Bryant Air Conditioning Company

installation instructions 559B

SELF-CONTAINED ELECTRIC COOLING UNITS

Sizes 024, 030, 036, 042, & 048
Series E

Cancels: 39559D47 39559DP61
6/1/74

The Model 559B unit is a complete cooling system, with provisions for addition of accessory electric heaters. Units are air cooled, designed for outdoor installation, and may be connected into existing duct system. Required connections include air ducts, condensate drain, and high- and low-voltage wiring. A field-supplied filter box must be installed in return air duct.

When optional electric heaters are being installed, see instructions beginning on page 8 of this publication for procedures.

TRANSPORTATION DAMAGE

File claim with shipping company if shipment is damaged or incomplete. Move unit to installation site in upright position.

Important—Read Before Installing

1. Check all local codes and ordinances that could affect installation of equipment.
2. Be sure power supply available (voltage, hertz, and phase) corresponds to that specified on unit rating plate.
3. Check electrical service provided by utility for building to be sure service capacity is sufficient to handle load imposed by unit.
4. Refer to dimensional drawing for locations of electrical, condensate drain, and duct connections before setting unit in place.

Installation consists of the following steps:

I. Locating and Mounting Unit
II. Connecting Ductwork
III. Connecting Condensate Drain
IV. Electrical Connections
V. Startup and Adjustment
VI. Maintenance
VII. Instructions to Owner

I. LOCATING AND MOUNTING UNIT

Place unit on a solid, level, concrete pad. Pad should be minimum of 3 inches high, extend about 6 inches from both sides and front of unit, and must not extend more than 1 inch from back (duct side) of unit. Insert sheet of tar-base construction felt paper between unit and pad.
Unit does not need to be secured to pad because there are no refrigerant lines extending outside of unit that could be damaged.

Be sure grass and shrubs do not interfere with condenser airstream. If necessary, extend gravel apron around pad.

Place duct side against building structure so ductwork cannot be seen from outside.

When installing unit, allow sufficient space for condenser airflow clearance, wiring, and servicing unit. See Figure 2. Position unit so water from roof will not pour directly on top of unit. Do not locate unit under eaves.

Recommended minimum service clearance:
18 inches all sides except duct side
0 inches bottom
36 inches top

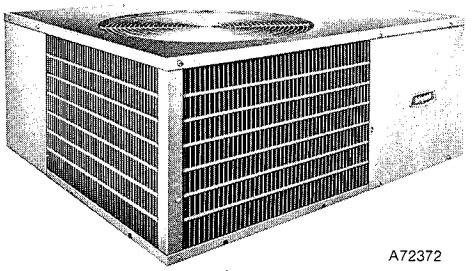


Figure 1—Model 559B

II. CONNECTING DUCTWORK

Flanges are provided on unit for duct connections. See Figure 2 for unit connection sizes and locations. Use weathertight connectors between ductwork and unit to prevent transmission of vibration.

Ductwork should be selected and sized according to Part 2 of Bryant Air Distribution Manual. All ductwork in unconditioned space should be insulated and weatherproof if used outdoors.

CAUTION: Do not operate unit longer than 5 minutes without ductwork.

Filters must be located in return airstream. Recommended sizes are shown in Table II. When electric heaters are installed, use an asbestos (or similar heat-resistant material) connector between ductwork and unit supply duct connection.

When flexible duct is used, friction loss in straight runs is approximately double amount found in Bryant Air Distribution Manual, Part 2, for air duct design.

It is recommended that rigid elbows should be used for bends. If rigid elbows are not used, ratio of centerline bend radius to duct diameter (R/D) should be at least 1.5 for minimum friction loss. If rectangular ducts are used over unit round connections, unit entering pressure loss must be considered when designing system.

WARNING: Do not drill holes in area shown in Figure 5.

It is also recommended that abrupt duct expansions and contractions be avoided.

NOTE: Mobile home duct kits (which include a return air filter box, filter, floor grille, flexible duct sections, and installation hardware) are available for mobile home installation. See your Bryant Distributor.

Mobile Home Duct Design

Design duct system to have friction loss of between 0.25 in. wc and 0.70 in. wc for proper unit operation. Insulated flexible ductwork (1-ft inside diameter) of weatherproof type is recommended. Do not reduce duct inside diameter below 1 ft. Combined length of supply and return ducts should not exceed 20 ft, with minimum supply duct length

DIMENSIONS IN INCHES

SIZE	C	D	E	F	G	H	J
024	17-5/8	12	12	10-1/4	14-1/2	8-5/8	25-5/16
030	17-5/8	12	12	10-1/4	14-1/2	8-5/8	25-5/16
036	19-5/8	14	14	11-1/4	16-1/2	8-5/8	25-5/16
042	27-5/8	14	14	12-1/4	24-1/2	9-5/8	24-5/16
048	27-5/8	14	14	12-1/4	24-1/2	9-5/8	24-5/16

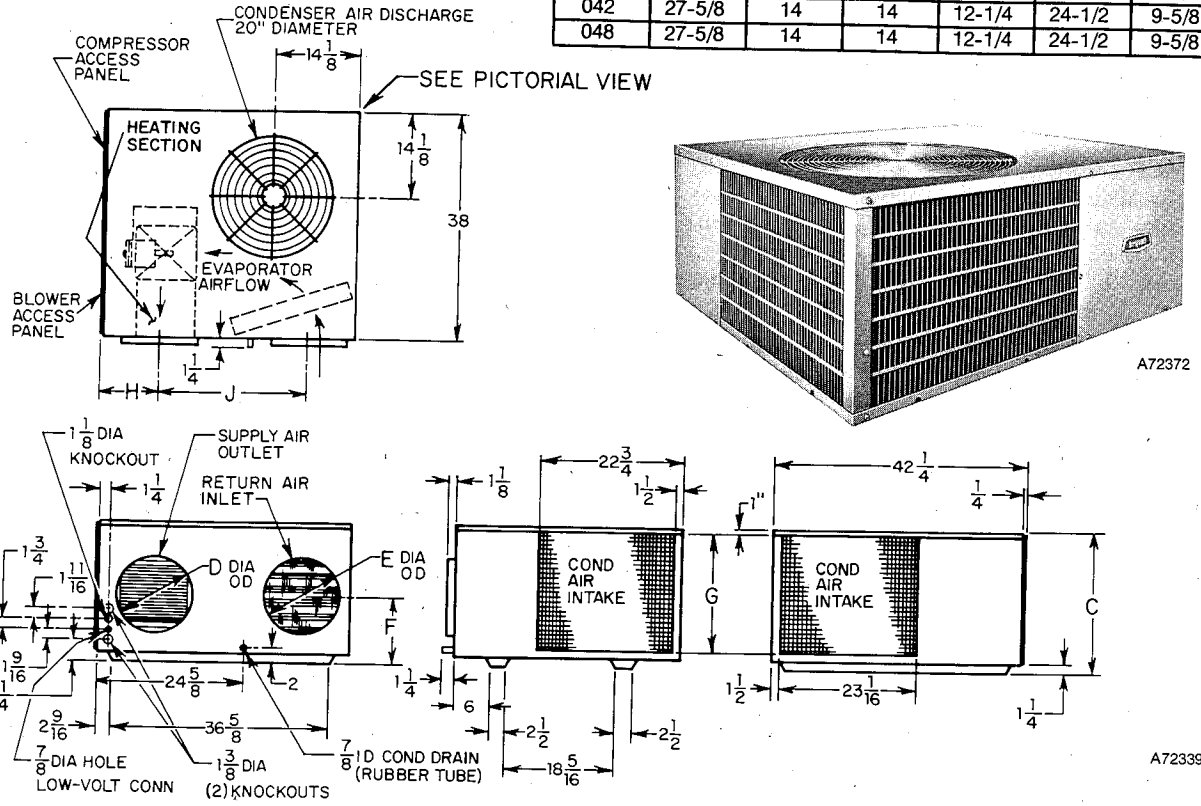


Figure 2 — Dimensional Drawing

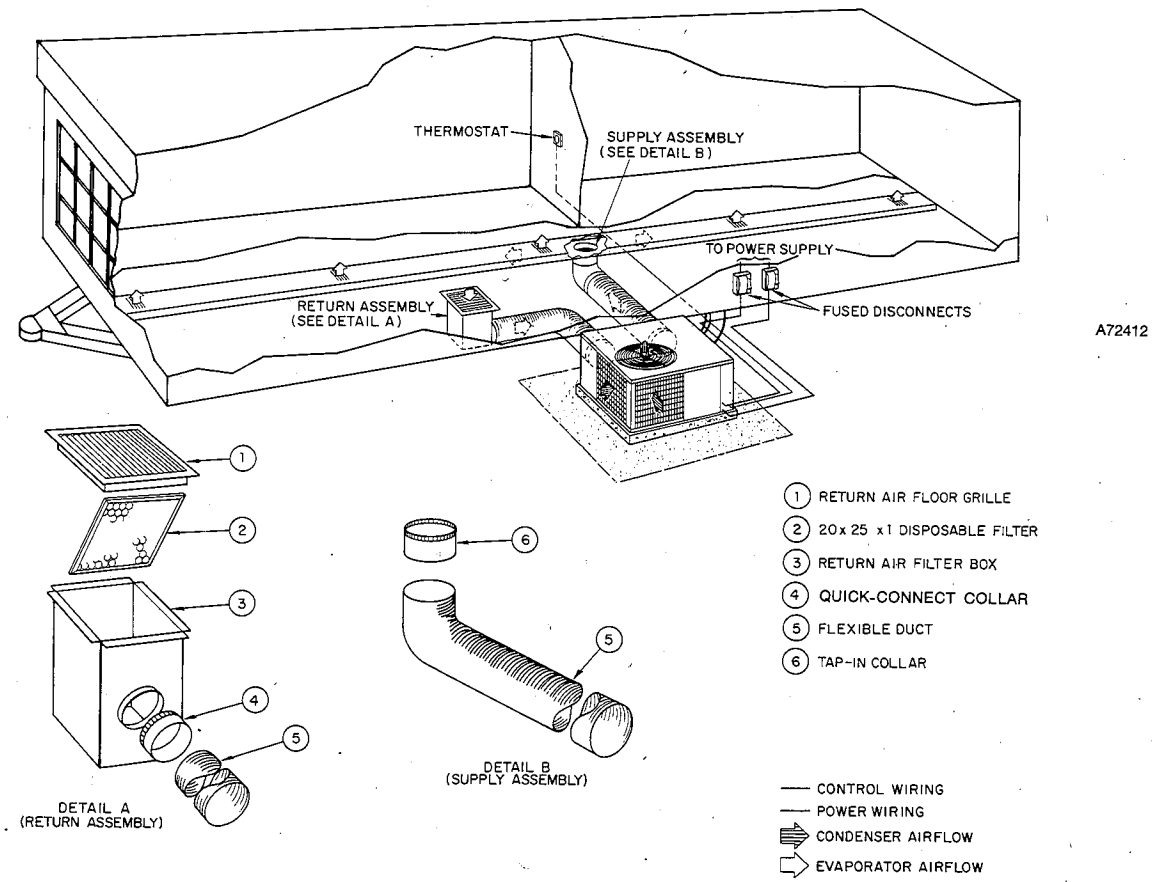


Figure 3 — Typical Installation

TABLE I—RATINGS AND PERFORMANCE

MODEL		559B-024-E	559B-030-E			559B-036-E		
Rated Cooling Capacity*	Btuh	24,000	30,000			35,000		
Nameplate Voltage-Freq-Phase		230-60-1	230-60-1	208-60-3	230-60-3	230-60-1	208-60-3	230-60-3
Operating Voltage Range		207-254	207-254	187-229	207-254	207-254	187-229	207-254
Compressor Motor	FLA	15.7	19.5	12.3	11.1	24.0	15.2	14.0
Locked Rotor Amps		72	88	70	60	100	80	70
Condenser Fan Motor**	HP	1/5	1/5	1/5	1/5	1/4	1/4	1/4
Full Load Amps		1.3	1.3	1.4	1.3	1.8	2.1	1.8
Evaporator Blower Motor**	HP	1/4	1/3	1/3	1/3	1/3	1/3	1/3
Full Load Amps		2.0	3.1	2.9	3.1	3.6	3.8	3.6
Rated Total Power Consumption	KWH	3.5	4.6	4.6	4.6	5.7	5.7	5.7
Electrical Connections								
Unit Full Load Amps		19.0	23.9	16.6	15.5	29.4	21.1	19.4
Unit Ampacity for Electrical Conductor Sizing		22.9	28.8	19.7	18.3	35.4	24.9	22.9
Min Branch Circuit Wire Size 60°C Temp Rating Copper Conductor***	AWG No.	10	10	12	12	8	10	10
Max Line Length****	Ft	119	95	92	110	122	115	142
Largest Wire Size Line-Voltage Connections Will Accommodate	AWG No.	4	4	4	4	4	4	4
Max Branch Circuit Fuse Size	Amps	25	30	25	20	40	30	25
Refrigerant	type/lbs-ozs	R-22/2-6	R-22/3-0	R-22/3-0	R-22/3-0	R-22/3-10	R-22/3-10	R-22/3-10
Evaporator Airflow	CFM	900	1125	1125	1125	1350	1350	1350
Approximate Shipping Weight	lbs	265	285	285	285	305	305	305

MODEL		559B-042-E			559B-048-E			
Rated Cooling Capacity*	Btuh	42,000	41,000	42,000	48,000			
Nameplate Voltage-Freq-Phase		230-60-1	208-60-3	230-60-3	230-60-1	208-60-3	230-60-3	460-60-3
Operating Voltage Range		207-254	187-229	207-254	207-254	187-229	207-254	414-508
Compressor Motor	FLA	25.0	16.9	15.3	26.5	20.9	18.0	9.1
Locked Rotor Amps		111	92	92	118	90	78.5	39.3
Condenser Fan Motor**	HP	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Full Load Amps		1.8	2.1	1.8	1.9	2.1	1.8	1.8
Evaporator Blower Motor**	HP	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Full Load Amps		4.2	4.4	4.2	4.9	5.1	4.9	4.9
Rated Total Power Consumption	KWH	6.3	6.3	6.3	7.2	7.2	7.2	7.2
Electrical Connections								
Unit Full Load Amps		31.0	23.4	21.3	33.3	28.1	24.7	15.8
Unit Ampacity for Electrical Conductor Sizing		37.4	27.6	25.1	40.0	33.3	29.2	18.1
Min Branch Circuit Wire Size 60°C Temp Rating Copper Conductor***	AWG No.	8	10	10	8	8	10	12
Max Line Length****	Ft	116	103	130	108	137	112	225
Largest Wire Size Line-Voltage Connections Will Accommodate	AWG No.	4	4	4	4	4	4	4
Max Branch Circuit Fuse Size	Amps	40	30	30	45	35	30	20
Refrigerant	type/lbs-ozs	R-22/4-13	R-22/4-13	R-22/4-13	R-22/4-11	R-22/4-11	R-22/4-11	R-22/4-11
Evaporator Airflow	CFM	1570	1570	1570	1800	1800	1800	1800
Approximate Shipping Weight	lbs	345	345	345	367	367	367	367

*Rated in Accordance with ARI Standard 210-66.

**Condenser fan and evaporator motors are single phase.

***If other than 60°C copper conductor is used, determine size from unit ampacity and the National Electrical Code. Voltage drop of wire must be less than 2% of unit rated voltage.

****Wire length shown is measured one way along the wire path between unit and service panel for minimum voltage drop.

TABLE II—FILTER DIMENSIONS

	Minimum Filter Size or Equivalent, Inches				
Unit Size	024	030	036	042	048
Disposable	16x20x1	20x20x1	20x25x1	25x25x1	25x25x1
Permanent	12x20x1	16x20x1	20x20x1	20x20x1	20x25x1

X = Size 024, 030, & 036 ..... 1-3/4 in.
Size 042 & 048 ..... 2 in.

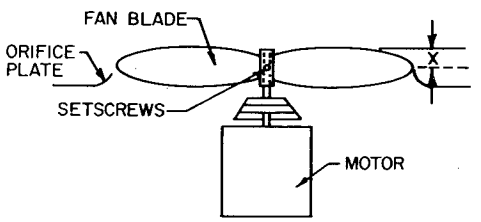


Figure 4—Required Condenser Fan Position

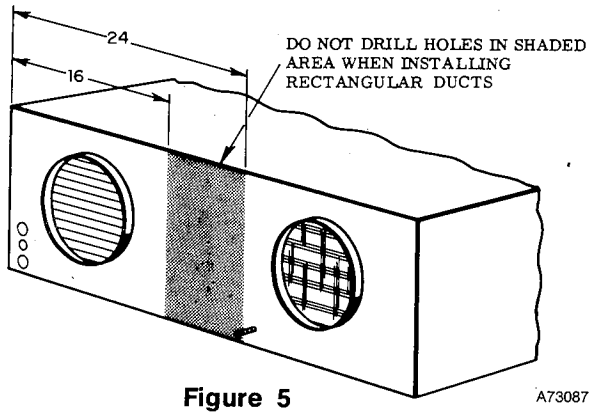


Figure 5

of 6 ft and minimum return duct length of 3 ft. **Do not operate unit longer than 5 minutes without ductwork.** Refer to Bryant Air Distribution Manual, Part 2, for air duct design.

Flanges are provided on unit for duct connections. See Figure 2 for connection sizes and Figure 3 for typical duct installation.

Supply Air Connection in Mobile Home

Connect flexible duct to unit supply air connection at approximate center of trailer. Install turning vanes in main supply duct directly above elbow connection, using standard sheet metal practices.

Return Air Connection in Mobile Home

Purchase or field-fabricate a filter box. Suggested minimum filter box dimensions are shown in Figure 6. At approximate center of trailer, cut a return air opening in floor. Locate opening where it will not be obstructed by furniture. Size opening to accept filter box. Cut a hole in carpet or floor covering to same size as filter box floor opening. Ensure electrical wiring or main structural supports are not accidentally cut. Insert filter box thru floor opening. Weather-seal floor connection in accordance with good construction practice. Insert filter in filter box, and cover with return air grille.

Connect flexible duct to filter box. Extend duct from filter box to unit return air connection. When existing furnace is kept in system: During heating season, insert sheet metal panel beneath return air grille and over filter to prevent air movement thru cooling unit.

When furnace is removed from system, blank-off original furnace floor connection.

III. CONNECTING CONDENSATE DRAIN

The unit is designed to dispose of accumulated water through condensate drain hose on unit. It is recommended that a drain line that includes a trap should be installed to avoid possibility of abnormal negative fan pressure preventing complete drainage of condensate. If drain connection is not practical or feasible, a factory-supplied condensate trap (taped at supply duct connection) must be installed for proper drainage. See Figure 7.

IV. ELECTRICAL CONNECTIONS

Field wiring must comply with National Electrical Code and local codes. Install a branch circuit fused disconnect of adequate size to handle unit current load. Provide separate fused disconnect for electric heaters.

Voltage to unit during operation must be within ±10% of voltage indicated on rating plate.

WARNING: Failure because of operation of unit on improper line voltage constitutes abuse and is not covered by Bryant warranty.

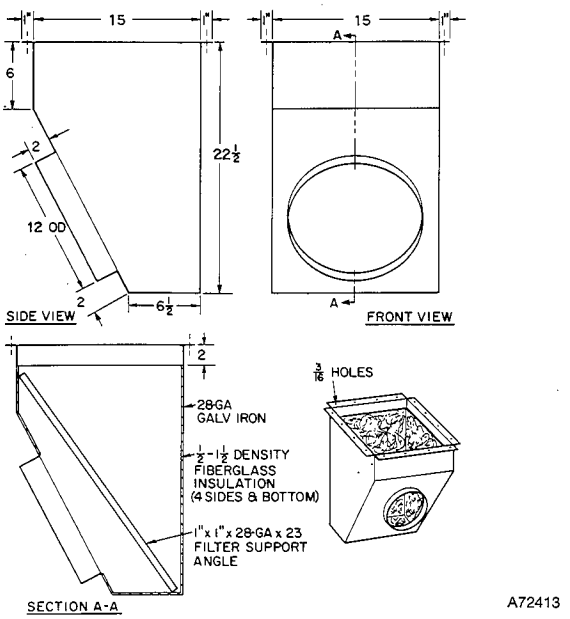


Figure 6 — Minimum Dimensions-Return Air Filter Box

Connect line-power leads from fused disconnect(s) to line power leads located in junction box. Screw connectors, which are suitable for aluminum or copper wires, are provided. See Figures 8 and 9. Tape screw connectors after connections are completed. Table I is provided to assist installer in selecting proper wire and fuse sizes.

Thermostat connections are made to color-coded wires located in junction box. See Figures 8 and 9. Be sure color-coded wires not used are adequately and individually taped at end.

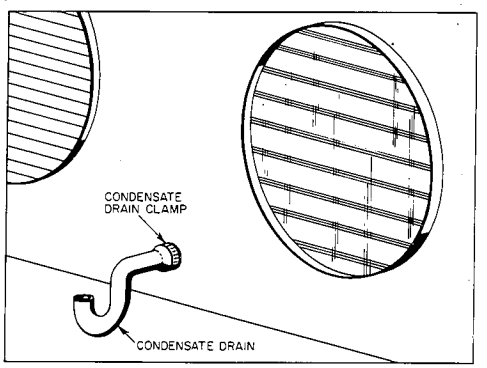


Figure 7 —Condensate Drain Connection

NOTE: When using Model 883 (P/N 34427DØ30) thermostat with optional electric heat package, W and J terminals on thermostat must be jumpered to ensure fan operation when thermostat is in **HEAT** position.

V. STARTUP AND ADJUSTMENT

Before starting system, make an initial overall inspection.

1. Check to be sure all wiring connections, including factory connections, have been completed and are tight.
2. Inspect all supply ducts and grilles to ensure proper adjustment.
3. Check to ensure air filters are in place.
4. Inspect refrigerant piping for damage or leaks that might have occurred during shipment.
5. Check for correct position of condenser fan blade in fan orifice plate. See Figure 4 for setting.
6. Check to ensure all tools and loose parts have been removed.
7. Check to ensure all panels and covers are in place.

Following initial inspection, unit may be started and ad-

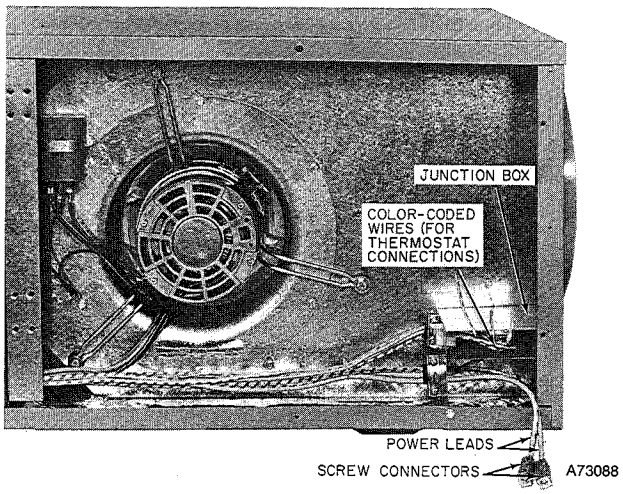


Figure 8 — Electrical Connections

justed for proper airflow.

Recommended evaporator airflow is 350 to 450 CFM per 12,000 Btuh.

1. Set thermostat to call for cooling, thus energizing unit.
2. Measure static pressure in duct system at unit.
3. To determine airflow across evaporator coil, see Tables III through VII.

Model 559B utilizes a direct-drive blower, factory-wired on high-speed tap. If airflow is incorrect, blower speed can be adjusted as follows:

1. Disconnect electric power to unit.
2. Disconnect cooling relay lead from high-speed tap (black wire). Tape end of wire removed.
3. Refer to appropriate Air Delivery Performance Table and connect relay lead to correct speed tap.

   Blue wire med speed
   Orange wire med-low speed
   Red Wire low speed

4. Recheck system static pressure.

The air conditioner has been tested and factory sealed. **There is no need to check refrigerant charge.** If it is necessary to open refrigerant circuit, contact your Bryant Distributor for proper procedure. The type and amount of refrigerant are listed on rating plate.

Typical Sequence of Operation

Do not leave installation until unit has been observed throughout one or two complete cycles. Installer should make certain during this time that all components are operating in correct sequence. Refer to line-to-line wiring diagrams, Figure 10 or 11. The following sequence of operation pertains to the units shown; however, the sequence of operation of all units is very similar.

NOTE: Although the unit wiring may vary slightly from that shown in Figure 10 or 11, the sequence of operation will not be affected.

Sizes 024, 030, and 036, 230V-60-1

Line voltage is supplied through terminals L1 and L2 to compressor contactor (2D) and to primary of control transformer (1A1). An external low-voltage thermostat is connected across low-voltage wires R, Y, and G.

Set system switch to COOL and fan switch to AUTO on thermostat. On call for cooling, power is supplied from control transformer (1A1) through wire R, external thermostat, wire Y, low-pressure switch (7C), and contactor holding coil (2D) to other side of control transformer (1A1), closing contactor contacts (2D).

When contactor contacts (2D) close, condenser fan motor (3C) is energized through run capacitor (4A2), starting condenser fan. In addition, power flows through compressor motor run capacitor (4A3), compressor start capacitor (4C1), start relay (2K), and compressor motor (3J), starting compressor motor.

When cooling fan relay contacts (2A) close, power flows through run capacitor (4A1) and blower motor (3D1) starting blower motor.

When thermostat ceases to require cooling, it breaks circuit between wires R and Y and wires R and G, shutting down unit.

Size 048, 208V- or 230V-60-3

Line voltage is supplied through terminals L1, L2, and L3 to compressor contactors (2D) and to control transformer (1A1). An external low-voltage thermostat is connected across low-voltage wires R, Y, and G. Set system to COOL and fan switch to AUTO on thermostat.

On a demand for cooling by the external thermostat, power is supplied from control transformer (1A1) through terminal R. Terminal R makes to terminals Y and G through the thermostat.

As R makes to G, the coil of the cooling fan relay (2A1) is energized, closing the fan relay contacts (2A1). Power is now allowed to flow through blower motor run capacitor (4A1), and the blower motor (3D1) starts.

As terminal R makes to terminal Y through the thermostat, the coil of cooling relay (2A2) is energized, closing the cooling relay contacts (2A2). Power is now allowed to flow through the low-pressure switch (7C), the compressor internal thermostat (7H), compressor overload contacts (8A), and the Bryant COMPROTEC™ circuit which includes timer motor (3M), and the coil of the holding relay (2C). The energized coil of the holding relay (2C) closes its normally open contacts and opens its normally closed contacts.

Timer motor (3M) runs through a 15-second (approx.) cycle. The timer motor contacts are then switched. Power is now allowed to flow through the coil of compressor contactor (2D), which closes the normally open contacts of compressor contactor (2D).

When compressor contactor contacts (2D) are closed, power is allowed to flow through compressor overloads (8A) and compressor motor (3L) starts. At this same time, power is allowed to flow through low-ambient condenser fan switch (7K), condenser fan run capacitor (4A2), and the two-speed condenser fan motor (3D2) starts. When outdoor temperature drops to 85°F, low-ambient condenser fan switch (7K) will switch contacts, energizing a lower speed of condenser fan motor (3D2).

When the demand for cooling is satisfied, the external thermostat breaks the circuit between terminal R and terminals Y and G. Breaking this circuit deenergizes compressor holding coil (2D), cooling relay coil (2A2), and cooling fan relay coil (2A1). The condenser fan motor (3D2), compressor motor (3L), and blower motor (3D1) are now deenergized.

At the same time, the holding relay coil (2C) is deenergized, opening its normally open contacts and closing its normally closed contacts. Power now flows through normally closed contacts of holding relay (2C) and timer motor (3M). In approximately 4 minutes 45 seconds, the timer motor contacts switch, breaking circuit to timer motor. The unit is now in a "standby" position, ready for the next demand for cooling by the external thermostat.

VI. MAINTENANCE

Refrigerant Charging

Unit is factory charged. When recharging is necessary, blow any refrigerant remaining in system, then weigh in total charge indicated on unit rating plate. Standard 1/4-inch Schrader service connections are provided on high and low sides of refrigerant system for evacuation and charging.

Cleaning

Before cleaning, disconnect electrical power.

Condenser Coil: Lift or remove unit top cover for access to condenser coil. Inspect coil periodically. Clean with brush, vacuum cleaner, low-pressure water, steam, or air.

Evaporator Coil: Lift or remove unit top cover for access to evaporator coil. Inspect coil periodically. Clean with brush, vacuum cleaner, or low-pressure air.

NOTE: When cleaning condenser coil or evaporator coil, be sure to thoroughly clean out the spaces between fins.

Return Air Filter: Clean filter a minimum of twice yearly. Flush permanent type with hot water, steam; or soak in mild solution of soap, or detergent, and water. Allow filters to dry, and replace. Refer to filter manufacturer's instructions, as required, for other types of filters.

VII. INSTRUCTIONS TO OWNER

This Bryant self-contained cooling unit is designed and installed to provide maximum comfort. Adherence to following guidelines will help promote greater efficiency and longer operating life.

1. Do not rapid-cycle unit. Allow at least 3 minutes before returning unit to operation after shutdown. On size 048 units, do not manually override COMPROTEC™.
2. If there is a general power failure, it is recommended that electrical power supply be turned off at unit disconnect switch until electrical power supply to building is restored. This prevents excessive current draw that would result from momentary low-voltage conditions at time power is restored.
3. Air filters should be cleaned or replaced regularly to protect against restricted airflow across cooling coil.
4. Size 048 units incorporate Bryant's COMPROTEC™ system for compressor protection. If compressor overloads or hi-pressure switch have cause to function, COMPROTEC ™ system will hold unit off for approximately 5 minutes. At that time, unit will try to restart. Should original condition still exist, unit will again cycle on COMPROTEC™ system.

TABLE III — SIZE 024 AIR DELIVERY PERFORMANCE

Air Delivery CFM	External Static Pressure Available, Wet Coil No Filters				External Static Pressure Available, Dry Coil No Filters			
	High	Med	Med Low	Low	High	Med	Med Low	Low
600	0.84	0.80	0.71	0.60	0.86	0.82	0.73	0.62
700	0.76	0.69	0.56	0.25	0.79	0.72	0.59	0.28
800	0.67	0.56	0.38	—	0.71	0.60	0.42	—
900	0.57	0.40	0.14	—	0.62	0.45	0.19	—
1000	0.45	0.17	—	—	0.50	0.22	—	—

TABLE IV — SIZE 030 AIR DELIVERY PERFORMANCE

Air Delivery CFM	External Static Pressure Available, Wet Coil No Filters				External Static Pressure Available, Dry Coil No Filters			
	High	Med	Med Low	Low	High	Med	Med Low	Low
800	1.12	0.96	0.80	0.21	1.14	0.98	0.82	0.23
900	1.01	0.80	0.48	—	1.04	0.83	0.51	—
1000	0.89	0.61	—	—	0.93	0.65	—	—
1100	0.74	0.37	—	—	0.79	0.42	—	—
1200	0.56	—	—	—	0.63	—	—	—

TABLE V — SIZE 036 AIR DELIVERY PERFORMANCE

Air Delivery CFM	External Static Pressure Available, Wet Coil No Filters				External Static Pressure Available, Dry Coil No Filters			
	High	Med	Med Low	Low	High	Med	Med Low	Low
1000	1.17	1.10	0.95	0.70	1.21	1.14	0.99	0.74
1100	1.06	0.97	0.77	0.35	1.11	1.02	0.82	0.40
1200	0.95	0.82	0.55	—	1.01	0.88	0.61	—
1300	0.82	0.64	—	—	0.89	0.71	—	—
1400	0.67	0.42	—	—	0.76	0.51	—	—

TABLE VI — SIZE 042 AIR DELIVERY PERFORMANCE

Air Delivery CFM	External Static Pressure Available, Wet Coil No Filters			External Static Pressure Available, Dry Coil No Filters		
	High	Med	Med Low	High	Med	Med Low
1100	—	—	1.10	—	—	1.14
1200	—	—	0.83	—	—	0.87
1300	—	1.10	0.35	—	1.15	0.40
1400	1.15	0.87	—	1.20	0.91	—
1500	1.00	0.55	—	1.06	0.61	—
1600	0.85	—	—	0.93	—	—

TABLE VII — SIZE 048 AIR DELIVERY PERFORMANCE

Air Delivery CFM	External Static Pressure Available, Wet Coil No Filters			External Static Pressure Available, Dry Coil No Filters		
	High	Med	Low	High	Med	Low
1400	1.12	0.95	0.60	1.17	1.00	0.65
1500	1.02	0.79	0.25	1.07	0.84	0.30
1600	0.92	0.61	—	0.97	0.66	—
1700	0.80	0.40	—	0.87	0.47	—
1800	0.68	0.15	—	0.76	0.23	—
1900	0.53	—	—	0.64	—	—

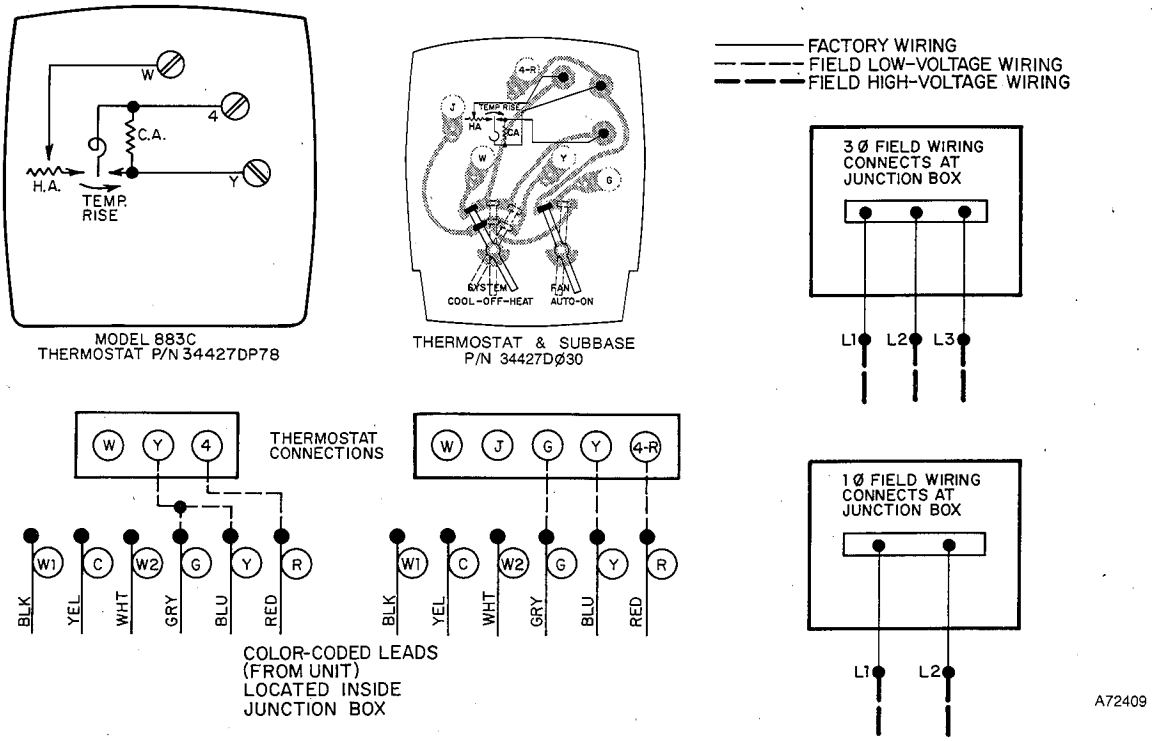


Figure 9 — Low-Voltage Field Wiring (Cooling Only)

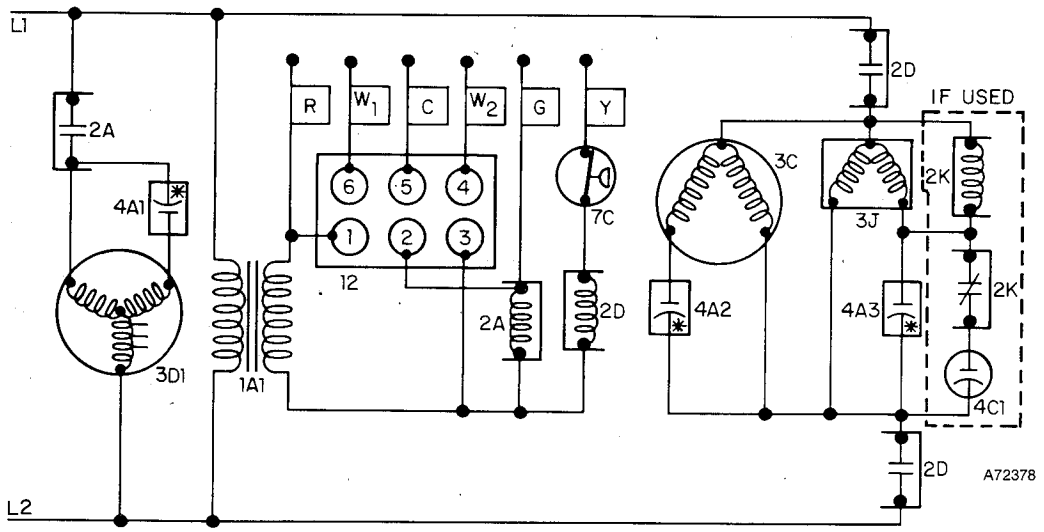


Figure 10—559B-024, -020, -030, & -036 Wiring Diagram, 230-60-1

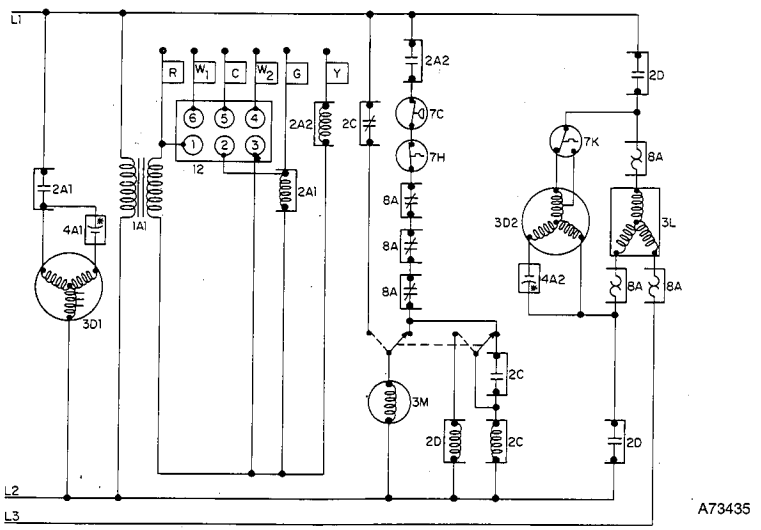


Figure 11 — 559B-048 Wiring Diagram, 208- or 230-60-3

LEGEND

1A1-Control Transformer
1A2-460- to 230-V Transformer
2A-Cooling Fan Relay
2A1-Cooling Fan Relay
2A2-Cooling Relay
2C-Holding Relay
2D-Compressor Contactor (2 pole)
2K-Start Relay
2M-Compressor Contactor (3 pole)
3C-Condenser Fan Motor
3D1-Blower Motor
3D2-Two-speed Condenser Fan Motor
3J-Compressor Motor with Internal Protection
3L-Compressor Motor with Internal Protection
3M-Timer Motor
4A1-Blower Motor Run Capacitor
4A2-Condenser Motor Run Capacitor
4A3-Compressor Motor Run Capacitor
4C1-Compressor Motor Start Capacitor
7C-Low-Pressure Switch
7H-Internal Compressor Thermostat
7K-Low-Ambient Condenser Fan Switch
8A-Compressor Motor Overload
12-Receptacle

Accessory Electric Heater Installation

(For Use With 559B Self-contained Cooling Units)

INTRODUCTION

Single-phase electric heaters in 5- through 15-KW sizes, and three-phase electric heaters in 5.6- through 14.5-KW sizes, are installed internally on 559B units. The 20- and 25-KW size single-phase heaters, and the 14.9- thru 25-KW size three-phase heaters, are mounted externally on the 559B supply air connection. **Do not use more than one heater per unit.** See Table I for heater model and 559B usage.

I. ELECTRIC HEATER INSTALLATION

A. Internal Heaters

1. Remove fan section access panel.
2. Remove sheet metal plate covering heater installation area (between evaporator fan discharge and supply air connection). See Figure 5. Discard sheet metal plate.
3. Insert heater into opening provided.

NOTE: Ensure the heater support bar (Figures 1 and 5) enters the hole in the side of the fan discharge duct.

4. Fasten heater in place at top and bottom with two sheet metal screws.
5. Attach heater wiring label provided to inside of fan section access panel.
6. Installation is now ready for electrical connections. See "Wiring", Section III.

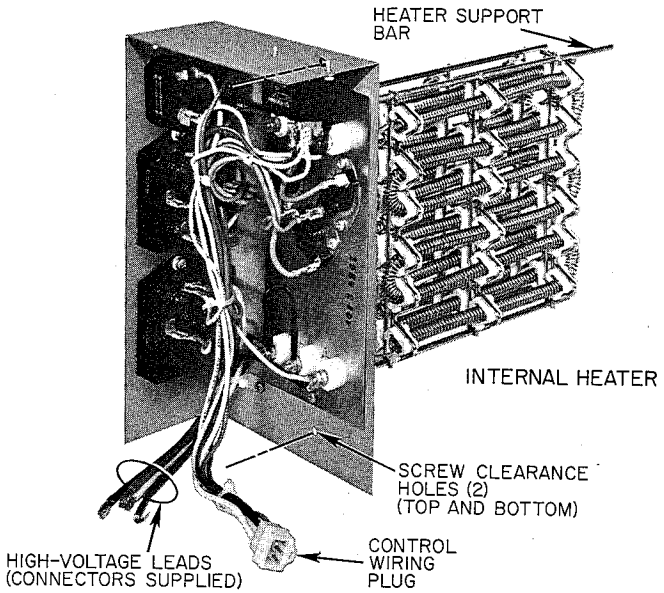


Figure 1—Internal Heater

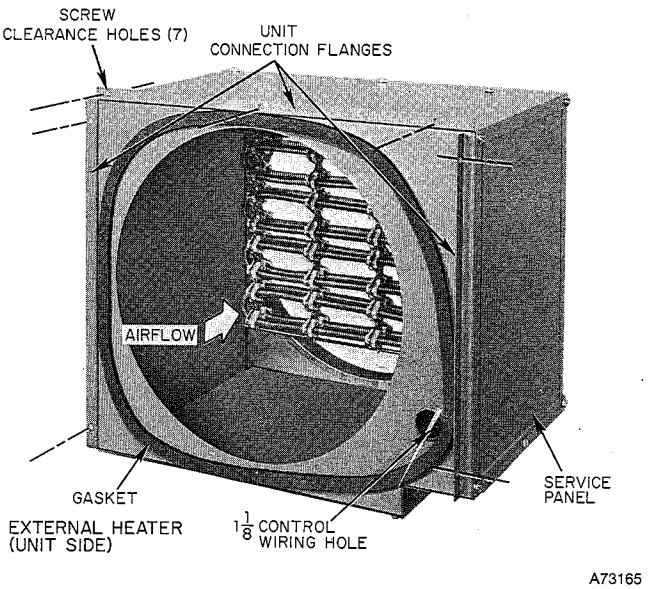


Figure 2—Entering Air Side of External Heater

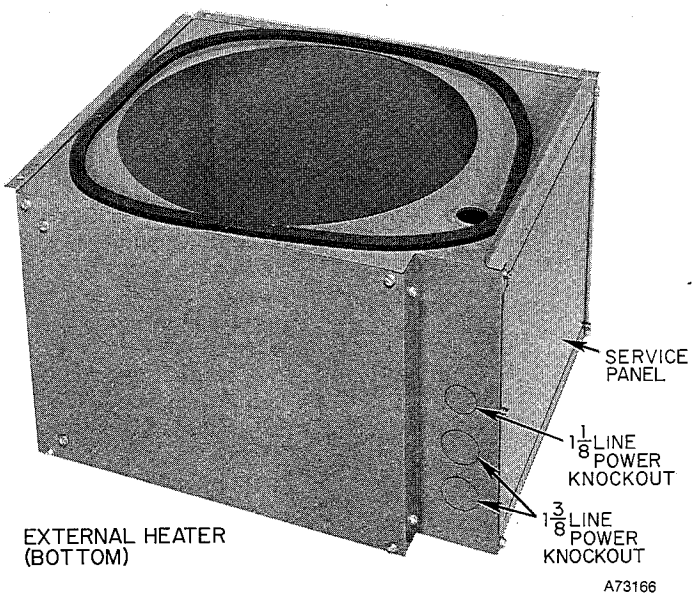


Figure 3—Power Knockouts on External Heater

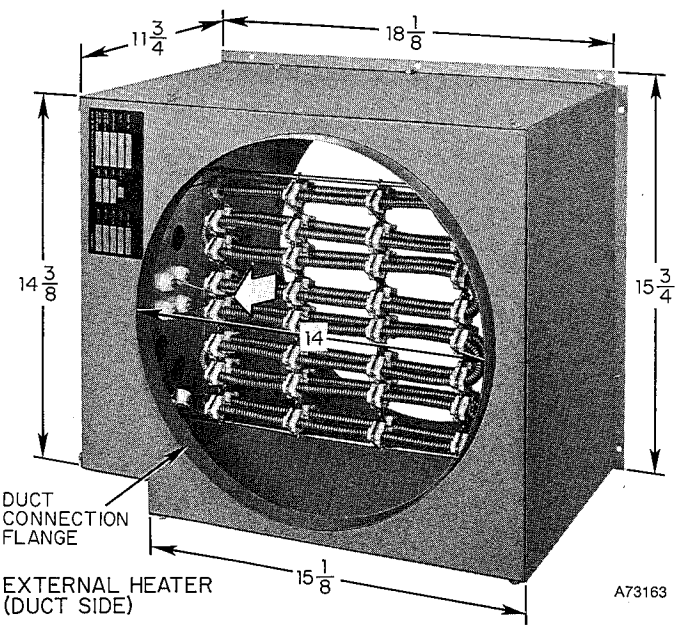


Figure 4—Duct Connection Side of External Heater

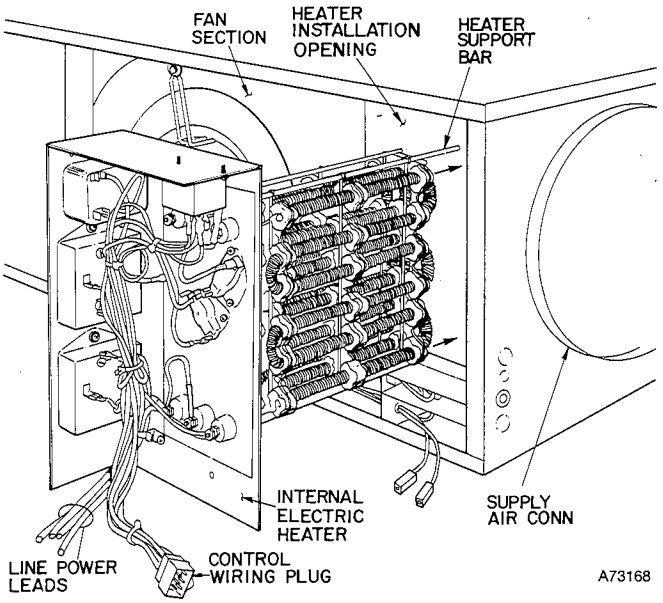


Figure 5—Internal Electric Heater Installation

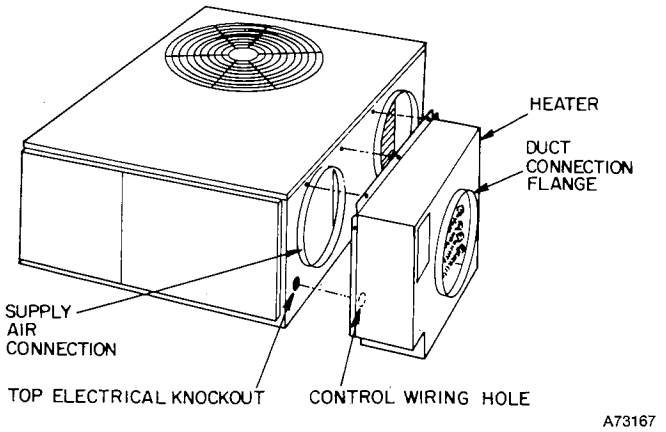


Figure 6—External Heater Installation

B. External Heaters

The **external** heaters are self-locating on the 559B evaporator fan supply air connection. See Figure 6. Flanges are provided on the heater for connection to the 559B with sheet metal screws. See Figure 2. Before installing the heater, ensure the factory-supplied gasket is in place around the heater entering air connection as shown in Figures 2 and 3. Complete installation as follows:

NOTE: When installing **external** heaters, remove the internal air baffle from the 559B. The **external** heaters have their own air baffle.

1. Remove top electrical knockout on 559B. See Figure 6.
2. Place heater over 559B supply air connection. See Figure 6.
3. Align control wiring hole in entering air side of heater (Figure 2) with top electrical knockout in 559B. See Figure 6.
4. Drill holes in 559B to align with screw clearance holes in heater flanges. See Figure 2 for location of clearance holes in flanges.

NOTE: Mark the drilling locations while holding the heater in place against the 559B.

CAUTION: Do not penetrate drill more than 1 inch inside of the 559B.

5. Fasten heater in place with sheet metal screws.
6. Installation is now ready for electrical connections. See "Wiring", Section III.

II. DUCTWORK REQUIREMENTS

Refer to **Connecting Ductwork** section on page 1 of these instructions for complete duct installation details. The following ductwork recommendations pertain to electric heater applications:

1. Flexible connectors are required between duct connection flanges and ductwork to prevent transmission of vibration. When electric heater is installed, it is recommended that asbestos (or similar heat-resistant material) connector be used between ductwork and heater duct connection flange. If non-heat-resistant flexible duct is used, it is recommended that a sheet metal sleeve be inserted inside of duct. Heat-resistant duct connector (or sheet metal sleeve) should extend 24 inches from electric heater element.
2. **Single-phase external heaters** are provided with means for attachment of circular ductwork only. **Three-phase external heaters** are provided with means for attachment of circular or square ductwork.
3. When electric heater is used, the ductwork must be capable of handling minimum air quantities shown in Table III.

III. WIRING

Field wiring must be made in accordance with the National Electrical Code and local electrical codes governing such wiring. Provide a separate fused disconnect for each electric heater circuit. See Table II. Refer to heat package wiring label.

A. Line-Power Connections

On **internal** heater installations, bring the line-power leads from the fused disconnect(s) through the power holes in the 559B unit panel. Knockouts are provided on the **external** heater cabinet for passage of the line-power leads. See Figure 3.

Connect the line-power leads to the heater line-power pigtails or to the heater high-voltage terminal block. See Figure 10 and Table II for branch circuit data and line-power connections. Use screw connectors provided for pigtail connections, and tape each connection. The screw connectors and terminal block are suitable for copper or aluminum wire.

If aluminum conductors are used, the wire gauge selected must have current capacity not less than the copper wire specified and must not create a voltage drop between the service panel and the unit in excess of 2% of the unit rated voltage.

NOTE: If aluminum conductors are used, the connections must be made in accordance with the National Electrical Code. In preparing the wire, just before installing the connector, all aluminum wire must be "brush-scratched" and the wire coated with a corrosion inhibiter, such as Pentrox A. When it is suspected that the connection will be exposed to moisture, it is very important to cover the entire connection completely to prevent an electro-chemical action that will cause the connection to fail very quickly. Reducing the effective size of the wire, such as cutting off strands so that the wire will fit a connector, is very poor practice. Proper size connectors should be used.

TABLE I—HEATER DATA & USAGE

Heater Model No.	Bryant P/N	KW*	Voltage-Hertz-Phase	Btuh Output				Size Unit Used With
				208V	230V	240V	480V	
88EA0050CA00	70181DØ1	5	240-60-1	—	15,673	17,065	—	024, 030, & 036
88EA0075CA00	70181DØ2	7.5	240-60-1	—	23,509	25,598	—	024 thru 048
88EA0100CA00	70181DØ3	10	240-60-1	—	31,345	34,130	—	024 thru 048
88EA0150CA00†	70181DØ4	15	240-60-1	—	47,018	51,195	—	030 thru 048
88EA1200CA00†	70181DØ5	20	240-60-1	—	62,690	68,260	—	042 & 048
88EA1250CA00†	70181DØ6	25	240-60-1	—	78,363	85,325	—	042 & 048
88EA1250LA00†	70181DØ8	25	208-60-3	85,325	—	—	—	042 & 048
88EA0075EA00	70181DØ10	5.6/7.5	208/240-60-3	19,227	23,509	25,598	—	030 thru 048
88EA0100EA00	70181DØ11	7.5/10	208/240-60-3	25,635	31,345	34,130	—	030 thru 048
88EA0145EA00	70181DØ12	10.9/14.5	208/240-60-3	37,171	45,450	49,489	—	030 thru 048
88EA1198EA00†	70181DØ13	14.9/19.8	208/240-60-3	50,758	62,063	67,577	—	042 & 048
88EA1250EA00†	70181DØ14	18.75/25	208/240-60-3	64,089	78,363	85,325	—	042 & 048
88EA0100FA00	70181DØ16	10	480-60-3	—	—	—	34,130	048
88EA1200FA00†	70181DØ18	20	480-60-3	—	—	—	68,260	048

*At rated voltage.

†These heaters are wired for two-stage heating. Remaining heaters are wired for single-stage heating.

NOTE: The 18.75/25- and 25-KW heaters must be field-connected for two-stage operation. All other heaters wired for two-stage heating may be field-connected for single- or two-stage operation.

TABLE II—HEATER ELECTRICAL DATA

KW	Voltage-Hertz-Phase-	Branch Circuit				
		No. of Circuits	FLA (each)	Wire Size* (AWG No.)	Max Wire Length (ft)**	Fuse Amps
5†	240-60-1	1	20.8	10	45	30
7.5†	240-60-1	1	31.2	8	45	40
10†	240-60-1	1	41.7	6	55	50
15†	240-60-1	2	41.7	6	55	50
			20.8	10	45	30
20	240-60-1	2	41.7	6	55	50
			41.7	6	55	50
25	240-60-1	3	41.7	6	55	50
			41.7	6	55	50
			20.8	10	45	30
25	208-60-3	2	34.7	6	55	45
			34.7	6	55	45
5.6/7.5†	208/240-60-3	1	15.6/18.0	12/10	49/49	20/25
7.5/10†	208/240-60-3	1	20.8/24.0	10/10	59/59	30/30
10.9/14.5†	208/240-60-3	1	30.2/34.9	8/6	63/63	40/45
14.9/19.8	208/240-60-3	1	41.3/47.6	6/4	46/73	60/60
18.75/25	208/240-60-3	2	26.0/30.1	8/8	47/47	35/40
			26.0/30.1	8/8	47/47	35/40
10†	480-60-3	1	12.0	14	59	15
20	480-60-3	1	24.0	10	74	30

†These heaters are internally installed. All others are externally installed.

*Based on 60°C copper wire. If other than 60°C copper conductor is used, determine size from unit ampacity and the National Electrical Code. Voltage drop of wire must be less than 2% of unit rated voltage.

**Length shown is for one way along the wire path from unit to service panel for minimum voltage drop.

B. Control Wiring (24V) Between Heater and 559B

A low-voltage control-wiring **plug** is provided on the heater for connection to the **receptacle** in the 559B control-wiring terminal box.

On **internal** heater installations, extend the control-wiring plug through the hole provided in the 559B control-wiring terminal box and connect to the receptacle. On **external** heaters, feed the plug through the control-wiring hole provided in the heater cabinet (Figures 2 and 6) and into the 559B. Extend the plug into the 559B control-wiring terminal box and connect the plug to the receptacle.

NOTE: When heater installation is completed, be sure to seal holes around all electrical openings to prevent air leakage.

C. Thermostat leads

The thermostat leads are brought through the grommeted hole, provided in the 559B, into the control-wiring terminal box. Connect the thermostat leads to the low-voltage pigtails. See Figure 8 or 9 for thermostat connection diagrams. Tape unused pigtails separately. When aluminum field wire is used, lubricate splices with a suitable splice compound, and use approved copper-to-aluminum splice connectors. Set the thermostat heat anticipator as described in "Determining Heat Anticipator Setting", Section V.

IV. SERVICE

A. Limit Switch

The limit switch provides overtemperature protection. A switch malfunction prevents the heating elements from being energized. Replace the limit switch if a malfunction occurs.

B. Time-Delay Relay

The 14.9- through 25-KW heaters are sequenced. The time-

TABLE III

SIZE UNIT	CFM*
024	600
030	750
036	900
042	1050
048	1200

*Minimum unit cfm for safe heater operation.

delay relay provides a time delay between the heater elements coming on or shutting off. A relay malfunction will prevent the heaters from being energized or prevent the heaters from being deenergized. Replace the time-delay relay if a malfunction occurs.

C. Safety Fan Relay (14.9- through 25-KW heaters)

The safety fan relay ensures the operation of the evaporator fan while the sequenced heater elements are energized. A malfunction will cause excess heat problems; the fan motor will not start or will not shut off. Replace the safety fan relay if a malfunction occurs.

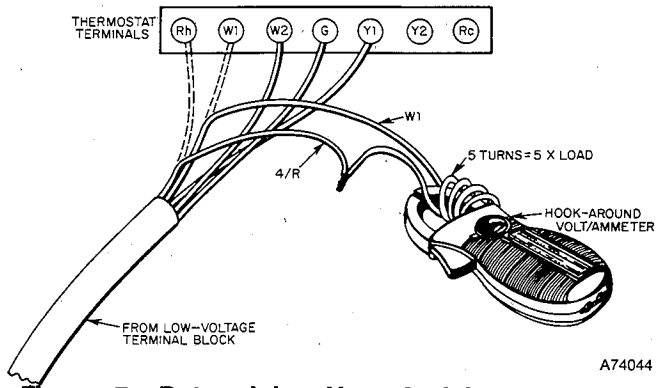


Figure 7—Determining Heat Anticipator Setting

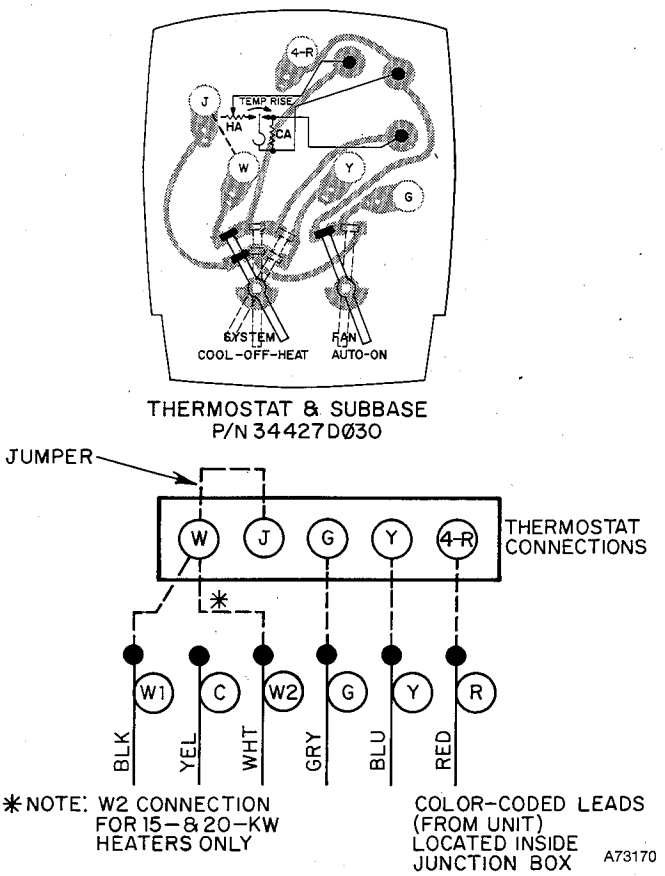


Figure 8—Cooling and Single-Stage Heating Thermostat Connections

V. DETERMINING HEAT ANTICIPATOR SETTING

Because of the numerous combinations of components that a heating control circuit may contain, it is necessary to measure the load in amperes, so that the thermostat heat anticipator(s) can be set properly after the installation is completed. A hook-around ammeter is used to measure the heating control circuit load in this procedure.

Figure 7 shows the proper use of a hook-around ammeter to determine the load. This illustration shows the circuit with five turns around the jaws of the ammeter. Five turns should be used to obtain an accurate reading.

To obtain correct heat anticipator setting, divide the ammeter reading by the number of turns around the jaws of the ammeter.

$$\text{Example: } \frac{3.5 \text{ amperes}}{5 \text{ turns around jaws}} = 0.7 \text{ amperes setting}$$

Procedure for two-stage heating units:

1. Disconnect lead from thermostat terminal W1 and make five turns around ammeter jaws. See Figure 7.
2. Disconnect lead from thermostat terminal Rh and connect to W1 as shown in Figure 7.
3. Obtain ammeter reading for calculating first-stage heat anticipator setting.
4. Reconnect W1 lead and disconnect W2 lead from thermostat.
5. Follow same procedure used above to obtain ammeter reading for calculating second-stage heat anticipator setting.
6. Reconnect W2 and Rh leads to thermostat terminals.

NOTE: The procedure for single-stage heating units is the same, except the leads from thermostat terminals W and 4-R are connected together.

NOTE: For accurate load calculations, the ammeter readings should be taken at the thermostat as shown in Figure 7. The thermostat hookup leads must be in the circuit when taking these readings.

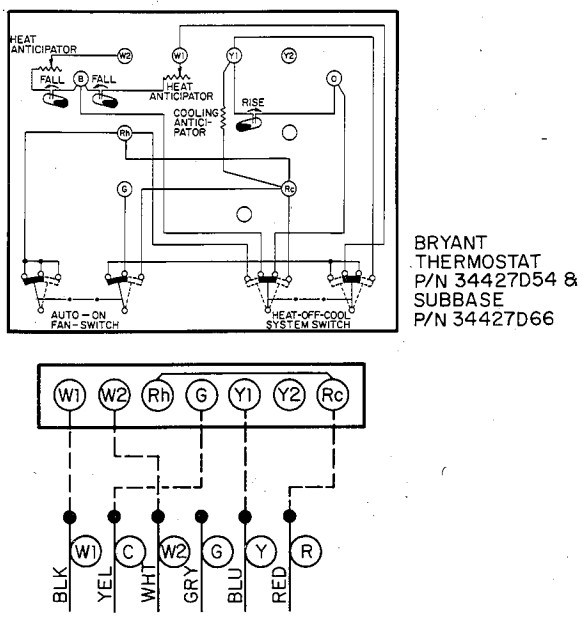
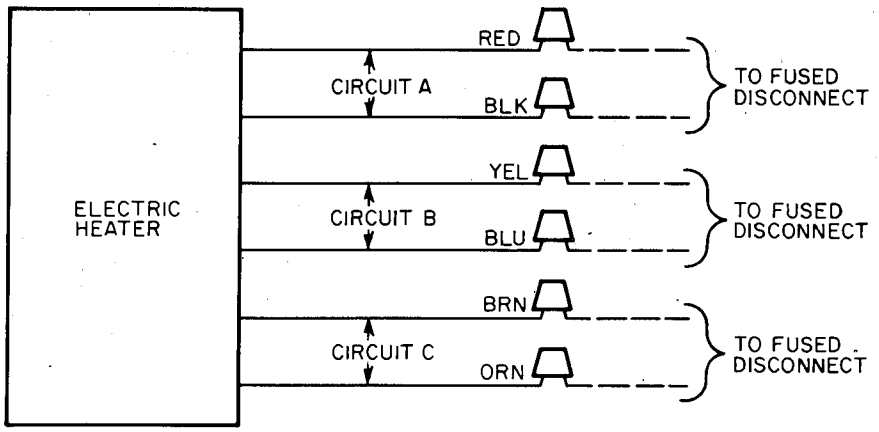


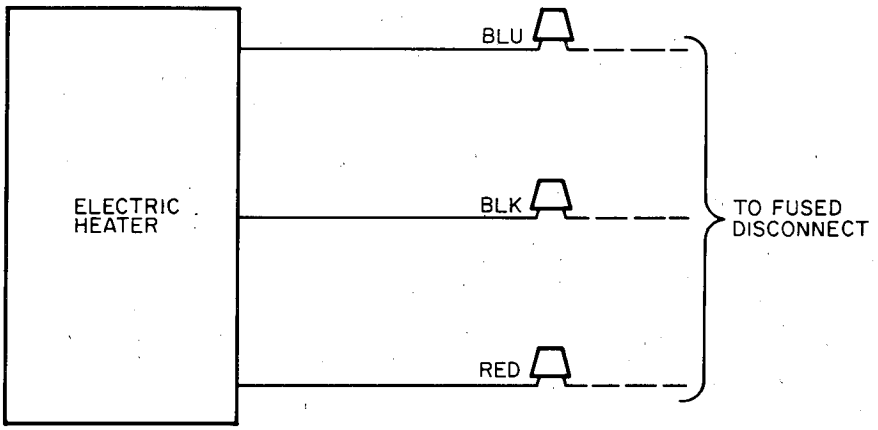
Figure 9—Cooling and Two-Stage Heating Thermostat Connections



KW	Voltage-Phase	Circuits Used		Wire Size*
5	240-1	1	A	10
7.5	240-1	1	A	8
10	240-1	1	A	6
15	240-1	2	A	6
			B	10
20	240-1	2	A	6
			B	6
25	240-1	3	A	6
			B	6
			C	10

*Based on 60°C copper wire. See Table II.

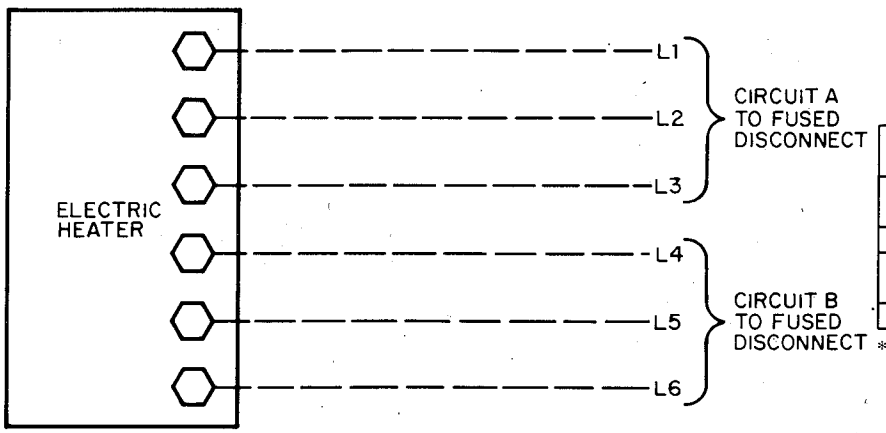
SINGLE-PHASE HEATERS



KW	Voltage-Phase	Circuits Used	Wire Size*
5.6/7.5	208/240-3	1	10/10
7.5/10	208/240-3	1	8/8
10.9/14.5	208/240-3	1	6/6
10	480-3	1	14

*Based on 60°C copper wire. See Table II.

THREE-PHASE HEATERS
(PIGTAIL CONNECTIONS)



KW	Voltage-Phase	Circuits Used		Wire Size*
25	208-3	2	A	6
			B	6
14.9/19.8	208/240-3	1	A	6/4
18.75/25	208/240-3	2	A	8/8
			B	8/8
20	480-3	1	A	10

*Based on 60°C copper wire. See Table II.

THREE-PHASE HEATERS
(TERMINAL BOARD CONNECTIONS)

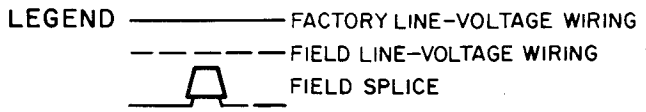


Figure 10—Line-Power Connections