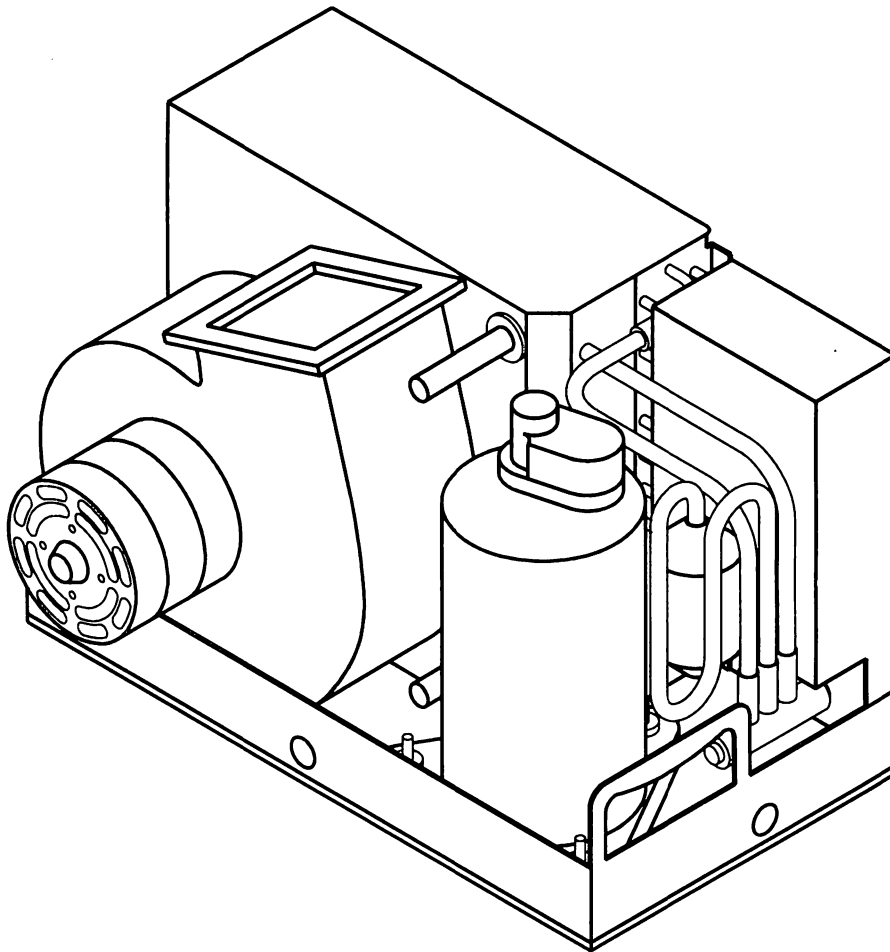


vector compact

INSTALLATION, OPERATION & MAINTENANCE



Patented

MARINE AIR SYSTEMS®
AIR

A Member of



6/99

PREFACE

Congratulations on the purchase of your Marine Air Systems VECTOR COMPACT air conditioner. No matter which of the following features was the reason for your purchase of this air conditioner, we are sure it will meet your needs and will give you many years of efficient and trouble free use. The VECTOR COMPACT units are self-contained direct expansion air conditioners designed for marine applications incorporating the following features:

- Patented compact design with the condenser coil in the evaporator shroud.
- High efficiency rotary (7-16K) or scroll (24K) compressors
- Cupronickel condenser coil
- Raised lance fin designed evaporator coil
- Polyurethane coated 2" deep drain pan with multiple condensate drain locations
- Anti-vibration base pan
- Pre-charged and pre-wired systems for easy connections
- Rotatable insulated blower assembly
- Charge Guard® ensures environmental protection and system integrity

The PASSPORT II microprocessor based digital controller, optional with this unit, offers the most technologically advanced design specifically made for the unique requirements of marine air conditioning. The controller has been designed with flexibility and the following "user friendly" features customers require for their applications:

- Non-volatile memory
- Program lock – prevents accidental program tampering
- Low voltage display panel
- Face plate air sensor for accurate temperature control, or optional remote sensor
- LED cabin temperature displayed in Fahrenheit or Celsius
- Multiple fan speed selections with high and low limits
- User selected programs for optimum control
- Optional outside air temperature sensor
- Compressor pressure failsafe protection and run time hour meter
- Compressor start staging delay for multiple a/c systems
- Moisture mode cycle for humidity control
- De-icing feature to prevent evaporator icing
- Blank display for nighttime operation

This manual is intended to provide the information necessary to ensure proper installation, operation, and maintenance of the unit. Improper installation or misunderstood operating procedures can result in unsatisfactory performance and/or premature failure of these units, so before proceeding ***please read this manual completely.***

The VECTOR COMPACT a/c units are covered under the existing Marine Air Systems' warranty policy contained in this manual. In the interest of product improvement, Marine Air Systems' specifications and design are subject to change without prior notice.

REVISION HISTORY

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CLEAN AIR ACT AMENDMENTS OF 1990 [TITLE VI - SECTION 608(C-1)]

“Effective July 1, 1992, it shall be unlawful for any person, in the course of maintaining, servicing, repairing, or disposing of an appliance or industrial process refrigeration, to knowingly vent or otherwise knowingly release or dispose of any Class I* or Class II** substance used as a refrigerant in such appliance (or industrial process refrigeration) in a manner which permits such substance to enter the environment. De minimis releases associated with good faith attempts to recapture and recycle or safely dispose of any such substances shall not be subject to the prohibition set forth in the preceding sentence.”

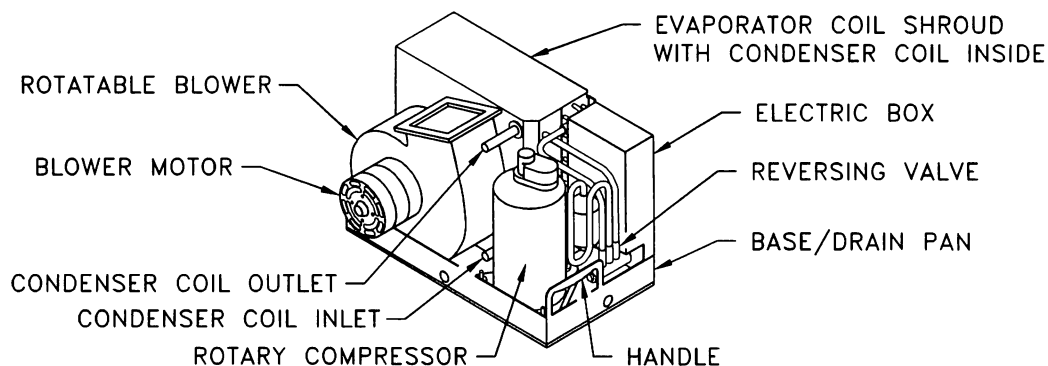
*Class I substances include CFC-12

**Class II substances include HCFC-22

MARINE AIR SYSTEMS

Marine Air Systems, Inc. (MAS) is a manufacturer of air conditioning and refrigeration equipment for the marine industry. MAS is committed to innovative technology, competitively priced products and market leadership. The MAS team has many years of experience in the design, manufacture, application and support of marine air conditioning and refrigeration. Our practical experience and design capability allows our application engineers and customer support team to offer optimum solutions for your environmental control requirements. Marine Air Systems, Inc. is ***A Member of the Taylor Made Group™***.

VECTOR COMPACT OVERVIEW



HOW IT WORKS:

Your self-contained air conditioner consists of four main components and a refrigerant gas circulating through the system. The BLOWER draws warm moist cabin air across the fins on the EVAPORATOR where the heat from the air causes the refrigerant in the evaporator coil to evaporate from a liquid into a gas. As the refrigerant evaporates, it absorbs the heat from the cabin air. The moisture in the air is captured on the evaporator coil and fins by forming condensation as the air is cooled. The COMPRESSOR then compresses the refrigerant gas and pumps it through the outer tube in the CONDENSER COIL (located in the evaporator shroud). The seawater pump circulates cool seawater through the inner tube in the condenser coil; this cools the refrigerant and condenses it into a liquid. The heat from the refrigerant is exchanged to the seawater and discharged overboard. The liquid refrigerant is then passed through the EVAPORATOR COIL and the cycle repeats. Removing heat and moisture from the cabin air lowers its temperature and humidity levels. The conditioned air is blown through the ducting and out the supply air grille(s). For reverse cycle heating, the refrigerant flows in the opposite direction through the reversing valve. Heat is transferred from the seawater in the condenser coil to the refrigerant and then to the air blowing through the evaporator into the cabin. Seawater temperature will directly affect the a/c unit's efficiency. This a/c unit can effectively cool your boat in water temperatures up to 90°F and heat it in water temperatures as low as 40°F.

TABLE OF CONTENTS

INSTALLATION

Unpacking and Inspection	1
Safety Considerations	1
Placement of System (Tools Required)	2
Spacing Allowances and Dimensions.....	3
Condensate Drains	4
Mounting Brackets.....	4
Blower Assembly.....	4
Supply & Return Air Grilles.....	5
Ducting	5
Seawater Pump and Plumbing	6
Electrical Connections, Grounding and Bonding	7
3 Phase Notice	7
Vector Compact Mechanical Control (VCM) Wiring Diagrams	8
Vector Compact Passport II Digital Control (VCP) Wiring Diagrams	9
Manual Control Panel (MCP) Installation.....	10
Passport II Display Panel Installation.....	11
Installation Checklist (review prior to installation).....	12

OPERATION

Manual Control Panel (MCP) Operation.....	10
Quick Start Operations Checklist	12
Passport II Control.....	13
Modes of Operation.....	13-14
Programming the Passport II	14-15
Programmable Parameters.....	15-17
Programming Notes.....	17
General Troubleshooting Guidelines	18-19
Passport II Digital Control Troubleshooting Guidelines	19-21
MCP Mechanical Control Panel Troubleshooting Guidelines	21

MAINTENANCE

Seawater System, Return Air Filters, Winterization	22
Manufacturers Limited Warranty Agreement	23
Worldwide Dealer/Service Network 1998.....	24-25

UNPACKING AND INSPECTION

When the equipment is received, all items should be carefully checked against the packing list to ensure all cartons have been received. Move units in the normal "up" orientation as indicated by the arrows on each carton. Examine cartons for shipping damage, removing the units from the cartons if necessary. If the unit is damaged, the carrier should make the proper notation on the delivery receipt acknowledging the damage.

SAFETY CONSIDERATIONS

VERY IMPORTANT: Never install your air conditioner in the bilge or engine room areas. Insure that the selected location is sealed from direct access to bilge and/or engine room vapors. Do not terminate condensate drain line within four (4) feet of any outlet of engine or generator exhaust systems, nor in a compartment housing an engine or generator, nor in a bilge, unless the drain is connected properly to a sealed condensate or shower sump pump.

Installation and servicing of this system can be hazardous due to system pressure and electrical components. When working on this equipment, always observe precautions described in the literature, tags and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves and place a fire extinguisher close to the work area. The following is a summary of the labels on the unit:

! DANGER ELECTRICAL SHOCK HAZARD. DISCONNECT VOLTAGE AT MAIN PANEL OR POWER SOURCE BEFORE OPENING ANY COVER. FAILURE TO COMPLY MAY RESULT IN INJURY OR DEATH.

! WARNING THIS COMPONENT DOES NOT MEET FEDERAL REQUIREMENTS FOR IGNITION PROTECTION. DO NOT INSTALL IN SPACES CONTAINING GASOLINE ENGINES, TANKS, LPG/CPG CYLINDERS, REGULATORS, VALVES OR FUEL LINE FITTINGS. FAILURE TO COMPLY MAY RESULT IN INJURY OR DEATH

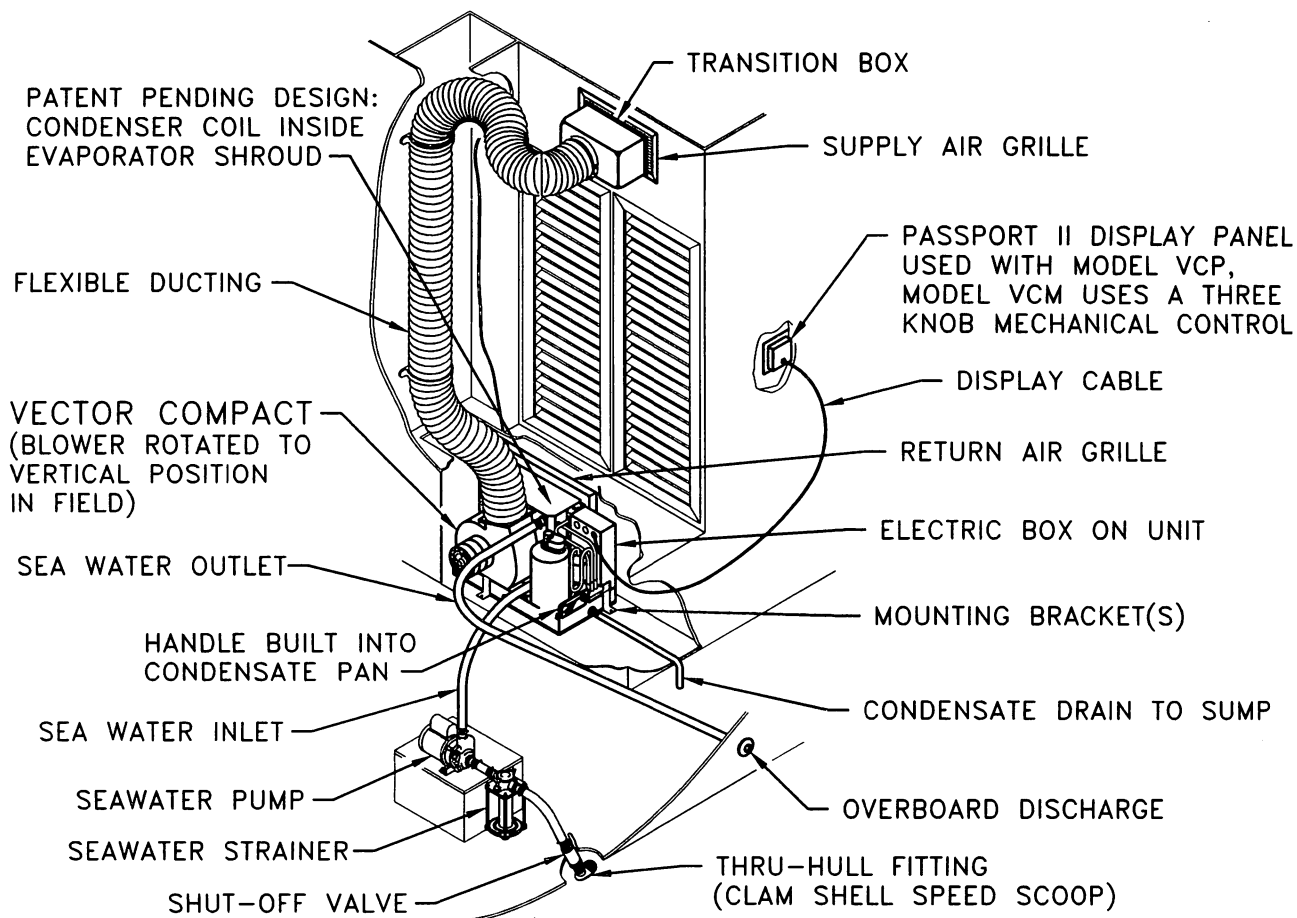
NOTICE THIS COMPONENT IS CHARGED WITH HYDROCHLOROFLUOROCARBON (HCFC) REFRIGERANT R22. EFFECTIVE JULY 1, 1992 IT SHALL BE UNLAWFUL FOR ANY PERSON TO KNOWINGLY VENT OR OTHERWISE KNOWINGLY RELEASE ANY CLASS 1 (CFC) OR CLASS 2 (HCFC) SUBSTANCE AS A REFRIGERANT IN A MANNER WHICH PERMITS SUCH SUBSTANCE TO ENTER THE ATMOSPHERE PER THE CLEAN AIR ACT OF 1990. PUBLIC LAW 101-549 TITLE IV SECTION 608-C. FAILURE TO COMPLY MAY RESULT IN SEVERE PENALTIES, INCLUDING FINES AND IMPRISONMENT.

! WARNING TO MINIMIZE THE HAZARD OF ELECTRICAL SHOCK AND PERSONAL INJURY, THIS COMPONENT MUST BE EFFECTIVELY GROUNDED. REFER TO THE INSTALLATION GUIDELINES FOR FURTHER INFORMATION.

CAUTION! HIGH COMPRESSOR TEMPERATURE IS NORMAL DO NOT TOUCH

PLACEMENT OF SYSTEM

Selecting a good location for your air conditioner is the most important part of your preparations. Be sure to consider the size of the area you are cooling, the air distribution needs, and the size of the unit you have chosen. Keeping in mind that cool air has a tendency to fall, it is highly recommended that you locate the supply air grille as high as possible in the cabin. See diagram below.



The VECTOR COMPACT unit should be installed as low as possible, **BUT NEVER IN THE BILGE OR ENGINE ROOM AREAS. INSURE THAT THE SELECTED LOCATION IS SEALED FROM DIRECT ACCESS TO BILGE AND/OR ENGINE ROOM VAPORS.** Installing the unit as low as possible (such as under a V-berth, dinette seat or bottom of a locker) and ducting the supply air as high as possible, creates an ideal air flow condition. This type of installation will prevent short or premature cycling.

The unit should be positioned on a firm; level surface and the condensate drain line should run aft and downward from the unit to a suitable drain location sealed away from any exhaust or bilge vapors. ***Plan all connections which must be made prior to starting installation,*** including ducting, condensate drain, cooling water in and out, electrical power connections, location of control panel, and seawater pump placement and plumbing, to assure easy access for installation and servicing.

TOOLS REQUIRED

- Screw drivers
- Pliers
- Pipe wrench
- Wire cutter/crimper
- Drill & 7/8" bit
- Jig saw
- Duct tape
- Electrical tape
- Teflon tape
- Bedding compound to seal thru-hull fittings
- Hardware to secure unit, pump, strainer, grilles & control panel

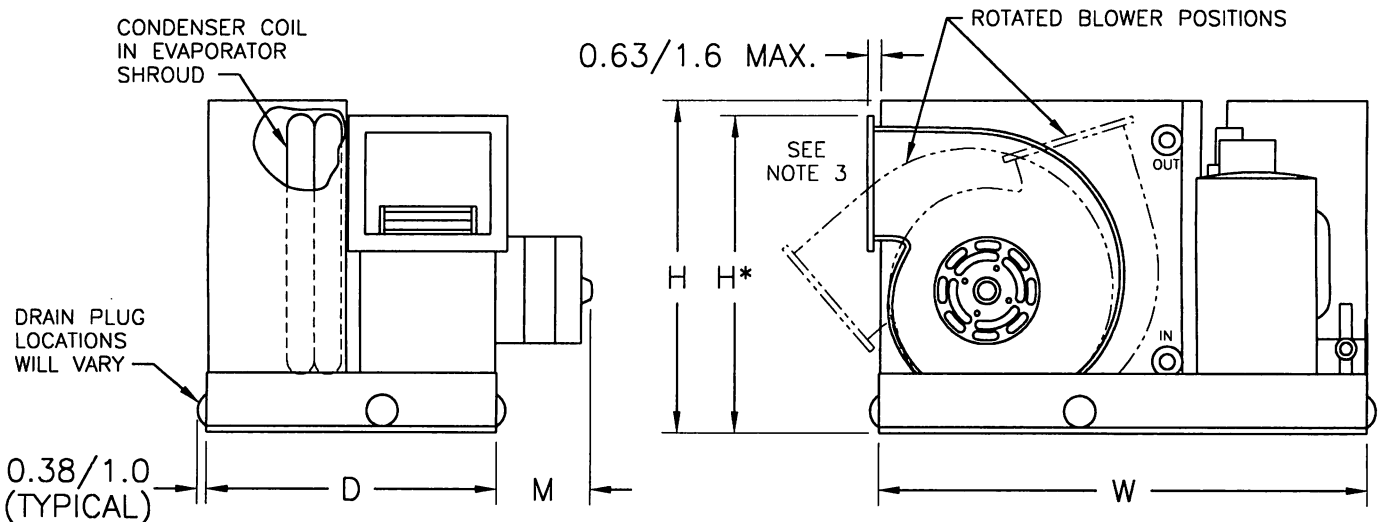
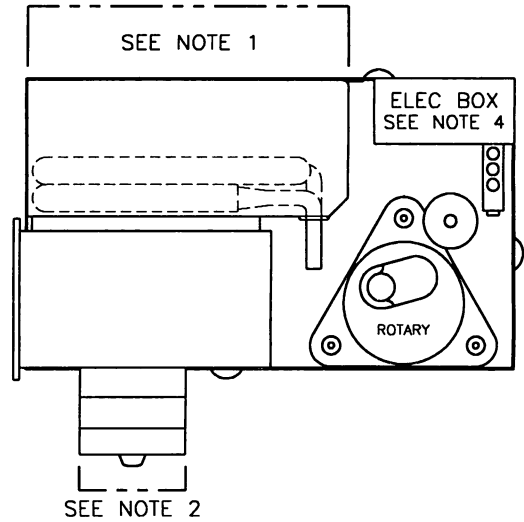
PROPRIETARY NOTE: THE INFORMATION CONTAINED WITHIN THIS DOCUMENT IS THE PROPERTY OF MARINE AIR SYSTEMS INC. ANY ATTEMPT TO COPY OR DISTRIBUTE WITHOUT WRITTEN CONSENT FROM MARINE AIR SYSTEMS INC. SHALL BE CONSIDERED UNLAWFUL AND CAN BE CONTESTED IN A COURT OF LAW.

REV	DATE	REVISION	DWG	APR
I	N/A	NO REVISION 'I'	DKM	
J	4/16/98	REVISED DIMENSIONS ON 10 & 12 HV UNITS	DKM	R P
K	1/13/99	CHANGED 24K M DIMENSION	DKM	D D
L	5/10/99	ADDED 5K UNIT	DKM	

SPACE ALLOWANCES TO CONSIDER WHEN DESIGNING AREA FOR A/C UNITS

- 1) Allow a minimum 3.00" [7.62cm] of air space in front of evaporator for return air intake if it is adjacent to a bulkhead.
- 2) Allow a minimum 1.00" [2.54cm] of air space for electric blower motor ventilation. Not applicable with HV units.
- 3) For flexible ducting connection:
 - A) If mount ring is used, allow 2.00" [5.08cm] for the ring, 1.00" [2.54cm] for duct bend radius and add the diameter of the ducting to get total distance as measured from blower outlet.
 - B) When using a transition box consider that each box is unique to it's application. A general rule is to add 1.00" [2.54cm] to the largest ring diameter used to get size of box (5" min.). Add mount ring and ducting as figured above to get approximate space needed to install transition box. Also note that the universal T-box is 8.00" [20.32cm] tall measured from blower outlet.

4) Allow enough room for removal of electric box cover for servicing.
 NOTE: The above dimensions are minimums. Enough space should be allocated for installation and serviceability.



MODEL NUMBER	DIMENSIONS (inches/centimeters)					WEIGHT (lbs/kg)
	H	H*	W	D	M	
VCP/M5K	11.75/29.8	N/A	16.5/41.9	9.00/22.9	3.75/9.5	42.0/19.1
VCP/M7K	12.00/30.5	12.25/31.1	18.00/45.7	9.63/24.5	3.25/8.3	48.7/22.0
VCP/M10K	12.25/31.1	13.63/34.6	20.25/51.4	10.63/27.0	4.00/10.2	59.2/26.8
VCP/M12K	13.63/34.6	N/A	20.25/51.4	10.63/27.0	3.75/9.5	62.8/28.5
VCP/M16K	13.63/34.6	N/A	20.25/51.4	12.00/30.5	4.00/10.2	64.7/29.3
VCP/M24K	18.00/45.7	19.25/48.9	24.75/62.9	15.25/38.7	3.50/8.9	120.0/54.4
VCP/M7K-HV	12.00/30.5	12.25/31.1	18.00/45.7	9.63/24.5	1.00/2.5**	48.7/22.0
VCP/M10K-HV	12.25/31.1	13.63/34.6	20.25/51.4	12.00/30.5	1.00/2.5**	59.2/26.8
VCP/M12K-HV	13.63/34.6	N/A	20.25/51.4	12.00/30.5	1.00/2.5**	62.8/28.5
VCP/M16K-HV	13.63/34.6	N/A	20.25/51.4	12.00/30.5	1.00/2.5**	64.7/29.3

*HEIGHT TO TOP OF BLOWER OUTLET, BLOWER MAY BE ROTATED DOWN BELOW EVAP SHROUD 'H'
 **MOTOR IS INSIDE FAN HOUSING ON HIGH VELOCITY (HV) UNITS, HOWEVER, ALLOW 1"/2.5cm FOR BLOWER RING MOUNTING FLANGE AND/OR BLOWER CAPACITOR ON THAT SIDE OF UNIT

ALL DIMENSIONS ARE NOMINAL - VERIFY ALL CRITICAL DIMENSIONS WITH MAS ENGINEERING.

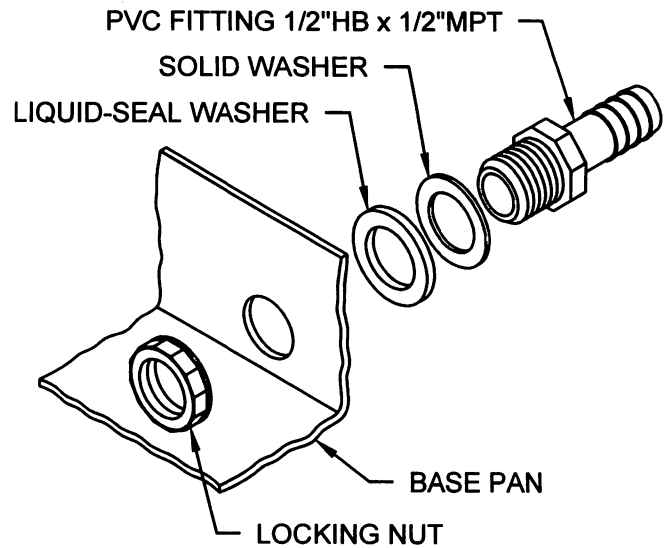
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APPROVED BY:	D D

ORTHOGRAPHIC PROJECTION
VCP/M5-24K (HV)
 VECTOR COMPACT PASSPORT/MECHANICAL
 SPACING ALLOWANCES AND DIMENSIONS
 DRAWING NO: **M1020036L**

MARINE AIR SYSTEMS®
AIRRRRRRRRR
 POMPANO BEACH, FLORIDA U.S.A.

CONDENSATE DRAINS

The condensate drain pan is 2" high with two drain locations. During conditions of high humidity, condensate may be produced at a rate of up to two gallons per hour. With this in mind, it is important to route condensate drains downward to a sump pump. Do not route condensate drains to the bilge. After the condensate drain installation is complete, test the installation by pouring a quart of water into the pan and checking for good flow. See note below.



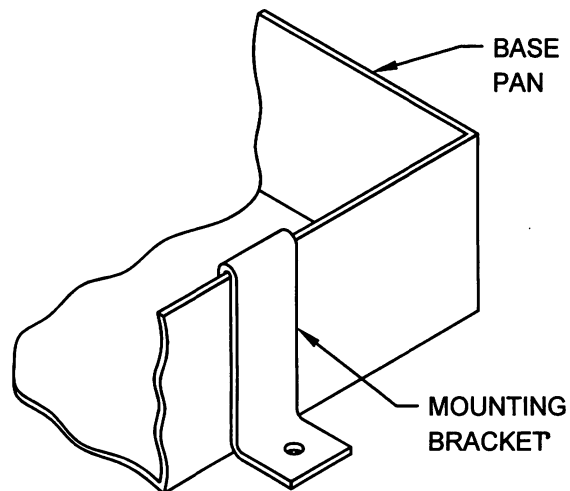
For installation of the condensate drain:

1. Remove the aft facing watertight plug from the base pan of the a/c unit.
2. Slip the solid washer and the liquid-seal washer onto the PVC fitting in that order.
3. Connect the fitting through the exposed hole in the base pan with the locking nut.
4. Securely tighten with two (2) wrenches to provide a proper seal.
5. Attach a 5/8" I.D. reinforced hose to the hose barb and secure with double/reversed stainless steel hose clamps.
6. Install the condensate drain hose downhill from the unit and aft to a sump.
7. Two drain fittings may be used and the hoses teed together provided there is a minimum 2" drop from the bottom of the base pan to the tee connection.

Note: Do not terminate condensate drain line within four (4) feet of any outlet of engine exhaust systems, nor in a compartment housing an engine, unless the drain is connected properly to a sealed condensate or shower sump pump.

MOUNTING BRACKETS

The VECTOR COMPACT unit is supplied with a 2" base pan, which also serves as a condensate pan. Stainless steel mounting clip brackets (4) are provided to secure the base pan onto a flat, horizontal surface.



BLOWER ASSEMBLY

With the VECTOR COMPACT you can achieve multi-directional supply air discharge from a single unit by rotating the blower to the desired location. It is ideal for tight installations, as 130° of rotation are available with which to position the blower. Its advanced design allows the blower to be easily removed for rotating or servicing by releasing a single stainless steel clamp and two (2) mounting ring screws. Rotate the blower to allow the most direct flow of air to the supply air grille.

SUPPLY & RETURN AIR GRILLES

Install the supply air grille as high as possible in a location that will provide uniform air distribution throughout the cabin, grille louvers should be directed upward. The return air grille should be installed as low and close to the a/c unit as possible to insure direct uninterrupted airflow to the evaporator. The return air grille should have a minimum four inches (4") or clearance in front of it, free from any furniture or other obstructions. In no instance should a supply air discharge be directed towards a return air grille, as this will cause the system to short cycle. Allow for adequate clearance behind the supply air grille(s) for the transition box and ducting connection. The following table shows minimum grille sizes. See the MAINTENANCE section of this manual for return air filter cleaning instructions.

DUCTING

Good air flow is critical for the performance of the entire system. It is highly dependent on the quality of the ducting installation. The ducting should be run as straight, smooth and taut as possible minimizing the number of 90 degree bends (two tight 90 degree bends can reduce airflow by 25%). The following table shows minimum duct diameters and their corresponding supply and return air grille minimum areas in square inches. If a transition box is used, the total area of supply air ducts going out of the box should equal the area of the supply duct feeding the box. To calculate the square inch area of a round duct, multiply the radius by itself (r^2) and multiply that number by 3.1416 (π).

MODEL	7K	10K	12K	16K	24K
DUCT DIA	5" dia	5" dia	6" dia	7" dia	8" dia
DUCT AREA	19.6 sq in	19.6 sq in	28.3 sq in	38.5 sq in	50.3 sq in
R/A GRILLE	88 sq in	98 sq in	140 sq in	168 sq in	280 sq in
S/A GRILLE	40 sq in	50 sq in	70 sq in	84 sq in	140 sq in

The following is a summary of proper ducting connections:

1. Pull back the fiberglass insulation exposing the inner mylar duct hose.
2. Slide the mylar duct hose around the mount ring until it bottoms out.
3. Screw 3 or 4 stainless steel sheet metal screws through the duct hose into the transition ring. Make sure to catch the wire in the duct hose with the heads of the screws. Do not use band clamps, as the hose will slide off.
4. Wrap the duct tape around the ducting and ring joint to prevent any air leaks.
5. Pull the insulation back up over the mylar to the ring and tape this joint.
6. Remove excess ducting and use the same connection method at the s/a grille.

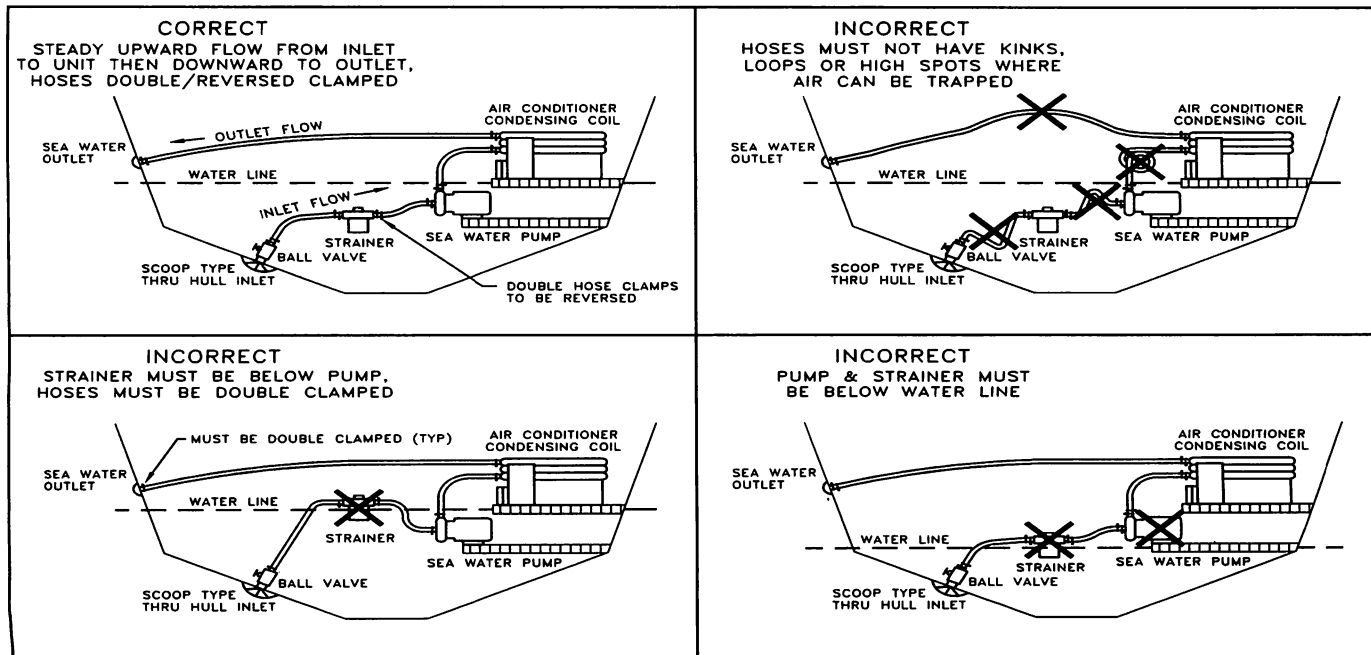
All ducting should:

- Be appropriately sized for each application.
- Run as smoothly and taut as possible.
- Have as few bends or loops as possible.
- Be securely fastened to prevent sagging during boat operation.
- Have all excess ducting lengths trimmed off.
- Not be flattened or kinked.
- Insulated when located in high heat load areas (hull side, mechanical compartments, etc.).
- Be properly protected against potential damage when routed through open areas.

SEAWATER PUMP AND PLUMBING

Seawater temperature will directly affect the a/c unit's efficiency. This a/c unit can effectively cool your boat in water temperatures up to 90°F and heat (if reverse cycle option is installed) in water as low as 40°F. Several guidelines should be followed during the installation of the seawater system. Since the circulation pump is centrifugal and not self-priming, it must be mounted so that it is always at least one foot below the water line regardless of which tack the vessel is on. The pump may be mounted horizontally or vertically, however the discharge must always be above the inlet. If possible, the pump head should be rotated toward the direction of water flow. **Install the seawater speed scoop intake as far below the water line and as close to the keel as possible in any application, but especially on a sailboat, to keep the intake in the water so that air does not get into the system when the boat heels over.** The speed scoop intake must face forward and not be shared with any other pump. A seacock (shut off valve) must be installed directly on the speed scoop outlet. A seawater strainer is mandatory between the seacock and pump. **Failure to install a seawater strainer will void the pump warranty.** The seawater system should be installed with an upward incline from the speed scoop & sea cock, through the strainer, to the inlet of the pump and then up to the inlet of the a/c unit's condenser coil. The discharge from the a/c unit should then run to the seawater outlet through hull fitting which should be located where it can be visually checked for water flow and as close as practicable to the waterline to reduce noise. Use only reinforced marine grade hose. All hose connections shall use double/reversed stainless steel hose clamps. Below is an installation summary:

1. Install the speed scoop thru-hull inlet as close to the keel and as far below the water line as possible, facing forward. Bed the scoop with a marine sealant designed for underwater use.
2. Install a bronze, full flow seacock on the speed scoop thru-hull inlet.
3. Install a seawater strainer below the level of the pump with access to filter.
4. Mount the pump at least one foot below the waterline and above the strainer.
5. Connect the seacock, strainer and pump with an uphill run of reinforced marine hose.
6. Connect the discharge from the pump uphill to the bottom inlet of the a/c unit's condenser coil.
7. Avoid loops, vertical bends (high spots) or the use of 90° elbows with seawater hose (each 90° elbow is equivalent to 2.5' of hose and a 90° elbow on the pump is equivalent to 20' of hose).
8. Double clamp all hose connections with stainless steel clamps, reversing the clamps.
9. Use teflon tape on all threaded connections.
10. **Connect all metallic parts in contact with seawater to the vessel's bonding system including the speed scoop inlet, strainer, pump and the air conditioner.**



ELECTRICAL CONNECTIONS, GROUNDING AND BONDING

All a/c units have a terminal strip mounted inside the electric box. The terminal strip is labeled for proper connections of the electrical supply, ground wires and pump circuits. A wiring diagram is provided in the electrical box and in this manual. The correct size circuit breaker should be used to protect the system as specified on the a/c unit's data plate label. A minimum of 12 AWG boat cable should be used to supply power to the a/c unit and the seawater pump. All connections shall be made with ring or fork terminals. **Turn off a/c power supply circuit breaker before opening electric box.**

Each a/c unit installed requires its own dedicated circuit breaker. If there is only one a/c unit installed, the seawater pump does not require a circuit breaker; the wiring from the seawater pump is connected to the terminal strip in the electric box. If two or more a/c units use the same seawater pump, the pump wires will be connected to a pump relay panel (PRP) which in turn has its own dedicated circuit breaker sized for the pump (20 amp max). Please see the wiring diagram furnished with the PRP (NOTE: PRP triac must have its mounting screw installed in order to dissipate heat). Electrical connections in the bilge and/or below the waterline should use heat shrink type butt splices.

Field wiring must comply with ABYC electrical codes. Power to the unit must be within the operating voltage range indicated on the data plate. Properly sized fuses or HACR circuit breakers must be installed for branch circuit protection. See data plate for maximum fuse/circuit breaker size (mfs) and minimum circuit ampacity (mca). All units must be effectively grounded to minimize the hazard of electrical shock and personal injury. The following are to be observed:

1. AC (alternating current) grounding (green wire) must be provided with the AC power conductors and connected to the ground terminal (marked "GRND") at the AC power input terminal block of the unit(s), per ABYC standard E-8, or equivalent.
2. Connections between the vessel's AC system grounding conductor (green wire) and the vessel's DC (Direct Current) negative or bonding system should be made as part of the vessel's wiring, per ABYC standard E-9, or equivalent.
3. When servicing or replacing existing equipment that contains a chassis-mounted ground stud, the service person or installer must check the vessel's wiring for the existence of the connection required in item 2 above.

ABYC standards are available from: American Boat and Yacht Council
3069 Solomon's Island Rd.
Edgewater, MD 21036 Telephone: (410) 956-1050

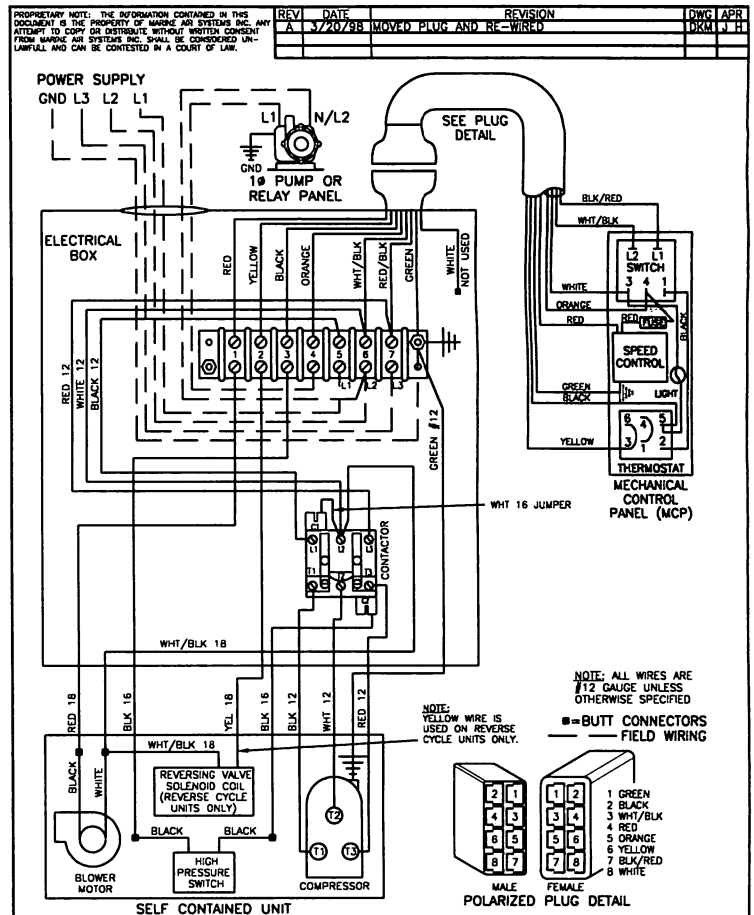
The a/c unit must be connected to the ship's bonding system to prevent corrosion due to stray electrical current or voltage. All pumps, metallic valves and fittings in the seawater circuit that are isolated from the a/c unit by PVC or rubber hoses must be individually bonded to the vessels bonding system also. This will help eliminate any possibility of corrosion due to stray current or voltage.

FAILURE TO PROPERLY GROUND AND BOND THE SYSTEM WILL VOID WARRANTY!

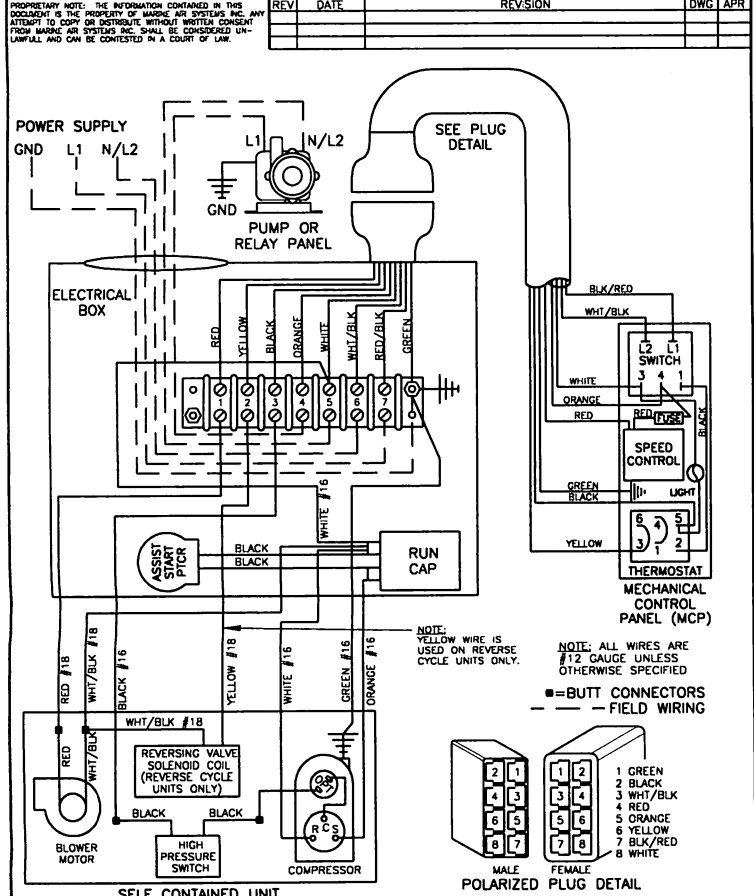
3 PHASE NOTICE

It is extremely important to insure that wiring and phase sequencing of a three phase power source is correct. Marine wiring standards call for power source phases L1, L2, and L3 to be color-coded BLACK, WHITE, and RED, respectively. These must be connected to the unit with the proper sequence, otherwise, it will not operate properly. If the wiring sequence is incorrect, the unit's compressor (*Scroll* type only) and pump (if applicable) will run in the reverse direction at a significantly increased noise level.

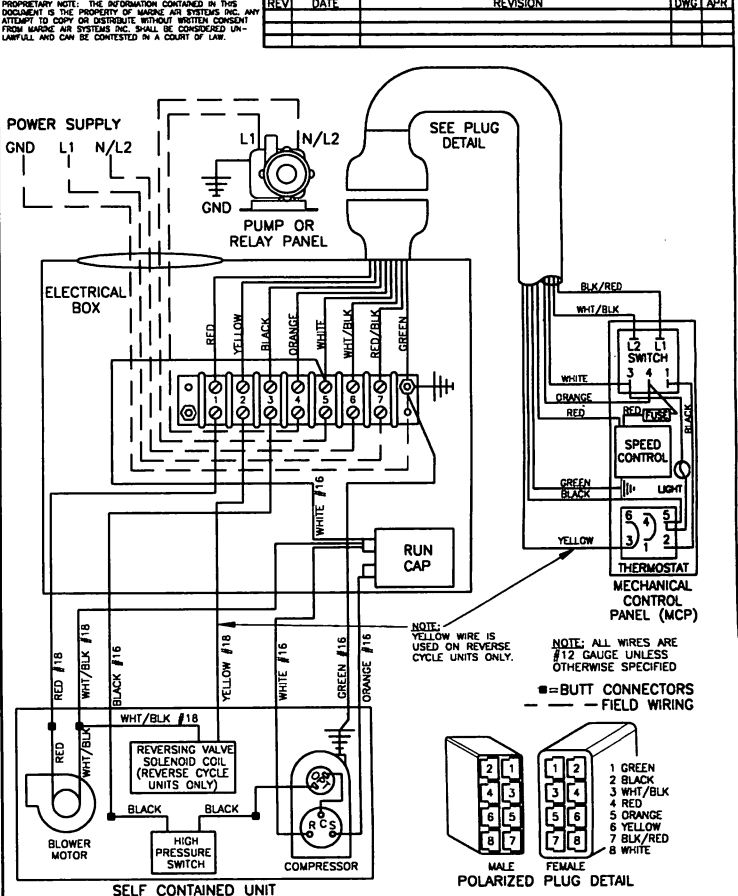
VECTOR COMPACT WIRING DIAGRAMS



DATE: 3/19/98	WIRING DIAGRAM	MARINE AIR SYSTEMS® AIR POMPANO BEACH, FLORIDA U.S.A.
SCALE: N.T.S. (P)	VCM24K-Z 3PH	
SHEET: CURRENT	VECTOR COMPACT 3ø 24K WITH MCP	
DRAWN BY: RMW J H	230VAC/50-60HZ/3ø	
APPROVED BY:	DRAWING NO: M1010090A	



DATE: 1/19/98	WIRING DIAGRAM	MARINE AIR SYSTEMS® AIR POMPANO BEACH, FLORIDA U.S.A.
SCALE: N.T.S. (P)	VCM7-16K(-Z/C/CZ)	
SHEET: CURRENT	VECTOR COMPACT WITH MCP	
DRAWN BY: RMW J H	115-230VAC/50-60HZ/1ø	
APPROVED BY:	DRAWING NO: M1010086	



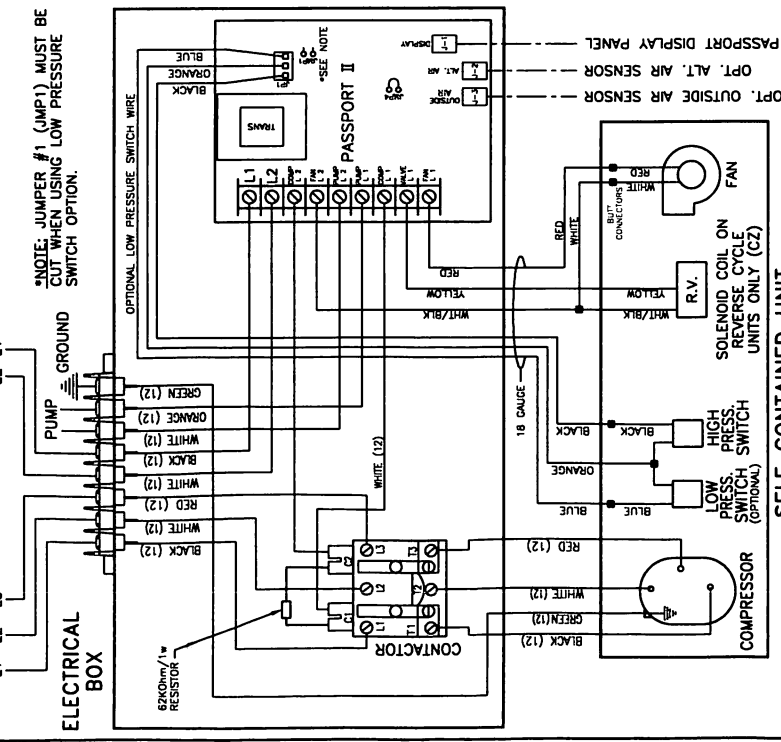
DATE: 1/30/98	WIRING DIAGRAM	MARINE AIR SYSTEMS® AIR POMPANO BEACH, FLORIDA U.S.A.
SCALE: N.T.S. (P)	VCM24K(-Z/C/CZ)	
SHEET: CURRENT	VECTOR COMPACT WITH MCP	
DRAWN BY: RMW J H	115-230VAC/50-60HZ/1ø	
APPROVED BY:	DRAWING NO: M1010087	

REVISION	DATE	DESCRIPTION
A	7/8/98	ADDED VCP TO TITLE BLOCK
DWGLABR DKM C D D		

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REFERENCE DWG(S) M1010055
NOTE: ALL WIRE GAUGE OTHERWISE SPECIFIED

TO COMPRESSOR
380VAC/50HZ/3ø



DATE: 2/17/97
SCALE: N.T.S.
SHEET: 1 OF 1
CURRENT: 380/50/3 COMP - 220/50/1 POWER
DWG LABR
DKM C D D

WIRING DIAGRAM
VCP/VHP24K-3803-Z(CZ)
VECTOR SERIES w/PASSPORT II
3ø VECTOR COMP - 220/50/1 POWER
POMPAÑO BEACH, FLORIDA U.S.A.

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REFERENCE DWG(S) M1010052 & M408009 FOR TERMINAL BLOCK LABEL

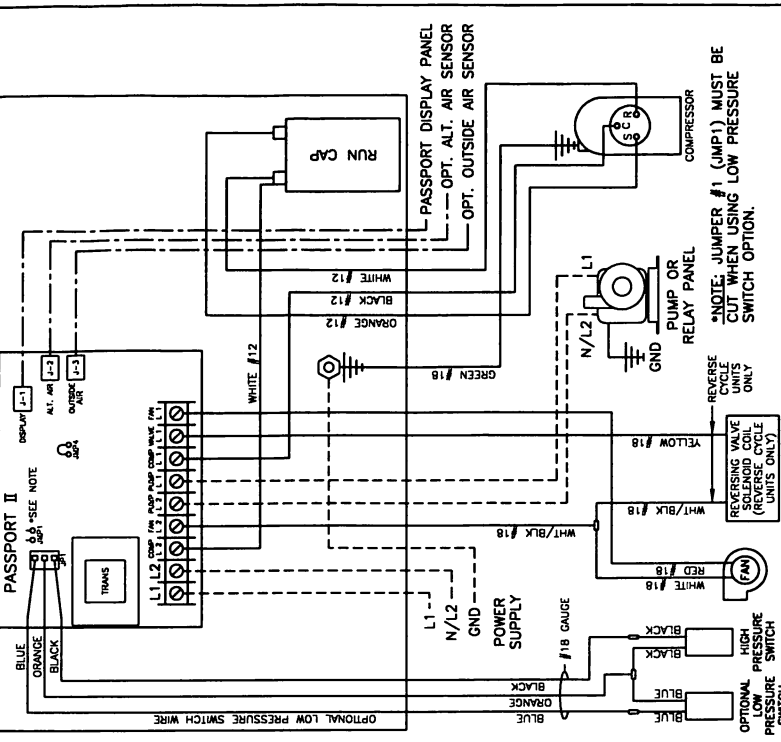
SELF CONTAINED UNIT

REVISION	DATE	DESCRIPTION
A	11/28/97	ADDED VCP TO TITLE BLOCK
DWGLABR DKM C D D		

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REFERENCE DWG(S) M1010042 & M408009 FOR TERMINAL BLOCK LABEL

ELECTRICAL BOX



DATE: 6/5/97
SCALE: N.T.S.
SHEET: 1 OF 1
CURRENT: 230-220VAC/50-60HZ/1ø
DWG LABR
DKM C D D

WIRING DIAGRAM
VCP/VHP24K(-Z/C/CZ)
VECTOR W/SCROLL COMP & PASSPORT II
230-220VAC/50-60HZ/1ø
POMPAÑO BEACH, FLORIDA U.S.A.

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REFERENCE DWG(S) M1010074

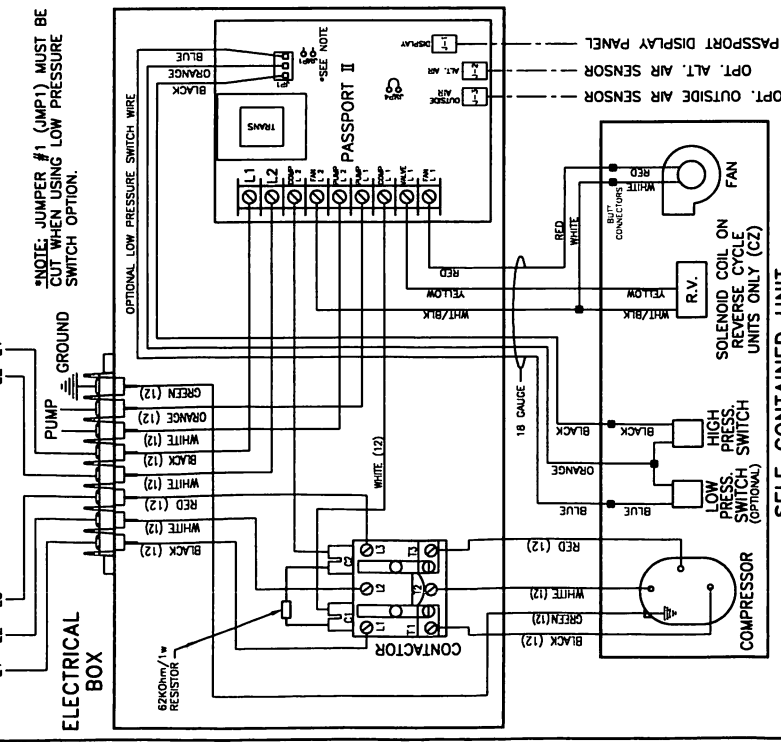
ELECTRICAL BOX

REVISION	DATE	DESCRIPTION
A	10/3/97	ADDED VCP TO TITLE BLOCK
DWGLABR DKM C D D		

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REFERENCE DWG(S) M1010082 & M408009 FOR TERMINAL BLOCK LABEL

ELECTRICAL BOX



DATE: 10/3/97
SCALE: N.T.S.
SHEET: 1 OF 1
CURRENT: 115-230VAC/50-60HZ/1ø
DWG LABR
DKM C D D

WIRING DIAGRAM
VCP7-16K(-Z/C/CZ)
VECTOR COMPACT with PASSPORT II
115-230VAC/50-60HZ/1ø
POMPAÑO BEACH, FLORIDA U.S.A.

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REFERENCE DWG(S) M1010082 & M408009 FOR TERMINAL BLOCK LABEL

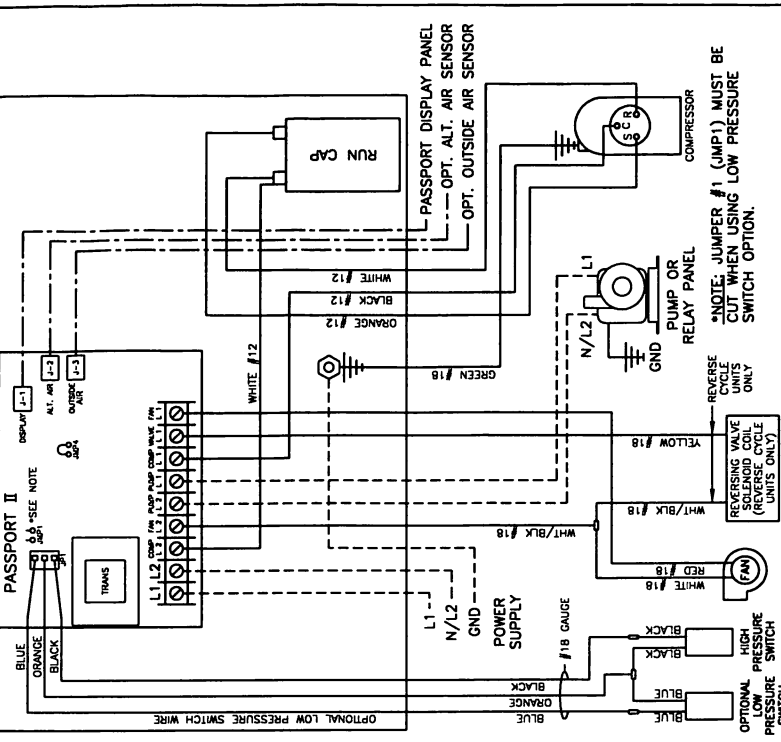
ELECTRICAL BOX

REVISION	DATE	DESCRIPTION
A	11/6/97	ADDED VCP TO TITLE BLOCK
DWGLABR DKM C D D		

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REFERENCE DWG(S) M1010082 & M408009 FOR TERMINAL BLOCK LABEL

ELECTRICAL BOX



DATE: 11/6/97
SCALE: N.T.S.
SHEET: 1 OF 1
CURRENT: 115-230VAC/50-60HZ/1ø
DWG LABR
DKM C D D

WIRING DIAGRAM
VCP7-16K(Z)HV
HIGH VELOCITY VCP w/PSPT II
115-230VAC/50-60HZ/1ø
POMPAÑO BEACH, FLORIDA U.S.A.

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REFERENCE DWG(S) M1010082 & M408009 FOR TERMINAL BLOCK LABEL

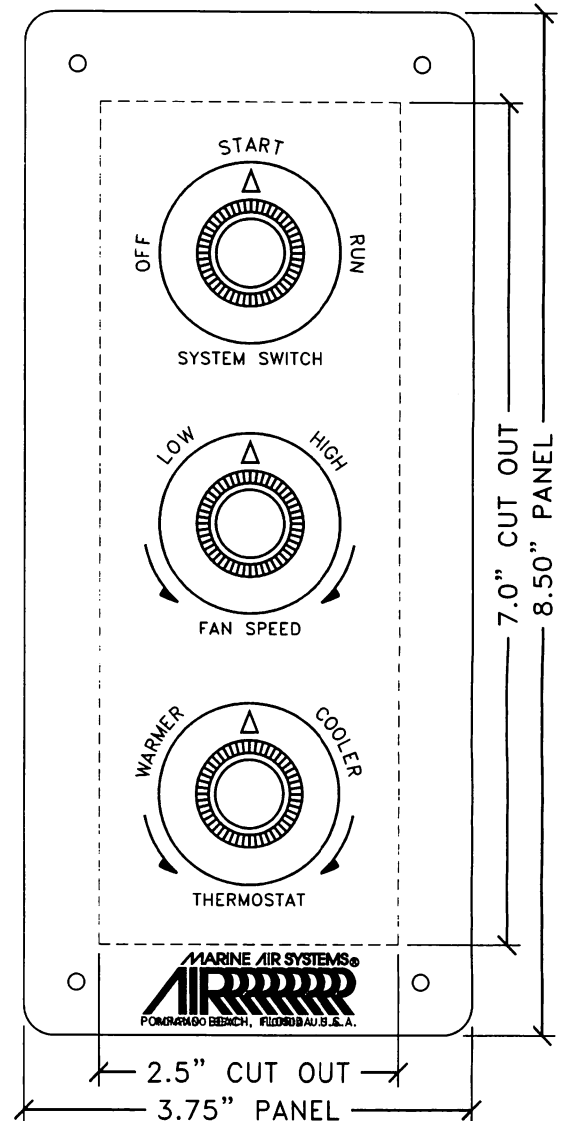
ELECTRICAL BOX

MANUAL CONTROL PANEL (MCP) INSTALLATION

The MCP should be located within cap tube length of the a/c unit. The 3 knob MCP is configured either vertically (shown) or horizontally. The cut out size is 2.5" by 7.0", see MCP for orientation. Once the cut out is made, carefully uncoil the copper cap tube with return air sensor (copper bulb) and route the control wires and cap tube through the hole and back to the a/c unit **using caution not to kink the cap tube**. Mount the return air sensor into the clips provided on the evaporator coil. If the return air sensor cannot be mounted on the evaporator coil, mount it behind the return air grille. The sensor must be mounted in the return air stream. Make electrical connections according to the wiring diagram found in the electric box and/or in the operations manual.

MCP OPERATION

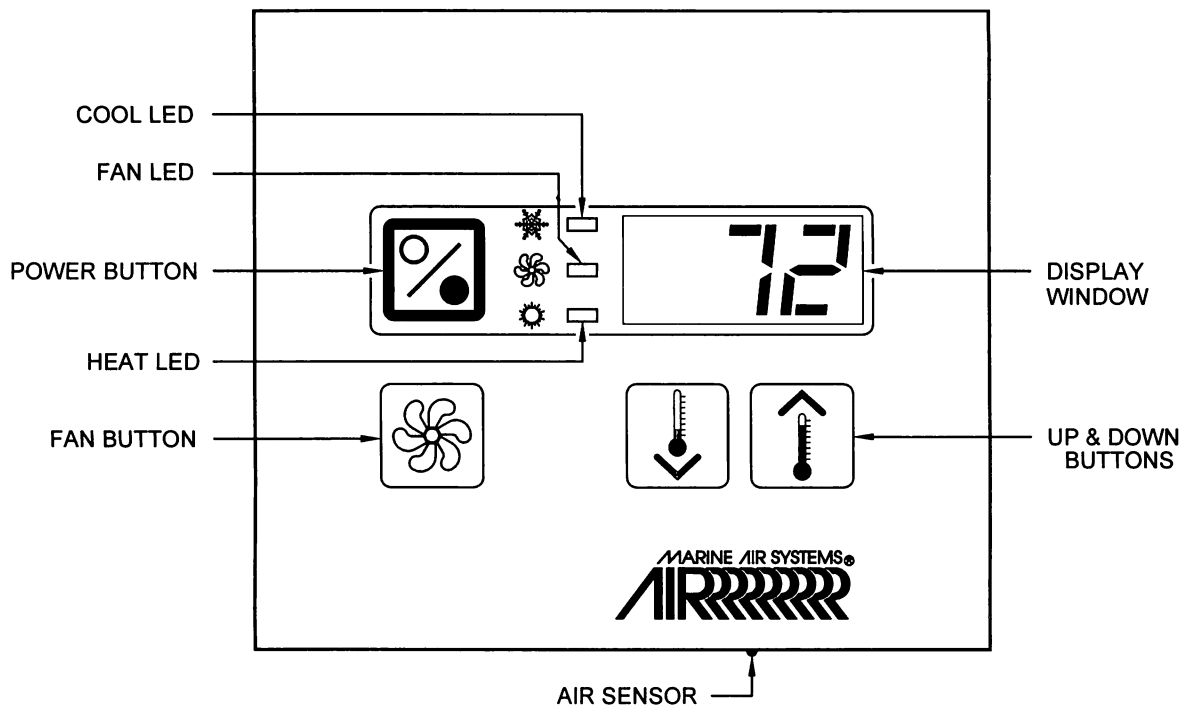
- 1) Ensure seawater intake ball valve (sea cock) is open.
- 2) Turn SYSTEM SWITCH control knob to OFF.
- 3) Turn on AC circuit breaker. If the seawater pump has its own circuit breaker, turn that on too.
- 4) Turn the SYSTEM SWITCH control knob to START; this energizes the fan and seawater pump. Turn THERMOSTAT control knob to the coolest position by rotating fully clockwise. If system has reverse cycle, turn knob counter-clockwise for heat.
- 5) Check for a steady solid stream of seawater from the overboard discharge.
- 6) Turn FAN SPEED control knob clockwise to highest setting.
- 7) Verify that the fan is running and that there is steady airflow out of the supply air grille.
- 8) Turn the SYSTEM SWITCH to RUN; this will start the compressor. The indicator light on the control will illuminate.
- 9) To set the thermostat, allow sufficient time for the unit to cool/heat the area to the desired temperature. When the area is sufficiently cooled/heated, turn the thermostat knob slowly toward the center position until it clicks once (the indicator light will turn off). The thermostat is now set to maintain a constant temperature. While heating, if the ambient temperature is less than 50°F, set the FAN SPEED control knob to low for five to ten minutes until the unit begins to heat well, then increase the fan speed for more heat output.



The thermostat on the MCP control panel serves to cycle the compressor on and off and provide an automatic changeover from cooling to heating (reverse cycle only) with a 3.5° differential. Rotating the thermostat to the left after it has been set for cooling will cause the unit to heat. If you rotate the thermostat to the right, the unit will cool. If the thermostat is left stationary after being set, the unit will cycle from cooling to neutral, or heating to neutral depending on the requirement.

Note: Do not turn the unit off and immediately turn it back on. Wait at least 30 seconds.

PASSPORT II DISPLAY PANEL INSTALLATION



Before mounting the Passport II digital display panel touch pad, consider the location. The air sensor built into the display panel will provide excellent room air temperature sensing given a proper installation. The display panel should be mounted on an inside wall, slightly higher than mid-height of the cabin, in a location with freely circulating air where it can best sense average temperature. The cut out size for the display panel is $3\frac{3}{8}$ " wide by $2\frac{3}{4}$ " high. Do not mount the display in direct sunlight, near any heat producing appliances or in a bulkhead where temperatures radiating from behind the panel may effect performance. **Do not mount the display in the supply air stream.** Do not mount the display above or below a supply or return air grille. Do not mount the display behind a door, in a corner, under a stairwell or any place where there is no freely circulating air. Mount the display within display cable length (custom lengths available) of the air conditioner. Plug the display cable ($15\frac{1}{4}$.6m standard length with 8-pin connector) into the circuit board in the electric box and into the back of the display panel. Secure the display panel to a bulkhead with the adhesive strips provided. Clean the mounting surface with *isopropyl alcohol only* prior to placement (test alcohol on hidden portion of surface first). If the adhesive strips cannot be used directly on the bulkhead then use the plastic bulkhead adapter. The bulkhead adapter (sold separately) is mounted to the bulkhead with screws and the display panel is secured to the adapter with adhesive strips. **Do not use a screw gun and do not over-tighten screws when mounting adapter.**

If a proper location for room temperature sensing cannot be found for the display, an optional remote air sensor may be used. Mount the remote air sensor in the return air stream behind the return air grille/opening and plug its cable ($7\frac{1}{2}$.1m standard length with 6-pin connector) into socket #J2 on the circuit board (socket nearest the corner of the board). Installing the remote air sensor will override the face plate sensor. An optional outside air temperature (O.A.T.) sensor and cable may also be used. Plug the O.A.T. cable into the 6-pin socket #J3. Mount the sensor outside in a protected location and not in direct sunlight. Air sensor cables are available in various lengths. Secure all cables but do not staple when mounting.

INSTALLATION CHECKLIST (review prior to installation)

Seawater cooling system:

- Speed scoop located as far below the water line and as close to the keel as possible
- Shut off valve and speed scoop properly sealed and tight
- Seawater pump is at least one foot below water line and securely mounted
- Strainer mounted below pump with access to filter
- Double/reversed stainless steel hose clamps on all hose connections
- Teflon tape on all threaded connections
- Hose runs uphill from speed scoop and sea cock to strainer, pump and a/c unit, then downhill (if possible) from a/c unit to overboard discharge
- Water flowing freely from overboard discharge while pump is running
- Pump relay panel, if used, must have its own circuit breaker sized for the pump (20 amp max)
- All metal fittings should be bonded

Mounting

- Not in engine room or bilge areas, must be sealed away from exhaust or fumes**
- Proper spacing allowed around unit
- Attached to solid level platform with hold down clips provided
- Condensate drain routed aft and down hill to a sealed sump (not bilge)
- Blower rotated toward supply air grille

Electrical

- All butt connections on pump wire tightly crimped and heat shrunk
- AC power source installed and grounded/bonded in accordance with ABYC standards
- Control wires connected to terminal strip with fork or ring terminals
- Circuit breakers sized according to specifications on the data plate label
- Passport II display cable is connected at both ends
- Pump Relay Panel (if used) has a dedicated circuit breaker sized for the pump but not to exceed 20 amps maximum.

Grilles and Ducting

- Supply air grille mounted as high as possible
- Return air grille mounted as low and as close to the a/c unit as possible
- Return air grille mounted away from bilge vapors or exhaust fumes
- Ducting is pulled taut, straight, smooth and properly connected with no excess

QUICK START OPERATIONS CHECKLIST

- Ensure seawater intake ball valve (seacock) is open.
- Turn on the A/C circuit breaker. If the seawater pump has its own circuit breaker, turn that on.
- Turn the system on.
- Set the desired cabin temperature (set point).
- Check for a steady solid stream of water from the overboard discharge.
- Verify that there is steady airflow out of the supply air grille.
- If the unit does not appear to be operating properly, refer to troubleshooting guidelines.

Note: Do not turn the unit off and immediately turn it back on. Allow at least 30 seconds for refrigerant pressure equalization.

PASSPORT II CONTROL

POWER BUTTON: Press and release to turn unit on and off.

NOTE: To “press and release” a button, press and hold for one second and then release.

FAN BUTTON: Press and hold until the letter “A” appears for automatic fan speed or the numbers “1” (slow) through “6” (fast) appear for manual fan speed. Fan may be used while a/c is off.

UP & DOWN BUTTONS: Press and hold either button until desired temperature (set point) is displayed. Press either button momentarily to show current set point. Range = 60°-85°F.

COOL LED: Lights when the compressor is running in cool mode or in automatic mode while cooling.

FAN LED: Lights when fan is on in manual mode.

HEAT LED: Lights when the compressor is running in heat mode, in automatic mode while heating or if optional electric heat is installed and operating.

DISPLAY WINDOW: Shows current cabin temperature. It can also show outside air temperature if the optional O.A.T. sensor is installed. Also used in viewing and setting program parameters.

AIR SENSOR: Cabin temperature is detected by the face plate air sensor, located in the bottom edge of the display. A remote air sensor can be installed if needed. Installing the remote air sensor will override the face plate sensor.

BLANK DISPLAY FOR NIGHTTIME OPERATION: Press the FAN and DOWN buttons simultaneously to blank the display for nighttime operation. The appropriate LEDs will remain lit during cooling and heating. When the desired temperature has been achieved, the middle segment of the display window will remain lit to indicate that the system is on. Press any button to return to normal display mode.

OUTSIDE AIR TEMPERATURE: When the optional outside air sensor is installed, press the UP and DOWN buttons simultaneously to display the outside air temperature. The outside air sensor should not be mounted in direct sunlight.

MODES OF OPERATION

COOL ONLY MODE: When the Passport II is configured for cool only mode, only cooling systems will be operated as required. When the temperature drops below the set point the system will not automatically switch into the heating mode.

HEAT ONLY MODE: When the controller is programmed for heating mode, only the heating system will be selected for operation as required. Should the temperature rise above the set point the system will not switch to the cooling mode automatically.

AUTOMATIC MODE: When the controller is configured for the automatic mode, both heating and cooling will be supplied as required. The heat and cool LED indicators will light according to which mode is operating. Temperature differential in a given mode will be maintained at 2°F, however, a 4°F difference is required to allow the control to change modes.

HUMIDITY MODE: While the system is on, press the POWER and the DOWN buttons simultaneously to enter the humidity or moisture control mode. The characters "HU-1" will appear in the temperature display. Every four hours, the fan is started and air is circulated for thirty minutes. During this time the air temperature is sampled and entered into memory. The cooling cycle is then 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 hours after the temperature is satisfied or the compressor times out, the cycle is repeated. During the cycle, the cool LED will be lit when the compressor is running. Humidity mode is provided to maintain a specific temperature and humidity range when the vessel is unoccupied for extended periods of time.

AUTOMATIC FAN MODE: Press and hold the FAN button until the letter "A" appears in the display window. Automatic fan mode allows the control to determine fan speeds based on the room temperature. The closer the room temperature gets to the set point, the slower the fan will run while in cool mode. This permits a balance between the most efficient temperature control and the slowest fan speed. See programmable parameter "U 9" to reverse the fan speeds while in heat mode. The fan LED will not be lit during automatic fan mode.

MANUAL FAN MODE: Press and hold the FAN button during normal operation to select one of the six manual fan speeds available. Six (6) is the highest and one (1) represents the lowest speed available. When a manual fan speed has been selected the fan LED will be lit.

NOTE: High and low fan speeds can be further tailored to suit the user by adjusting the fan limits. See programming modes "U 2" and "U 3".

CIRCULATION MODE (FAN ONLY): With the system off, press and hold the FAN button until the desired fan speed is indicated by the numbers "1" (slow) through "6" (fast). To turn the fan off press and hold the FAN button until the number "0" appears in the display window.

PROGRAMMING THE PASSPORT II

The program mode is used to adjust operating parameters to tailor the system for efficient operation and to allow for user flexibility. Installation variables such as ducting, sensor location and system layout effect the operation of the overall system. Custom programming allows the system to operate as efficiently as possible in any given installation.

TO ENTER PROGRAM MODE: With the system off, press and hold the POWER button for five seconds until the letter "U" appears in the display window. Release the button and the first parameter setting appears followed by "U 1".

TO UNLOCK PROGRAM MODE: After entering the program mode, simultaneously press and release the POWER and DOWN buttons.

TO SELECT PROGRAM PARAMETER: Press and hold the FAN button to scroll through the parameters indicated by the program number. Programs are described in the following table.

TO CHANGE THE PROGRAM PARAMETER: Use the UP and DOWN buttons to select data or set the desired limits. The range of parameter settings is listed in the following table.

TO RESET DEFAULT SETTINGS: With the system off, press and hold the POWER button for ten seconds until the software version number (A##) appears in the display window.

TO LOCK NEW DEFAULT SETTINGS: Once the desired program changes have been made and before exiting the program mode, simultaneously press and release the UP and DOWN buttons. Locking new defaults will render the factory defaults obsolete. Make note of the new defaults in the following chart for future reference.

TO EXIT PROGRAM MODE: Press the POWER button or press no button for sixty seconds. The software version number is displayed for one second prior to exiting the program mode.

PROGRAMMABLE PARAMETERS:

Program Number	Description	Default Setting	New** Default	Range
U 1	Operating Mode	0 or 1*		0 = Automatic Mode 1 = Cool Only Mode 2 = Heat Only Mode
U 2	High Fan Speed Limit	85		56 – 85
U 3	Low Fan Speed Limit	50		30 – 55
U 4	Compressor Staging Time Delay	15 or 135*		5 – 135 Seconds
U 5	Temperature Calibration	0		±10°F
U 6	Compressor Fail-Safe Protection HHH = high freon pressure PPP = low freon pressure (option)	3		0 = Fail Safe Protection OFF 1 = Continuous Restarts, No Display 2 = Continuous Restarts, With Display 3 = 3 Failures w/Display, Reset Required
U 7	Fahrenheit or Celsius Temperature Display	0		0 = °F 1 = °C
U 8	Not Used	-		-
U 9	Reversed Fan Speeds During Heating	1		0 = Fan speed decreases as set point is approached. 1 = Reversed Fan Speeds
U10	Continuous Fan Operation or Cycle Fan with Compressor	1		0 = Cycle Fan with Compressor 1 = Continuous Fan Operation
U11	Reverse Cycle or Electric Heat Option Installed	0		0 = Reverse Cycle Heat 1 = Electric Heat
U12	Fan Motor Type Selection	Set at Factory		0 = Shaded Pole Fan Motor 1 = Split Capacitor Fan Motor
U15	De-Icing Cycle	0		0 = Off, 1 = One Minute 2 = Two Minutes, 3 = Three Minutes

* Specific default settings for cool only a/c units (no heat option installed) should not be changed.

** Default parameter settings may be reprogrammed by user, enter new default settings in this column.

U 1 OPERATING MODE: The operating mode is used to select heating, cooling, or automatic modes. Zero (0) selects automatic mode, one (1) selects cooling mode and two (2) selects heating mode. Systems that do not have heating capabilities should be programmed for cooling mode (1). The factory default is zero (0) for automatic mode for reverse cycle units or one (1) for cool only mode for units with no heat option installed.

U 2 HIGH FAN SPEED LIMIT: The high fan speed limit can be tailored to suit various motors and operating conditions. The range of values is 56 through 85 in arbitrary units. The factory default is 85.

U 3 LOW FAN SPEED LIMIT: The low fan speed limit determines the lowest output allowed for the low fan speed. The range of values is 30 through 55 in arbitrary units. The factory default is 50.

Both the high and low fan limits may be adjusted as follows: While the system is off, start the fan by pressing and holding the FAN button until the number “1” appears in the display. Enter the program mode while the fan is running and select “U2” or “U3”. Raising and lowering the fan limits while the fan is running allows the programmer to experience fan speed changes as they are made. Once the high and low fan speed limits are set, the system will automatically reprogram itself to produce six equally spaced fan speeds between them.

U 4 COMPRESSOR STAGING TIME DELAY: The compressor staging time delay is provided for use where more than one a/c system is being operated from the same power source. Setting the staging delays at different intervals allows for only one compressor to start at a time to lessen the amperage load on the power source. 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 for reverse cycle units or one hundred thirty five (135) seconds for units with no heat option installed.

U 5 TEMPERATURE CALIBRATION: Use this feature to calibrate the air sensor within a range of $\pm 10^{\circ}\text{F}$. The factory default is 0°F .

U 6 COMPRESSOR FAIL-SAFE PROTECTION: This feature is provided to monitor the refrigerant circuit. When a high head pressure condition occurs the display will flash “HHH”, when the refrigerant system is low on pressure “PPP” will flash only if the optional low pressure switch is installed. This display indicates that the system requires maintenance. See the troubleshooting guidelines in this manual. The factory default is three (3). The four parameter settings are:

Zero (0): Turns off all protection, no action is taken and no message displayed.

One (1): No message displayed with 90 seconds between continuous restarts.

Two (2): Message displayed with 90 seconds between continuous restarts.

Three (3): Message displayed with three 90 second restarts, manual reset is required.

U 7 FAHRENHEIT OR CELSIUS TEMPERATURE DISPLAY: The PASSPORT II can display temperature in either degrees Fahrenheit ($^{\circ}\text{F}$) or degrees Celsius ($^{\circ}\text{C}$). Setting to zero (0) displays $^{\circ}\text{F}$ and setting to one (1) displays $^{\circ}\text{C}$. The factory default is zero (0).

U 8 NOT USED

U 9 REVERSED FAN SPEEDS DURING HEATING: During normal operation in the cooling mode with the fan speed set to “A” (automatic), the fan speed is reduced as the set point temperature is approached. During heating, this is not always the preferred method of operation. When this parameter is set to one (1), the fan speed will increase as the set point is approached during heating. This will reduce head pressure by increasing airflow across the coil as the set point is approached. Setting the parameter to zero (0) will cause the fan speed to decrease as the set point is approached during heating, as it does in the cooling mode. The factory default is one (1).

U10 CONTINUOUS FAN OPERATION OR CYCLE FAN WITH COMPRESSOR: The fan can be programmed to run continuously while the system is on, or can be allowed to cycle with the compressor. When cycled with the compressor, the fan will only operate when cooling or reverse cycle heating is called for. To cycle the fan with the compressor, select zero (0). To operate the fan continuously, select one (1). The factory default is one (1).

GENERAL TROUBLESHOOTING GUIDELINES

Also see specific a/c control troubleshooting sections following these general guidelines.

FAULT	POSSIBLE REASON	CORRECTION
Will not start.	A/C circuit breaker is off.	Turn circuit breaker on at ship's panel.
	Control is not turned on.	See control operation section in this manual.
	Wrong wiring at terminal strip.	Check wiring diagram and correct if necessary.
	Push-on butt connectors became disconnected during installation.	Disconnect power supply and open electric box, check wiring diagram, correct if necessary.
	Input line voltage is insufficient.	Check power source (shore/generator) for proper voltage. Check wiring and terminals for proper sizes and connections.
Fan is not running.	Check your specific control troubleshooting section.	
No cooling or heating.	Temperature set point is above (in cooling) or below (in heating) ambient temperature.	Lower or raise set point
	Obstructed seawater flow.	Clean seawater strainer. Check for obstructions at speed scoop thru-hull inlet. Check for a good steady flow from the overboard discharge.
	Seawater pump may be air-locked.	Remove hose from pump discharge to purge air from line.
	Loss of refrigerant gas.	Check a/c unit for refrigerant oil leakage, call service technician (see back of manual).
	Seawater temperature too high for cooling or too low for heating.	Seawater temperature will directly affect the a/c unit's efficiency. This a/c unit can effectively cool your boat in water temperatures up to 90°F and heat (if reverse cycle option is installed) in water as low as 40°F. Switch to electric heat if installed.
	Coil is iced (in cooling).	See below.
	Fan is not running.	See below.
	Pressure switch or thermal overload opened.	Check your specific control troubleshooting section.
No heating.	Unit is "cool only" not reverse cycle.	Install optional electric heat; contact your dealer for details.

GENERAL TROUBLESHOOTING GUIDELINES CONTINUED

FAULT	POSSIBLE REASON	CORRECTION
Low airflow.	Air flow is blocked.	Remove any obstructions in return air stream. Clean return air filter and grille. Check for crushed or restricted ducting, ducting must be as straight, smooth and taut as possible.
	Coil is iced.	See below.
Coil is iced.	Thermostat set point is too low.	Raise set point.
	Improper air flow.	Remove any obstructions in return air stream. Clean return air filter and grille. Check for crushed or restricted ducting, ducting must be as straight, smooth and taut as possible.
	Supply air is short-cycling.	Redirect supply air so that it is not blowing into the return air stream. Seal any air leaks on duct.
	Seawater temperature is below 40°F.	Shut down system to prevent damage to condenser. Allow coil to defrost (see below).
	Humidity level too high.	Close hatches and doors.
	When all else fails.	Switch a/c to heat until ice melts or use hair dryer to melt ice.
	Check your specific control troubleshooting section.	
System runs continuously.	Set point temperature is improperly set: too low for cooling or too high for heating.	Raise or lower set point.
	Porthole or hatches open.	Close all port holes and hatches.
	Seawater temperature too high for cooling or too low for heating.	Seawater temperature will directly affect the a/c unit's efficiency. This a/c unit can effectively cool your boat in water temperatures up to 90°F and heat (if reverse cycle option is installed) in water as low as 40°F. Switch to electric heat if installed.
	Improper air sensor location.	Check your specific control troubleshooting section.

PASSPORT II DIGITAL CONTROL TROUBLESHOOTING GUIDELINES

FAULT	POSSIBLE REASON	CORRECTION
Passport II display panel is not lit.	8-pin display cable plugs are not making contact (unplugged, dirt, bent, or broken pins).	With POWER OFF at the circuit breaker, remove connector and inspect. If damaged, replace connector or entire display cable.

PASSPORT II DIGITAL CONTROL TROUBLESHOOTING GUIDELINES CONT.

FAULT	POSSIBLE REASON	CORRECTION
Fan is not running.	Passport II is programmed for fan cycling with compressor.	Reprogram parameter U10 to 1 so fan will run continuously while unit is on.
Fan runs continuously.	Passport II is programmed for continuous fan operation.	Reprogram parameter U10 to 0 for fan to cycle with compressor.
Fan is not running but compressor is.	Failed triac on Passport II circuit board.	Send for repair or call local service technician (see back of book).
Fan runs continuously although it is set to cycle w/compressor.	Failed triac on Passport II circuit board.	Send for repair or call local service technician (see back of book).
No cooling or heating.	Passport II programmed for heat or cool only.	Reprogram parameter U1 for appropriate mode: cooling, heating or auto.
	"HHH" or "PPP" is displayed on Passport II panel.	See below.
No heat.	Electric heat option not operating properly with Passport II.	The Passport II circuit board has a 6 amp relay for reverse cycle, if electric heat is installed, a contactor must be used to carry the heater current. Check wiring and see programmable parameter U11.
	Electric heater thermal overload is open or fuse is blown.	Check that fan is running properly while in heat mode. Check fuse.
Unit switches to heat while in cool mode.	Passport II de-icing feature enabled due to coil icing up.	Reprogram parameter U15. If coil is iced, see below.
Coil is iced.	Improper air flow.	Remove any obstructions in return air stream. Clean return air filter and grille. Check for crushed or restricted ducting, ducting must be as straight, smooth and taut as possible.
		Read Passport II programmable parameter U15 and reset. If de-icing cycle does not melt ice, switch a/c to heat until ice melts or use hair dryer to melt ice.
		If problem persists program low fan speed parameter U3 for maximum value (55).

PASSPORT II DIGITAL CONTROL TROUBLESHOOTING GUIDELINES CONT.

FAULT	POSSIBLE REASON	CORRECTION
"HHH" is displayed on Passport II.	High-pressure switch is open (in cooling) due to improper seawater flow.	Strainer or intake may be plugged, seacock may be closed, check seawater hose for kinks or collapses. Verify pump operation; check pump circuit breaker if applicable.
"PPP" is displayed on Passport II.	Low-pressure switch is open due to low seawater and/or low return air temperatures.	Try restarting the a/c unit, the optional low pressure switch has a ten minute time delay that may be in effect.
	Low pressure switch is open due to loss of refrigerant.	Check a/c unit for refrigerant oil leakage, call service technician (see back of manual).
System runs continuously.	Improper Passport II air sensor location.	Verify display head location with criteria found in this manual. Install alternate air sensor if necessary.
"AAA" is displayed.	Indicates failed face plate air sensor, alternate air sensor or display cable	Unplug alternate air sensor if installed or plug in alternate air sensor if not installed. Try another display cable.

MCP MECHANICAL CONTROL PANEL TROUBLESHOOTING GUIDELINES

FAULT	POSSIBLE REASON	CORRECTION
Fan is not running.	MCP system switch is not set properly	Set MCP system switch to "START" for fan only or "RUN" for cooling and heating.
	MCP fuse blown.	Replace 10 amp fuse behind MCP panel.
No cooling or heating.	High-pressure switch is open (in cooling) due to improper seawater flow.	Strainer or intake may be plugged, seacock may be closed, check seawater hose for kinks or collapses. Verify pump operation. Check pump circuit breaker if applicable.
	High pressure switch open (in heating) due to improper air flow.	Remove any obstructions in return air stream. Clean return air filter and grille. Check for crushed or restricted ducting, ducting must be as straight, smooth and taut as possible.
	Compressor's thermal overload is open due to either of the above two reasons.	Compressor needs to cool down. Turn system off for a while (it may take up to three hours to reset thermal overload).
System runs continuously.	Improper MCP air sensor location.	Verify return air sensing bulb location with criteria found in this manual.

MAINTENANCE

Seawater Strainer

Insure that your pump receives adequate seawater flow by regularly cleaning the strainer basket. Periodically check the overboard discharge for a steady stream of water. Check seawater intake speed scoop for obstructions. Make sure hoses are not looped, kinked or crushed.

Seawater Pump

If the capacity of your air conditioning system is greater than 24,000 BTU/hr, the seawater pump is most likely air-cooled and will need occasional oiling. See manufacturer's labeling on the pump for maintenance instructions.

Condenser Coil Cleaning

1. With the system turned off at the circuit breaker on the ship's panel, disconnect the inlet and outlet connections of the condenser coil.
2. Use chemical resistant hoses (MAS white PVC 5/8" I.D., etc.) to connect the inlet of the condenser coil to the outlet of a chemical resistant, submersible pump (MAS P-500 pump, etc.) and let the hose connected to the coil outlet flow freely into the container mentioned below.
3. Place a strainer or piece of screen over the inlet of the pump and submerge the pump into a container filled with a 5% solution of muriatic or hydrochloric acid and fresh water or use a premixed over-the-counter solution. Use as large a container as possible to hold the solution (5-25 gal.). **Caution:** avoid spilling or splashing the solution. Follow all warnings and recommendations given by the manufacturer of any acids or pre-mixed solutions.
4. Power the pump and circulate the solution through the condenser coil for 15-45 minutes depending upon the size of the coils and the extent of the contamination. Visual inspection of the solution in the container should indicate when contamination removal has stopped.
5. Circulate fresh water through the coil to flush any residual acid from the system.
6. Restart the system and check operational parameters to ensure thorough cleaning has taken place. Additional cleaning(s) may be necessary with extreme contamination.

Warning: For the purpose of protecting the environment, dispose of any contaminated acid solutions in accordance with federal, state and/or local regulations.

Return Air Filters

Check the return air filter about once a month and clean as necessary. To clean the filter, remove it from the unit/grille, rinse with water, air dry and reinstall.

Winterization

There are several methods of winterization, some of which work better than others. The four various methods employed using a 50/50 non-polluting biodegradable anti-freeze/water solution are:

1. Pumping of anti-freeze solution into the overboard thru-hull fitting, and discharging through the intake thru-hull fitting.
2. Use of the seawater pump to pump anti-freeze solution through the system and discharging through the overboard thru-hull fitting. Close sea cock, remove hose from strainer discharge, raise hose above pump (so pump does not lose its prime) and pour in anti-freeze solution. Pump solution through system. The strainer and hose to sea cock will also need to be drained of water.
3. Use of pressurized air injected at the overboard discharge fitting and the water being discharged through the seawater intake fitting.
4. Use of pressurized air to force water from the intake through the overboard discharge.

Any method that causes the anti-freeze solution to flow downward is the method of choice. By this means, the anti-freeze solution will displace any water trapped and eliminate the possibility of freezing in hidden areas. In addition, since the seawater pump utilizes a magnetically driven impeller, the impeller should be removed from the wet end assembly, wiped with an alcohol solution, and stored in a warm, dry area until commissioning takes place.

Note: Collect all discharged liquids and recycle or dispose of in a proper manner.

MANUFACTURERS LIMITED WARRANTY AGREEMENT

The following warranty is extended to cover marine air conditioners manufactured or supplied by **Marine Air Systems, Inc. (MAS)**, and is subject to qualifications indicated. **Marine Air Systems, Inc.** warrants for the periods set forth below that products manufactured or supplied by it will be free from defects in workmanship and material, provided such products are installed, operated, and maintained in accordance with Marine Air Systems' written instruction.

ALL IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE TERMS AND PERIODS OF WARRANTY SET FORTH BELOW AND, TO THE EXTENT PERMITTED BY LAW, ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED.

Warranty with the Passport II digital control (Coverage applies to units manufactured on or after 01/01/98 and applies only to units equipped with Passport II from the MAS factory.): Components comprising of the Passport II circuit boards, display heads and associated cables are warranted for a period of three (3) years from the date of installation, but not to exceed four (4) years from the date of manufacture at the Marine Air Systems factory. All other components comprising a complete system (excluding pumps and pump relay panels) on a new installation are warranted for a period of two (2) years from the date of installation, but not to exceed three (3) years from the date of manufacture at the Marine Air Systems factory. Pumps and pump relay panels are warranted for a period of one (1) year from the date of installation, but not to exceed two (2) years from the date of purchase. OEM installed equipment warranties begin with the purchase of the vessel, not from the date of installation.

Warranty with MCP (Mechanical Control Panel) control:

Components comprising a complete system on a new installation are warranted for a period of one (1) year from the date of installation, but not to exceed two (2) years from the date of manufacture at the Marine Air Systems factory. OEM installed equipment warranties begin with the purchase of the vessel, not from the date of installation.

In addition, Marine Air Systems will pay labor costs and travel as outlined in its **Schedule of Limited Warranty Allowances** for removal and reinstallation of such components for a period of one (1) year from the date of installation, but not to exceed two (2) years from the date of manufacture at the Marine Air Systems factory. OEM installed equipment warranties begin with the purchase of the vessel, not from the date of installation. Warranty will be paid in accordance with our established schedule of allowances. Compensation for warranty repairs is only made to MAS authorized service companies.

Marine Air Systems will repair, or replace at its option, components found to be defective due to faulty materials or workmanship, when such components, examined by an authorized service dealer or a factory service representative, are found to have a defect for which the company is responsible. **Refer to Manufacturer's Limited Warranty Policy for complete coverage and exclusions.** Replacement components are warranted for the duration of the remaining warranty period in effect on the original component.

This limited warranty is extended in lieu of all other warranties, agreements or obligations, expressed or implied, concerning Marine Air Systems' components. This warranty is extended only to the original purchaser and is not transferable. This warranty shall be governed by the laws of the State of Florida and gives the original first end user definite legal rights.

This warranty does not cover damages incidental and or consequential to the failure of Marine Air Systems' equipment including but not limited to; normal wear, accident, misuse, abuse, negligence or improper installation, lack of reasonable and necessary maintenance, alteration, civil disturbance or act of God.

No person or dealer is authorized to extend any other warranties or to assume any other liabilities on Marine Air Systems' behalf, unless made or assumed in writing by an officer of Marine Air Systems.

WORLDWIDE DEALER/SERVICE NETWORK 2000

Country	State	City	Company Name	Phone
Argentina		Buenos Aires	Baron	(54) 1 746 9600
Australia		Brisbane	Seairland Systems, Inc.	(61) 7-3268-7511
Bahamas		Nassau	Freezing Point	(242) 325-3589
Bermuda	HM MX	Hamilton	Bermuda Auto/Marine Elec	(441) 297-2817
Brazil			Mar-Center Compl Imp Ltda	
Brazil	Amazonas	Manaus	Nashira Enterprises	(55) 92-654-2457
Brazil		Manaus, Am	OR Trading	(092) 622-4242
Brazil		Sao Paulo	Mar-Center Compl Imp Ltda	(55) 11-229-7196
Brazil			SUL Nautica Ltda	55-51-241-0974
BVI		Tortola	BVI Marine Management	(284) 494-2938
BVI		Tortula	C & G Refrigeration	(284) 776-0038
Canada	Ontario	Burgessville	Can-Do Sports	(519) 424-2163
Canada	Ontario	Midland	Bay Port Marine Ltd	(888) 229-7678
Canada	Ontario	Rockport	Ed Huck Marine	(613) 659-3408
Canada	British Columbia	Richmond	Airon Heating & Air Conditioning	(604) 270-2040
Canada	Laual, Quebec	Ste-Dorothee	Dupuis Marine	(514) 689-4232
Canada	Ontario	Keswick	Northland Supply Co	(905) 476-7731
Canada	Ontario	Keswick	Crate Marine Sales	(905) 476-4552
Canada	Ontario	Maple	Skyline Marina	(905) 832-8333
Canada	Ontario	Port Credit	Bristol Marine Ltd	(905) 891-3777
Canada	Ontario	Port Severn	Scobie Yacht Services, Inc.	(705) 538-0134
Canada	Quebec	St. Paul de Ille-Aux-Nois	Marina Gagnon	(514) 291-3336
Canada	British Columbia	Vancouver	Summer Equipment	(604) 873-4545
Canada	Ontario	Coldwater	Watt Marine Specialists	(705) 686-3434
Canada	Ontario	Mississauga	Dac's Mobile Marine	(905) 274-6431
China	Beijing	Chaoyang District	Flash Marine	86 10 64671962
Cyprus	4103	Limassol	Tuti Mare Trading	(35) 75431313
Dominican Rep.		Santo Domingo	Baez & Rannik	(809) 562-3353
Dubai		Dubai	HFL Mantech-Dubai	(971) 4-3332-542
England	Devon	Plymouth	Ocean Marine	(44) 17 525 00121
England	Middlesex	Enfield	HFL Marine Int'l Ltd	(44) 181-805-9088
England	Surrey	Charsholton	London City Services	(44) 181-773-2095
Ecuador	Quito	P.O. Box 17-01-0069	Quassar Nautica, S A	(593) 2-446-996-997
Egypt	Cairo	Abasia	Engineering Air	202 4829341
France	Mandelieu Cedex	De LA Siagne	Waeco-France	(33) 492194100
France		06800 Cagnes Sur Mer	Hydro Froid	(33) 40-92-15-84
France			Tech 'Plaisance	(33) 94-64-72-00
Germany	Dusseldorf	D-40468	HFL Marine International Ltd	(49) 211 4230313
Gibraltar			The Yachtsman Chandlery	(350) 70252
Greece	Piraeus		Pollfrost Technical, Ltd	0030 1 4613370
Greece	Piraeus	Athens	Aegean Diesel Electric Ltd	0030-1-4222484
Holland		Spakenburg	Heinen & Hopman Eng. Bv.	(31) (0)33 2992500
Hong Kong	Sai Kung	Sai Kung	Piercey Marine Limited	(852) 2791-4106
India	Calcutta		Heinen & Hopman Eng Ind. Ltd.	(91) 33. 543. 9264
India	Mumbai		Heinen & Hopman India Ltd.	(91) 22 834 8923
Israel			Keshet Yami Ltd.	(972) 3-960-3460
Italy		Milano	Condaria S R L	(2) 3902 2617 2583
Japan	Osaka	Kita-Ku	Tominaga & Company Ltd	(81) 66365-5010
Kuwait			Sammari Marine Est	(965) 573.2767
Malta		Taxbix	Inmartech Ltd	(356) 320-577
Martinique-FWI		Marin	Caribes Distribution	0596 257292
Mexico	BCS	Cabo San Lucas	Climas De California	90 114 86 653
Mexico	GRO	Acapulco	Pacific Southwest Marine	74 82 2084
Mexico	JAL	Puerto Vallarta	Scorpio P V,	322-10555
N.A.	St. Maarten		Tropicold Systems Engineering	(599) 542 648
N.A.	St. Maarten	Simpson Bay	Necol N.V. Technical Services	(599) 523/4
New Zealand	Auckland		Whiting Power Systems	649-3582050
Portugal	1000 Lisbon		Coqema	(351) 1-556-843
Puerto Rico		Puerto Real	Technomarine	(787) 863-0614
Puerto Rico		Ocean Park	Sun Cool Air Conditioning	(787) 727-6370
Saudi Arabia			Samaco Marine	(966) 2-699-0064
Scotland	Ayrshire	Troon	Boat Electric Ltd	(44) 1292-31-5355
Singapore			Marina Yacht Services	(65) 862-4320
Slovenia Europa	1000 LJUBLJANA		L JUBLJANA	(38) 661 339541
Spain	De Mallorca		Servnautic	(34) 71 45 8747
Spain	Mallorca	07200 Felanx	Ocean Marine	(34) 71-65-9049
Spain		Barcelona	Techno Electronica Naval, S A	34 (93)664 49 70
Spain			Rod Ritol SA	33 (28) 461 384
Spain	Cadiz	Puerto Real	Frio-Clima Valentin, S.L.	956560980
Spain	Ibiza	Ibiza	Electro Francisco	(34) 71-31-4385
Spain	P Mallorca	Palma Mallorca	Ferdicold, S.L.	971280670
Sweden	Alvesta	342 32	S A L T. Sea Life	(46) 47-216-600
Taiwan		Kaohsiung	Mercury Marine Supply Co	(886)7-331-7293
Turkey		Istanbul	Egamar	(0216)446 32 79
Turkey		Istanbul	KAREDA/THALAT UE/HRACA	(212) 266 7261
USA	AL	Foley	Cline's Marine Service	334-965-3526
USA	AL	Mobile	Doq River Marina	(334) 471-5449
USA	AL	Mobile	Hill Marine Refrigeration	334-432-1625
USA	AL	Foley	Blue Water Ship's Store	334-943-4179
USA	AL	Guntersville	Aired Marine	(256) 582-4400
USA	AL	Mobile	Middletown Marine	(334) 478-4432
USA	AL	Mobile	Turner Marine Supply	(334) 476-6772
USA	AL	Orange Beach	P & D Marine Service Inc	334-981-6431
USA	AL	Orange Beach	Saunders Yacht Works	334-981-3700

Country	State	City	Company Name	Phone
USA	AR	Flippin	Ozark Marine	870-453-2217
USA	AR	Mt. Ida	Harbors Marine Specialties	
USA	AR	Scott	Marine & Industrial Service	501-961-2869
USA	AZ	Flagstaff	Monte Vista Marine, Inc	(520) 526-5600
USA	AZ	Mesa	Precision Marine	602-986-0969
USA	AZ	Mesa	Weather Masters	(602) 832-9659
USA	AZ	Page	Blue Star Enterprises	(520) 645-5413
USA	CA	Alameda	Anderson Refrigeration	(510) 521-3111
USA	CA	Costa Mesa	Easy Marine	949-631-0142
USA	CA	Los Angeles	West Coast Marine Electronics	(310) 636-8400
USA	CA	San Diego	A to Z Marine	(619) 224-1606
USA	CA	Sausalito	Edinger Marine Service	(415) 332-3780
USA	CA	Costa Mesa	Thomas Gillett Refrigeration & A/C	(949) 650-5448
USA	CA	Long Beach	Long Beach Marine Electric	(562) 594-0959
USA	CO	Denver	Mike's Marine	303-778-7400
USA	CO	Grand Junction	Ultra Marine	800-990-9608
USA	CT	Essex	Brewer's Dauntless Shipyard	(860) 767-2483
USA	CT	Essex	Essex Boat Works	(860) 761-8276
USA	CT	Niantic	Port Niantic Marine	(860) 736-2155
USA	CT	Noank	Spicer's Marina	(860) 536-4978
USA	CT	Old Lyme	Old Lyme Marina	(860) 434-1271
USA	CT	Southbury	Ship Shape Inc	(203) 264-9566
USA	CT	Stamford	Brewer's Special Products	(203) 359-4500
USA	CT	Stonington	Dodson Boat Yard	(860) 535-1507
USA	FL	Cape Coral	Tropica Boats & Marine Inc.	800-263-5677
USA	FL	Cocoa Village	Bottoms Up & Down the Hatch	(407) 636-1933
USA	FL	Destin	Walker Marine	(850) 837-9711
USA	FL	East Palatka	Barton Marine	(904) 825-7448
USA	FL	Englewood	Sea Tech Refrigeration & A/C	(941) 473-9344
USA	FL	Ft. Lauderdale	ARW Maritime	(954) 463-0110
USA	FL	Ft. Lauderdale	Beard Marine Ft. Lauderdale	(954) 463-2288
USA	FL	Ft. Lauderdale	Cable Marine	(954) 462-2840
USA	FL	Ft. Lauderdale	Chincock Marine	(954) 763-2250
USA	FL	Ft. Lauderdale	Neptune Air Corporation	(954) 463-3005
USA	FL	Ft. Walton Beach	Emerald Air Service	(850) 244-0732
USA	FL	Jacksonville	Southern Marine	(904) 743-6670
USA	FL	Jacksonville	Commercial Refrigeration	(904) 387-6110
USA	FL	Lake Paru	Cowherd Marine	(561) 844-1666
USA	FL	Lighthouse Point	Sea Breeze Marine	(954) 427-3843
USA	FL	Lynn Haven	Divng & Cooling Services	(850)932-4283
USA	FL	Miami	A-Sea Marine	(305) 856-8600
USA	FL	Miami	Masters Marine Center Inc.	(305) 891-1238
USA	FL	Miami	Thomas Marine Systems	(305) 635-2062
USA	FL	Ormond Beach	Chris Brown Marine	(904) 873-5965
USA	FL	Panama City Beach	Treasure Island Marina	(850) 234-6533
USA	FL	Pensacola	Climate Control	(850) 433-2323
USA	FL	Pensacola	NW Florida Mechanical Service	(850) 436-2665
USA	FL	Pensacola	Williams Marine Service	(904) 432-5543
USA	FL	Pinellas Park	IYS Marine	(727) 521-6650
USA	FL	Pompano Beach	A A Mabru, Inc	954-970-3313
USA	FL	Port Charlotte	Jim's Marine A/C	(941) 629-8788
USA	FL	Port St. Lucie	Marine Air Conditioning	(561) 464-7896
USA	FL	Riviera Beach	Beard Marine of the Palm Beaches	(800) 348-9637
USA	FL	St. Augustine	Technical Services	(904) 823-8779
USA	FL	Vero Beach	Heiseth Machine & Marine	(561) 567-9552
USA	FL	West Palm Beach	Palm Beach Aquas Air	(561) 832-8820
USA	FL	Daytona Beach	Ferranti Services	(904) 254-0465
USA	FL	Ft. Lauderdale	Sukawa, Inc	(954) 462-8355
USA	FL	Jacksonville	Marine Consultants Service	888-723-0823
USA	FL	Niceville	Holt-Phillips Services, Inc.	850-892-5559
USA	FL	Southport	Harris Marine	850-285-2174
USA	FL	Hollywood	Nautical Systems	(954) 525-2477
USA	FL	Marathon	Sea Air Land Technologies	(305) 289-1150
USA	FL	Sebastian	Ty Cobb Services, Inc.	(561)388-5966
USA	GA	Savannah	Beard Marine Savannah	(800) 286-2674
USA	GA	Loganville	Coastal Marine Service	(770) 297-8565
USA	GA	Savannah	C. E. Donnelly Company	(912) 897-1572
USA	HI	Honolulu	Cosco	(808) 845-2234
USA	IA	Dubuque	Giese Sheet Metal Co.	(319) 589-2023
USA	IL	Channahon	Steve's Marine Service	(815) 467-7884
USA	IL	Ottawa	Starved Rock Marina	(815) 433-4218
USA	IL	Peoria Heights	National Marine Sales	(309) 689-5513
USA	IL	Seneca	Spring Brook Marine	(815) 357-8666
USA	IL	Park Ridge	Advance Marine Service	(847) 692-4093
USA	IL	Waukegan	Larsen Marine	(847) 336-5456
USA	IN	Michigan City	B & E Marine	(219) 879-8301
USA	IN	Merrillville	Sai-Tec Service	888-725-8321
USA	IN	Porter	TSL Refrigeration	(219) 929-4494
USA	KY	Grand Rivers	Green Turtle Bay Boat Works	(502) 362-4213
USA	KY	Grand Rivers	Kentucky Lake Sails	(502) 362-4951
USA	KY	Louisville	Clean Away	502-266-0078
USA	KY	Gilbertsville	Marine Services	(502) 362-4951
USA	LA	Harvey	Lemoin's Marine Refrigeration, Inc.	(504) 366-0903
USA	LA	Houma	LeBlanc & Associates	(504) 876-7982

WORLDWIDE DEALER/SERVICE NETWORK 2000

Country	State	City	Company Name	Phone
USA	LA	Mandeville	Triple S Marine	504-626-8392
USA	LA	New Orleans	Schubert's Marine	(504) 282-8136
USA	LA	New Orleans	Sea Chest Marine Distributors	(504) 289-8431
USA	LA	Patterson	Johnston Brothers Enterprises, Inc.	(800) 256-2184
USA	LA	Slidell	Bonnet & Associates, Ltd	(504) 649-6909
USA	LA	Sulphur	Trouth A/C & Heating	(318) 527-8683
USA	MA	Falmouth	MacDougalls/Cape Cod Marine Services	(508) 548-3146
USA	MA	Gloucester	Cape Ann Marine Sales & Service	(978) 283-0806
USA	MA	Marblehead	Boatworks Marine Electronics & Refrigeration	(718) 631-7565
USA	MA	Nantucket	Ken Wiggins A/C & Heating Services	(508) 228-4144
USA	MA	Plymouth	Brewers Plymouth Marine	(508) 746-4500
USA	MA	Salem	Fred J. Dion's Yacht Yard	(978) 744-0844
USA	MA	Salem	Winter Island Yacht Yard	(508) 745-3797
USA	MA	Vineyard Haven	Martha's Vineyard Shipyard	(508) 693-0400
USA	MD	Annapolis	Coastal Climate Control, Inc	(410) 268-2123
USA	MD	Annapolis	J Gordon & Company, Inc.	(410) 263-0054
USA	MD	Baltimore	Air Conditioning & Marine Services	(888)766-2653
USA	MD	Baltimore	Sherrord Marine	(410) 752-2870
USA	MD	Baltimore	Tidewater Yacht Service	(410) 625-4992
USA	MD	Chestertown	Looking Glass Marine	(410) 778-3627
USA	MD	Easton	Comfort Air Service	(410) 820-7219
USA	MD	Edgewater	Ocean Options - Mid Atlantic	(410) 266-8033
USA	MD	Fort Washington	Marine Services	(301) 292-0840
USA	MD	Galesville	Hartge Yacht Yard	(410) 867-2188
USA	MD	Georgetown	Georgetown Yacht Basin	(410) 648-5112
USA	MD	Lusby	Drum Point Marine	(410) 326-3256
USA	MD	Northeast	McDaniel Yacht Basin, Inc	(410) 287-8121
USA	MD	Oxford	Crockett Bros Boatyard	(410) 226-5113
USA	MD	Oxford	Oxford Boatyard	(410) 226-5101
USA	MD	Rock Hall	Haven Harbor Marina	(410) 778-6697
USA	MD	Solomons	Zahniser's Yachting Center	(410) 326-2186
USA	MD	Tracy's Landing	Heron Integrated Marine Systems	(301) 261-5085
USA	ME	Camden	Wayfarer Marine Corp	(207) 236-4378
USA	ME	Portland	River Valley Boatworks, Inc.	(207) 767-6188
USA	ME	Rockland	Ocean Pursuits	(207) 596-7357
USA	ME	Southwest Harbor	M. L. Pettegrow	(207) 244-5082
USA	ME	Southwest Harbor	The Hinkley Company	(207) 244-5572
USA	ME	Stonington	Billings Diesel	(207) 367-2328
USA	ME	Thomaston	Lyman Morse Boatbuilding	(207) 354-6904
USA	ME	West Southport	BoothBay Region Boatyard	(207) 633-2970
USA	MI	Bay City	Bay Harbor Marine	(517) 684-5901
USA	MI	Cheboygan	Walstrom Marine	(616) 627-7105
USA	MI	Grand Haven	Reaume Heating & Cooling	(616) 842-5672
USA	MI	Macatawa	Eidean Shipyard	(616) 335-5843
USA	MI	St. Clair Shores	Midwest Marine Supply	(810) 778-8950
USA	MI	St. Clair Shores	Nautic Air	(810) 774-0527
USA	MI	New Buffalo	Oseika's Snug Harbor Marine	(616) 469-2600
USA	MO	Branson	The Harbor	417-338-2828
USA	MO	Gravois Mills	Reitz Heating & Cooling	(573) 374-5115
USA	MO	Kimberling City	Specialized Marine Sales	417-739-4261
USA	MO	Lake Ozark	Mobile Marine - Lake Ozark	573-964-6555
USA	MO	Lake Ozark	Ozark Powerboat, Inc	573-365-2332
USA	MO	Lake Ozark	Port Arrowhead Marine	(573) 365-5382
USA	MO	Osage Beach	Kelly's Port Inc	573-372-5100
USA	MO	Osage Beach	Moorings Marine Service Inc	573-348-2111
USA	MO	St. Charles	KKK Services, Inc.	(314) 946-3906
USA	MO	St. Charles	Lane's Refrigeration	314-447-6770
USA	MO	St. Louis	Burg Heating & Cooling	314-849-4671
USA	MO	Stockton	Spurgeons Port-O-Call	417-276-5101
USA	MS	Columbus	Columbus Marina	(662) 327-8450
USA	MS	Diberville	Radich Refrigeration Inc	228-392-3773
USA	MS	Fulton	Midway Marina	601-862-7306
USA	MS	Iuka	Aqua Yacht Harbor	(601)423-2222
USA	MS	Long Beach	Patterson Ice Machines	(228) 865-9277
USA	MS	Luka	Lee Spray Marine	601-424-9577
USA	NC	Beaufort	Island Marine	252-726-5706
USA	NC	Belhaven	River Forest Manor and Marina	252-943-6602
USA	NC	Belhaven	Robb's Boatyard and Marina	252-943-2110
USA	NC	Concord	Cool Breeze Marine	(704) 788-2975
USA	NC	Edenton	Boat Doc	800-849-9912
USA	NC	Hatteras	Air Waves	(252) 986-2757
USA	NC	Manns Harbor	Jack's Electric	(252) 473-1270
USA	NC	Morehead City	Atlantic Refrigeration Company	(252) 726-1565
USA	NC	Nags Head	Griffin Marine, Inc	252-473-1422
USA	NC	New Bern	Farebee Marine Service	(252) 633-1740
USA	NC	Newport	Land & Sea HVAC/ Refrigeration, Inc	252-247-0100
USA	NC	Washington	East Carolina Yacht Services	252-975-2046
USA	NC	Washington	McCotters Marine	252-975-2174
USA	NC	Wilmington	Martin's Marine	800-849-7731
USA	NC	Wrightsville Beach	Coastline Marine	(910) 791-0410
USA	NJ	Bayville	Atlantic Marine Supplies & Service Inc	(732) 341-7600
USA	NJ	Delran	Holland Air Conditioning	(609) 461-1332
USA	NJ	Dorothy	Michael's Marine Electrical	(609)476-3232
USA	NJ	Manalapan	Anchor Air Systems, Inc.	(732) 446-8600

Country	State	City	Company Name	Phone
USA	NJ	Teaneck	Gren Richmond, Inc.	(201) 907-0526
USA	NJ	Weehawken	Barz Marine Services	(201) 319-5100
USA	NM	Torç	Morgan Marine	505-894-3110
USA	NV	Boulder City	All Season's Marine	702-293-4499
USA	NV	Henderson	Elite Marine	702-566-2333
USA	NV	Las Vegas	Marine Center of Las Vegas	702-434-4405
USA	NY	Alexandria Bay	Vapco Refrigeration	(315) 482-3618
USA	NY	Amsterdam	Ron Bloom Marine Service	(518) 399-4766
USA	NY	Freeport	Marine Temperature Systems	(516) 623-5600
USA	NY	Mamaroneck	Ocean Air Inc	(914) 381-3023
USA	NY	New Windsor	GenTech Ltd.	(914) 567-6343
USA	NY	Ronkonkoma	Marine Specialists	(516) 580-0545
USA	NY	Tonawanda	Thermo Mechanical Services	(800) 562-0780
USA	NY	Westport	Westport Marina, Inc	(518) 962-4356
USA	NY	Rochester	Leo J. Roth Corporation	(716) 423-0100
USA	OH	Ashtabula	Ashtabula Heating & Cooling	(440) 992-2705
USA	OH	Cincinnati	Beckman Services	(513) 530-9088
USA	OH	Cleveland	Moreland Mechanical	(216) 247-7550
USA	OH	Port Clinton	Sorgen Services	(419) 734-2511
USA	OH	Toledo	Independent Stove Works	(419) 243-3103
USA	OK	Afton	Harbors View Marina	918-782-3277
USA	OK	Afton	Tera Miranda	918-257-4274
USA	OK	Afton	Thunder Bay Marina	918-782-4414
USA	OK	Fairland	All Season's Inc	918-257-5438
USA	OK	Ketchum	Hammerhead Marina	918-782-3238
USA	OK	Kingston	Catfish Bay Marina	(580) 564-2307
USA	OK	Kingston	Dupree Refrigeration	580-564-2539
USA	OR	Portland	Rodgers Marine	(503) 287-1101
USA	OR	Portland	Valley Pacific Mechanical, Inc	(503) 285-9070
USA	RI	Jamestown	Jamestown Boatyard	(401) 423-0600
USA	RI	Newport	Island Marine	(401) 423-3735
USA	RI	Portsmouth	New England Boat Works	(401) 883-6110
USA	RI	Tiverton	Ocean Options, Inc	(401) 624-7334
USA	SC	Adams Run	Marine Electric	(843) 889-3536
USA	SC	Bluffton	Yacht Services	(843) 837-2976
USA	SC	Charleston	Atlantic Boat ACR, PMB#134	(843) 402-0220
USA	SC	Charleston	Cannon Auto Electric	(843) 849-1702
USA	SC	Hilton Head	Mallen Marine	(843) 842-9335
USA	SC	Myrtle Beach	Hague Marina	(843) 293-2141
USA	SC	Myrtle Beach	Paci Aviation Services, Inc	(843) 238-7328
USA	SC	N. Charleston	Duncan's Boat Harbor	843-744-2628
USA	SC	Wadmalaw	Adams Creek Marine Inc	800-841-4617
USA	SC	Mt. Pleasant	Dickinson Marine Service	843-849-8167
USA	TN	Chattanooga	Erwin Marine	(423) 622-0821
USA	TN	Hendersonville	Drake's Creek Marina	(615) 822-3886
USA	TN	Knoxville	Travis Marine	(423) 690-6700
USA	TN	Maryville	Freedom Marine	(423) 681-2683
USA	TN	Nashville	Rock Harbor Marine	(615) 356-1111
USA	TX	Aranas Pass	Wynnger Company	(512) 758-5541
USA	TX	Austin	Windjammer Yacht Service	512-315-2423
USA	TX	Denison	Carter's Inc	903-463-2634
USA	TX	Denison	Grandpappy Point Marina	(903) 465-6330
USA	TX	Freeport	Kirby Marina	(409) 239-1081
USA	TX	Fl. Worth	Water Power Marine	817-737-7559
USA	TX	Kemah	Blue Water Ship's Store	281-334-7583
USA	TX	Kemah	Day Marine Service	(281) 334-3691
USA	TX	Kemah	Sail Tech	(281) 334-4690
USA	TX	Kemah	Ship and Sail	(281) 334-0573
USA	TX	Lewisville	Eagle Point Marine	(972) 436-6561
USA	TX	Lewisville	Marine Max	972-625-6501
USA	TX	Port Aransas	Wiggins Air Conditioning & Heating Inc	512-749-4310
USA	TX	Port Isabel	J & L Commercial	(956) 943-4601
USA	TX	Pottsboro	Loe's Highport	(903) 786-2966
USA	TX	Sanger	Lake Ray Roberts Marina	940-458-7023
USA	TX	Seabrook	Bay Water Ship's Store	281-474-5529
USA	TX	Seabrook	Lakewood Yacht Service	(281) 474-2885
USA	TX	Seabrook	AER Marine Supply	800-767-7606
USA	UT	Odgen	Petersen Marine	(801) 621-7532
USA	UT	Salt Lake City	Petersen Marine	(801) 572-6720
USA	UT	Salt Lake City	Robertson's Marine Inc	(801) 534-1111
USA	VA	Cardinal	Zimmerman Marine Inc	(804) 725-3440
USA	WA	Bellingham	Sea Freeze	(360) 733-8282
USA	WA	Mukiteo	American Marine Contractors	(425) 508-4911
USA	WA	Vancouver	Dial Service Company	(360) 253-9130
USA	WI	Green Bay	Lakeside Marina	(920) 432-2400
USA	WI	Lake Geneva	Majestic Marine	(414) 248-6128
USA	WI	Oshkosh	Lakeside Marina	(920) 231-4321
USA	WI	Sturgeon Bay	Sturgeon Bay Yacht Harbor	(920) 743-3311
USA	WI	Washburn	Pringles Refrigeration	(715) 373-5336
USVI	St. Thomas	St. Thomas	Reefco	(340) 776-0038
Venezuela SA		Complejo Turistico El Morro	Rich Marine Center	(58) 81-811630
West Indies	Antigua		Aboard Refrigeration	(268) 460-1690
West Indies	Antigua		The Signal Locker	(268) 460-1528
West Indies	St. Lucia	Castries	Electronics Ltd	(758) 452-9922



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