

# PROAIR

## 110/12v Combination Heat/Cool Unit Installation Instructions



This manual contains guidelines for the installation of ProAir commercial, mobile heating and cooling equipment.

This manual has been prepared for use by trained personnel who are familiar with the installation of mobile heating and heat/air conditioning systems as described in the manual. Do not attempt installation based solely on the information contained in this manual.

# ProAir LLC.

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## 110/12 volt System Installation Instructions

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# 1.0 Component Mounting

## 1.1 Evaporator Mounting

- **Caution: The Evaporator and condenser modules are built and pre-run as an assembly they are identified by matching serial numbers and must remain together to insure proper system performance.**
- **Note: When choosing an evaporator mounting location take into consideration the system requirements.**
  1. The evaporator must be mounted on a solid level surface.
  2. The evaporator must have an unrestricted source for return air.
  3. The evaporator must be insulated from hot air intrusion from the cap or walls of the vehicle.
  4. The evaporator must maintain a good chassis ground.

Mount the Evaporator in a suitable location, it must be secured by the (4) mounting legs attached to the case sides. After securing the brackets to the mounting surface tighten the bolts to the case sides. (fig.1)

## 1.2 Condenser Mounting

- **Note: See Template for mounting hole layout and bolt requirement.**
- ProAir has provided (4)-mounting holes on the backside of the condenser module; these holes are to be used as a direct mount to a bracket (*to be fabricated by the chassis builder or purchased from ProAir*) which will be attached to the chassis. The condenser must be mounted only in the position shown in (fig2). When mounting the condenser module it must be located within 14 feet of the evaporator and electrical panel, to ensure the wiring and hoses will reach. When mounting the condenser it is preferred that the fan assembly is facing to the rear of the vehicle to prevent road debris from being thrown into it. If this is not possible the fan must be protected by use of a shield. Maintain clear access to the wiring and primore valves when mounting the condenser module. This condenser module is designed to utilize a pull-through fan. Unobstructed airflow must be maintained on the inlet and outlet sides of the condenser. Do not locate the condenser in a position that will promote the re-circulation of hot air. The condenser must maintain a good chassis ground.

### **1.3 Electrical Panel Mounting**

The electrical panel can be mounted in any position as long as a good chassis ground can be made. The harness lead with the connector on it must reach the evaporator. If this is not possible consult ProAir sales for installation options. The panel must be located in an area where cross ventilation is available to prevent over heating of components. When choosing a mounting location consideration of unit serviceability should not be overlooked.

### **1.4 Thermostat Mounting 110/12 volt**

The system uses (1) digital thermostat to operate the heating and cooling of the 110 volt and 12 volt systems. The temperature sensing probe must be mounted in the return air where a good air flow sampling is maintained. Do not cut or extend the temperature probe incorrect temperature may be displayed.

## 2.0 Component Plumbing

### 2.1 110v A/C

Route (1) #6 liquid line and (1) #10 suction line from the condenser shut off valves to the evaporator fittings. Use line-stakes to secure the hoses every 18” and use grommets or trim-loc to protect the hoses from being chaffed on hole cutouts and edges. Make all crimps on all fittings to SAE specification J2064 when necessary. The condenser fittings are (1) 90 degree #8 o-ring fitting to #6 hose and (1) 90 degree #10 o-ring fitting to #10 hose. Use the appropriate o-ring on each fitting and lubricate them with mineral oil. Start both fittings on the condenser Primore valves hand tight and finish connecting by tightening to a torque value of 20ft lbs. **(DO NOT OPEN THE PRIMORE VALVES UNTIL COMPLETING THE CHARGING PROCEDURES IN SECTION 6.1).** Make the evaporator connections by using (1) 90 degree #6 male o-ring fitting to #6 hose and (1) 90 degree #10 male o-ring fitting to #10 hose. Lubricate the o-rings with mineral oil and hand tighten fittings to block valve. Finish this connection by torqueing the #10 fitting to 20-ft lbs. and the #6 fitting to 15ft lbs. Wrap all the exposed metal on the suction line with prestite tape to prevent condensation from forming on the fittings.

### 2.2 12v A/C Plumbing

ProAir offers many options in the area of system configuration (Pre-charged, Hot Weather Packages, Tie-in Systems etc...). For specific system outlines consult ProAir’s commercial guidelines C/D or ProAir directly for assistance.

### 2.3 12v Heat

Make the heater connections to the evaporator using (2) worm drive clamps torque to 13 in lbs. Route the hoses smoothly and safely protecting them from chafing by using grommets and trim-loc as necessary. Final connections, water valves and water wyes are dictated by manufacturer and customer requirements. Consult ProAir’s commercial guidelines C/D or ProAir directly for assistance with these issues.

## 3.0 Electrical Connections

### 3.1 110v Land Line Requirements

- **Caution: Electrical components should only be installed and serviced by qualified personnel due to the electrical shock hazard presented by such components.**

The landline and wiring to the electrical panel must be constructed of at least 10ga. wiring and be no longer than 15' in length to reduce the problem of voltage drop to the 110v components. Connect the power-input wires to the electrical panel as shown in ( fig 3). Use standard industry practices when routing the wiring and making electrical connections.

### 3.2 Condenser Connections

Use the supplied terminals to connect the condenser cable to the electrical panel. Cut the cable to the desired length and crimp on the terminals as outlined in (fig 4). **(DO NOT ADD TO THE CONDENSER HARNESS LENGTH IT HAS BEEN SIZED TO THE SYSTEM REQUIREMENTS AND ADDITIONAL LENGTH MAY CAUSE ADVERSE EFFECTS ON SYSTEM PERFORMANCE AND/OR COMPONENT LIFE)**. Connect the terminated condenser wiring to the electrical panel as shown in ( fig 5). Make sure the terminal block on the electrical panel is not accessible to accidental contact by service or end user personnel to prevent accidental electrical shock.

### 3.3 Evaporator Connections

Connect the pre-wired 6-pin connector on the evaporator to the Pre-wired 6-pin connector on the electrical panel this connection will snap together and not pull apart unless the catches are released manually.

### 3.4 Thermostat Connections

Route the pre-wired thermostat cable from the electrical panel to the thermostat mounting location. Connect the (7) pin harness to the back side of the control head. Connect the temperature probe to the back side of the control head assembly. Route the sensing end of the probe to the return air area and secure it in place behind the grille.

## **4.0 Electrical Connections 12v**

### **4.1 Heat signal out-put**

The pink and blue wires in the harness are to be used as signal wires to initiate heat and A/C on the 12v side of the system. Do not place more than a 4amp load on these circuits. For further information or alternate wiring options contact ProAir for assistance.

### **4.2 Thermostat**

The ProAir evaporator has built into its case a freeze up thermostat for the 12v system. For a typical 12v system wiring diagram see (fig 8). For further information or alternate wiring options contact ProAir for assistance.

## **5.0 Drain Line Installation**

### **5.1 110/12v Evaporator**

Connect (2) independent drain lines to the drain pan outlets. Secure them by using (1) drain hose clamp on each outlet tightened to 6in lbs. Use elbows and clamps as needed to route the drains smoothly and in a downward flowing motion away from the unit. One drain should be routed down each side of the chassis to the underbody area. The use of the (2) provided dust valves is critical to promote proper drainage of the unit and prevent dust, dirt and road debris from entering and clogging the drain hose assemblies.



# 6.0 Charging Procedures

## 6.1 110v System

- **Note: The condenser of the 110v system is pre-charged with 2.0lbs of refrigerant R134a and sufficient oil for 14' of refrigerant lines. No additional charge is required unless the hose length is altered beyond their intended length. Contact ProAir for assistance if any deviation is made to the hose lengths for charging determination.**

Using standard shop procedures evacuate the 110v A/C lines for 10 minutes close the gage set and shut down the vacuum pump and check for vacuum loss. No more than 5 hg. loss over a 5-minute period is allowed, If the vacuum test is not passed you must repair the leak before continuing with the charging procedure. If the vacuum test is passed restart the vacuum pump and open the gage set and continue to the vacuum process for 30 minutes. After the vacuum procedure is completed close the gages shut down the pump and open the Primore valves on the condenser. The valves must be fully opened and back seated. Replace the caps and let the system set for 20 minutes. Connect the landline as outlined in section 7.0 Unit Operation. After the unit operation and performance has been verified remove the gages and replace the caps on the charging ports and leak test the system.

## 6.2 12v System

Consult ProAir for specific charge procedures and amounts when charging the 12v side of the system. The system charge amounts vary greatly depending on what system configuration is utilized. Contact ProAir for assistance with charge determination of your specific system.

# 7.0 Unit Operation

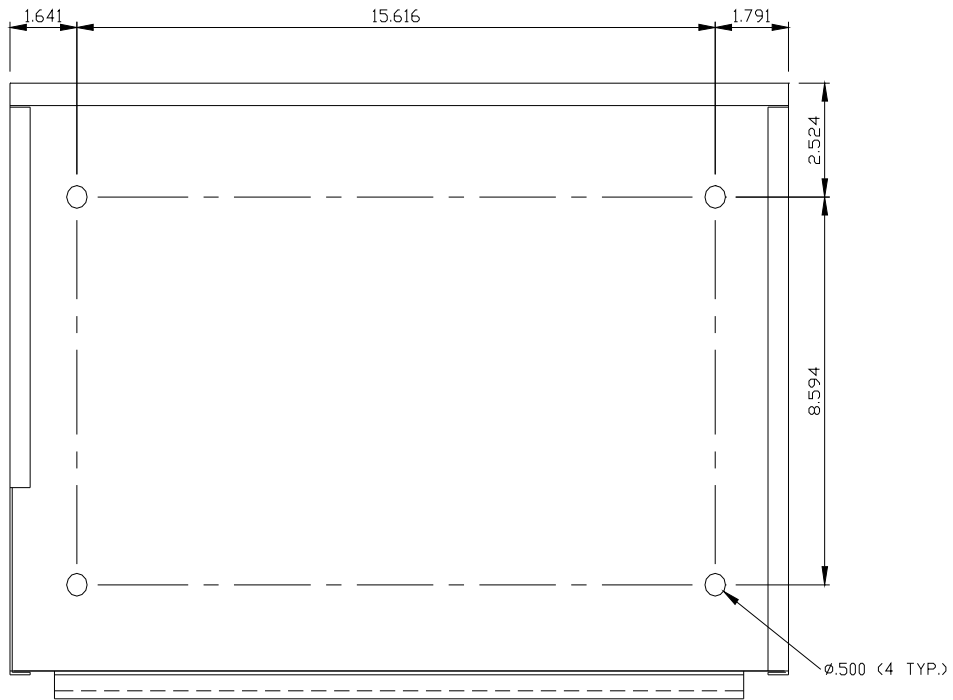
## 7.1 110v Unit Operation

- **Note: This 110v unit was designed as a temperature maintenance unit not as a primary heating and cooling system. Using this system out side of its original design parameters is not recommended.**
- Connect a landline, which is constructed of 10/3 cable and no longer than 15', to a switched 110VAC 20-amp ground fault protected circuit.
- To test the system operation energize the landline, Select cool and cycle the temperature reading down to 50° This will turn the blower on and energize the condenser module. Run the unit for 15 minutes in the cooling mode. After the cooling system operation has been verified select heat and cycle the temperature reading up to 90°. This will turn the blower on medium speed and energize the heating element. Run the system for 15 minutes in the heating mode to verify correct operation and system performance.
- After the system has been tested the operator can select a temperature on the thermostat and either heat or cooling mode. No other adjustments will be necessary. The system when energized by the landline will maintain cabin at the desired temperature automatically. It will be necessary to switch from heat to A/C modes when needed.

## **8.0 Illustration**

- **Locations, Condenser Mounting and Hardware Usage Chart**
- **( Fig 1 ) Evaporator Mounting**
- **( Fig 2 ) Condenser Mounting**
- **( Fig 3 ) Land Line Connections to Electrical Panel**
- **( Fig 4 ) Condenser Cable Termination Chart**
- **( Fig 5 ) Condenser Cable Connection to Electrical Panel**
- **( Fig 6 ) Electrical Panel Wiring to Thermostat**
- **( Fig 7 ) Typical 12v Heat Circuit Wiring**
- **( Fig 8 ) Typical 12v Clutch Circuit Wiring**

# LOCATIONS



BOLT REQUIREMENTS TO CONDENSER		
QTY	TYPE	SIZE
4	GRADE 5 OR BETTER	1/2"-13 × 1 1/4"
4	GRADE 5 OR BETTER	1/2" FLAT WASHER
4	GRADE 5 OR BETTER	1/2" LOCK WASHER

**FIG 1**



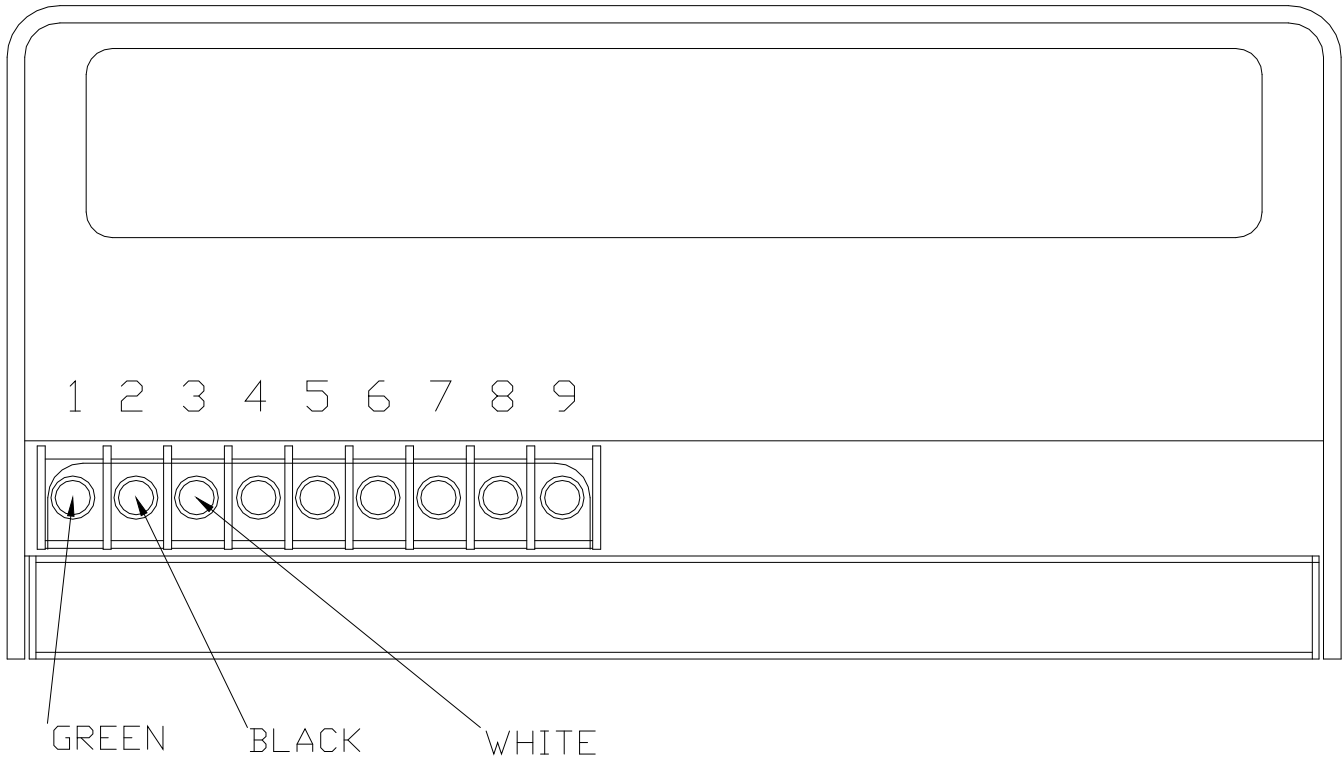
Case bolts right side shown.  
Left side typical

Mounting legs

**FIG 2**

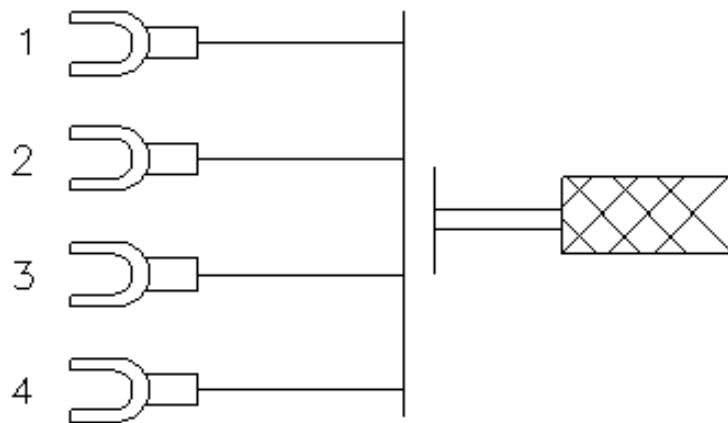


**FIG. 3**



110 VAC ELECTRICAL PANEL WIRING	
#	LAND LINE CONNECTIONS
1	GREEN - 110 v GROUND
2	BLACK - 110v POSITIVE
3	WHITE - 110v NETURAL

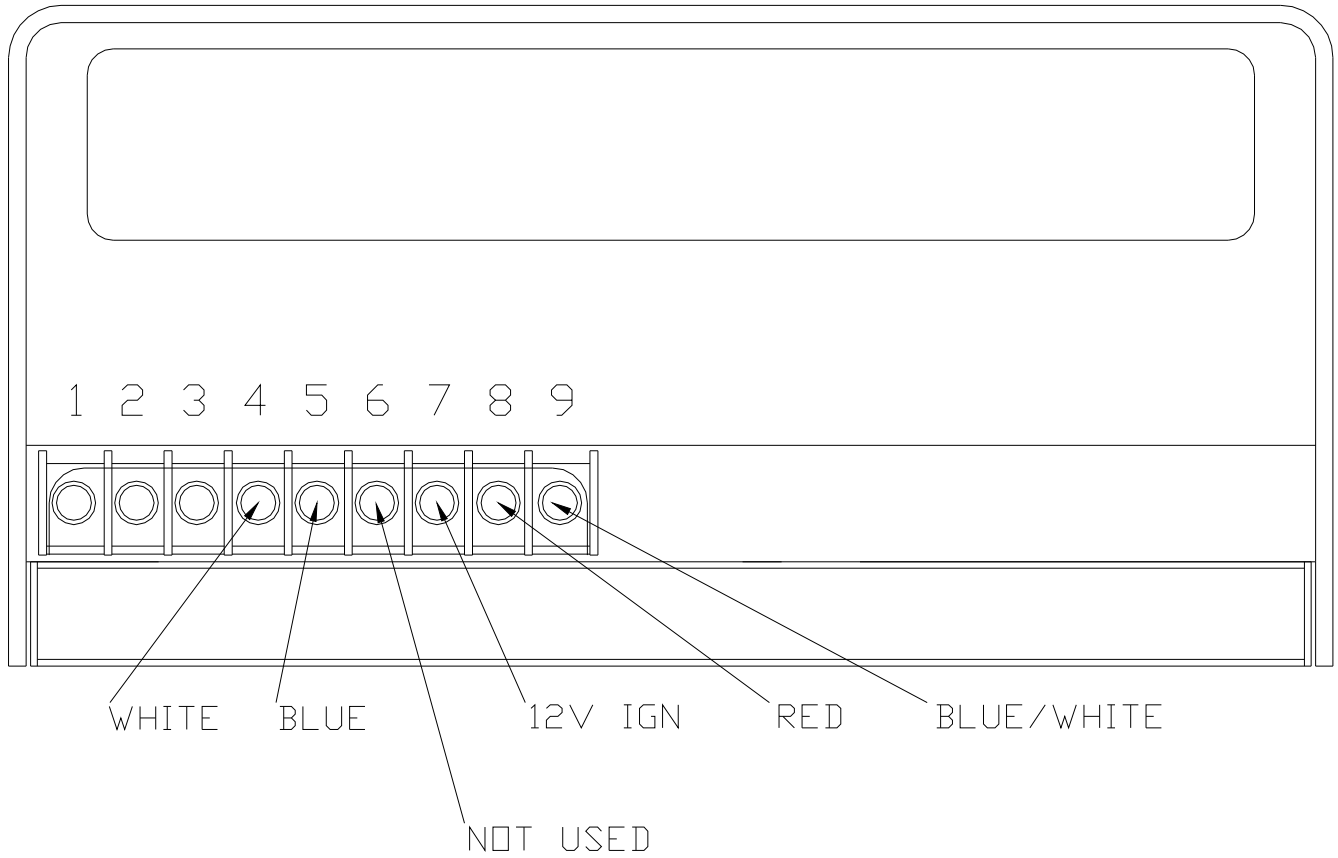
FIG.  
4



110 VAC ELECTRICAL PANEL WIRING	
#	CONDENSOR HARNESS TERMINATION
1	BLUE - 14 GA. (SUPPLIED)
2	BLUE/WHITE - 12 GA. (SUPPLIED)
3	RED - 12 GA. (SUPPLIED)
4	WHITE - 12 GA. (SUPPLIED)



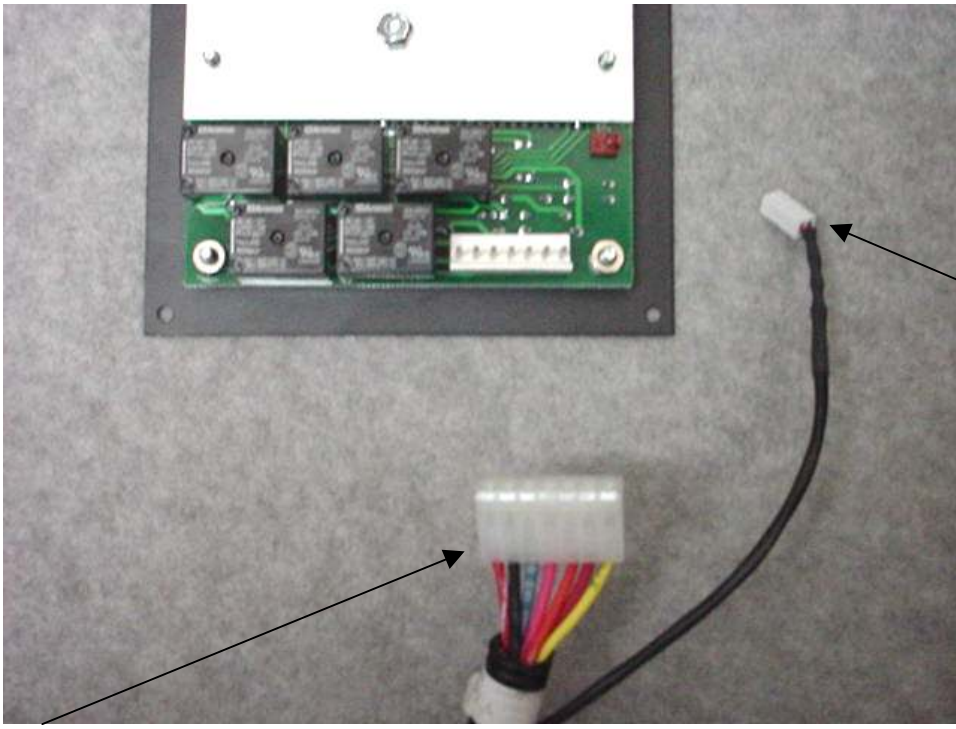
FIG 5



110 VAC ELECTRICAL PANEL WIRING	
#	CONDENSER CONNECTIONS
4	WHITE - COMPRESSOR COMMON
5	BLUE - CONDENSER FAN
6	NOT USED
7	12VDC CHASSIS IGN 30amp
8	RED - COMPRESSOR START
9	BLUE/WHITE - COMPRESSOR RUN

\* NEW WIRE BUILDER SUPPLIED  
30amp CIRCUIT

FIG 6



Temperature sensing probe connector

Thermostat wiring connector from electrical panel

Connect as shown

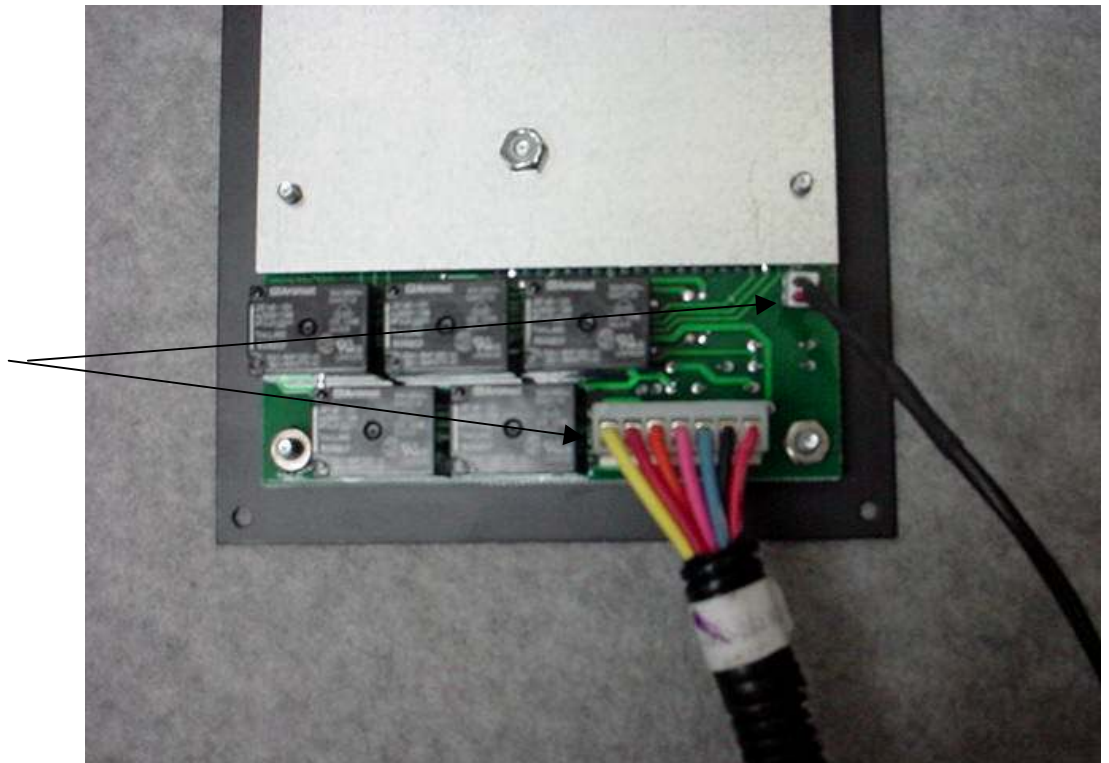


FIG.  
7

**NOTES:**

- 1) HARNESS - 125° INSULATED WIRE  
EQUIVALENT TO SAE SPECIFICATION  
J1128 TYPE GXL
- 2) WIRE HARNESS ROUTED WITH HOSES
- 3) ALL GROUND WIRES SHOULD BE FASTENED  
SECURELY TO THE CHASSIS
- 4) IF THE CLUTCH WIRE IS LONGER THAN  
20'-0", A CLUTCH RELAY MUST BE USED  
SO A VOLTAGE DROP DOES NOT OCCUR

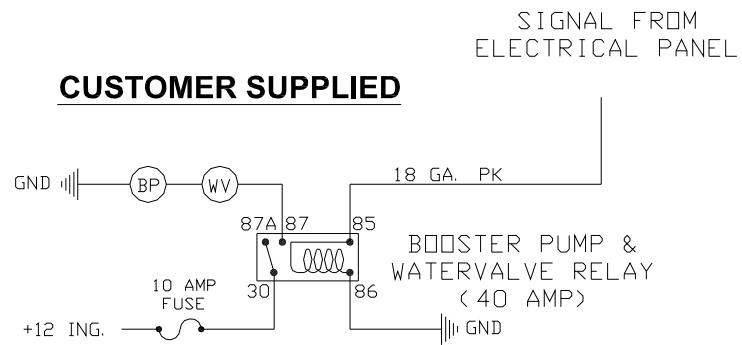
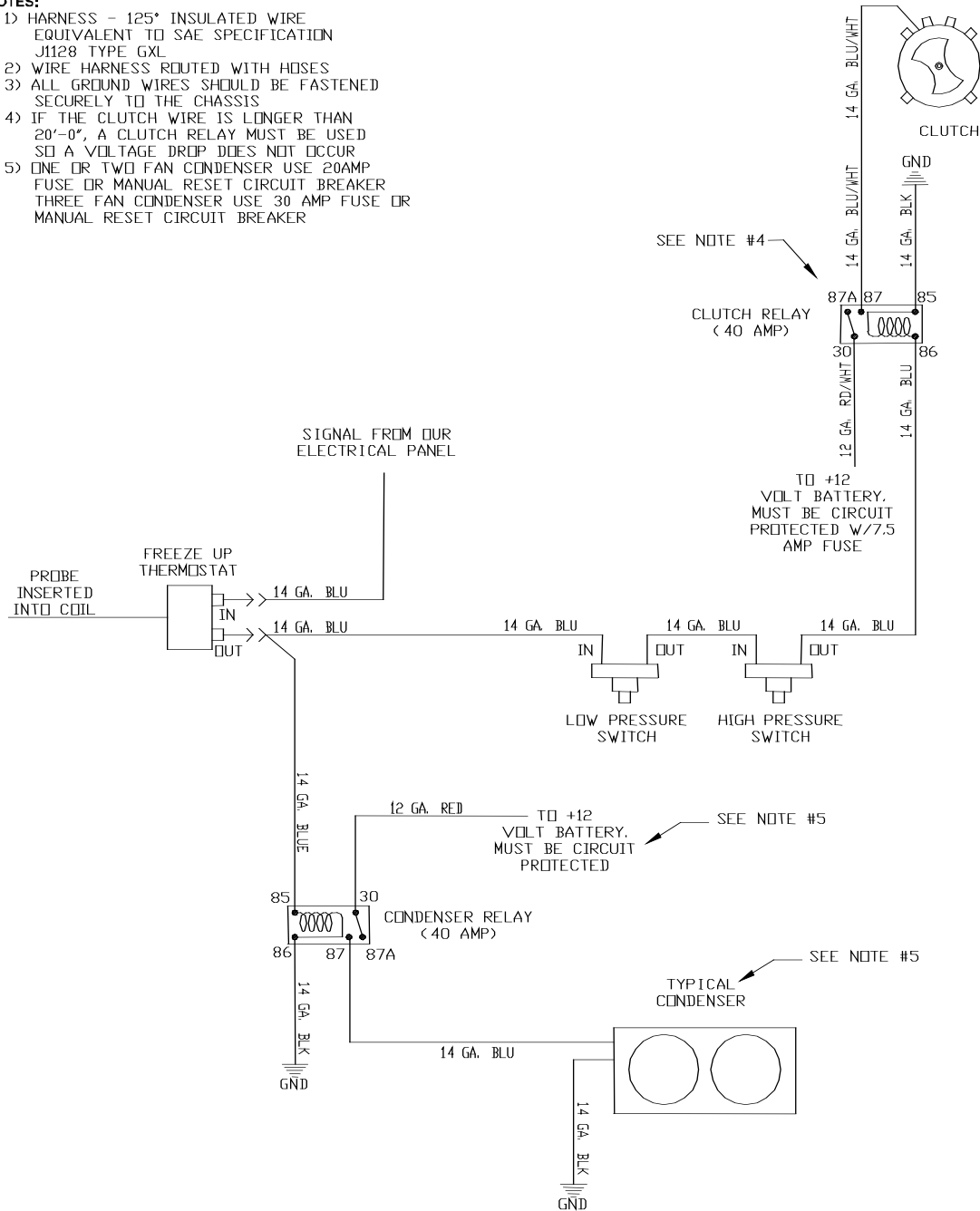


FIG.  
100

**NOTES:**

- 1) HARNESS - 125° INSULATED WIRE EQUIVALENT TO SAE SPECIFICATION J1128 TYPE GXL
- 2) WIRE HARNESS ROUTED WITH HOSES
- 3) ALL GROUND WIRES SHOULD BE FASTENED SECURELY TO THE CHASSIS
- 4) IF THE CLUTCH WIRE IS LONGER THAN 20'-0", A CLUTCH RELAY MUST BE USED SO A VOLTAGE DROP DOES NOT OCCUR
- 5) ONE OR TWO FAN CONDENSER USE 20AMP FUSE OR MANUAL RESET CIRCUIT BREAKER  
THREE FAN CONDENSER USE 30 AMP FUSE OR MANUAL RESET CIRCUIT BREAKER





# ProAir 110-Volt/12-Volt System 1-Year/Unlimited Mileage Limited Warranty

1. ProAir warrants every 110-volt/12-volt unit produced by ProAir and used in a commercial or specialty vehicle to be free from defects in material and workmanship under normal use for a period of twelve (12) months from the date of retail purchase.
2. If a repair or adjustment under the warranty is required, the product should be taken to an authorized ProAir service center or, if possible, taken to the original installer. The owner's registration certificate should be presented. If the ProAir service center is too far away, the customer may find a repairing facility nearby and contact ProAir. We will attempt to allow the repair facility authorization to address the concern.
3. **Before repairs are started, the repairing service center *must* contact ProAir by calling 574 264 5494 or 800 338 8544, asking for the customer service department and describing the type of warranty repair needed.** The following additional information is required at that time: ProAir serial number and model number, vehicle identification number (VIN), mileage, retail purchase date, and retail customer's name. The installers of ProAir's air conditioning units apply an installation sticker to the passenger-side door jamb. The information on this sticker indicates what model of unit was installed, the unit's serial number, and date of installation; this information is very helpful when requesting warranty parts and/or technical assistance. In the event that this sticker cannot be found, there is a duplicate sticker on the housing of the unit itself.
4. **ProAir reserves the right to supply warranty parts.** All warranty parts are shipped on a memo (no-charge) billing and are sent the same day, if possible. An authorization number accompanies the replacement parts. Also noted on the memo billing is ProAir's labor allowance for the repair; labor allowances are based on ProAir's flat-rate standards multiplied by the repair facility's standard warranty or retail labor rate, whichever is less.
5. All defective parts must be returned to ProAir. **No warranty claim will be paid without the return of replaced part(s) to ProAir.** Shipping charges—by the most economical method—to return these parts to ProAir may be added to the cost of the repair.
6. **ProAir reserves the right to deny a claim if, upon testing, no problem is found with allegedly defective part(s).**

7. Warranty claims submitted to ProAir must include the following: ProAir authorization number, ProAir serial number, vehicle serial number, mileage, and authorized labor amount. ProAir does not pay tax or miscellaneous shop supplies. ProAir uses no special warranty-claim forms; the repair facility's standard repair order or invoice will suffice. All claims must be submitted within 180 days of the date of repair, and all parts must be returned in order to receive payment on these warranty claims.
8. ProAir reserves the right to deny any warranty claim that is without proper documentation or that was for an improper repair. Service management is responsible for implementing controls to eliminate improper or unnecessary repairs and for providing accurate information on the warranty claim. This includes a complete and clear description of the customer's original concern, the underlying cause of this concern, and the subsequent correction.
9. This warranty does not cover any product which has been subject to misuse, neglect, alteration, accident, improper installation, or improper maintenance, or which has been repaired outside of an authorized ProAir service center in any way so as to affect adversely its performance or reliability. This warranty does not cover material or labor used in normal maintenance services or the replacement of service items. Normal wear of service items will not be considered a defect under this warranty. **This warranty does not cover customer's lost time, vehicle towing, vehicle rental, or lodging.**
10. This warranty does not include consequential damages, and ProAir will not be responsible for any such damages. ProAir does not make and does not authorize any person to make for it any warranty other than the foregoing warranty. Such other warranties, if any as may be imposed or implied by law, are limited to the duration of this written warranty.
12. This warranty does not cover loss of refrigerant unless the loss is a direct result of a defect covered by this warranty.

# ProAir Labor Standards

<b>Operation</b>	<b>110V Side</b>	<b>12V Side</b>
<b>Air Conditioning</b>	<b>R-22 Only</b>	<b>R-134 a Only</b>
Pressurize, Diagnose, Leak Test, Drain, Evac, Charge, Recover	1.0	1.0
A/C System Diagnosis (part of Pressurize, Diagnose, Leak Test, Drain, etc.)	0.5	0.5
Coil, Condenser—Replace (includes drier)	1.0	—
Coil, Evaporator—Replace	1.0	1.0
Compressor—Replace	1.0	
Drier—Replace	1.0	—
Fitting—Replace or Repair (each)	0.5	0.5
O-Ring—Replace (one or more)	0.5	0.5
Power Pack—Replace	—	1.5
Refrigerant Hose—Repair (one or more)	1.0	1.0
Refrigerant Hose—Replace (one or more)	Open	Open
Valve, Expansion—Replace	1.0	1.0
<b>Electrical</b>		
Electrical System Diagnosis	0.5	0.5
Blower, Evaporator—Replace	0.5	0.5
Capacitor, Run—Replace	0.3	—
Capacitor, Start—Replace	0.3	—
Fan, Condenser—Replace	0.5	—
Fuse—Replace (includes Electrical System Diagnosis)	0.5	0.5
Module, Power Supply—Replace	0.3	—
Relay—Replace (one or more)	0.3	0.3
Switch, Pressure—Replace	1.0	—
Thermostat, Unit—Replace	1.0	1.0
Thermostat, Wall—Replace	0.3	—
Wiring—Repair	0.8	0.8
<b>Heating</b>		
Heat System Diagnosis	0.5	0.5
Coil, Heater—Replace	0.8	1.0
Heater Hose Wye—Replace (one or more)	—	0.6
Heater Hose—Repair (each)	—	0.5
Heater Hose—Replace (one or more)	—	1.0
Hose Clamp—Replace (one or more)	—	0.5
Water Valve—Replace	—	0.5
<b>Other</b>		
Louver—Replace or Repair (one or more)	—	0.1



# ProAir 110volt Unit Operation

- **Note: This 110v unit was designed as a temperature maintenance unit not as a primary heating and cooling system. Using this system out side of its original design parameters is not recommended. For any questions or concerns please contact ProAir at (574) 264-5494**
- Connect a landline, which is constructed of 10/3 cable and no longer than 15', to a switched 110VAC 20-amp ground fault protected circuit.
- To test the system operation energize the landline, Select cool and cycle the temperature reading down to 50° This will turn the blower on and energize the condenser module. After a three minute delay the compressor will energize. Run the unit for 15 minutes in the cooling mode. After the cooling system operation has been verified select heat and cycle the temperature reading up to 90°. This will turn the blower on medium speed and energize the heating element. Run the system for 15 minutes in the heating mode to verify correct operation and system performance.
- After the system has been tested the operator can select a temperature on the thermostat and either heat or cooling mode. No other adjustments will be necessary. The system when energized by the landline will maintain cabin at the desired temperature automatically. It will be necessary to switch from heat to A/C modes when needed.

# PROAIR®

## Digital Thermostat Operation 12v

Function/Mode	Action
<b>OFF</b>	No functions or outputs display off
<b>Cool Mode</b>	Display on, reads and displays probe temperature Fan speeds operational can be selected L/M/H Constant signal from A/C relay above set point signal off below set point.
<b>Heat Mode</b>	Display on, reads and displays probe temperature Fan speeds operational can be selected L/M/H Constant signal from heat relay below set point signal off above set point.
<b>Fan Modes</b>	Select desired fan speed by pressing the up or down arrows a lighted LED will indicate set speed. The fan modes are fixed and non-functional during the 110volt unit operation
<b>Set Mode/Temperature</b>	Temperature can be set by using the up/down buttons to select user desired level between 50°F and 99°F. Display has a lighted LED to indicate set mode it will turn off after several seconds to indicate operation mode/cabin temperature.

### Preset operations:

Upon cycling of 12vdc supply the unit will default to previous settings Mode and Fan.

All output signals are positive + voltage.

