

# CARAVAN ROOF MOUNT AIR CONDITIONER

Used with Part No. 3107541 Analog Relay Kit with  
Remote Analog Thermostat

## **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.

## **AVERTISSEMENT**

Lire et comprendre ce manuel avant de procéder à l'installation, à des réglages, de l'entretien ou des réparations. L'installation de cet appareil doit être effectuée par un réparateur qualifié. Toute modification de cet appareil peut être extrêmement dangereuse et entraîner des blessures ou dommages matériels.

## INSTALLATION INSTRUCTIONS

### MODELS

CAL61.401

CAL136.301

CAL136.302

CAL136.303

### REVISION

Form No. 3108216.015 11/03

(Replaces 3108216.007)

(French 3109118.012)

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LaGrange, IN 46761

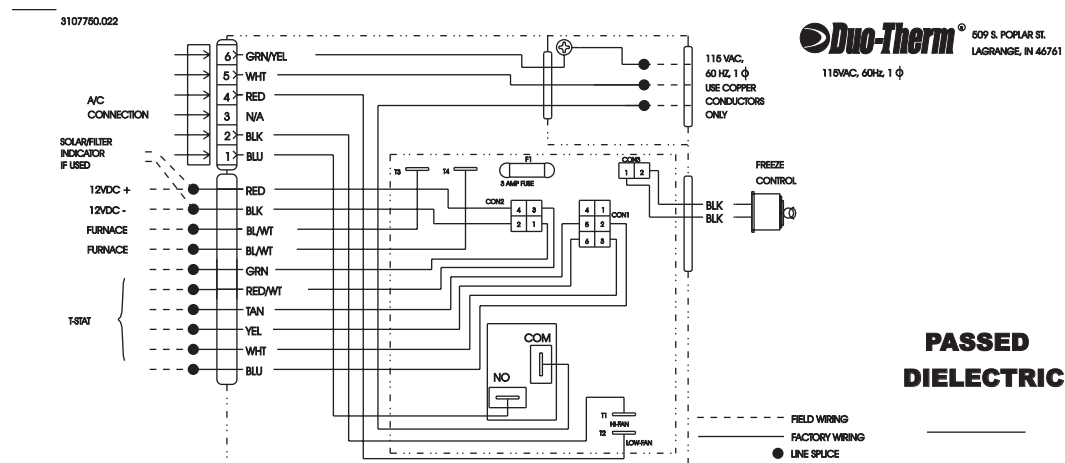
**Important:** These instructions must stay with unit.  
Owner read carefully.

## SPECIFICATIONS

| Model Number             |         | CAL136.301                                              | CAL61.401 | CAL136.302                                                  | CAL136.303 |
|--------------------------|---------|---------------------------------------------------------|-----------|-------------------------------------------------------------|------------|
| Electrical Rating        |         | 100-110V; 50/60Hz; 1 Ph                                 |           | 220-240V; 50Hz; 1 Ph                                        |            |
| Cycles                   |         | 50                                                      | 60        | 50                                                          | 50         |
| Nominal Capacity (kW)    |         | 3.1                                                     | 3.8       | 2.1                                                         | 3.2        |
| FL Amps (Compressor)     |         | 12.6                                                    | 12.8      | 4.0                                                         | 5.1        |
| FL Amps (Fan Motor)      |         | 3.4                                                     | 3.6       | 0.8                                                         | 1.6        |
| LR Amps (Compressor)     |         | 71.0                                                    | 66.0      | 23.0                                                        | 26.0       |
| LR Amps (Fan Motor)      |         | 9.0                                                     | 8.0       | 5.0                                                         | 4.4        |
| Input Power (kW)         |         | 1.3                                                     | 1.6       | 0.98                                                        | 1.4        |
| Min. Wire Size           |         | Up to 8 M use 2.5 mm <sup>2</sup> Copper Conductor      |           | Up to 8 M use 1.5 mm <sup>2</sup> Copper Conductor          |            |
| Circuit Protection       |         | 20 Amp Time Delay Fuse or 20 Amp Time Delay Crct. Brkr. |           | 10 Amp Time Delay Fuse or 10 Amp Time Delay Circuit Breaker |            |
| **Minimum Generator Size | 1 Unit  | 3.5                                                     | 2.5       | 3.5                                                         | 3.5        |
|                          | 2 Units | 5.0                                                     | 4.0       | 5.0                                                         | 5.0        |

\*\* The manufacturer gives only general guidelines for generator requirements. These generator requirements come from experiences consumers have with our equipment in field applications. When sizing generators, the total electric power consumption of the Caravan must be considered. Keep in mind that generators lose power because of altitude increases above sea level, high outside temperatures and lack of maintenance.

## RELAY KIT FIELD WIRING DIAGRAM



## COOLING/FURNACE

## 1. GENERAL INFORMATION

A. This air conditioner is designed for:

1. Installation on a recreational vehicle or caravan vehicle at the time the vehicle is manufactured.
2. Installation and use on the roof of a RV/caravan only.
3. Connection to an air distribution system located in the ceiling/roof cavity of the RV/caravan.
4. Roof construction with rafters/joists on minimum of 16"/400mm centers.
5. Minimum of 1.75"/45mm and maximum of 4.5"/115mm distance between roof to ceiling of caravan required.
6. Alternate installation methods will allow for roofs more than 4.5"/115mm thickness.

B. The ability of the air conditioner to maintain the desired inside temperature depends on the heat gain of the RV/caravan. Some preventative measures taken by the occupants of the RV/caravan 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/caravan 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

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/caravan, 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.

## 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.

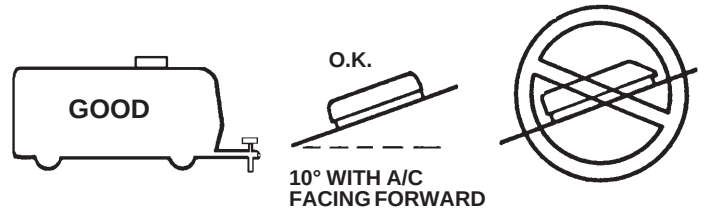
# INSTALLATION INSTRUCTIONS

## 1. PRECAUTIONS FOR SAFE INSTALLATION

- Read these Installation Instructions thoroughly and carefully before attempting installation or operation of the air conditioner.
- The Manufacturer will not be liable for any damages or injury due to failure to follow these Installation Instructions.
- DO NOT** add any devices or accessories to this equipment not specifically authorized by the manufacturer.
- This equipment must be serviced only by qualified service personnel. Some areas require service personnel to be licensed.

- Check location acceptability before beginning the installation.

- It is preferred that the air conditioner be installed in a relatively flat and level roof section when the RV or caravan is parked on a level surface. If this is not possible, up to a 10 degree pitch in any direction can be tolerated.



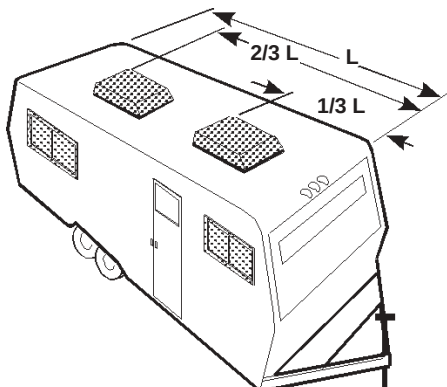
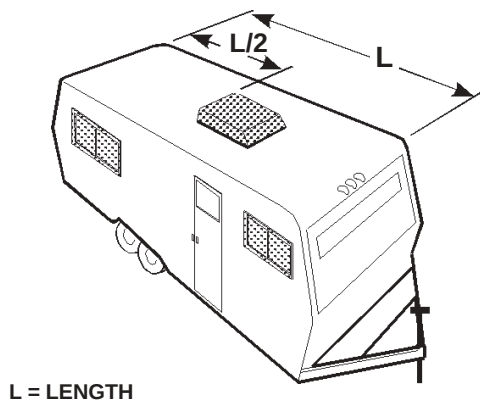
## 2. LOCATION

This air conditioner is designed for installation and use on the roof of an RV or Caravan. One or more units may be used on the vehicle.

### A. DESIGN RECOMMENDATIONS

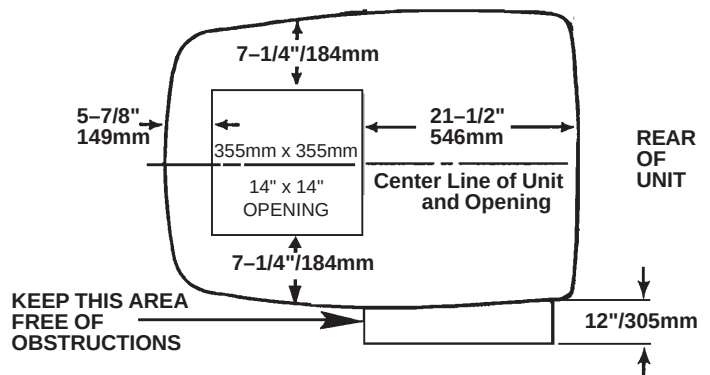
For one unit installation: The air conditioner should be mounted slightly forward of center (front-to-back) and centered from side-to-side on the on the RV or caravan.

For two unit installation: Install one air conditioner 1/3 and one air conditioner 2/3's back from front of RV or caravan and centered from side-to-side.

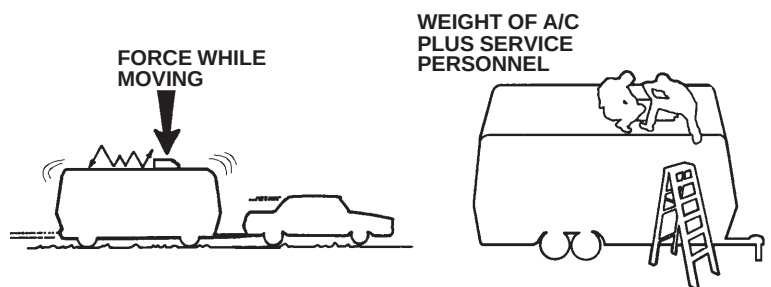


- Check on the roof to be sure no obstructions are in the area where the air conditioner will be.

### AIR CONDITIONER DIMENSIONS (On Top of Vehicle)



- Be sure your roof structure is capable of supporting a weight of 65Kg/130Lbs. when the RV or caravan is in motion. Normally, if the roof can support a static load of 100Kg/200Lbs., it meets this requirement.



### 3. AIR DISTRIBUTION SYSTEM SIZING & DESIGN

The installer of this air conditioner system must design the air distribution system for his particular application. Several requirements for this system **MUST** be met for the air conditioner to operate properly. These requirements are as follows:

- A. Roof cavity thickness must be between 1.75"/45mm to 4.50"/115mm. This distance is measured between roof and ceiling surface.
- B. The total cross-sectional discharge area of outlet ducts from the plenum area under the air conditioner must be a minimum of 17.5 in.<sup>2</sup>/113cm<sup>2</sup>.
- C. Duct sizing requirements are as follows:

|                         | MIN.             | MAX.       |
|-------------------------|------------------|------------|
| Duct Depth              | 1.25"/32mm       | 2.25"/60mm |
| Duct Width              | 7.00"/178mm      | — — —      |
| Total Duct Length       | 12ft./3.7m       | 36ft./11m  |
| Duct Length (Short Run) | 1.3 Total Length |            |

- D. Register Requirements as follows:

|                                      | MIN.                                  | MAX.     |
|--------------------------------------|---------------------------------------|----------|
| Distance from Duct End               | 5"/130mm                              | 8"/200mm |
| Distance from end of elbow           | 15"/380mm                             | — — —    |
| Distance between registers           | 24"/610mm                             | — — —    |
| Total Registers Required             | 4                                     | 8        |
| Number of Registers required per run | 2                                     | — — —    |
| Free Area per Register               | 14in. <sup>2</sup> /90cm <sup>2</sup> | — — —    |

- E. The duct material must meet or exceed any agency Standard that may be in existence at the time the RV/ caravan is produced.

- F. All discharge air ducts must be properly insulated to prevent condensation from forming on their surfaces or adjacent surfaces during operation of the air conditioner. This insulation must be R-7 minimum.
- G. Ducts and their joints must be sealed to prevent condensation from forming on adjacent surfaces during operation of the air conditioner.
- H. Return air opening must have 40 in.<sup>2</sup>/260 cm<sup>2</sup> free area including the air filter.
- I. Return air to the air conditioner must be filtered to prevent dirt accumulation on air conditioner cooling surface.
- J. Total system pressure must be between:

**0.12—0.65 in. W.C.  
(3.0—16.5mm W.C.)**

This is to be determined with the air conditioner blower operating on high speed and return air filter and grill in place.

**Note:** It is the responsibility of the installer of this air conditioner system to insure the structural integrity of the RV/ caravan roof.

- K. The thermostat must be located on an inside wall of the RV/caravan, 54"/1.4M above the floor. The thermostat must not be located near a heat source.

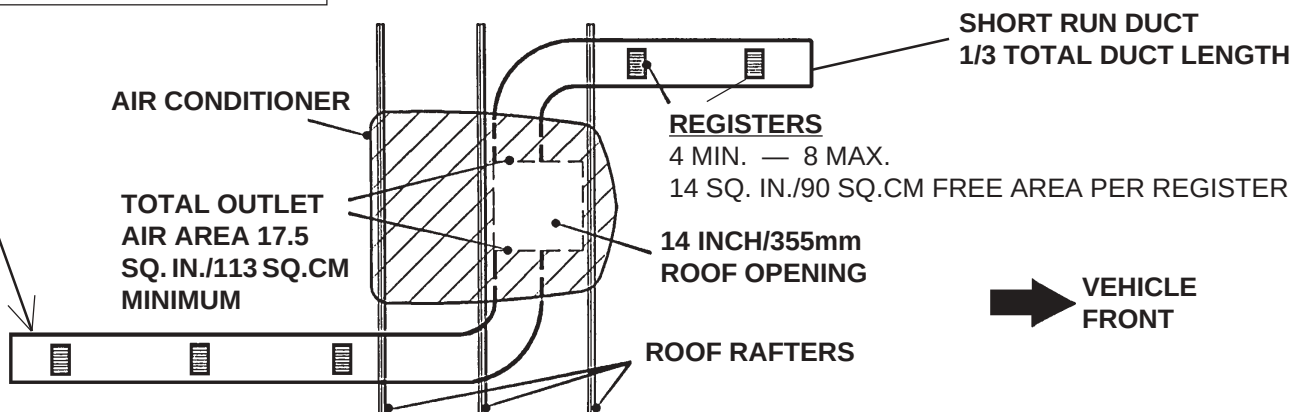
### 4. AIR DISTRIBUTION SYSTEM INSTALLATION

The Manufacturer recommends the basic configuration shown below for installing this air conditioner system. We have found by testing, that this configuration works best in most

#### **CAUTION**

**It is the responsibility of the installer to insure the duct-work will not collapse or bend during and after the installation. The Dometic Corporation will not be liable for roof structural or ceiling damage due to improperly insulated, sealed or collapsed duct-work.**

| DUCTS        | MIN.        | MAX.        |
|--------------|-------------|-------------|
| DEPTH        | 1-1/4"/32mm | 2-1/4"/57mm |
| WIDTH        | 7"          | — —         |
| TOTAL LENGTH | 12'/3.7M    | 36'/11M     |



It is the responsibility of the installer of this system to review each RV/caravan floor plan and determine the following:

- A. Duct size;
- B. Duct layout;
- C. Register size;
- D. Register locations;
- E. Thermostat location.

These items must be determined in conjunction with the air distribution system sizing and design requirements listed in Section 3 of this manual.

ALTERNATE CONFIGURATIONS AND METHODS MAY BE USED WHICH STILL ALLOW THE AIR CONDITIONER TO OPERATE PROPERLY. HOWEVER, THESE ALTERNATE METHODS MUST BE APPROVED IN WRITING BY THE MANUFACTURER.

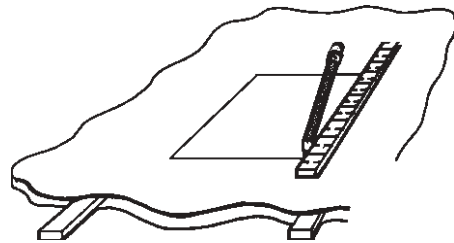
The following instructions are based upon the use of Return Air Kit No. 3105007 or 3105935. The Relay Kit has mounting bolts supplied for use with this Kit.

#### A. ROOF & CEILING OPENING PREPARATION

### **! WARNING**

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.

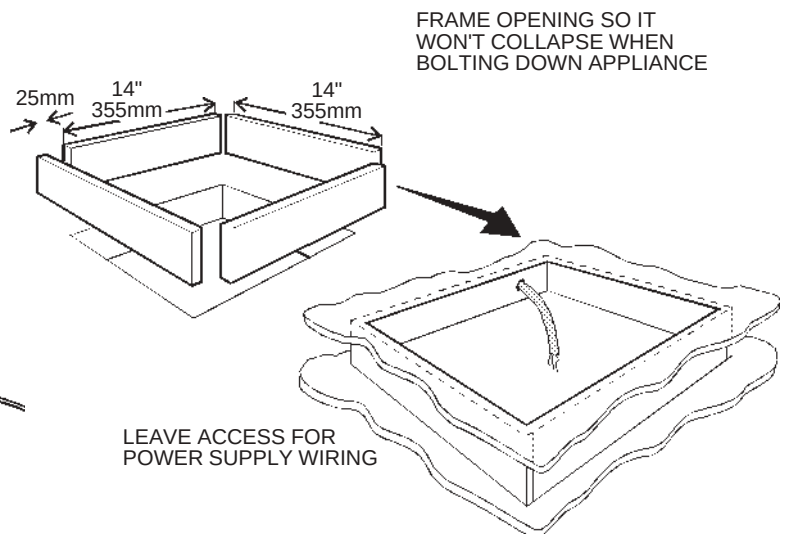
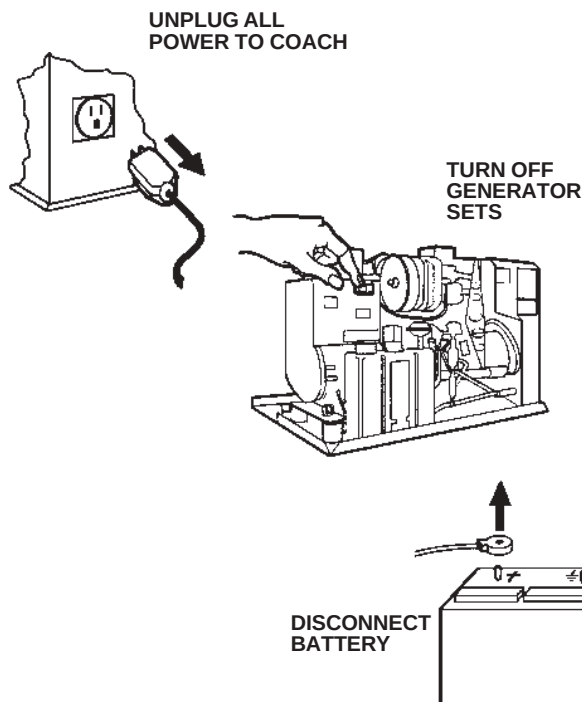
1. A 14"/355mm square opening must be cut through the roof and ceiling of the RV/caravan. This opening must be located between the roof reinforcing members.
2. Mark a 14"/355mm square on the roof and carefully cut the opening.



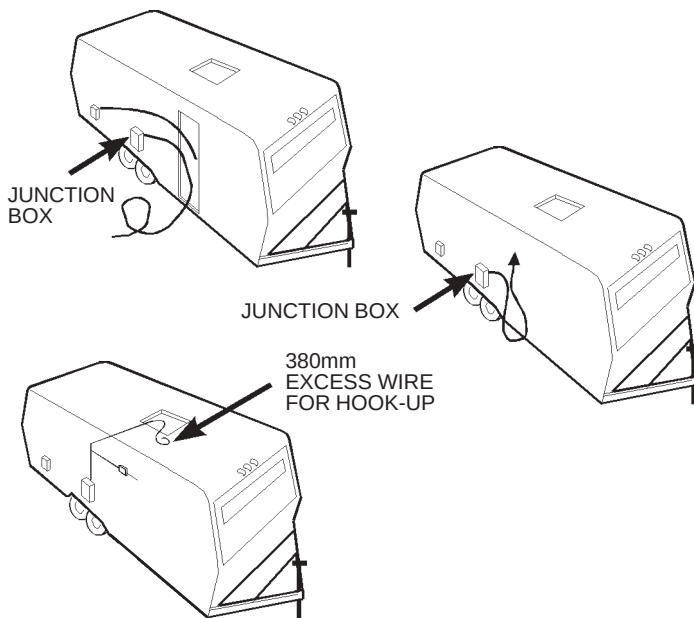
3. Using the roof opening as a guide, cut the matching hole in the ceiling.



4. The opening created must be framed to provide adequate support and prevent air from being drawn from the roof cavity. Lumber 3/4"/20mm or more in thickness must be used. Remember to provide an entrance hole for power supply wiring and thermostat wires.



5. Route a grounded power supply line from circuit breaker or fuse box to roof opening.
  - a. The power supply must be a separate circuit, fused with a specified time delay fuse or circuit breaker.
  - b. The power supply wire must be a grounded specified wire size of COPPER material for distances of 24'/8M or less.
  - c. The power supply wiring **MUST** comply with all applicable regulations and wiring codes.
  - d. 15"/380mm of supply wire must extend into the roof opening to insure ease of attachment to relay kit junction box.
  - e. The supply wire must be located toward front of 14"/355mm opening, either on right or left side.
  - f. Route a dedicated 12V DC supply line (18-22 AWG/0.5mm<sup>2</sup>) from the RV/caravan converter or battery to the roof opening.
    1. This supply line must be located in the front portion of the 14"/355mm opening.
    2. Make sure that at least 15"/380mm of supply wire extends into the roof opening.



### ⚠ CAUTION

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



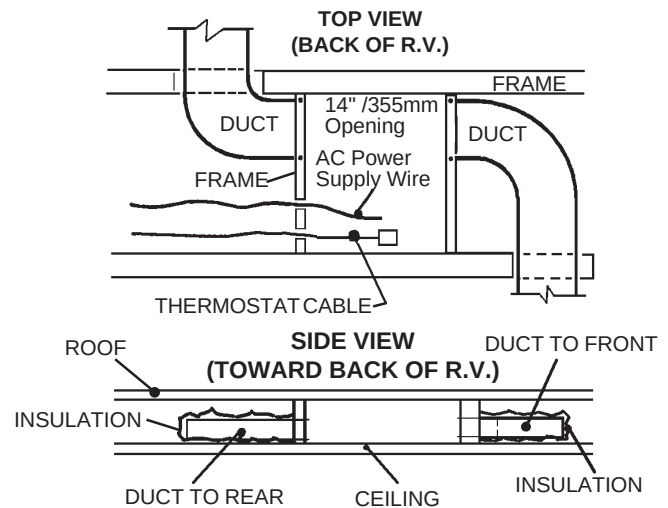
## B. AIR DISTRIBUTION DUCT INSTALLATION

Install the air distribution ducts in the RV/caravan roof cavity.

The distribution system must meet:

1. RV/caravan's requirements,
2. System requirements listed in Section 3 of this manual.

Terminate the start of the duct at the back edge of the 14"/355mm opening previously cut.



## 5. THERMOSTAT & CABLE INSTALLATION

### A. LOCATION

The proper location of the thermostat is very important to insure that it will provide a comfortable RV/caravan temperature. Observe the following general rules when selecting a location.

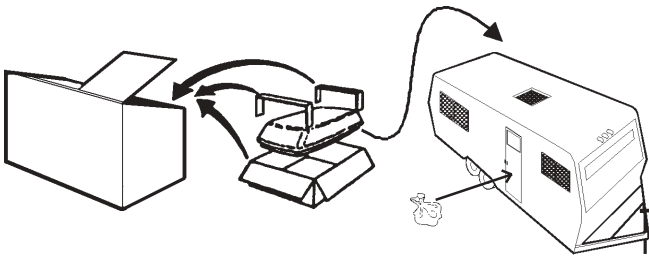
1. Locate the thermostat about 5'/1.4M above the floor.
2. Install thermostat on a partition, not on an outside wall.
3. NEVER expose it to direct heat from lamps, sun or other heat producing items.
4. Avoid locations close to doors that lead outside, windows or adjoining outside walls.
5. Avoid locations close to supply registers and the air from these registers.
6. Never locate thermostat in a room that is warmer or cooler than the rest of the RV/caravan — such as the kitchen.
7. The major living area is normally a good location.

### B. CABLE INSTALLATION

1. A seven conductor cable 18-24AWG/.25—.75mm<sup>2</sup> is to be used for low voltage connections.
2. Choose the shortest, direct route from the 14"/355mm opening to the thermostat location selected.
3. Consider where screws, nails or staples might contact the cable and avoid inadvertent contact with cable.
4. Leave approximately 6"/150mm of cable extending through the wall for connection to the thermostat.
5. Leave approximately 10"/250mm of cable extending into the 14"/355mm opening for connection at Relay Kit.
6. If system is to control a gas furnace: Route two 18 gauge wires from the furnace to 14"/355mm opening at this time.

## 6. PLACING THE AIR CONDITIONER ON THE ROOF

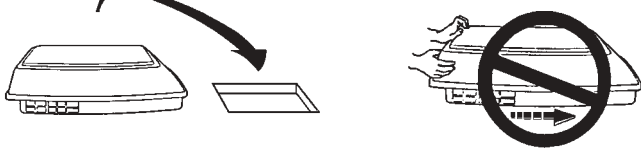
- A. Remove the Air Conditioner from the carton and discard.
- B. Place the Air Conditioner on the roof.



### **! CAUTION**

**This unit weighs approximately 100 pounds/ 45kg. To prevent back injury, use a mechanical hoist to place Air Conditioner on roof.**

- C. Lift and place the unit over the prepared opening using the gasket on unit as a guide. The blunt end goes toward the rear of the RV/caravan.



### **! CAUTION**

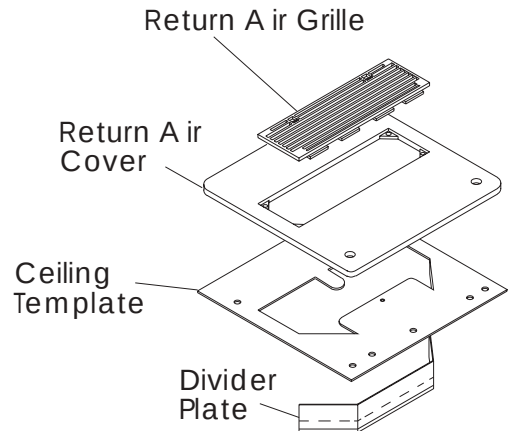
**Do not slide the unit. This may damage the neoprene gasket attached to the bottom and create a leaky installation.**

- D. Place 3107541 Relay Kit, 3108217 Adapter Cable Kit 3105007 or 3105935 Return Air Cover Kit, inside the RV/caravan. These cartons contain mounting hardware for the air conditioner and will be used inside the RV/caravan.

This completes the outside work. Minor adjustments can be done from the inside of the RV/caravan if required.

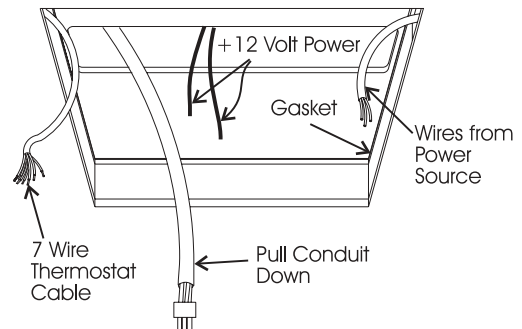
## 7. INSTALLATION OF AIR CONDITIONER

### A. INSTALLATION OF CEILING TEMPLATE

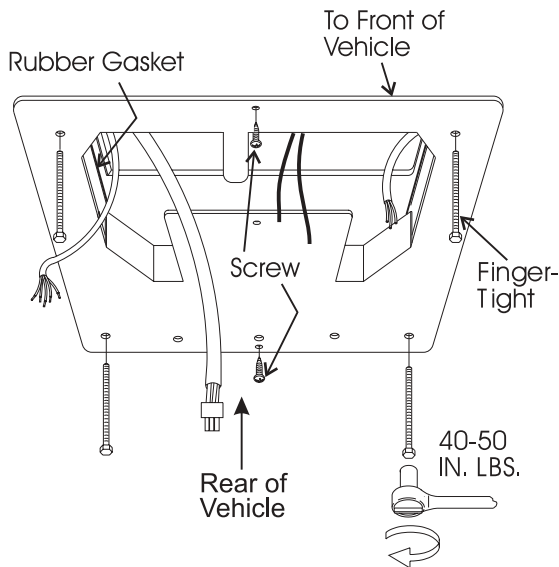


1. Check gasket alignment of the Air Conditioner over roof opening and adjust if necessary. Unit may be moved from below by slightly lifting and sliding.
2. Reach up into the return air opening of the Air Conditioner and pull the unit electrical cord down for later connection.

(Center Air Conditioner from Below)



3. Remove Return Air Cover and Ceiling Template from the 3105007 or 3105935 return air cover kit carton.
4. Remove Parts Package, Relay Box and Thermostat from Relay Kit, Carton No. 3106997.
5. Locate 1/4"/6.4mm unit mounting bolts in the parts package.
6. Take the ceiling template and hold up to the 14"/355mm opening. Be sure the solid end faces the rear of the RV/caravan.
7. Start each mounting bolt through the ceiling template and up into the unit base pan by hand.



**EVENLY TIGHTEN MOUNTING BOLTS TO A TORQUE OF 40- 50 INCH POUNDS/4.5-5 Nm.**

### ⚠ CAUTION

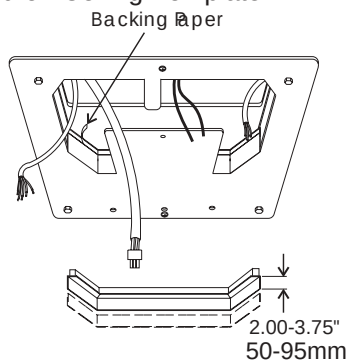
**If bolts are left loose there may not be an adequate roof seal or if over tightened, damage may occur to the air conditioner base or ceiling template. Tighten to torque specifications listed in this manual.**

This will compress the roof gasket to approximately 1/2"/13mm. The bolts are self locking so over tightening is not necessary.

8. Install wood screw in each end of ceiling template. This insures a tight fit of return air cover to ceiling.

## B. INSTALLATION OF DIVIDER PLATE

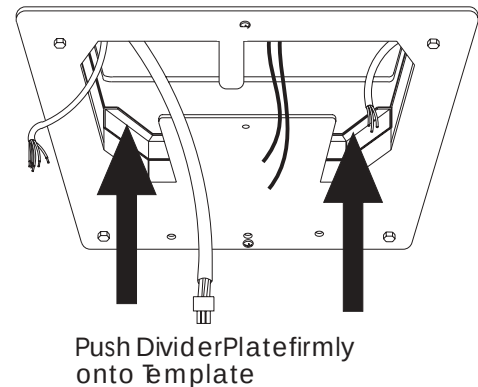
1. Measure the ceiling to roof thickness:
  - a. If distance is 2.00"-3.75"/50-95mm, remove perforated tab from Divider Plate.
  - b. If distance is 3.75"-5.50"/95-140mm, remove no tabs.
2. Remove the backing paper from double sided tape located on Ceiling Template.



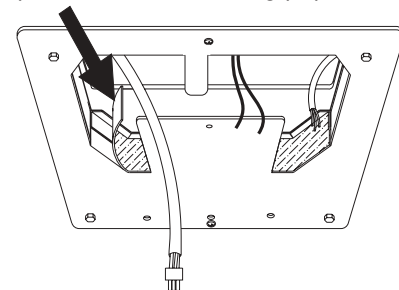
### ⚠ CAUTION

**Improper installation and sealing of divider plate will cause the compressor to quick cycle on the cold control. This may result in fuse or circuit breaker opening and/or lack of cooling**

3. Place Divider Plate up to bottom of Air Conditioner base pan firmly. The foam tape on the divider plate



Place insulation in position  
(Do not cover unit rating plate)



must seal to bottom of base pan.

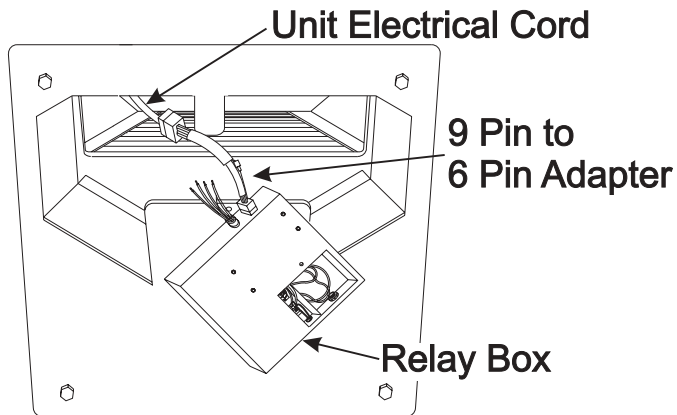
**Note:** The adhesive on double sided tape is extremely sticky. Divider Plate must be properly positioned before pressing in place.

4. With slight pressure then push divider plate against exposed double sided tape on ceiling template.
5. Locate 7" x 18"/175mm x 460mm self-adhesive insulation supplied with the Return Air Kit. Remove the backing paper from the insulation and carefully stick onto the ceiling template divider panel.
  - a. Excess width is intended to seal the divider plate to the sides of the 14"/355mm opening. This is to prevent cold air discharge air from circulating into the Air Conditioner return air opening.
  - b. If the insulation is too high, stick the excess height of insulation to the Air Conditioner base pan. **Do not cover up unit rating plate.**

**Note:** The adhesive on insulation is extremely sticky. Be sure part is located where desired before pressing into place. We recommend pulling off part of backing paper, locating part and then removing backing paper as insulation is pressed into place.

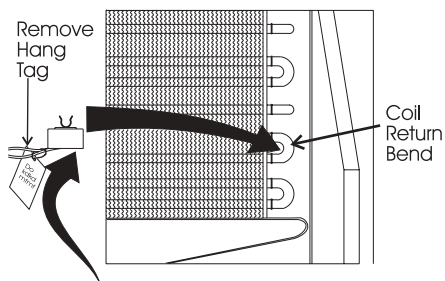
### C. INSTALLATION OF RELAY BOX

1. Locate the 3108217.005, 6 pin to 9 pin Adapter Cable.
2. Plug unit electrical cord into the mating 9 pin connector on Adapter Cable.
3. Plug 6 pin connector of Adapter Cable into 6 pin connector on relay box. These connectors are polarized and will easily snap together.  
**DO NOT FORCE TOGETHER.**

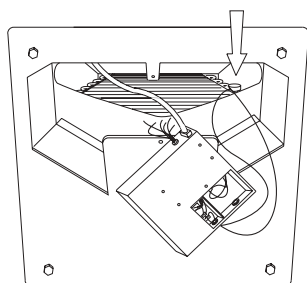


### FREEZE CONTROL INSTALLATION

- a. Snap the freeze control into place on return bend located at right side of evaporator coil as follows:
    - 1) Locate vertical return bend at lower right of evaporator coil.
    - 2) Place the horseshoe end of freeze control onto this coil return bend and snap into place. When positioned correctly, control wires will be 90° to direction of coil fin surface.
3. Remove Installation Notice Hang Tag from freeze control.
  4. Locate the Relay Kit on Ceiling Template (Cable towards rear of RV/caravan).
  5. Drive two #10 x 3/8" 10mm blunt pointed Phillips head screws through ceiling template into holes in Relay Kit to hold in place.



Freeze Control with wires

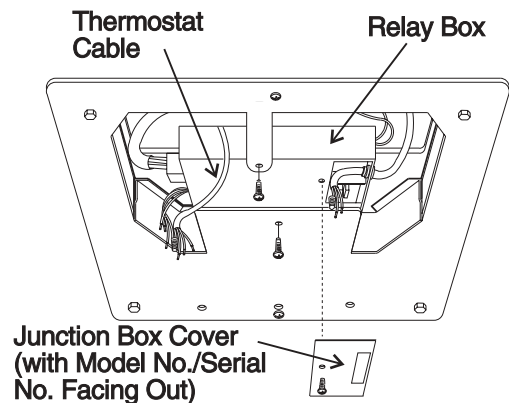


### D. CONNECTION OF POWER SUPPLY



**Disconnect 115 volt AC. Failure to follow these instructions could create a shock hazard causing death or severe personal injury.**

1. Route the previously run power supply line through the Romex Connector and into Relay Kit Junction Box.
2. Connect the white to incoming neutral leg; black to incoming hot leg; and green to green or bare copper wire using appropriate sized twist wire connectors. Tape the twist wire connectors to the supply wiring to assure they do not vibrate off.
3. Tighten screws on Romex connector being careful not to pinch and cut into the insulation on power supply leads.
4. Push excess wires into junction box. Install junction box cover, with model number/serial number label facing out, onto the Relay Control Box with #8 x 3/8" blunt point Phillips head screw provided. NOTE: Model Number/Serial Number label **MUST** face out. (See illustration below).

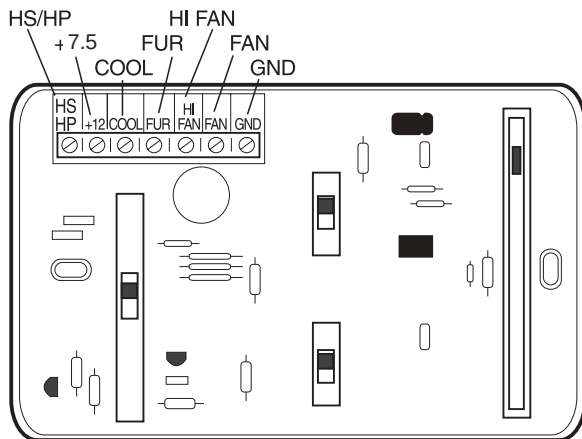


## E. CONNECTION OF LOW VOLTAGE WIRES

### **⚠ CAUTION**

**Disconnect the positive (+) 12 volt DC terminal at the supply battery. Damage to equipment could occur if the 12 volt DC is not shut off.**

1. **Current model color coding**
  - a. Connect the previously run +12V DC to the red wire labeled +12V protruding from the relay kit.
  - b. Connect the previously run -12V DC to the black wire labeled -12V protruding from the relay kit.
  - c. Connect the red/white wire to the thermostat +7.5.
  - d. Connect the unit green wire to the thermostat GND terminal.
  - e. Connect the unit yellow wire to the thermostat COOL terminal.
  - f. Connect the unit tan wire to the thermostat FAN terminal.
  - g. Connect the unit blue wire to the thermostat HI FAN.
  - h. Connect the unit orange wire to the thermostat HS/HP terminal (if applicable).
  - i. Connect the unit white wire to the thermostat FUR terminal (if applicable).
  - j. Connect the unit blue/white wires to the two

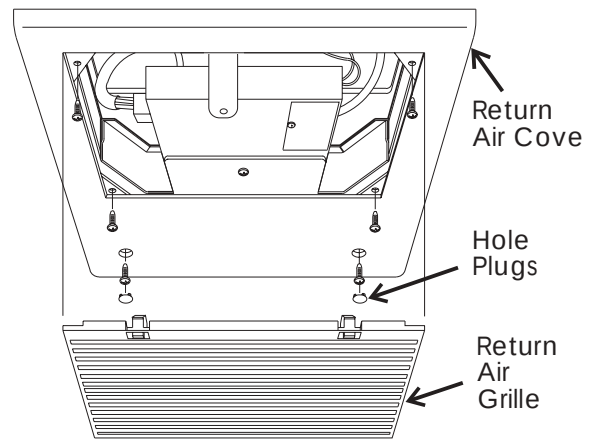


**THERMOSTAT WITH COVER REMOVED**

furnace control wires (if applicable).

## F. INSTALLATION OF RETURN AIR COVER

1. Remove Return Air Grille from the Return Air Cover.
2. Place the Return Air Cover up to Ceiling Template.
3. Install Cover to Template with #8 x 3/8" blunt point Phillips head screws provided (6 required).
4. Reinstall return Air Grille into Return Air Cover.
5. Install two (2) hole plugs into screw holes in back of



return air grille. Align tabs with mating notches and snap into place.

**This completes the installation of the Air Conditioner. We recommend that power be supplied to the air conditioner and check for proper operation.**