



**RV Products Division**

**INSTALLATION INSTRUCTIONS  
FOR  
47000 SERIES  
HEAT PUMP**

*Coleman-Mach*

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These instructions are a general guide for installing the 47000 series Coleman-Mach roof top heat pump. For specific heat pump details, it will be necessary to refer to the printed Customer Envelope Package supplied with each heat pump.

## IMPORTANT NOTICE

These instructions are for the use of qualified individuals specially trained and experienced in installation of this type equipment and related system components.

Installation and service personnel are required by some states to be licensed. **PERSONS NOT QUALIFIED SHALL NOT INSTALL NOR SERVICE THIS EQUIPMENT.**

## NOTE

The words “Shall” or “Must” indicate a requirement which is essential to satisfactory and safe product performance.

The words “Should” or “May” indicate a recommendation or advice which is not essential and not required but which may be useful or helpful.

## WARNING – SHOCK HAZARD

**To prevent the possibility of severe personal injury or equipment damage due to electrical shock, always be sure the electrical power source to the appliance is disconnected.**

**CAREFULLY FOLLOW ALL INSTRUCTIONS AND WARNINGS IN THIS BOOKLET TO AVOID DAMAGE TO THE EQUIPMENT, PERSONAL INJURY OR FIRE.**

## WARNING

**Improper installation may damage equipment, can create a hazard and will void the warranty.**

**The use of components not tested in accordance with these units will void the warranty, may make the equipment in violation of state codes, may create a hazard and may ruin the equipment.**

## 1. GENERAL INFORMATION

**OEM** – Please make sure the Customer Envelope Package accompanies the heat pump.

**INSTALLER AND/OR DEALER** – Please make sure the Customer Envelope Package is presented to the product consumer. The product consumer should also be afforded the opportunity to purchase the optional three (3) year parts replacement contract available from Airxcel.

For more information about the contract, please review the sample contract located in the Operation and Maintenance Instructions Booklet (Customer Envelope Package). Use the card attached to the Customer Envelope Package to apply for the extended parts contract.

**INQUIRIES ABOUT THE HEAT PUMP UNIT** – Inquiries to your Airxcel representative or to Airxcel pertaining to product installation should contain both the model and serial numbers of the roof top heat pump. All roof top heat pump units have model and serial number identification in two locations: (1) rating plate sticker which is assembled to the evaporator cover of the roof top heat pump unit (necessitates removal of shroud for viewing), (2) model/serial number sticker (silver color) located on the bottom of the basepan of the roof top heat pump. If the heat pump is installed, the sticker may be viewed by lowering the ceiling assembly shroud.

## II. HEAT PUMP SIZING

Heat pumps should be rated primarily by their ability to cool. The thermal measurement used for detecting a gain or loss of heat is the British Thermal Unit (BTU). One (1) BTU is the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. A heat pump rated at 13,500 BTUH can remove 13,500 BTU's of heat in one hour.

The ability of a heat pump to cool down a vehicle or maintain a consumer desired temperature is dependent upon the heat gain of the vehicle. The physical size, the amount of window area, the quality and amount of insulation, the position exposure to sunlight, the number of people using the vehicle and the outside temperature may increase the heat gain to such an extent that the capacity of the heat pump is exceeded.

As a general rule, air supplied (discharge air) from the heat pump will be 15 to 20 degrees cooler than the air entering (return air) the ceiling assembly's bottom air grilles.

For example, if the air entering the heat pump is 80 degrees F. (return air), the supply air (discharge air) into the vehicle will

be 60 to 65 degrees F. As long as this temperature difference (15 to 20 degrees) is being maintained at the heat pump, the heat pump is operating properly.

Again, give careful consideration to the vehicle heat gain variables. During extreme outdoor temperatures, the heat gain of the vehicle may be reduced by:

- Parking the vehicle in a shaded area
- Keeping windows and doors closed
- Avoiding the use of heat producing appliances
- Using window shades (blinds and/or curtains)

For a more permanent solution to high heat gain situations, additional vehicle insulation, window awnings and/or window glass tinting should be considered.

A heat pump should not be considered as a total replacement for a furnace. At ambient temperatures below freezing, the heat pump will not operate.

## III. SELECTING AN INSTALLATION LOCATION

Your Mach 8 heat pump has been designed for use primarily in recreational vehicles.

Is the roof of the vehicle capable of supporting both the roof top unit and ceiling assembly without additional support structures? Inspect the interior ceiling mounting area to avoid interference with existing structural members such as: bunks, curtains, tracks or room dividers. The depth of the ceiling assembly shroud is 3". Be sure to check clearance for doors which must be swung open (refrigerator, closets, cabinets).

Most of the time, roof mount heat pumps are installed at existing roof vent locations. If there are no roof vents (existing mounting hole), the following placement locations are recommended.

Motor Homes – a single unit or the forward of two units should be mounted within 9 feet of the drivers compartment.

Travel Trailers or Mini-Homes – a location should be selected that is near the door slightly forward of the vehicle center length.

Vans – location should be in the center of the roof (side to side – front to back).

Truck with Camper – location should be between 4 or 5 feet from the rear of the camper to achieve maximum cooling effect.

## IV. INSTALLING THE ROOF TOP UNIT

### **DANGER SHOCK HAZARD**

**DISCONNECT ALL POWER TO THE VEHICLE BEFORE PERFORMING ANY CUTTING TO THE VEHICLE. CONTACT WITH HIGH VOLTAGE CAN RESULT IN EQUIPMENT DAMAGE, PERSONAL INJURY OR DEATH.**

### **IMPORTANT**

**TO PREVENT DAMAGE TO THE WIRING AND BATTERY, DISCONNECT THE BATTERY CABLE FROM THE POSITIVE BATTERY TERMINAL BEFORE PERFORMING ANY CUTTING TO THE VEHICLE.**

If the heat pump is being installed on a low friction roof surface such as aluminum, steel or gelcoat fiberglass, it is advisable to order a spring pad kit, part number 8333-3871 to add "spring pads" to maintain bolt tension and retard lateral motion of the heat pump which could shear the mounting bolts.

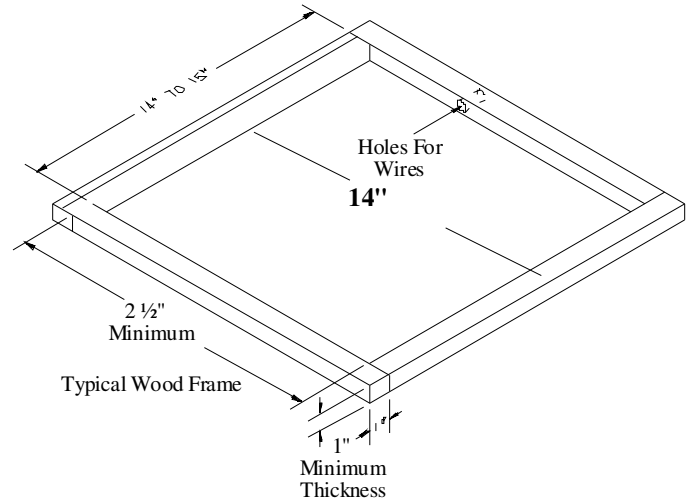
If the heat pump is being installed subject to heavy lateral loads, it is advisable to order a "Roughneck" gasket/bolt package, part number 48207-3301 to maintain bolt tension, prevent lateral movement of the heat pump and guard against bolt shear.

Once the location for your heat pump has been determined (See Section III), a reinforced and framed roof hole opening must be provided (may use existing vent hole). Before cutting into the vehicle roof, verify that the cutting action will clear all structural members and crossbeams. Additionally, the location of any inner roof plumbing and electrical supplies must be considered.

- A. If a roof vent is already present in the desired mounting location for the heat pump, the following steps must be taken:
  1. Remove all screws which secure the roof vent to the vehicle. Remove the vent and any additional trim materials. Carefully remove all chalking from around the roof vent opening to obtain clean exterior roof surface.
  2. It may be necessary to seal some of the old roof vent mounting screw holes which may fall outside of the heat pump basepan gasket.
  3. Examine the roof opening. If the opening is smaller than 14" x 14", the opening must be enlarged (See Figure 1).
  
- B. If a roof vent opening is not used, a new opening (See Figure 1) will have to be cut into the vehicle roof. A matching opening will also have to be cut into the interior vehicle ceiling. Be careful when cutting the ceiling opening. If the ceiling opening is carpeted, snagging could occur. After the opening in the roof and interior ceiling are the correct size, a framed support structure must be provided between exterior roof top and interior ceiling. The reinforced framed structure must provide the following guidelines:
  1. Capable of supporting both the weight of the roof top heat pump and the interior ceiling assembly.
  2. Capable of holding or supporting the roof outer surface and interior ceiling apart, so that when the roof top heat pump and ceiling assembly are bolted together, no collapsing occurs.

The frame must provide an opening to allow passage for the power supply wiring. Route the supply wiring through the frame at the same time the support frame is being installed.

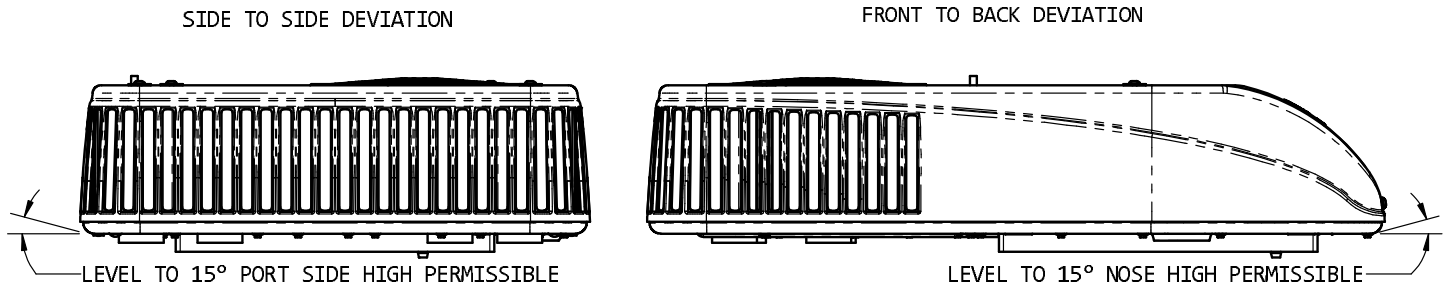
- C. This heat pump is to be installed in accordance with NFPA Standard 501C.
  
- D. The roof top heat pump must be mounted as near level from front to rear and side to side as is possible when the vehicle is parked on a level plane. Figure 2 shows maximum allowable degree deviations (mounting degrees from total surface flat plane).



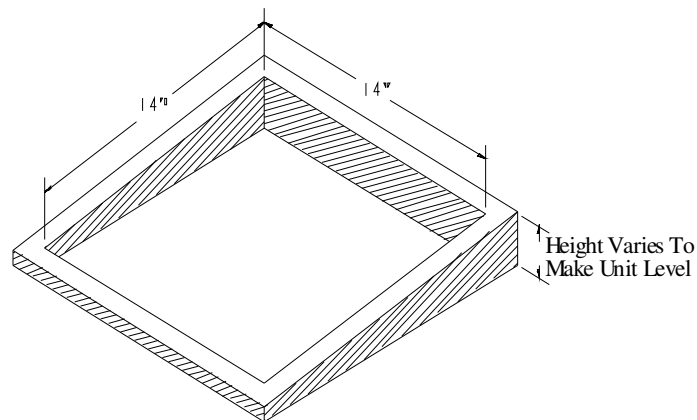
**FIGURE 1**

If the roof of the vehicle is sloped (not level) such that the roof top heat pump cannot be mounted within the maximum allowable degree deviations, an exterior leveling shim will need to be added to make the roof top heat pump level. A typical leveling shim is shown in Figure 4.

- E. After the mounting hole area is properly prepared, remove the carton and shipping pads from the roof top heat pump. **Carefully** lift the unit on top of the vehicle. Do not use the outer plastic shroud for lifting. Place the roof top heat pump over the prepared mounting hole. The sloped end (nose) of the shroud must face towards the front of the vehicle. Pull the electrical conduit down from the roof heat pump through the mounting opening and let hang.



**FIGURE 2**



**FIGURE 3**

## V. SECURING THE HEAT PUMP TO THE ROOF

A mounting frame is supplied with the ceiling assembly. Follow the steps below to secure the heat pump to the roof. Refer to Figure 4.

- A. Locate the heat pump mount gasket over the 14" to 15" square opening in the roof.
- B. Install the ceiling assembly mount frame using the four bolts found with the ceiling assembly.
- C. Proper tension has been achieved for each bolt when any portion of each gasket indicating tab has been pulled down even with the roof. See Figure 4. The upper unit has now been properly installed with optimum gasket compression.
- D. If the heat pump is equipped with an optional evaporator condensate pump, a 1/2" I.D. hose must be provided that runs from the 14" square opening, through the vehicle ceiling and down the side wall to allow water to drain under the vehicle. The hose must not be allowed to kink shut while making a bend. Connect the top end of the drain hose to the barbed fitting shown in Figure 4.

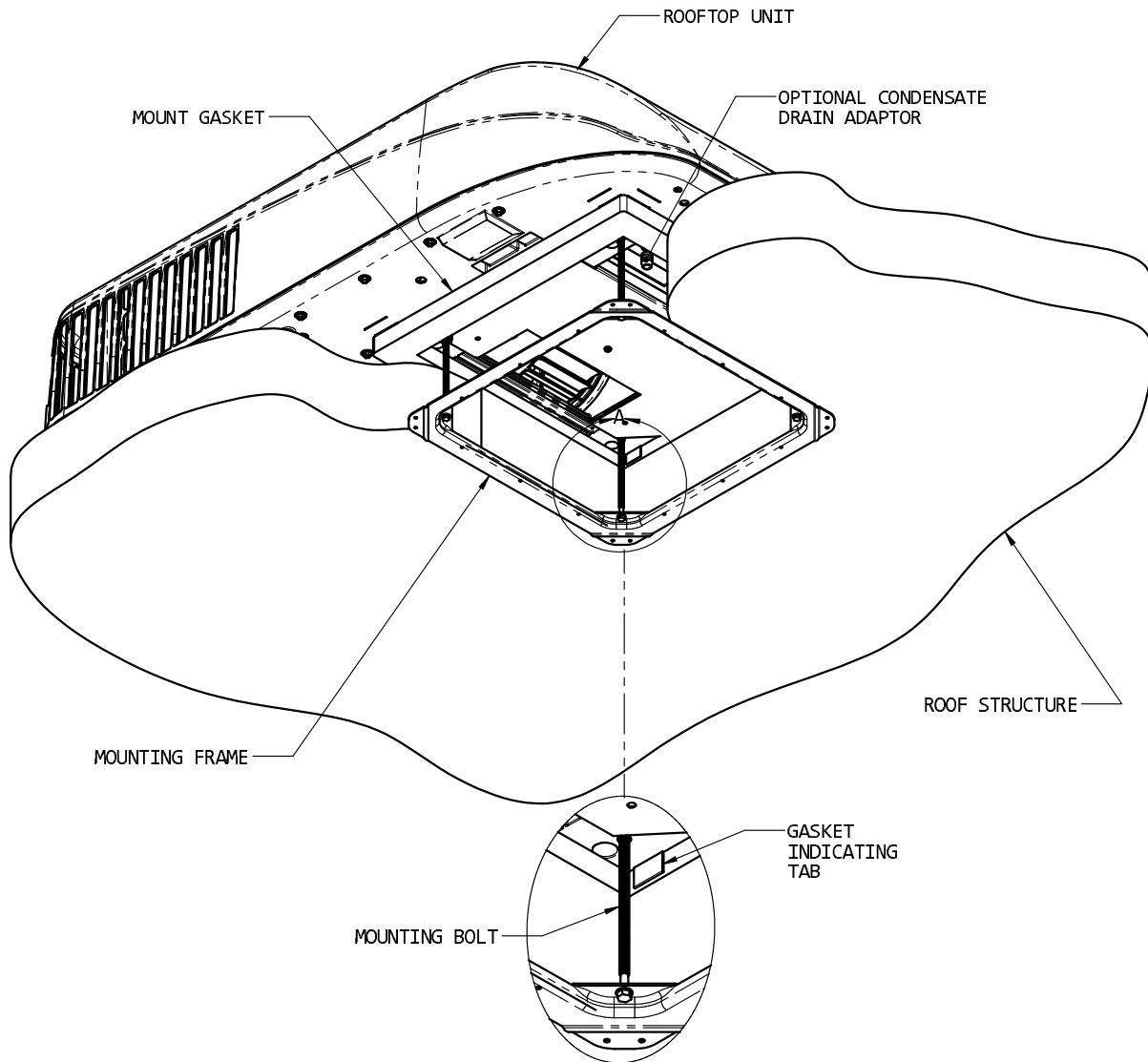


FIGURE 4

## VI. ELECTRICAL WIRING

### ROUTING 115 VAC WIRING

Following Airxcel, Inc. high voltage wiring specifications and all local and national electrical codes, route the roof top unit 115 VAC supply wiring from its power source to the wirebox.

#### **High Voltage Wiring Specifications based on Minimum Overcurrent Protection Device Amperage – (see upper unit nameplate)**

1. U.L. requires copper conductors only with minimum #12 AWG when using the minimum recommended overcurrent protection device. Higher rated devices or longer wiring runs will require #10 AWG or greater copper conductors.

2. To prevent voltage drops greater than 10% during starting loads, adhere to the following guideline:

For lengths greater than 50', use #10 AWG or larger copper conductors. Match to the overcurrent protection device provided.

Circuit Protection – Refer to upper unit nameplate.

#### **High Voltage Wiring Specifications based on Overcurrent Protection Device rated higher than the minimum required (see upper unit nameplate)**

Follow all local and NEC (National Electrical Code) for proper sizing of wire AWG based on Overcurrent Protection Device selected and the length of the wiring run to the air conditioner.

**DANGER – SHOCK HAZARD**

**MAKE SURE THAT ALL POWER SUPPLY TO THE UNIT IS DISCONNECTED BEFORE PERFORMING ANY WORK ON THE UNIT TO AVOID THE POSSIBILITY OF SHOCK INJURY OR DAMAGE TO THE EQUIPMENT.**

**DANGER**

WHEN USING NON-METALLIC SHEATH CABLES (ROMEX, ETC.), STRIP SHEATH BACK TO EXPOSE 4-6 INCHES OF THE SUPPLY LEADS. STRIP THE INDIVIDUAL WIRE LEAD ENDS FOR WIRE CONNECTION (ABOUT 3/4" BARE WIRE). INSERT THE SUPPLY WIRES INTO THE ELECTRICAL CONNECTOR CLAMP. SHEATH MUST PROTRUDE PAST THE CLAMP BUSHING INSIDE THE BOX AS ILLUSTRATED. MAKE SURE SHEATH CABLE IS CENTERED IN CLAMP BEFORE TIGHTENING UP ON IT. DO NOT OVERTIGHTEN!! THIS COULD RESULT IN PINCHING

**THROUGH THE PLASTIC WIRE INSULATION AND CAUSE SHORTING OR "HOT" WIRES TO GROUND (SHOCK HAZARD). THE CLAMP IS INTENDED FOR STRAIN RELIEF OF THE WIRES. SLIGHT PRESSURE IS USUALLY SUFFICIENT TO ACCOMPLISH THIS.**

**IF OTHER THAN NON-METALLIC CABLES ARE USED FOR SUPPLY CONDUCTORS, APPROPRIATE STRAIN RELIEF CONNECTORS MUST BE USED. IN NO CASE SHOULD CLAMPING OR PINCHING ACTION BE APPLIED TO THE INDIVIDUAL SUPPLY LEADS (NEUTRAL AND "HOT" WIRES).**

**DANGER  
SHOCK HAZARD**

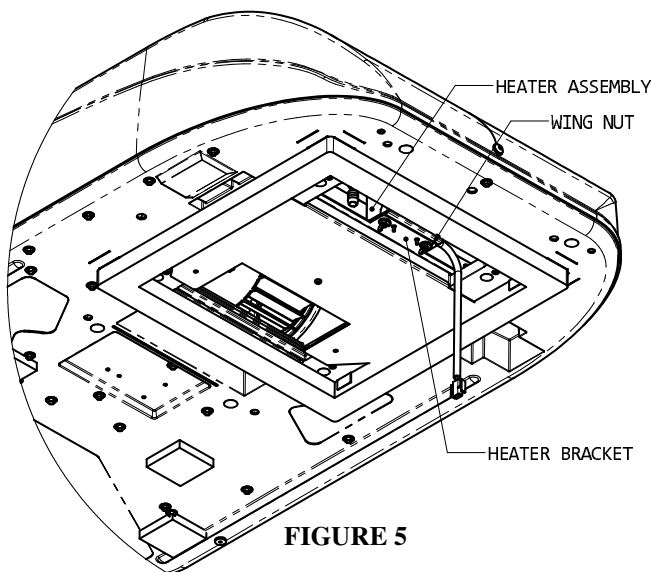
**TO PREVENT THE POSSIBILITY OF SHOCK INJURY, THE WHITE WIRE MUST BE CONNECTED TO NEUTRAL IN THE SERVICE BOX ENTRANCE AND THE MECHANICAL GROUND MUST BE CONNECTED TO A GROUNDING LUG EITHER IN THE SERVICE BOX OR THE MOTOR GENERATOR COMPARTMENT.**

## VII. INSTALLING THE OPTIONAL HEATER ACCESSORY

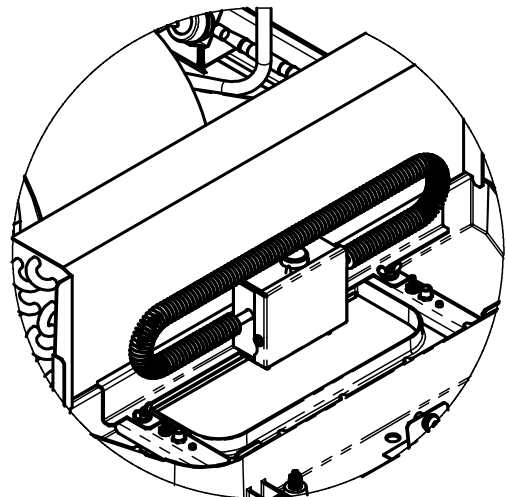
**NOTE**

The optional Heater Accessory is intended to take the chill out of the indoor air when the air is a few degrees too cool for comfort. The Heater Accessory is an effective "chill chaser". It is not a substitute for a furnace.

If the heater option is being installed, mount the heater bracket on the weld studs on the channels in the return air opening as shown in Figure 5. Secure the bracket using the wing nuts provided. The heater is then assembled to the heater bracket lining up the weld studs on the heater with the holes on the heater bracket. Secure the heater in place using wing nuts provided (See Figure 6).



**FIGURE 5**



**FIGURE 6**

## VIII. INSTALLING THE CEILING ASSEMBLY (9500 SERIES)

Make sure that you have properly matched the roof top heat pump and interior ceiling assembly. The following step by step instructions must be performed in the following sequence to insure proper installation.

- A. Carefully uncarton the ceiling assembly. Controls are factory installed in the ceiling assembly (except ceiling assemblies for applications with remote control box/thermostat).
- B. Remove the grille and filters from the ceiling assembly.
- C. STEP "C" CAN BE SKIPPED IF THE OPTIONAL 47233(X)4551 HEATER ACCESSORY PACKAGE IS NOT INSTALLED AT THIS TIME.

Plug the heater cord into the 2 position receptacle (See Figure 7).

**TIE ALL WIRING TO INSURE NO CONTACT WITH THE HEATER OR ANY SHARP EDGES. KEEP IN MIND THAT HIGH VELOCITY AIR WILL BE ENCOUNTERED IN THIS AREA.**

- D. Fold and break off the three tabs around the inner opening of the duct collar, then fasten the duct collar to the basepan of the heat pump with three (3) screws (See Figure 9).
- E. Plug the roof top heat pump electrical conduit into the 9 position receptacle located in the thermostat side of the ceiling assembly (See Figure 7).
- F. Insert the supply wiring through the cable clamp and into the field wiring box so that 4 – 6" of supply conductor is inside the box. Secure the cable clamp over the supply wire sheath so that no movement is possible (See Figure 8).
- G. Connect the supply power conductors to the black and white pigtail wires and the supply ground wire to the green pigtail wire found in the field wiring box using the 3 provided wire nuts. **IMPORTANT** – connect the black supply to the black pigtail and the white supply to the white pigtail. Using a U.L. approved electrical tape, secure the wire nuts to wires in a workmanlike manner (See Figure 8).
- H. Place the metal control box shield over the thermostat, switch and field wiring boxes. Make certain that all wires are pushed into the control boxes or laying in the wireway between the thermostat and switch boxes and will not be pinched by the control box shield. Control box shield is properly installed when the two holes in shield are aligned with the two screw holes in the ceiling assembly chute (See Figure 7).

- I. Raise the ceiling assembly and secure to the mounting frame with 4 provided shoulder screw/spring assemblies. The front two screws should pass through the clearance holes in the metal control box shield (See Figure 9).
- J. The ceiling assembly shroud is curved to contour to a crowned ceiling. If installation is to a flat ceiling and gaps are present on the sides of the shroud, insert the four optional 3/4 inch screws (provided) through the mounting posts and secure them to the mounting frame above (See Figure 7, 8 & 9 for screw locations).
- K. Pull the fabric duct material through ceiling assembly discharge opening. Peel the release liner from the adhesive strip around the discharge opening. Press the fabric duct material firmly in place around opening. Cut off excess fabric on inside of ceiling assembly chute with a box knife taking care not to tear the fabric beyond the adhesive strip.
- L. Make sure the non-allergenic filters are properly positioned in the ceiling grille.
- M. Install the ceiling grille by positioning on the bottom of the shroud and engaging the two 1/4 turn fasteners.
- N. Turn the selector switch to OFF position.
- O. Turn ON the power supply to the roof top heat pump.

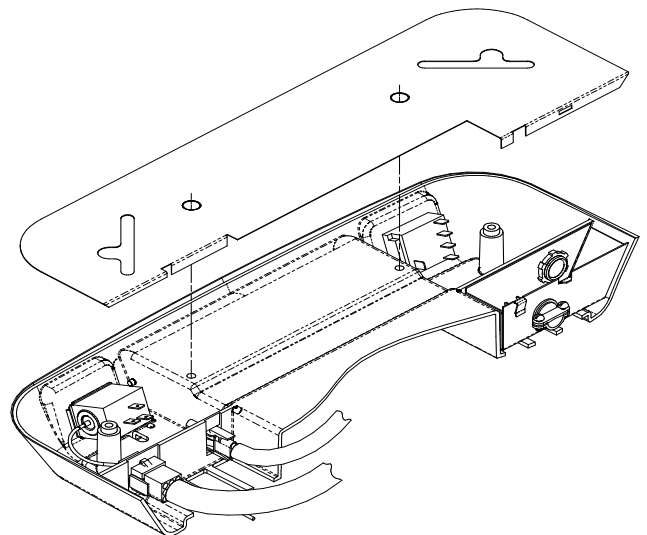
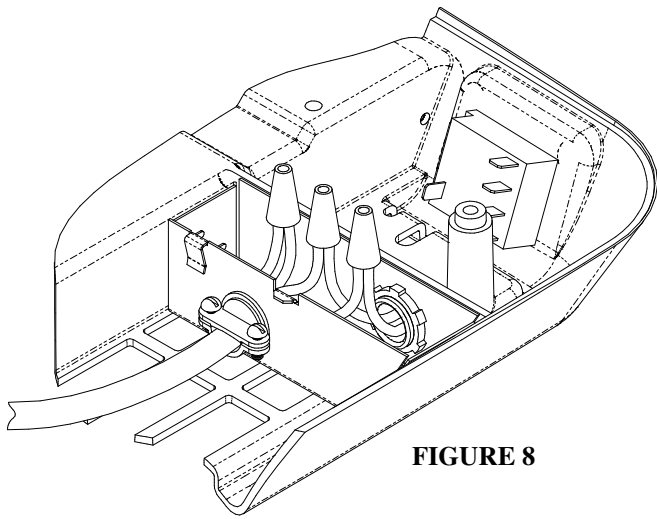
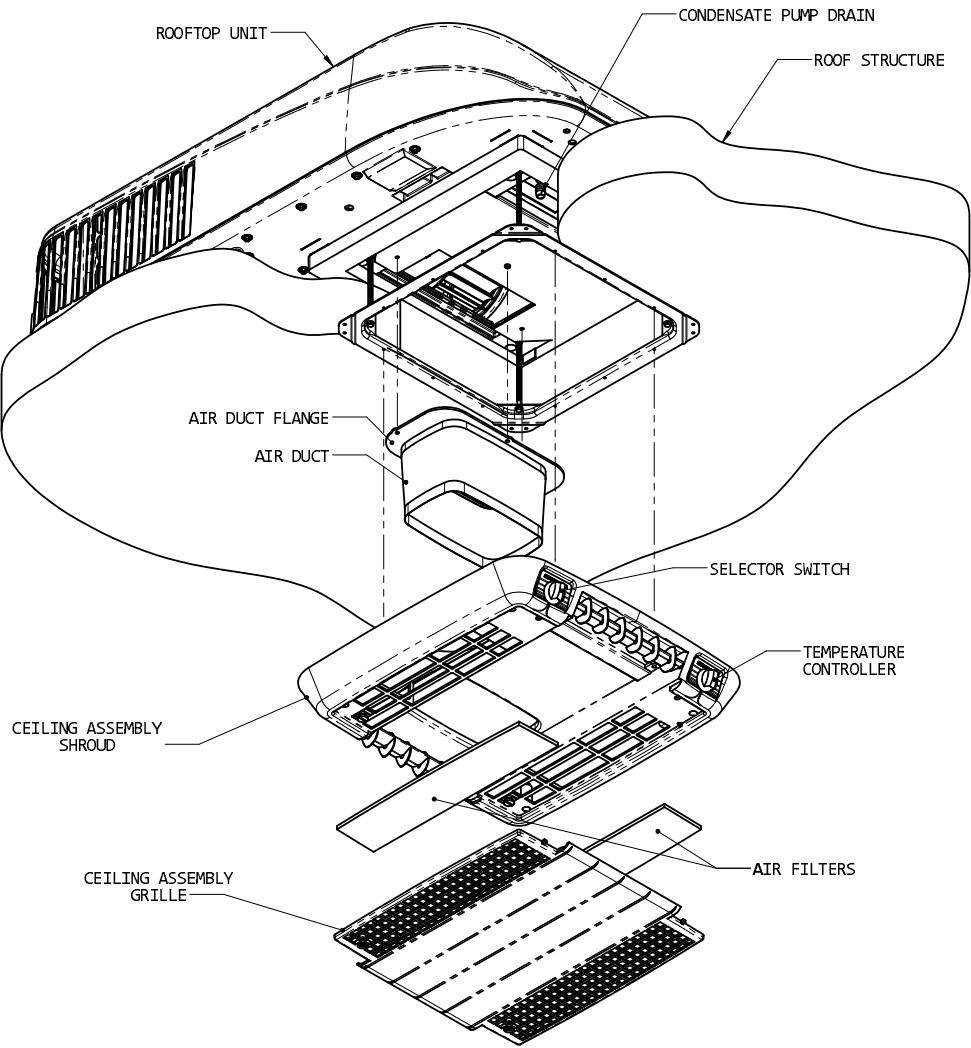


FIGURE 7





**FIGURE 8**



**FIGURE 9**

## IX. INSTALLING THE CEILING ASSEMBLY (9600 SERIES)

Make sure that you have properly matched the roof top heat pump and interior ceiling assembly. The following step-by-step instructions must be performed in the following sequence to insure proper installation.

- A. Remove ceiling assembly from carton, separate individual items and remove the two grilles and filters from the ceiling shroud.
- B. Fold and break off the 3 tabs around the inner opening of the duct collar then fasten the duct collar to the heat pump basepan with 3 provided screws (See Figure 12).
- C. Raise the ceiling assembly chute and insert the supply wiring through the cable clamp and into the wiring box so that 4-6" of supply conductor is inside the box. Secure the cable clamp over the supply wire sheath so that no movement is possible (See Figure 10).
- D. Connect the supply power black conductor to the black pigtail wire, the white conductor to the white pigtail wire and the supply ground conductor to the green pigtail wire found in the wiring box using the 3 provided wire nuts. Using a U.L. approved electrical tape, secure the wire nuts to wires in a workmanlike manner (See Figure 11).
- E. Press supply conductors and wire nuts into wiring box and making sure no wires are pinched, secure the wire box cover with 2 provided screws (See Figure 11).
- F. Plug the heat pump electrical conduit into the 9 position receptacle as shown in Figure 10.
- G. If the optional heater accessory package is being installed, remove the cover from the 2 position

receptacle and plug the heater cord into receptacle as shown in Figure 10.

- H. Raise the ceiling assembly chute to the unit mounting frame and secure the chute with 4 provided screws (See Figure 12).
- I. **TIE ALL WIRING TO INSURE NO CONTACT WITH ANY SHARP EDGES OR WITH OPTIONAL HEATER IS POSSIBLE. KEEP IN MIND THAT HIGH VELOCITY AIR WILL BE ENCOUNTERED IN THIS AREA.**
- J. Pull the fabric duct material through the ceiling chute discharge opening. Peel the release liner from the adhesive strip around the opening. Press the fabric duct material firmly in place around opening. Cut off excess fabric on inside of ceiling chute with a box knife taking care not to tear the fabric beyond the adhesive strip.
- K. Raise the ceiling shroud and while insuring it meshes with the chute, secure to mounting frame with 4 provided screws (See Figure 12).
- L. Install the control knobs over the switch and thermostat shafts. The thermostat (temperature) control knob installs nearest the "Coleman-Mach" logo.
- M. Re-install the filters and grilles into the ceiling assembly shroud.
- N. Turn the selector switch to OFF position.
- O. Turn ON the power supply to the roof top heat pump.

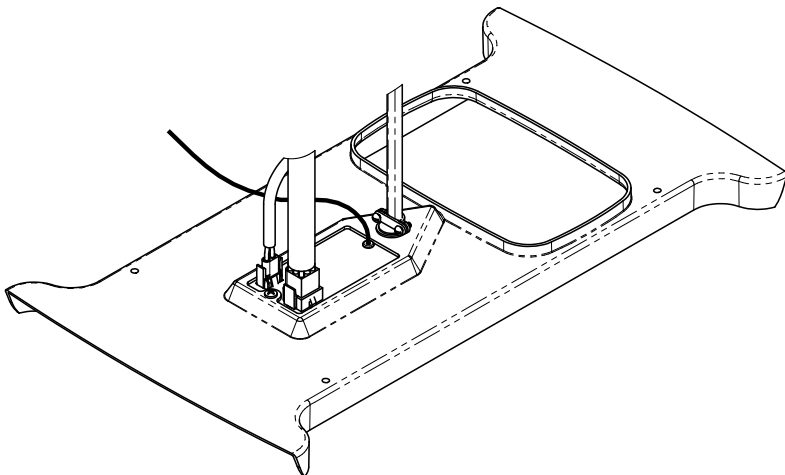


FIGURE 10

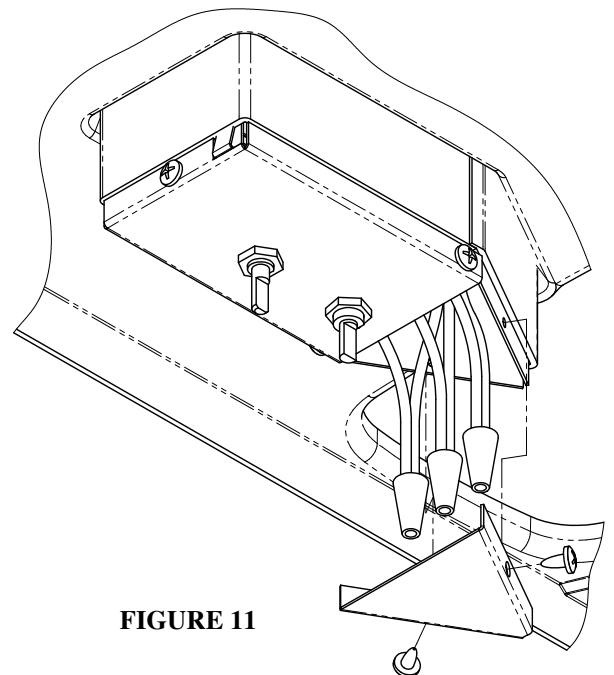
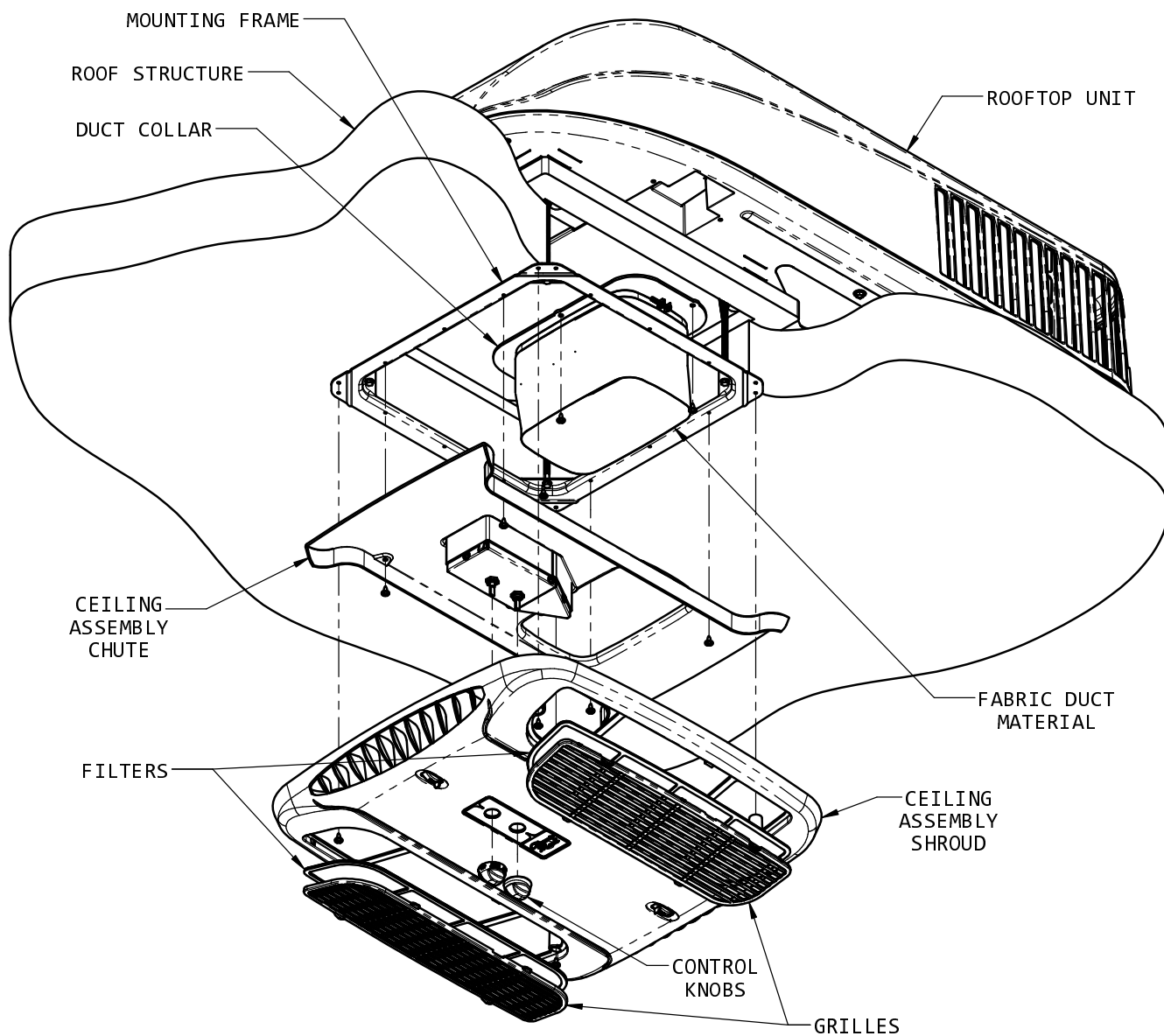


FIGURE 11



**FIGURE 12**

## **X. SYSTEM CHECKOUT**

Airxcel, Inc. manufactures a wide range of roof top heat pumps which incorporate different product operation features. To properly evaluate the performance of a newly installed

heat pump, it is necessary to review the specific unit operation characteristics (features) described in the product operation and maintenance instructions (Customer Envelope Package).