

TRUE AIR (CENTRAL AIR CONDITIONING)

The motor home air conditioner is powered by 110 volt AC electricity. It can be one of two styles: roof mounted or central package. Roof mounted means that the unit is physically located on the roof of the vehicle. Central package units are located in a compartment below the floor line of the vehicle. This article will focus on our True Air packaged central air conditioner.

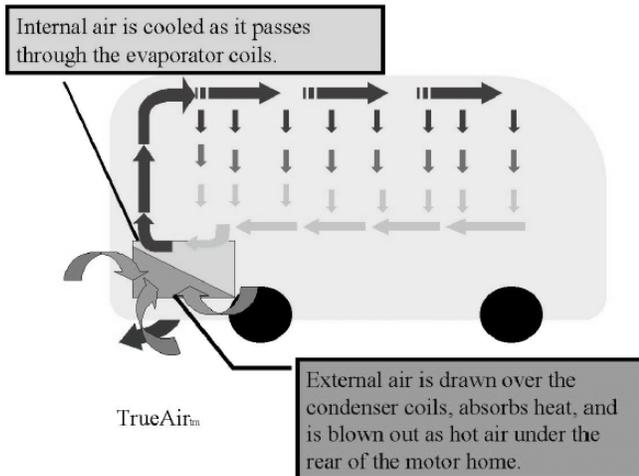
How the Central Air Conditioner Works

Internal air-cooling and circulation system:

An impeller blower draws air from the interior of the coach through the air filter and then through the interior (evaporator) coils. The interior coils absorb heat out of the air and transfer it to exterior coils (condenser) via the refrigerant in the coolant lines. The cooled interior air is then routed through the plenum in the ceiling for even distribution throughout the coach.

External heat removal system:

The second impeller blower is used to draw exterior air through the exterior coils and exhaust it under the rear of the motor home after it has absorbed heat from the refrigerant. This operation is completed outside of the motor home, so no exterior air is drawn into the coach. The cooled fluid then travels through coolant lines to the interior evaporator coils – completing the cycle.



Refrigerant cycle

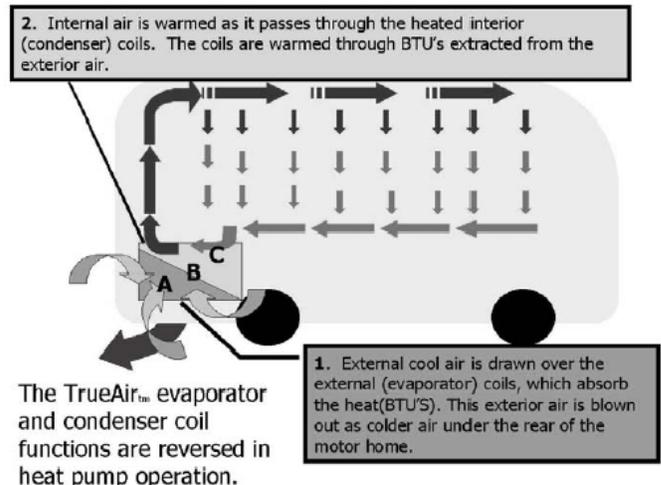
The refrigerant cycle starts at the compressor. Its function is to take low-pressure vapor and discharge it as high-pressure vapor. The high-pressure vapor leaves the compressor through the discharge line and enters the reversing valve. The reversing valve routes the high-pressure vapor to the outside coil (in the cooling mode, the outside coil is a condenser coil) where it is cooled and condensed into liquid. Heat removed from the refrigerant is expelled to the outside

air. The refrigerant leaves the outside coil as high-pressure liquid.

The high-pressure liquid then enters the inside coil (evaporator). When the liquid enters the low-pressure atmosphere of the inside coil, it returns to the vapor state. From the inside coil (evaporator), the low-pressure refrigerant vapor returns to the reversing valve. The reversing valve routes the low-pressure vapor to the compressor through the suction line to start the cooling process again.

How the Heat Pump Works

The key to understanding how a heat pump can heat your motor home is that even when it is very "cold" outside, there is a heat energy in the air. Air would need to be -460 degrees F (absolute zero) for there to be no heat energy. An easy way to think of how the heat pump works is that it simply operates the are conditioning in reverse to absorb this heat energy from the outside air.



The system refrigerant is a fluid that vaporizes (boils) at a low temperature to absorb this energy. The refrigerant circulates through tubes (refrigerant lines) that travel throughout the air conditioning system.

The refrigerant begins as a cold liquid-colder than the outside air. The refrigerant flows to the outdoor coil (A in the above diagram). This coil is a "heat exchanger" with a large surface area to absorb heat from the air into the colder refrigerant.

The heat added to the refrigerant causes the fluid to vaporize, so this heat exchanger is called the "evaporator coil" during the heating cycle. When materials change state (in the case from liquid to gas), large amounts of energy transfer take place.

The refrigerant is warmed and vaporized by the warmer outdoor air. The compressor (B) concentrates the heat energy and transfers it to the

interior coils. The interior coil (C) is where the refrigerant gives up its heat to the indoor air. A fan blows air past the indoor coil to distribute heat to the motor home.

Heating mode

To heat the air inside a structure, heat is removed from the outside air or ambient and released to the inside air.

Maintenance Requirements

Inspect or replace the filters on a monthly basis or sooner as needed. Central package systems utilize disposable filters. To determine filter locations consult your owner's guide. Inspect and clean the evaporator and condenser assemblies on an annual basis.

For more information on central and roof a/c systems contact RVP at 877-430-8084 or www.rvcomfort.com.

Operation Chart

The chart below shows the system functions with the 6537-335* thermostat. After the entire air conditioning system (and furnace system) is installed, check each position function.

6537-335* 2-Stage Heat Pump Thermostat Truth Table

| | Mode Switch | Fan Speed Switch #1 | Fan Speed Switch #2 | Calling | Operation of Unit |
|----|-------------|---------------------|---------------------|-------------------------|--|
| 1 | Cool | Auto | Lo | No | No functions occur in this mode |
| 2 | Cool | Auto | Lo | Stage 1 1° above set | ID fan low, compressor #1 and OD blower low cycle as needed |
| 3 | Cool | Auto | Lo | Stage 2 2° above set | ID fan low, compressor #1 and #2 and OD blower high cycle as needed |
| 4 | Cool | On | Lo | No | ID fan low continuous |
| 5 | Cool | On | Lo | Stage 1 1° above set | ID fan low continuous, compressor #1 and OD blower low cycle as needed |
| 6 | Cool | On | Lo | Stage 2 2° above set | ID fan low continuous, compressor #1 and #2 and OD blower high cycle as needed |
| 7 | Cool | Auto | Hi | No | No functions occur in this mode |
| 8 | Cool | Auto | Hi | Stage 1 1° above set | ID fan high, compressor #1 and OD blower low cycle as needed |
| 9 | Cool | Auto | Hi | Stage 2 2° above set | ID fan high, compressors #1 and #2 and OD blower high cycle as needed |
| 10 | Cool | On | Hi | No | ID fan high continuous |
| 11 | Cool | On | Hi | Stage 1 1° above set | ID fan high continuous, compressor #1 and OD blower low cycle as needed |
| 12 | Cool | On | Hi | Stage 2 2° above set | ID fan high continuous, compressors #1 and #2 and OD blower high cycle as needed |
| 13 | Off | Auto | Lo or Hi | N/A | No functions occur in this mode |
| 14 | Off | On | Lo | N/A | ID fan low continuous |
| 15 | Off | On | Hi | N/A | ID fan high continuous |
| 16 | Gas Heat | Auto or On | Lo or Hi | No | No functions occur in this mode |
| 17 | Gas Heat | Auto or On | Lo or Hi | Stage 1 1° below set | Gas heat will be energized to run |
| 18 | Gas Heat | Auto or On | Lo or Hi | Stage 2 | There is no provision for second stage heat when operating in the gas heat mode |
| 19 | Elec Heat | Auto or On | Lo or Hi | No | Nothing is operating in this mode |
| 20 | Elec Heat | Auto or On | Lo or Hi | Stage 1 1° below set | Heat pump will run ID fan high, Compressor #1 and #2 with reversing valve #1 and #2 and the OD fan high |
| 21 | Elec Heat | Auto or On | Lo or Hi | Stage 2 5° below set | Heat pump will run ID fan high, Compressor #1 and #2 with reversing valve #1 and #2, OD fan high and gas heat will be energized to run |

Notes: 1) When 2nd stage cooling is activated, it stays on until setpoint is satisfied.
 2) When 2nd stage heating is activated, it stays on until setpoint is satisfied.
 3) The word "DIFF" will display on the LCD when 2nd stage electric heat (gas furnace) is operating.

Heat Pump Algorithm

To bring on gas furnace as 2nd stage heat

| Setpoint | Indoor Temp. | Operation |
|----------|--------------|---|
| 70 | 70+ | No functions occur |
| | 69 | Heat pump turns on (primary heat source) |
| | 71 | Heat pump turns off (thermostat satisfied) |
| | 69 | Heat pump turns on |
| | 65 | Gas furnace turns on (heat pump not able to satisfy thermostat) (first strike for second stage heat counter) (First strike for second stage heat counter) |
| | 71 | Heat pump and gas furnace turn off (thermostat satisfied) |
| | 69 | Heat pump turns on |
| | 65 | Gas furnace turns on (heat pump not able to satisfy thermostat) (second strike for second stage heat counter) |
| | 71 | Heat pump and gas furnace turn off (thermostat satisfied) |
| | 69 | Heat pump turns on |
| | 65 | Gas furnace turns on (heat pump is again unable to satisfy thermostat), (second stage heat counter reaches third strike and heat pump is locked out for 1 hour and 45 minutes), second stage heat counter is reset if heat pump is running for more than 20 minutes and does not call for second stage heat |
| | 71 | Gas furnace turns off (thermostat satisfied) |
| | 69 | Gas furnace turns on (becomes primary heat source) |
| | 71 | Gas furnace turns off (thermostat satisfied) |
| | | After 1 hour and 45 minutes lockout |
| | 69 | Heat pump turns on (resumes as primary heat source) |
| | 65 | Gas furnace turns on (becomes primary heat source) (heat pump is locked out for another 1 hour and 45 minutes) |
| | 71 | Gas furnace turns off (thermostat satisfied) |
| | | After 1 hour and 45 minutes lockout |
| | 69 | Heat pump turns on (resumes as primary heat source) |
| | 71 | Heat pump turns off (thermostat satisfied) (second stage heat counter is reset any time heat pump satisfies thermostat setpoint and does not need gas furnace) |

The word "DIFF" will display on LCD when second stage heat is operating and the heat pump is locked out. There is a 30-second delay between Stage 1 and Stage 2. There is also a 3-minute anti-short cycle delay time for cooling.

Wall Thermostat

