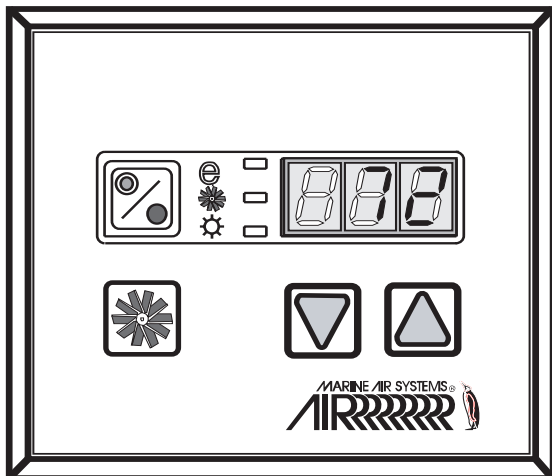


# passport I/O control

Operation Manual

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**MARINE AIR SYSTEMS®**  
**AIR**  
**DIRECT EXPANSION SYSTEMS**

Revised: 3-21-03  
L-2231



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Passport I/O is a micro controller based unit designed for use with direct expansion, reverse cycle air conditioning systems.

### ***Standard Features***

- Universal 115 / 230 volt, 50 / 60 Hz AC power supply.
- User friendly 4 button display panel.
- Five volt micro controller located in the display.
- Displays ° Fahrenheit or ° Celsius.
- Face plate ambient air sensor.
- Sixteen programmable parameters.
- High / Low Freon pressure switch inputs.
- Humidity Mode control.
- De-Icing cycle prevents evaporator icing.
- Programmable fan operation.
- Programmable compressor delays.
- Nonvolatile memory requiring no backup power.
- Programmable display brightness.
- Programmable fail-safe modes.

### ***Optional Features***

- Electric heating control capabilities
- Outside air temperature sensor.
- Alternate air temperature sensor.

This manual provides all necessary information for proper installation and operation of Passport I/O. Poor installation or **misunderstood** operating parameters will result in unsatisfactory performance and possible failure.

### ***Read This Manual Completely Before Proceeding !***

If you require assistance call Taylor Made Environmental, Inc. at 954-973-2477 or Fax your questions to 954-979-4414.

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

Press the ON/OFF button once to engage the system. The display indicates room temperature when the system is on and is blank when the system is off.

Set the desired 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 allowing fan speed to decrease as room temperature is approached in the cool mode. The fan will operate at low speed when set point is satisfied. Manual fan speeds can be selected by with the fan button.

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

**Memory:** Passport I/O has nonvolatile memory requiring no batteries or backup power. When power is lost the operating parameters are retained indefinitely. When power is restored, the control resumes operating as last programmed.

### *NORMAL HEATING OR COOLING CYCLE*

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Automatic heating and cooling will be supplied as required. Automatic operation maintains a two °F temperature variation. A four degree swing is required to cause the unit to shift to the opposite mode. Once in heating or cooling mode Passport I/O maintains the two degree differential.

Program Cool only and cooling only will be supplied. The cabin temperature will be maintained within 2° F of set point. Program Heat only and only heating will be supplied. The cabin temperature will be maintained within 2° F of set point.

When the Heating or Cooling is satisfied, the compressor cycles off and the fan returns to low speed. The fan speed will remain constant if **MANUAL FAN SPEED** has been selected.

### *REVERSING VALVE OPERATION*

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The reversing valve is toggled to the opposite mode when heating or cooling is required to reduce the compressor starting surge. The valve will only toggle to the opposite mode when a cooling or heating cycle is called for and if the system has been off for less than seventy-five (75) seconds. The valve will also toggle if a cycle is interrupted from the display panel by pressing the power button ON/OFF, or changing the set point. Unnecessary valve toggling has been limited to reduce reversing valve noise. Valve toggling can be totally eliminated by programming the minimum compressor staging delay at seventy-five seconds (75) or greater (program P-4).

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

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 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.

**3. FAN LED INDICATOR**

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

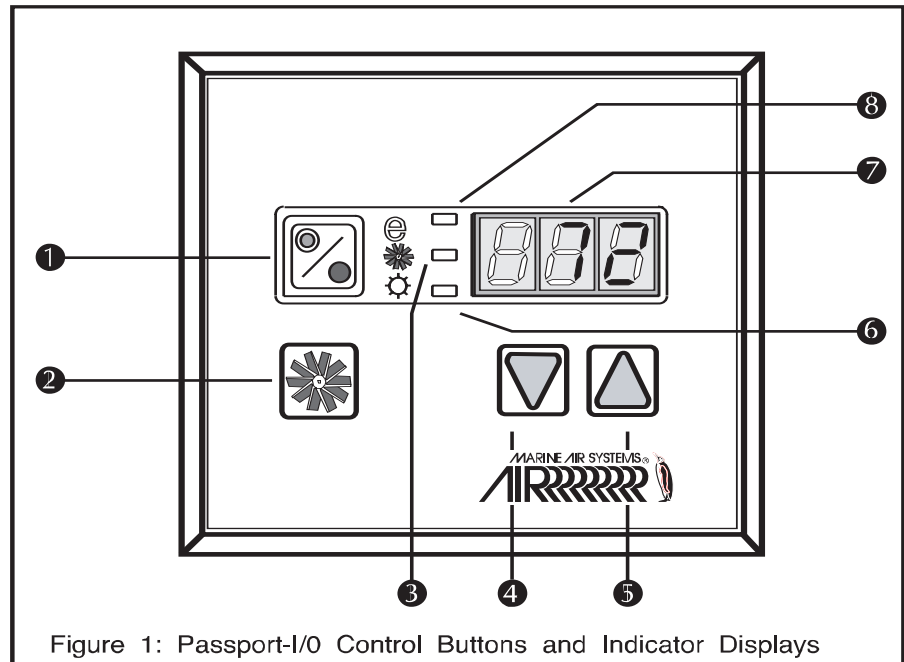


Figure 1: Passport-I/O Control Buttons and Indicator Displays

**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.

*DUAL BUTTON FUNCTIONS*

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**Up & Down Buttons...** Press the up and down button together to display outside air temperature providing the **OPTIONAL OUTSIDE AIR TEMPERATURE SENSOR** is installed.

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

**Power & Down Buttons...** Simultaneously press the power and down buttons while viewing the Service Fault History Log clears the fault History Log.

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

*SPECIAL BUTTON FUNCTIONS*

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

**1. Service History Log...** View the service history log by pressing and holding the **fan button** while turning on the AC power. Exit the service history log by pressing the **power button** once.

**2. Self Test Mode...** Press and hold the **power button** while AC power is applied to enter the self test mode. The self test is used to diagnose problems and test the air conditioning system. For complete details see page 12 of this manual.

**3. View Hour Meter...** To view the compressor hour meter, press and hold the **down button** while applying AC power. Maximum recorded time is 65,536 hours. The hour meter functions are described fully on page 13 of this manual.

*MODES OF OPERATION*

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***Off Mode***

When the **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 can only be accessed from the off mode.

***On Mode***

When the control is in the **on mode** power is supplied to the appropriate outputs and the display indicates 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.

### ***Heat 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.

### ***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.

### ***Moisture 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. The compressor is allowed a maximum of one hour running time to reach the desired temperature. Four (4) hours after the temperature is satisfied or the compressor times out, the cycle is repeated. The HU1 mnemonic code is displayed while in the moisture mode.

Press the power button to end the moisture mode.

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## ***PROGRAM MODE***

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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. **Passport I/O** is shipped with factory 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 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 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 Passport I/O control returns to the **off mode**. IP then the software version number ("A12") is displayed when you exit the program mode.

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*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 data or set 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 the control will return to the **off mode**. Not pressing any buttons or attempting any program changes for one minute will 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. ("A11") 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 Passport I/O be sure to have the software identification number and serial number available.***

***Programmable Parameters***

There are 15 programmable parameters with their Factory Default Settings listed in this section. The table below indicates what these parameters are, along with the permitted values and the original Factory Default Settings.

Program Number	Description	Default	Range
P-1	Operating Mode	0	0 = Auto      2 = Heat Only 1 = Cool Only
P-2	High Fan Speed Limit (arbitrary units)	95	65 - 95
P-3	Low Fan Speed Limit (arbitrary units)	55	30 - 64
P-4	Compressor Staging Time Delay	15	5 - 135 seconds
P-5	Temperature Sensor Calibration	Ambient Temp	Ambient $\pm$ 10° F
P-6	FAILSAFE	3	0 = Min. Protection 1 = Continuous No Display 2 = Continuous W / Display 3 = 4 Failures Reset Required
P-7	Reserved For Future Option		
P-8	De-Icing Cycle	OFF	Off 1 to 3 Minutes
P-9	Reserved		
P-10	Display Brightness Control	9	4 = Low 13 = Maximum
P-11	Display ° Fahrenheit or ° Celsius	°F	°F = Fahrenheit Displayed °C = Celsius Displayed
P-12	Cycle Pump With Compressor or Continuous Pump	OFF	OFF = Cycle with Compressor On = Continuous Pump
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 Compressor	con	CYC = Cycle Fan With Comp. con = Continuous Fan Operation
P-15	Reverse Cycle Heating or Electric Heat	nor	nor = Reverse Cycle Heating ELE = Electric Heater Installed
P-16	Fan motor type selection... Shaded pole or split capacitor.	SP	SP = Shaded Pole Fan Motor SC = Split Cap. Fan Motor
P-17	Reset Memorized Programming Defaults	nor	rSt = Reset Defaults nor = Normal

***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 selecting 0, COOLING ONLY by selecting 1 and HEATING ONLY by selecting 2.

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

The upper fan speed limit can be adjusted for various motors. The **high fan limit** is adjusted with the system installed and operating. The values range from 65 through 95 arbitrary units. Set a higher number for a higher fan speed. Set lower number to lower the fan speed. Use the up and down buttons to select the desired speed.

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

The **low fan limit** determines the lowest output allowed for the low fan speed. The values from 30 through 64, arbitrary units. Use the up and down buttons to select the low fan limit. Set a higher number, for higher fan speed. Setting lower numbers lowers the fan speed.

IMPORTANT ! Once the high and low fan speed limits are set, the unit will automatically readjust the remaining speeds to produce 3 equally spaced fan speeds in both automatic and manual fan modes.

### ***P-4: Compressor Staging Time Delay***

The **compressor staging delay** is provided for installations where more than one system operates from the same power source. Setting different staging delays allows compressors to start at different times when power is interrupted. Units should be staged five seconds apart. The minimum delay is 5 seconds and the maximum is 135 seconds. (See the Reversing Valve Operation section for programming tips.)

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

Use this feature to calibrate the ambient sensor. Select P-5 and the ambient temperature appears in the display. Use the up and down keys to set the correct reading. The temperature in the display will increase or decrease as required.

### ***P-6: Fail Safe Level***

There are four fail safe levels. See page 10 for detailed information.

### ***P-7: Reserved for Future Option***

### ***P-8: De-Icing Cycle***

The De-Icing Cycle prevents ice build up on the evaporator coil.

De-Icing is accomplished by switching the reversing valve into the HEAT MODE while the system is cooling. The valve will remain energized for the programmed cycle time. The cycle range is OFF, or a period of 1, 2 or 3 minutes. On units equipped with electric heat De-Icing is accomplished by turning off the compressor.

***P-9: Reserved for Future Option***

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

The display brightness can be adjusted from four to thirteen. Four being the dimmest and thirteen the brightest.

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

The default setting is °F. Select °C for Celsius readings displayed in tenths, i.e. 22.2°.

***P-12: Cycle Pump With Compressor***

The pump can also be programmed to operate continuously or cycle on demand. To program continuous operation select ON.

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

The automatic fan speeds can be reversed during heating mode. The fan will speed up as the set point is approached. Lowering the fan speed when the cabin is cold increases head pressure and helps raise supply temperature. The fan switches to low speed when the set point is satisfied and the compressor cycles off. NOR represents normal fan operation REF selects reverse fan speeds in heating.

***P-14: Cycle Fan with Compressor***

The fan can be programmed to run continuously when the system is on or can be allowed to cycle with the compressor. To cycle the fan with the compressor select CYC. The default is CON continuous fan.

***Important***

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

***P-15: Reverse Cycle or Electric Heat***

Units not equipped with reverse cycle heat may have electric heater added.

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

Shaded pole and split capacitor parameter allows the use of single phase (SP) or (SC) motors.

***P-17: Reset Memorized Defaults***

The default programming parameters can be reset by entering the program mode and selecting rSt. This restores the programmable parameters to the default values. The default parameters listed on page 7 may be altered by the installing dealer or end user. Once **new** defaults are entered (see page 4 dual button functions) and memorized the factory defaults will be over written. The original factory program parameters as listed on page 7 will have to be restored manually.

*FAIL SAFE AND MNEMONIC FAULT HANDLING CODES*

**HPF...** indicates high Freon pressure.

**LPF...** Indicates low Freon pressure.

**ASF...** Indicates failed air sensor.

Failsafe Level	Action Taken
0	Only <b>ASF</b> detected and displayed. The control will shut down and will not restart until the fault is repaired. Once the fault is repaired the control will restart.
1	All actions in level 0 plus all other faults detected but not indicated. The system shuts down for 2 minutes or until the fault is cleared whatever is longer. The system will restart if the fault is cleared.
2	All actions same as level 0 and 1. Faults are indicated. The system shuts down for 2 minutes or until the fault is cleared whatever is longer.
3	All actions the same as level 0, 1 and 2. The system shuts down for 2 minutes or until the fault is cleared whatever is longer. The system will lockout after four consecutive <b>HPF</b> or <b>LPF</b> faults. Press the power button once to OFF MODE, press again to ON MODE clears Lockout

NOTE:

**HPF** is not indicated and does not cause lockout in **HEAT MODE**.

**LPF** has a 10 minute shut down delay.

*SPECIFICATIONS*

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
PUMP OUTPUT .....	1/4 HP @ 115 VAC
PUMP OUTPUT .....	1/2 HP @ 230 VAC
COMPRESSOR OUTPUT .....	1 HP @ 115 VAC
COMPRESSOR OUTPUT .....	2 HP @ 230 VAC
MINIMUM OPERATING TEMPERATURE .....	0 ° F
MAXIMUM AMBIENT OPERATING TEMPERATURE .....	180 ° F
MAXIMUM RH CONDITIONS .....	99% NON CONDENSING
POWER CONSUMPTION .....	LESS THAN 5 WATTS

*DIMENSIONS*

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

*CABLE LENGTHS*

SELF CONTAINED DISPLAY CABLE .....	15' STANDARD
CENTRAL SYSTEM DISPLAY CABLE .....	30' STANDARD
ALTERNATE AIR SENSOR .....	7' STANDARD
OUTSIDE AIR SENSOR .....	15' STANDARD
ALL CUSTOM CABLE LENGTHS SUPPLIED IN STANDARD 5' INCREMENTS .....	CUSTOM CABLES

**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*

1 .....	AMBIENT FACE PLATE AIR TEMPERATURE SENSOR
1 .....	HIGH FREON PRESSURE
1 .....	LOW FREON PRESSURE
1 .....	OPTIONAL ALTERNATE INSIDE AIR SENSOR
1 .....	OPTIONAL OUTSIDE AIR TEMPERATURE SENSOR

### ***Self-Test Mode***

The **Passport I/O** software contains a self-test program to facilitate factory testing of the entire air-conditioning system. Once the **self-test mode** is activated, the test cycle will continue until the AC power is interrupted or the **on/off button** is pressed once which returns the system to the off mode.

Activate the self-test by pressing the **on/off button** while turning on the AC power. Release the **on/off button** while the display indicates **888** and all **LED's** are lit. Passport I/O is now in the self-test mode.

TST appears in the display while in the test mode.

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

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

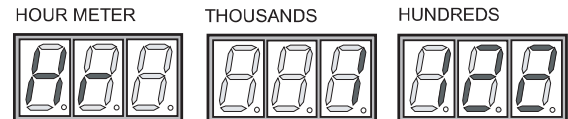
The test mode will continue until the power is interrupted or the test is halted by pressing the **on/off button** once.

## ***Hour Meter***

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

To view the hour meter turn off the AC power and press the down button. While holding the **down button**, restore AC power. After **Power-On** reset is complete, the following appears in the display:

1. Hr is displayed for 1 second.
2. The display blanks out for 1 second then displays the thousands units for 3 seconds.
3. The display blanks out for 1 second then displays the hundreds units for 3 seconds.



4. The unit returns to the last operating state before power was removed.

The example shown is displaying eleven-hundred twenty-two [1,122] hours.

Maximum recorded time is 65,536 hours, the meter stops and can only be reset by TME.

## ***Service History***

Passport I/O records and remembers 8 most recent faults.

Only the 8 most recent faults are stored to conserve memory.

Each time a fault is detected, a one hour timer is started.

Three consecutive faults within that hour cause system shut down, lock out and display the fault code.

During that hour, to conserve memory, the same recurring fault is not be recorded in history.

Continuous operation for 1 hour without the same recurring fault clears that fault counter but the event remains in history until over written.

Should a different fault be detected during the hour, it will be entered into the history log.

The following events are entered into the service history log:

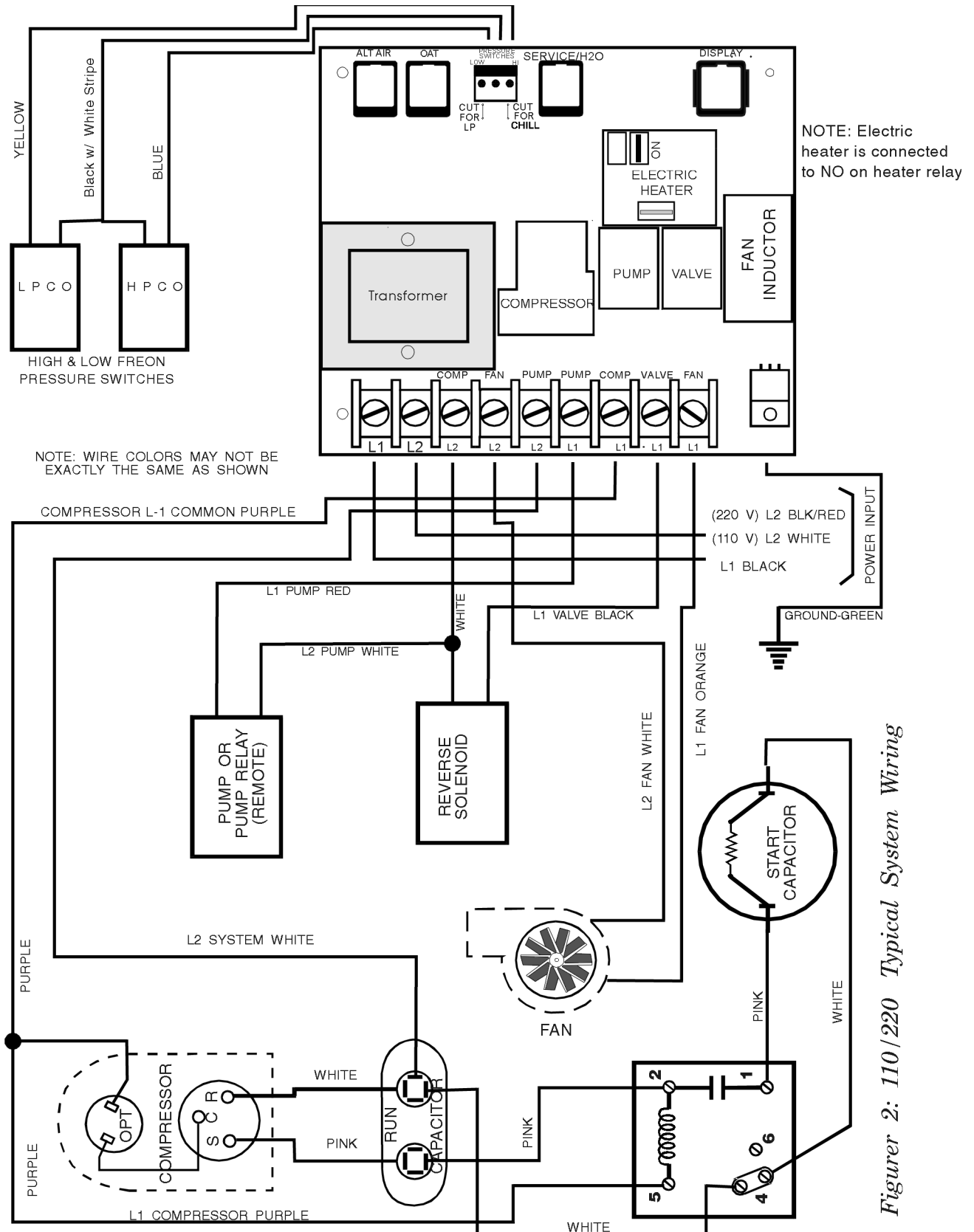
1. High Freon Pressure
2. Low Freon Pressure
3. Air Sensor Fault

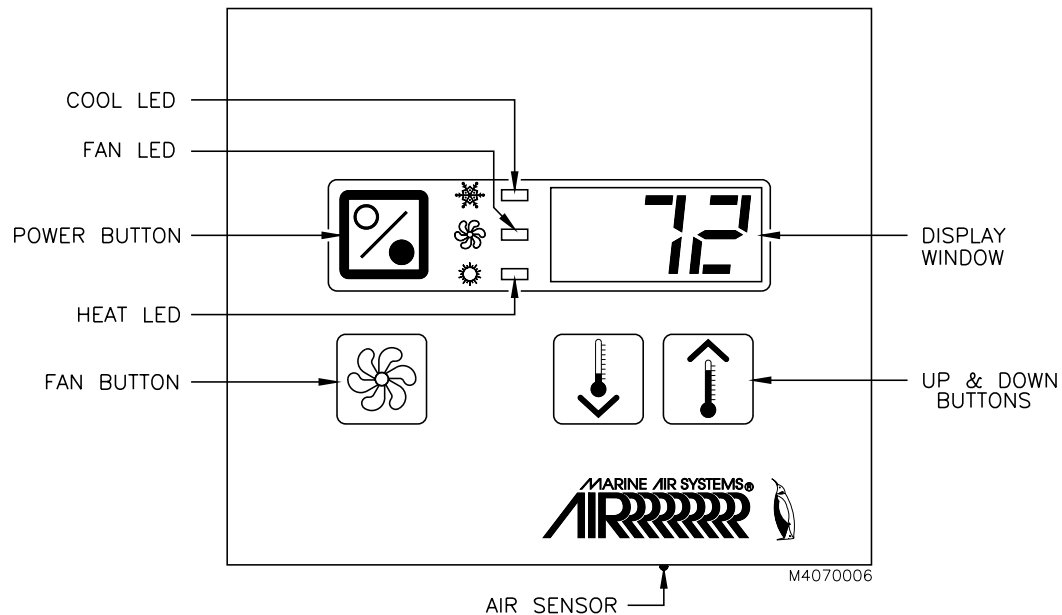
To view the service log turn off the AC power and press the **fan button**. With the **fan button** pressed turn on the AC power. Once **Power-On** reset is completed (display indicates **888** and all **LED's** are lit) release the fan button.

The display will flash the most recent fault detected, followed by the event chronology number. To view other events detected press either the **up** or **down buttons**.

Exit the history log by pressing either the **power** or **select button** or wait 30 seconds without pressing any buttons.

The service log can be cleared by simultaneously pressing the **power** and **down** buttons while you are viewing the service log mode.





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.





Taylor Made  
ENVIRONMENTAL™

2000 North Andrews Avenue Ext. • Pompano Beach, • FL 33069-1497 USA • 954- 973-2477 • Fax: 954-979-4414

Service Hot Line: (954) 633-3150 • Service Fax: (954) 973-8795 • sales@tmenviro-fl.com • www.tmenviro.com

Fleets Industrial Estate • 26 Willis Way • Poole, Dorset BH15 3SU, England • +44(0)870 3306101 • Facsimile: +44(0)870 3306102 • sales@tmenviro-eu.com

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