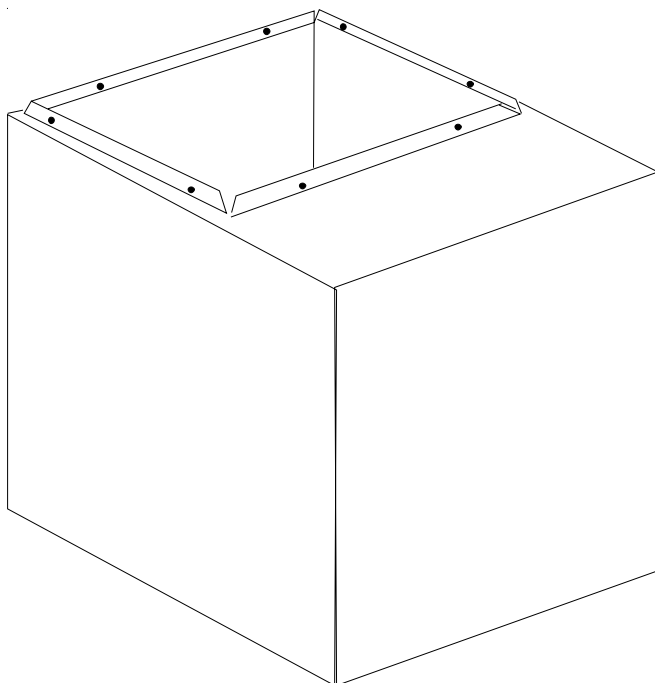


Installation Instructions



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RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION.

ATTENTION INSTALLING PERSONNEL

As a professional installer you have an obligation to know the product better than the customer. This includes all safety precautions and related items.

Prior to actual installation, thoroughly familiarize yourself with this Instruction Manual. Pay special attention to all safety warnings. Often during installation or repair it is possible to place yourself in a position which is more hazardous than when the unit is in operation.

Remember, it is **your** responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use.

Safety is a matter of common sense...a matter of thinking before acting. Most dealers have a list of specific good safety practices...follow them.

The precautions listed in this Installation Manual are intended as supplemental to existing practices. However, if there is a direct conflict between existing practices and the content of this manual, the

Safety Instructions

Recognize Safety Symbols, Words, and Labels

The following symbols and labels are used throughout this manual to indicate immediate or potential safety hazards. It is the owner's and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of personal injury, property damage, and/or product damage.

WARNING

WARNING - Hazards or unsafe practices which COULD result in severe personal injury or death.

CAUTION

CAUTION - Hazards or unsafe practices which COULD result in minor or moderate personal injury, product damage, property damage.

Safety Guidelines

1. Allow only qualified, experienced technicians to install or service this unit.
2. Unit must be installed in accordance with Regulations of the National Fire Protection Association for Installation of Air Conditioning, Warm Air Heating, and Ventilating Systems, Pamphlets 90A and 90B, as well as applicable local codes. Where local regulations are at a variance with instructions, installer should adhere to local codes.

General Information

The BBA/BBC Blower Cabinets are used in combination with a cased evaporator coil. This combination of blower and coil functions as the indoor part of a split air-conditioning system, and may be matched with a remote condensing or heat pump unit. The blower cabinet can also function as an electric furnace when used with an electric heater. **NOTE:** The electric heating elements for electric furnace installation are not shipped with the cabinet and are field-installed.

Systems should be properly sized by heat gain and loss calculations made according to methods of the Air Conditioning Contractors Association (ACCA) or equivalent. It is the contractor's responsibility to ensure the system has adequate capacity to heat or cool the conditioned space.

Shipping and Handling

The blower is usually shipped F.O.B. factory. Upon receipt, inspect the carton for any damage which may have occurred in transit. If the carton is damaged, note the damage on the carrier's freight bill for inspection and immediately initiate a settlement of claim.

Inspect carton contents. If contents are damaged, file a concealed damage claim. Concealed damage claims must be made within 30 days of shipment.

It is the consignee's responsibility to file damage claims. If no damage is found, remove the packaging material and recycle or dispose of according to local codes.

Clearances and Accessibility

The unit can be positioned for upflow, counterflow, horizontal right or horizontal left operation. Zero clearance is allowed on all sides for combustible materials. Thirty-six inches should be allotted on the door side for maintenance and service.

To reduce risk of rusting, do not install the unit blower directly on the ground or on a floor that is likely to be wet. In such environments, the unit must be elevated by use of a sturdy, nonporous material.

Insulation

All units are constructed with R-4.2 insulation. To ensure efficient operation, review the following precautions.

- Where the humidity is consistently 80% or greater, protect the exterior of the cabinet with insulation. If local codes permit, insulate the exterior with insulation having a vapor barrier equivalent to that used on ductwork.
- The factory recommends insulating the duct running through any unconditioned spaces with insulation having a R rating of 4.2 or higher.

To reduce operating sound and vibration transmission, use flexible canvas duct connections at the cabinet.

Installation Instructions

Blower with Cased Evaporator Coil Installation

1. If installing the blower with a cased evaporator coil, remove the white gasket material from the blower bag assembly and place it between the top and bottom cabinet (Figure 1). **NOTE:** Do NOT discard remaining white gasket material as it will be used to provide a seal for the blower door (Figure 2).
2. Secure the coil and blower together with the two connector plates and screws supplied in the blower bag assembly. Use one connector plate and four screws on each side of the unit.
3. Seal the inside seam created by the coil and blower with the black gasket shipped loose in the blower carton.
4. Position remaining white gasket material along the outer edge of the blower door.

If accessory electric heat is to be added, install now per the instructions shipped with the heater kit. Otherwise, cover the electric heat access hole in the blower cabinet with the

filler plate and screws supplied with the blower bag assembly (Figure 3).

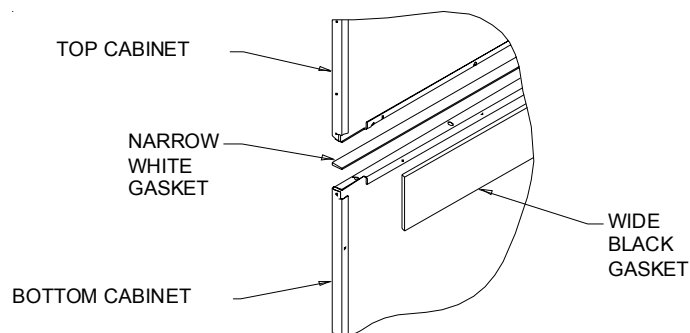


Figure 1
Gasket Placement

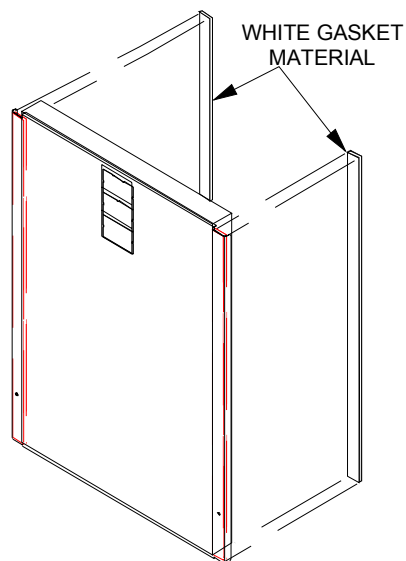


Figure 2

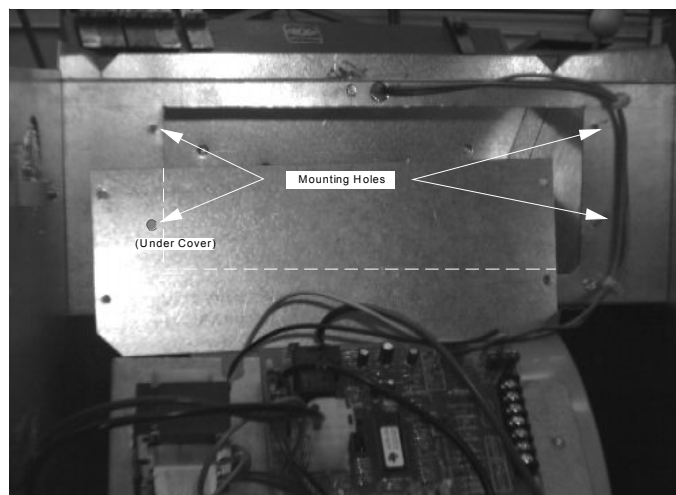


Figure 3
Electric Heat Filler Plate

Installation Instructions

Upflow Installation

For upflow installations, the blower cabinet must sit on top of the coil cabinet (Figure 4). **NOTE:** All panels should be in place before installing the cabinet.

1. Place the blower and coil cabinet assembly upright on the return duct or duct opening. Ensure that there is ample support for the cabinet assembly and all attached ductwork.
2. Connect refrigerant and condensate drain connections per the evaporator coil installation instructions. Ensure refrigerant and drain lines do not interfere with service access to the unit.
3. Attach supply ductwork. Seal connections between unit and ductwork as required to reduce/eliminate air leakage.
4. Make electrical connections as specified in “Electrical” section of this manual.

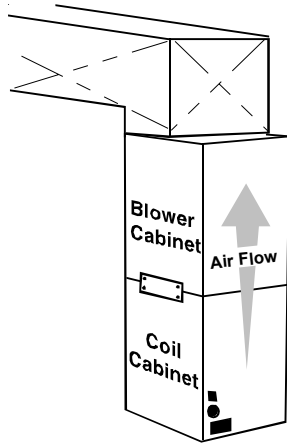


Figure 4
Upflow Application

Counterflow Installation

For counterflow installations, the evaporator coil cabinet must sit on top of the blower cabinet (Figure 5). **NOTE:** All panels should be in place when installing the unit.

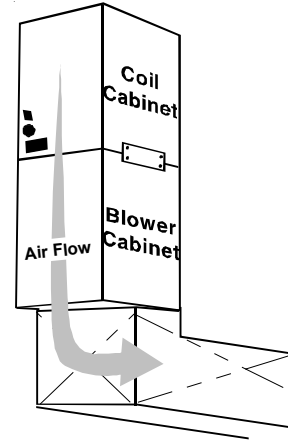


Figure 5
Counterflow Application

NOTE: Supply ductwork for counterflow applications, must be Class I. However, if combustible ductwork is used, sheet metal protection is required.

1. Place the blower and coil cabinet assembly supply outlet on the supply duct or duct opening. Ensure there is ample support for the unit and all attached ductwork.

BBC Only

Loosen motor mount and rotate motor (See Figure 6). Be sure motor is oriented with the female connections on the casing pointing down. If the motor is not oriented with the connections pointing down, water will collect in the motor and cause premature failure.

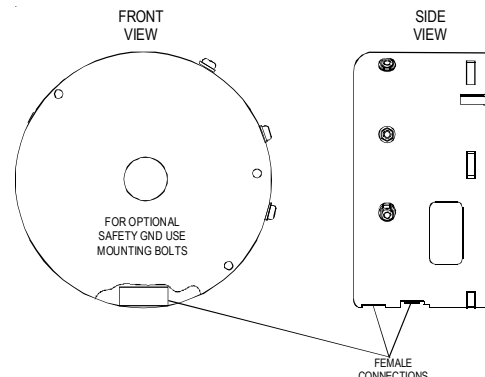


Figure 6
BBC Motor Orientation

Installation Instructions

2. Connect refrigerant and condensate drain connections per the evaporator coil installation instructions. Ensure refrigerant and drain lines do not interfere with service access to the unit.
3. Attach return ductwork. Seal connections between unit and ductwork as required to reduce/eliminate air leakage.
4. Make electrical connections as specified in "Electrical" section of this manual.

Horizontal Installation

For horizontal installations, the coil cabinet must be upstream of the blower cabinet (Figure 7 and 8).

1. Set the unit near its final installation place. The unit must be supported along the entire length of the unit (Figure 7 and 8). Rubber isolation pads may be used to reduce sound and vibration transmission. All panels should be in place when installing the unit. Ensure there is ample support for the unit and all attached ductwork.
2. Verify that there is an air gap between the motor and insulation. If not, adjust motor position.
3. If installed above a finished ceiling or living space, be sure to put a secondary drain pan under the entire unit, and pipe the drain separately from the main condensate drain.
4. Connect refrigerant and condensate drain connections per the coil section installation instructions. Ensure refrigerant and drain lines do not interfere with service access to the unit.
5. Attach return and supply ductwork. Seal connections.
6. Make electrical connections as specified in "Electrical" section of this manual.

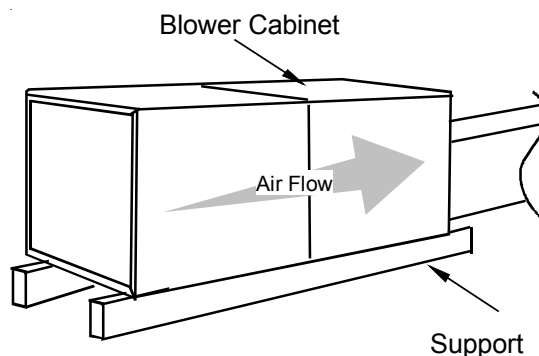


Figure 7
Horizontal Flow Application
Attic Installation

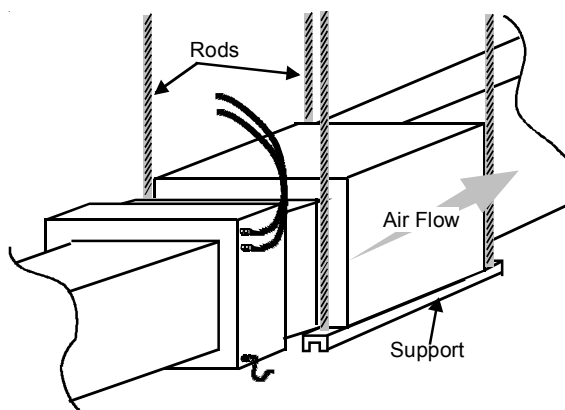


Figure 8
Horizontal Flow Application
Hanging Installation

Electrical Connections

Consult the local power company and local codes before installing this unit. All wiring must be in accordance with the National Electrical Code as well as all local codes. Knockouts have been provided on side and top of the cabinet for the installation of the electrical conduit. Use Minimum Circuit Ampacity and type of wire to determine proper wire size. The unit **MUST** be properly grounded. A ground lug is provided in the unit.

Check all factory connections before connecting electrical power to unit to ensure none were loosened or disconnected during shipping and handling.



WARNING

Shock Hazard!

Disconnect all electrical power before electrically connecting or servicing the unit. Failure to disconnect the electrical power before working on this product can create a hazard leading to personal injury and/or death.



WARNING

Fire Hazard!

Copper conductors **MUST** be used when wiring this unit. Failure to use copper conductors can create a hazard leading to personal injury and/or death.



WARNING

Shock Hazard!

To avoid the risk of electric shock or death, wiring to the unit must be properly grounded. Failure to properly ground the unit can result in a hazard leading to personal injury and/or death.



WARNING

Protect the unit with a disconnect switch to provide the overcurrent protection as shown on the unit nameplate.

Electrical Connections

High Voltage Wiring

If heater kits have been or are to be installed, see the heater kit installation instructions for line voltage wiring instructions.

If heater kits will not be installed, remove the proper size knockout for the electrical conduit connection. Connect electrical conduit to the unit using two washers to make an approved connection.

The power supply wires must be connected to the red and black power wiring. Two wire nuts are provided in the bag assembly for this connection. Wrap the wire nuts with electrical tape. (Insulated crimp type connectors, field supplied, may be substituted for the wire nuts and electrical tape provided proper size connectors are used.) A ground wire **MUST** be connected to the ground lug on the left side of unit.

Low Voltage Wiring

Knockouts are also provided for low voltage wiring on the unit. A rubber grommet is provided in the bag assembly. Remove the proper knockout, install the rubber grommet and route low voltage thermostat wire (18 AWG minimum) directly to the control board. Make connections to the screw terminal strip on the control board per the appropriate low voltage wiring diagram (*see following pages*).

Miscellaneous Electrical

The unit transformer is factory connected for 230 V operation. If unit is to operate on 208 V, switch the transformer orange wire from control board L1 terminal with the transformer red wire from control board UNUSED terminal.

When using a field-installed electric heater, the wiring diagram on the blower housing must be changed. With a BBA model blower, find the appropriate wiring diagram that is shipped with the heater and place over the existing wiring diagram. With a BBC model blower, find the appropriate wiring diagram that is shipped with the blower and place over the existing wiring diagram. NOTE: The appropriate wiring diagram for the BBC blower is determined both by the heater used, and whether or not the unit is set up with a two-speed outdoor unit.

HEAT PUMP MINIMUM SUPPLY SELECTION

For heat pump applications, the minimum supply temperature selection can be either made on the blower control board, or left at the factory set point temperature of 90°F. The blower control board locks out electric heat usage when the heat pump supply temperature is higher than the selected minimum.

Electrical Connections

The minimum supply temperature is selected in the same way that an outdoor thermostat set point is selected – by using the balance point of the system. Using Table 1, find the appropriate outdoor thermostat set point in the left column. Moving to the right, find the recommended minimum supply temperature for either normal or high static applications. **If not using an outdoor thermostat, select the 100°F minimum supply temperature.**

Outdoor Thermostat Set Point (°F)	Minimum Supply Normal Static Applications (°F)	Minimum Supply High Static Applications (°F)
15	85	90
25	90	95
35	95	100
45	100	100

Table 1
Minimum Supply Temperature

NOTE: Minimum supply temperature is used for heat pump applications only. The control locks out electric heat usage when the heat pump is supplying higher than the selected temperature.

BBA LED CONTROL OPERATION NUMBERS

NOTE: Power reset the unit after correcting the problem.

1. Control Board Malfunction

Check all field and factory connections. Power reset. If the problem still exists, replace the control board.

2. Thermistor and/or Board Error

Check the resistance between the thermistor termination leads at the control board. At 70°F the thermistor resistance should be 40 kilo ohms. (as temperature increases, resistance decreases). If out of range, replace the thermistor. Otherwise, replace the control board.

3. Thermistor Error

Check resistance between the thermistor termination leads at the control board. If failures such as opens, shorts across the device, shorts to ground, shorts to power and leakage path to ground are sensed, replace the thermistor or thermistor wires.

4. System Error

Check setup and configuration of the system. Check for restricted inlets, blocked outlets, or leaks in the unit or ductwork.

5. Normal Operation

This is the normal operating mode. No adjustments are required.

Low Voltage Wiring Connections

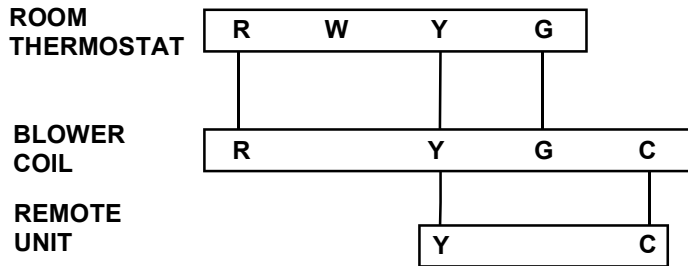


WARNING

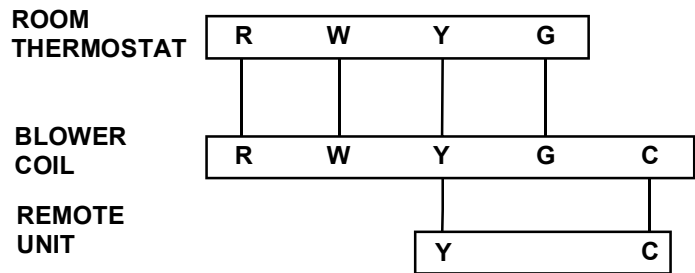
To avoid personal injury, electrical shock, or death, disconnect electrical power before working on this product.

BBA Models Only

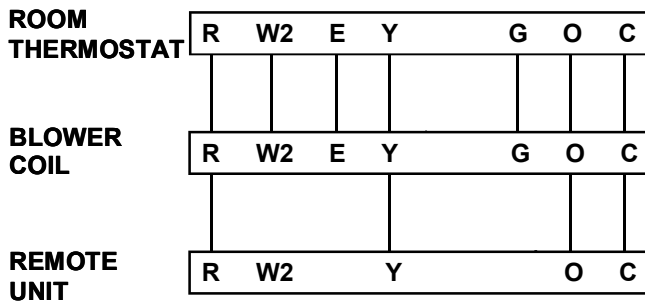
Cooling Only - Single Stage Cool without Electric Heat



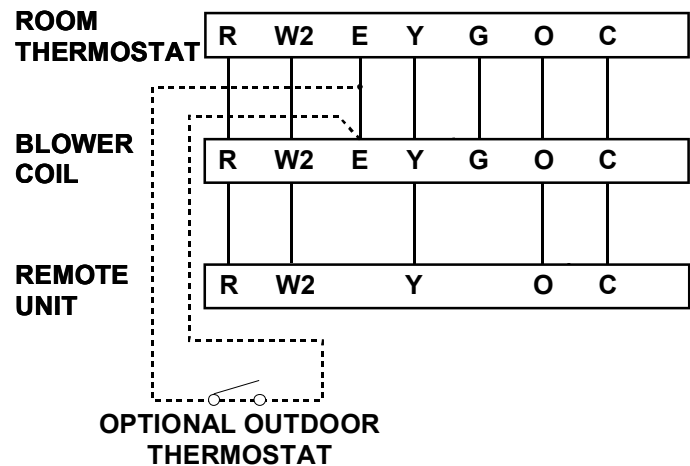
Cooling Only - Single Stage Cool with Electric Heat



Heat Pump - Single Stage Cool without Electric Heat



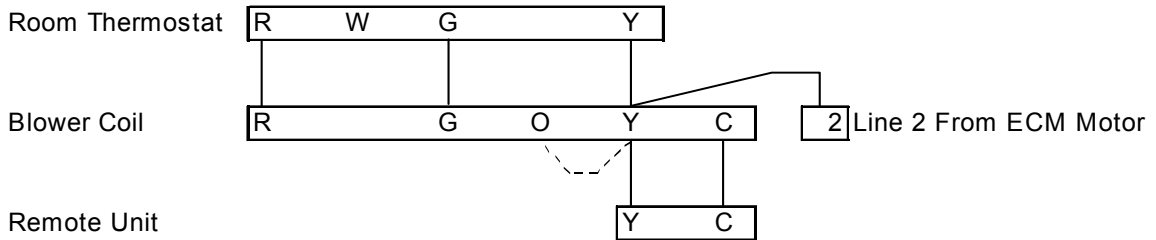
Heat Pump - Single Stage Cool with Electric Heat



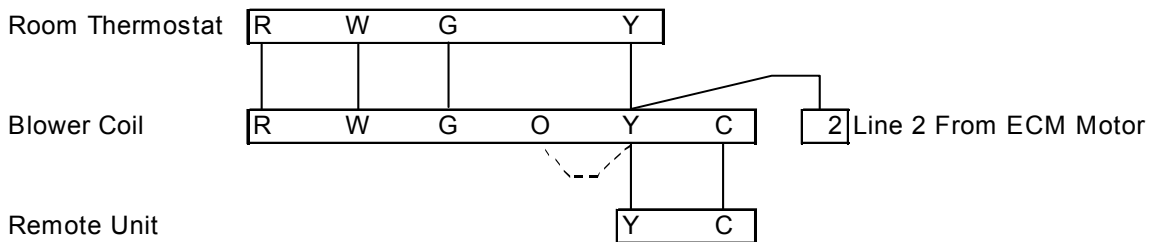
Low Voltage Wiring Connections

BBC Models Only

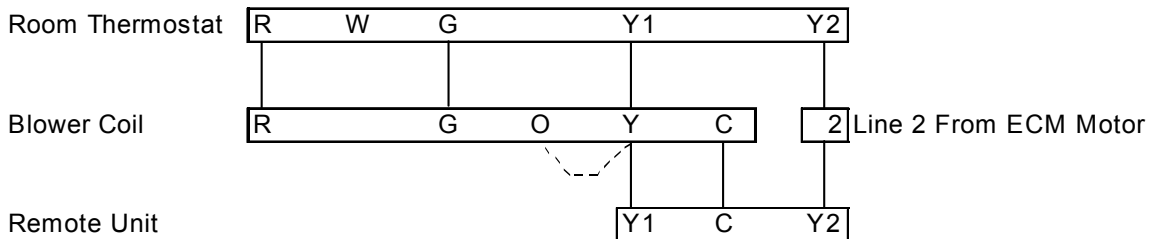
Cooling Only - Single Stage Cool without Electric Heat



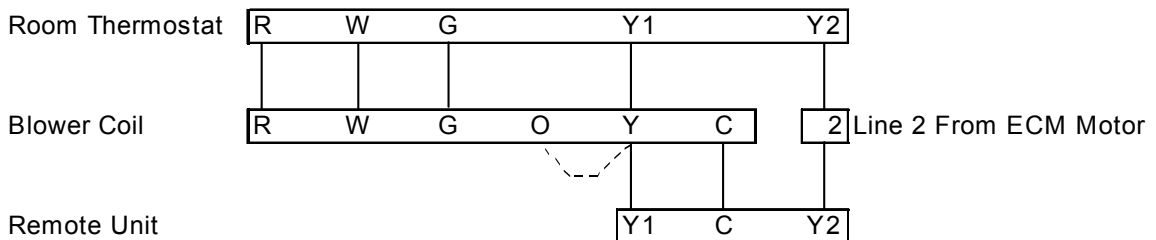
Cooling Only - Single Stage Cool with Electric Heat



Cooling Only - Two Stage Cool without Electric Heat



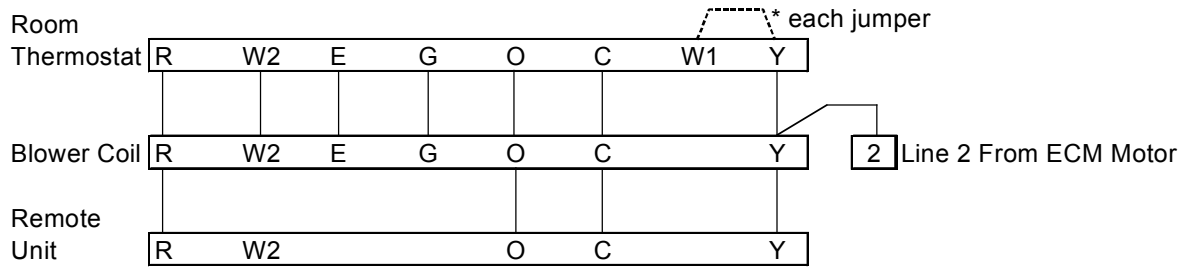
Cooling Only - Two Stage Cool with Electric Heat



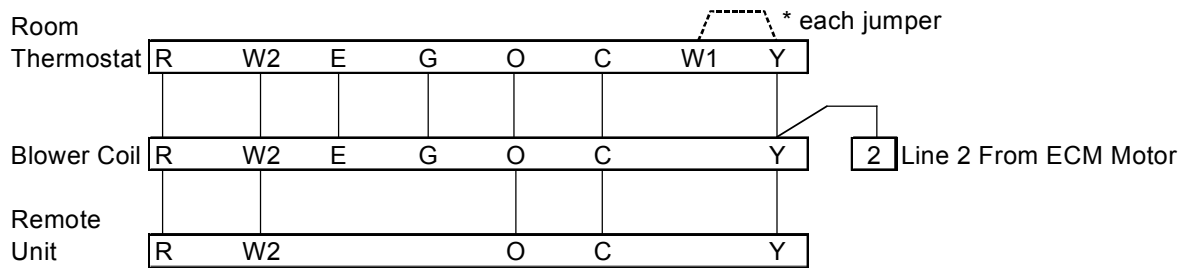
Low Voltage Wiring Connections

BBC Models Only

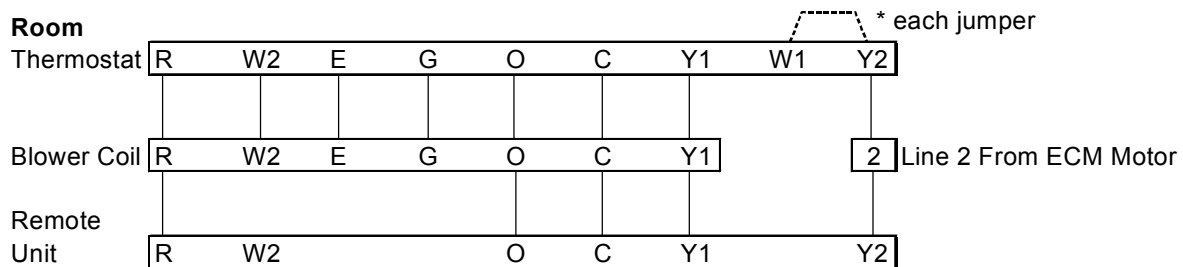
Heat Pump - Single Stage Cool without Electric Heat



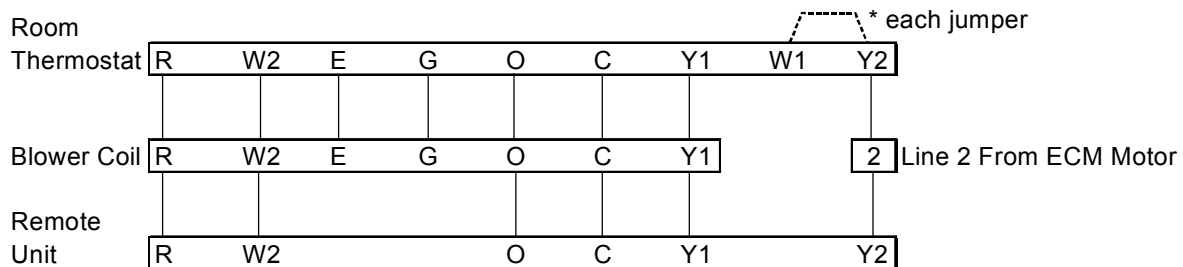
Heat Pump - Single Stage Cool with Electric Heat



Heat Pump - Two Stage Cool without Electric Heat



Heat Pump - Two Stage Cool with Electric Heat



Approved Thermostats are:

(HEAT PUMP)

1213403
1213404
1213405
1213406 (2 stage cool)
1213412 (2 stage cool)

(COOLING ONLY)

1213402
1213401
M0380101
1213408
1213411 (2 stage cool)

*Jumper is necessary only when required by the thermostat. See thermostat instructions for details.

Thermostats shown with required connections only. Thermostats may have other terminals not shown in diagrams.

Electrical Connections

Speed Tap Selection

BBA BLOWER CABINETS

Refer to the BBA specification sheet to select the proper speed tap for system operation. This unit was shipped with high speed selected. If medium or low speed is required for normal operation, follow the steps below.

1. Remove the high speed tap (black motor wire) from terminal labeled "FAN" on the control board.
2. Move the desired tap (blue motor wire for medium speed, red motor wire for low speed) from the "UNUSED" terminal to the terminal labeled "FAN".
3. Replace the high speed tap wire on the vacated "UNUSED" terminal.

BBC BLOWER CABINETS

The appropriate speed tap selection must be made based on the outdoor section being used. Speed tap selections are made on the interface control located in the unit (Figure 9).

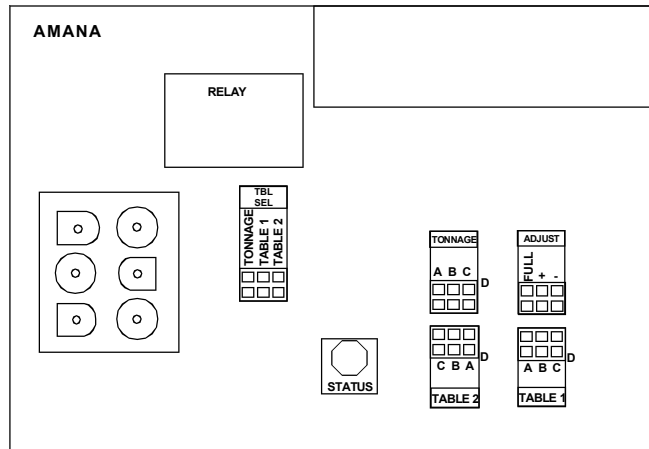


Figure 9
Interface Control

SPEED TAP SELECTION

Changing the position of the jumpers on the six-pin headers labeled "TONNAGE" and "TABLE 2" makes speed tap selection. Each position of the jumpers (A, B, C, or D) gives a different airflow, and the jumpers for "TONNAGE" and "TABLE 2" should always be set to the same letter setting. The possible jumper positions on the headers are shown in Figures 10 and 11.

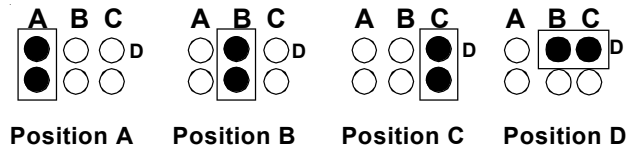


Figure 10
Tonnage Jumper Positions

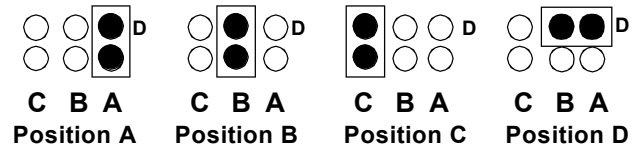


Figure 11
Table 2 Jumper Positions

BBC PIN POSITIONING

The following charts (Table B, C, and D) are located on the wiring diagram for the BBC models. The charts indicate the proper positioning of the jumper pins on the six-pin headers labeled "TONNAGE" and "TABLE 2" located on the control board.

Actual Tonnage Setting	Airflow Range (CFM)	Tonnage	Table 2
1 1/2	600	A B C ● ○ ○ D ● ○ ○	○ ○ ● D ○ ○ ● C B A
2	800	A B C ○ ● ○ D ○ ● ○	○ ● ○ D ○ ● ○ C B A
2 1/2	1000	A B C ○ ○ ● D ○ ○ ●	● ○ ○ D ● ○ ○ C B A
3	1200	A B C ○ ● ● D ○ ○ ○	○ ● ● D ○ ○ ○ C B A

Table B
BBC36A2A Pin Positioning (Tonnage)

Actual Tonnage Setting	Airflow Range (CFM)	Tonnage	Table 2
2 1/2	1000	A B C ● ○ ○ D ● ○ ○	○ ○ ● D ○ ○ ● C B A
3	1200	A B C ○ ● ○ D ○ ● ○	○ ● ○ D ○ ● ○ C B A
3 1/2	1400	A B C ○ ○ ● D ○ ○ ●	● ○ ○ D ● ○ ○ C B A
4	1600	A B C ○ ● ● D ○ ○ ○	○ ● ● D ○ ○ ○ C B A

Table C
BBC48A2A Pin Positioning (Tonnage)

Actual Tonnage Setting	Airflow Range (CFM)	Tonnage	Table 2
5	1800	A B C ● ○ ○ D ● ○ ○	○ ○ ● D ○ ○ ● C B A
4	1600	A B C ○ ● ○ D ○ ● ○	○ ● ○ D ○ ● ○ C B A
3 1/2	1400	A B C ○ ○ ● D ○ ○ ●	● ○ ○ D ● ○ ○ C B A
3	1200	A B C ○ ● ● D ○ ○ ○	○ ● ● D ○ ○ ○ C B A

Table D
BBC60A2A Pin Positioning (Tonnage)

Electrical Connections

Speed Tap Selection

NOTE: The two six-pin headers labeled “TABLE 1” and “TABLE SELECT” are not included in the charts. These headers are NOT to be adjusted in the field. The factory setting for these headers allow for proper operation. The TABLE SELECT jumper MUST remain on TONNAGE.

NOTE: For each individual position in the preceding charts, the blackened circles are to be connected by the jumper included on the header (Figure 12).

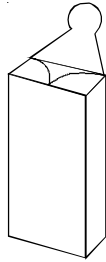


Figure 12
Jumper Connection

CONTINUOUS AIR OPTION (BBA ONLY)

If continuous air circulation is desired, the control board provides the option of a second airflow during the off cycle. To activate this feature, move the desired speed tap from the “UNUSED” terminal to the terminal labeled “FAN IDLE”. The blower will run at this speed when not in a heating or cooling mode.

BBA CONTROL BOARD OPERATION

The BBA control board has an LED indicator for operating status. The following table shows the codes that may be displayed by the LED.

Light Signal	Refer to BBA Control Board Operation Numbers
Continuous Light	1 Control Board Malfunction
2 Flashes	2 Thermistor and/or Board Error
4 Flashes	3 Thermistor Error
6 Flashes	4 System Error
Continuous Flashing	5 Normal Operation

Table 2

BBA/BBC CONTROL BOARD OPERATION

The BBA/BBC control board contains a relay that is operated based on inputs from the room thermostat and thermistor. The relay and therefore the blower is controlled per the following table.

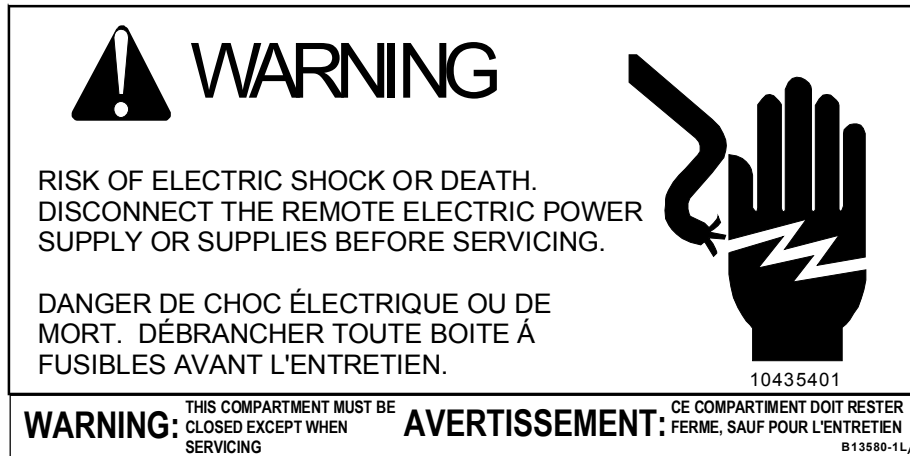
Input	Control Board Operation
"G" On	Relay energized instantly
"G" Off	Relay de-energized instantly
"Y" On	Relay energized instantly
"Y" Off/ "O" On	Relay de-energized after supply air rises above 65°F or 45 seconds, whichever is shorter
"Y" Off/ "O" Off	Relay de-energizes after supply air rises above 85°F or 45 seconds, whichever is shorter
Thermistor Error	Relay energized until thermistor operation is restored. Blower runs continuously
Supply Air > 170°	Relay energized until supply air is < 85°F
"W 2" or "E" On	Relay energized instantly
"W 2" or "E" Off	Relay de-energized instantly

Table 3

1. Turn ON the power supply to the unit.
2. Set the room thermostat fan switch to ON. The blower should come on. Refer to the blower specification sheet for the air volume delivery.
3. Check the amp draw of the indoor blower motor. It must not be more than the “ID MOTOR FLA” (Full Load Amps) as listed on the blower nameplate. If the amp draw is excessive, the external static pressure is too high. Locate the restriction or modify the ductwork and filters accordingly and repeat step 3.
4. If electric heaters are installed, change the room thermostat system switch to EMERGENCY HEAT or HEAT. Move the temperature setpoint well above room temperature. Wait until all heaters are energized (this may require a few minutes). Check the line voltage amp draw. It must not be more than the “Minimum Circuit Ampacity” as listed on the blower unit nameplate for the heater installed. If the amp draw is excessive, recheck the wiring and supply voltage.
5. Check the blower external static pressure to ensure that nameplate maximum E.S.P. is not being exceeded. Refer to the blower specification sheet for CFM versus E.S.P. table.

Safety Labels

NOTE: If safety labels are missing or illegible, contact the installing dealer for ordering information.



To obtain proper labels, the Model, Manufacturing Number and serial number of the unit must be supplied to the installing dealer or Amana brand Customer Service Department. For convenience, please record this information below.

Model Number: _____

Manufacturing Number: _____

Serial Number: _____