Carrier®
HEATING & COOLING

38TDA
Two-Speed Air Conditioning Unit

Visit www.carrier.com

Installation and Start-Up Instructions

NOTE: Read the entire instruction manual before starting the installation.

This symbol → indicates a change since the last issue.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

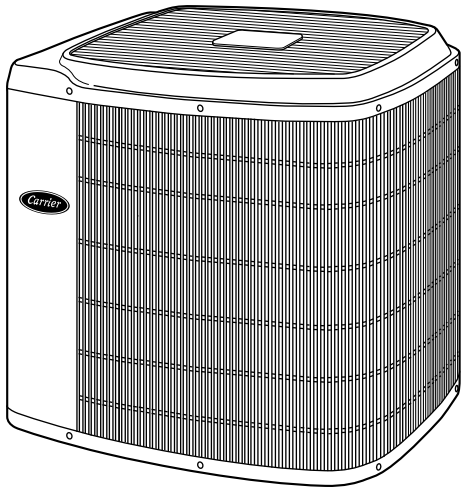
⚠ WARNING

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

INSTALLATION RECOMMENDATIONS

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

1. Locate unit away from windows, patios, decks, etc. where unit operation sound may disturb customer.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit.
3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between structure and unit to absorb vibration.
5. When passing refrigerant tubes through the wall, seal opening with RTV or other pliable silicon-based caulk. (See Fig. 2.)
6. Avoid direct tubing contact with water pipes, duct work, floor joists, wall studs, floors, and walls.



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→ **Fig. 1—Model 38TDA**

7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing. (See Fig. 2.)
8. Ensure that tubing insulation is pliable and completely surrounds vapor tube.
9. When necessary, use hanger straps which are 1 in. wide and conform to shape of tubing insulation. (See Fig. 2.)
10. Isolate hanger straps from insulation by using metal sleeves bent to conform to shape of insulation.

When outdoor unit is connected to factory-approved indoor unit, outdoor unit contains system refrigerant charge for operation with indoor unit of the same size when connected by 15 ft of field-supplied or factory accessory tubing. For proper unit operation, check refrigerant charge using charging information located on control box cover.

IMPORTANT: Maximum liquid-line size is 3/8-in. O.D. for all residential applications.

IMPORTANT: Always install a liquid-line filter drier. Refer to Product Data Sheet for appropriate part number. Obtain filter driers from your local dealer or branch.

INSTALLATION

Step 1—Check Equipment and Job Site

UNPACK UNIT

Move to final location. Remove carton taking care not to damage unit.

INSPECT EQUIPMENT

File claim with shipping company prior to installation if shipment is damaged or incomplete. Locate unit rating plate on unit corner panel. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

NOTE: Avoid contact between tubing and structure

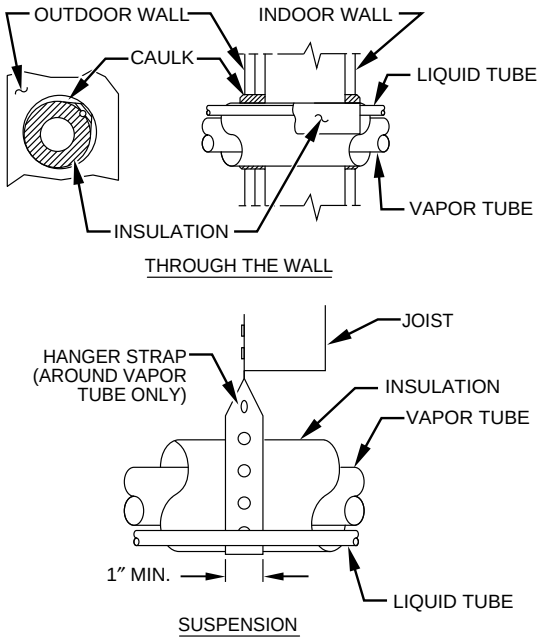

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Fig. 2—Connecting Tubing Installation

Step 2—Install on a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tie down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 3 to determine base pan size and knockout hole location.

On rooftop applications, mount on level platform or frame. Place unit above a load-bearing wall and isolate unit and tubing set from structure. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

Roof mounted units exposed to winds above 5 mph may require wind baffles. Consult Low-Ambient Guideline for wind baffle construction.

NOTE: Unit must be level to within ± 2° (± 3/8 in./ft) per compressor manufacturer specifications.

Step 3—Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 30-in. clearance to service end of unit and 48 in. above unit. For proper airflow, a 6-in. clearance on 1 side of unit and 12 in. on all remaining sides must be maintained. Maintain a distance of 24 in. between units. Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. above roof surface.

Step 4—Operating Ambients

The minimum outdoor operating ambient in cooling mode is 55°F, and the maximum outdoor operating ambient in cooling mode is 125°F.

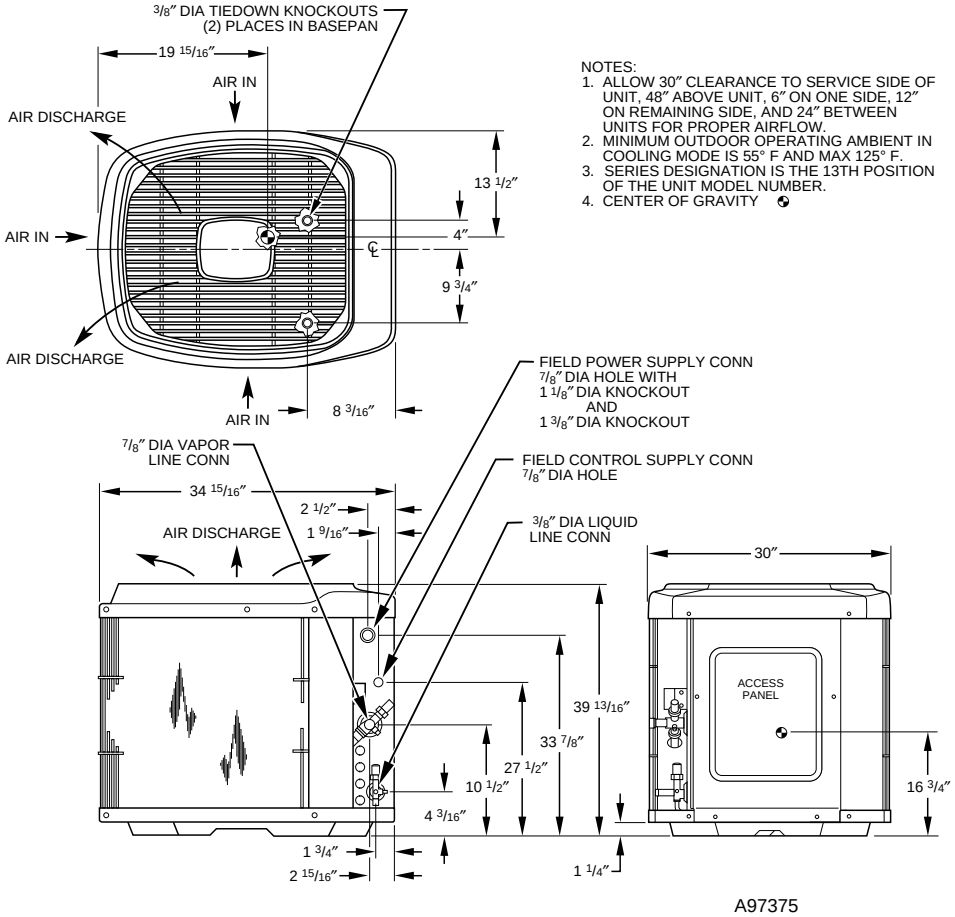

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Fig. 3—Unit Reference Drawing

Step 5—Remove Indoor AccuRater® Piston and Replace with TXV

⚠ CAUTION

For proper unit operation and reliability, the outdoor unit must be installed with the factory-supplied balance port, hard shutoff TXV. Do not install with evaporator coils having capillary tube metering devices.

After removing existing AccuRater® from indoor coil, install factory-supplied thermostatic expansion valve (TXV) kit. (See Fig. 4.) The kit is shipped inside the unit's compressor compartment. If unit is installed with an FK4 or FC4 fan coil, no TXV change is necessary since these fan coils are factory-equipped with proper TXV.

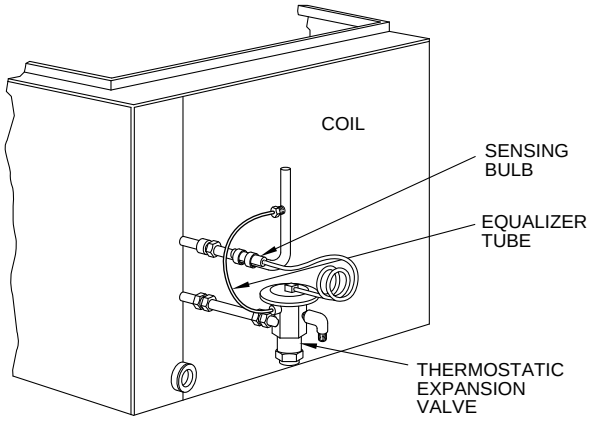

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Fig. 4—TXV Installed

Install TXV kit to indoor coil as follows:

1. Install suction tube adapter.
2. Install liquid flare-to-sweat adapter.
3. Install TXV on liquid flare-to-sweat adapter.
4. Connect external equalizer tube to fitting on suction tube adapter.
5. Position sensing bulb on horizontal portion of suction tube adapter. Secure using supplied hardware. Insulate bulb after installation. (See Fig. 5.)
6. Check all connections for leaks.

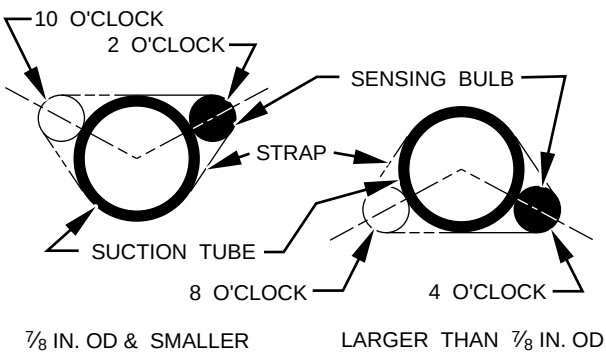

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Fig. 5—Positioning of Sensing Bulb

Step 6—Make Piping Connections

⚠ WARNING

Relieve pressure and recover all refrigerant before system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.

⚠ CAUTION

→ If ANY refrigerant tubing is buried, provide 6-in. vertical rise at service valve. Refrigerant tubing lengths up to 36 in. may be buried without further special consideration. For lengths above 36 in., consult your local distributor.

⚠ CAUTION

To prevent damage to unit or service valves observe the following:
- Use a brazing shield.
- Wrap service valves with wet cloth or use a heat sink material.

Outdoor units may be connected to indoor section using accessory tubing package or field-supplied refrigerant grade tubing of correct size and condition. Tubing diameters listed in Table 1 are adequate for equivalent lengths up to 100 ft. DO NOT INSTALL EQUIVALENT INTERCONNECTING TUBING LENGTHS GREATER THAN 100 FT. Do not increase or decrease interconnecting tubing diameters.

Table 1—Refrigerant Connections and Recommended Liquid and Vapor Tube Diameters (In.)

UNIT SIZE	LIQUID		VAPOR	
	Connection Diameter	Tube Diameter	Connection Diameter	Tube Diameter
036, 048	3/8	3/8	7/8	7/8
060	3/8	3/8	7/8	1-1/8

NOTES:
1. Tube diameters are for lengths up to 100 equivalent ft.
2. Do not increase or decrease tubing sizes.

If refrigerant tubes or indoor coil are exposed to atmosphere, they must be evacuated to 500 microns to eliminate contamination and moisture in the system.

OUTDOOR UNIT CONNECTED TO FACTORY-APPROVED INDOOR UNIT

See Product Data Sheet for factory-approved indoor units.

Outdoor unit contains correct system refrigerant charge for operation with indoor unit of same size when connected by 15 ft of field-supplied or factory-accessory tubing. Check refrigerant charge for maximum efficiency.

REFRIGERANT TUBING

Connect tubing to fittings on outdoor unit vapor and liquid service valves. (See Table 1.) Use refrigerant grade tubing.

SWEAT CONNECTION

⚠ CAUTION

To avoid valve damage while brazing, service valves must be wrapped in a heat-sinking material such as a wet cloth.

Service valves are closed from factory and ready for brazing. After wrapping service valve with a wet cloth, tubing set can be brazed

to service valve using either silver bearing or non-silver bearing brazing material. Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.

Step 7—Make Electrical Connections

⚠ WARNING

To avoid personal injury or death, do not supply power to unit with compressor terminal box cover removed.

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect of adequate size per NEC to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

ROUTE GROUND AND POWER WIRES

Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. Size wires per NEC but not smaller than minimum wire size shown in Product Data Sheet.

⚠ WARNING

The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. Failure to follow this warning can result in an electric shock, fire, or death.

CONNECT GROUND AND POWER WIRES

Connect ground wire to ground connection in control box for safety. Connect power wiring to leads provided as shown in Fig. 6.

CONNECT CONTROL WIRING

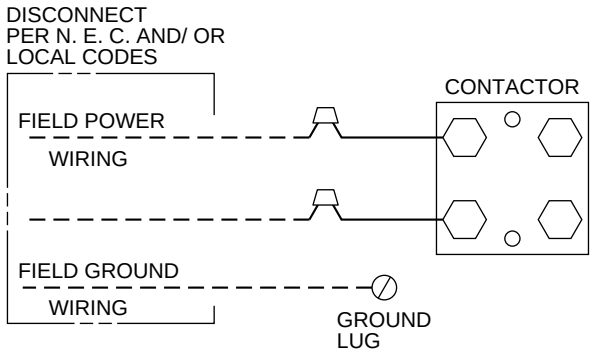


Fig. 6—Line Power Connections

Route 24-v control wires through control wiring grommet and connect to leads provided in control box. (See Table 2 and Fig. 7.)

Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 ft from unit, as measured along the control voltage wires, use No. 16 AWG color-coded wire to avoid excessive voltage drop.

All wiring must be NEC Class 1 and must be separated from incoming power leads.

The outdoor unit requires a minimum of 27-va, 24-vac control power.

IMPORTANT: Check factory wiring and wire connections to ensure terminations are secured properly. Check wire routing to ensure wires are not in contact with tubing, sheet metal, etc.

Step 8—Install Electrical Accessories

GENERAL

Refer to the individual instructions packaged with kits or accessories when installing.

⚠ CAUTION

Low-ambient kits are not available for 2-speed units. Do not attempt to operate below 55°F or modify control system for low-ambient operation. Compressor damage may occur.

Available electrical accessories include latent capacity control. See Table 2 and Fig. 7 for typical accessory wiring diagrams.

LATENT CAPACITY CONTROL (LCC)

The purpose of an LCC is to provide a dehumidification mode to assure a 75 percent or less system sensible heat ratio. If indoor unit installed contains an ICM blower (such as an FK4C fan coil or a 333(B,J)AV or 355MAV gas furnace), no LCC is required. Indoor products with ICM blowers have enough CFM range to provide proper airflow for low-speed cooling. If indoor unit installed has a standard PSC blower motor, the low-speed airflow available is too great to assure 75 percent or less system sensible heat ratio. The LCC for standard blower products consists of a standard humidistat which opens contacts on humidity rise and a pilot duty relay with 24-v coil.

NOTE: If an LCC is desired, low-speed airflow must be maintained so that a minimum of 300 CFM/ton can be supplied during high-speed LCC operation.

LCC Operation for Typical PSC Fan Coils

The standard blower operation for systems with typical PSC fan coils is covered in Fig. 7A, B, and D. The blower runs in high speed regardless if compressor operation is high or low speed. When the LCC is wired according to Fig. 7A, B, or D and humidity rises, the humidistat contacts open and de-energize the relay. If relay is de-energized, the system operates on high-speed compressor and high-speed airflow until humidistat closes. Fig. 7C shows the wiring with a Carrier Thermidistat which controls temperature and humidity level without the need for an additional humidistat and relay.

LCC Operation for Typical PSC Furnaces

The standard blower operation of systems with typical PSC furnaces is covered in Fig. 7J, K, M, N, P, or R. The blower runs in high or low speed in conjunction with compressor high- or low-speed operation. When the LCC is wired according to Fig. 7K, M, N, P, or R and humidity rises, the humidistat contacts open and de-energize the relay. If relay is de-energized, the system operates on high-speed compressor and low-speed airflow until humidistat closes. Fig. 7L and 7Q shows the wiring with a Carrier Thermidistat which controls temperature and humidity level without the need for an additional humidistat and relay.

Step 9—Make Airflow Selections

AIRFLOW SELECTION FOR 58UHV FURNACES

The 58UHV Non-Condensing Variable-Speed Furnaces provide high- and low-speed blower operation to match the capacities of compressor high and low speeds. To select recommended airflow, refer to Table 3 and the 58UHV Installation Instructions. These

settings are made on the furnace airflow selector board by moving the appropriate color-coded jumper wires. The ORANGE jumper wire should be set to the AC position for cooling only. The YELLOW COOL SIZE jumper is used to select airflow to match the needed tons of cooling. The BLUE CFM/TON jumper wire is used to select slight adjustments to airflow of 400, 350, or 315 CFM per ton. (See Table 3.)

AIRFLOW SELECTION FOR 355MAV FURNACES

The 58MVP Condensing Variable-Speed Furnaces provide high- and low-speed blower operation to match the capacities of compressor at high and low speeds. To select recommended airflow, refer to Table 4 and the 58MVP Installation Instructions. The 58MVP utilizes a control center that allows the installing technician to select proper airflows. For adjustments to the manual switches labeled A/C and CF and recommended switch positions, refer to Table 4. High-speed airflow is determined by the position of the A/C switches, and low-speed airflow is determined by the position of the CF switches. This furnace has a built-in, non-adjustable 90 sec off delay for cooling mode blower operation.

AIRFLOW SELECTION FOR FK4C FAN COILS

The FK4C provides high- and low-speed blower operation to match the capacities of compressor at high and low speeds. To select recommended airflow, refer to Table 5 and the FK4C Installation Instructions. The FK4C utilizes an EASY SELECT control board that allows the installing technician to select proper airflows. For adjustments to control board and recommended A/C SIZE and CFM ADJUST selections, refer to Table 5. This fan coil has an adjustable blower off delay factory set at 90 sec for high- and low-speed blower operation.

Step 10—Start-Up

⚠ CAUTION

To prevent compressor damage or personal injury, observe the following:
• Do not overcharge system with refrigerant.
• Do not operate unit in a vacuum or at negative pressure.
• Do not disable low-pressure switch.
In scroll compressor applications:
• Dome temperatures may be hot.
• In 3-phase application, incorrect phasing will cause reverse rotation, resulting in elevated noise levels, equalized pressures, and reduced current draw. Correct by reversing power connection L1 and L2 on contactor.

⚠ CAUTION

To prevent personal injury wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:
• Back seating service valves are not equipped with Schrader valves. Fully back seat (counter clockwise) valve stem before removing gage port cap.

⚠ CAUTION

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

1. The outdoor unit is equipped with a crankcase heater which operates at temperatures less than 75°F. If outdoor temperature is less than 75°F, energize crankcase heater 24 hr before starting unit. To energize heater only, set indoor thermostat to OFF position and close power disconnect to unit.
2. Fully back seat (open) liquid and vapor tube service valves.
3. Unit is shipped with valve stem(s) front seated and caps installed. Replace stem caps after system is opened to refrigerant flow (back seated). Replace caps finger tight and tighten additional 1/12 turn (20 ft-lb torque) with wrench.

Table 2—Wiring Diagram Reference

INDOOR PRODUCT	THERMOSTAT	CONTROLS	DIAGRAM LETTER IN FIG. 7
Standard Fan Coil	Carrier Programmable (Model 2S)	Latent Capacity	A
	Carrier Non-Programmable (Model 2S)	Latent Capacity	B
	Carrier Thermidistat™ Control	Humidifier and Outdoor Sensor	C
	Other Brand Models	Latent Capacity	D
FK4C Fan Coil	Carrier Programmable (Model 2S)	—	E
	Carrier Non-Programmable (Model 2S)	—	F
	Carrier Thermidistat™ Control	Humidifier and Outdoor Sensor	G
	Other Brand Models	—	H
Single-Stage Furnace	Carrier Programmable (Model 2S)	Latent Capacity	J
	Carrier Non-Programmable (Model 2S)	Latent Capacity	K
	Carrier Thermidistat™ Control	Humidifier and Outdoor Sensor	L
	Other Brand Models	Latent Capacity	M
Two-Stage Furnace with PSC Blower Motor	Carrier Programmable (Model 2S)	Latent Capacity	N
	Carrier Non-Programmable (Model 2S)	Latent Capacity	P
	Carrier Thermidistat™ Control	Humidifier and Outdoor Sensor	Q
	Other Brand Models	Latent Capacity	R
Two-Stage Furnace with ICM Blower Motor	Carrier Programmable (Model 2S)	—	S
	Carrier Non-Programmable (Model 2S)	—	T
	Other Brand Models	—	U
Variable-Speed 80% Non-Condensing Furnace	Carrier Thermidistat™ Control	Humidifier and Outdoor Sensor	V
Variable-Speed Condensing Furnace	Carrier Thermidistat™ Control	Humidifier and Outdoor Sensor	W

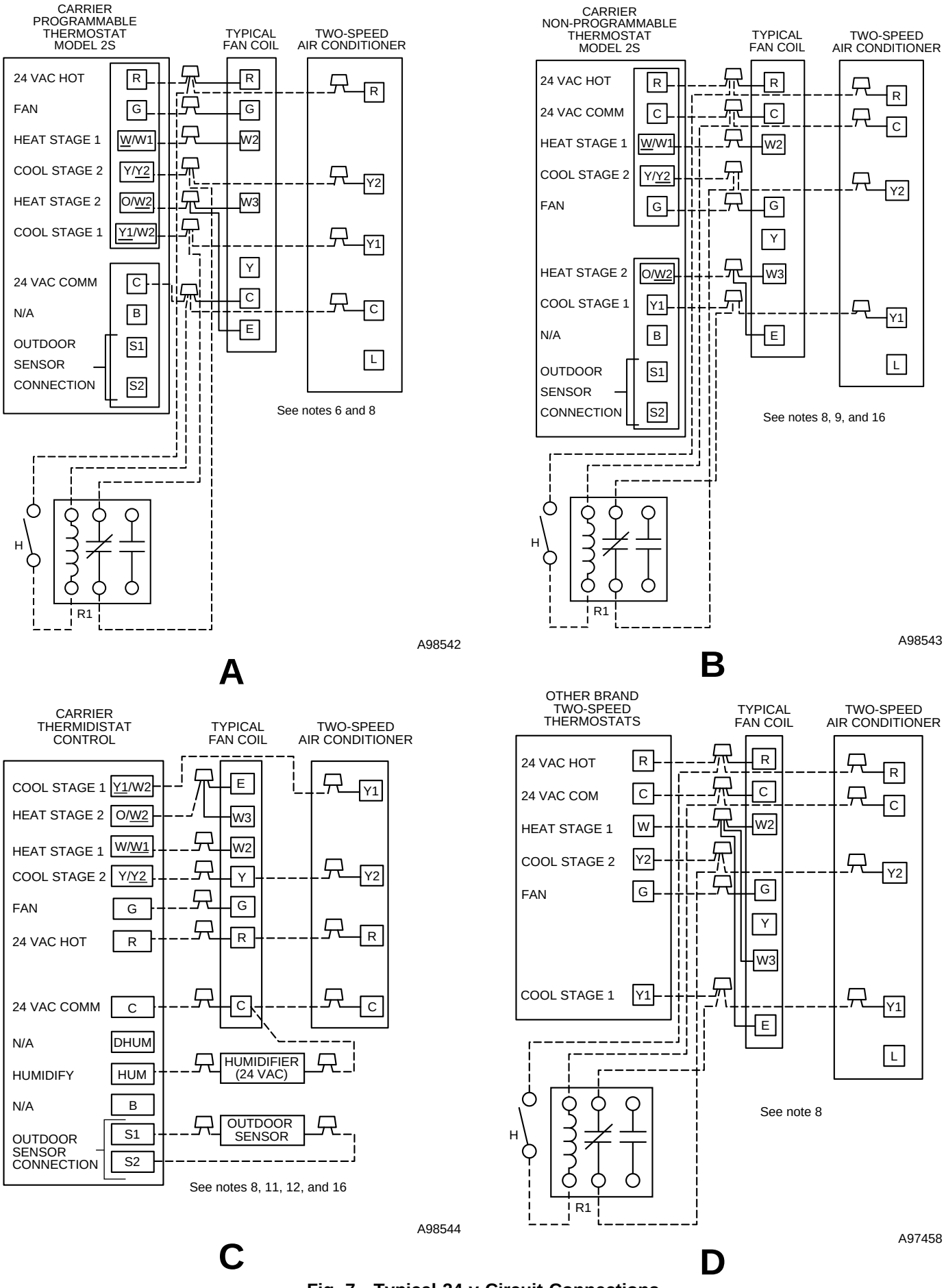
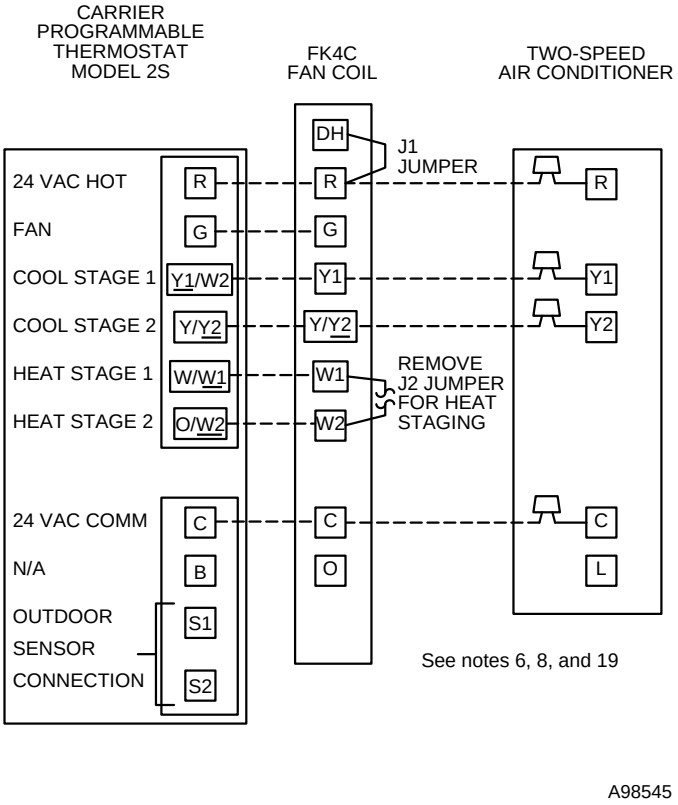


Fig. 7—Typical 24-v Circuit Connections



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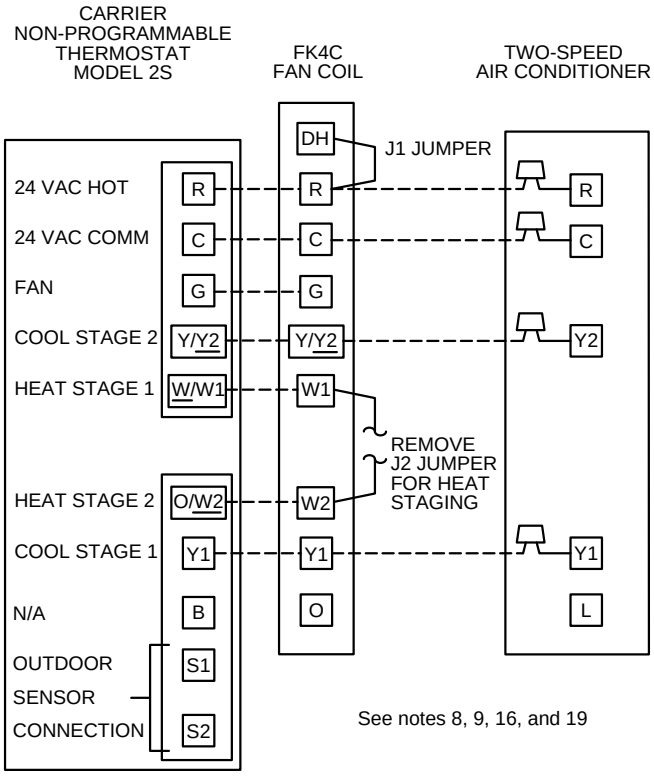

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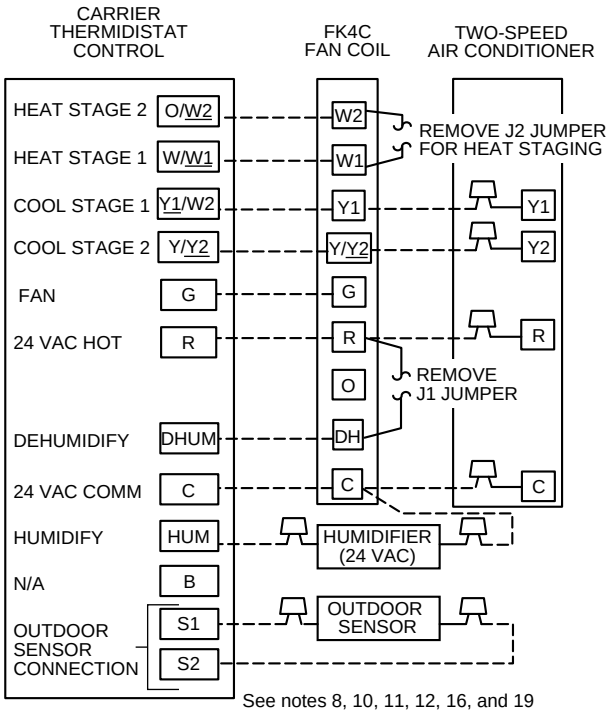

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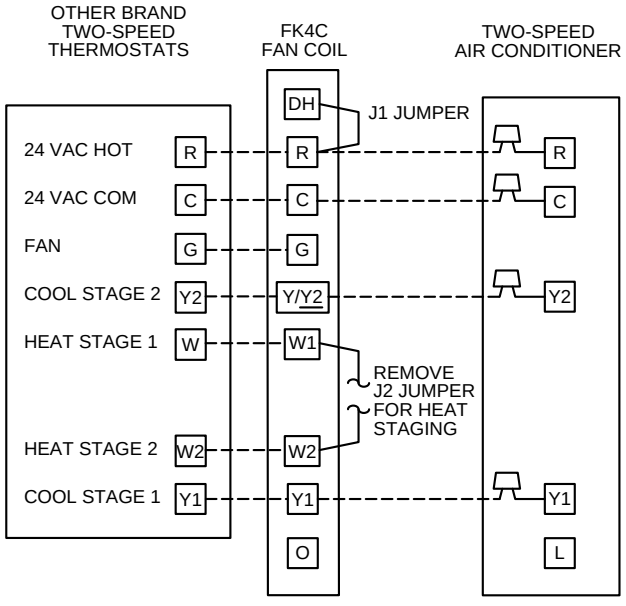

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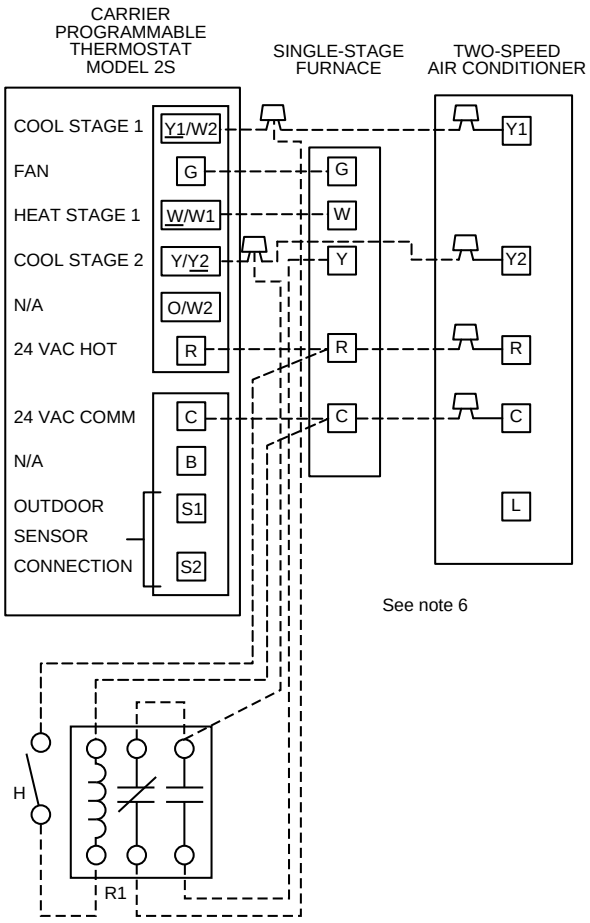
Fig. 7—Typical 24-v Circuit Connections (Continued)



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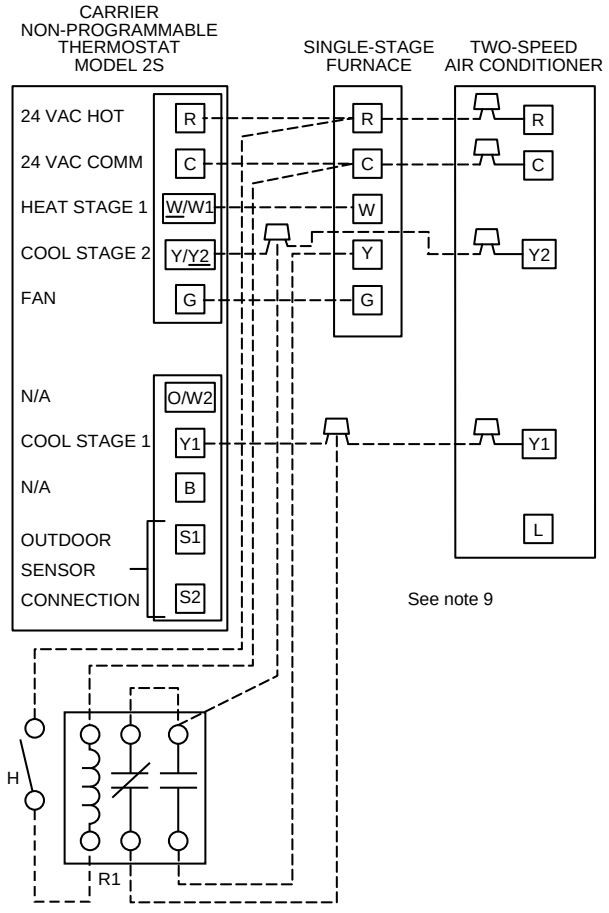

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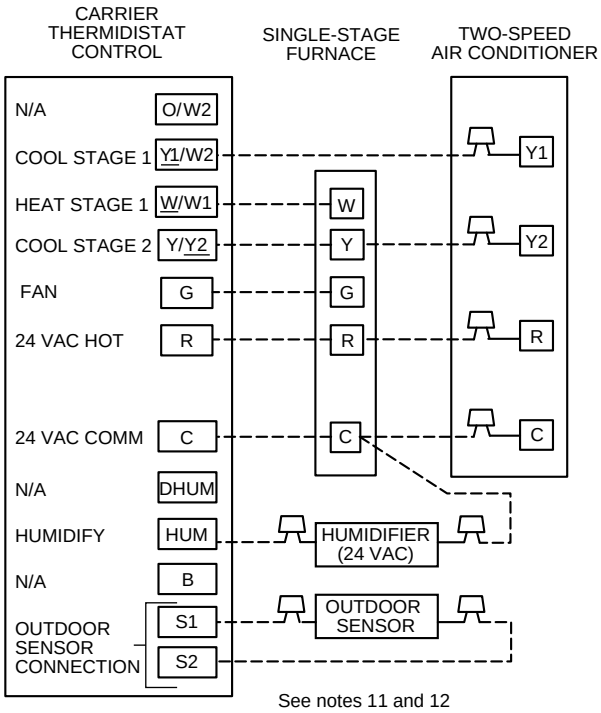

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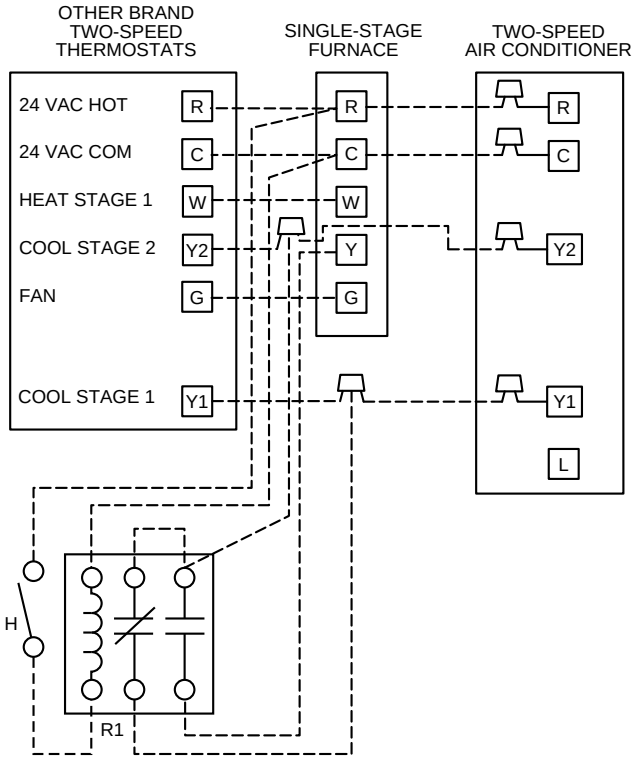

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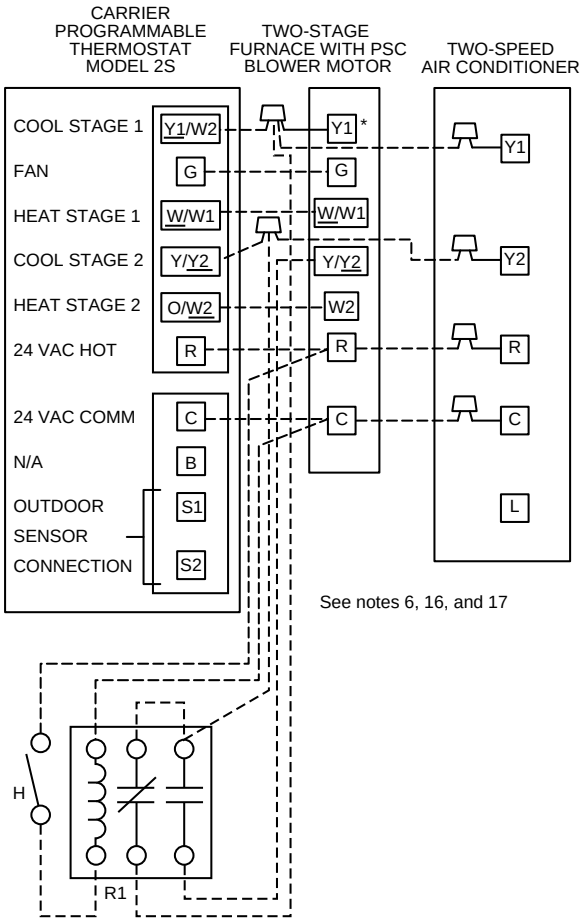
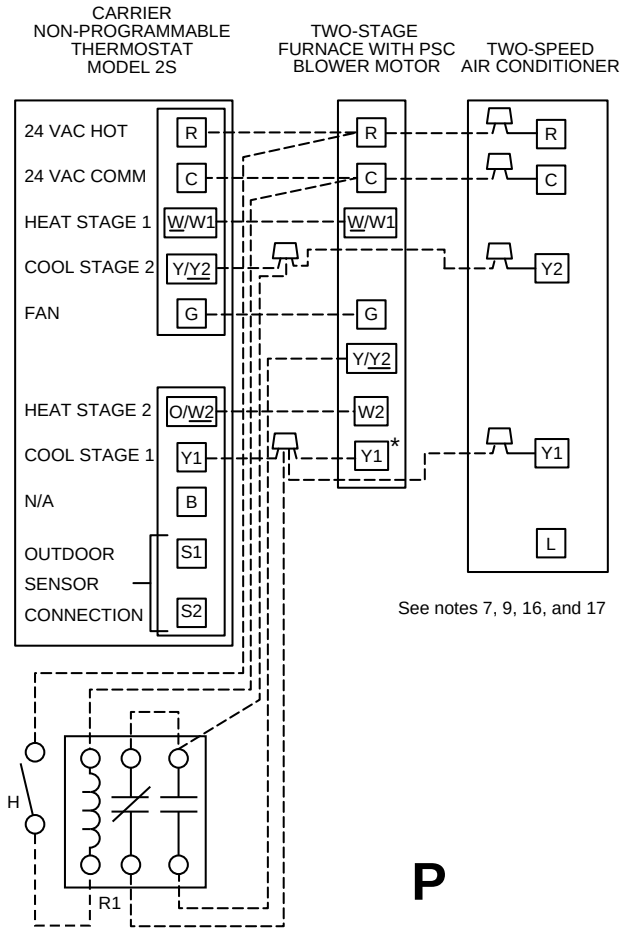
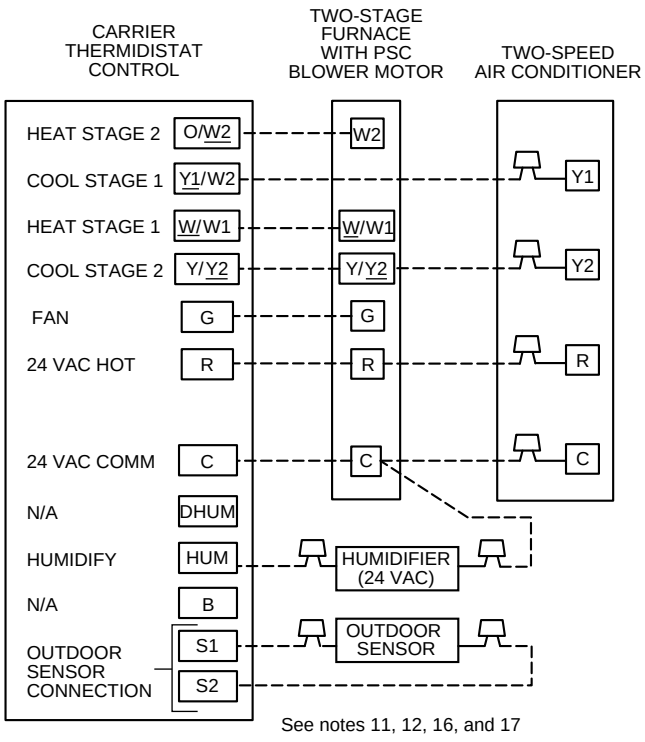






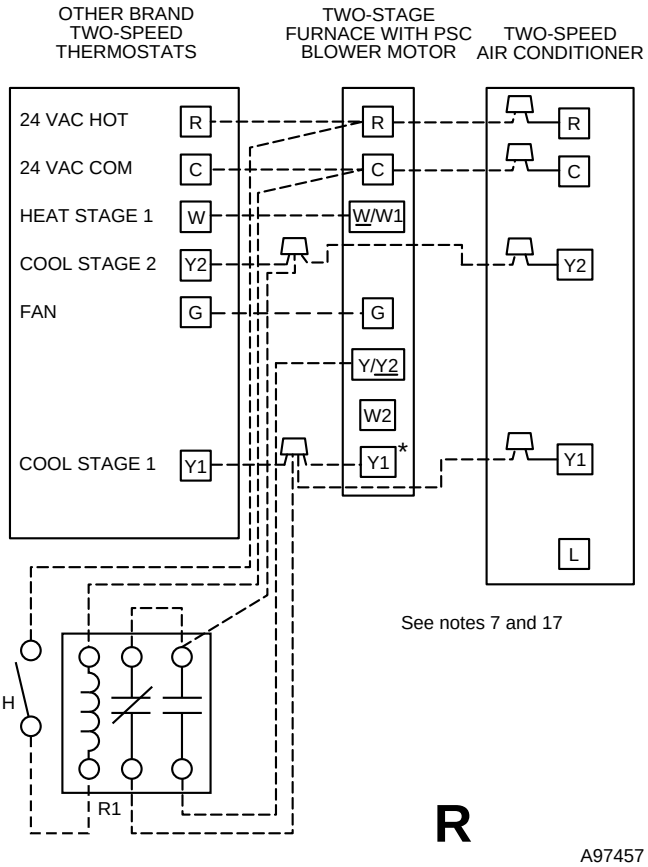
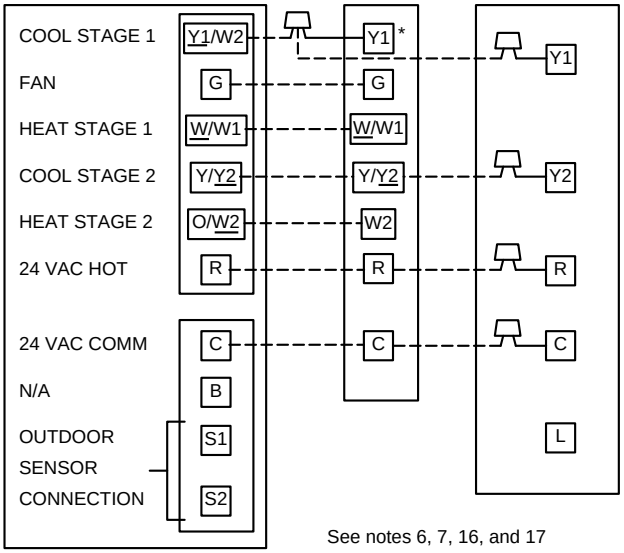


Fig. 7—Typical 24-v Circuit Connections (Continued)



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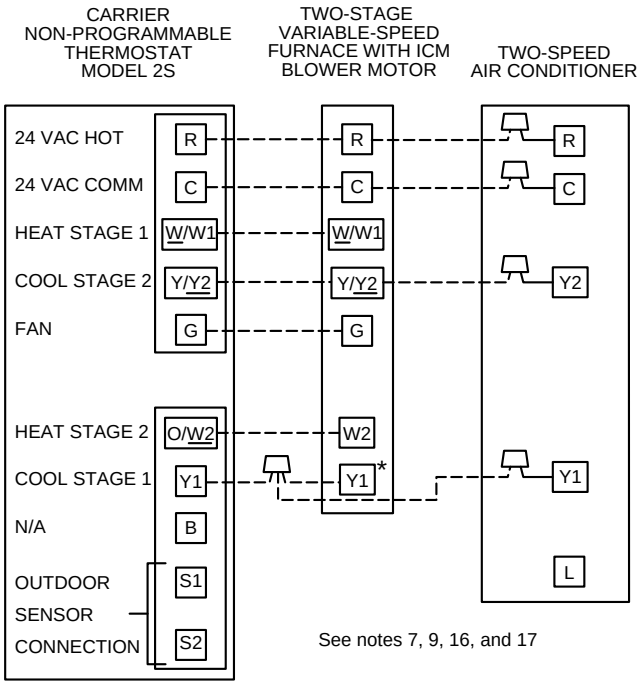

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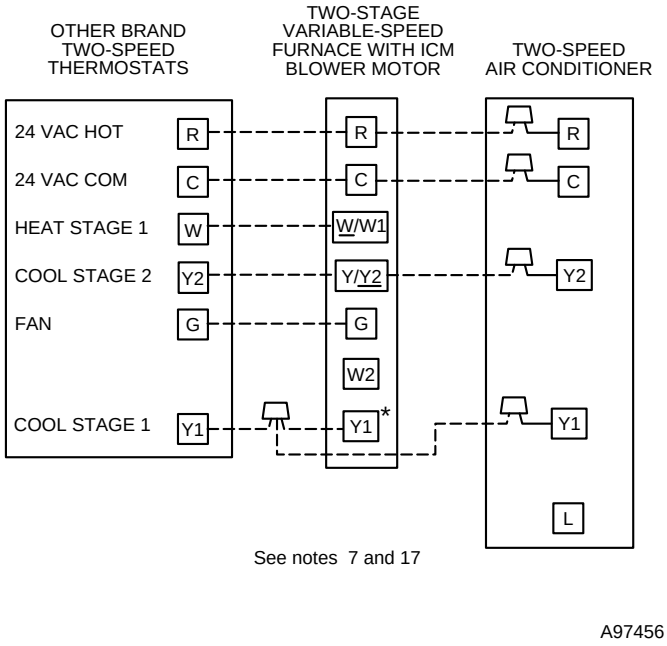

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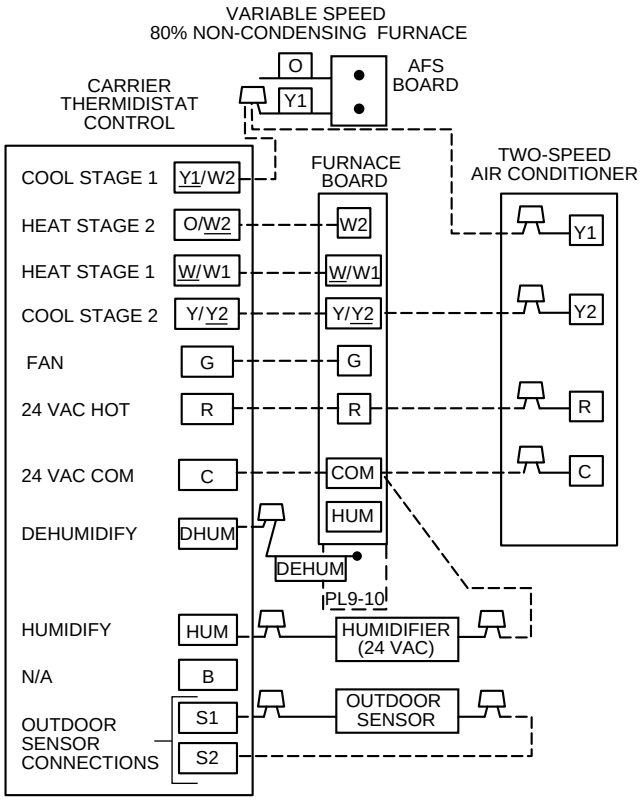

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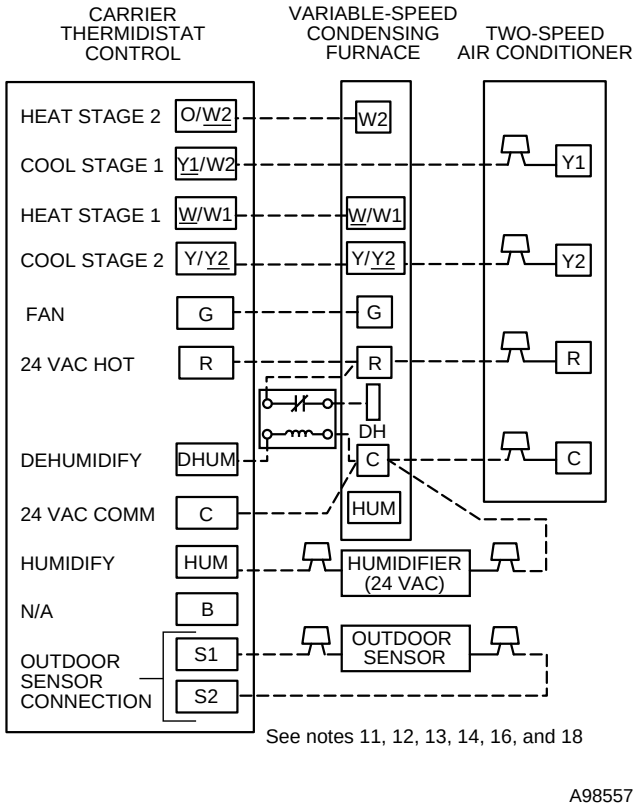

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Fig. 7—Typical 24-v Circuit Connections (Continued)

WIRING DIAGRAM NOTES:

1. CARRIER THERMOSTAT WIRING DIAGRAMS ARE ONLY ACCURATE FOR MODEL NUMBERS BEGINNING WITH TSTAT _ _ _ _ _ _.
2. WIRING MUST CONFORM TO NEC OR LOCAL CODES.
3. CONNECT 24-V FIELD WIRING TO FACTORY-PROVIDED STRIPPED LEADS.
4. THERMOSTATS ARE FACTORY CONFIGURED WITH 5-MINUTE COMPRESSOR CYCLE PROTECTION AND 4 CYCLES PER HR LIMIT. SEE THERMOSTAT INSTALLATION INSTRUCTIONS FOR DETAILS.
5. TO STAGE ELECTRIC RESISTANCE HEAT, CONSULT OUTDOOR THERMOSTAT INSTALLATION INSTRUCTIONS.
6. WHEN USED IN TWO-SPEED AIR CONDITIONER INSTALLATIONS THERMOSTAT DIP SWITCH C SHOULD BE IN THE "ON" POSITION. IN THIS CONFIGURATION, O/W2 IS USED TO CONTROL SECOND-STAGE HEAT.
7. TERMINALS MARKED WITH AN * MAY NOT BE PRESENT ON EQUIPMENT.
8. REFER TO FAN COIL INSTALLATION INSTRUCTIONS FOR FEATURES AND ADDITIONAL WIRING INFORMATION.
9. CUT AND REMOVE R19 JUMPER AT THERMOSTAT TO CONVERT TO AIR CONDITIONER OPERATION.
10. TO ACTIVATE DEHUMIDIFY FUNCTION ON FK4C, REMOVE J1 JUMPER AT FAN COIL CONTROL BOARD.
11. THERMIDISTAT DIP SWITCH 1 SHOULD BE SET IN THE "OFF" POSITION FOR AIR CONDITIONER INSTALLATIONS. THIS IS THE FACTORY DEFAULT.
12. THERMIDISTAT DIP SWITCH 2 SHOULD BE SET IN THE "ON" POSITION FOR 2-SPEED COMPRESSOR OPERATION.
13. REFER TO INDOOR EQUIPMENT INSTALLATION INSTRUCTIONS FOR PROPER SETUP.
14. TO ACTIVATE DEHUMIDIFY FEATURE ON CURRENT STYLE VARIABLE-SPEED FURNACES (58MVP), A PILOT DUTY, 24-V RELAY MUST BE USED.
15. TO ACTIVATE DEHUMIDIFY FEATURE ON CURRENT STYLE VARIABLE-SPEED 80% NON-CONDENSING FURNACES (58UHV), DISCONNECT GREEN (DEHUM) WIRE FROM G ON FURNACE CONTROL BOARD AND CONNECT TO DEHUMIDIFY TERMINAL DHU ON THERMIDISTAT.
16. AS AN OPTION, O/W2 CAN CONTROL SECOND-STAGE HEAT.
17. SEE TABLE 3—AIRFLOW SELECTION FOR 58UHV FURNACES.
18. SEE TABLE 4—AIRFLOW SELECTION FOR 58MVP FURNACES.
19. SEE TABLE 5—AIRFLOW SELECTION FOR FK4C FAN COILS.

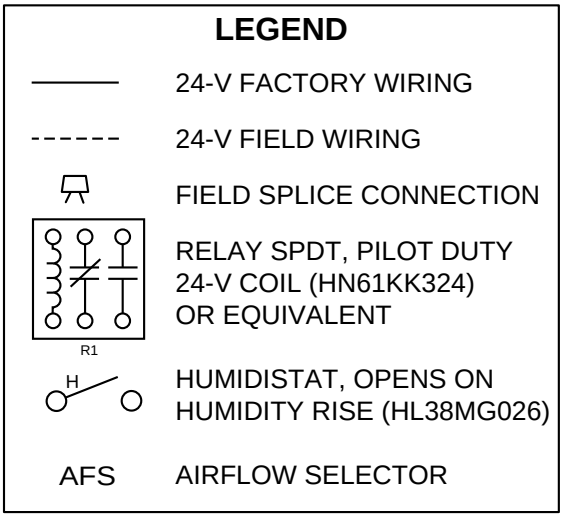

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Table 3—Airflow Selection for 58UHV Furnaces (CFM)

38TDA UNIT SIZE	FURNACE MODEL/HEATING SIZE	FURNACE AIRFLOW SELECTION BOARD SETTINGS							
		AC/HP Jumper Position	Cool Size Jumper Position	Cool CFM Per Ton Jumper Position					
				400		350		315	
				High	Low	High	Low	High	Low
036	060	AC	HI	1260	780	1100	680	990	585
	080	AC	M-LO	1260	790	1100	700	990	625
	100	AC	LO	1260	780	1090	775	990	700
	120	AC	LO	1195	865	1085	785	985	785
048	080	AC	HI	1635	1040	1470	915	1325	820
	100	AC	M-HI	1680	1040	1465	915	1325	820
	120	AC	M-HI	1650	1070	1465	975	1315	930
060	100	AC	HI	1085	1300	1840	1150	1655	1025
	120	AC	HI	2110	1300	1865	1140	1640	1080

Table 4—Airflow Selection for 58MVP Furnaces (CFM)

38TDA UNIT SIZE	HIGH-SPEED A/C SETUP SWITCH POSITION			FURNACE MODEL/HEATING SIZE						LOW-SPEED CF SETUP SWITCH POSITION		
				060		080		100				
	A/C-1	A/C-2	A/C-3	High	Low	High	Low	High	Low	CF-1	CF-2	CF-3
036	OFF	OFF	ON	1200	800	1200	800	1200	800	OFF	ON	OFF
048	OFF	ON	ON	—	—	—	—	1600	1000	ON	ON	OFF
060	OFF	ON	ON	—	—	—	—	1600*	1000	ON	ON	OFF

* Efficiency rating obtained at 1600 CFM. If 2000 CFM is desired, adjust airflow per 355MAV Installation Instructions.

Table 5—Airflow Selection for FK4C Fan Coils (CFM)

38TDA UNIT SIZE	FK4C	EASY SELECT CONTROL BOARD			CFM*	
		SYSTEM TYPE (Orange Wire)	A/C SIZE (Blue Wire)	AC/HP CFM ADJUST (Black Wire)	High	Low
036	001	AC	036	NOM	1100	680
	002	AC	036	NOM	1100	680
	003	AC	036	NOM	1100	680
	005	AC	036	NOM	1100	680
	006	AC	036	NOM	1100	745
048	005	AC	048	NOM	1470	910
	006	AC	048	NOM	1470	995
060	006	AC	060	NOM	1835	1240

* Airflow CFMs are given with AC/HP CFM ADJUST jumper set at NOM. Airflow can be adjusted +15% or -10% by selecting HI or LO respectively.

4. Close electrical disconnects to energize system.
5. Set room thermostat at desired temperature. Be sure set point is below indoor ambient and is set low enough to energize desired speed.

NOTE: Carrier electronic thermostats are equipped with a 15-minute staging timer. This timer prevents the 2-speed system from operating at high speed until unit has been operating in low speed for 15 minutes unless there is at least a 5°F difference between room temperature and thermostat set point. To force high speed (after a minimum of 2 minutes in low speed), adjust the set point at least 5° below room ambient.

6. Set room thermostat to COOL and fan control to AUTO or ON as desired. Wait for appropriate time delay(s) and 2-minute minimum low-speed run time. Operate unit for 15 minutes. Check refrigerant charge.

Step 11—Check Charge

⚠ WARNING

Service valve gage ports are not equipped with Schrader valves. To prevent personal injury, make sure gage manifold is connected to the valve gage ports before moving valves off fully back seated position. Wear safety glasses and gloves when handling refrigerant.

UNIT CHARGE

Factory charge is shown on unit rating plate.

NOTE: When 2-speed unit is operating at low speed, system vapor (suction) pressure will be higher than a standard single-speed system or high-speed operation. This normal operation is due to the reduced capacity operating with typically larger indoor and outdoor coils.

Adjust charge by following procedure shown on charging tables located on unit.

NOTE: If superheat or subcooling charging conditions are not favorable, charge must be weighed in accordance with unit rating plate ± 0.6 oz/ft of 3/8-in. liquid line above or below 15 ft respectively.

EXAMPLE:

25 ft - 15 ft = 10 ft X 0.6 oz/ft = 6 oz of additional charge

COOLING ONLY PROCEDURE

1. Operate unit a minimum of 10 minutes before checking charge.
2. Measure liquid service valve pressure by attaching an accurate gage to service port.
3. Measure liquid line temperature by attaching an accurate thermistor type or electronic thermometer to liquid line near outdoor coil.
4. Refer to unit rating plate for required subcooling temperature.
5. Refer to Table 6. Find the point where required subcooling temperature intersects measured liquid service valve pressure.
6. To obtain required subcooling temperature at a specific liquid line pressure, add refrigerant if liquid line temperature is higher than indicated or reclaim refrigerant if temperature is lower. Allow a tolerance of ± 3°F.

Table 6—Required Liquid-Line Temperature (°F)

LIQUID PRESSURE AT SERVICE VALVE (PSIG)	REQUIRED SUBCOOLING TEMPERATURE (°F)			
	5	10	15	20
134	71	66	61	56
141	74	69	64	59
148	77	72	67	62
156	80	75	70	65
163	83	78	73	68
171	86	81	76	71
179	89	84	79	74
187	92	87	82	77
196	95	90	85	80
205	98	93	88	83
214	101	96	91	86
223	104	99	94	89
233	107	102	97	92
243	110	105	100	95
253	113	108	103	98
264	116	111	106	101
274	119	114	109	104
285	122	117	112	107
297	125	120	115	110
309	128	123	118	113
321	131	126	121	116
331	134	129	124	119
346	137	132	127	122
359	140	135	130	125

Step 12—System Functions and Sequence of Operation

The outdoor unit control system has special functions. The following is an overview of the 2-speed control functions:

COOLING OPERATION

This product utilizes a 2-stage cooling indoor thermostat. With a call for first stage cooling (Y1), the outdoor fan and low-speed compressor are energized. If low speed cannot satisfy cooling demand, high speed is energized (Y1 and Y2) by the second stage of indoor thermostat. After second stage is satisfied, the unit returns to low-speed operation until first stage is satisfied or until second stage is required again.

LED FUNCTION LIGHTS

System control function LED indicator lights are available at the outdoor unit 2-speed control board. The indoor thermostat provides indicator signals for high- and low-speed operation and system malfunction (if equipped to do so). The 2-speed control board has an LED which provides signals for several system operations. See Table 7 for LED functions and definitions. Table 7 also provides the order of signal importance if more than 1 signal should occur. If equipped and properly wired, a signal to indoor thermostat is supplied by the low-voltage L lead.

NOTE: A signal (code) is sent through the L lead to thermostat unless a failure has occurred.

Table 7—Control Function LED Code

CODE	DEFINITION	SIGNAL IMPORTANCE*
Constant flash No pause	No demand Stand by	9
1 flash w/pause	Low-speed operation	8
2 flashes w/pause	High-speed operation	7
3 flashes w/pause	Outdoor thermistor failure	6
4 flashes w/pause	Used for heat pump only Outdoor coil thermistor failure	5
3 flashes pause 4 flashes	Used for heat pump only Thermistor out of range	4
5 flashes w/pause	Pressure switch trip (LM1/LM2)	3
6 flashes w/pause	Compressor PTC's out of limit	2
Constant light No Pause No Flash	Board failure	1

* Function light signal order of importance in case of multiple signal request; 1 is most important.

3-SEC TIME DELAY

Any time the control receives a 24-v input, such as Y1 or Y2, there is a 3-sec time delay before control function is initiated. This helps prevent nuisance trips from thermostat jiggling.

1-MINUTE SPEED CHANGE TIME DELAY

When compressor changes speeds from high to low or low to high, there is a 1-minute time delay before compressor restarts. The outdoor fan motor remains running.

5-MINUTE TIME DELAY

The 2-speed control logic contains a 5-minute time delay that prevents unit from short cycling after a thermostat off cycle or power interruption. The unit can be forced to operate immediately by momentarily touching a jumper between speed-up terminals of control board. (See Fig. 8.) The speed-up feature does not bypass any other function or time delay.

2-MINUTE LOW-SPEED MINIMUM

If unit has not operated within the past 30 minutes, upon the next thermostat high- or low-speed demand, unit operates for a minimum of 2 minutes in low speed.

CRANKCASE HEATER OPERATION

The 2-speed control energizes crankcase heater during unit off cycle when outdoor ambient is below 75°F.

OUTDOOR FAN MOTOR OPERATION

The 2-speed control energizes outdoor fan anytime compressor is operating. The outdoor fan remains energized during the 1-minute speed change time delay and if a pressure switch or compressor PTC overload should trip.

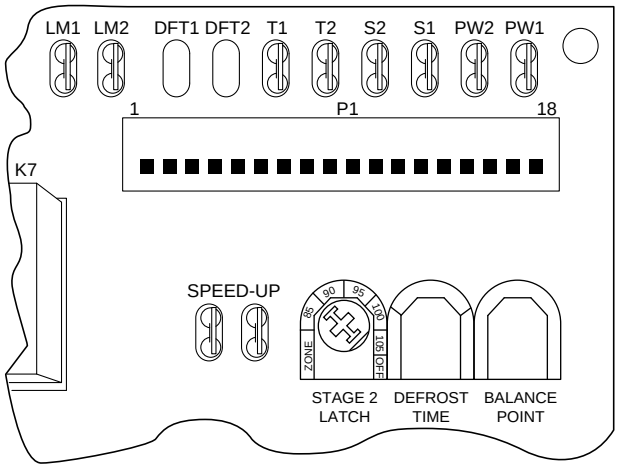

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Fig. 8—Two-Speed Control Board

SECOND-STAGE LATCHING

Mechanical thermostats operate with a staging differential of 2°F (droop). Carrier electronic thermostats are droopless, meaning that they maintain room temperature at set point without latching second stage. If system is installed with a mechanical thermostat or second stage latching is desired, the following information applies.

During normal operation, the compressor operates at low speed to satisfy first stage of indoor thermostat. If indoor thermostat temperature increases 2 degrees, the compressor shifts into high-speed operation. When indoor thermostat temperature is satisfied, the compressor returns to low-speed, first-stage operation.

The installing technician can select high-speed compressor operation until first stage of indoor thermostat is satisfied. This eliminates the temperature droop of indoor thermostat between first- and second-stage operation and holds room temperature closer to set point when load requirements are high. To select this option, rotate the STAGE 2 LATCH potentiometer (pot) to desired temperature. (See Fig. 9). The pot is factory set at OFF; however, a temperature of 85°, 90°, 95°, 100°, or 105°F can be selected. The selected temperature is the outdoor temperature at which the structure's cooling load requires high-speed operation.

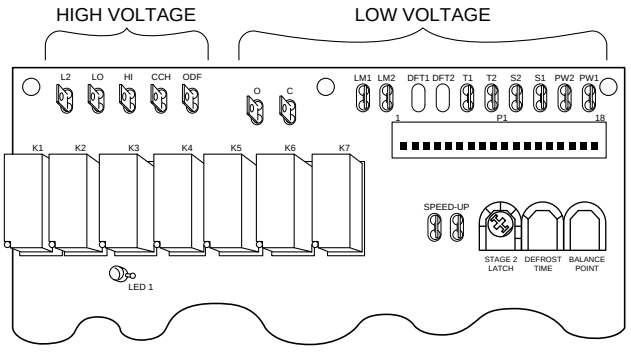

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Fig. 9—LED and Potentiometer Location

The unit's capacities should be plotted versus cooling load (heat gain) of structure to accurately determine the STAGE 2 LATCH temperature to be selected. The unit's capacities versus outdoor temperature can be found in presale literature. The cooling load must be taken from structure's heat gain/loss calculations. The selected temperature is the point at which high-speed capacity is needed and is just above the low-speed balance point. (See Fig. 10.)

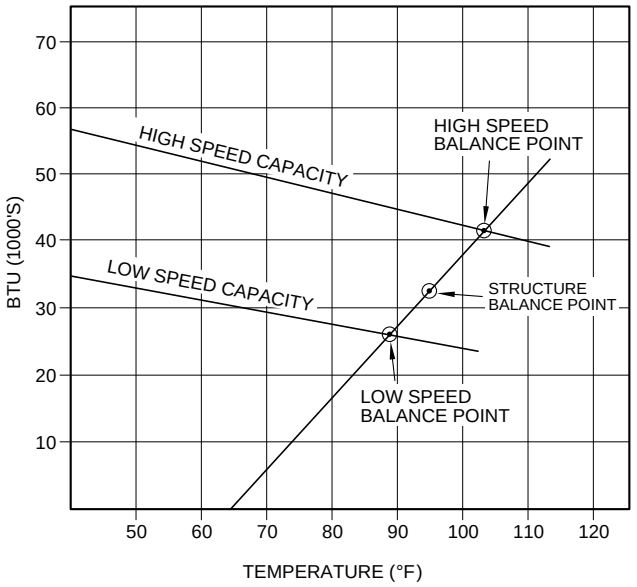

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Fig. 10—Typical Cooling Balance Points

After the temperature is selected, unit operates in high speed during first-stage demand at any temperature at or above the setting.

COMPRESSOR PTC OVERLOAD PROTECTION

The control senses the resistance of the compressor internal positive temperature coefficient (PTC) overloads. If PTC resistance is out of range, control shuts off the unit until resistance range is acceptable. See Table 8 for compressor PTC ranges.

Table 8—Compressor PTC Ranges

COMPRESSOR INTERNAL PTC RESISTANCE	
Safe range (77°F)	1.5k to 7.8k ohms
To trip	26k to 34k ohms
To reset	8.4k to 10k ohms

When the control turns outdoor unit off due to out of range PTCs, the unit remains off for 15 minutes with outdoor fan running. After 15 minutes, the control checks resistance every 5 minutes until it reaches the reset range. During this time, a malfunction signal appears at control board. If a PTC trip occurs 3 times, the control locks out outdoor unit operation and provides a malfunction signal at control and indoor thermostat.

PRESSURE SWITCH PROTECTION

The outdoor unit is equipped with high- and low-pressure switches, wired in series. If the control senses the opening of a pressure switch, it provides a 5-minute time delay in outdoor unit operation with outdoor fan running. A malfunction signal appears on control when pressure switch opens. If pressure switch remains open for 1 hr or longer, a malfunction signal is provided at L terminal on indoor thermostat.

⚠ WARNING

Interlocked contactor coils are 240v, high voltage. Electrical shock can cause personal injury or death.

⚠ CAUTION

Do not bypass interlocks of contactors, as compressor damage will occur.

MAJOR COMPONENTS

2-Speed Control

The 2-speed control board controls the following functions:
- High- and low-compressor contactor operation
- Outdoor fan motor operation
- Crankcase heater operation
- Compressor protection
- Pressure switch monitoring
- Second-stage latching
- Time delays
- 5-minute time delay speed-up (bypass)

Refer to the System Functions section for individual function information.

Header Pin Housing

The header pin housing is the plastic assembly which holds the stripped lead ends for field connections. The 2-speed control receives 24-vac low-voltage control system inputs through the housing/pins. The housing also contains jumpers which the control uses for system configuration, such as heat pump versus air conditioner. Refer to Fig. 11 for header pin housing configuration.

2-Speed Compressor

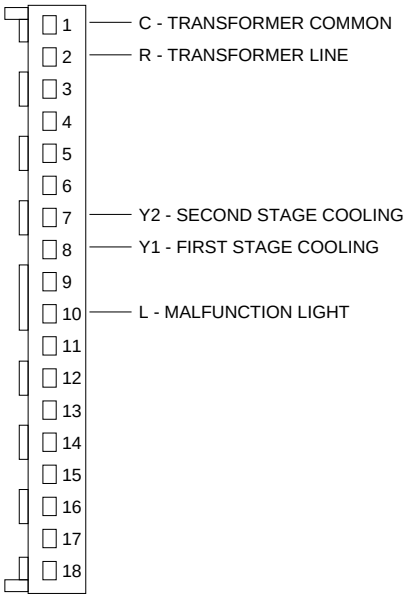

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Fig. 11—Header Pin Housing Configuration

The 2-speed compressor contains motor windings that provide low-speed, 4 pole (1750 RPM) and high-speed, 2-pole (3500 RPM) operation. Refer to Table 9 for appropriate winding resistances. Refer to unit wiring label for winding configurations.

The 2-speed compressor is protected by an internal pressure relief (IPR) which relieves discharge gas into compressor shell when differential between suction and discharge pressures exceeds 500 psi.

The compressor is also protected by 3 PTC devices attached to motor windings. The PTC resistance is sensed by the 2-speed control. See Table 8 for resistance ranges.

Table 9—Two-Speed Compressor (Winding Resistance at 70°F ± 20°)

WINDING	3 TON	4 TON	5 TON
T1-T2	0.80	0.70	0.60
T1-T3	3.20	2.20	1.80
T1-T7	1.30	1.00	1.00
T1-T8	3.10	2.20	2.00

Mechanically Interlocked Contactors

The 2-speed products are equipped with mechanically interlocked contactors. Each contactor has interconnecting linkage, providing independent interlocks.

The 2-speed control provides the electrical interlock. The contactors are supplied with 240-v coils, which reduce the va requirements of low-voltage (24-vac) control system.

Temperature Thermistors

Thermistors are electronic devices which sense temperature. As the temperature increases, the resistance decreases. A thermistor is used to sense outdoor ambient. Refer to Fig. 12 for resistance values versus temperature.

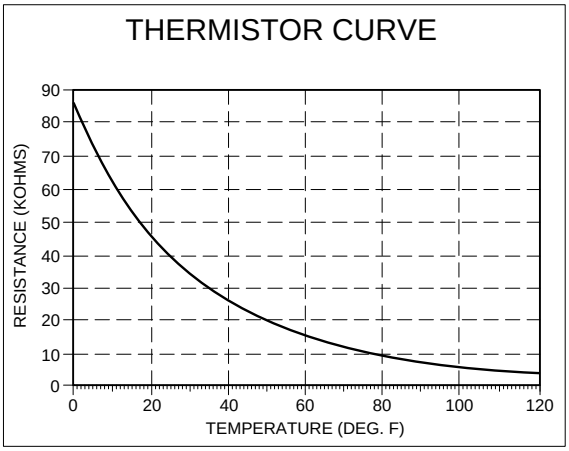

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Fig. 12—Resistance Values Versus Temperature

If the outdoor ambient thermistor should fail, a malfunction signal appears on indoor thermostat and 2-speed control. The control does not initiate second-stage latching, and crankcase heater is turned on during all off cycles.

Step 13—Final Checks

IMPORTANT: Before leaving job, be sure to do the following:

1. Securely fasten all panels and covers.
2. Tighten service valve stem caps to 1/12-turn past finger tight.
3. Leave User's Manual with owner. Explain system operation and periodic maintenance requirements outlined in manual.
4. Fill out Dealer Installation Checklist and place in customer file.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

Frequency of maintenance may vary depending upon geographic areas, such as coastal applications.