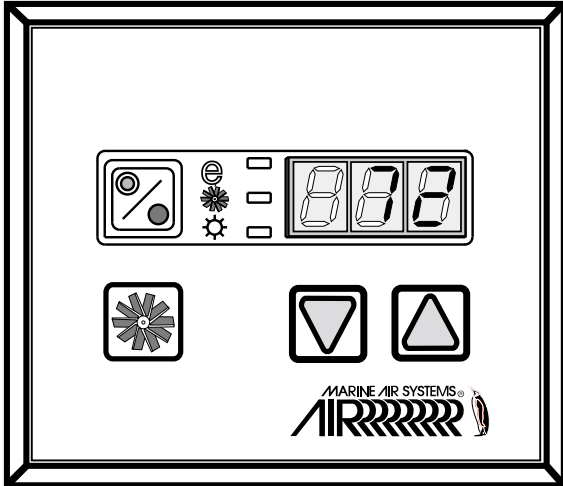


# ah-passport I/O

Operation Manual

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Every precaution has been taken in the preparation of this manual to insure its accuracy. However, Micro Air Corporation assumes no responsibility for errors and omissions. Neither is any liability assumed for damages resulting from the use of this product and information contained herein.

The **AH-Passport I/O** is designed for use with Marine Chilled Water Air Conditioning Systems.

## **STANDARD FEATURES**

User friendly 4 button display panel requires no manual for basic operation.

Five volt logic and micro controller located in the display.

3-digit 7-segment display indicates ° F or ° C.

Room temperature sensor integral in the display panel.

Automatic fan speed reduction as set point is approached.

Six [6] programmable manual fan speeds.

Thirteen (13) programmable parameters for custom installations.

Water In Sensor allowing individual cabin heating.

Humidity Mode for controlling relative humidity.

Universal AC power supply 120/240 vac 50/60Hz.

Electric Heat Chill Chaser

Nonvolatile memory retains settings without batteries.

Programmable display brightness control for night use.

## **OPTIONAL FEATURES**

The following optional items can be added by plugging the device into the appropriate jack.

Outside air temperature sensor

Alternate air temperature sensor

This manual is intended to provide information necessary to insure proper installation and operation of the **AH-Passport I/O**. Poor installation and **MISUNDERSTOOD** operating parameters will result in unsatisfactory performance and premature failure of the AH-Passport I/O.

## **READ THIS MANUAL COMPLETELY BEFORE PROCEEDING !**

If you require assistance prior to or during the installation of the AH-Passport I/O call Taylor Made Environmental, Inc. at 954-973-2477 or Fax your questions to 954-979-4414.

The **AH-Passport I/O** is covered under existing Marine Air Systems Warranty Policy. Incorrect installation, neglect and system abuse are not covered under Marine Air Systems warranty policy.

Press the ON/OFF 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.

Set the room temperature by pressing the up or down button. The set point can be viewed by momentarily pressing and releasing the up or down button.

Fan speed operation is automatic. The fan speed decreases as room temperature is approached. The fan will operate at low speed when set point is satisfied. Manual fan speeds can be selected by pressing fan and selecting the desired speed. The fan will operate at the speed selected and will not change speeds with room temperature. See page 6 of this manual for programming instructions.

The fan can be programmed to cycle on and off with the Heating and Cooling demand. Normally the automatic fan speed operation is reversed in the heating mode, however, the fan speeds can be programmed to operate the same as in the cooling mode.

### *NORMAL HEATING OR COOLING CYCLE*

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When heating or cooling is called for the water valve switches to the appropriate mode. Four [4] seconds later the automatic fan control adjusts the fan to the proper speed. When the demand is satisfied, the water valve cycles off and the fan returns to low speed. If cooling is required, the water valve will not open unless adequate cooling water is available. The fan will remain in low speed until adequate cooling water is available. If heating is required the valve will not open unless adequate heating water is available. The fan remains in low speed until adequate heating water is available. The water temperature can be viewed by simultaneously pressing the Up and Down Buttons while in the On Mode. Heat will be supplied when no heating water is available if the Optional Electric Heater [Chill Chaser] has been installed.

While in a Heating or Cooling Mode the controller will maintain a two degrees Fahrenheit (2 °F) temperature variation. A 4 degree swing is required to cause the unit to shift to the opposite mode. Once in a new mode, Heating or Cooling, AH-Passport I/O will maintain a 2 degree differential.

### *HUMIDITY MODE*

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While in the **on mode**, press the Power and Down Buttons simultaneously and the display will indicate HU1. Every four (4) hours, the fan is started and air 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 system is allowed a maximum of one hour running time to reach the desired temperature. Four (4) hours after the temperature is satisfied or the Cooling Mode times out, the cycle is repeated. During the humidity cycle the Operating LED is lit while the system is Cooling.

### *MEMORY*

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**Memory: AH-Passport I/O** has nonvolatile 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 control resumes operating as last programmed. All operating and programming parameters are entered into nonvolatile memory instantly and are retained indefinitely.

Refer to figure 1 for the buttons locations and display functions listed on the following pages.

**1. POWER BUTTON** Press and release to toggle between the **on** and **off** modes.

**2. FAN BUTTON** Press and hold to advance through the available fan settings. One through six indicates MANUAL FAN SPEEDS. One is the lowest fan speed and six is the highest speed. The letter A indicates automatic fan operation selected.

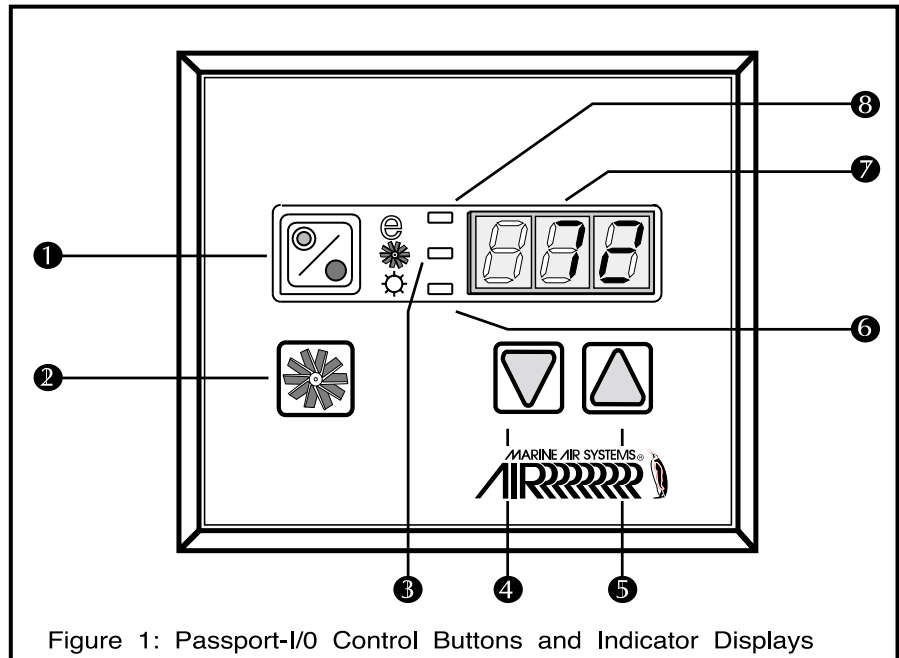


Figure 1: Passport-I/O Control Buttons and Indicator Displays

**3. FAN LED INDICATOR** The FAN INDICATOR LED is on when a manual fan speed is selected.

**4. DOWN BUTTON** Press and release to display the set point. Press and hold the DOWN BUTTON to decrease the set point. Set point is decreased one degree each time the button is depressed.

**5. UP BUTTON** Momentarily press and the set point will appear in the display. Press and release the UP BUTTON to increase the set point one degree.

**6. HEAT MODE LED** The heat mode LED is lit when the HEAT ONLY MODE is selected or the unit is in a heating cycle.

**7. THREE DIGIT 7 SEGMENT DISPLAY** The inside air temperature is displayed when the control on. The set point is displayed when either up or down button is pressed. The display also indicates program information and fault codes.

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

**8. COOL MODE LED** The cool mode LED is lit when COOLING ONLY MODE is selected or when the unit is in a cooling cycle.

**Up & Down Buttons...** Press the up and down button together to display outside air temperature while in the off mode.

**Up & Down Buttons... Press** the up and down button together to display the chilled water temperature while in the on mode.

**Fan & Down Buttons... Simultaneously** press the fan and down to blank the display for night operation.

**Pressing the UP & Down Buttons** simultaneously in the program mode sets new program defaults.

**Power & Down Buttons...** Simultaneously press the power and down buttons while in the on mode to enter the moisture mode.

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*MODES OF OPERATION*

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### *Off Mode*

When the **AH-Passport I/O** is in the **off mode**, all control outputs are turned off. Program parameters and user settings are saved in nonvolatile memory. The program mode is accessed only from the off mode.

### *On Mode*

When the control 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 **Cool only is selected** the cooling systems are operated as required. When the temperature drops below the set point, the system will **not automatically** switch to the heat mode.

### *Heating Mode Only*

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.

### *Automatic Mode*

Automatic mode provides both heating and cooling as required. The heat or cool LED will be lit according to the mode required. Temperature in a given mode is maintained at 2° F however a 4° F difference is required to allow the control to change modes. Once the mode changes temperature will be maintained within 2° F of set point.

### *Humidity Mode*

While in the **on mode** simultaneously press the power and down buttons. The first cycle will start in one minute. Every four (4) hours, the fan is started and air 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. One hour running time is allowed to reach the desired temperature. Four hours after the temperature is satisfied or the system times out, the cycle is repeated. HU1 is displayed while in the humidity mode. Press the power button to end the humidity 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. Variables such as, ducting, sensor location and system layout affect the system operation. **AH-Passport I/O** is shipped with factory programmable default settings which are stored in permanent memory and can be recalled at any time.

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### *ENTERING PROGRAM MODE*

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The program mode can **only** be entered from the **off mode**. Press and hold the power button while in the off mode until the letter "P" appears in the display. The characters "P 1" followed by the parameter setting, appear in the display. The AH-Passport I/O control is now in the program mode. **NOTE:** The control will exit the program mode and return to the **off mode** if no programming is attempted for one (1) minute.

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### *RESTORE MEMORIZED DEFAULT SETTINGS*

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**IMPORTANT !** The memorized default settings can be **restored** by entering the program mode and setting P-17 to **rSt**. Exit the program mode and the software version number appears in the display. The **memorized default settings** are restored and the AH Passport I/O returns to the **off mode**. The software version number is always displayed when you exit the program mode.

---

### *USING THE PROGRAM MODE*

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Increment from one **program parameter** to the next by pressing the **fan button** while in the **program mode**. Press and release the fan button to advance to the desired parameter. The **programmable parameters** range from P-1 through P-17.

### ***Up and Down Buttons***

The **up** and **down buttons** are used to select the desired limits for the parameter being programmed.

### ***Exiting the Program Mode***

There are two methods to exit the program mode. Press the power button and **AH-Passport I/O** will return to the **off mode**. Not pressing any buttons or attempting any program changes for one minute will allow the control to exit the **program mode**.

### ***Software Identification***

The software version of the control is identified for one (1) second prior to the exit from the program mode. The software identification number, i.e. ("A12") will appear in the display for one second, then the control will return to the off mode.

***Should there be any reason to contact Taylor Made Environmental, Inc. about the system or programming AH-Passport I/O be sure to have the software identification number and serial number available.***

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***Programmable Parameters***

There are 13 programmable parameters with 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	Operating Mode	0	0 = Automatic    2 = Heat 1 = Cool
P-2	High Fan Speed Limit (arbitrary units)	95	65 - 95
P-3	Low Fan Speed Limit (arbitrary units)	55	30 - 64
P-4	Reserved for future options		
P-5	Temperature Sensor Calibration	0	Ambient ± 10° F
P-6	Reserved for future options		
P-7	Reserved for future options		
P-8	Reserved for future options		
P-9	Reserved for future options		
P-10	Display Brightness Control	9	4 = Low 13 = Max
P-11	Display ° Fahrenheit or ° Celsius	°F	°F = Fahrenheit Displayed °C = Celsius Displayed
P-12	Reserved for future options		
P-13	Reverse Fan Speeds During Heating Mode	rEF	nor = Normal Fan Operation rEF = Reversed Fan In Heating
P-14	Continuous Fan or Cycle Fan with Demand	con	CYC = Cycle Fan On Demand con = Continuous Fan Operation
P-15	Chill Water Heating or Electric Heat Only	nor	nor = Chill Water Heat Only ELE = Electric Heater Installed
P-16	Fan motor type selection... Shaded pole or split capacitor.	SC	SP = Shaded Pole Fan Motor SC = Split Cap. Fan Motor
P-17	Reset Memorized Programming Defaults	nor	rSt = Reset Defaults nor = Normal
P-18	Water Valve Forced Open 4 Hours to Bleed the Chill Water System	nor	nor = Normal Operation OPn = Valve Forced Open
P-19	Ambient Air to Chillwater Temperature Differential	15°F	5°F to 25° Fahrenheit

***Should any programming problems or confusion occur, reset the Memorized Default Settings by entering the program mode and setting P-17 to rSt.***

***P-1: Operating Mode***

The following operating modes can be selected: AUTOMATIC MODE by programming 0, COOLING ONLY by selecting 1 and HEATING ONLY by selecting 2.

***P-2: High Fan Limit***

The upper fan speed limit can be tailored to suit various motors and operating conditions. The **high fan limit** is adjusted with the system installed and operating. The values are 65 through 95 arbitrary units. Setting a higher number results in a higher fan speed, setting lower numbers lowers the high fan speed limit.

***P-3: Low Fan Limit***

The **low fan limit** determines the lowest output allowed for the low fan speed. The values are 30 through 64, in arbitrary units. Setting a higher number results in a higher fan speed, setting lower numbers lowers the low fan speed limit.

IMPORTANT ! Once the high and low fan speed limits are set, the unit will automatically readjust the remaining fan speeds to produce six (6) equally spaced in both the automatic and manual fan modes.

***P-4: Reserved For Future Options***

Program item P-4 reserved for future options.

***P-5: Temperature Calibration***

Enter the program mode and the ambient temperature appears in the display. Use the up and down keys to select the desired offset. The temperature in the display will increase or decrease according to the offset programmed.

***P-6, P-7, P-8 and P-9: Reserved***

Program items P-4, P-6, P-7, P-8, P-9 and P-12 reserved for future options.

***P-10: Display Brightness Control***

The allowed settings are four (4) to thirteen (13). Four (4) is dimmest and thirteen (13) is the brightest.

***P-11: Fahrenheit or Celsius Selection***

Select °F for Fahrenheit or °C for Celsius. When degrees Celsius (°C) is selected the readings are displayed in tenths, i.e. 22.2°.

***P-12: Reserved For Future Options***

### ***P-13: Reverse Automatic Fan Speeds During Heating***

The automatic fan speeds can be reversed during the heating mode. The fan speed is decreased as the temperature spread increases. The fan will speed up as the set point is approached. The fan switches to low speed when the set point is satisfied and the water valve cycles off. The fan can be programmed to operate the same as in cooling by programming P-13 to **nor**.

### ***P-14: Cycle Fan with the Cooling or Heating Demand***

The fan can be programmed to run continuously or can be cycled on demand. When cycled on demand, the fan operates when heating or cooling is called for. To cycle the fan select **CYC**. To operate the fan continuously select **con**.

**Note:** When used with optional electric heat the fan will remain on 4 minutes after the heater cycles off.

### ***P-15: Chill Chaser Option***

Units may be equipped with an Electric Chill Chaser. Chill Chasers are used when the main system is in the Cooling Mode and a particular cabin requires heating. Chill chasers are also used to supplement Chill Water heating when necessary. Program P-15 for ELE to select the Electric Heat Chill Chaser Option. Please note that option **P-15** has to be programmed for **ELE** to allow electric heat chill chaser operation.

### ***P-16: Fan Motor Selection***

The 2 basic fan motor types are shaded pole and split capacitor. The default setting is "**SC**" which selects the split capacitor motor type, however, "**SP**" should be selected if a shaded pole motor is used.

### ***P-17: 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. The program parameters listed on page 9 may be altered by TME, the installing dealer or the end user. Once new defaults are entered (see page 5, dual button functions) and memorized the **New** defaults will be reset. The original factory programmable parameters as listed on page 9 will have to be restored manually.

### ***Why Memorize New Defaults?***

Once the desired programming changes have been made and the system tests satisfactorily your work can be saved as **new factory defaults**. The new defaults are initiated by **simultaneously** pressing and releasing the **up** and **down buttons** prior to exiting the **program mode**.

### ***P-18: Hydronic Valve Forced Open***

Opens the water valve to bleed air from the system. **OPn** forces the valve open for 4 hours while normal operation is maintained. The valve can be returned to normal anytime by selecting **nor**.

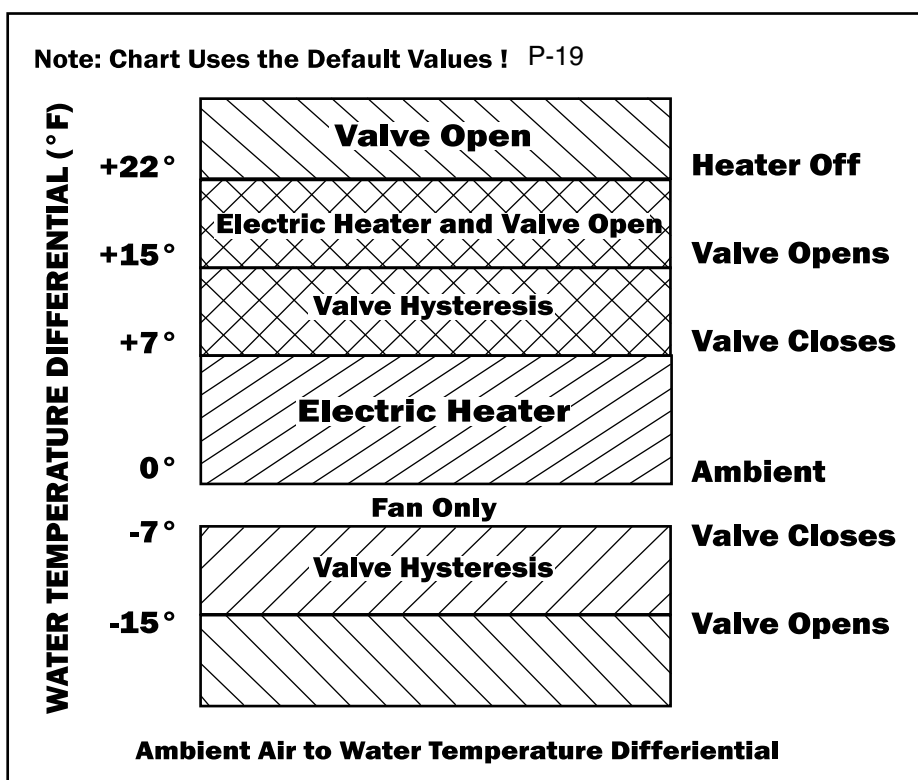
***P-19: Ambient to Water Temperature Differential***

The difference between ambient air temperature and hydronic water temperature is used to control the water valve. Selecting 10 ° F opens the valve when water temperature is ten degrees less than ambient in **cooling mode** and 10 ° F greater than ambient in the **heating mode**. Figure 2, shown below illustrates the relationship between ambient air and hydronic water temperature using the default values.

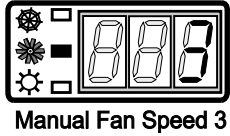
Careful selection of the temperature differential can fully utilize the ships heating and cooling resources. For example, while in the **cooling mode** and using a ten degree value, the valve will open to allow some cooling while the hydronic system is coming down to temperature.

***AMBIENT AIR TEMPERATURE TO WATER TEMPERATURE DIFFERENTIAL***

When equipped with an optional electric heater, the heater will overlap with the hydronic heat by twenty-two degrees Fahrenheit ( 22 ° F). The heater will turn on when heat is required and remain on until the hydronic water temperature exceeds the ambient by twenty-two degrees Fahrenheit or until the room temperature is satisfied.



The electric heat is allowed to overlap the hydronic heat to supplement the main heating system during very cold conditions.

***Manual Fan Mode***

Press and hold the fan button during normal operation to select one of the six (6) manual fan speeds available. Six (6) is the fastest and one (1) represents the slowest fan speed. Manual fan mode allows the user to select the desired fan speed manually. When a manual fan speed has been selected, the fan LED will be lit. Manual fan mode is sometimes preferred when room temperature is constantly changing due to varying heat loads.

***Circulation Mode***

When the system is off at the display panel the fan can be used to only circulate the air. Press and hold the fan button when the display is off until the desired speed number appears in the window. Release the fan button and the fan will run at the selected speed circulating the air without heating or cooling. Press the power button once to cancel the circulation mode and enter the on mode.

*SPECIFICATIONS*

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SET POINT OPERATING RANGE .....	65 ° F TO 85 ° F
AMBIENT TEMPERATURE OPERATING RANGE DISPLAYED .....	5 ° F TO 150 ° F
SENSOR ACCURACY .....	± 2 ° F AT 77 ° F
LOW VOLTAGE LIMIT 115 VOLT UNITS .....	75 VAC
LOW VOLTAGE LIMIT 220 VOLT UNITS .....	175 VAC
LOW VOLTAGE PROCESSOR RESET .....	50 VAC
LINE VOLTAGE .....	115 THROUGH 240 VAC
FREQUENCY .....	50 OR 60 Hz
FAN OUTPUT .....	6 AMPS @ 115 VAC
FAN OUTPUT .....	6 AMPS @ 230 VAC
VALVE OUTPUT .....	1/4 AMP @ 115/230 VAC
HEATER OUTPUT .....	30 AMPS @ 115 VAC
HEATER OUTPUT .....	15 AMPS @ 230 VAC
MINIMUM AMBIENT OPERATING TEMPERATURE .....	0 ° F
MAXIMUM AMBIENT OPERATING TEMPERATURE .....	180 ° F
MAXIMUM RH CONDITIONS .....	99% NON CONDENSING
POWER CONSUMPTION .....	LESS THAN 5 WATTS

*DIMENSIONS*

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DISPLAY PANEL .....	4.45" X 3.82"
PANEL CUT OUT .....	3.375" X 2.875"

*CABLE LENGTHS*

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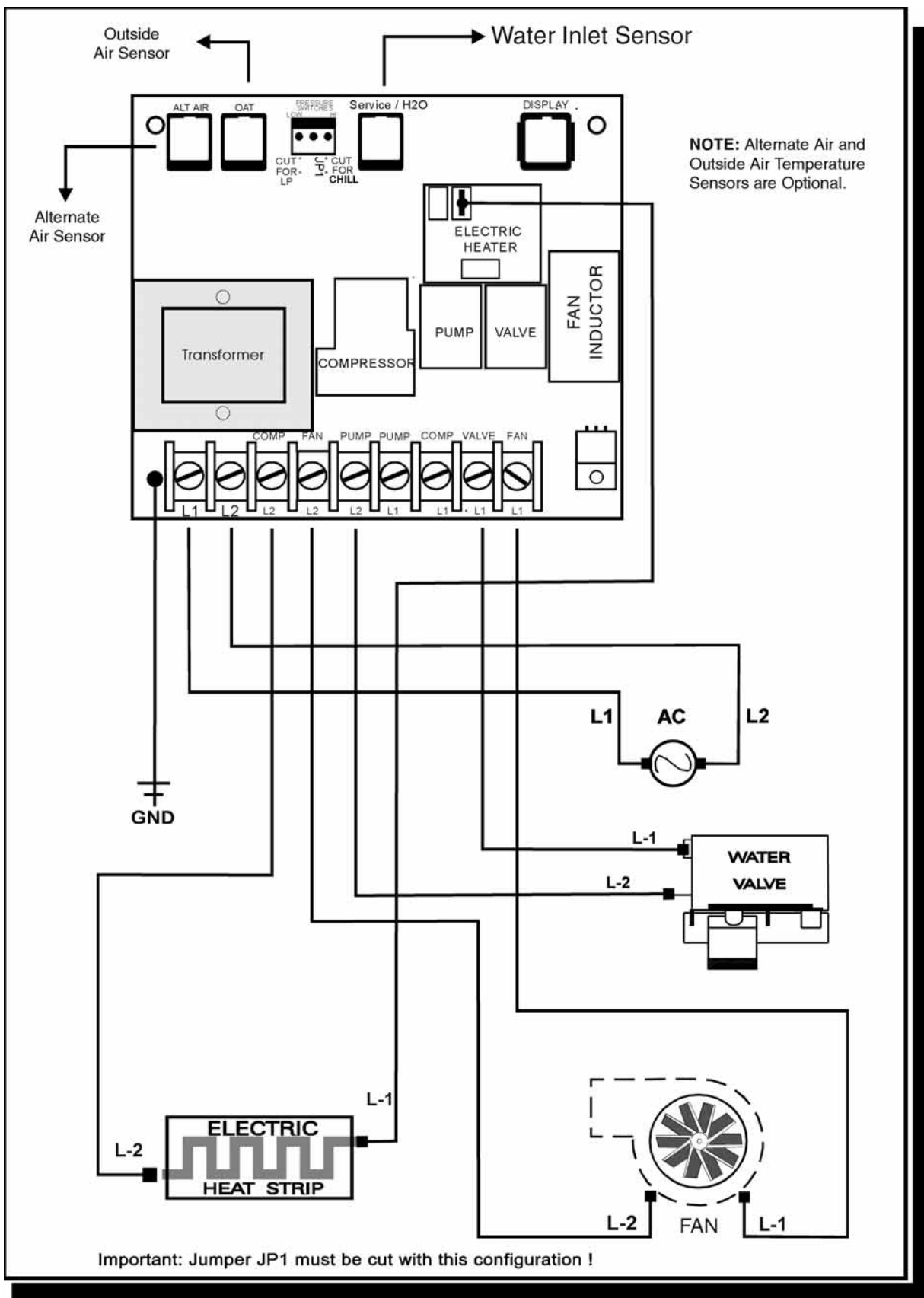
DISPLAY CABLE .....	STANDARD 15'
ALTERNATE AIR SENSOR .....	STANDARD 7'
OUTSIDE AIR SENSOR .....	STANDARD 7'

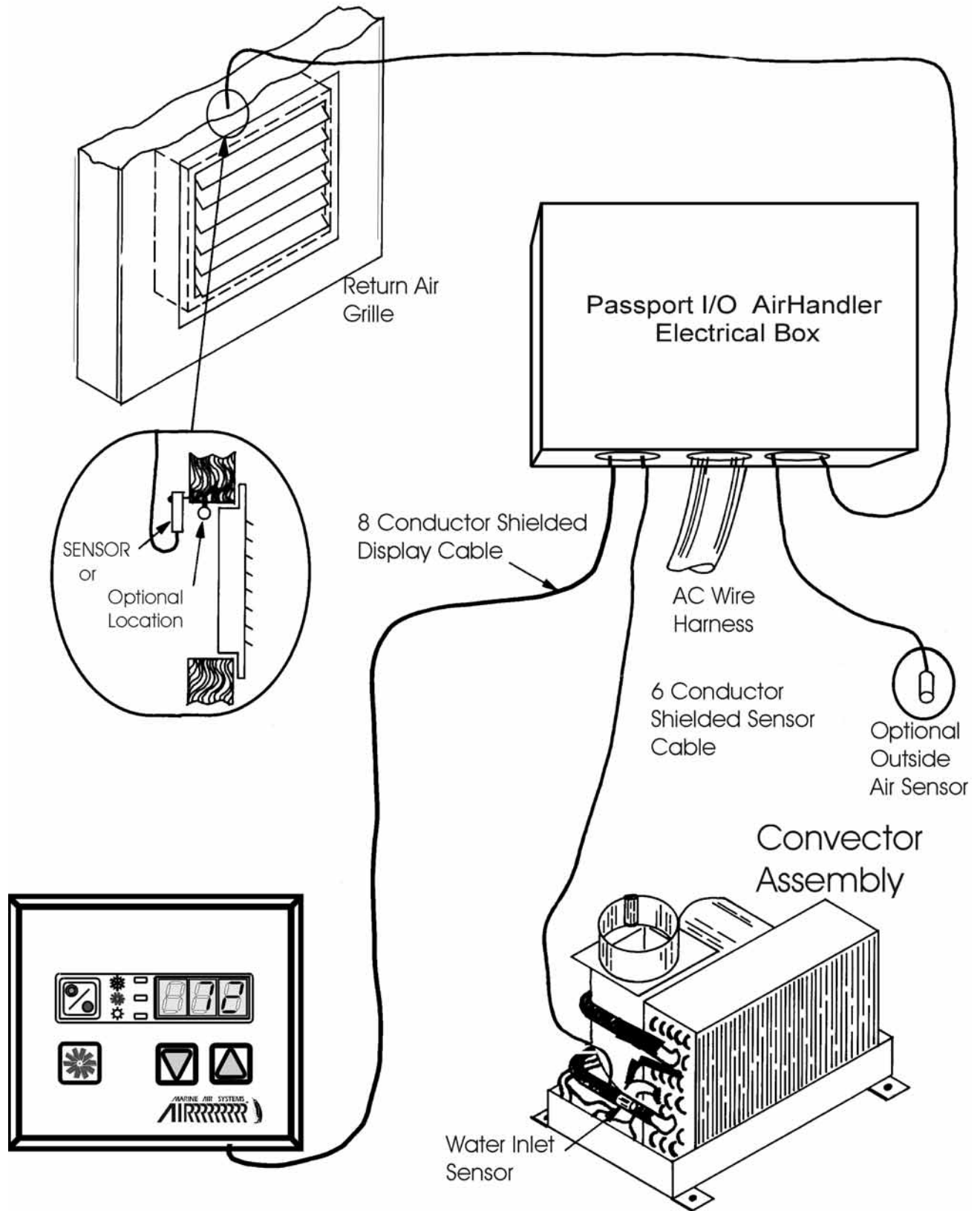
**NOTES:** Maximum length of display and sensor cables is 75 feet. The **outside air sensor** and **alternate air sensors** are optional items and are **not** included with the standard control package.

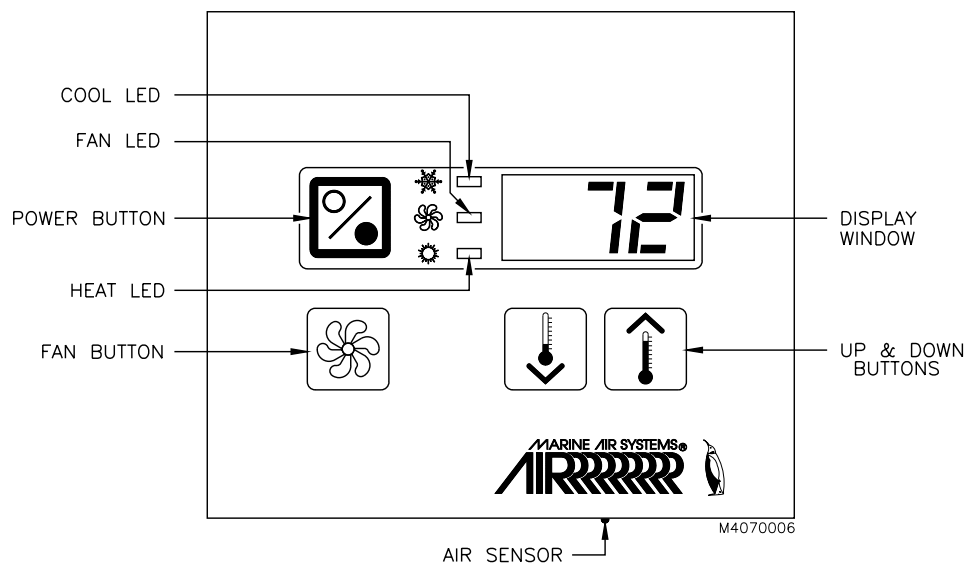
*SYSTEM INPUTS*

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1 .....	INSIDE AIR TEMPERATURE SENSOR
1 .....	ALTERNATE AIR TEMPERATURE SENSOR [ OPTIONAL ]
1 .....	CHILLWATER WATER INLET TEMPERATURE SENSOR
1 .....	OUTSIDE AIR TEMPERATURE SENSOR [ OPTIONAL ]







Before mounting the Passport I/O or AH-Passport I/O 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 3.375" wide by 2.875" 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 affect 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 one end of the display cable (15'4.6m standard length with 8-pin connector) into the upper right-hand socket on the circuit board in the electric box and the other end 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 (7'2.1m standard length with 6-pin connector) into the ALT AIR socket #J4 in the upper left-hand corner of the circuit board. Installing the remote air sensor will override the faceplate sensor. An optional outside air temperature sensor and cable may also be used. Plug that cable into the OAT socket #J3 (next to #J4). Mount the sensor outside but not in direct sunlight. Air sensor cables are available in various lengths. Do not staple any cables when mounting.

When using the AH-Passport I/O with a chilled water airhandler, plug the water inlet sensor cable into the SERVICE/H2O socket #J5.







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