

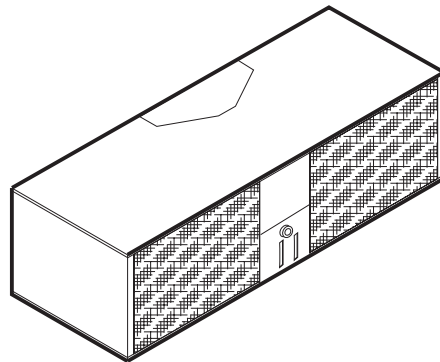
**Duo-THERM<sup>®</sup>**  
by Dometic

**RECORD THIS INFORMATION FOR FUTURE REFERENCE  
BEFORE INSTALLING THE UNIT:**

Model Number \_\_\_\_\_  
Serial Number \_\_\_\_\_  
Date Purchased \_\_\_\_\_  
Place of Purchase \_\_\_\_\_

# SELF-CONTAINED AIR CONDITIONER FOR RECREATIONAL VEHICLES

## ROTARY COMPRESSOR SYSTEM MODEL 39224.601



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THIS UNIT IS DESIGNED FOR OEM INSTALLATION  
ALL INITIAL INSTALLATIONS MUST BE APPROVED BY THE SALES DEPT.

### WARNING

**Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer or service agency.**

### AVERTISSEMENT

**Une mauvaise installation, de mauvais réglages, modifications ou opérations d'entretien peuvent endommager les biens ou même blesser. Se reporter à la notice. Pour obtenir de l'aide ou des renseignements complémentaires, consulter un installateur qualifié ou une agence de service après-vente.**

## INSTALLATION & OPERATING INSTRUCTIONS

## SYSTEM MODEL 39224.601



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## 1. SPECIFICATIONS, GENERAL INFORMATION & LOCATION

### SPECIFICATIONS

System Model	39224.601		
Nominal BTU Capacity	24,000		
Volts/Phase/Hertz (each circuit)	115 AC / 1 / 60		
Run Amps Comp/Motor	[Circuit 1 = 8.7/4.1]	[Circuit 2 = 8.7 /4.1]	
LRA Compressor	[Circuit 1 = 54]	[Circuit 2 = 54]	
Normal Min.                      1 Unit	5.0 KW		
Generator Size **			
Wire Size	Up to 24 ft. - Use No. 12 AWG Copper Conductors		
Circuit Protection Each Circuit	15 Amp Time Delay Fuse or 15 Amp HACR Circuit Breaker		
Control Voltage	12V DC		
Refrigerant	R-22		
System Refrigerant Charge	22.5 oz. (each Circuit)		
Size (In Inches)	Width 44	Height 16.25	Depth 21
Installed Weight	180 Pounds		

\*\* 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 the generator, the total electrical power must be taken into consideration. Keep in mind that generators lose power because of altitude increases above sea level, high outdoor temperatures and lack of maintenance.

NOTE: THE FINS OF THE CONDENSER COIL SHOULD FACE THE EXTERIOR OF THE VEHICLE.

### GENERAL INFORMATION

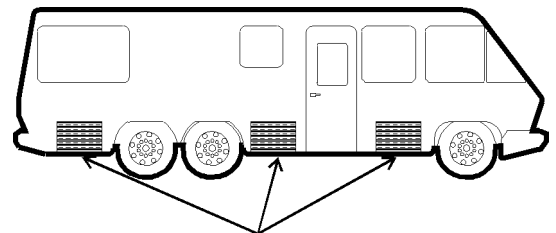
The **39224 Central Air Conditioning Unit** was designed for installation in a basement storage compartment of the RV. The advantages of the 39224 central air conditioning unit are the unit is not exposed to the elements, easier to service, and eliminates the need for two roof mounted air conditioning units.

The 39224 is designed to be used exclusively with external ductwork for the cold air discharge. A 12 volt control utilizing a wall mounted thermostat operates the cooling cycle. There are no provisions for an electric heater to be installed as part of the unit. The heating of the RV will be supplied by the central furnace, if installed.

Since it is necessary to install all or part of the ductwork in the ceiling and sidewall or floor, it is the responsibility of the RV manufacturer to assure that structural integrity is maintained throughout the coach. The RV manufacturer should review each RV floor plan to determine proper duct design and register location.

The Dometic Product Engineering and Applications Departments are available for recommendations and suggestions.

**FIG. 1**



**POSSIBLE LOCATIONS**

### LOCATION

This system is intended for installation in a recreational vehicle where the interior is essentially one undivided space. (See FIG. 1)

- A. A **Condenser Section** intended to be installed with **DIRECT** access to the out-of-doors.
- B. The thermostat can be located up to twenty-five (25) feet from the electrical box.

## 2. CONDENSER SECTION

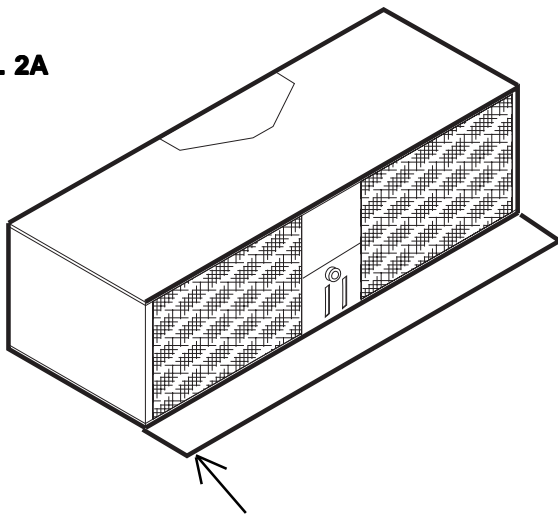
### A. SUPPLY AIR

The inlet of the condenser coil should be positioned so that it draws air from outside the vehicle. **SPECIAL CARE MUST BE TAKEN TO PREVENT THE DISCHARGE AIR FROM RE-CIRCULATING TO THE INLET OF THE CONDENSER COIL.** Shields should be added to ensure fresh air supply. (See FIG. 2A).

### CAUTION

**DO NOT INSTALL THE CONDENSER WHERE THE FAN WILL DRAW AIR FROM THE EXHAUST OF THE VEHICLE, A MOTOR GENERATOR SET, TRANSMISSION, ROAD HEAT OR ANY OTHER HEAT PRODUCING SOURCE.**

FIG. 2A

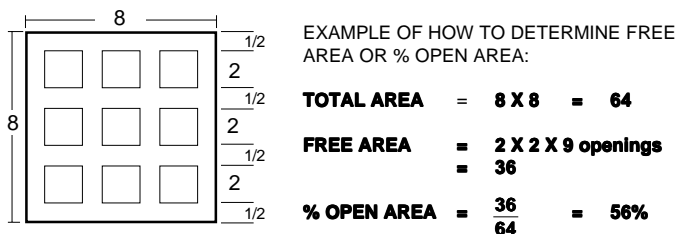


**FIELD INSTALLED SHIELD THAT WILL PREVENT RECIRCULATION OF CONDENSER AIR.**

The condenser section is a "draw-through" type. When the face of the coil is positioned behind a louvered or other type of restrictive opening, the FREE AREA of the opening must be **at least 460 square inches**.

**B. FREE AREA** — is the opening that remains in a grill or louvered panel after the restrictions are taken away. For example, an opening of 10 x 20 inches has 200 square inches. When this opening is covered with a grill that is 56 percent open, the FREE AREA is (200 x .56), 112 square inches.

FIG. 2B



Expanded and perforated metal grills in general vary from 30 percent to 60 percent open. Be certain that **460 square inches** of FREE AREA is available to the face of the condenser.

**NOTE:** Service access must always be supplied either as clearance or as a defined access panel.

## 3. MOUNTING

The Model 39224 Air Conditioning unit design is for installation below the floor in an unfinished storage compartment. This unit should be mounted in an angle-iron frame, designed and built for the Model 39224. Optional mounting, with frame rails attached within the unfinished compartment. The Model 39224 should be mounted with a slight tilt toward the condensing section. This will allow condensation to drain easily from the unit. If frame rails are used, be careful not to restrict the condenser air discharge opening.

Vibration pads are factory installed to the unit base at the corners and the center balance point.

### CLEARANCES

The air conditioning unit clearances depend on:

1. Inlet air access used;
2. Discharge air duct arrangement;
3. Return air duct;
4. Storage compartment location and design.

A one (1) inch clearance is required on three (3) sides of the air conditioner if the top return is used. When using the side access for return, please allow a minimum of eight (8) inches for the return air duct. Access to the electrical connections must be provided when making the installation.

## 4. EVAPORATION SECTION

### A. INLET AIR

The evaporation section must have free access to room air. A minimum of 128 square inches of FREE AREA opening is required. Where the return air must be provided through louvers or mesh screen, the FREE AREA percentage of the material used shall be taken into consideration when making this determination. An example of how to determine FREE AREA is included under "2. CONDENSER SECTION".

### B. GRILLS (See Fig. 3)

**NOTE:** The return air grill must have the same square surface as the return air duct.

- 1) For each air conditioning system, there must be a return grill to bring cabin air back into the unit. There must also be at least four discharge grills per unit.
- 2) Return grills must be mounted in front of the evaporator. If this is not possible, make sure there is nothing blocking the air flow from the grill to the evaporator.

3) The unit must have a return filter between the grill and the unit. This filter must be accessible for periodic cleaning.

**C. OUTLET AIR (See Fig. 3)**

The air diffusion system, supplied by the installer, must be sized to maintain a static pressure at the blower outlet between .4 and 1.2 inches water column.

All air handling ducts must be properly insulated to prevent condensation forming on their surface during operation. A vapor barrier must also be supplied on the outer surface of the insulation to prevent moisture from traveling through the insulation and condensing on the cold ductwork.

**D. CONDENSATE DRAIN**

A .50 dia. hole for condensate drainage is located between the condenser coils. A 1/4" NPT fitting with tubing may be added to direct condensation.

**NOTE:** Drain fitting and tubing must be used if installed in a finished compartment.

**5. ELECTRICAL WIRING**

See FIG. 4.

**NOTE:** All wiring must comply with the National Electrical Code or CSA Standard C22.1, Canadian Electric Code, Part 1; and all local codes.

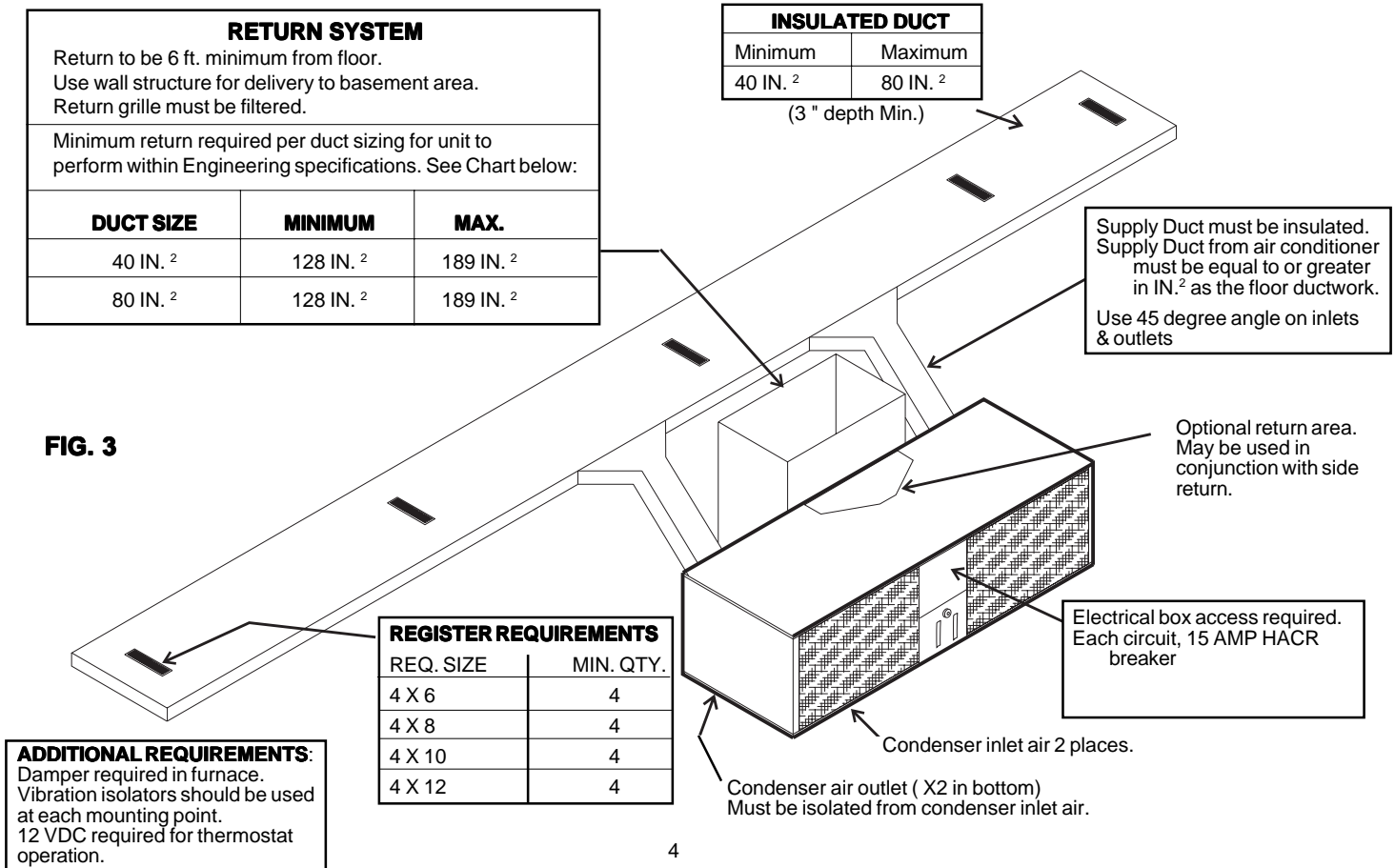
**A. GENERAL**

1. All wiring must be at least 12 AWG.
2. Two independent 15 amp circuits must be supplied to the air conditioner.
3. Two conductors plus a ground must be provided for each circuit protected by a 15 amp slow-blow fuse or a 15 amp HACR type circuit breaker.

**B. UNIT LINE VOLTAGE (See Fig. 4)**

1. The 39224 Electrical Control Box, Thermostat and Thermostat Cable was shipped in a separate package. The Electrical Box and Thermostat are factory wired and ready for installation.
2. Locate the unit electrical box. Remove the cover from the electrical box.
  - A. Using the four (4) mounting screws supplied, mount the electrical box high on a wall within the air conditioner storage compartment.
  - B. Each electrical circuit terminal block is marked.  
 CIR. 1    L1    N    GR  
 CIR. 2    L1    N    GR
  - C. Route two independent 15 amp supply circuits to the air conditioner electrical box. Each supply should be marked Cir #1 and Cir #2.
  - D. Circuit #1 should be wired directly from the coach's main breaker panel.
  - E. Circuit #2 should be wired through the on-board generator.

**NOTE:** A standard 30 amp hook-up will not power both Circuit 1 and Circuit 2 and the coach's other major appliances.



3. Route field supply Cir. #1 to terminal block Cir. #1. Attach black "**Hot**" to "**L1**" terminal. Attach White to "**N**" terminal and attach the ground wire to the "**GR**" terminal. Route field supply Cir. #2 to terminal block Cir. #2. Attach Black "**Hot**" to "**L1**" terminal. Attach White to "**N**" terminal and attach the ground wire to the "GR" terminal.
5. Route the non-metallic liquid-tight tubing with the two 9-pin connectors and ground wire to the air conditioning unit.
6. Remove the field connect junction box cover. Remove lower vent panel. Place pin connectors Cir. #1 and Cir. #2 and ground wire through bushing in vent panel. Move bushing down tubing about four (4) inches. Install bushing with tubing in vent panel. Place the tubing into slot at bottom of the junction box with about 3/4 inches extending into junction box. Install vent panel using screws removed.
7. Locate ground wire and locate ground screw in junction box. Attach ground wire to junction box using ground screw.
8. Locate pin connector for Cir. #2. Insert connector into receptacle marked Cir. #2. Push the connector into seat. Pull lightly on connector assuring it is attached.
9. Repeat Step 8 using Cir. #1 connector.
10. Install junction box cover.

**! WARNING**

**FAILURE TO CORRECTLY WIRE THE UNIT WILL CAUSE PRODUCT DAMAGE AND MAY CAUSE PERSONAL INJURY.**

## 6. THERMOSTAT MOUNTING

### A. LOCATION

Contact The Dometic Corporation for the proper thermostat kit. A home mercury bulb thermostat does not work in RV applications. The proper location of the thermostat is very important to ensure that it will provide a comfortable RV temperature. Observe the following general rules when selecting a location.

1. Locate thermostat about 5 feet 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 them;
6. Never locate thermostat in a room that is warmer or cooler than the rest of the coach — such as the kitchen;
7. The major living area is normally a good location.

## 7. THERMOSTAT WIRING (12V DC)

A 2-conductor cable, 18 to 22 AWG is required for the 12V DC power source. This **MUST** be routed to the system at the thermostat.

Select the shortest direct route between the power supply and the system. A negative wire must be supplied. Frame work grounding is not adequate.

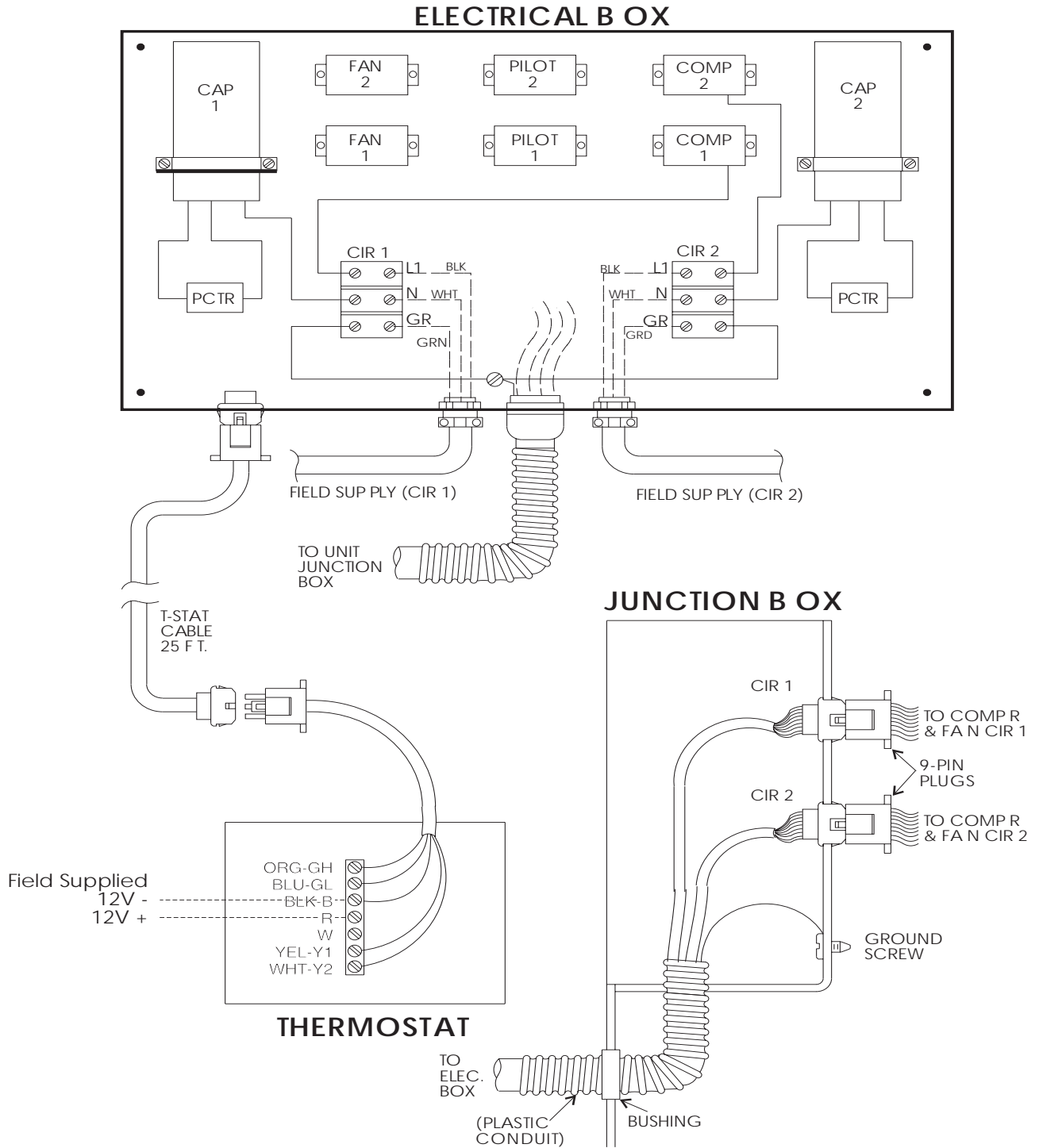
These instructions cover only the connections required for Dometic's two-speed, two-stage thermostat, and the 39224 Dual Compressor Air Conditioning Unit.

- A. Using the template received with the thermostat, cut out a slot in the wall for the terminal strip. Mark the mounting hole locations and pre-drill each hole.
- B. Route the five conductor cable from the A/C unit to the thermostat cutout. Leave approximately 6 inches of cable extending through the wall.
- C. Connect the cable from the thermostat to the cable end through the wall.
- D. Refer to TABLE 1 for additional thermostat wiring.
- E. Remove the screw at the bottom of the thermostat cover, and remove the cover.
- F. Push excess cable back into wall. Fill wall opening with noncombustible material to prevent drafts which could affect operation of the thermostat.
- G. Locate the thermostat mounting holes, using the screws supplied with the thermostat. Tighten until snug.
- H. Replace cover and install cover screw.

**TABLE 1 FIELD SUPPLY WIRES**

A/C	T*stat Terminal	Unit Wire Color	Power Source
	R+	---	+12V DC
	B—	---	—12V DC
HEAT	W B—	(Furnace Option)	

**FIG. 4**



## HEATING

When using Dometic's two-stage thermostat to operate the coach's main furnace, a two conductor cable must be routed from the furnace to the thermostat.

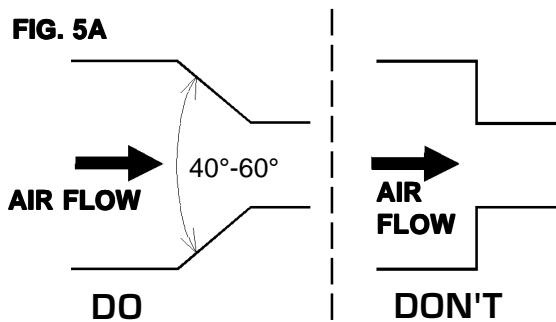
- Connect 12 volt negative to "B" terminal on thermostat terminal strip.
- Connect the "HEAT" wire to "W" terminal on thermostat strip.

## 8. DUCTS

**NOTE:** Streamlining of the air duct system means less resistance to air flow. Sharp angles and turns are to be avoided.

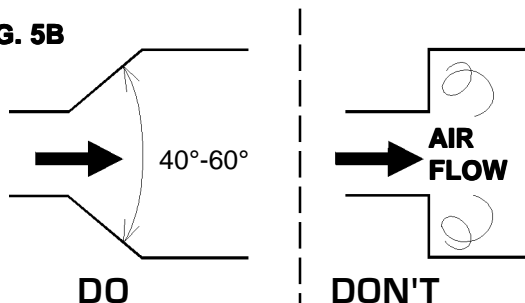
- Pressure losses increase as the diameter of the duct is reduced. When installing your ductwork on long runs, increase the duct diameter and avoid sharp turns.
- When air is contracted from a large duct to a small duct, a pressure loss occurs. See FIG. 5A for recommended reducer configuration.

FIG. 5A



- The pressure loss resulting from a sudden expansion of air from a small duct to a large duct can be much larger than losses due to sudden contractions. See FIG. 5B for recommended expansion configuration.

FIG. 5B



- The final evaluation of air distribution in a space is determined by the occupants' comfort.

## THERMOSTAT

FIG. 6A

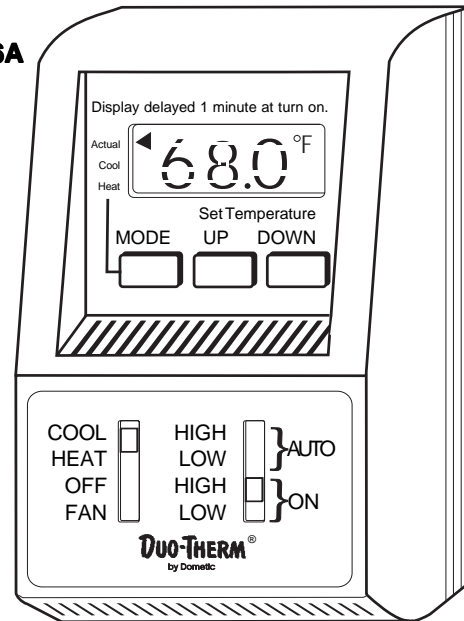
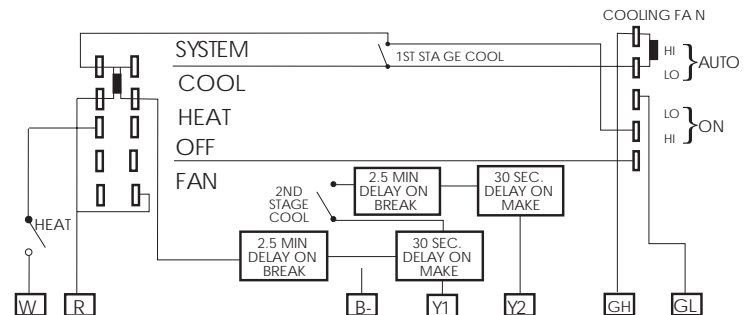


FIG. 6B

## THERMOSTAT BLOCK DIAGRAM



### TERMINAL DESIGNATION WIRE COLOR

Y1 - First Stage Cooling	YEL	W - Heating	
Y2 - Second Stage Cooling	WHT	(B-) - 12VDC, chassis ground	BLK
GH - Cooling Fan High Speed	ORG	(R+) + 12VDC	
GL - Cooling Fan Low Speed	BLU		

## 9. AIR CONDITIONER & THERMOSTAT

This packaged air conditioner contains a dual compressor refrigeration system. Each compressor is connected to a separate refrigeration circuit and air system. The system can be operated with a single compressor when the cooling requirement is low, or with two compressors when maximum cooling performance is required.

This air conditioner operates a two-stage cooling system. The first compressor and refrigeration circuit is referred to as "**Stage 1 Cooling**". The second compressor and refrigeration circuit and air system is referred to as "**2nd Stage Cooling**". The first and second stage cooling will operate as indicated below.

**1st Stage Cooling (the first compressor and air system) will operate when:**

- A. The thermostat is calling for cooling.
- B. Power is being supplied by either shoreline or the on-board generator.

**2nd Stage Cooling (the second compressor and air system) will operate when:**

- A. The thermostat senses room temperature is two degrees higher than set point.
- B. The vehicle is being powered by the on-board generator. A 30 amp shoreline by itself will not provide enough power to operate the 1st and 2nd Stage cooling.

Switching and control of the 1st and 2nd Stage cooling is automatic. When operating from shoreline, the system automatically limits operation to 1st Stage cooling only. When the shoreline is plugged into the on-board generator, the system automatically allows 1st and 2nd Stage cooling. However, if powering both systems from the generator and cooling demand does not required both systems to operate, Stage 2 will shut down and only Stage 1 will operate.

## **THERMOSTAT:**

This thermostat controls 12 volt DC heating and air conditioning systems. It can control one stage of heat and two stages of cooling. Changeover from heating to cooling is operator controlled — the thermostat can not make this change. Time delay circuits have been incorporated to protect the cooling system components.

The time delay is 3 minutes between "OFF" and "ON" cycles. There is a 30 second delay when the compressors turn on. This allows time for the generator to stabilize on initial starting. The balance of the delay (2.5 minutes) occurs when the compressor cycles off. This is to allow the compressor pressures to balance before restarting. There is a 30 second delay and 2 degrees between 1st and 2nd stage cooling operation.

## **10. OPERATION**

Your air conditioner is operated from the control panel of the electronic wall thermostat. When the furnace is connected to this thermostat, it will operate from the same control panel.

Identification and operational descriptions for all control panel switches and display are listed below: (Refer to Figure 6A)

**A. LIQUID CRYSTAL DISPLAY:** This display will be illuminated any time the system is in operation.

The display shows the operator both the mode of

the display (indicated by the arrow at the left side of the display) and the temperature for that mode. There are three display modes: **ACTUAL**, **COOL** and **HEAT**. The operator may choose the mode to view by depressing the "**MODE**" switch. Each time the **MODE** switch is depressed, the display advances to the next mode. If the display is left in either **COOL** or **HEAT**, the thermostat will automatically return the display to **ACTUAL** in approximately three minutes.

A description of the three modes is:

**ACTUAL:** When in this mode, the display is indicating current room temperature.

**COOL SET:** When in this mode, the display is indicating the current cooling set-point temperature. At this time the cooling system set-point temperature may be adjusted up or down to meet the individual comfort level. See "Adjusting Set-Point" for further instructions.

**HEAT SET:** When in this mode, the display is indicating the current heating system set-point temperature. At this time, the heating system set-point temperature may be adjusted up or down to meet the operator's comfort level. See "Adjusting Set-Point" for further instructions.

All three display modes can be accessed without affecting the operation of the system. The system operation will remain normal unless a change is made to the set-point to force a change in the system operation.

**B. SYSTEM SWITCH:** The system switch has four positions to control the operation of the heating and cooling systems. They are as follows:

**COOL:** When in the "**COOL**" position, 1st and 2nd Stage cooling will cycle from the cooling system set-point. Blower operation will be controlled by the position of the Cooling Fan Switch.

**HEAT:** When in this position, the heating system will cycle from the heating system set-point. The heating blower will operate per the heating system manufacturer specifications.

**OFF:** When in the "**OFF**" position, no thermostat or system operation will occur. The liquid crystal display will indicate room temperature until back-up power is depleted (approximately 2 minutes).

**FAN:** When in the fan position, the blower will operate continuously at high speed.

**C. COOLING FAN SWITCH:** The fan switch has four positions to control the operation of the cooling blower. The fan switch controls operation of the cooling blower only after the system switch is placed into the **COOL** position.

With the system switch in any other position, the fan switch will have no affect on the operation of the cooling blower. Fan switch positions and their resulting functions are listed on the following page.



**HIGH AUTO:** When in the high auto position, the cooling blower operates at high speed and cycles "OFF" and "ON" with the 1st Stage compressor. The 2nd Stage cooling will cycle "ON" and "OFF" as needed.

**LOW AUTO:** When in LOW AUTO position, the cooling blower operates at low speed and cycles "OFF" and "ON" with the 1st Stage compressor, the 2nd Stage cooling will cycle "ON" and "OFF" as needed.

**HIGH and LOW ON:** When in the HIGH or LOW ON positions, the cooling blower operates continuously. The 1st and 2nd Stage compressors cycle OFF and ON as needed.

**D. MOMENTARY SWITCHES:** Momentary Switches are activated by depressing the center of the switch. There are three momentary switches:

**MODE:** Depressing this switch advances the display mode from ACTUAL to COOL, HEAT and back to ACTUAL.

When using this switch, you are indicating your desire to check or adjust the set-point temperatures for cooling or heating.

The cooling setting determines the temperature at which the air conditioner will start to operate. The heat setting determines the temperature at which the heating system will start to operate.

**UP:** Depressing this switch increases the temperature set-point.

**DOWN:** Depressing this switch decreases the temperature set-point.

## ADJUSTING SET-POINT

To adjust the set-point for heating or cooling, press the MODE button until the arrow on the display indicates the desired set-point you wish to change, cool or heat. The display will indicate the current set-point of the thermostat. Press UP or DOWN to change the set-point. Once the new desired set-point is displayed, press the MODE button until the arrow is pointing to ACTUAL. If the thermostat is left in

the COOL or HEAT mode, the display will return to ACTUAL in about 3 minutes. After the display returns to ACTUAL, it takes 15 to 30 seconds for the thermostat to recognize the changes made to the set-point.

## 11. MAINTENANCE

**A. AIR FILTER:** Your air conditioner will operate more efficiently with a clean filter. Replace the filter with a new one every three months.

**B.** To maintain efficient operation, the exposed CONDENSER COIL should be cleaned as often as necessary to keep it free of dirt and debris. Be careful not to damage the coil fins when cleaning.

## 12. SERVICING

If service work is needed, contact your dealer or the nearest authorized service center. When requesting service, always give complete model and serial numbers. These numbers are located on the left side of the condenser bulkhead.

### BEFORE YOU CONTACT A SERVICEMAN

There are several built-in features that may automatically shut off the unit under abnormal operating conditions. If your unit should shut off, here are some things you should check before you contact a service center.

- A. Wait a 15 to 30 minutes — to see if unit will resume operation.
- B. Check thermostat for correct setting.
- C. Check fuses on electrical supply in the vehicle.
- D. Check the filter (indoor section) to see if it is clean.
- E. Check the condenser coil to be sure it is clean.
- F. Check the screen covering the outlet side of the condenser section to be sure it is not obstructed.

# WIRING DIAGRAM

