UNITED COOLAIR

INSTALLATION AND OPERATION MANUAL
12-TON PORTABLE
AIR CONDITIONING UNIT

Serial Number _____

UNITED COOLAIR CORPORATION
YORK, PA

MODEL NO.	SCPAC5GxAS_3_24_16				
SERIAL NUMBER	1610057				
VOLTS	460	PHASE	3	CYCLE	60
COMP. LRA	351 EA	QTY	2	RLA	53.6 EA
EVAP. MOTOR HP	15.0			FLA	35
COND. MOTOR HP	3.0 EA	QTY	2	RLA	8.6 EA
ELEC. HEATER KW	15				
MCA	25.8				
MOP	30				
FACTORY CHARGE	R-410A	46 lb 0oz CKT1			
		46 lb 0oz CKT2			

TEST PRESS. HISIDE 500 PSIG - LOSIDE 250 PSIG

COMPRESSOR MOTOR AND FAN ARE THERMALLY PROTECTED

USE COPPER CONDUCTORS ONLY.

EXT. STATIC PRESS - 0.1 TO 1.0 IN. WC.

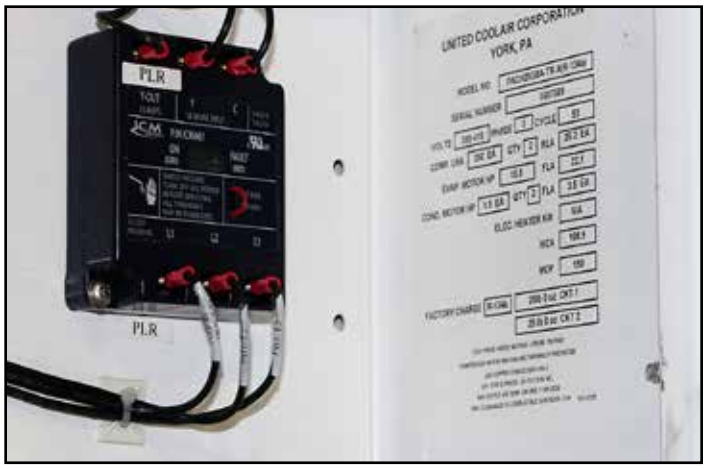
MAX OUTPUT AIR TEMP. 200 DEG. F OR LESS

MIN. CLEARANCE TO COMBUSTIBLE SURFACES - 0 IN

9CA-6242

IDENTIFICATION OF YOUR UNIT

The Data Tag contains important information on how identify your United CoolAir Unit. See Figure 1 for more information on locating tag.



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WARNING: HIGH VOLTAGE – DISCONNECT POWER BEFORE SERVICING	
DISCONNECT POWER Failure to disconnect power before servicing could lead to severe personal injury or death.	**RE-CONNECT ALL GROUNDS** All parts of this product capable of conducting electrical current are grounded. If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for servicing, they must be reconnected at their original location.

PAC12G3ASC* (208/230 Volt) – PRODUCT SPECIFICATIONS

COOLING MODE		
Design Indoor Dry Bulb / Wet Bulb		80°F / 67°F
Design Outdoor Ambient Temperature		95°F
Total Cooling Capacity	BTU/HR	144,000
Sensible Cooling Capacity		104,400
Minimum Indoor Ambient Temperature		68°F
Design Return Air Dry Bulb		80°F
Design Return Air Relative Humidity		50%
POWER REQUIREMENTS		
Voltage / Phasing / Frequency		230/3/60
Minimum Circuit Ampacity	(Amps)	92.2
Maximum Fuse Size	(Amps)	125
COMPRESSOR		
Type		12 Ton Scroll
Voltage / Phasing / Frequency		208-230/3/60
FLA	(Amps)	48.1
LRA	(Amps)	245
CONDENSER		
Airflow	Belt Drive	6000 CFM @ 1.5” W.C.
Horsepower		7.5
Voltage / Phasing / Frequency		208-230/3/60
FLA	(Amps)	18.5
Speed	RPM	3450
EVAPORATOR		
Airflow	Belt Drive	4800 CFM @ 1.0 “ W.C.
Horsepower		5
Voltage / Phasing / Frequency		208-230/3/60
FLA	(Amps)	13.6
Speed	RPM	1750
REFRIGERANT		
R - 410A		16 lbs. 0 oz.
Low Pressure	100 PSIG Cutout	100 PSIG Reset
High Pressure	600 PSIG Cutout	Manual Reset
Suction Operating Pressure	280 PSIG Low	145 PSIG High
Discharge Operating Pressure	280 PSIG Low	600 PSIG High
Superheat	80 °F ambient1	12-15°F
DIMENSIONS		
Height		55-3/4”
Width		43”
Length		68”
OPTIONAL HEAT		
Total Heating Capacity		15 KW (51,195 BTU/HR)
Operating Current	208 VAC	37.2 Amps
Operating Current	230 VAC	41.2 Amps

*Readings are dependent upon ambient conditions; numbers listed are approximate.

PAC12G4ASC* (460 Volt) – PRODUCT SPECIFICATIONS

COOLING MODE		
Design Indoor Dry Bulb / Wet Bulb		80°F / 67°F
Design Outdoor Ambient Temperature		95°F
Total Cooling Capacity	BTU/HR	144,000
Sensible Cooling Capacity		104,400
Minimum Indoor Ambient Temperature		68°F
Design Return Air Dry Bulb		80°F
Design Return Air Relative Humidity		50%
POWER REQUIREMENTS		
Voltage / Phasing / Frequency		460/3/60
Minimum Circuit Ampacity	(Amps)	37.95
Maximum Fuse Size	(Amps)	50
COMPRESSOR		
Type		12 Ton Scroll
Voltage / Phasing / Frequency		460/3/60
FLA	(Amps)	18.6
LRA	(Amps)	125
CONDENSER		
Airflow	Belt Drive	6000 CFM @ 1.5” W.C.
Horsepower		7.5
Voltage / Phasing / Frequency		460/3/60
FLA	(Amps)	8.4
Speed	RPM	3450
EVAPORATOR		
Airflow	Belt Drive	4800 CFM @ 1.0 “ W.C.
Horsepower		5
Voltage / Phasing / Frequency		460/3/60
FLA	(Amps)	6.3
Speed	RPM	1750
REFRIGERANT		
R-410A		16 lbs. 0 oz.
Low Pressure	100 PSIG Cutout	100 PSIG Reset
High Pressure	600 PSIG Cutout	Manual Reset
Suction Operating Pressure	280 PSIG Low	145 PSIG High
Discharge Operating Pressure	80 °F ambient1	600 PSIG High
Superheat		12-15°F
DIMENSIONS		
Height		55-3/4”
Width		43”
Length		68”
OPTIONAL HEAT		
Total Heating Capacity		15 KW (51,195 BTU/HR)
Operating Current	460 VAC	18.8 Amps

*Readings are dependent upon ambient conditions; numbers listed are approximate.

GENERAL INFORMATION

The PAC12GxAS is a portable air conditioning unit designed for air conditioning of spaces such as tents, construction sites and remote buildings. This product may also have optional electric heaters. If supplied with the electric heat option, refer to the specifications and operating sections provided for the electric heaters.

IMPORTANT – Read this instruction manual carefully before attempting to install, operate, or perform maintenance on this unit. This unit must be installed and maintained by qualified service technicians.

WARNING: BODILY INJURY CAN RESULT FROM HIGH VOLTAGE ELECTRICAL COMPONENTS AND FAST MOVING FAN DRIVES. FOR PROTECTION FROM INHERENT HAZARDS DURING INSTALLATION AND SERVICING, THE ELECTRICAL SUPPLY MUST BE DISCONNECTED. IF CHECKS MUST BE PERFORMED WITH THE UNIT OPERATING, IT IS THE RESPONSIBILITY OF THE TECHNICIAN TO RECOGNIZE THESE HAZARDS AND PROCEED WITH EXTREME CAUTION.

NOTE: "Warnings and Cautions" appear at the appropriate places throughout this manual. Your personal safety and the proper operation of this unit require that you follow them carefully. The manufacturer assumes no liability for installations or servicing performed by non-qualified personnel.

UNIT INSPECTION

Upon receiving the unit, inspect for damage to the unit structural interior and exterior components that may have happened during transit. Immediately notify the carrier of damage to the unit. Verify the unit is the correct unit ordered by looking at the unit's data plate. Figure 1 – Data Plate is located on the right hand side of the electrical box section. The main power source must be capable of delivering the required amount of power to the unit. Refer to the installation instructions for connections.

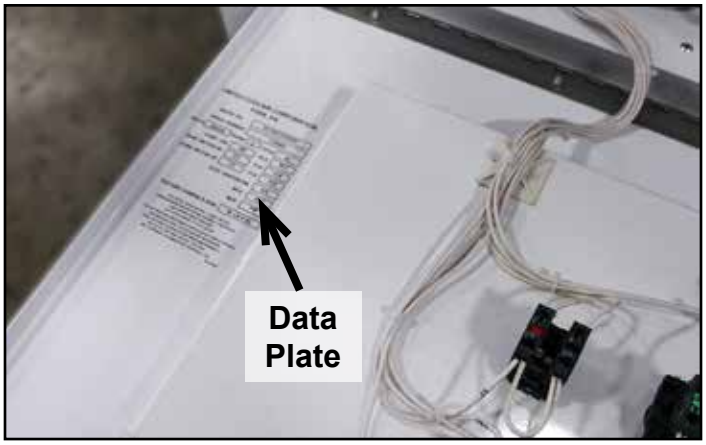

Figure 1 – Data Plate

The main power source must be capable of delivering the required amount of power to the unit. Refer to the installation instructions for connections.

Access to the Schrader pressure taps is located behind the access panel to the compressor compartment. These taps are sealed from serviceability. Break these seals only when there is a necessity to check or service the system to ensure correct operation. Refer to the specifications section for operating pressures and maximum operating currents. See Figure 3 – Compressor Compartment.

Figure 3 – Compressor Compartment

UNIT SETUP

Location and Clearances

Select a location that permits unobstructed airflow into the condenser coil and away from the condenser fan discharge air outlets. This may require allowing several feet between the inlet air side of the condenser coil as well as the condenser blower discharge air outlet.

Placement and Rigging

When using a forklift to set the portable air conditioning unit into place, ensure the forks are directly centered into the openings in the base frame of the equipment.

CAUTION: Never attempt to lift this unit using a Crane.

Pre-Installation Inspection

It is recommended that the following be inspected to insure internal components have not vibrated loose during shipment or transit from job site to job site.

1. Open the condenser blower/motor access panel located to the right of the compressor compartment. Check the condenser blower assembly, motor mounting hardware, pulley, belt, blower shaft, blower bearings, and blower wheel for proper tightness.
2. Open the evaporator blower/motor access panel located to the right of the control panel. Check the condenser blower assembly, motor mounting hardware, pulley, belt, blower shaft, blower bearings, and blower wheel for proper tightness.
3. Close and lock all panel doors.

Electrical Connection

Refer to the unit data plate for main power requirements. Electrical wiring and grounding must be installed in accordance with The National Electrical Code NEC/NFPA Latest Revision. Refer to the electrical wiring diagram for Main Power connections also shown in Figure 4 – Camlock Power Connections which are located directly below the control panel.

Figure 4 – Camlock Power Connections

CAUTION: Only qualified electrical technicians should perform the electrical installation.

1. An envelope containing the electrical schematic is located in the electrical control box section for reference.
2. This unit also has a Voltage Meter which is imperative in the setup and operation of the unit. Refer to Figure 5 – Voltmeter.

Figure 5 – Voltmeter

208 – 230 Volt Applications

In a 208-230 Volt AC application, the meter is used for two functions. The most important function is to check the applied voltage from the main power source. **If the applied voltage from the main power source is less than 190 Volts AC or greater than 250 Volts AC, do not operate the unit until power is corrected at the main**

power source. The second function is to use the measured voltage to select the control circuit type 208 or 230 volt. Selecting the type of voltage for the control circuit based the measured voltage helps to stiffen the control voltage to the control components (motor contactor, time delays, etc.).

460 – Volt Applications

In a 460 Volt AC application, the meter is only used for an over/under applied voltage check. **If the applied voltage from the main power source is less than 420 Volts AC or greater than 500 Volts AC, do not operate the unit until power is corrected at the main power source.**

3. Review the following steps to insure that electrical phasing and voltage setup is correct prior to initial start-up and unit operation.

4. Proper phasing of the electrical power wiring is critical for proper rotation of the motors and operation of the compressor. Electrical phase sequence monitors are standard on all three-phase 12 Ton Spot Cooler A/C units.

   (a) Connect the power cable to the correct power source as verified by the unit's data plate shown in Figure 1 or at the Camlock connection fittings.

   (b) Turn **ON** the main power to the unit.

   (c) As soon as power is applied to the unit, check two items immediately.

   (d) Read the voltage on the Voltage Meter.

   (e) Next, verify the Red Out-of-Phase Indicator (OPI) located on the front of the control panel is not illuminated as viewed from the control panel Figure 2.

   (f) At this point, **TURN OFF POWER** to the unit at the main power source.

   (g) If the Red OPI light is illuminated, switch any two leads of the three main power wires connected from the main power source.

   CAUTION: Do not switch Green. Green is Ground.

   (h) For 208 – 230 volt applications, if the displayed voltage is greater than 190 VAC and less than 219 volts AC, set the Control Voltage Selector Switch (CVSS) to the 208 Volt position.

   (i) For 208 – 230 volt applications, if the displayed voltage is greater than 219 VAC and less than 250 volts AC, set the Control Voltage Selector Switch (CVSS) to the 230 Volt position.

   (j) Turn main power **ON** again. When the Red OPI indicator light is off, the phase sequence is correct.

   (k) Turn **OFF** main power at this point and lockout the disconnect switch until the supply and return air ducting is connected.

CAUTION:

1. IN 208 – 230 VOLT APPLICATIONS, DO NOT OPERATE THE UNIT IF THE APPLIED VOLTAGE IS LESS THAN 190 VAC OR GREATER THAN 250 VAC.

2. IN 460 VOLT APPLICATIONS, DO NOT OPERATE THE UNIT IF THE APPLIED VOLTAGE IS LESS THAN 420 VAC OR GREATER THAN 500 VAC.

3. These units will not operate if phase sequence is not correct.

DUCT CONNECTIONS

Supply Air Duct

The supply air duct connections are labeled "AIR OUT". The connection size is 14" in diameter. Connect the flexible air ducting as follows:

1. Attach the flexible air ducting to the unit's duct collars making sure that air will not leak past the connection collar by using appropriate round flexible ducting clamps.

2. Route the ducting as straight as possible to the space being conditioned avoiding excessive turns and pinches in the ducting.

3. Terminate the ends of each duct to the space being conditioned making sure that supply air does not have the possibility of short cycling back into the return air.

4. Verify the termination points are not restricted meaning no objects are directly in front of the termination.

Return Air Duct

The Return Air duct connections are labeled “AIR IN”. Follow the same procedures as the Supply Air Duct Connections. If outdoor air is required for specific applications use only one (1) Air In duct collar to pull in fresh outdoor air. The other must be ducted to the return air from the space being conditioned. Determine which Return Air Duct will be connected and terminate the return air ducts to that particular duct collars.

CAUTION: Do not operate the unit without duct(s) attached to the return air side of the unit. If operated without duct(s), the evaporator blower motor overloads will cut out on thermal overload due to the motor operating higher than design Full Load Amperage.

CONDENSATE DRAIN

There are condensate drains on both sides of the unit. There are two drain connection options:

1. Drain to the ground. The drain line must be trapped and filled with water before operating the unit. Filling the trap with water prevents negative air pressure inside the unit cabinet from holding the condensate internal to the drain pan which may eventually overflow if a trap is not installed.

   If drain to ground is not a desirable option, connect the drain to a suitable drainage point such as a storm drain using a hose. The hose must still have a form of trap to allow the water to drain. Fill the trap with water before operation to form a seal.

Or

2. Drain to an optional condensate pump, to pump condensate to another location. Refer to the Figure 6 – Condensate Pump for information on installation of this option. The pump plugs into a standard 115 vac receptacle. Use of an extension cord is acceptable. Make sure to slide catch lip at point B back onto the front edge of the fork lift pocket. Angle point A downward until point B is completely secured back onto the fork lift pocket then tilt the pump downward so that point A rises upward to meet the back edge of the fork lift pocket.

   Before installing the flexible condensate tubing from the condensate drain connection on the unit to the condensate pump, fill the pump with water. Next, make sure the flexible condensate tubing that will be installed from the condensate outlet of the unit into the condensate pump has a V shaped notch cut into the end of the tube so that when the end of the tube is pushed down into the pump, the bottom of the pump cannot seal off the end preventing water from flowing into the pump. See Figure 7 – V Notch

OPERATION

Getting Started

1. Connect the 12 Ton Portable Spot Cooler Air Conditioning unit to the correct power source.

2. Turn ON the main supply power at the main power source.

3. Verify the Red Out-of-Phase Indicator (OPI) is not illuminated and that the voltage is within the required range. Refer to the procedures under the Installation Instructions.

System Fan Mode

Turn Selector Switch (SS) to the Fan position. The Evaporator Motor Contactor (CEM) will

energize to start the Evaporator Motor (ME). The Evaporator Fan will operate continuously in the Fan and Cool modes of operation. It will also operate continuously during optional Heat Mode.

System Cool Mode

Turn the Selector Switch (SS) to the Cool position. If the Return Air Temperature “AIR IN” is greater than the Thermostat setting sensed by the thermostats temperature measuring bulb, the compressor contactor (CCR) will energize the Compressor (CR) and the Amber Cool Indicator light (CL) will illuminate. When the compressor energizes, condenser fan contactor (CCM) will energize and condenser fan motor (MC) will start. As soon as the return air temperature falls below the thermostat setting, the compressor and condenser motors are de-energized.

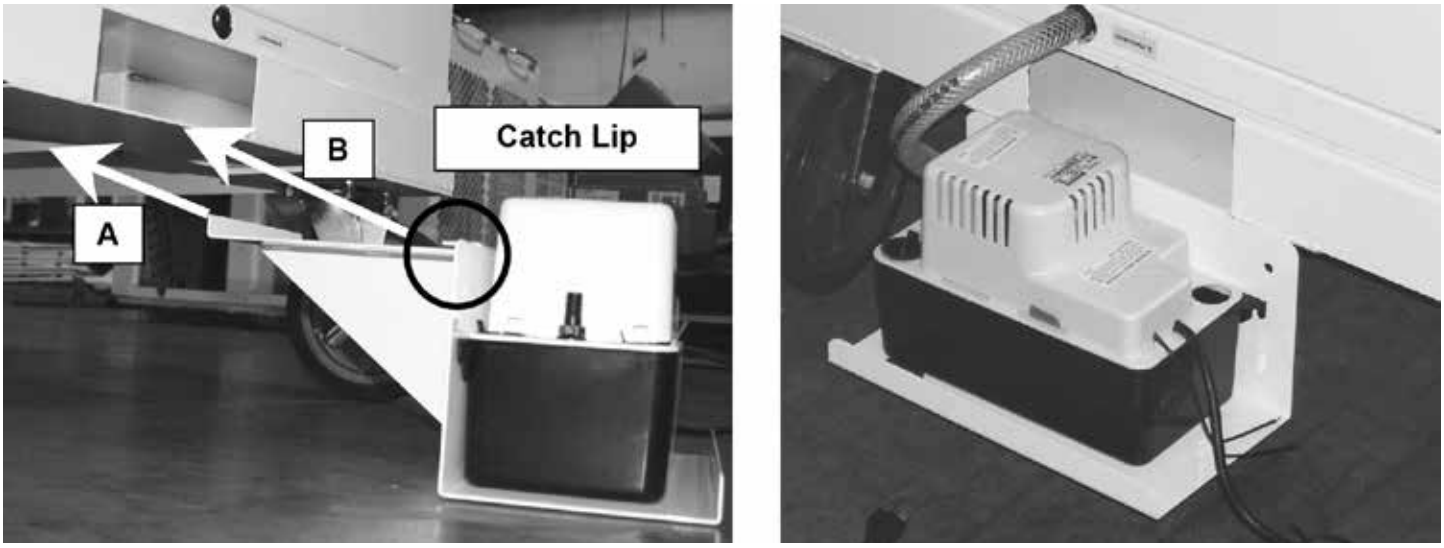

Figure 6 – Condensate Pump

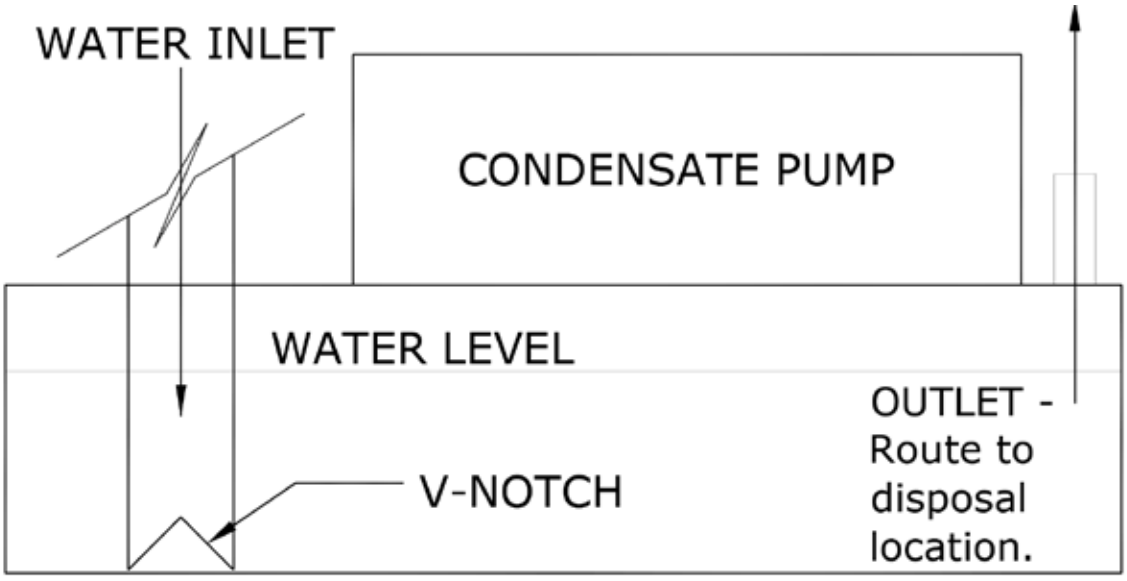

Figure 7 – V-Notch

To stop the unit, turn Selector Switch (SS) to the OFF position.

NOTE: There is a manual damper slide damper at the top of the condenser blower discharge air outlet. This damper should be closed off approximately 1-2 inches when the condenser outlet is not ducted. This will reduce the condenser motor current and prevent overload conditions with the condenser motor. Adjust this damper only when the condenser discharge is not ducted. When it is ducted to a length of 20 feet or greater, make sure the slide plate is completely open.

System Heat Mode (Option)

Turn the Selector Switch (SS) to the Heat position. If the return air temperature is below the unit's thermostat setting, the heating contactor(s) (CHT or CHT1 and CHT2) will energize the Electric Heating Elements and the Amber Heat Indicator light (HL) will illuminate. As the return air temperature rises above the Thermostat's setting, the heater(s) are de-energized.

To stop the unit, turn Selector Switch (SS) to the OFF position.

REMOTE THERMOSTAT CONTROL – RTC (OPTION)

These units are pre-wired for this specific option. If remote thermostat control is desired, contact your representatives at (800) 367 – 8675.

1. When the remote thermostat is desired, insert the plug at the end of the cord into the unit's adapter located on the control panel side of the unit at the evaporator sections corner post. See Figure 8 – Remote Thermostat Connection below for location. After the plug has been inserted and properly tightened follow the procedures listed below:

   (a) Press the ON/OFF button shown in Figure 9 – Remote Thermostat Control. ON will display in the LCD. To turn the unit off, press the ON/OFF button again and OFF will appear on the LCD.

   (b) Press the (+) or (–) sign and the Digits on the LCD will flash. Press the (+) to increase the temperature set point. Press the (–) to decrease the temperature set point.

Figure 8 – Remote Thermostat Connection

Figure 9 – Remote Thermostat Control

   (c) Press the SELECT button and adjust the COOL/HEAT setting using the (+,–) to select the COOL mode.

   (d) Press the SELECT button again and adjust the fan to Continuous Mode using the (+,–). Using continuous fan mode will allow for more accurate readings at the temperature sensor.

Thermostat Bypass

The unit also has a Thermostat Bypass Switch which is used to manually force cooling or heating to be energized based on the mode selected by the Selector Switch. Thermostat bypass overrides the unit's on-board thermostat and the Remote Thermostat. Both of the thermostats become non-functional in the bypass mode.

To operate in Bypass Mode, set the Selector Switch to the desired mode of operation (COOL or HEAT). Set the Thermostat Bypass Switch to the BYPASS position. At this point either COOL or HEAT will operate continuously without shutting down.

UNIT SAFETY DEVICES

Evaporator Motor Overload

The evaporator and condenser motors are protected by thermal overloads. The evaporator blower motor protection is internal and automatically resets once the temperature inside the windings of the motor falls below the temperature trip point.

Condenser Motor Overload

The condenser blower motor is external and protected manually with an overload block. This overload block is tied directly to the condenser motor contactor (CCM). This is a manual reset overload. If the condenser motor for any reason should cut out on overload, disconnect power using the unit's circuit breaker then open the main control box. Press the reset button on the CCM overload block. Refer to the troubleshooting guide section for information on troubleshooting.

High Pressure Switch

The compressor system has a manual reset High Pressure Switch. If the unit is not providing cooling as evidenced by the Return Air Temperature "AIR IN" being approximately equal to the Supply Air Temperature "AIR OUT", the compressor system may have tripped on high refrigerant pressure. Disconnect power using the unit's circuit breaker. Remove the Access Panel to the Compressor Compartment and locate the Manual Reset High Pressure Switch. Press the button downward to verify if the switch tripped. If the button clicks the unit tripped on high pressure. Replace the access panel then reapply power using the unit's circuit breaker. Set the unit to Cool Mode. Refer to the Troubleshooting section for causes and corrective actions. It may require a service technician to check system pressures if the switch trips more than 1-2 times.

Low Pressure Switch

The compressor system has an automatic reset low pressure safety switch. If the unit trips on low pressure, the compressor will shut down but automatically restart once the switch resets. The low pressure switch shuts down the compressor system if the refrigerant pressure falls below 70 psig and automatically restarts the compressor once the pressure rises above 100 psig.

Compressor Internal Overload

Each compressor has an internal motor overload switch. This switch opens to protect the compressor motor when the temperature within the windings of the compressor motor exceeds the high temperature trip point. When this switch opens, the compressor motor will continue to operate but the compressor pumping mechanism "scroll" will become disconnected. To reset this condition, the power must be disconnected from the compressor contactor. Set the unit back to the FAN position and allow the unit to operate in the FAN position for approximately 30- 45 minutes. This should be enough time to cool the windings of the compressor motor which will allow the switch to reset (re-engaging the scroll). Set the Selector Switch back to COOL mode and the compressor should re-start. If this compressor goes out on internal overload condition, check the voltage. Since the compressor motor windings are cooled by the refrigerant gas as it enters the compressor, the unit may also be low on refrigerant.

UNIT COMPONENTS

Electrical Components

Contactors

Contactors are used to energize the evaporator and condenser blower motors and compressor motor. Contactors have a set of high current carrying contacts for conducting line voltage to the load (device) and a magnetic holding coil which closes the line voltage contacts whenever control voltage of 115 VAC is applied by the control panel devices. The evaporator blower and compressor motors have built in internal overload protection to protect against high current draw. They automatically reset when the motors have cooled down.

High Pressure Safety Switch

The high-pressure switch is designed to protect the compressor circuit from unusually high refrigerant pressures. If the refrigerant pressure rises above 600 PSIG, the pressure switch will open causing the compressor to shut off and the switch prevents the compressor from re- starting until the manual reset button is pressed. Refer to the troubleshooting section for resolutions to the problem.

Low Pressure Safety Switch

The low-pressure switch is designed to protect the compressor circuit from unusually low refrigerant pressures. If the refrigerant pressure falls below 70 PSIG, the switch will open causing the compressor to shut off. As the pressure starts to rise above 100 PSIG, the switch will reset and allow the compressor to restart.

Phase Monitor

A phase monitor is supplied to monitor the phase rotation of the power. When the Red, Out-of-Phase Indicator (OPI) is illuminated, the phasing of the power is out of rotation to the unit. At this point, the unit will not start in any mode. Swapping any two leads of the incoming line voltage at the power connection block on the PAC12 unit will correct the phasing to the unit. The Green Power Lamp will illuminate whether the phase sequence is correct or not for reference that the system has power applied.

Thermostat

The unit has a standard Cooling/Heating thermostat with a temperature sensing bulb that is installed in the return air opening of the unit.

Time Delay (TD1) – Low Pressure Bypass for Flooded Condenser Option

On systems with the flooded condenser option, this switch is required to maintain suction pressure during cold start periods of the compressor. Each time the compressor starts during low out door ambient conditions, if the discharge pressure is low, the suction pressure will also be low. The head pressure control valve alone is not enough to maintain the discharge pressure and the suction pressure. This switch is intended to bypass the low pressure switch long enough to allow the head pressure valve to react to the low discharge pressure. Once the discharge pressure starts to increase, the suction pressure starts to increase as well and should rise above the low pressure switch's trip point. Once this happens, the time delay has timed out and the bypass switch is opened to allow the low pressure switch to operate as the safety device it is.

Time Delay (TD2) – Remote Thermostat Delay

This time delay is used to electrically disconnect the main thermostat control and add the remote thermostat control without creating an electrical feed back.

REFRIGERATION SYSTEM COMPONENTS

Compressor

The compressor is scroll hermetic type. The function of the compressor is to create a differential in refrigerant pressure. It converts

low pressure, low temperature refrigerant vapor entering the suction side of the compressor into a high pressure, high temperature gas at the discharge side of the compressor. The function of the compressor also pumps the refrigerant through the piping and components within the refrigeration system.

Condenser Coil

The condenser receives the high-pressure high-temperature gas from the compressor after it passes through the vibration eliminator. As the condenser blower draws the ambient air across the fins and tubes of the condenser coil and the high-pressure high-temperature gas enters the condenser coil, the gas starts to condense back into liquid state. At the outlet piping of the condenser coil, the gas has been turned back into liquid refrigerant and flows toward the receiver.

Evaporator Coil

As the liquid refrigerant passes through the expansion valve, the liquid refrigerant's pressure is regulated downward. This significant change in pressure causes a drop in temperature of the refrigerant. When the warmer ambient air is drawn over the cooler evaporator coil, the warmer or latent heat is exchanged. As the heat is being exchanged, the exchange of heat energy causes the liquid refrigerant to boil into a vapor and greatly reducing the temperature of the air on the outlet side of the coil. The liquid refrigerant is converted into the lower temperature, lower pressure refrigerant causing it to changing into a vapor state.

Flooded Condenser (Option)

The Flooded Condenser Option is used for discharge refrigerant pressure control during low outdoor ambient conditions. As the outdoor ambient temperature starts to fall below 60 degrees and cooling is still required within the space being conditioned, the compressor system's head pressure starts to fall. As the compressor's refrigerant discharge pressure starts to fall below 290 psig, the valve mechanically modulates open to bypass some of the discharge gas around the condenser coil directly into the liquid receiver. As this gas enters the receiver, it backs the flow of the converted liquid refrigerant back into the condenser coil rendering part of the coil inactive. This increases the discharge pressure to help maintain system capacity.

Filter Drier

The filter drier, filters loose particles, moisture and possible brazing residue from the system. If the unit starts tripping on low pressure cutout and the refrigerant line is frosted up to the outlet of the filter drier, check the refrigerant pressure drop across the filter drier and replace the filter drier if necessary.

Hot Gas Bypass Valve

The hot gas bypass valve has a pressure port to monitor the compressor system's suction pressure. If the suction pressure falls below 104 psig, the hot gas bypass valve mechanically modulates open to maintain the 104 psig set point. This valve modulates under conditions such as low space loads such as non comfort cooling applications, low temperature applications, low volume comfort cooling applications (minimal occupants).

Sight Glass

A liquid sight glass is located before the liquid line solenoid valve. During the cooling mode of operation, pure liquid should flow through the liquid sight glass. The liquid refrigerant will appear clear enough to see the back of the inside of the sight glass. Flashing (bubbles) will appear in the sight glass during the first minute or two of operation until the expansion valve fully adjusts. If flashing is constant during the cooling mode, it may be an indication the unit is short of refrigerant. There may also be some flashing during hot gas bypass operation. See the Troubleshooting Chart for further details.

Thermostatic Expansion Valve

The expansion valve regulates the amount of liquid refrigerant entering into the evaporator. As the liquid enters into the expansion valve, the valve will start to change the state by changing the pressure of the liquid refrigerant as it passes through and starts to enter the evaporator coil. When the environments load conditions start to change, the bulb recognizes a change in temperature at the outlet piping of the evaporator to the suction side of the compressor and automatically adjusts the valve to maintain the correct flow into the evaporator coil.

ROUTINE MAINTENANCE

To keep the Portable Air Conditioner operating safely and efficiently, it is recommended that a qualified service technician check the entire system at least once a year. Check the system more frequently depending on use and surrounding conditions.

Filters

It is very important to keep the air filters clean. Be sure to inspect them at least once each month when the system is in constant operation. If the unit is equipped with disposable type air filters, replace them with the same type and size.

NOTE: Do not attempt to clean disposable air filters

CONDENSER COIL

Inspect the condenser coil. If the condenser coil is dirty, clean with a stream of cold water, or pressurized air not exceeding 50 psig, or vacuum cleaner. Do not use hot water or steam, which can cause excessive high pressure in the refrigerant system. Clean the condenser coil in the opposite direction of the airflow.

Motor and Drive Components

Grease fittings are provided directly on the pillow block bearings for both the evaporator blower assembly and the condenser blower assembly. See Figure 10 for Evaporator Blower grease fittings. One side of the condenser blower is directly behind the control panel. In this case, a tube is attached to the grease fitting on the pillow block bearing and extends to a grease fitting mounted on the framework of the blower in the condenser section allowing easier access. See Figure 11 for Condenser Blower grease fittings.

Figure 10 – Evaporator Blower

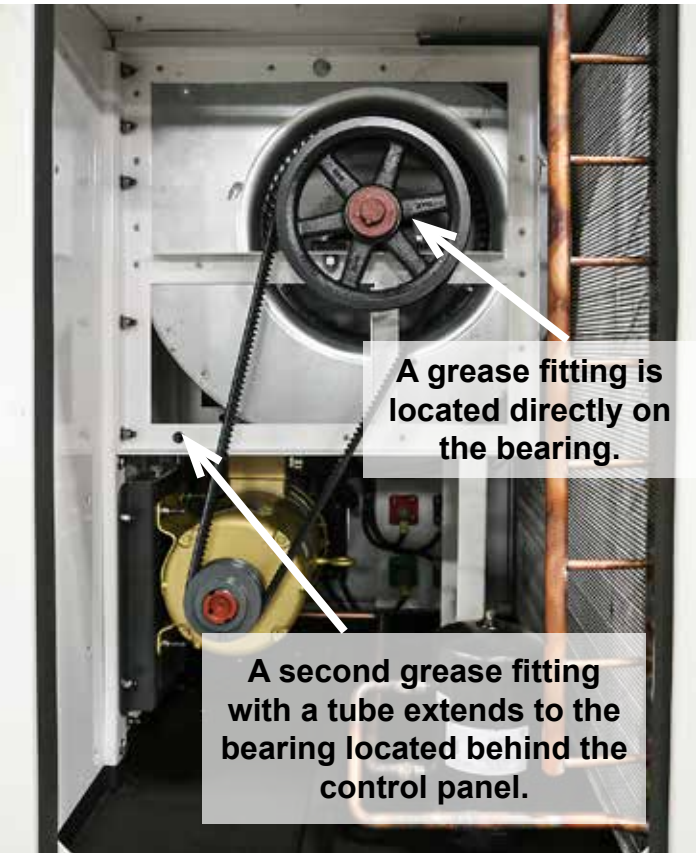

Figure 11 – Condenser Blower

Lubricate the bearings with high quality lithium grease while hand turning the shaft using the pulleys. It is preferable to add grease while rotating the shaft to ensure that grease forces the air pockets from the bearing and to allow a good grease seal the entire volume of the bearing. Grease should be added until it exudes through the bearing seals. When enough grease is added, beads will form at the seals. Wipe excess grease from the faces of the bearing with a rag.

CAUTION: Over lubricating will cause the bearing to overheat and could cause the grease seal to blow out.

Both excessive and inadequate grease may cause premature failure. Provided there is some grease in the bearings for lubrication, under lubrication is better than over lubrication as grease can easily be added but not removed. Always allow a slight bead around the circumference of the seals to protect the bearing from foreign matter and helps flush out the bearing as well.

Frequency of Lubrication

Frequency of Lubrication depends on operating conditions. The following chart gives the frequency of lubrication based upon operational duty and should be used as a guide for determining when bearings should be lubricated.

Duty	Grease Interval
Low Usage	12 months
Periodic	6 months
Continuous	1-2 months

Belt Tensioning

Excessive belt tension is the number one cause for blower bearing failure. Proper belt tension and pulley alignment are essential for trouble free operation. Insufficient deflection indicates that the belt tension is entirely too tight, and if not loosened somewhat, noise due to excessive vibration, premature bearing failure, shortened belt life, and a reduction in fan performance may result. **Deflection** is the amount the belt gives when force is applied, usually by finger, to the belt at the approximate center point to the belt span. Tight belts may also overload the motor and cause the efficiency to drop considerably or even cause premature motor failure. **Belt Span** is the distance in inches between the drive shaft center point and the fan shaft center point. Refer to Figure 12 – Belt Tensioning below.

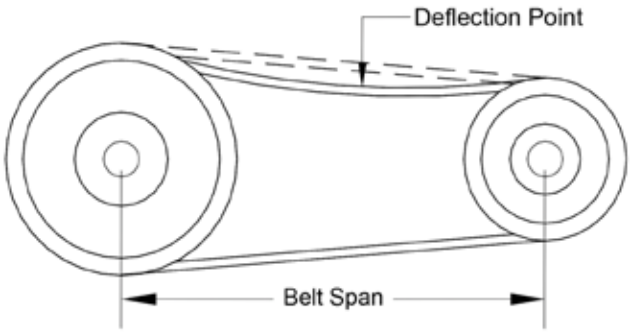

Figure 12 – Belt Tensioning

Excessive deflection is an indication that the belt is not tight enough. If not corrected, the belts will

slip causing loss of blower speed, the belts will glaze due to excessive slipping and heat leading to premature belt failure. Belts may slip during start-up, but slipping should stop as soon as the fan reaches full speed. Please use the chart below for recommended deflection amount for the measured Belt Span.

Belt Span	Deflection Amount	Belt Span	Deflection Amount
12"	3/16"	36"	9/16"
15"	1/4"	39"	5/8"
18"	1/4"	42"	5/8"
21"	5/16"	45"	3/4"
24"	3/8"	48"	3/4"
27"	7/16"	51"	13/16"
30"	7/16"	54"	7/8"
33"	1/2"	57"	7/8"
36"	9/16"	60"	15/16"
39"	5/8"	63"	1"

Check the sheave alignment to make sure that the sheave faces are in the same plane. Check this by placing a straight edge across the face of the sheaves. Any gap between the edge and sheave faces indicates misalignment.

CAUTION: This method is only valid when the width of the surfaces between the belt edges is the same for both sheaves. When they are not equal or when using adjustable pitch pulleys, adjust so that the belts have approximately equal tension. Both shafts should be at right angles to the belt. Check the setscrew and/or bushing bolt tightness.

Belts tend to stretch somewhat after installation. Recheck belt tension after several hours of operation.

TROUBLESHOOTING GUIDE

WARNING: BE AWARE OF HIGH POWER SITUATIONS WHILE TROUBLESHOOTING. THERE ARE ALSO MOVING BELTS, BLOWERS, AND MOTORS WHILE POWER IS CONNECTED TO THE UNIT. WHEN REACHING INTO ANY OF THE UNIT SECTIONS TO MAKE ADJUSTMENTS TO THE UNIT. PLEASE DISCONNECT POWER FROM THE UNIT.

Problem	Cause	Description
Power Lamp (PL) OFF	**1.** No voltage to unit.	**1.** Check voltage at power supply and check for broken power wires.
Power Lamp (PL) ON	**1.** No cooling or no blower.	**1.** Check and/or replace defective selector switch. **2.** Check phase indicator light for correct phasing. **3.** Check for defective phase monitor.
Unit Locked in Cooling Mode	**1.** Thermostat incorrectly set. **2.** Defective thermostat. **3.** Defective compressor contactor CCR.	**1.** Check thermostat setting and selector switch mode. **2.** Replace thermostat. **3.** Replace compressor contactor CCR.
No Cooling	**1.** Dirty air filter. **2.** Check thermostat setting and mode selector switch. **3.** Defective power wiring to compressor. **4.** Defective compressor contactor CCR. **5.** Defective compressor motor **6.** Compressor won't start. **7.** Compression pressures almost equalized. **8.** Condenser motor tripped on overload may have also caused high pressure trip.	**1.** Clean or replace air filters in front of evaporator coil. **2.** Reset thermostat setting or mode selector switch. **3.** Check continuity of power wiring. **4.** Replace compressor contactor CCR. **5.** Check motor windings for shorts or opens and/or replace compressor if necessary. **6.** Internal overload opened up. Wait one hour to see if it resets and starts. **7.** Defective compressor valves. Replace compressor. **8.** Reset the overload and also check and reset the high pressure switch if required.
High Pressure Trips	**1.** Condenser air inlet and/or outlets are restricted. **2.** High-pressure switch open but doesn't reset. **3.** Defective condenser blower motor. **4.** Defective condenser blower motor contactor CCR. **5.** System is over-charged or has non-condensibles. **6.** Condenser blower v-belts loose, slipping, or broken.	**1.** Re-locate unit to a place with unobstructed airflow. **2.** Replace high-pressure switch. **3.** Replace condenser blower motor. **4.** Replace defective condenser blower motor contactor CCR. **5.** Remove some refrigerant. If the high side pressure doesn't start to drop, recover the refrigerant and re-charge with fresh R-22 to correct system charge. **6.** Re-tighten or replace v-belts.

Low Pressure Trips	**1.** Supply and return air grills in space are restricted. **2.** Dirty return air filter. **3.** Low-pressure switch open and does not reset. **4.** Defective evaporator blower motor **5.** Defective evaporator blower motor contactor CEM. **6.** System might be under charged check sight glass and perform leak checks. **7.** Expansion valve is sticking or binding. **8.** Filter drier is dirty or plugged. **9.** Evaporator blower v-belts loose, slipping, or broken.	**1.** Re-locate objects in front of air grills or re-locate supply and return air grills in space. **2.** Clean or replace air filter. **3.** Replace low-pressure switch. **4.** Replace evaporator blower motor. **5.** Replace defective evaporator blower motor contactor CEM. **6.** Recover refrigerant, repair leaks, re-leak check, evacuate and re-charge to system operating charge **7.** Replace expansion valve. **8.** Replace filter drier. **9.** Re-tighten or replace v-belts.
No Condenser Blower Operation	**1.** Tripped Condenser Motor Contactor Overload.	**1.** Condenser blower motor moving too much air due to no blower ducting attached. Close off damper slide plate. **2.** If access panels are off of unit, replace access panels.