

Installation Instructions



454
SIZE 36
SERIES W

GAS-FIRED AIR CONDITIONER

bryant

39454D1
4/25/69

Installation of the Model 454 Gas Air Conditioning unit consists of the following steps:

- I. Locating and Mounting the Unit
- II. Connecting Chilled Water Lines
- III. Making Electrical Connections
- IV. Making Gas Connections
- V. Charging System with Water
- VI. Checking the Unit Operation
- VII. Adjusting Gas Input
- VIII. Balancing the System
- IX. Freezing Weather Protection

Each of the above steps is discussed in detail in this instruction. Read the entire instruction before starting the installation.

Multiple Chillers and Cooling Coils

When it is planned to connect two or more chillers or coils, additional piping and electrical information is required and should be obtained from your Bryant Distributor. When making multiple chiller installations, it is recommended that only 454 chillers be interconnected. The use of other model chillers with the 454 in a multiple system should be avoided.

Operation at Atmospheric Pressure

The chilled water tank on this unit is vented to the atmosphere; consequently, the chilled water circuit operates at or near atmospheric pressure.

Therefore, conventional piping practices for a closed, pressurized system do not apply for this unit.

NOTE: When the water chiller is piped to a boiler as described below, the indoor coil operates at or near atmospheric pressure when used for cooling; it may be pressurized when it is used with the boiler for heating.

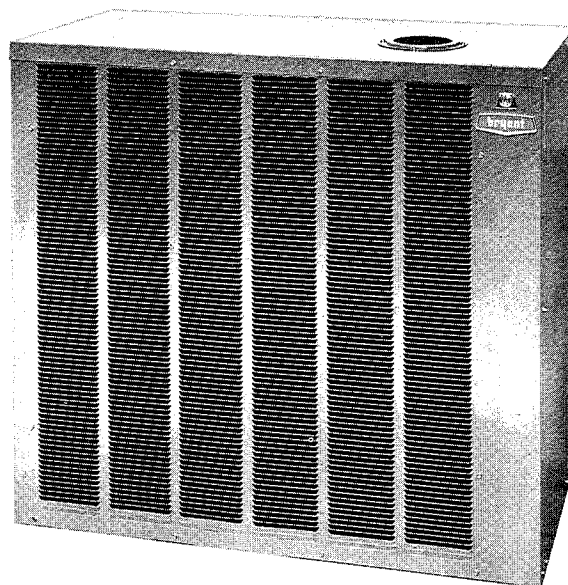


Figure 1 - Model 454 Gas Air Conditioner

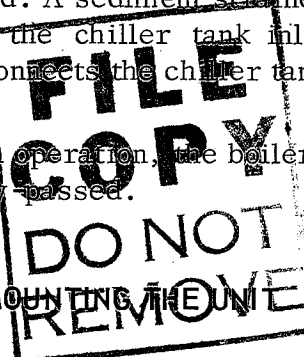
When this chiller is piped with a boiler to form a combination heating and cooling system, provisions must be made for a positive shut-off between the chiller tank and the boiler.

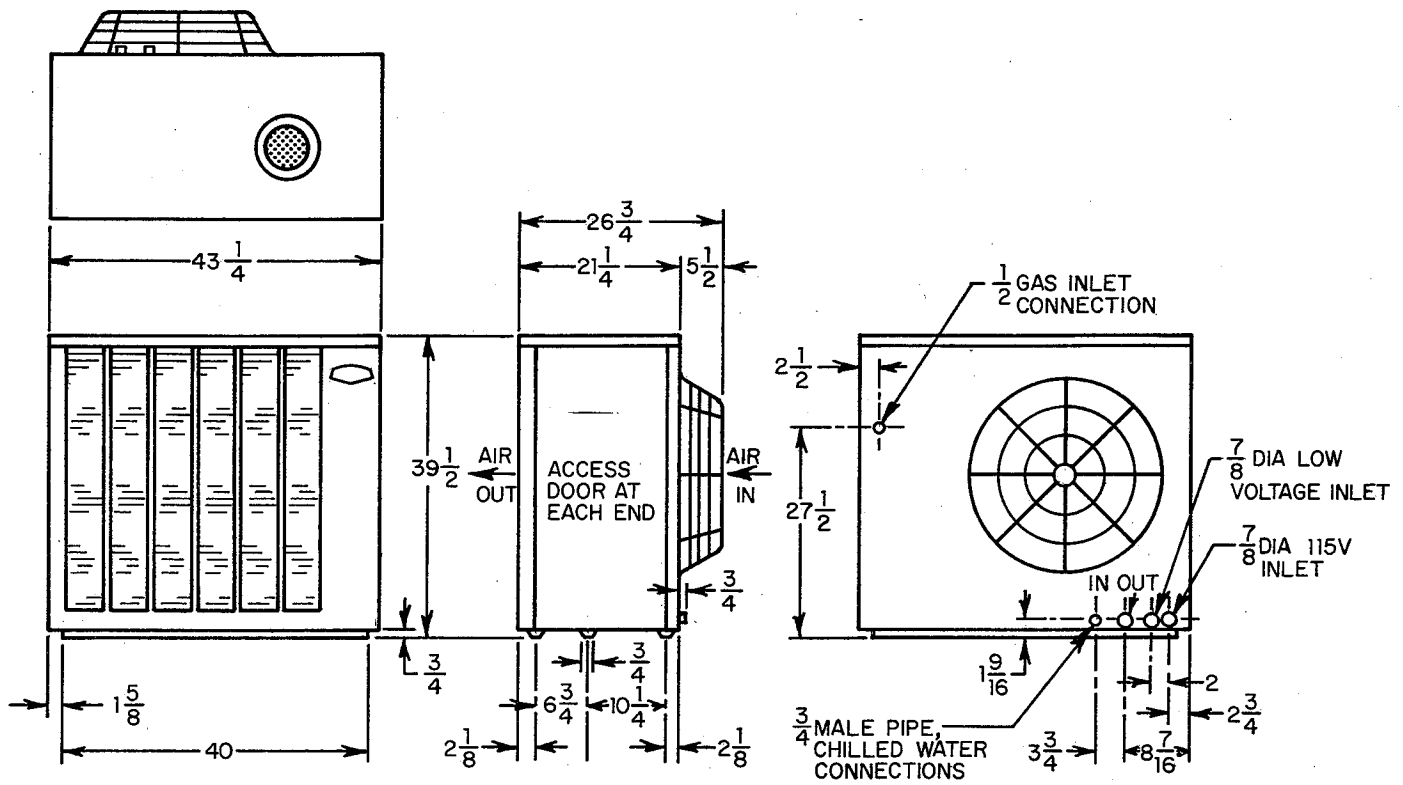
When the boiler is in operation, the chiller tank must be by-passed. A sediment strainer must be installed at the chiller tank inlet when a common pipe connects the chiller tank and boiler.

When the chiller is in operation, the boiler, of course, should be by-passed.

I. LOCATING AND MOUNTING THE UNIT

The unit is designed for outdoor installation. It may be located at ground level or on a roof. Consult local or other applicable codes for information concerning proximity to property lines, height above roof, obstructions, etc.





Mounting Base

The unit is supported on 3 rails attached to the bottom of the base. These rails extend the full width of the unit as shown in the dimensional drawing on page 2.

The recommended types of mounting bases for all installations are:

a. Precast concrete lintels.

Use three lintels run the depth of the unit; one each under the right and left end and one at the center of the unit.

b. Concrete blocks.

Use a block under each corner plus a block under each of the two long sides midway between the corner blocks. Arrange the blocks so that the center rail as well as the front and back rail is supported.

c. Concrete slab.

Minimum thickness 4 inches.

CAUTION: ALWAYS USE NON-COMBUSTIBLE MATERIAL FOR THE BASE.

Clearances

The condenser coil is located at the front of the unit with the condenser air inlet through the rear fan opening and the discharge through the louvered front panel.

The minimum clearance between the back of the unit and a wall is 15 inches. If the overhang is less than 7 feet above the unit, the unit must be mounted outside a plumb line from the eaves of the overhang. The clearance on the right and left ends should be a minimum of 2 feet to provide access for servicing.

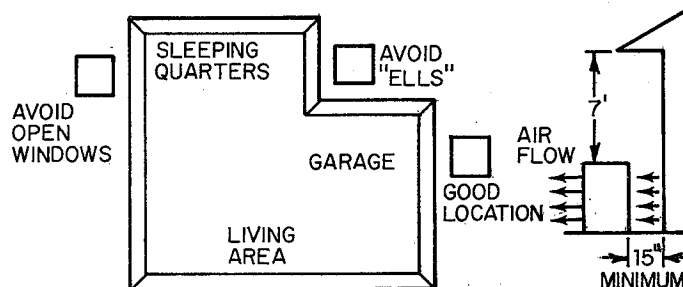


Figure 2 - Locating the Unit

II. CONNECTING CHILLED WATER LINES

Refer to the following information: "Multiple Chillers and Cooling Coils", page 1; "Operation at Atmospheric Pressure," page 1; and "Cold Weather Protection," page 8.

TABLE I

Nominal Pipe Size Inches	Allowable Distance* between Coil Models 404, 405, 406, 407, 408 and Chiller			
	Polyethylene Pipe	Bryant Quick Connect Plastic Hose	Copper Pipe	Galvanized Pipe
	Size 36	Size 36	Size 36	Size 36
3/4	65 ft	45 ft	67 ft	87 ft
1	280 ft		260 ft	304 ft

* **Note:** Values shown in the above table are for one direction only, and using Bryant water coils. Total length of pipe, from chiller to coil and return, would be double the values shown. Values apply to single unit installations only. All distances shown are calculated on the predication that only long elbows are used. Galvanized well head elbows are used with the polyethylene pipe. When using plastic hose, avoid any sharp bends that would tend to restrict or stop the flow of water.

Materials

1. Chilled Water Piping
 - a. Use Bryant quick connect plastic hose.
 - b. Polyethylene pipe - satisfactory substitute; use medium density flexible pipe whose wall thickness approximates Schedule 40 pipe (Commercial Standard CS 255-63). Pipe must be made from virgin material. Do not use pipe manufactured from re-claimed material.
 - c. Copper - satisfactory substitute.
 - d. Brass - satisfactory substitute.
2. Fittings
 - a. Galvanized - use when possible.
 - b. Brass - satisfactory substitute.

Pipe Length and Diameter

Table I shows the maximum length of pipe of different diameters that can be used between the pump discharge and the coil inlet and still maintain minimum allowable (design) water flow rate.

1. Multiply table values by two to obtain the total length of pipe from chiller to coil and return.
2. Length is measured along the pipe path and therefore includes vertical distance between the water coil and the chiller.
3. Lengths shown in Table I are based on using a total of eight well head fittings in the entire water line (chiller to coil and return). Lengths are predicated on the use of a Bryant matching water coil. For greater distances use larger size pipe.
4. For calculating chilled water pipe size for coils not listed use friction loss method with allowance for coil pressure loss. Refer to coil instructions for pressure loss at design water flow rate. Refer to Table II showing available head with standard pump drive. For additional pump head consult your Bryant Distributor.

Insulation

1. Insulate both supply and return lines.
2. Material should be of good quality and be covered with a good vapor barrier. Armaflex or equivalent is recommended. Use 1/2-inch wall thickness. (Plastic hose is pre-insulated.)

WATER FLOW RATE AT VARIOUS EXTERNAL PRESSURES

Table II - Model 36-454

Water Flow Rate GPM	Pressure External to Unit Ft Water Std RPM
2.0	25.9
3.0	25.5
4.0	25.0
5.0	24.5
6.0	23.8
7.0	23.0
7.5	22.5
8.0	22.0
9.0	21.0
10.0	19.7
11.0	18.6

Height of Coil above Unit

For the Model 36-454 the maximum vertical distance from chiller to top of coil is 21 feet. For greater heights an adjustable water pump pulley kit is available, Part No. 65070D01.

Water Coil Connections

1. If the cooling coil is used in connection with a heating unit and the heating unit is not approved for installation downstream from the cooling coil, install the cooling coil in parallel with or downstream from the heating unit. This will avoid condensation in the heating unit. If the coil and heating unit are installed in parallel, the dampers or other means used to control flow of air should be adequate to prevent chilled air from entering the heating unit; if manually operated, the dampers shall be equipped with some means to prevent operation of either unit unless the dampers are in full heat or full cool position.
2. If the coil is located in a warm air stream, do not connect polyethylene pipe directly to the coil. Connect a minimum of 24 inches of copper or galvanized pipe to both the coil inlet and outlet; then connect the polyethylene pipe to these nipples. Note: not required when using Bryant quick connect plastic hose.
3. On installations where the water in the outside piping freezes and the coil is in a heated air stream, precautions must be taken to provide for water expansion. The connecting polyethylene pipe acts as an expansion vessel if there is sufficient footage in the

heated space (space not subject to freezing). The following Table III shows the minimum lengths (total inlet and outlet) of polyethylene piping of various diameters that are required to provide adequate expansion volume.

TABLE III

Nominal Pipe Size Inches	Length of Polyethylene Pipe in Feet
	Size 36
3/4	24
1	15

If the total polyethylene chilled water line footage in the heated space is not as long as the minimum values shown in the table, tee a vertical pipe of sufficient volume into either of the coil connections to provide for expansion, or drain the lines during freezing weather, (see GAC-YAC #1-100 pages).

Note: No minimum run required when using Bryant quick connect plastic hose.

III. MAKING ELECTRICAL CONNECTIONS

1. Make all electrical connections in accordance with the National Electrical Code and any local ordinances or codes that might apply.
2. Provide a separate power supply for the air conditioner.
3. Provide a fused disconnect switch within sight of and not more than 50 feet from the unit. A 30 amp standard fuse or a 15 amp Fusetron is suggested.

Use minimum wire of #14 copper wire or #12 aluminum wire. The 115V power supply connects into the control box located inside the service panel on the right side of the unit. The conduit enters through a knockout located in the rear of the unit and attaches to the opening in the bottom of the control box. The

low voltage (24V) wires from the thermostat control are connected to the low voltage terminal block in the control box.

Low Voltage Power Supply

Transformer - The air conditioner is not equipped with a transformer. However, when a Bryant furnace is used as the air handler the furnace transformer may be utilized as the power supply for the low voltage control circuit in the 454.

If other than a Bryant furnace is used, you must use Bryant part number:

64805D01 115 volt 24 V

The transformer listed is available as an accessory.

Length of Low Voltage Wire - If the length of the wire run between the transformer and the R terminal on the air conditioner exceeds 70 feet it will be necessary to remove the resistor from the low voltage circuit of the air conditioner as follows:

1. Remove the wire running from the resistor to "R" on the 454 terminal block.
2. Disconnect the pilot wire at the resistor and connect this wire to "R" on the terminal block.

IV. MAKING GAS CONNECTIONS

The following recommendations apply to the installation, tests and operation of appliances and piping systems for natural and propane gases:

1. Before making any gas connections, refer to the regulations of the serving gas supplier and the local building, heating, plumbing or other codes in effect in the area in which the installation is made.

2. The gas supply pipe enters the unit through a knockout located in the rear of the unit near the left side. This unit requires one nipple that is threaded into the 1/2-inch combination regulator-shutoff valve, see Figure 3.

3. A wrench-type shutoff valve should be installed in the gas line within sight of, and convenient to the unit.

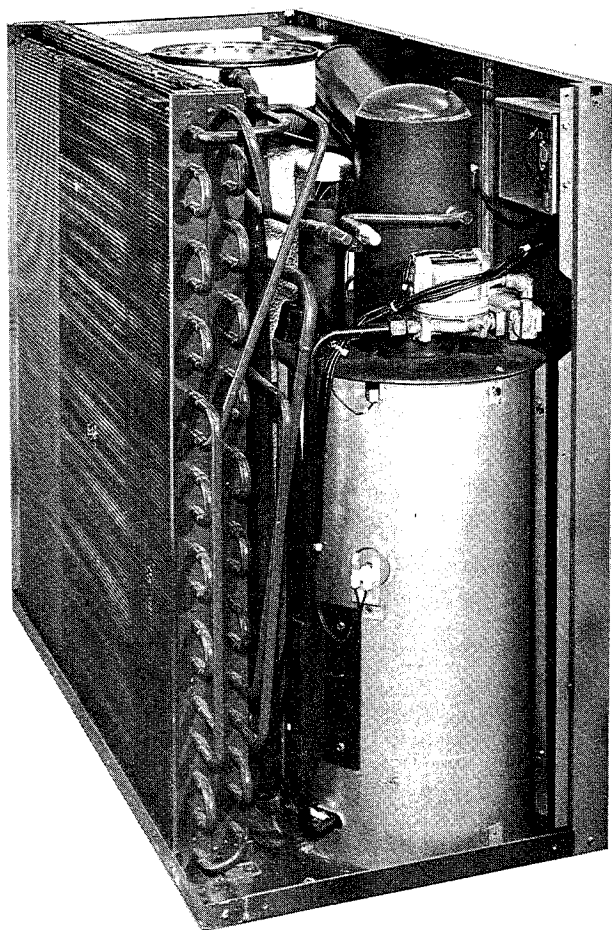


Figure 3 - Gas Connections

4. Joint compound (pipe dope) which is resistant to the action of liquefied petroleum gases should be applied sparingly and only to the male threads of the joints.

5. Install a drip leg trap in the gas supply riser leading to the unit. After gas pipe connections have been made, purge the lines, as described below, and check for leakage. Use a soap and water or other recommended solution.

6. Never use matches, candles, flame or other source of ignition to check for leaks.

Pilot

Light the pilot, using the procedure outlined on the unit rating plate. However, when lighting the pilot for the first time, perform the following additional steps:

1. If the supply line was not purged prior to connecting the unit, it will be full of air. Since it would take a long time to vent this air through the small pilot port, it is recommended that the pilot supply line be disconnected at the pilot shutoff valve and the supply line be allowed to purge until the odor of gas is detected. Never purge gas lines into the combustion chamber. Immediately upon detection of gas odor, reconnect the pilot supply tube. Allow 5 minutes to elapse and light the pilot in accordance with the instructions on the lighting plate.

2. The pilot flame should be soft blue in color.

a. For natural gas this flame should be of sufficient length to provide good impingement on the unimetal of the Bryant pilot. The flame should extend upward and above main burner ports.

3. If the pilot flame does not have the appearance described above, it may be adjusted at the manual pilot shutoff valve.

a. The valve is equipped with an adjustable screw. Turn the handle to the full open position, and remove the screw cap to expose the adjustable screw. Turn adjusting screw until flame has the desired appearance.

b. Replace screw cap.

V. CHARGING THE SYSTEM WITH WATER

Cautions:

1. Do not run the pump dry.

2. Do not operate the pump when the chiller or chilled water lines are frozen. Freezing temperatures, however, will not damage the pump.

3. The gas valve on the unit should be closed when operating the unit during the following procedures.

Charge the system with water as follows:

1. Remove the top casing and remove the cover from the chilled water tank, see Figure 4.
2. Add tap water until the distributor pan is covered. A garden hose is useful for this operation.
3. Start unit (be sure gas is turned off). Continue to add water until the system is primed and the water is returning to the chiller tank.
4. Check water piping for leaks throughout the chilled water system.
5. On the Model 36-454 remove the left side access panel from unit and remove operating level drain plug on the side of the chiller tank.
6. The pump should still be running. When water ceases to flow from the drain opening, replace the drain plug.
7. With the water still circulating, add the bag of chilled water additive by spreading additive over the distributor pan. The additive is sufficient for chilled water systems containing up to 9 gallons of water. For systems larger than 9 gallon capacity, add 1/2 package of additive for each 4-1/2 gallon water capacity or fraction thereof. To estimate chilled water capacity of system, refer to Table ~~II~~ IV.
8. Replace chiller tank cover.

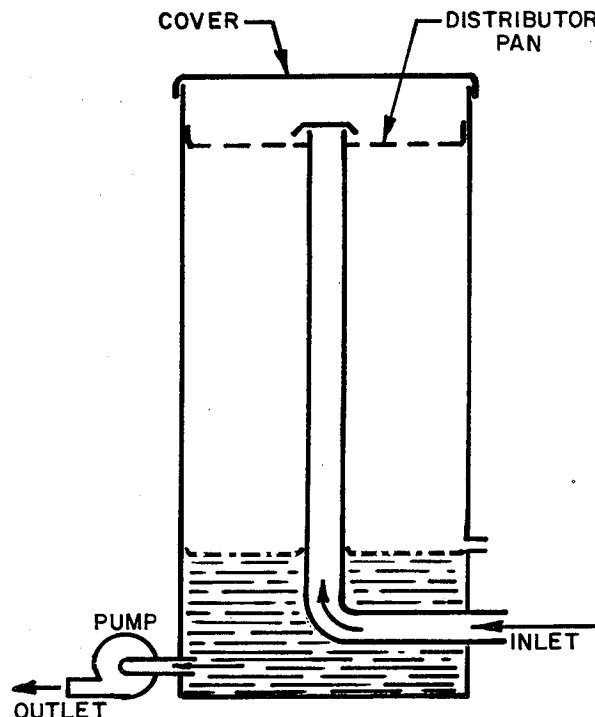


Figure 4 - Chiller Tank

TABLE IV

	Water Capacity Gallons
36-454 Chiller	3.8 2.3
Bryant 1-1/2 ton coil6
Bryant 3 ton coil	1
1 ft 3/4-inch pipe03
1 ft 1-inch pipe05

VI. CHECKING THE UNIT OPERATION

1. Be sure combination gas valve is off. Light pilot as described on instruction plate.
2. Set thermostat to "cool"; set thermostat fan switch to "auto"; set thermostat below room temperature.
3. Turn on main electric switch to unit.
4. Check indoor fan operation by turning thermostat fan switch to "on" for continuous operation. Move thermostat above room temperature and observe that the indoor fan remains on.
5. To place the system in operation, open the main manual gas valve, replace all panels, and set the thermostat at the desired temperature.

High Temperature Cut-Off

The high temperature circuit includes a high temperature control located on the side of the generator plus a high temperature lockout (circuit breaker) located in the control box. If the generator becomes overheated, the contacts in the high temp control open, causing the circuit breaker to go into lockout position. The gas valve closes, the fan and pumps stop and they will not recycle until the circuit breaker is reset. To reset the circuit breaker, push the red button extending through the bottom of the control box. Be sure to locate and correct the cause of the high temp cut-out.

Cycle of Operation

The 36-454 is equipped with a fan/pump motor control (Bryant Model 821), an auxiliary SPST relay and a sail switch. The fan/pump motor control is a single pole, single throw low voltage switch actuated by a heat motor (low voltage electric resistance coil fastened to mono-metal strip next to the switch). When the thermostat calls for cooling, electric current energizes the resistance coil in the Model 821 control and in approximately one minute the low voltage switch closes, energizing the auxiliary relay which starts the condenser fan motor and solution pump-water pump motor. The opening of the gas valve will be delayed slightly until the condenser fan is moving a sufficient amount of air through the unit to activate the sail switch.

On shutdown by the thermostat, the gas valve will close immediately; however, the balance of the unit will continue to run for approximately 3 minutes until the low voltage switch in the Model 821 control opens.

VII. ADJUST GAS INPUT

The gas input must be checked and adjusted if necessary to agree with the input shown on the unit's rating plate.

The natural gas units are equipped with adjustable gas pressure regulators set at factory for 4.2 inches w.c. manifold pressure.

Check natural gas units by the following method:

1. Measure gas at meter. Be sure all other gas appliances are turned off. Increase or decrease input to burners by adjusting the gas pressure regulator.

Caution: The unit may be run for short periods with the panel removed. Prolonged operation with panels removed should not be attempted.

VIII. BALANCING THE SYSTEM

After the unit is in operation and the input has been measured and adjusted to agree with the rating plate requirements, the system must be balanced.

Any approved method of checking the air flow over the water coil may be utilized. Refer to the Bryant Service Manual on Gas Air Conditioners for a review of standard methods.

IX. FREEZING WEATHER PROTECTION

Gas Air Conditioner

The unit has built-in freeze protection sufficient to protect the chiller and pump.

Chilled Water Pipes

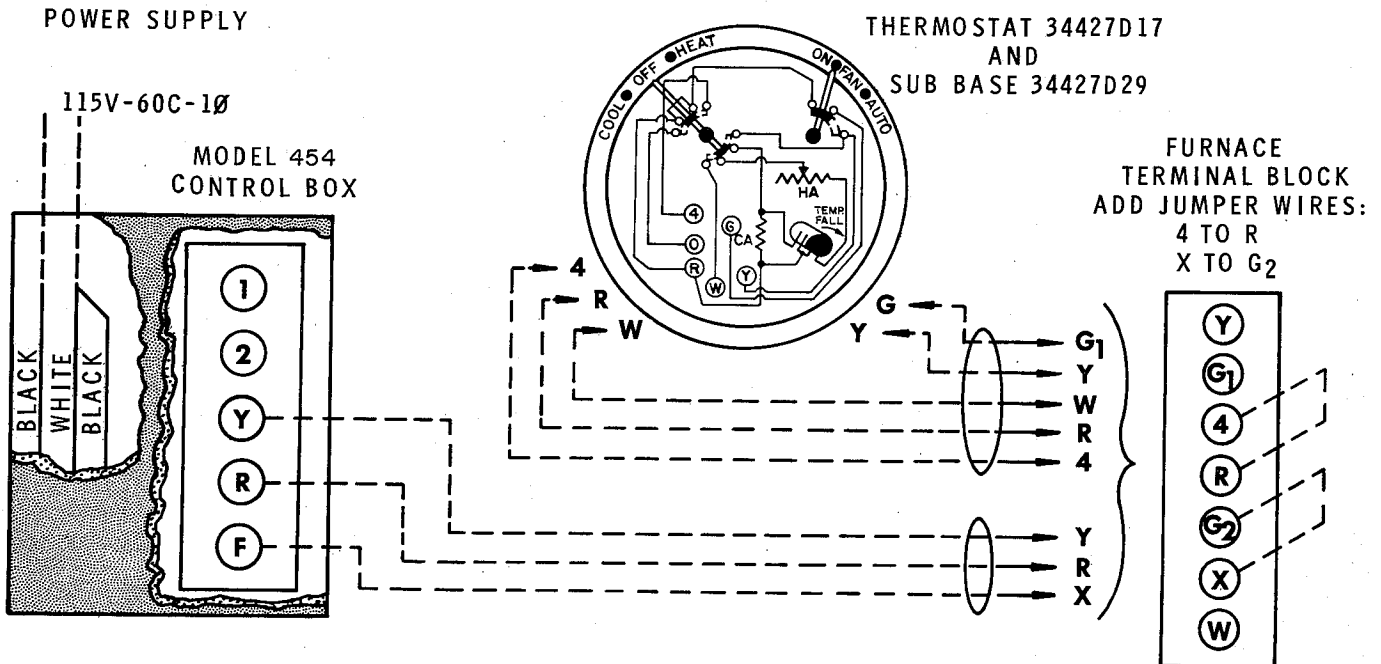
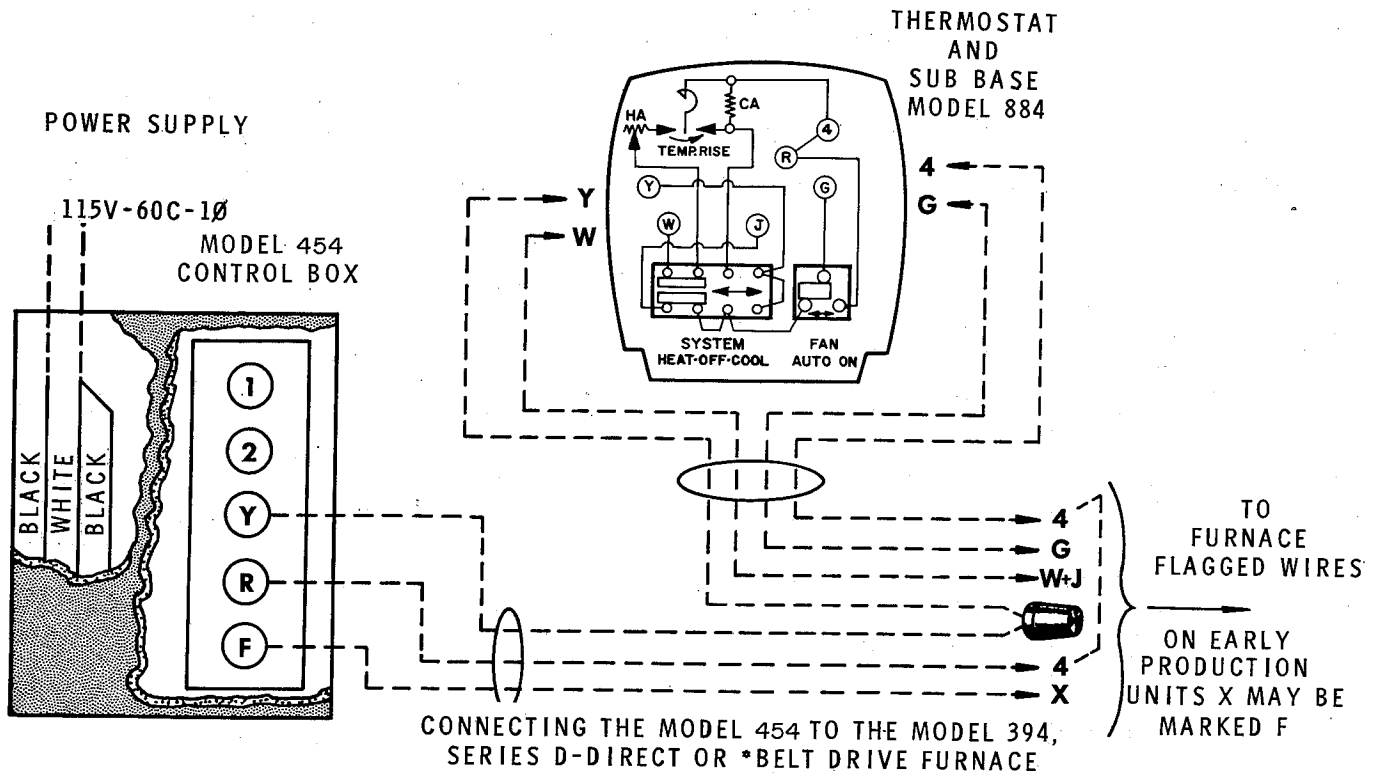
If hard pipe (non-plastic) is used for the chilled water lines, it will be necessary to drain the lines or add antifreeze. The recommended antifreeze is Zerex. The chilled water additive must be used in the same proportion as indicated in Section V when antifreeze treatment is required.

Chilled Water Coil

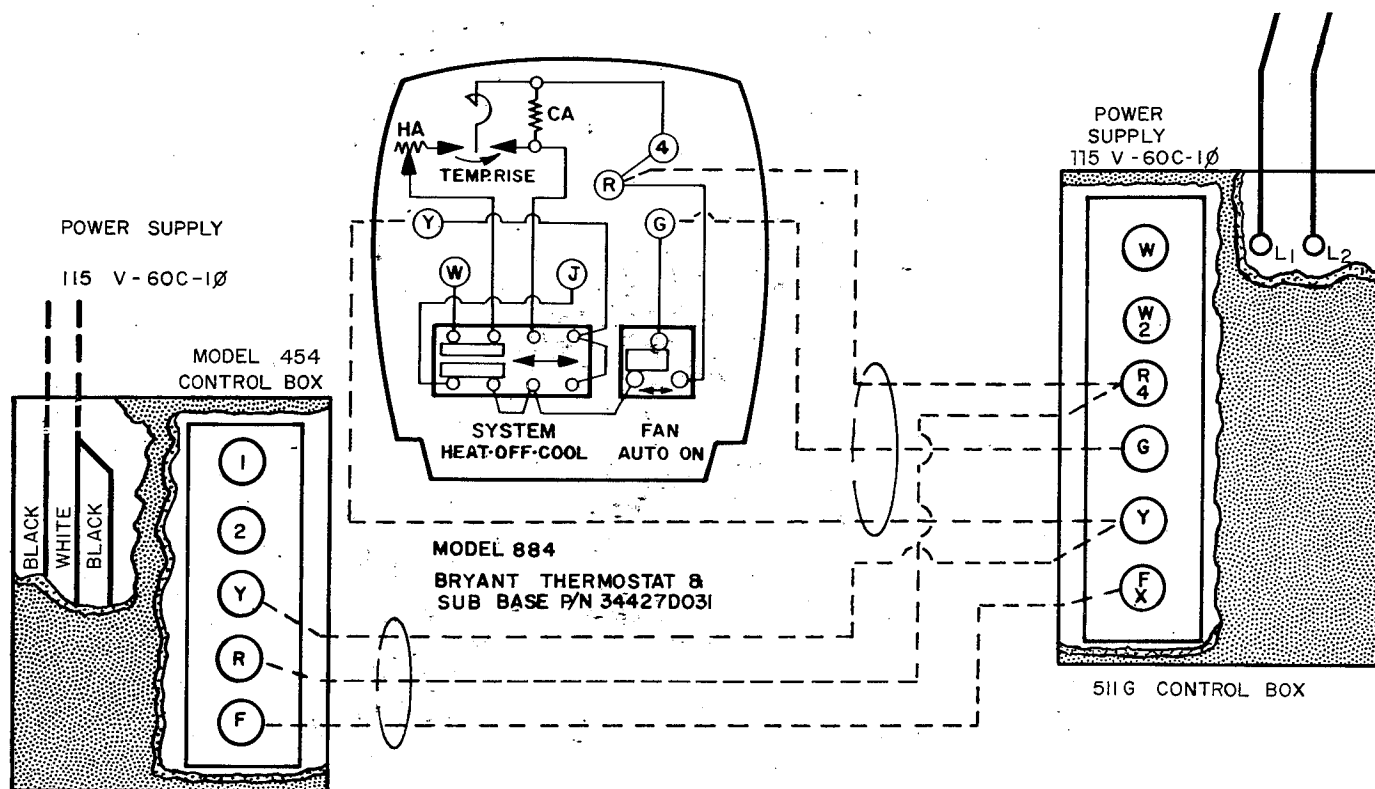
Chilled water coils cannot be completely drained; therefore, if the water coil is subject to freezing temperatures, protect it by adding antifreeze. The chilled water additive must be used in the same proportion as indicated in Section V when antifreeze treatment is required.

Operation at Freezing Temperatures

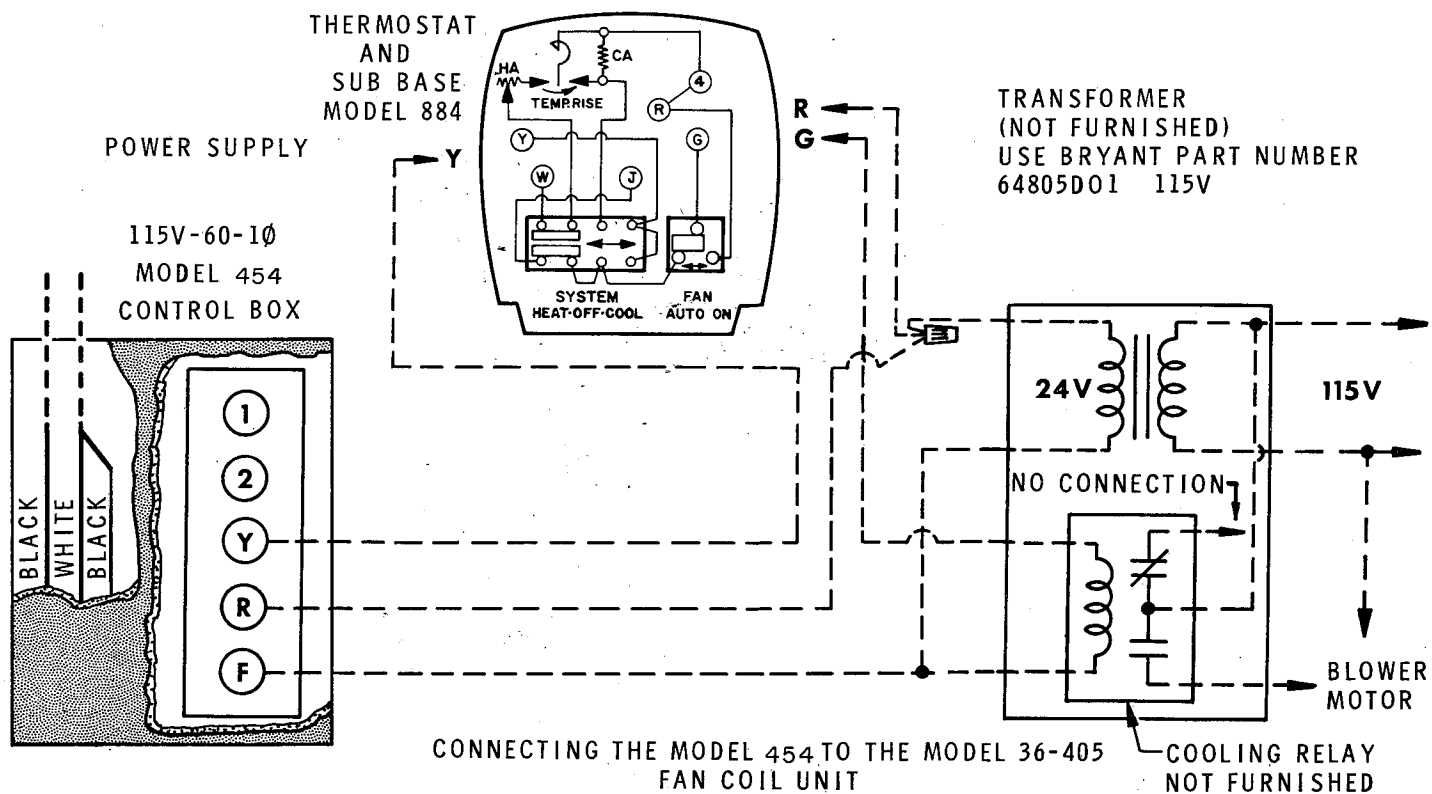
The unit cannot be operated at temperatures below 40° F.



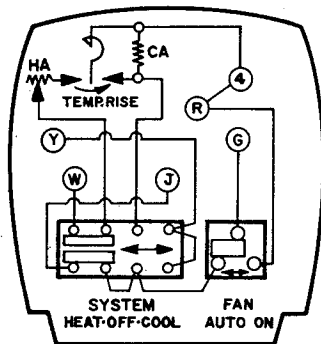
MODEL 454 CONNECTED TO THE MODEL 394 SERIES B DIRECT DRIVE OR * BELT DRIVE FURNACE



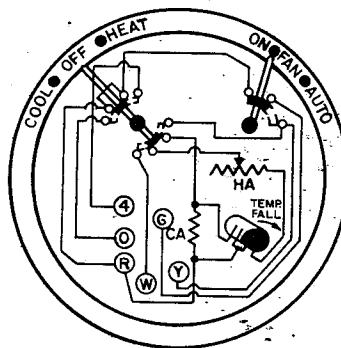
CONNECTING THE MODEL 454 TO THE MODEL 100-511G OR 200-511G



THERMOSTAT
AND
SUB BASE
MODEL 884



THERMOSTAT 34427D17
AND
SUB BASE 34427D29

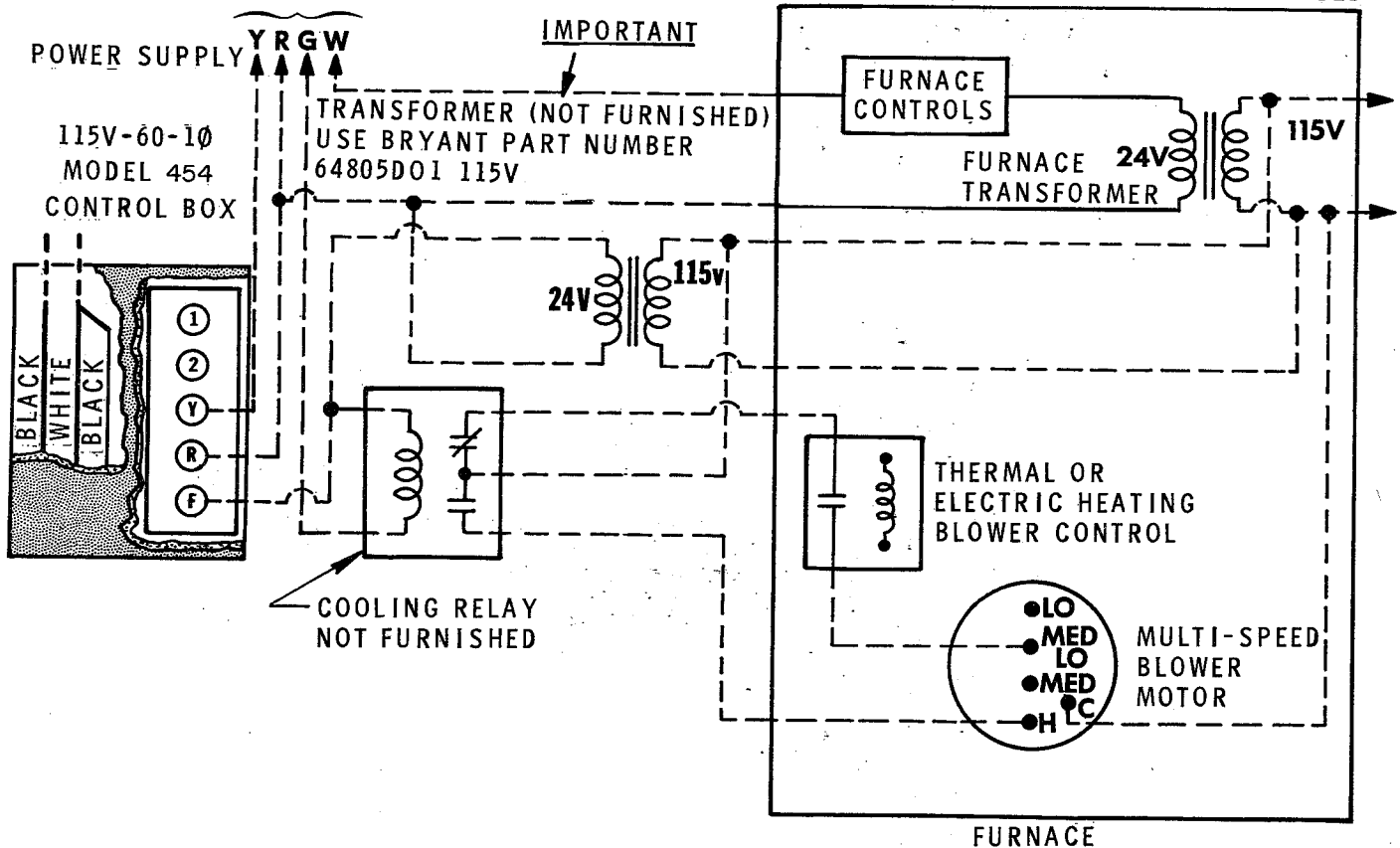


CHECK FURNACE LOW VOLTAGE (24V) WIRING CIRCUIT TO INSURE ALL CONTROLS (PILOT, LIMIT CONTROLS AND GAS VALVE) ARE WIRED IN SERIES BETWEEN THE FURNACE TRANSFORMER AND THE "W" TERMINAL OF THE THERMOSTAT.

TO EITHER SUB-BASE

"IMPORTANT"

TRANSFORMERS MUST BE PHASED



CONNECTING THE MODEL 454 INTO A STANDARD FURNACE
CONTROL CIRCUIT