 (7")
16	Transformer, 40 VA	50203	50203	50203	50203	50203	50203
17	Contact, Compressor and Pump	50104	50104	50104	50104	50104	50104
18	Relay, Indoor Blower	50023	50023	50023	50023	50023	50023
19	Terminal Block (Qty)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)
20	Ground Lug	80271	80271	80271	80271	80271	80271
21	Thermostat, Heat Pump, ICM	50121	50121	50121	50121	50121	50121
22	Filter, Return Air		81291	81289	81289	81288	81288

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## REPLACEMENT PARTS LIST - SPMxxRCA

ITEM	DESCRIPTION	SPM07RCAR	SPM10RCAR	SPM12RCAR	SPM16RCAL	SPM18RCAR	SPM24RCAR
		SPM07RCAL	SPM10RCAL	SPM12RCAL	SPM16RCAL	SPM18RCAL	SPM24RCAL
1	Compressor	51450	10081	10082	10228	10007	10223
2	Capacitor, Compressor	50306	50306	50265	50265	50265	50280
3	Motor Protector, Compressor Texas Instruments P/N	MRA5472-114	MRA4765-114		MRA4763-114		Internal
4	Indoor Coil, R.H. Unit	60087	60088	60089	60090	60090	60118
	Indoor Coil, L.H. Unit	60119	60121	60122	60123	60123	60124
5	Motor/Blower Assembly, Standard	30054	30048	30048	30051	30057	30059
	Motor/Blower Assembly, High Static	30046	n/a	n/a	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50307	50299	50299	50297	50297	
	Capacitor, Blower Motor, High Static	50302	n/a	n/a	n/a	n/a	n/a
7	Distributor, with Screen	20276	20276	20275	20275	20294	20275 (Two)
8	Tube, Capillary (Qty)	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)	80950 (Three)	81032 (Six)
9	Heat Exchanger	60091	60092	60092	60092	60092	60117
10	Valve, Reversing	20279A	20280A	20280A	20280A	20280A	20220A
11	Coil, Reversing Valve	50232A	50232A	50232A	50232A	50232A	50232A
12	Switch, High Pressure	70080	70080	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047	70047	70047
14	Plenum, Adapter Ring	01316	01317	01317	01317	01317	01317
15	Hose Adapter, Blower (Optional)	90134 (5")	90135 (6")	90135 (6")	90136 (7")	90136 (7")	90136 (7")
16	Transformer, 40 VA	50203	50203	50203	50203	50203	50203
17	Relay, Compressor and Pump	50023	50023	50023	50023	50023	50023
18	Relay, Indoor Blower	50023	50023	50023	50023	50023	50023
19	Terminal Block (Qty)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)
20	Ground Lug	80271	80271	80271	80271	80271	80271
21	Thermostat, Heat Pump, ICM	50121	50121	50121	50121	50121	50121
22	Filter, Return Air	81291	81289	81289	81288	81288	81288

## REPLACEMENT PARTS LIST - SCMxxRCF

ITEM	DESCRIPTION	SCM07RCFR	SCM10RCFR	SCM12RCFR	SCM16RCFL
		SCM07RCFL	SCM10RCFL	SCM12RCFL	SCM16RCFL
1	Compressor	10245	10246	10243	10244
2	Capacitor, Compressor	50265	50265	50265	50265
3	Motor Protector, Compressor Texas Instruments P/N	MSP28APW-114	MRA1723-114	MST16AHZ-112	MST16AHW-112
4	Indoor Coil, R.H. Unit	60087	60088	60089	60090
	Indoor Coil, L.H. Unit	60119	60121	60122	60123
5	Motor/Blower Assembly, Standard	30054	30048	30048	30051
	Motor/Blower Assembly, High Static	30046	n/a	n/a	n/a
6	Capacitor, Blower Motor, Standard	50307	50299	50299	50297
	Capacitor, Blower Motor, High Static	50302	n/a	n/a	n/a
7	Distributor, with Screen	20276	20276	20275	20275
8	Tube, Capillary (Qty)	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)
9	Heat Exchanger	60091	60092	60092	60092
10	Valve, Reversing	20279A	20280A	20280A	20280A
11	Coil, Reversing Valve	50232A	50232A	50232A	50232A
12	Switch, High Pressure	70080	70080	70080	70080
13	Switch, Low Pressure	70047	70047	70047	70047
14	Plenum, Adapter Ring	01316	01317	01317	01317
15	Hose Adapter, Blower (Optional)	90134 (5")	90135 (6")	90135 (6")	90136 (7")
16	Transformer, 40 VA	50203	50203	50203	50203
17	Relay, Compressor and Pump	50023	50023	50023	50023
18	Relay, Indoor Blower	50023	50023	50023	50023
19	Terminal Block (Qty)	80812 (Two)	80812 (Two)	80812 (Two)	80812 (Two)
20	Ground Lug	80271	80271	80271	80271
21	Thermostat, Heat Pump, ICM	50121	50121	50121	50121
22	Filter, Return Air	81291	81289	81289	81288

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## REPLACEMENT PARTS LIST - DEAHxxRCBR

ITEM	DESCRIPTION		DEAH07RCB	DEAH10RCB	DEAH12RCB	DEAH16RCB	DEAH18RCB
1	Indoor Coil	RH Unit Application	60087	60088	60089	60090	60090
2	Distributor with Screen		20276	20276	20275	20275	20294
3	Capillary Tube		81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)	80950 (Three)
4	Indoor Motor/Blower Assembly		30053	30049	30049	30052	30056
5	Capacitor, Indoor Motor		50308	50301	50301	50298	50298
6	Valve, Shutoff, Discharge Line		20308	20308	20308	20308	20308
7	Valve, Shutoff, Suction Line		20309	20309	20309	20310	20310
8	Plenum Adapter Ring		01316	01317	01317	01317	01317
9	Hose Adapter		90134	90135	90135	90136	90136
10	Frost Sensor (50 Ft, Power First)		70357	70357	70357	70357	70357
11	Filter	Standard	81291	81288	81288	81289	81289
		High Filtration	91918	91919	91919	91920	91920

## REPLACEMENT PARTS LIST - DEAHxxRCA

ITEM	DESCRIPTION		DEAH05RCA	DEAH07RCA	DEAH10RCA	DEAH12RCA	DEAH16RCA	DEAH18RCA	DEAH24RCA
1	Indoor Coil	RH Unit Application		60087	60088	60089	60090	60090	60118
		LH Unit Application	60144						
2	Distributor with Screen		None	20276	20276	20275	20275	20294	20333
3	Capillary Tube		81224	81032 (Two)	81224 (Two)	81032 (Three)	81224 (Three)	80950 (Three)	81032 (Six)
4	Indoor Motor/Blower Assembly		30062	30054	30048	30048	30051	30057	30059
5	Capacitor, Indoor Motor		None	50307	50299	50299	50297	50297	50302
6	Valve, Shutoff, Discharge Line		20308	20308	20308	20308	20308	20308	20309
7	Valve, Shutoff, Suction Line		20309	20309	20309	20309	20310	20310	20332
8	Plenum Adapter Ring		n/a	01316	01317	01317	01317	01317	n/a
9	Hose Adapter		n/a	90134	90135	90135	90136	90136	n/a
10	Hose Ring, Flat Oval 8"		n/a	n/a	n/a	n/a	n/a	n/a	91568
11	Frost Sensor (50 Ft, Power First)		70357	70357	70357	70357	70357	70357	70357
12	Filter	Standard	91916	81291	81288	81288	81289	81289	91922
		High Filtration	91917	91918	91919	91919	91920	91920	91921

## REPLACEMENT PARTS LIST - CPBxxRCBN

ITEM	DESCRIPTION		CPB07RCBN	CPB10RCBN	CPB12RCBN	CPB16RCBN	CPB18RCBN
1	Compressor		10239	10012	10067	10008	10256
2	Capacitor, Compressor		50296	50265	50265	50265	50315
3	Heat Exchanger		60091	60092	60092	60092	60092
4	Valve, Reversing		20279A	20280A	20280A	20280A	20280A
5	Coil, Reversing Valve		20278A	20278A	20278A	20278A	20278A
6	Valve, Shutoff, Discharge Line		20308	20308	20308	20308	20308
7	Valve, Shutoff, Suction Line		20309	20309	20309	20310	20310
8	Switch, High Pressure		70080	70080	70080	70080	70080
9	Switch, Low Pressure		70047	70047	70047	70047	70047
10	Accumulator		70430	70430	70430	70430	70430
11	Receiver		70429	70429	70429	70429	70429
12	Control Board, Micro Air		80525	80525	80525	80525	80525
	Control Board, Power First		80505	80505	80505	80505	80505
13	Display, Micro Air, Black		80527	80527	80527	80527	80527
	Display, Micro Air, White		80528	80528	80528	80528	80528
	Display, Micro Air, Designer		80529	80529	80529	80529	80529
	Display, Power First, Programmable		80518	80518	80518	80518	80518
	Display, Power First, Manual		80519	80519	80519	80519	80519
14	Cover Plate, Power First Display		01384	01384	01384	01384	01384
15	Frame Support, Power First Display		91862	91862	91862	91862	91862
16	Display Cable, Micro Air		80526	80526	80526	80526	80526
	Display Cable, Power First		80510	80510	80510	80510	80510

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## REPLACEMENT PARTS LIST - CPMxxRCBN

ITEM	DESCRIPTION	CPM07RCBN	CPM10RCBN	CPM12RCN	CPM16RCB	CPM18RCB
1	Compressor	10239	10012	10067	10008	10256
2	Capacitor, Compressor	50296	50265	50265	50265	50315
3	Heat Exchanger	60091	60092	60092	60092	60092
4	Valve, Reversing	20279A	20280A	20280A	20280A	20280A
5	Coil, Reversing Valve	50225A	50225A	50225A	50225A	50225A
6	Valve, Shutoff, Discharge Line	20308	20308	20308	20308	20308
7	Valve, Shutoff, Suction Line	20309	20309	20309	20310	20310
8	Switch, High Pressure	70080	70080	70080	70080	70080
9	Switch, Low Pressure	70047	70047	70047	70047	70047
10	Accumulator	70430	70430	70430	70430	70430
11	Receiver	70429	70429	70429	70429	70429
12	Transformer	50203	50203	50203	50203	50203
13	Contactora, Compressor/Pump	50104	50104	50104	50104	50104
14	Relay, Indoor Blower	50023	50023	50023	50023	50023
15	Thermostat	50121	50121	50121	50121	50121

## REPLACEMENT PARTS LIST - CPBxxRCAN

ITEM	DESCRIPTION	CPB05RCAN	CPB07RCAN	CPB10RCAN	CPB12RCAN	CPB16RCAN	CPB18RCAN	CPB24RCAN
1	Compressor	10297	51450	10081	10082	10228	10007	10223
2	Capacitor, Compressor	50240	50306	50306	50265	50265	50265	50280
3	Heat Exchanger	60091	60091	60092	60092	60092	60092	60117
4	Valve, Reversing	20279A	20279A	20280A	20280A	20280A	20280A	20220A
5	Coil, Reversing Valve	50232A	50232A	50232A	50232A	50232A	50232A	50232A
6	Valve, Shutoff, Discharge Line	20308	20308	20308	20308	20308	20308	20309
7	Valve, Shutoff, Suction Line	20309	20309	20309	20309	20310	20310	20332
8	Switch, High Pressure	70080	70080	70080	70080	70080	70080	70080
9	Switch, Low Pressure	70047	70047	70047	70047	70047	70047	70047
10	Accumulator	70430	70430	70430	70430	70430	70430	70430
11	Receiver	70429	70429	70429	70429	70429	70429	70429
12	Control Board, Micro Air	80525	80525	80525	80525	80525	80525	80525
	Control Board, Power First	80506	80506	80506	80506	80506	80506	80506
	Display, Micro Air, Black	80527	80527	80527	80527	80527	80527	80527
	Display, Micro Air, White	80528	80528	80528	80528	80528	80528	80528
13	Display, Micro Air, Designer	80529	80529	80529	80529	80529	80529	80529
	Display, Power First, Programmable	80518	80518	80518	80518	80518	80518	80518
	Display, Power First, Manual	80519	80519	80519	80519	80519	80519	80519
14	Cover Plate, Power First Display	01384	01384	01384	01384	01384	01384	01384
15	Frame Support, Power First Display	91862	91862	91862	91862	91862	91862	91862
16	Display Cable, Micro Air	80526	80526	80526	80526	80526	80526	80526
	Display Cable, Power First	80510	80510	80510	80510	80510	80510	80510

## REPLACEMENT PARTS LIST - CPMxxRCAN

ITEM	DESCRIPTION	CPM05RCAN	CPM07RCAN	CPM10RCAN	CPM12RCAN	CPM16RCAN	CPM18RCAN	CPM24RCAN
1	Compressor	10297	51450	10081	10082	10228	10007	10223
2	Capacitor, Compressor	50240	50306	50306	50265	50265	50265	50280
3	Heat Exchanger	60091	60091	60092	60092	60092	60092	60117
4	Valve, Reversing	20279A	20279A	20280A	20280A	20280A	20280A	20220A
5	Coil, Reversing Valve	50225A	50225A	50225A	50225A	50225A	50225A	50225A
6	Valve, Shutoff, Discharge Line	20308	20308	20308	20308	20308	20308	20309
7	Valve, Shutoff, Suction Line	20309	20309	20309	20309	20310	20310	20332
8	Switch, High Pressure	70080	70080	70080	70080	70080	70080	70080
9	Switch, Low Pressure	70047	70047	70047	70047	70047	70047	70047
10	Accumulator	70430	70430	70430	70430	70430	70430	70430
11	Receiver	70429	70429	70429	70429	70429	70429	70429
12	Transformer	50203	50203	50203	50203	50203	50203	50203
13	Relay, Compressor/Pump	50023	50023	50023	50023	50023	50023	50023
14	Relay, Indoor Blower	50023	50023	50023	50023	50023	50023	50023
15	Thermostat	50121	50121	50121	50121	50121	50121	50121

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## REPLACEMENT PARTS LIST - CCBxxRCFN

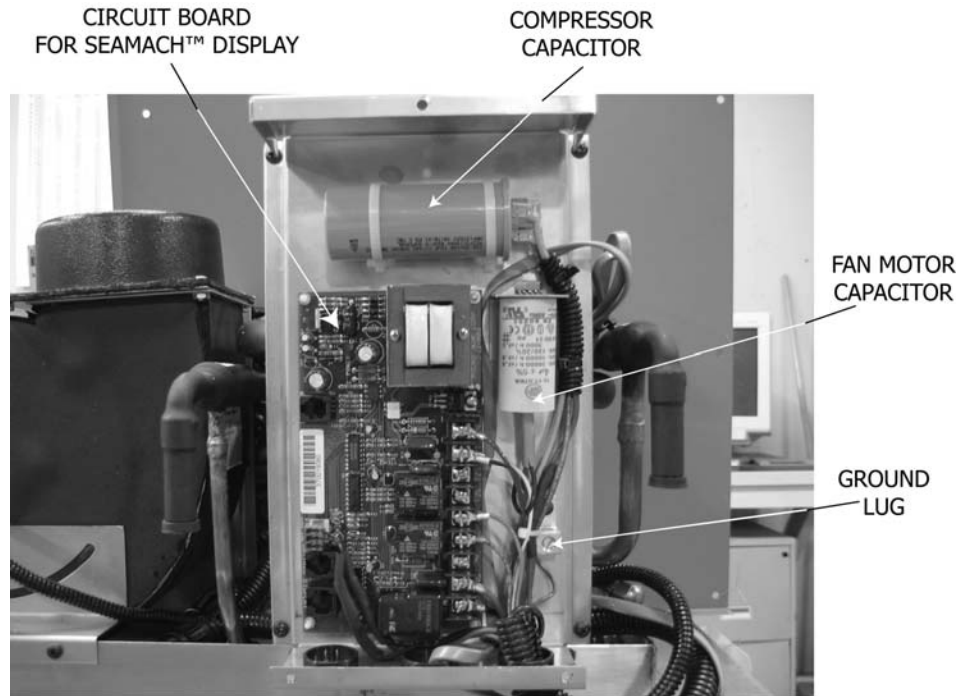
ITEM	DESCRIPTION	CCB07RCFN	CCB10RCFN	CCB12RCFN	CCB16RCFN	CCB18RCFN	CCB24RCFN
1	Compressor	10245	10246	10243	10244	10244	10292
2	Capacitor, Compressor	50265	50265	50265	50265	50265	50321
3	Heat Exchanger	60091	60092	60092	60092	60092	60117
4	Valve, Reversing	20279A	20280A	20280A	20280A	20280A	20220A
5	Coil, Reversing Valve	50232A	50232A	50232A	50232A	50232A	50232A
6	Valve, Shutoff, Discharge Line	20308	20308	20308	20308	20308	20309
7	Valve, Shutoff, Suction Line	20309	20309	20309	20310	20310	20332
8	Switch, High Pressure	70080	70080	70080	70080	70080	70080
9	Switch, Low Pressure	70047	70047	70047	70047	70047	70047
10	Accumulator	70430	70430	70430	70430	70430	70430
11	Receiver	70429	70429	70429	70429	70429	70429
12	Control Board, Micro Air	80525	80525	80525	80525	80525	80525
	Control Board, Power First	80506	80506	80506	80506	80506	80506
13	Display, Micro Air, Black	80527	80527	80527	80527	80527	80527
	Display, Micro Air, White	80528	80528	80528	80528	80528	80528
	Display, Micro Air, Designer	80529	80529	80529	80529	80529	80529
	Display, Power First, Programmable	80518	80518	80518	80518	80518	80518
	Display, Power First, Manual	80519	80519	80519	80519	80519	80519
14	Cover Plate, Power First Display	01384	01384	01384	01384	01384	01384
15	Frame Support, Power First Display	91862	91862	91862	91862	91862	91862
16	Display Cable, Micro Air	80526	80526	80526	80526	80526	80526
	Display Cable, Power First	80510	80510	80510	80510	80510	80510

## REPLACEMENT PARTS LIST - CCMxxRCFN

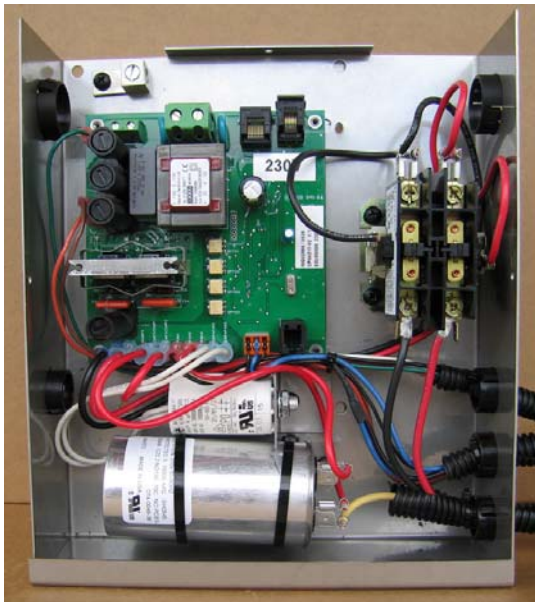
ITEM	DESCRIPTION	CCM07RCFN	CCM10RCFN	CCM12RCFN	CCM16RCFN	CCM18RCFN	CCM24RCFN
1	Compressor	10245	10246	10243	10244	10244	10292
2	Capacitor, Compressor	50265	50265	50265	50265	50265	50321
3	Heat Exchanger	60091	60092	60092	60092	60092	60117
4	Valve, Reversing	20279A	20280A	20280A	20280A	20280A	20220A
5	Coil, Reversing Valve	50225A	50225A	50225A	50225A	50225A	50225A
6	Valve, Shutoff, Discharge Line	20308	20308	20308	20308	20308	20309
7	Valve, Shutoff, Suction Line	20309	20309	20309	20310	20310	20332
8	Switch, High Pressure	70080	70080	70080	70080	70080	70080
9	Switch, Low Pressure	70047	70047	70047	70047	70047	70047
10	Accumulator	70430	70430	70430	70430	70430	70430
11	Receiver	70429	70429	70429	70429	70429	70429
12	Transformer	50203	50203	50203	50203	50203	50203
13	Relay, Compressor/Pump	50023	50023	50023	50023	50023	50023
14	Relay, Indoor Blower	50023	50023	50023	50023	50023	50023
15	Thermostat	50121	50121	50121	50121	50121	50121

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## 8.2 SeaMach™ MachAir™ I Control Box



## SeaMach™ MachAir™ OLED Control Box



For Model 24



For Models 5, 7, 10, 12, 16 & 18.

# **SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners**

## **Chapter 9 - Warranty**

### **Marvair® SeaMach™ Self-Contained and Split Systems Warranty**

#### **Parts**

If any part of your Marvair SeaMach unit fails because of a manufacturing defect within twenty-seven months from the date of original shipment by Marvair or within twenty-four months from the date of original start-up, whichever is the later date, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement part.

In addition, if the air coil fails because of a manufacturing defect within sixty-three months from the date of original shipment by Marvair or within sixty months from the date of original start-up, whichever is the later date, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement coil.

In addition, if any stainless steel component fails because of a manufacturing defect within one hundred twenty three months from the date of original shipment by Marvair or within one hundred twenty months from the date of original start-up, whichever is the later date, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement part.

In addition, if the display or PC board in the SeaMach unit, models SPB or SCB, fails because of a manufacturing defect within thirty-nine months from the date of original shipment by Marvair or within thirty-six months from the date of original start-up, whichever is the later date, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement part.

In addition, if the thermostat used with the SeaMach unit, models SPM or SCM, fails because of a manufacturing defect within fifteen months from the date of original shipment by Marvair or within twelve months from the date of original start-up, whichever is the later date, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement part.

Any incidental supplies, e.g. filters, driers, fuses, are not included. The owner must provide proof of the date of the original start-up. The owner's registration card filed with Marvair, the date of the purchase of the vessel, an invoice, or similar document are examples of proof of the date of the original start-up.

#### **Labor**

If any part of your Marvair SeaMach air conditioner fails because of a manufacturing defect within fifteen months from the date of original shipment by Marvair or within twelve months from the date of original start-up, whichever is the earlier date, Marvair will pay for the related service labor to replace the failed part according to the Marvair labor rate schedule currently in effect. The owner must provide proof of the date of the original start-up. The owner's registration card filed with Marvair, the date of the purchase of the vessel, an invoice, or similar document are examples of proof of the date of the original start-up.

When service is required, it must be performed during normal working hours (8:00 a.m. to 5:00 p.m.) Monday through Friday and must be performed by Marvair personnel or their designated Service Representative.

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

The responsibility of the Owner of the Equipment includes the following:

1. To operate the equipment according to the manufacturer's instructions.
2. To provide easy accessibility for service.
3. To check and reset circuit breaker(s) and disconnect before calling for service. (Circuit breaker(s) may be in the main service panel.)
4. To keep the unit clean and free of dirt.
5. To clean and/or replace the filter as required. (The filter may be located in the return air filter grille or in front of the evaporator coil.)
6. To keep the evaporator coil clean and the condenser coil free of sediment or scale.
7. To pay the charges incurred when any of the above have not been done.
8. To pay for repair or replacement of any material or part other than those within the Marvair unit or thermostat itself.
9. To check any fuses on the circuit board and replace as required.

The owner of the product may ship the allegedly defective or malfunctioning product or part to Marvair, at such owner's expense, and Marvair will diagnose the defect and, if the defect is covered under this warranty, Marvair will honor its warranty and furnish the required replacement part. All costs for shipment and risk of loss during shipment of the product or part to Marvair and back to the owner shall be the responsibility and liability of the owner. Upon request by an owner, Marvair may arrange for remote diagnosis and repair of the allegedly defective or malfunctioning product or part.

An owner requesting performance under this Warranty shall provide reasonable access to the allegedly defective or malfunctioning product to Marvair and its authorized agents and employees.

This warranty does not cover damage caused by improper installation including any refrigerant leaks in the tubing and fittings between the evaporator and condenser sections on split systems; misuse of equipment; negligent servicing; damage due to use of the product for purposes other than those for which it was designed; damage caused by natural disasters, power surges, lightning and submersion; damage caused by unauthorized modifications; and damage caused by improper wiring or power supply to the air conditioner including operating the unit with an undersized generator.

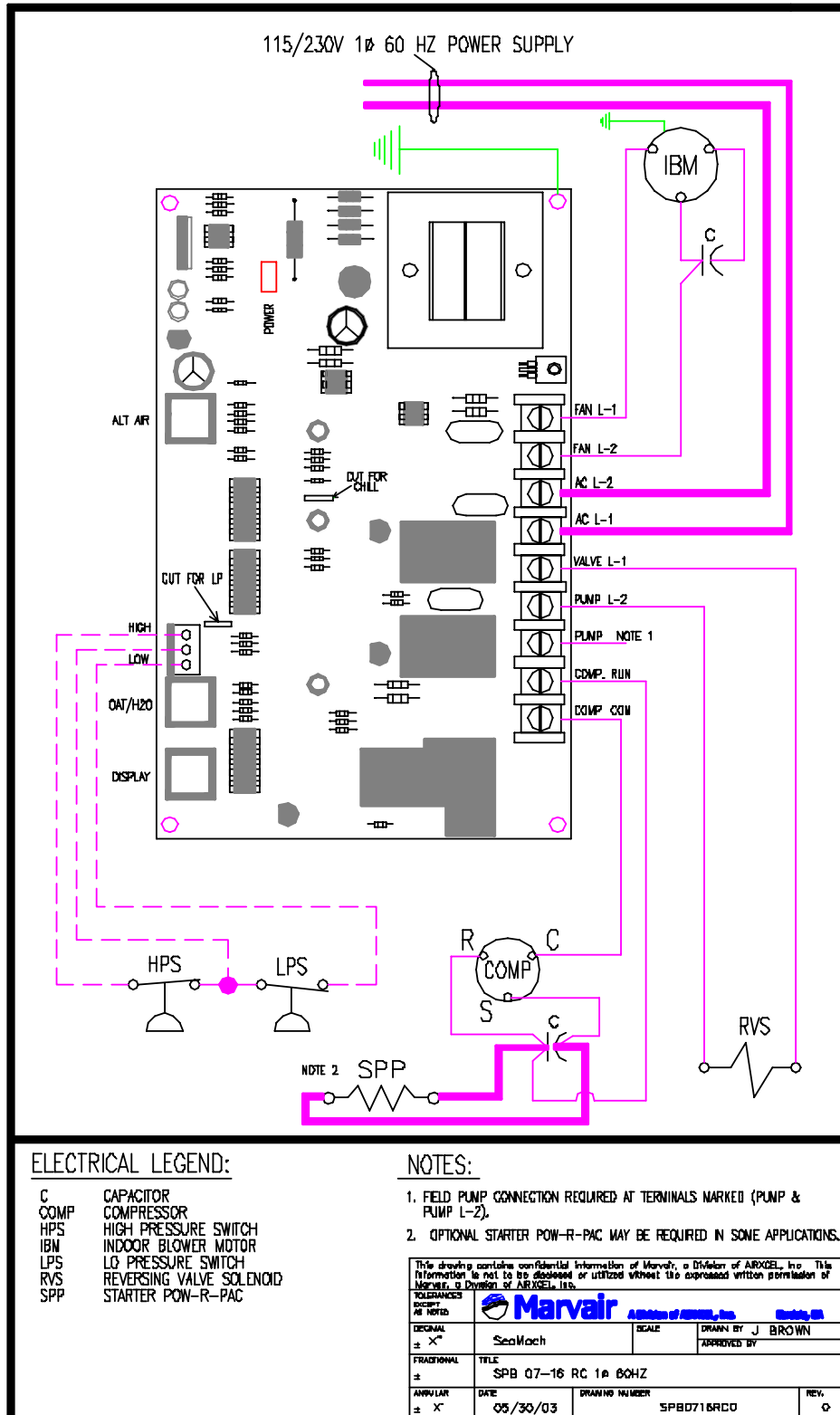
**THIS WARRANTY AND SERVICE POLICY CONSTITUTE THE EXCLUSIVE REMEDY OF ANY PURCHASER OF A MARVAIR REVERSE CYCLE AIR CONDITIONER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE, TO THE FULLEST EXTENT PERMITTED BY LAW. IN NO EVENT SHALL ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE EXCEED THE TERMS OF THE APPLICABLE WARRANTY STATED ABOVE AND MARVAIR SHALL HAVE NO OTHER OBLIGATION OR LIABILITY. IN NO EVENT SHALL MARVAIR BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR MONETARY DAMAGES.**

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE-TO-STATE. Some states do not allow limitations or exclusions, so the above limitations and exclusions may not apply to you.

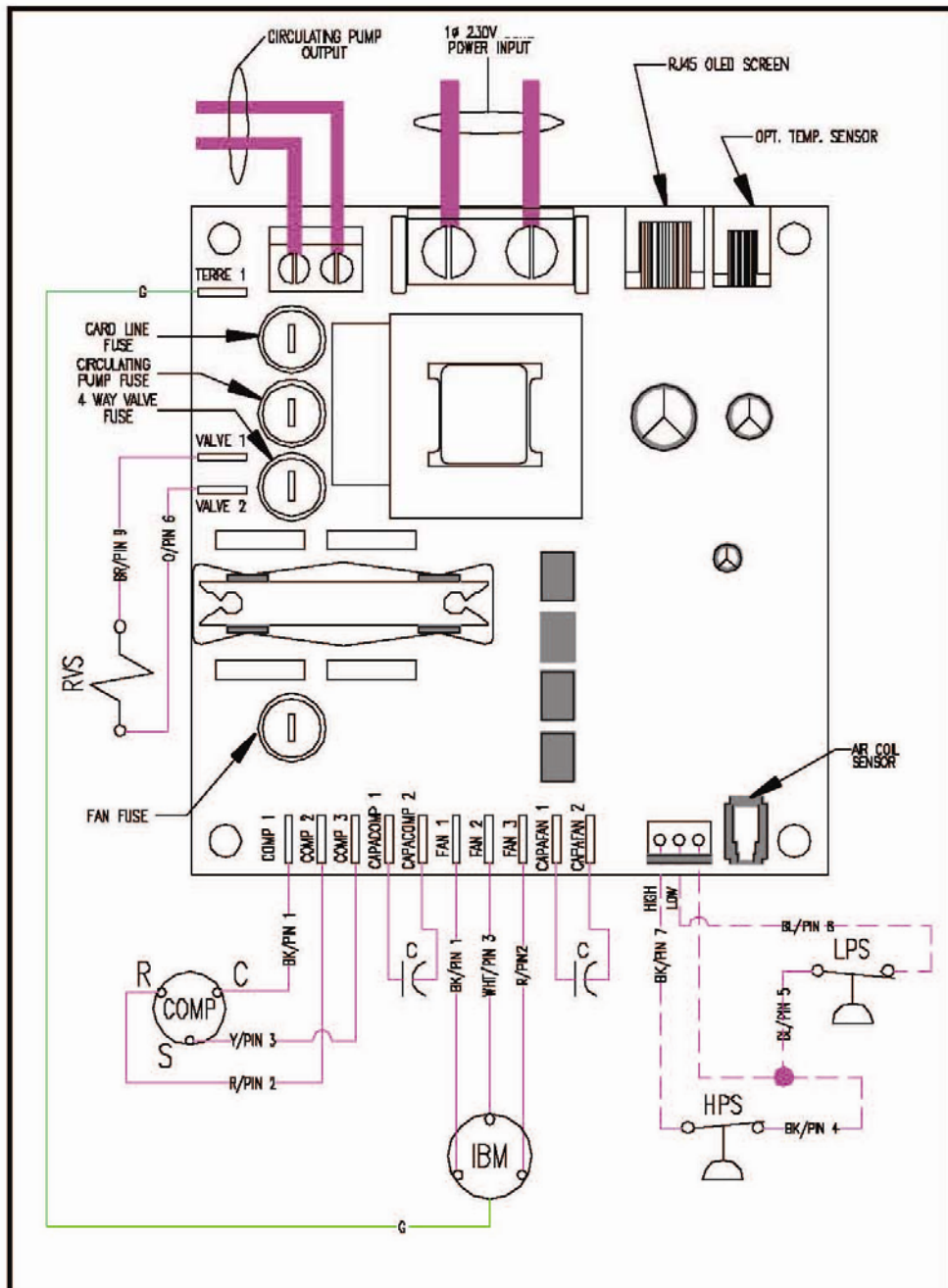
*4/05 Rev. 2*

# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners

## Appendix A – Wiring Schematics



# SeaMach™ Self-Contained and Split System Reverse Cycle Air Conditioners



### ELECTRICAL LEGEND:

- C CAPACITOR
- COMP COMPRESSOR
- HPS HIGH PRESSURE SWITCH
- IBM INDOOR BLOWER MOTOR
- LPS LO PRESSURE SWITCH
- RVS REVERSING VALVE SOLENOID

#### COLOR CODE

- |    |       |     |        |
|----|-------|-----|--------|
| BK | BLACK | O   | ORANGE |
| BL | BLUE  | R   | RED    |
| BR | BROWN | Y   | YELLOW |
| G  | GREEN | WHT | WHITE  |
| GY | GRAY  |     |        |

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TOLERANCES UNLESS NOTED DECIMAL ± X" FRACTIONAL ±	SCALE DRAWN BY J. BROWN APPROVED BY	
TITLE SPB 07-16 RC 1# POWER FIRST		
ANNOTATED ± X"	DATE 06/15/05	DRAWING NUMBER SPB0716RC0-P1
	REV. 0	