

## Change the 2001.5 and later A/C & Heat system on the Discovery coach With the multi-zone coleman mach thermostat

This schematic and wiring diagram is to be used only for single stage heating and single stage cooling. Do not use if you have a heat pump or aux strip heating in the roof top A/C system. It is imperative that all safety measures be absolutely adhered to. Please read and re-read this complete article before attempting to make the change. Follow each step exactly as described for a safe installation. **The author of this article assumes no responsibility for any errors or damage as a result of proceeding with this product. A note of caution.** The new system will abort the shedding feature built into the OEM thermostat and controller for the two rooftop A/C units only. All other shedding will function as it normally would. When operating in 20 or 30 amp shore hookups, use common sense and operate only one A/C zone at a time. During 50 amp operation, or on generator power this should not be an issue.

The center roof A/C chase is a good area to run the new cable. Another method would be wire mold products.

Lets get started

**Before beginning, make sure all power including inverter power is OFF in the coach, and no outside power to the shore power cord. Disconnect the battery power.**

We will remove the existing Coleman Mach thermostat and replace it with a Hunter model 42999B or comparable single stage heat, single stage cool thermostat.\* **see schematic of plug connecting this TX to the coach system.** I would suggest that the wiring for the OEM thermostat be kept in place, and just shoved back into the wall after making our connections. The same logic for the wiring not needed for the conversion on the two roof top A/C units. Just gather the wires using a plastic tie pushing them out of the way.

To begin, let's call the digital room thermostats a TX. These are available for under \$25.00 each from WalMart or most big box home improvement stores. The relays we will use are the Omron G8P or equivalent. They have spade connectors on the bottom, and are flange mounted. They are available on the internet, see web address in parts list at bottom of article.

The 3 Relays can be mounted on a 4X4 or a 4 gang plastic electrical box, with plastic cover. I do not recommend metal boxes for electrical conductivity reasons.

Looking at the OEM controller which can be found on the upper A/C plenum chamber on the roof top units, you will note it is held in place by a wing nut on each side of the unit. They can be accessed from inside the coach by removing the large return air grill, or from atop the coach by removing the shroud and about 10 or so sheet metal screws on the forward part of the unit.

Remove the wing nuts, Remove the two phillip head screws, and open the box. You will notice a plastic 9 pin connector mounted to the controller facing to the outside of the cover. Remove the male plug by holding the two retainer clips on either side of the plug assembly. Remove all wires from the outside terminals, and the 12 gauge romex wire that supplies power through the breaker panel at the foot of the bed.

The controller can now be removed from the system.

## **Building the new relay system.**

Install the 3 relays onto the 4x4 or 4 gang plastic box so that the relays will be on the outside, and the wiring connectors (spade connectors) will be inside. Label each relay with the following terminology

- a. Compressor relay
- b. High fan relay
- c. Low fan relay

I would recommend removing the 9 pin female connector from the controller, and installing in the new box, or you may want to salvage the controller opting to use wire nut or crimp connectors to affix the wiring to the system. If you choose to salvage the controller, cut the wires far enough from the upper wire male connector to allow re connecting using appropriate crimp connectors, and or heat shrink tubing.

**If you choose to salvage the controller proceed in this manner.**

The black wire of the #12 romex 20 amp line must be connected to each of the three relays on the line side of the relays pin 3 to supply 120 VAC to the components when +12 VDC is applied to each coil pin 6 through the TX.(see schematic with relay or detail on side of relay). I would recommend using #14 machine type wire for these load connections. These wires can be connected to the black romex wire with twist connectors.

From the wiring that goes to the upper circuits:

Pin #2,4,8 have no wires on them.

1. Cut both white wires to the 9 pin male plug These wires are hooked to pin #1 and pin #9 on the 9 pin male plug, and are the neutral for the compressor and blower fan. (your particular unit may have one white and one yellow). The yellow is the common, to the compressor, and will be hooked to pin#9) Ground the bare copper wire to the unit frame. This will also be hooked to a green wire, and to pin #7 on the 9 pin male plug.
2. Compressor relay. Purple wire (hooked to #3 on 9 pin male plug). Cut this wire and splice to load side of the compressor relay pin 5. This wire will receive power from the 120 VAC line side of the relay pin 3 when +12 VDC is applied to the coil terminal pin 6.
3. High blower relay. Black wire (hooked to #5 pin on male plug). Cut this wire, and connect to load side of high fan relay pin 5. This wire will receive power from the 120 VAC line side of the relay pin 3 when +12 VDC is applied to the coil terminal pin 6.
4. Low blower relay. Red wire (hooked to pin 6 on 9 pin male plug) Cut

this wire, and attach to the load side of the low fan relay pin 5. This wire will receive power from the 120 VAC line side of the relay pin 3 when +12 VDC is applied to the coil terminal pin 6

Run a 4 wire cable (thermostat wire) from the location of the new TX's to each roof top A/C unit. This will carry the low voltage 12VDC from the TX to the new control unit just constructed.

The blue wire will supply -12VDC to all three of the relay coil common terminals pins 2. The other end must be connected to pin 3(ground) of the 9 pin coleman mach connector, or a known good -12VDC source.

**Y terminal on the TX.** The yellow wire connects to this terminal, and the other end to the coil of the Compressor relay pin 6 in the just constructed new controller.

Install a on-on SPDT toggle switch close to the TX which will control the high and low speed blower. Some TX's have enough room on the device to mount the switches, but type will dictate. I suggest just mounting in the wall above the TX position. Looking at the backside of the toggle switch there should be 3 terminals. To either outside tap on this switch hook the green wire. This will be connected to the high fan relay coil pin 6. White wire connect to the other outside tap on the toggle on-on switch. The other end is connected to the low fan relay coil pin 6.

**G terminal on TX.** Hook a wire from this terminal to the center tap on the on-on SPDT toggle switch. Moving the switch one way engages the low fan speed and the other way the high fan speed. I suggest labeling the switch accordingly.

Run a wire from +12VDC at pin 1 on the nine pin Coleman Mach connector to the RC/RH terminal on the new TX. This will supply control voltage to the TX. Install the cover on the 4x4 box.

This will complete the wiring for the A/C section of this project.

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## Heating Circuit

Run a two conductor wire from the selected position of the front controlled system TX to the rear TX area in the bedroom area. This will carry +12VDC for the control voltage, and also the connector to the orange wire that is cut from the original TX location in the bedroom area for furnace #2. Hook one of the wires to the RH/RC terminal on the thermostat, and the other end to the Red wire at the OEM TX location. The second wire to the W terminal on the thermostat, and the other end to the orange wire at the OEM TX location in the bedroom.

This will complete the wiring for the Heat section of this project.

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## CHECKING SYSTEM OUT

Hook battery post earlier connected back to original positions. Plug shore power cable in to a known power source, or start the generator and allow to come on line.

Install batteries in both TX's

On TX #1 in bedroom area, place heat/cool slide switch to cool position. Lower temperature on TX to below ambient temperature. Fan switch in auto. Bedroom roof top A/C system should start and begin to cool. Switch fan toggle switch (on-on toggle hi/low installed in instructions) to determine change in fan speed. Allow system to cool until unit is shut down by TX setting. Once A/C shuts down, place fan switch on TX in on position. Fan should start to run without compressor start. Check hi/low fan switch to determine change in fan speed.

Do this for each unit.

If everything checks out to be OK, system can be turned off by moving fan switch on TX to auto, and heat/cool slide switch to off.

To check out furnace move heat/cool slide switch on TX to heat position. Note that fan switch does not function in auto position, and only controls A/C functions of blower. Raise temperature setting on TX to above ambient room. Furnace blower will start momentarily, and furnace should ignite. Move heat/ cool slide switch to off, and system should shut down after cool down sequence of approximately 2 minutes.

This completes the change in the ECC system to the coach.

### Parts needed for project

(2) Hunter model 42999B or equivalent digital heat cool thermostats

(6) relays Omron G8P series or comparable. Purchase at:

[http://www.mouser.com/ProductDetail/Omron/G8P-1A2T-F-DC12/?qs=sQVrL4YZhsQyUvjPK9kyzg%3D%3D&gclid=CjwKEAju37afBRDO5M3h0qvj9zQsJACvwnOJiUOLzXiz2PKj0BdliXqoxwsF9rM\\_wpgKSUZPMXpIqRoC8v\\_w\\_wcB](http://www.mouser.com/ProductDetail/Omron/G8P-1A2T-F-DC12/?qs=sQVrL4YZhsQyUvjPK9kyzg%3D%3D&gclid=CjwKEAju37afBRDO5M3h0qvj9zQsJACvwnOJiUOLzXiz2PKj0BdliXqoxwsF9rM_wpgKSUZPMXpIqRoC8v_w_wcB)

(2) 4x4 or 4 gang plastic electrical boxes and covers to mount components. Home depot or Lowes

(2) on-on SPDT toggle switches (not momentary) Radio Shack or

[http://www.ebay.com/itm/Pair-Miniature-SPST-Toggle-Switches-ON-ON-SW104X2-/261229646952?pt=LH\\_DefaultDomain\\_0&hash=item3cd2801468](http://www.ebay.com/itm/Pair-Miniature-SPST-Toggle-Switches-ON-ON-SW104X2-/261229646952?pt=LH_DefaultDomain_0&hash=item3cd2801468)

(4) 1/2" romex connectors (some boxes have built in wire restrainers)

Necessary lengths of 4/5 conductor thermostat wire TX location to roof top A/C units

Necessary 2 conductor wire for furnace to TX

2 feet of #14 machine(stranded) wire for hookups in box.

Necessary spade connectors for attaching wires to the relays

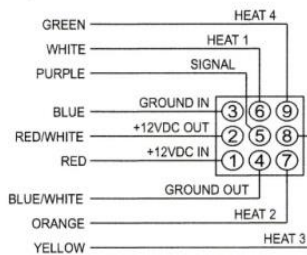
## Technical data and schematics

The schematic below is of the thermostat connector in the bedroom area of the 2002 Discovery. Other models should be similar for the 8330B331 and 8330B335 MULTIPLE zone TX. I would suggest cutting all wires to this plug leaving enough of a pigtail for reconnection, and to salvage the connector if considering selling the removed system for parts.

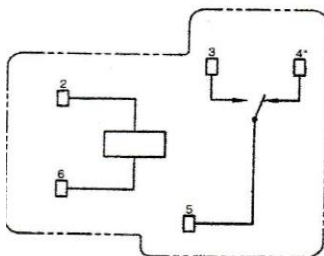
You will note (4) four heat connectors. This TX is capable of handling up to four zones, however most installations will be for two. Use Heat #1 white wire to #1 furnace, and Heat # 2 orange wire to #2 furnace, for the furnace controls in the new system. You can also use +12VDC in, red wire, for your power supply to the TX's. The other drawing depicts the relay wire connections to be used.

I have included a couple of [Photos](#) showing the upper chamber of the rooftop A/C, and the controller for reference.

OEM must supply these mating parts to connect these thermostats as shown below. A minimum wire size of AWG 18 must be used for this system.



**Terminal arrangement/  
Internal connections  
(Bottom view)**



**Note:** Terminal #4 is omitted on G8P-1A4P/1A2P.

### Wiring Diagrams

#### 4-wire Heat/Cool System

