



# Roof Top Air Conditioner

## INSTALLATION AND OPERATING INSTRUCTIONS

### Non- Ducted System

**RECORD THIS UNIT INFORMATION FOR FUTURE REFERENCE:**

**Model Number:**

**Serial Number:**

**Date Purchased:**

#### **WARNING**

This manual must be read and understood before installation, adjustment, service, or maintenance is performed. This unit must be installed by a qualified service technician. Modification of this product can be extremely hazardous and could result in personal injury or property damage.

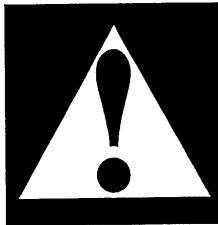
## INSTALLATION & OPERATING INSTRUCTIONS

**Important:** These instructions must stay with unit. Owner read carefully.

### Safety Instructions

This manual has safety information and instructions to help users eliminate or reduce the risk of accidents and injuries.

### RECOGNIZE SAFETY INFORMATION



This is the safety-alert symbol. When you see this symbol in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating instructions.

#### Understand Signal Words

A signal word, **WARNING** or **CAUTION** is used with the safety-alert symbol. They give the level of risk for potential injury.

**▲ WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**▲ CAUTION** indicates a potentially hazardous situation which, if not avoided may result in minor or moderate injury.

**CAUTION** used without the safety alert symbol indicates, a potentially hazardous situation which, if not avoided may result in property damage.

Read and follow all safety information and instructions.

## GENERAL INFORMATION

- A.** This air conditioner is designed for:
1. Installation on a recreational vehicle during or after the time the vehicle is manufactured.
  2. Mounting on the roof of a recreational vehicle.
  3. Roof construction with rafters/joists on minimum of 16 inch centers.
  4. Minimum of 1 inch and maximum of 4 inches distance between roof to ceiling of recreational vehicle.
  5. when distance is thicker than 4 inches, an optional duct adaptor will be needed.

**B.** The ability of the air conditioner to maintain the desired inside temperature depends on the heat gain of the RV. Some preventative measures taken by the occupants of the RV can reduce the heat gain and improve the performance of the air conditioner. During extremely high outdoor temperatures, the heat gain of the vehicle may be reduced by:

1. Parking the RV in a shaded area
2. Using window shades (blinds and/or curtains)
3. Keeping windows and doors shut or minimizing usage
4. Avoiding the use of heat producing appliances

Operation on High Fan/Cooling mode will give optimum or maximum efficiency in high humidity or high outside temperature.

Starting the air conditioner early in the morning and giving it a "head start" on the expected high outdoor ambient will greatly improve its ability to maintain the desired indoor temperature.

### C. Condensation

**Note:** The manufacturer of this air conditioner will not be responsible for damage caused by condensed moisture on ceilings or other surfaces. Air contains moisture and this moisture tends to condense on cold surfaces. When air enters the RV, condensed moisture may appear on the ceiling, windows, metal parts, etc. The air conditioner removes this moisture from the air during normal operation. Keeping doors and windows closed when this air conditioner is in operation will minimize condensed moisture on cold surfaces.

Model	Cooling capacity (Btu/hr)	Electrical heater (Btu/hr)	Electrical rating	Compressor rated load (Amps)	Compressor locked rotor current (Amps)	Fan motor rated load (Amps)	Fan motor locked rotor (Amps)	Air flow (High speed) (m <sup>3</sup> /h)	Refrigerant (R410a) (lb.)	Min. wire size	AC circuit protection (User supplied)	Unit dimensions (mm)	Packing dimensions (mm)	Weight (net/grass) (kg)
RT-135D	13500	5000	115VA C60H Z1PH	12.4	61	2.5	5.8	580	500	12AWG copper up to 24'	20Amp	890x760x335	950x770x390	39/43
RT-135	13500	0		12.4	61	2.5	5.8	580	500		20Amp	890x760x335	950x770x390	39/43
RT-150D	15000	5000		13.5	66	2.5	5.8	580	520		20Amp	890x760x335	950x770x390	41/45
RT-150	15000	0		13.5	66	2.5	5.8	580	520		20Amp	890x760x335	950x770x390	41/45

Notes:

- 1) For wire lengths over 24 ft. consult the National Electric Code for proper sizing.
- 2) When sizing the generator, the total power usage of your recreational vehicle must be considered. Keep in mind generators lose power at high altitudes and from lack of maintenance.
- 3) **CIRCUIT PROTECTION:** Time Delay Fuse or HACR Circuit Breakers Required.

## INSTALLATION INSTRUCTIONS

### 1. PRECAUTIONS

- A. Read installation and operating instructions carefully before attempting to start your air conditioner installation.
- B. The manufacturer will not be liable for any damages or injury incurred due to failure in following these instructions.
- C. Installation **must** comply with the National Electrical Code and any State or Local Codes or regulations.
- D. **DO NOT** add any devices or accessories to this air conditioner except those specifically authorized by manufacturer.
- E. This equipment must be serviced by qualified personnel and some states require these people to be licensed.

### 2. CHOOSE LOCATION FOR THE AIR CONDITIONER

This air conditioner is specifically designed for installation on the roof of a recreational vehicle (RV).

#### A. NORMAL LOCATIONS:

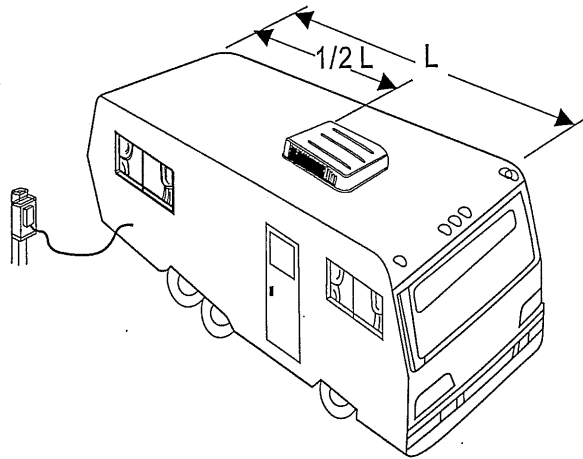
The air conditioner is designed to fit over an existing roof vent opening.

When the vent is removed, it normally creates a 14-1/4" x 14-1/4"  $\pm$ 1/8" opening.

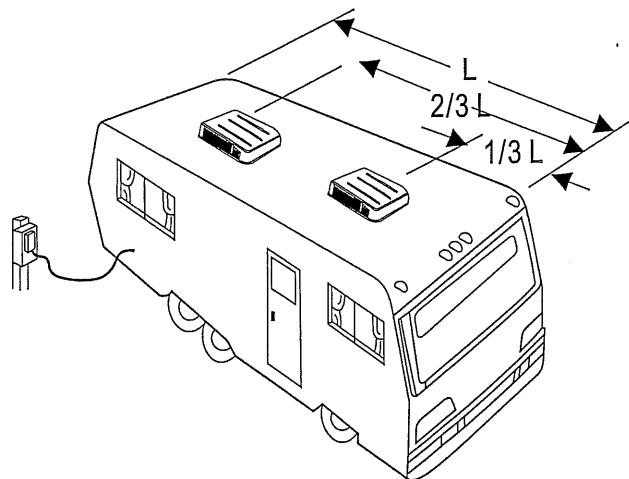
**B. OTHER LOCATIONS:**

When no roof vent is available or another location is desired, the following is recommended:

- a). For one unit installation: The air conditioner should be mounted slightly forward of center (front to back) and centered from side to side. See FIG. 1.



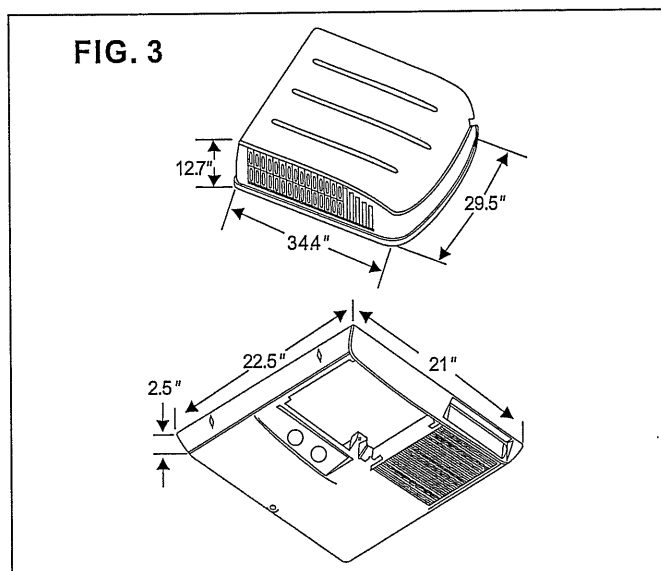
- b). For two unit installations: Install one air conditioner 1/3 and one air conditioner 2/3's from front of RV and centered from side to side. See FIG. 2.



It is preferred that this air conditioner be installed in a relatively flat and level roof section measured with the RV parked on a level surface; however, up to 15° slant to either side, or front-to-back, is acceptable.

**C. AFTER LOCATION SELECTION:**

- a). Check for obstructions in the area where air conditioner will be installed.
- b). The roof must be designed to support 130 pounds when the RV is in motion. Normally a 200 lb. static load design will meet this requirement.
- c). Check inside the RV for air box obstructions. (i.e. door openings, room dividers, curtains, ceiling fixtures, etc.) See FIG. 3.



**3. ROOF PREPARATION**

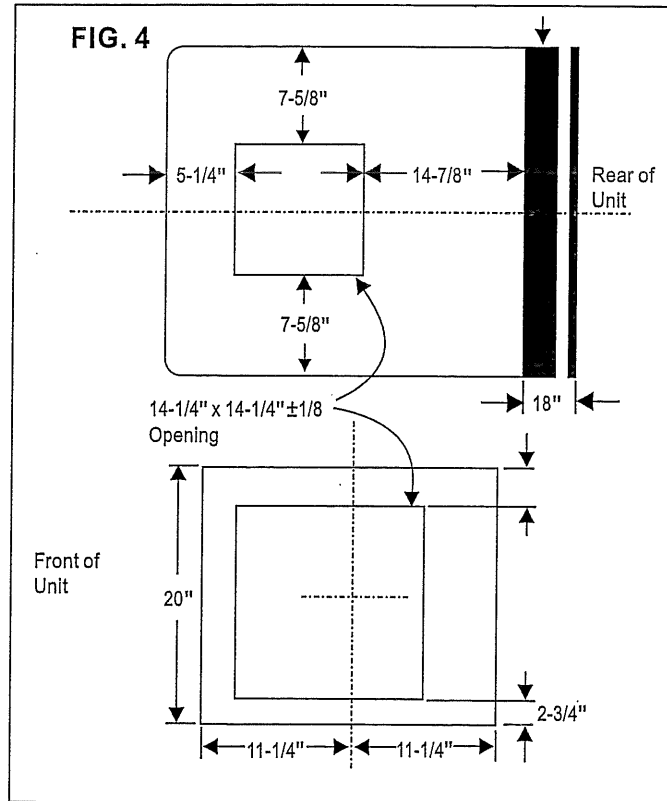
**A. ROOF VENT REMOVAL:**

1. Unscrew and remove the roof vent.
2. Remove all caulking compound around opening.
3. Seal all screw holes and seams where the roof gasket will be located. Use a good grade of all weather sealer.

**B. NEW OPENING: (Installations Other Than Vent Openings)**

1. A 14-1/4" x 14-1/4"±1/8 opening must be cut through the roof and ceiling of the RV. It is recommended this opening be located between roof reinforcing members.

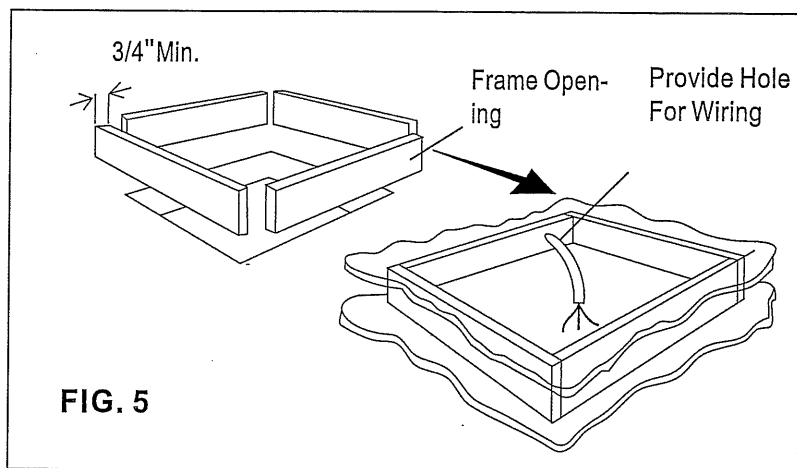
2. Mark a  $14\text{-}1/4'' \times 14\text{-}1/4'' \pm 1/8$  square on the roof and carefully cut the opening.
3. Using the roof opening as a guide, cut the matching hole in the ceiling. See FIG.4.



**C. OPENING PREPARATION:**

1. If the opening exceeds  $14\text{-}3/8'' \times 14\text{-}3/8''$ , it will be necessary to install spacers.
2. If the opening is less than  $14\text{-}1/8'' \times 14\text{-}1/8''$ , it must be enlarged.
3. Route a copper 12 AWG, with ground, supply line from the fuse or circuit breaker box to the roof opening.
  - a. The power supply must be on a separate 20 amp Time Delay Fuse or HACR Circuit Breaker.
  - b. Wiring must comply with all National, State and Local wiring codes.
  - c. Make sure at least  $15''$  of wire extend into the roof opening. This insures easy air conditioner attachment.

- d. If vent fan was removed, the existing wire may be used provided it is of proper size and correctly fused.
4. The opening must be framed to provide adequate support and prevent air from being drawn from the roof cavity. Lumber  $3/4"$  thick or more and long enough to bridge the opening must be used. Remember to provide an entrance hole for the power supply wire. See FIG. 5.



5. The  $14-1/4" \times 14-1/4" \pm 1/8$  roof opening is part of the return air duct and must be finished in accordance with NFPA standard 501C, Standard for Recreational Vehicles, Section 2-7.

### **CAUTION**

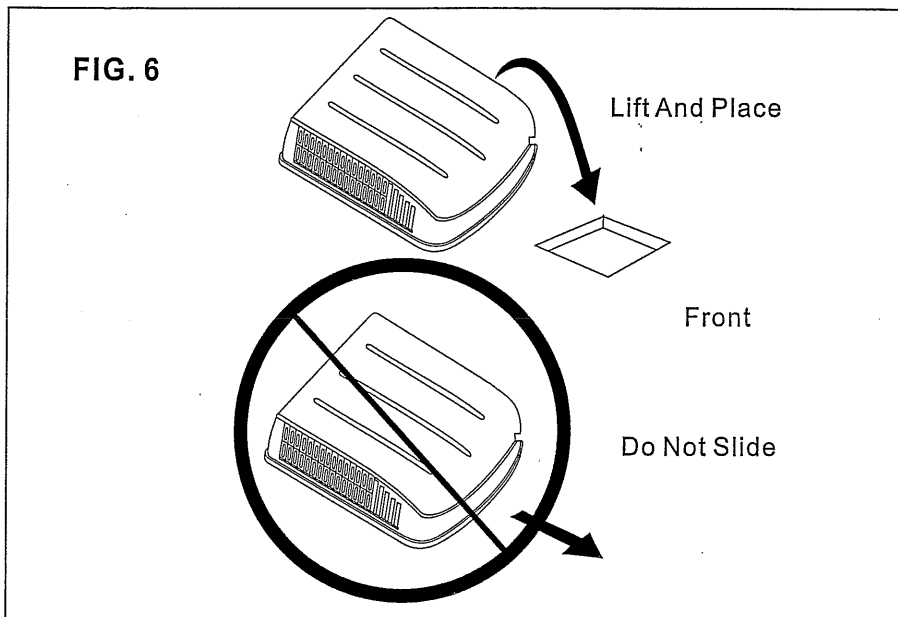
It is the responsibility of the installer of this air conditioner/heat pump system to ensure structural integrity of the RV roof. Never create a low spot on the roof where water will collect. Water standing around the air conditioner/heat pump may leak into the interior causing damage to the product and RV

#### **4. PLACING THE AIR CONDITIONER ON THE ROOF**

- A. Remove the Air Conditioner from the carton and discard the carton.
- B. Place the air conditioner on the roof.
- C. Lift and place the unit over the prepared opening using the gasket as a guide.



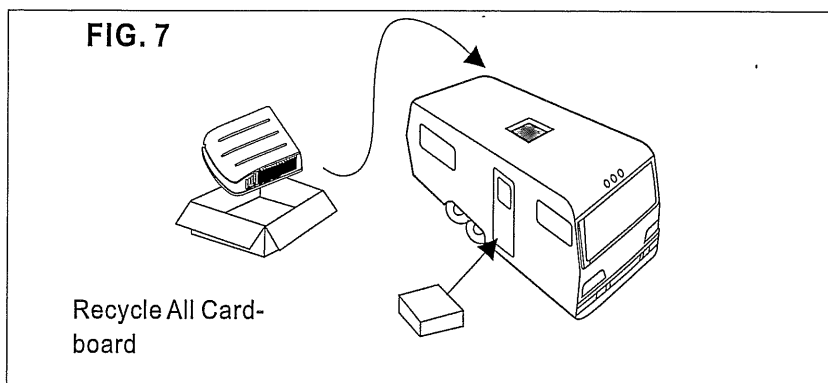
The condenser coil goes toward the rear of the RV. See FIG. 6.



**CAUTION**

Do not slide the unit. This may damage the gasket attached to the bottom and create a leaky installation.

- D. Place the Air Box Kit inside the RV. This box contains mounting hardware for the air conditioner and will be used inside the RV. See FIG. 7.



This completes the outside work. Minor adjustments can be done from the inside if required.

## 5. DISCHARGE DUCT AND CEILING

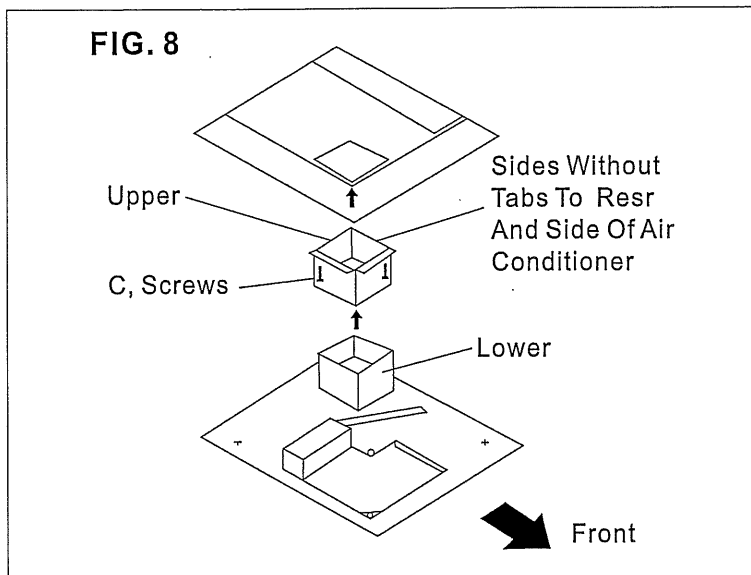
### TEMPLATE INSTALLATION

A. Remove air box and mounting hardware from carton. The upper duct is shipped inside, the lower duct is part of the ceiling template.

1. Remove upper duct from ceiling template and locate it over blower discharge.

**Note:** Edges without flanges install toward REAR and SIDE of opening. See

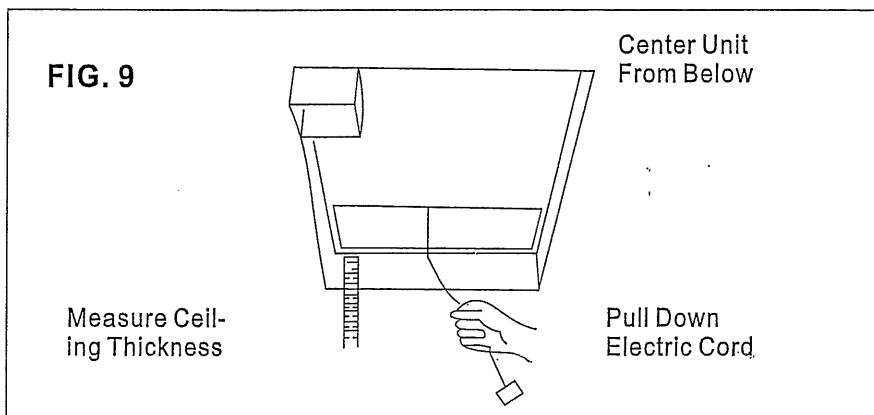
FIG. 8.



2. Use two (2) #10 x 3/8" screws (C) to hold duct to base pan. Holes provided in bottom of basepan for these screws to go into.

B. Check for correct alignment and adjust the unit as necessary (Roof Gasket centers over 14-1/4"±1/8 opening).

C. Reach up into return air opening of the air conditioner and pull the unit electrical cord down for later connection. See FIG. 9.



**D. Measure (See FIG. 9) the ceiling to roof thickness:**

1. If distance is 1"-2", remove perforated tabs from both upper and lower ducts.
2. If distance is 2"-3", remove perforated tabs from bottom duct only.
3. If distance is 3"-4", install ducts as received.
4. If distance is 4"- 6", an optional duct adaptor will be needed.

**E. Install ceiling template by sliding lower duct over upper duct.**

**F. Start each mounting bolt by hand before tightening any of them. The four (4) threaded inserts in the base pan can be seen to aid in starting the bolts.**

**EVENLY TIGHTEN MOUNTING BOLTS TO A TORQUE OF 40 TO 50 INCH POUNDS.**

This will compress the roof gasket to approximately 1/2". The bolts are self locking so over tightening is not necessary.

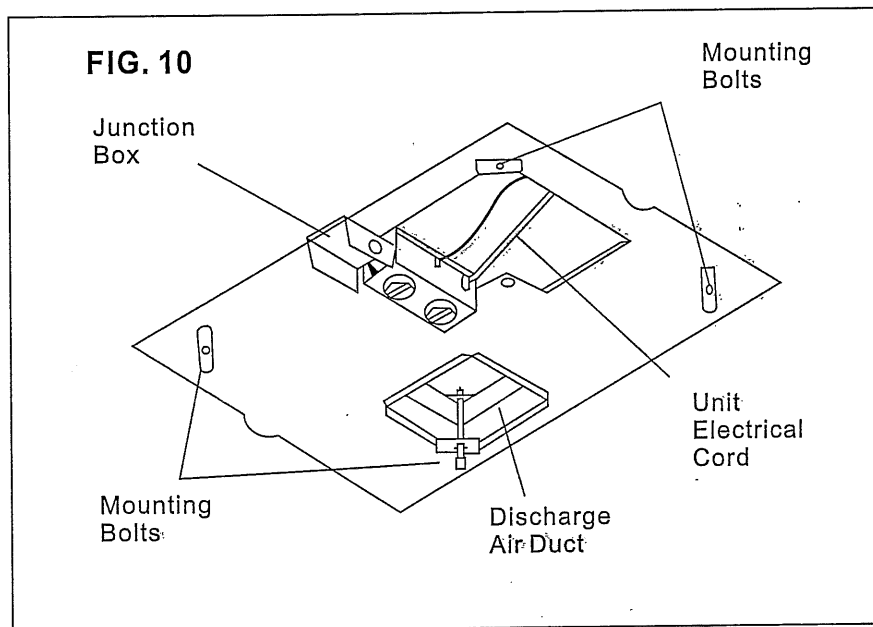
**CAUTION**

**If bolts are left loose there may not be an adequate roof seal or if over tightened, damage may occur to the air conditioner base or ceiling template. Tighten to torque specifications listed in this manual.**

**6. WIRING OF SYSTEM**

**Note:** All wiring must comply with the National Electrical Code and any State or Local Codes or regulations.

(Steps A. - F refer to FIG. 10.)



- A. Route supply line into junction box through provided Connector. Six (6) inch leads are sufficient for connection to unit wires and ground screws.

**⚠ WARNING**

1. **Disconnect 120volt AC. Failure to follow these instructions could create a shock hazard causing death or severe personal injury!**
2. **This product is equipped with a 3-wires(grounded) system for protection against shock hazard. Make sure that the appliance is wired into a properly grounded 120volt AC circuit and the polarity is correct. Failure to do so could result in death, personal injury or damage to the equipment.**

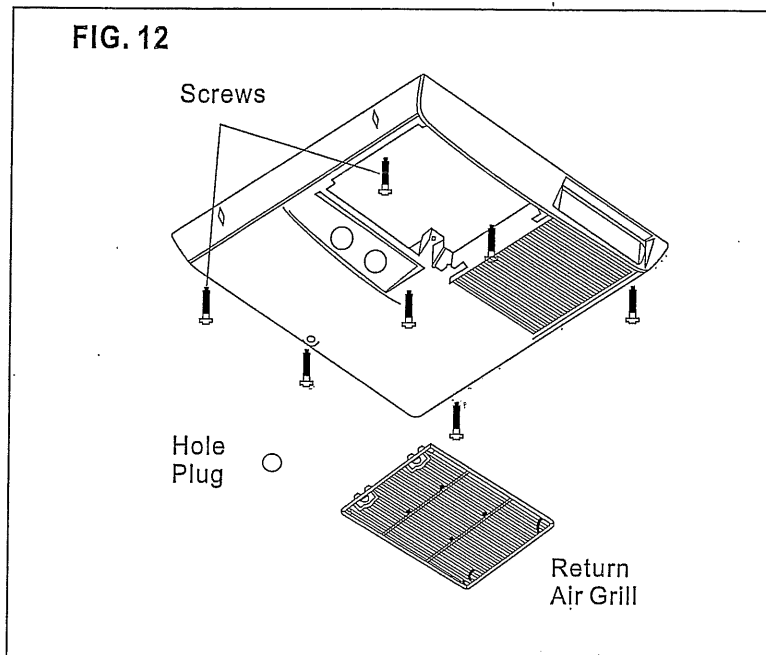
- B. Connect white wire in junction box to white or neutral wire from supply line.
- C. Connect black wire in junction box to black or hot wire from supply line.
- D. Connect supply ground wire to identified ground screw in junction box.
- E. Install junction box cover with two (2) blunt point screws (C).
- F. Plug unit electrical cord into the mating connector on control box.

**7. INSTALL AIR BOX**

- A. Remove return air grille from air box by pulling in on half-round finger catches.

**Note:** If optional heat package is to be installed, do so at this time, before the air box is installed. Follow instructions with heat package for its installation procedure.

- B. Hold air box up to ceiling template and install three (3) #10 x 3/8" screws at air box mounting point. See FIG. 12.



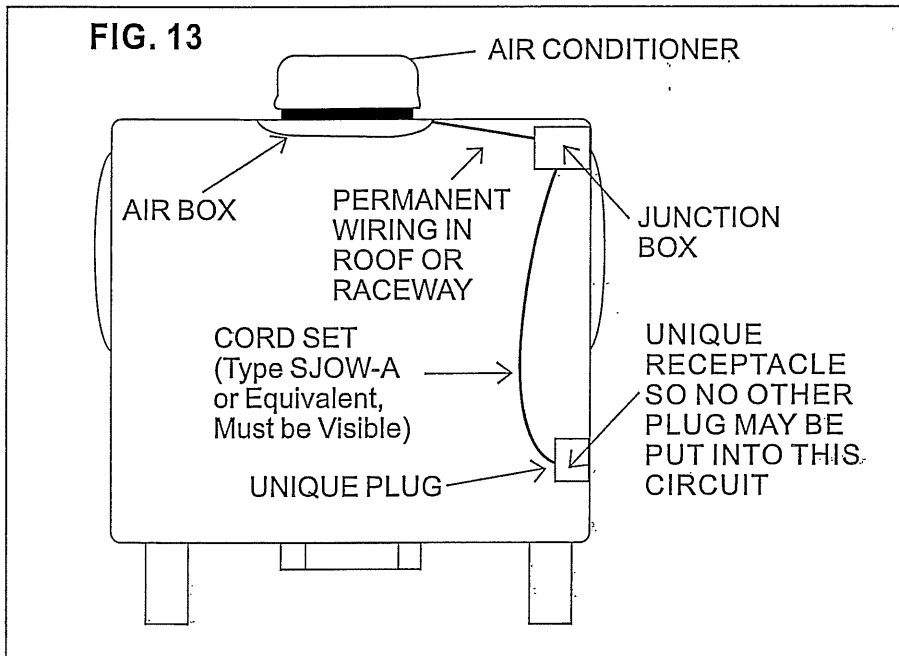
- C. Snap hole plug (D) into place at rear of air box.  
D. Install four (4) wood screws (B) that hold air box tight to ceiling if so desired.  
E. Reinstall return air grille and filter into air box.  
F. The air conditioner installation is now complete. Turn on power to the unit for operational check. Please read Unit Operating Instructions before proceeding.

## 8. INSTALLATION ON TENT CAMPER

### ROOF

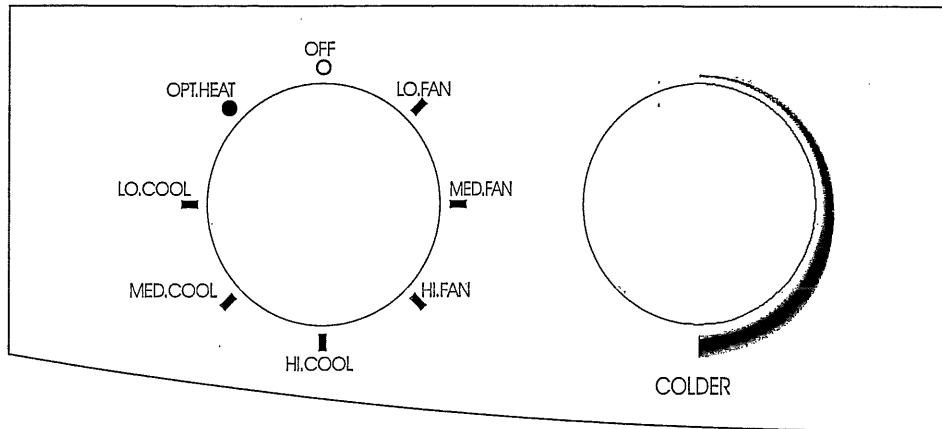
- A. The permanent wiring leading to unit junction box may originate in a flanged surface inlet located in roof section near the side wall.

See FIG. 13.



- B. A unique outlet receptacle for air conditioner should be located in the side wall of vehicle beneath the flanged surface inlet.
- C. A cord set fabricated from an oil, water, and ozone resistant material, such as Type SJOW-A, shall be used to connect the flanged surface inlet and the air conditioning receptacle. This cord set shall be visible during use and shall not be installed in raceways or placed behind walls or cabinet panels.

## OPERATING INSTRUCTIONS



### 1. CONTROLS:

A. The Selector Switch has eight positions including "OFF". This controls fan speed, heating mode, and cooling modes.

B. The Thermostat controls the temperature range from 65°F(16°C) on the coldest side to 90°F(30°C) on the warmest side. In the cooling mode, the compressor ON/OFF controlled by the thermostat setting.

### 2. COOLING OPERATION:

A. Set the thermostat at the desired temperature level.

B. Select the fan speed that best satisfies your needs:

a. **HIGH COOL:** Selected when maximum cooling and dehumidification required.

b. **MED. COOL:** Selected when normal or average cooling required.

c. **LOW COOL:** Selected when room at desired comfort level and needs to be maintained. Normally this speed used for night time operation.

**Note:** The blower runs continuously to circulate air and maintain an even temperature. The compressor will come on as cooling is required.

to maintain the selected temperature level.

### 3. HEATING OPERATION:

(without heater kit installed, the heating selection will be fan only)

(With Optional Heat Kit Installed)

**Note:** This electric heater will not replace a furnace for heating your RV in cold weather. The intent is to remove the chill on cool days or mornings.

- A. Turn the selector switch to OPTIONAL "HIGH HEAT", "MED HEAT" or "LOW. HEAT". To avoid feeling low temperature air flow, it is suggested to select "LOW. HEAT" for heating operation.
- B. The Heater will come on and begin heating.
- C. When desired temperature level in RV is reached, move the selector switch to off position or fan position.

**Note:** Thermostat does not control heater ON/OFF cycle.

### 4. FAN OPERATION:

This will circulate the air in your RV without cooling or heating. There are three positions: HIGH FAN, MED. FAN or LOW FAN to select from, depending upon personal choice.

### 5. "OFF" POSITION:

This is to turn Unit off.

## MAINTENANCE

### 1. AIR FILTER:

Periodically remove the return air filter located above the removable panel in the air box. Wash the filter with soap and warm water, let dry and then reinstall.

**Note:** Never run the air conditioner without return air filter in place. This may plug the unit evaporator coil with dirt and may substantially affect the performance of the unit.

### 2. AIR BOX HOUSING:



Clean air box housing and control panel with a soft cloth dampened with a mild detergent. Never use furniture polish or scouring powders.

**3. FAN MOTOR:**

Factory lubricated and requires no service under normal use.

**4. FROST FORMATION ON COOLING COIL:**

Under certain conditions, frost may form on the evaporator coil. If this should occur, inspect the filter and clean if dirty. Make sure air louvers are not obstructed. Air conditioners have a greater tendency to frost when the outside temperature is relatively low. This may be prevented by adjusting the thermostat control knob to a warmer setting (counter clockwise). Should frosting continue, operate on LOW, MED. or HIGH FAN setting until the cooling coil is free of frost.

If your unit fails to operate or operated improperly, check the following before calling your service center.

## SERVICE

### If the unit does not operate

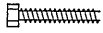
1. If RV connected to motor generator, check to be sure motor generator is running and producing power.
2. If RV connected to power supply by a land line, check to be sure line is sized properly to run air conditioner load and it is plugged into power supply.
3. Check your fuse or circuit breaker to see if it is open.
4. After the above checks, call your local service center for further help.  
This unit must serviced by qualified service personnel only.

### **CAUTION**

There may be electrical wiring between the roof and the ceiling. Disconnect 115 volt AC power cord and the positive (+) 12 volt DC terminal at the supply battery. Failure to follow this instruction may create a shock hazard causing death or severe personal injury.

## MOUNTING PARTS

- A. (4) 1/4" — #20 x 7" bolts



- B. (4) #8 x 5/8" long sharp point wood screws



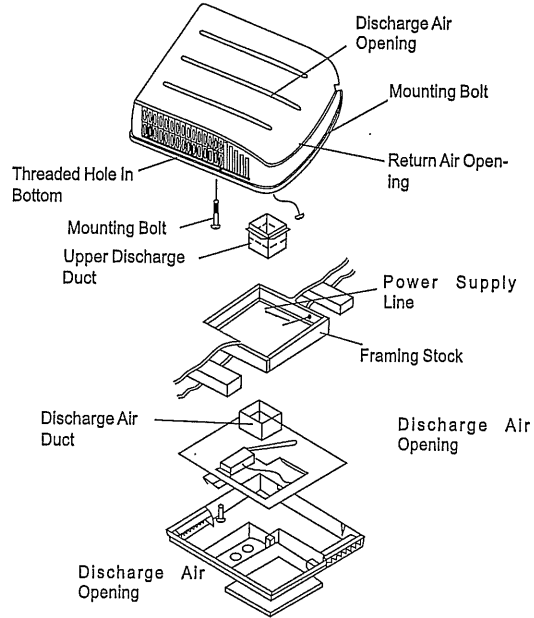
- C. (7) #10 x 3/8" blunt point tapping screws



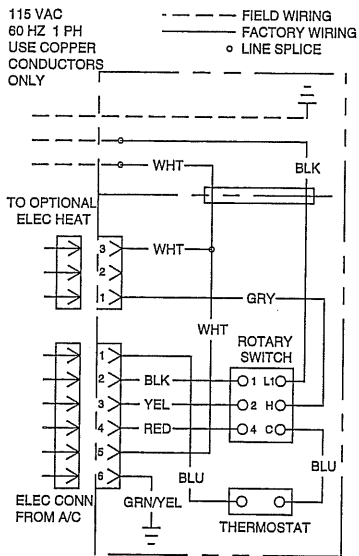
- D. (1) Hole Plug



## AIR CONDITIONING UNIT



## AIR BOX - CONTROLS WIRING DIAGRAM



## AIR CONDITIONER-WIRING DIAGRAM

