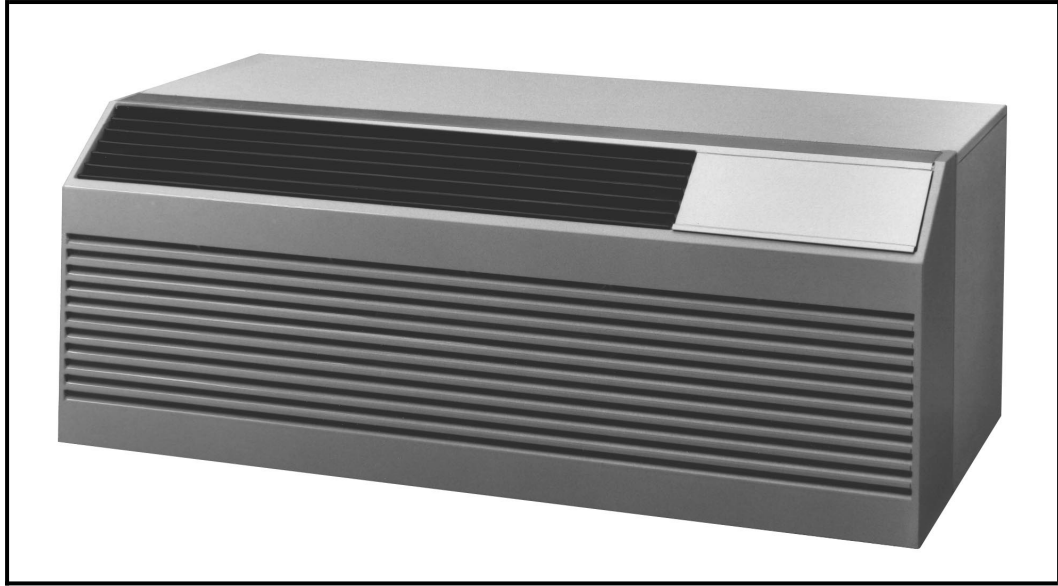


SERVICE TECHNICIAN GUIDE



PACKAGED TERMINAL AIR CONDITIONERS AND HEAT PUMPS

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INTRODUCTION

The focus of this manual is to provide basic information on service procedures, safety, troubleshooting, cleaning, and component replacement for service technicians. **It is intended for use only by HVAC service technicians who have successfully completed instruction and received Type I Certification from the U.S. Environmental Protection Agency.**

The instructions in this manual are general in nature and are not to be substituted for installation and service instructions shipped with the unit. No attempt to install, operate, adjust, repair, or dismantle any equipment should be made until the manufacturer's instructions are read and thoroughly understood by the service technician. Even equipment that seems familiar may have specific model differences from year to year. Always review manufacturer's instructions.

The Model 52S packaged terminal air conditioner and heat pump units are self-contained for installation through the wall for individual room heating and cooling. The Model 52S polymer sleeve is permanently fastened to the wall; the unit chassis slides out of the sleeve to allow the service technician easy access. An accessory louvered rear grille may be mounted on the sleeve. Many accessories are offered to complement the unit's comfort control.

Before beginning any service procedures, it is important to check the unit model number. Even units that seem similar may have subtle differences that could affect service procedures. The 52S units covered in this book are the 52SC (Cooling Only model); the 52SE (Cooling with Electric Heat model); and the 52SQ (Cooling, Electric Heat, and Heat Pump model).

Knowing which model is being serviced will help determine if the unit is performing at optimum levels. The model number is located on the data information plate beneath the front panel of the unit. The data information plate also lists voltage ranges and other important electrical information about the unit. To access the data information plate, remove the front panel of unit by grasping panel on each side and gently pulling upward and out (Figure 1). See Figure 2 for model number nomenclature and Figure 3 for a sample data information plate.

SUMMARY OF DANGERS, WARNINGS, AND CAUTIONS

The terms DANGER, WARNING, and CAUTION have specific meanings that identify the degree of hazard. Typically in the HVAC industry, these specific meanings are:

⚠ DANGER

There is an immediate hazard which WILL result in severe personal injury or death.

⚠ WARNING

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

⚠ CAUTION

Potential hazards or unsafe practices which COULD result in minor personal injury or equipment damage.

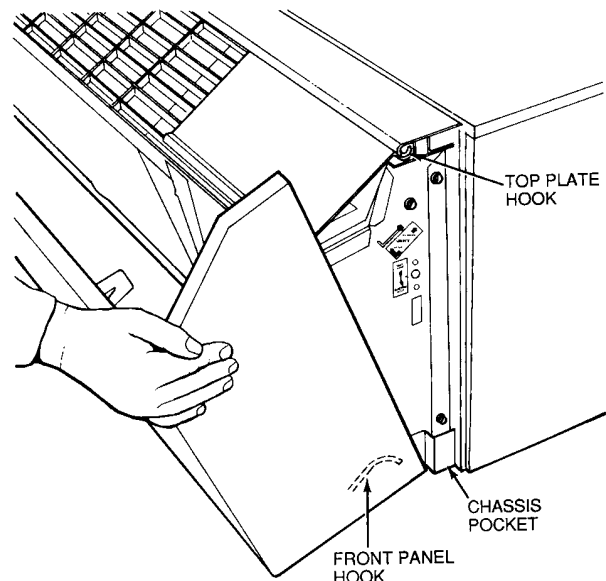
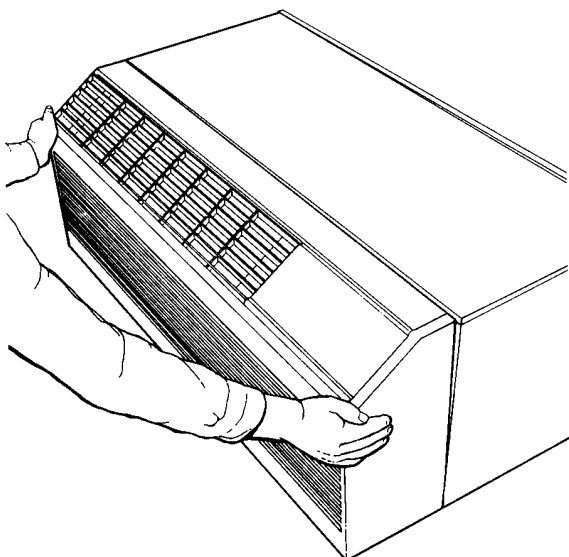


FIGURE 1 — REMOVING FRONT PANEL

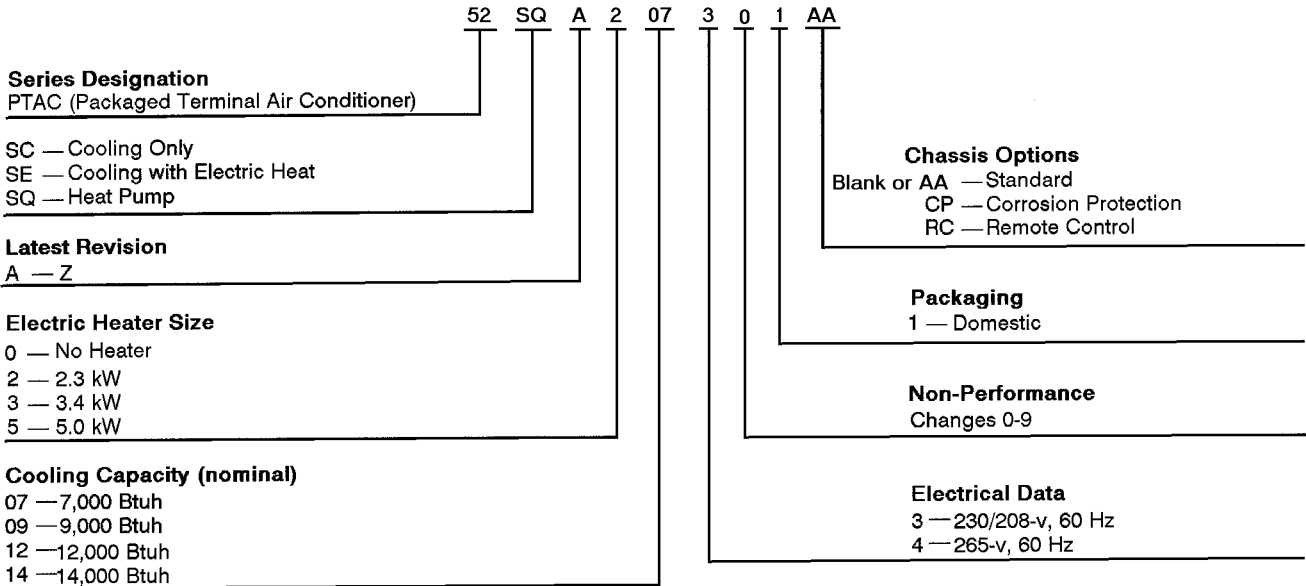


FIGURE 2 — MODEL NUMBER NOMENCLATURE




MODEL		525QA207301AA	
SERIAL		1395E62973	
DATE OF MFG		3-20-95	
VOLT RANGE		253-187	
VOLTS		230/208	
PH	1	HZ	60
MIN CKT AMPACITY		13.3	
R-22 OZ		29.0	
DESIGN PSIG 350 HIGH SIDE, 150 LOW SIDE			
COOLING			
BTU/HR		6,000/6,600	
AMPS		3.2/3.4	
WATTS		715/695	
EER		9.5/9.5	
COMP	RLA	2.9	
	LRA	18	
FAN	FLA	0.6/0.5	
	HP	1/15	
HEATING			
BTU/HR		6,000/5,805	
AMPS		10.6/9.6	
WATTS		2440/2025	
COP		2.8/2.8	
HEATER	AMPS	10.0/9.1	
	WATTS	2300/1900	
BTU/HR	WATER	—	
	STEAM	—	
USE	15 AMP	CANADIAN INSTALLATION	
TIME DELAY FUSE OR HACR TYPE CIRCUIT BREAKER	15 AMP	MAX FUSE	MAX BREAKER
		15 AMP	15 AMP
<small>REMOVE DATA FOR PERMANENTLY CONNECTED UNIT ONLY MOTOR - COMPRESSOR THERMALLY PROTECTED</small>			
 LISTED PACKAGED TERMINAL AIR CONDITIONER			
		Carrier Corporation Syracuse, New York	
MADE IN U.S.A. 99LR520212 REV B			

FIGURE 3 — SAMPLE DATA INFORMATION PLATE



GENERAL DISASSEMBLY

This section includes common procedures for disassembly and reassembly of 52S units. These instructions are general in nature and include procedures the technician may be called upon to perform when accessing certain components of the 52S unit.

It is important to carefully follow manufacturer's instructions when disassembling or reassembling a unit for cleaning, maintenance, or part replacement. When disassembling wiring, it is strongly recommended that numbered stickers be attached to identify leads and terminals to aid in the reassembly process. Always review safety procedures prior to the start of a job.

⚠ WARNING

Prior to servicing electrical equipment, disconnect all power to avoid electric shock! Never alter cord or plug and do not use extension cords.

TO DISCONNECT POWER FOR CORD-CONNECTED UNIT

1. Push OFF button.
2. Open the disconnect switch at main power supply. Use proper Lockout and Tag procedures.
3. Unplug the unit service cord.

TO DISCONNECT POWER FOR PERMANENTLY CONNECTED (HARDWIRED) UNITS

1. Push OFF button.
2. Open the disconnect switch at main power supply. Use proper Lockout and Tag procedures.
3. Remove screw from access cover and remove access cover.
4. Pull out the plug assembly and disconnect (see Figure 4).

TO OPEN THE CONTROL BOX

The control box is factory wired. To open the control box, remove the 2 screws on the front of the control box and lower the front hinged panel. See Figure 5.

TO REMOVE THE UNIT FROM THE WALL SLEEVE

1. Remove the four, 1 $\frac{3}{4}$ -in. mounting screws that secure the unit to the wall sleeve. There are 2 screws on each side (Figure 6).
2. Grasp the sides of the unit and slide it from the sleeve.

⚠ CAUTION

The chassis weighs between 110 and 150 pounds. Take proper safety precautions to avoid personal injury when lifting and moving the chassis.

⚠ CAUTION

The unit basepan may have water in it. Tilt the unit back slightly when removing it from the sleeve to drain some of the water into the sleeve.

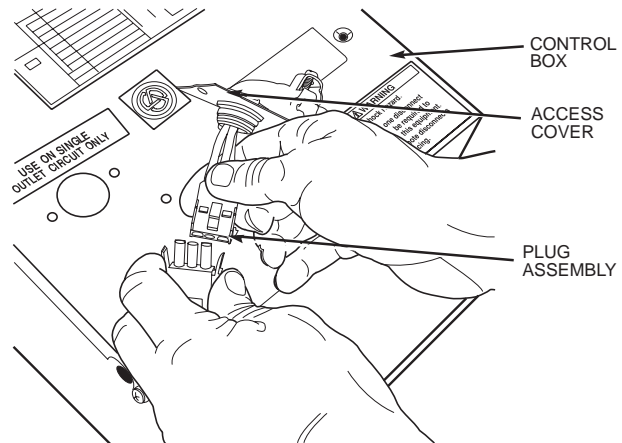


FIGURE 4 — DISCONNECTING PLUG ASSEMBLY ON HARDWIRED UNITS

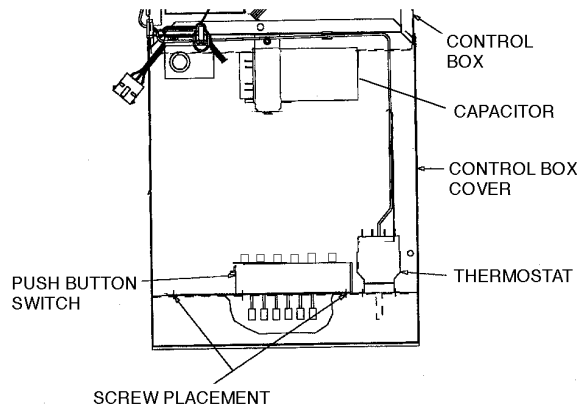


FIGURE 5 — OPEN CONTROL BOX

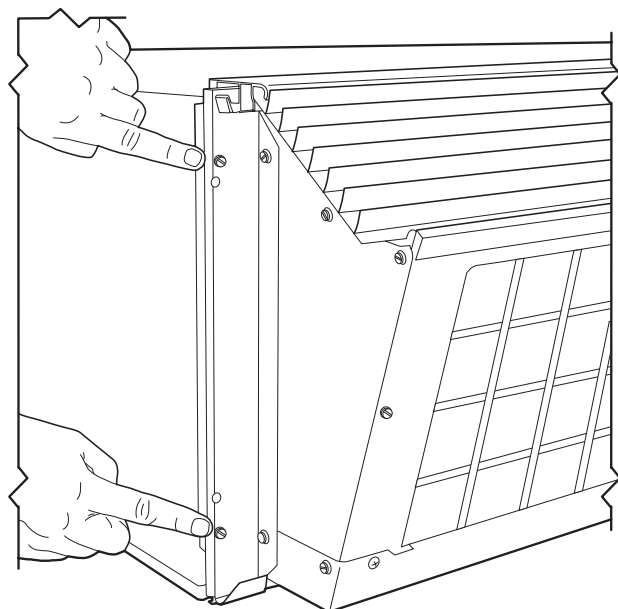


FIGURE 6 — UNIT TO WALL SLEEVE MOUNTING SCREWS

TO REMOVE THE LATERAL DUCT EXTENSION, FOR UNITS EQUIPPED WITH THE LATERAL DUCT ACCESSORY PACKAGE

1. Remove the front panel as shown in Figure 1.
2. Remove the four 1 $\frac{3}{4}$ -in. screws that secure the chassis to the wall sleeve (see Figure 6). There are 2 screws on each side.
3. Remove the 2 screws that secure the lateral duct extension to the top of the lateral duct adapter as shown in Figure 7.

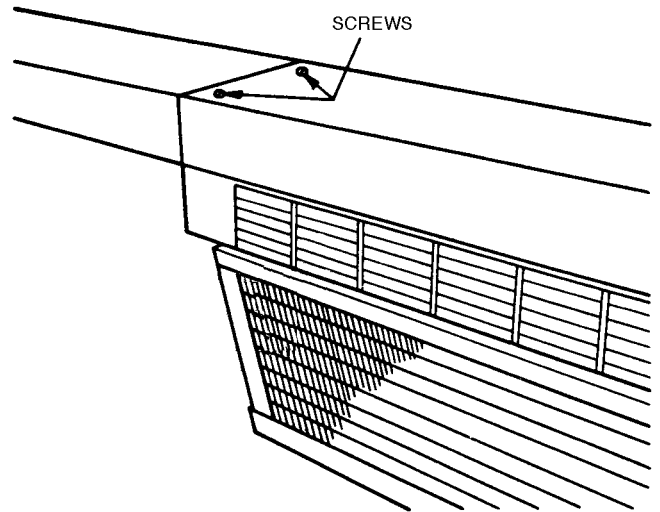


FIGURE 7 — DUCT EXTENSION SCREWS

4. Locate and remove the 2 screws that secure the lateral duct extension to the bracket flange as shown in Figure 8.
5. Carefully slide the chassis away from the extension duct and remove from the sleeve (as shown in Figure 9).

⚠ CAUTION

The unit basepan may have water in it. Tilt the unit back slightly when removing it from the sleeve to drain some of the water into the sleeve.

⚠ CAUTION

The chassis weighs between 110 and 150 pounds. Take proper safety precautions to avoid personal injury when lifting and moving the chassis.

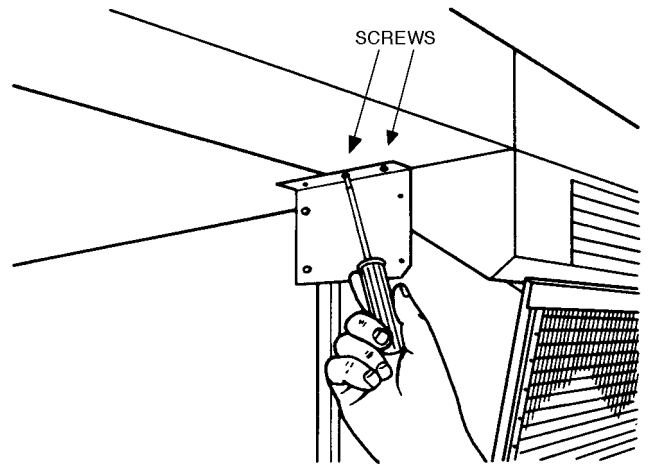


FIGURE 8 — BRACKET FLANGE SCREWS

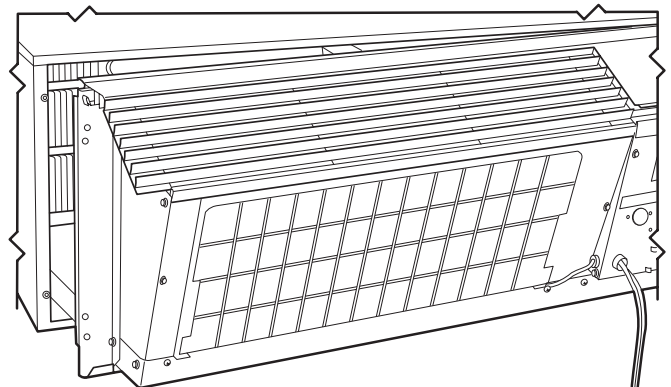


FIGURE 9 — PARTIAL REMOVAL OF CHASSIS FROM WALL SLEEVE

52S SERIES

TO ACCESS INDOOR-AIR SECTION COMPONENTS

■ DISASSEMBLING THE LATERAL DUCT ADAPTER, FOR UNITS EQUIPPED WITH THE LATERAL DUCT ACCESSORY PACKAGE

1. Remove the lateral duct adapter end cap, shown in Figure 10, by removing the two 1/2-in. screws
2. Remove the adapter top panel by removing one screw at each end of unit as shown in Figure 11. Rotate the front of the panel up and back and lift free.
3. Rotate and lift the air baffle out of the unit. See Figure 12.
4. Remove the 2 screws holding the duct adapter to the chassis discharge air opening flanges, as shown in Figure 13, and remove the duct adapter.

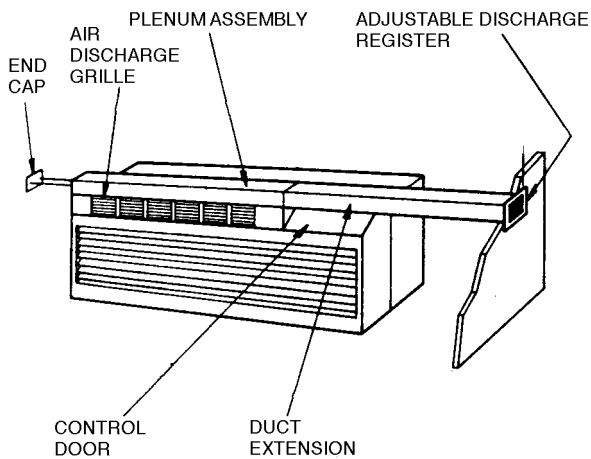


FIGURE 10 — WALL SLEEVE, DUCT ADAPTER, AND EXTENSION LOCATION (RIGHT-HAND EXTENSION)

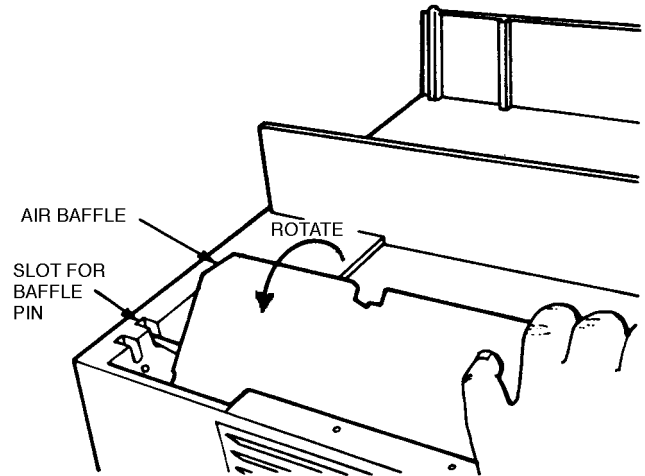


FIGURE 12 — REMOVING THE AIR BAFFLE

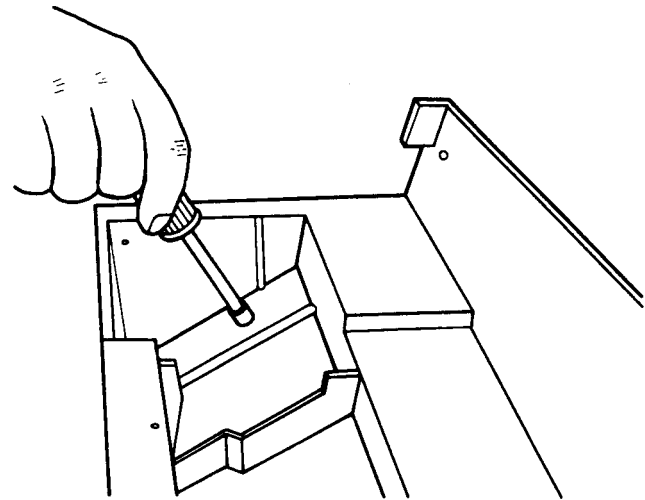


FIGURE 13 — REMOVING THE DUCT ADAPTER

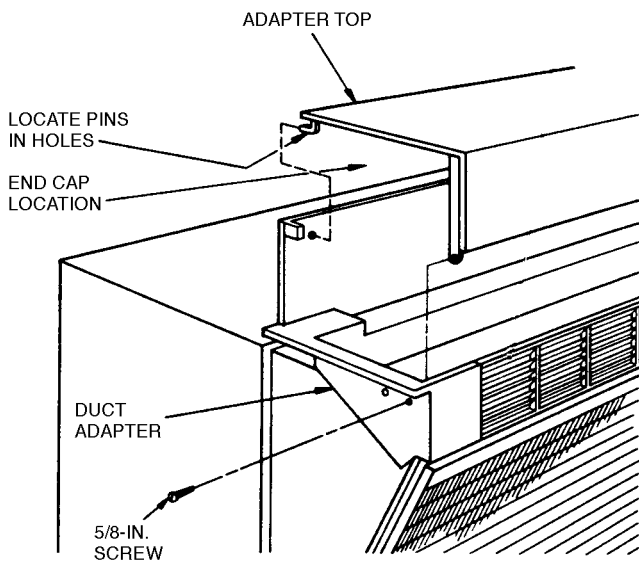


FIGURE 11 — DISCHARGE PLENUM ASSEMBLY

■ **TO REMOVE THE AIR DISCHARGE GRILLE**

1. Remove the 2 screws on each end of the air discharge grille as shown in Figure 14.
2. Lift and rotate back the bottom edge of the discharge grille and remove it.

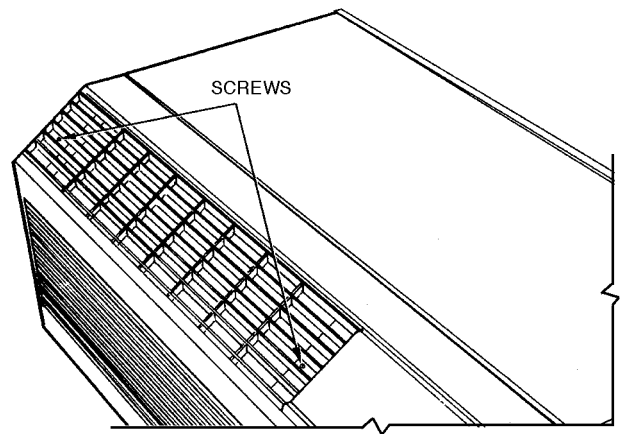


FIGURE 14 — REMOVING AIR DISCHARGE GRILLE

■ **TO REMOVE THE ALUMINUM TOP PANEL**

— Remove one screw from each end of the aluminum top panel (located on the underside of the panel) as shown in Figure 15. On the left side of the unit, remove the screw closest to the side of the unit.

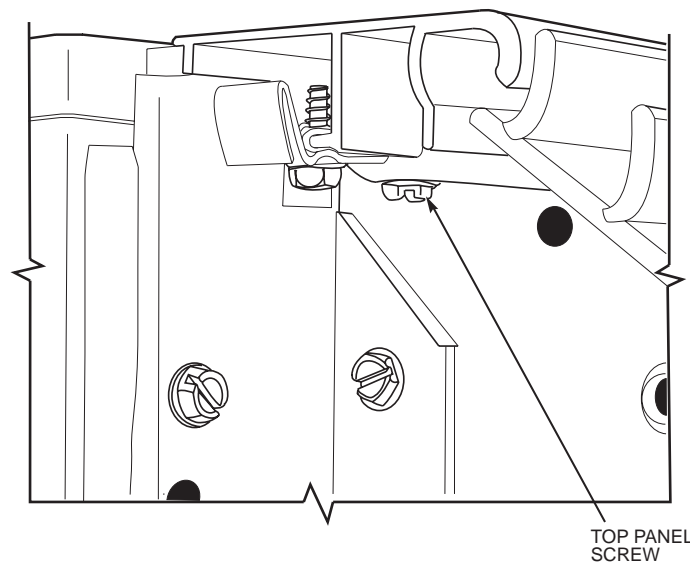


FIGURE 15 — ALUMINUM TOP PANEL

■ **TO REMOVE THE TOP COVER** — Remove the screw located in the middle of the top cover and remove the cover. See Figure 16.

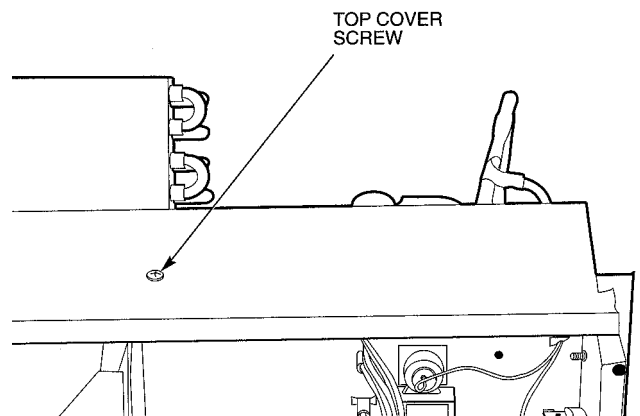


FIGURE 16 — TOP COVER SCREW

■ TO REMOVE THE DISCHARGE DECK

1. Remove the 2 discharge deck screws shown in Figure 17. Also remove the screw located at the top left corner of the outdoor coil tube sheet.
2. Gently pull the left side panel out and lift the end of the discharge deck that the screws were removed from, up and forward, to remove.

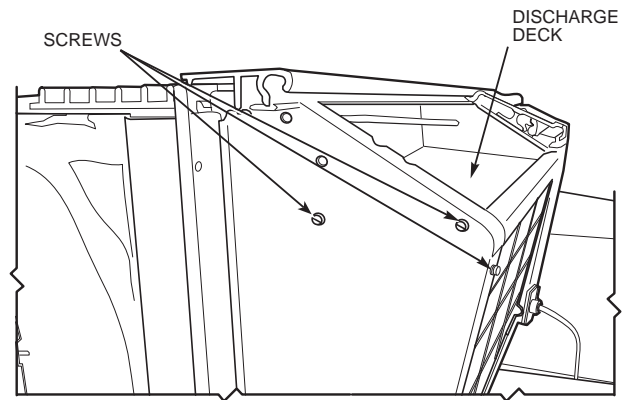


FIGURE 17 — DISCHARGE DECK REMOVAL

TO ACCESS OUTDOOR-AIR SECTION COMPONENTS

■ TO REMOVE THE GUSSET

1. Remove the 2 screws that secure the gusset to the partition.
2. Remove the screw that secures the gusset to the plastic condenser orifice and remove the gusset. See Figure 18.

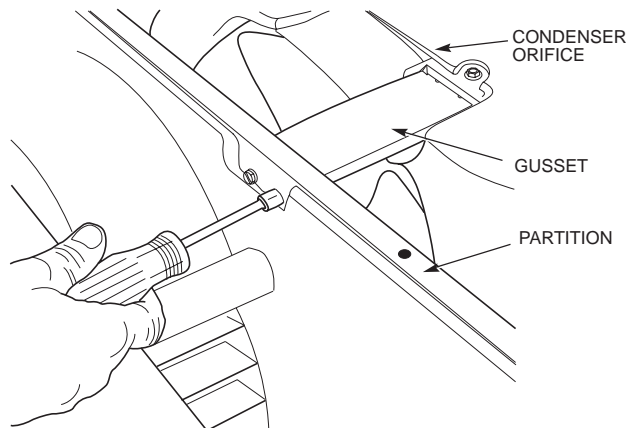


FIGURE 18 — GUSSET REMOVAL

- ### ■ TO DETACH THE CONDENSER ORIFICE FROM THE CONDENSER COIL
- Using a flat head screw driver, gently pry the plastic condenser orifice tabs away from both condenser coil tube sheets and pull the condenser orifice away as shown in Figure 19.

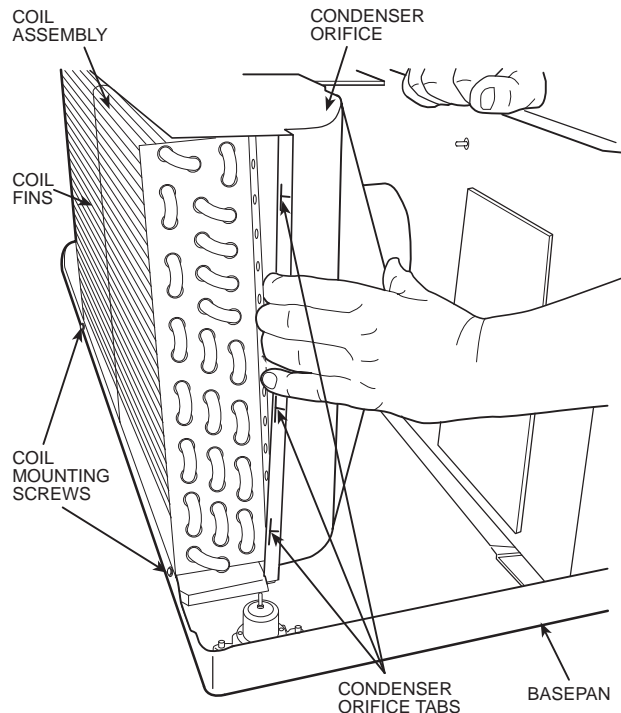


FIGURE 19 — REMOVING CONDENSER ORIFICE

■ **TO REMOVE THE STATOR** — After pulling the top of the condenser orifice away from the condenser coil, grasp the top of the stator and slide it up and out of the stator track. See Figure 20.

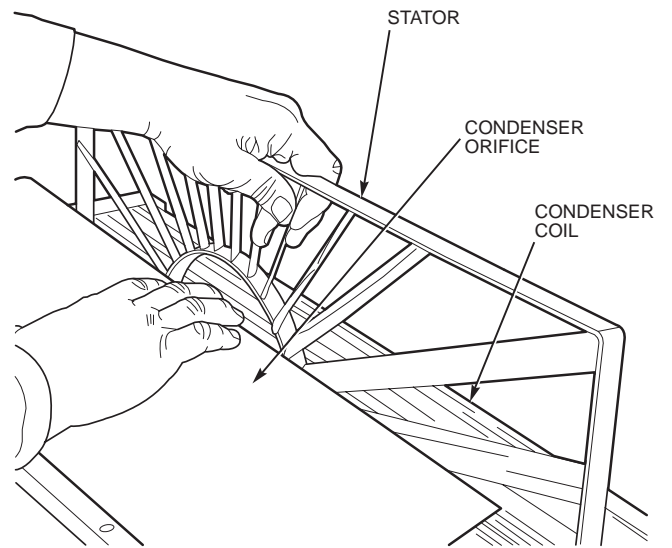


FIGURE 20 — REMOVING STATOR

GENERAL CLEANING

Maintaining proper performance of 52S systems (Figure 21) requires conscientious cleaning and care of components. Specific components require periodic cleaning and/or replacement, including the following:

COMPONENT CLEANING SCHEDULE

Indoor Air Filter	Monthly
Vent Air Filter	Monthly
Indoor Coil	Seasonally
Indoor Fan	Seasonally
Outdoor Coil	Seasonally

CLEANING AND SAFETY

Before starting to clean a unit, read the instructions thoroughly and gather the necessary tools for the job. Review all safety information on unit and in literature.

⚠ WARNING

Before cleaning, servicing, performing maintenance, or removing the chassis from the wall sleeve, disconnect all power to the unit to avoid the possibility of electrical shock and personal injury. Only trained and qualified service personnel should perform installation and service procedures on these units. Untrained personnel may perform basic maintenance tasks such as cleaning and replacing filters. Refer to General Disassembly section of this manual for proper procedures to disconnect power to 52S units.

Consider the following safety issues before beginning:

- New and unfamiliar tasks should be performed under the supervision of an experienced service technician.
- Personal protective equipment, such as safety glasses and work gloves, should be used.
- The floor around the work area should be clean and free of debris.
- The 52S unit weighs up to 150 pounds. Use a lifting device or ask for assistance if the unit must be moved.
- Make sure tools are the correct tools for the job, and that they are working properly and in good condition.

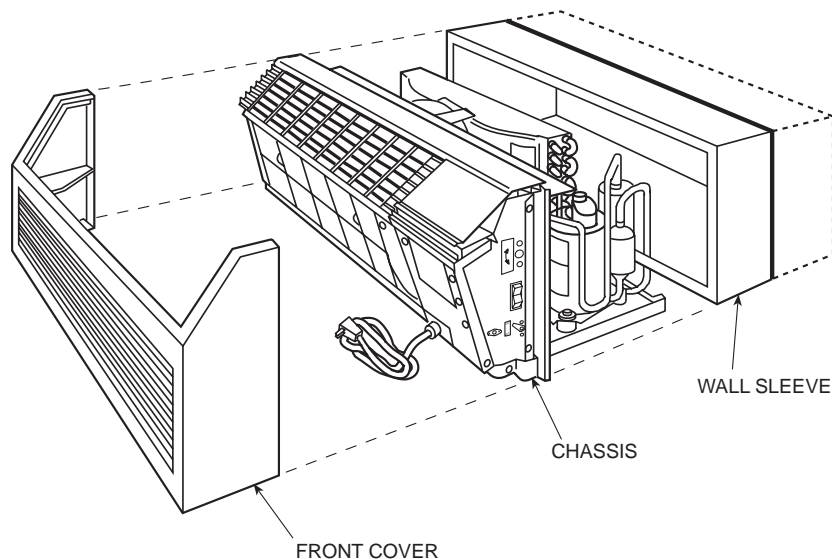


FIGURE 21 — FRONT PANEL, CHASSIS, AND SLEEVE

TOOLS NEEDED

The following list includes the recommended tools, devices, and cleaning solutions for use in cleaning the 52S unit components.

Vacuum Cleaner with Crevice Tool Attachment, or Soft Plastic Bristle Brush
Mild Household Detergent
Phillips Head Screwdriver
⁵ / ₁₆ -in. Nut Driver
Flat Head Screw Driver
Lifting Device (or another person for assistance)
Tank Sprayer (Part No. P9021001) or Trigger Spray Extension Tube (Part No. P9029000)
Compressed Air Tank
Clean Water Supply
Indoor Air Filter Replacement (Part No. AIR-FILTER-25PAK)
Vent Air Filter Replacement (Part No. 52SQ500204)
Condenser Coil Cleaning Solution (Part No. P9020501)
Evaporator Coil Cleaning Solution (Part No. P9021001)
9.5-in. by 9.5-in. Piece of Clean Cardboard
3% Solution of Hydrogen Peroxide in Spray Bottle
Clean Cloth
Safety Glasses
Protective Gloves

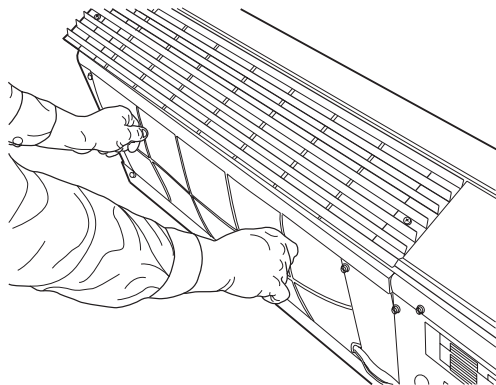


FIGURE 22 — REMOVING FILTER

MONTHLY CLEANING

■ **AIR FILTERS** — The indoor and vent air filters should be cleaned once per month. Filters that are not cleaned become clogged and will restrict airflow. This may lead to major component damage. If a filter becomes torn, has holes, or other damage, replace it with a new one. Replacement filters are available through Carrier Finished Goods and Carrier Replacement Component Division.

■ **CLEANING THE INDOOR AIR FILTER** — Remove the indoor air filter as follows:

1. Remove the front panel to access the indoor air filter. To remove front panel, grasp panel firmly near the top of each side. Lift upward and pull forward. It is not necessary to use excessive force. See Figure 1.
2. To remove the indoor air filter, gently grasp the 2 filter tabs, push down, and pull out. See Figure 22.

Once the indoor air filter has been removed, use a **vacuum cleaner**, or a **soft bristle brush** and a small amount of **mild dish detergent** to gently wash the filter. If detergent is used, remove detergent residue with a gentle, clean water stream. Let the filter air dry. Be sure to reinsert the filter into the unit.

■ **REPLACING THE INDOOR AIR FILTER** — Access and remove indoor air filter as detailed above in Cleaning the Indoor Air Filter. Use a filter replacement with the Carrier Part No. AIR-FILTER-25PAK, available through Carrier Finished Goods and Carrier Replacement Component Division.

52S SERIES

■ CLEANING THE VENT AIR FILTER

1. Remove the unit chassis from wall sleeve as described in the General Disassembly section of this manual. See Figure 6.
2. Swing open vent door. The filter is located directly behind the vent door. See Figure 23.
3. Remove the vent air filter by gently pushing on the filter slot.

Once the vent air filter is removed, it may be cleaned using either a **vacuum cleaner**, or a **soft bristle brush** and a small amount of **mild dish detergent**. If detergent is used, remove detergent residue with a gentle, clean water stream. Let the filter air dry. Be sure to reinsert the filter into the unit.

■ REPLACING THE VENT AIR FILTER

Access and remove the vent air filter as detailed above in Cleaning the Vent Air Filter. Use a filter replacement with the Carrier Part No. 52SQ500204, available through Replacement Components Division.

■ CHASSIS

As-needed cleaning of the unit's exterior surfaces (Figure 24) optimizes the unit's appearance and removes particles that may enter the air system. The 52S units are built to resist corrosion. The indoor front panel and wall sleeve are created from non-metallic compounds that do not rust. Additional corrosion protection may be factory installed on the partition, control box, and outside coil for use in highly corrosive environments. Mild detergents reduce electrostatic charges on plastic sections on the grille and are good cleaners. Use such detergent cleaners sparingly.

Use a clean cloth or brush to gently wipe exterior surfaces. Be careful not to push dirt or other fibers into the unit's interior. Accessible sleeve surfaces should also be wiped clean.

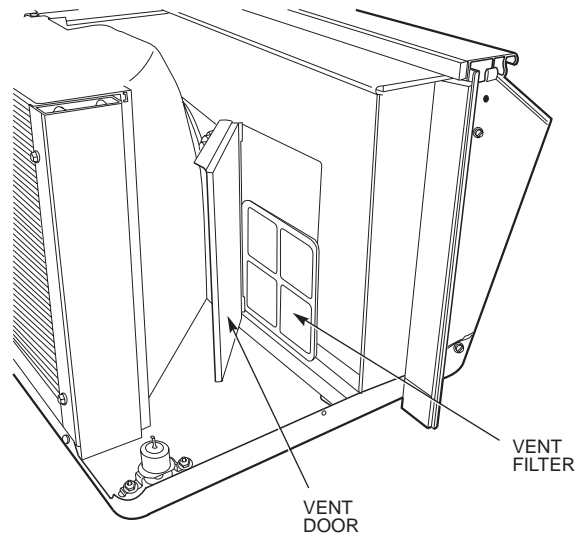


FIGURE 23 — ACCESSING VENT AIR FILTER

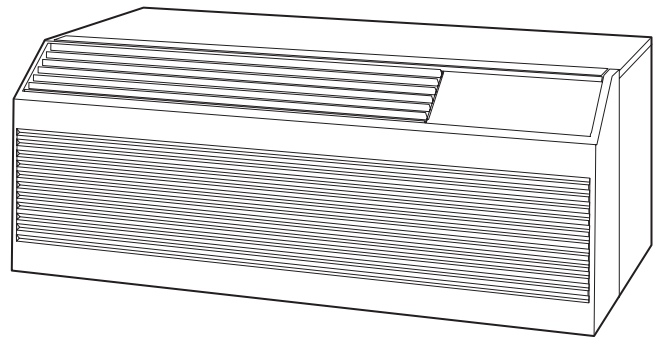


FIGURE 24 — UNIT FRONT PANEL AND SLEEVE

SEASONAL CLEANING

■ **ACCESSING THE INDOOR AND OUTDOOR COILS** — The minimum cleaning recommendation for indoor and outdoor coils is once per season. To access the coils for a thorough cleaning, it is necessary to **remove the Air System**. To accomplish this task, perform the following steps:

1. **DISCONNECT ALL POWER TO UNIT!**
2. Remove the unit chassis from the sleeve as described in the General Disassembly section of this manual. See Figure 6.
3. Remove each side angle from unit with a $\frac{5}{16}$ -in. nut driver. See Figure 25.
4. Locate and disconnect wires from the compressor. Label each wire for easy reassembly.

⚠ DANGER

For compressors that are known to be damaged: Remove refrigerant prior to disconnecting compressor wires. Damaged hermetic compressor terminals may become loose and eject from the compressor. Wear safety glasses and keep your face away from the area above the terminals when removing compressor wires.

5. **For Heat Pump Units** — Disconnect the wire plug on the reversing valve and carefully remove the outdoor thermostat capillary from the outdoor coil.
6. With a $\frac{5}{16}$ -in. nut driver, locate and remove the 8 screws mounting the fan section to the chassis. See Figures 26 and 27.
7. Using a flat head screw driver, gently pry the plastic condenser orifice tabs away from both outdoor coil tube sheets and pull the condenser orifice away as shown in Figure 19. See GENERAL DISASSEMBLY section.
8. Carefully remove the fan section from the chassis by lifting fan section straight up and out. The fan deck is awkward; 2 people may be needed for its removal.

9. Remove the stator from the outdoor coil. See GENERAL DISASSEMBLY section. After cleaning, reassemble by reversing steps 1 - 8.

IMPORTANT: During reassembly of the fan section, carefully align the rubber seal around the tubing where it passes through the partition.

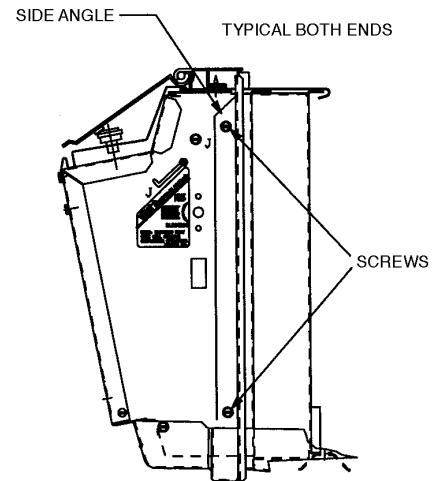


FIGURE 25 — SIDE ANGLE SCREWS

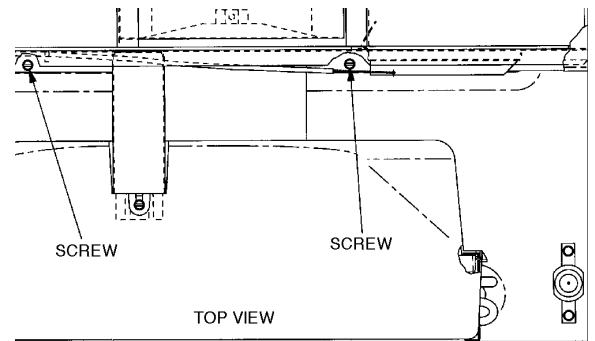


FIGURE 26 — PARTITION FLANGE SCREWS

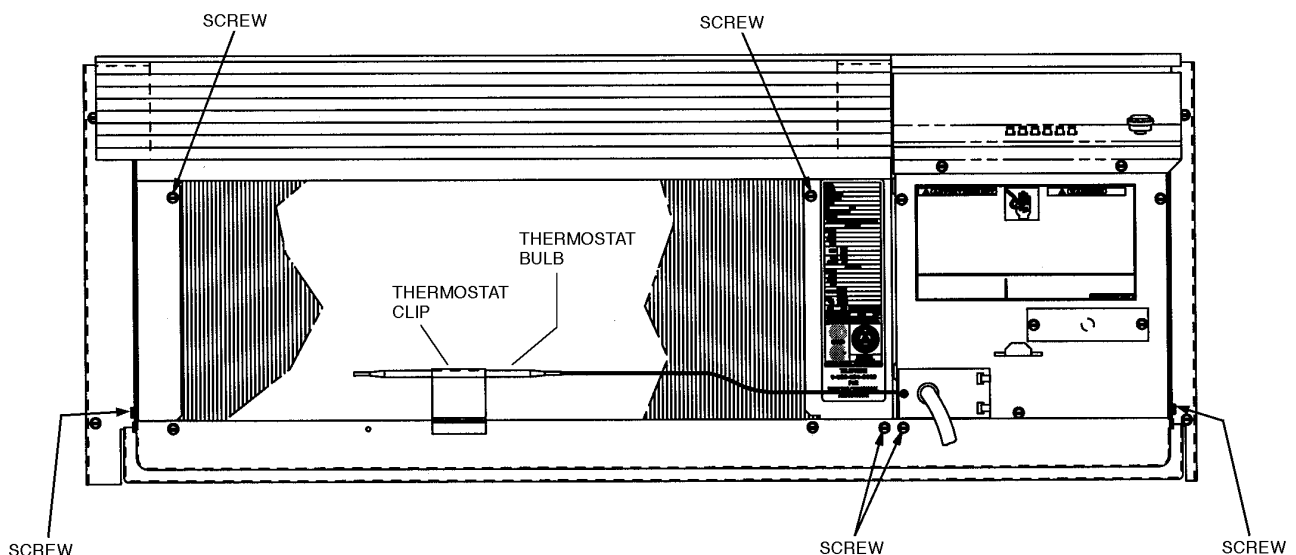


FIGURE 27 — FAN SECTION SCREW LOCATIONS



52S SERIES

■ CLEANING THE INDOOR AND OUTDOOR COILS

▲ CAUTION

Coil fins are sharp and may cut hands. Wear heavy **protective gloves** when cleaning coils.

1. Use a vacuum cleaner or soft bristle brush to remove surface fibers and dirt from each of the faces of the coil. Both the inner and outer surfaces of the coils must be cleaned. It is important to apply the tool in the **same direction of the fins**, not against them. Applying the tool against the fins may cause damage (fin edges may bend over).
2. With a tank sprayer or a trigger spray extension tube, spray coil cleaning solution evenly across the coils, making sure coils are thoroughly saturated. See Figure 28. Refer to instructions on the cleaning solution containers for best results. **Do not use a high pressure sprayer.**
3. Rinse the coils thoroughly with low-velocity, clean water.
4. Repeat steps 2 and 3.
5. Drain water and cleaning solution that may have collected in the basepan during the cleaning process by carefully tilting the chassis. This allows excess water to flow out of the overflow notches.

▲ CAUTION

Do not set unit on end to drain water from basepan, or at any other time. Oil will drain from the compressor sump, which could cause compressor failure.

6. Thoroughly clean the basepan and drain passages by rinsing with clean water. Be sure all debris is removed from the drain valve. See Figure 29.
7. Allow unit components to air dry before reassembling the unit. Once dry, reassemble by reversing Steps 1 - 9 from the **Accessing Indoor and Outdoor Coils section**.

■ **ACCESSING THE INDOOR FAN AND INDOOR FAN SCROLL** — Dried debris and build-up on the blower wheel and blower scroll can reduce the efficiency of the unit. To properly access the indoor fan and indoor fan scroll for cleaning, refer to the **GENERAL DISASSEMBLY** section under **To Access Indoor-Air Section Components on page 6**.

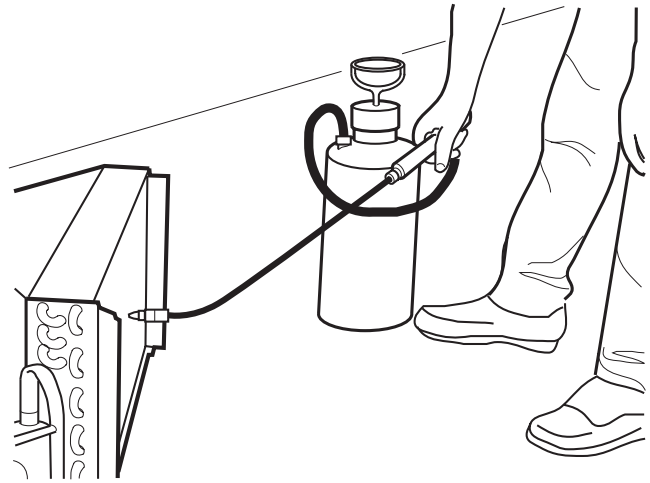


FIGURE 28 — CLEANING THE COILS

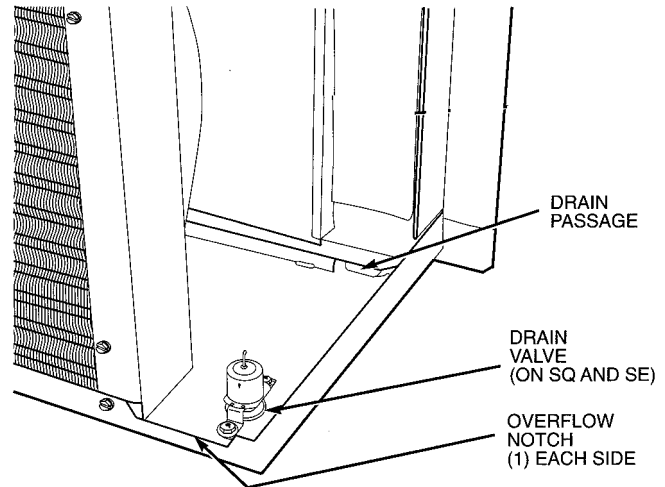


FIGURE 29 — BASEPAN SECTION

■ **CLEANING THE INDOOR FAN AND FAN**

SCROLL — Once the indoor fan wheel and the indoor fan scroll have been accessed, proceed with the cleaning instructions detailed below:

1. Insert a piece of 9.5-in. by 9.5-in. cardboard between the blower wheel and the opening in the blower scroll to prevent fungus and other debris from falling into the coil.
2. Bend a soft, spiral wound, long bristle brush, to conform to the inner curve of the blower wheel blades. See Figure 30.
3. Insert the brush into **every** blower wheel blade and gently brush out dried material.
4. Clean the walls of the blower scroll by carefully brushing with the bristle brush. Vacuum loose debris that may have fallen into the bottom of the scroll during the cleaning process.
5. Use the spray bottle to spray the blower wheel blades and the inner surface of the blower scroll with a 3% solution of hydrogen peroxide to kill any fungus spores. Wipe up excess solution in the bottom of the blower scroll with a clean cloth. See Figure 31.
6. Reassemble components by reversing the steps used to disassemble the unit as detailed in the **GENERAL DISASSEMBLY** section under **To Access Indoor-Air Section Components**.

■ **ACCESSING THE HEATER ASSEMBLY** — To access the heater assembly for cleaning, perform the following steps:

1. **DISCONNECT ALL POWER TO THE UNIT.**
2. Remove the unit front panel, the discharge air grille, and the discharge air deck as described and shown in Figure 1 and the **GENERAL DISASSEMBLY** section.
3. Once the discharge air deck is removed, the heater assembly is accessible.

■ **CLEANING THE HEATER ASSEMBLY** — Once the heater assembly is accessed, use compressed air to blow off any dust that has accumulated on the heater coils. Do not direct the air at the bi-metal discs of the temperature limit switches. Reassemble the unit by reversing Steps 1 - 3.

▲ CAUTION

Do not touch the heater coils or the temperature limit switches. Touching or depressing the bi-metal discs on the temperature limit switches may affect the set point or cause the secondary temperature limit switch to electrically open, requiring it to be replaced.

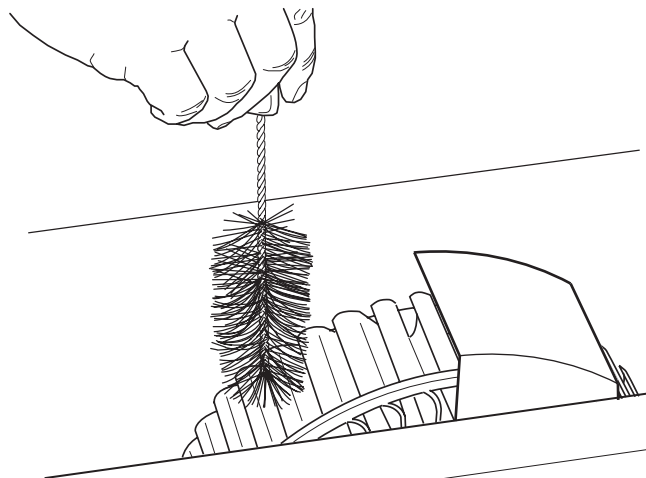


FIGURE 30 — CLEANING INDOOR FAN AND FAN SCROLL

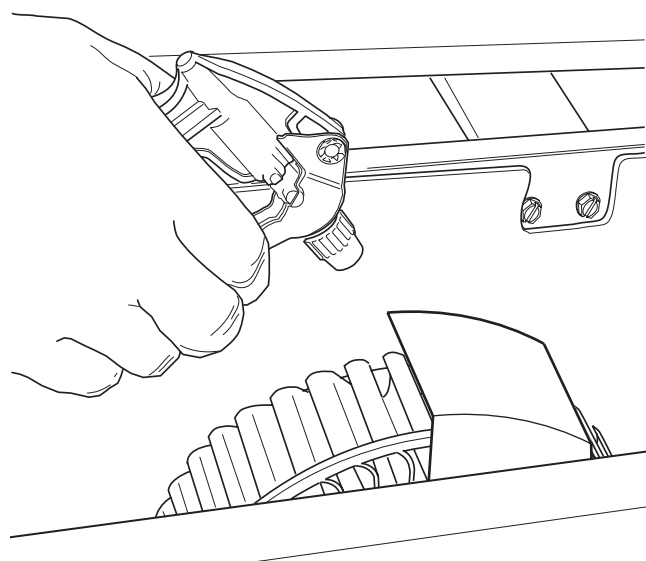


FIGURE 31 — SPRAYING BLOWER WHEEL BLADES

COMPRESSOR

A cutaway view of the rotary compressor with key components labeled is shown in Figure 32. The motor stator is rigidly attached to the compressor shell. The rotor is pressed onto the eccentric shaft, which is supported by 2 bearings. Both the discharge valve and discharge muffler are attached to the motor bearing. The pump

bearing provides a thrust surface for the shaft and the rolling piston. Compressed gas is separated from the suction gas by the vane. Discharge gas pressure and the vane spring keep the vane in contact with the rolling piston.

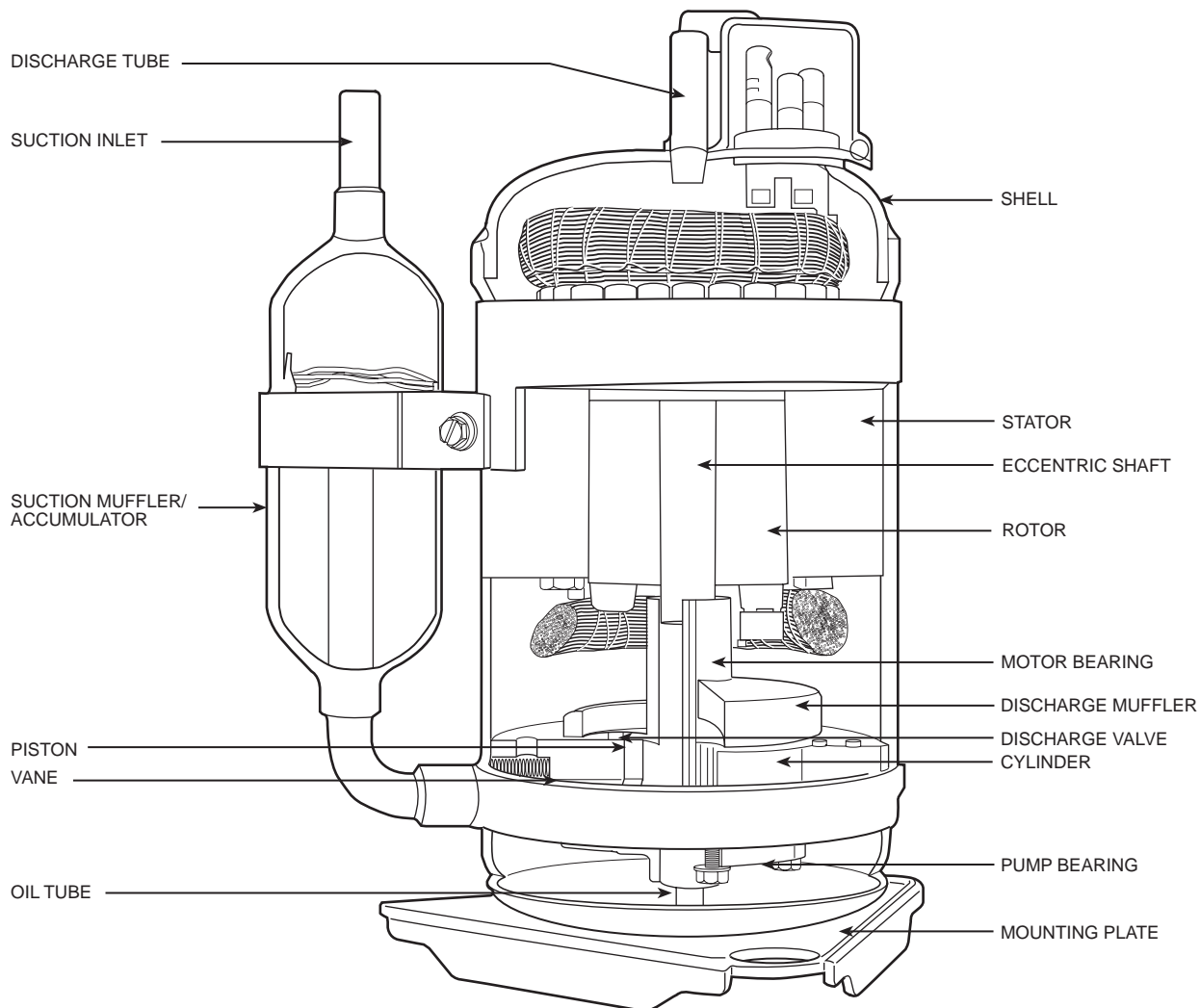


FIGURE 32 — ROTARY COMPRESSOR COMPONENTS

The rotary compression process (Figure 33), starts at top dead center as shown in (1). Suction gas flows through the suction inlet and into the cylinder area. As the shaft rotates through 90 degrees, the rolling piston moves to position A as shown in (2). The suction volume is now the area defined by point A and the tip of the vane. Gas in the remaining volume has been compressed above suction pressure. After another 90 degrees of shaft rotation, the rolling piston has moved to position B as shown in (3). Both the compressed gas and suction gas volumes are now equal. Another 90 degrees of shaft rotation is shown in (4). Compressed gas has reached a pressure sufficient to open the discharge valve, and flows from the cylinder into the compressor shell. After another 90 degrees of shaft rotation, the entire process begins again. Continuous suction and discharge allows for a smooth compression process.

The rolling piston is not in actual contact with the cylinder wall, vane, or bearing faces. Hydrodynamic sealing prevents leakage from the compressed gas volume to the suction volume via these paths. Precise control of machining tolerances, surfaces, finishes, and assembly clearances is critical to achieve high efficiency performance. In addition, the line contact between the vane tip and the rolling piston requires careful selection and control of materials to provide wear resistance and reliable long-term operation.

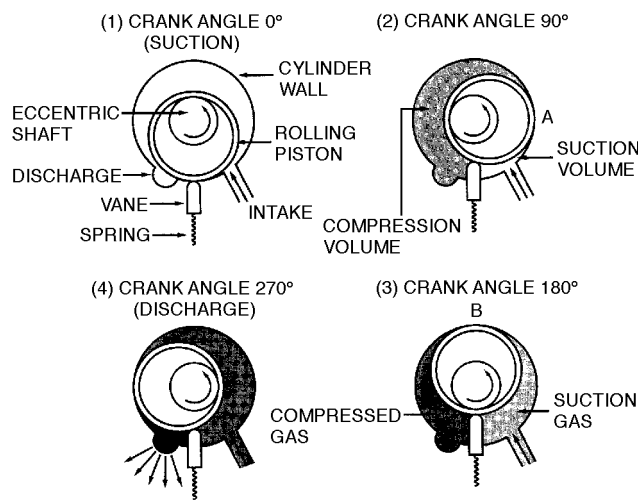


FIGURE 33 — ROTARY COMPRESSOR COMPRESSION PROCESS

COMPRESSOR TROUBLESHOOTING

Refer to Figure 34 for a basic compressor troubleshooting chart.

BASIC HERMETIC COMPRESSOR ELECTRICAL MEASUREMENTS

There are 2 basic electrical tests for hermetic compressors that will determine the electrical state of the motor. The first test requires checking the electrical resistance of each of the electrical motor windings. The second test requires checking the electrical resistance of each of the electrical motor windings to ground. These tests may be accomplished by performing the following steps:

1. **DISCONNECT ALL POWER TO THE UNIT.**
2. Remove the unit chassis from the sleeve as detailed in the GENERAL DISASSEMBLY section.
3. Open the control box as detailed in the GENERAL DISASSEMBLY section, then locate, label, and remove the 3 compressor wires from the following locations: the RUN wire (BLACK) from the capacitor, the START wire (BLUE) from the capacitor. The third wire, COMMON wire (YELLOW) may be connected to one of the following locations: **for SC units** the wire is on the indoor thermostat, **for SE Remote Control Units** the wire is on the indoor frost thermostat, **for all other SE Units** the wire is located on the push button switch, **for ALL SQ Units** the wire is on the outdoor frost thermostat.

⚠ DANGER

For compressors that are known to be damaged: Remove refrigerant prior to disconnecting compressor wires. Damaged hermetic compressor terminals may become loose and eject from the compressor. Wear safety glasses and keep your face away from the area above the terminals when removing compressor wires.

4. To measure the resistance between the windings of the compressor motor, use a volt-ohmmeter set to the lowest ohm reading level then read and record the resistance between the RUN and START, START and COMMON, and RUN and COMMON wires. See Figure 35. The typical resistance readings will be about 4, 3, and 1 ohms respectively. The smaller values should add to equal the larger value. If this is not true then the compressor is likely shorted winding to winding.

NOTE: The rotary compressor has the compressor overload located under the terminal cover. If the overload is open it can show ohm readings that are infinite. The unit should be off for at least an hour to give this overload time to reset if it is open.

52S SERIES

SYMPTOM ↘ POSSIBLE CAUSE ↙	COMPRESSOR STARTS AND RUNS BUT CYCLES ON THE OVERLOAD	COMPRESSOR STARTS AFTER CYCLING THE OVERLOAD SEVERAL TIMES	COMPRESSOR WILL NOT START. IT HUMS AND CYCLES ON THE OVERLOAD	COMPRESSOR WILL NOT START AND MAKES NO NOISE	COMPRESSOR CYCLES OFF (NOT ON OVERLOAD)
COILS/FILTERS DIRTY OR PLUGGED	X				
AIR OR NONCONDENSABLE GASES IN SYSTEM	X	X			
SYSTEM REFRIGERANT OVERCHARGED	X				X
DISCHARGE LINE RESTRICTED	X	X			
CAPILLARY TUBE OR STRAINER RESTRICTED OR PLUGGED	X	X			X
FAN BLADE OR MOTOR DEFECTIVE	X				X
FAN BLADE OR BLOWER WHEEL STUCK	X				X
SYSTEM REFRIGERANT UNDERCHARGED	X				X
EVAPORATOR AIRFLOW RECIRCULATION					X
UNIT OVERSIZED FOR APPLICATION					X
COMPRESSOR REQUIRES START ASSIST		X	X		
NO POWER TO UNIT				X	
LOW VOLTAGE TO UNIT	X	X	X		X
OVERLOAD PROTECTOR OPEN				X	
OVERLOAD PROTECTOR INCORRECT OR DEFECTIVE	X		X	X	
CAPACITOR INCORRECT OR DEFECTIVE	X	X	X		X
THERMOSTAT CONTACTS ARE OPEN				X	
THERMOSTAT IS SET TOO HIGH OR LOW				X	
SELECTOR SWITCH IS OPEN OR DEFECTIVE				X	
WIRING IS INCORRECT OR DEFECTIVE	X		X	X	X
SYSTEM PRESSURES NOT EQUALIZED		X	X		X
COMPRESSOR MOTOR OR MECHANISM DEFECTIVE	X	X	X	X	X
COMPRESSOR GROUNDED			X		

FIGURE 34 — BASIC COMPRESSOR TROUBLESHOOTING GUIDE

5. Next, test the resistance individually of each wire to the shell of the compressor. The paint on the compressor can prevent good contact between the probe and the metal. The paint should be removed from a small section of the shell of the compressor to ensure good contact by the meter probe. The volt-ohmmeter should be set to at least the 100X ohm level. The measured resistance between each wire and ground should be infinite or O.L. on the readout. If there is measurable resistance one of the windings is likely shorted to ground. See Figure 36.
6. A compressor that has a winding to winding short or a winding to compressor shell short is electrically failed and needs to be replaced. See the **Compressor Replacement** section for details.

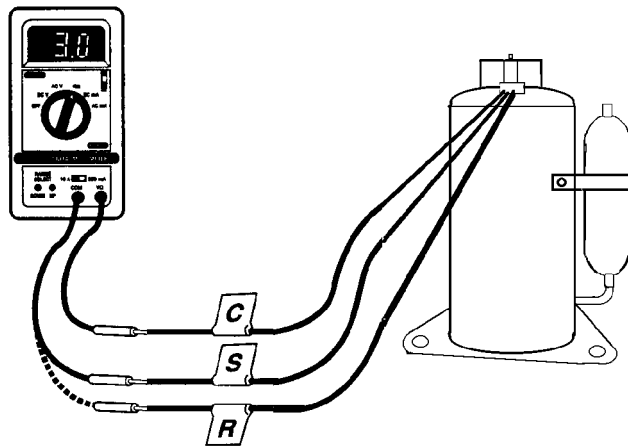


FIGURE 35 — SHORTED/OPEN WINDINGS TEST

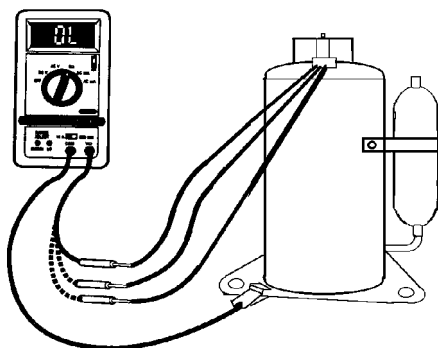


FIGURE 36 — GROUNDED WINDINGS TEST

COMPRESSOR REPLACEMENT

Before working on the compressor, read the instructions thoroughly and gather the necessary tools for the job. Review all safety information on unit and in literature. Always turn off all power to unit to avoid the possibility of electrical shock.

Consider the following safety issues before beginning:

- New and unfamiliar tasks should be performed under the supervision of an experienced service technician.
- Personal protective equipment, such as work gloves and safety glasses, should be worn.
- The floor around the work area should be clean and free of debris.
- Make sure tools are the correct tools for the job and that they are working properly and in good condition.
- Never replace a blown fuse without correcting the cause of the original failure. If thermally operated circuit breakers or overloads are tripping, make sure the trip is not due to excessively high temperatures or loose connections.
- When brazing suction and discharge lines, cool the lines with a damp, clean cloth to prevent injury.
- Oil may be present in the compressor accumulator and interconnecting tubing. Use caution when removing tubing.

▲ DANGER

For compressors that are known to be damaged: Remove refrigerant prior to disconnecting compressor wires. Damaged hermetic compressor terminals may become loose and eject from the compressor. Wear safety glasses and keep your face away from the area above the terminals when removing compressor wires.

- **TOOLS NEEDED** — The following list includes the recommended tools and devices for removing and replacing the compressor.

1/2-in. and 3/8-in. Tube Benders

1/2-in. Nut Driver

5/16-in. Nut Driver

Flat Head Screwdriver

Piercing Valve

2 Parker Access Valves (Part No. AVUSE-5)

Pinch Off Tool

Filter Drier for 52SQ Units (Part No. Sporlan C-164S)

Filter Drier for 52SC or SE Units (Part No. KH43LG060)

Carrier TOTALTEST® Kit (Part No. TT1-001)

Totalclaim® System

Charging Cylinder or an Electronic Scale

Refrigerant-22

Tubing Cutter

Torch

Nitrogen Cylinder with Regulator



■ **REMOVING THE COMPRESSOR** — Follow the steps below to remove the compressor:

1. **Disconnect all power to unit.**
2. Remove unit from wall sleeve as detailed in the **GENERAL DISASSEMBLY** section. The unit weighs up to 150 pounds. Seek assistance or use a lifting device when removing unit from wall sleeve.
3. **If the unit is a heat pump:** Disconnect the wire plug on the reversing valve solenoid and carefully remove the outdoor thermostat capillary from the outdoor coil.
4. Attach the piercing valve to the suction side process tube below the crimps. Attach Carrier **TOTALTEST®** kit (Part No. TT1-001), to the piercing valve to verify acidity of the system. After verifying the system acidity, attach the **Totalclaim®** System to the access port to remove and clean the refrigerant.
5. When all the refrigerant has been recovered, remove the terminal cover from the compressor with a nut driver. Disconnect the 3 wires from the compressor and label the location of each. Once the wires are labeled, replace the terminal cover to protect the compressor terminals.
6. Remove the air system assembly by following the procedure detailed in the **SEASONAL CLEANING** section under **Accessing the Indoor and Outdoor Coils.**
7. Remove the piercing valve and cut the crimped portion of both process tubes off with a small tubing cutter. Braze a Parker access valve on each process tube. Using a torch, disconnect the suction and discharge tubes from the compressor connections.
8. Remove the compressor mounting bolts, and remove the compressor.

⚠ CAUTION

The compressor may still be hot from the brazing process.

9. **For Cooling Only units and Heat/Cool Units:** Remove the strainer and capillary tubes from the system. A Cooling Only or Heat/Cool unit will have one strainer located in the liquid line between the outdoor coil and the capillary tube. The strainer may be an external bulb type or a tube inserted type. The tube inserted type must be cut out with a tubing cutter. Remove and save the section of liquid line tube that was connected to the capillary tube. Remove and discard the strainer. See Figures 37 and 38.

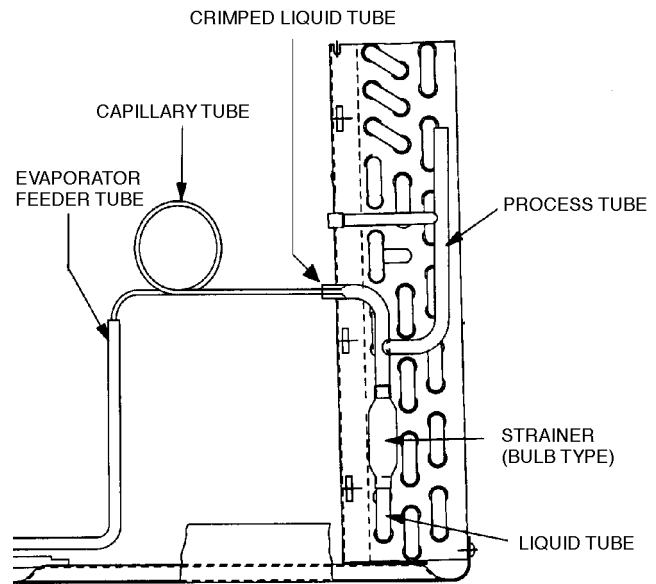


FIGURE 37 — STRAINER AND LIQUID TUBE

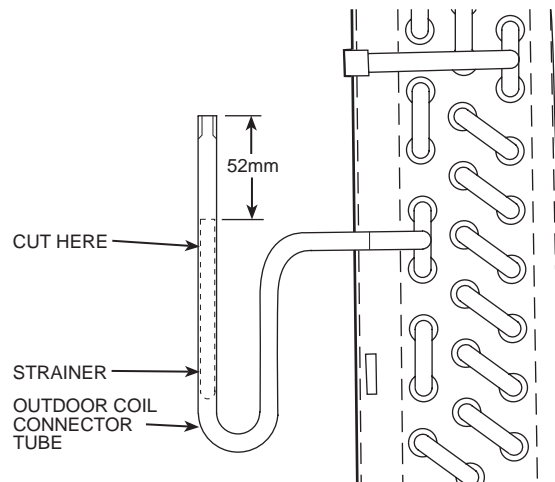


FIGURE 38 — TUBE INSERTED STRAINER

10. **For Heat Pump Units** remove the capillary tube only.
11. **For Heat/Cool Units** the filter drier is installed in the liquid line, in place of the strainer. Trim the saved liquid line tube from Step 9, to be 1.5 in. long (saving the crimped portion), and braze it into the filter drier, Part No. KH43LG060. See Figure 39.

For Heat Pump Units: A suction line filter drier (Part No. Sporlan C-164S) is used and is **installed between the reversing valve and the compressor accumulator**. There are several suction tube configurations and the suction line filter drier will be field piped and brazed into the suction tube for your unit. See Figure 40 for a general installation view.

12. Remove the grommets from the existing compressor and install them onto the new compressor.
13. Install the new compressor and the new capillary assembly (the correct capillary may be obtained from Carrier RCD), into the unit.
14. Leak check the unit with 150 psi of nitrogen pressure.
15. For 52S units, the system should be evacuated from the high side to the low side to a minimum of 200 microns of mercury. This evacuation removes residual moisture from the system prior to charging.
16. **For Heat Pump Units:** Recharge unit to the nameplate refrigerant charge using a charging cylinder.
For Cooling Only and Heat/Cool Units: Add one ounce of refrigerant to the nameplate charge to compensate for the size of the liquid line drier.
17. Pinch off each access valve on the process tubes, in 2 places, using a pinch off tool such as Imperial tool #105-FF or Robinair Tool #12294. Release any refrigerant pressure trapped in the access valve by depressing the valve core, then confirm that no R-22 is leaking past the pinch off tool location. Cut the access valve stem of the process tube above the top crimp and braze the top of each process tube to ensure the system is sealed, (leave the pinch off tool in place until after the brazing process is complete).
18. Reassemble the unit by reversing steps 1 - 9.
19. Connect the compressor wires and energize the unit to verify operation.

■ **REFRIGERANT CHARGING** — Every mechanical refrigeration system that is opened for servicing must be accurately charged before it is returned to service. Run the compressor **ONLY** after charging the system with refrigerant. **The compressor should never be operated on air!**

It is important to remember that recovered and/or recycled refrigerant may only be recharged into the system from which it was initially recovered, or another one owned by the same customer. Charge level is important. Charge units only as recommended by manufacturer.

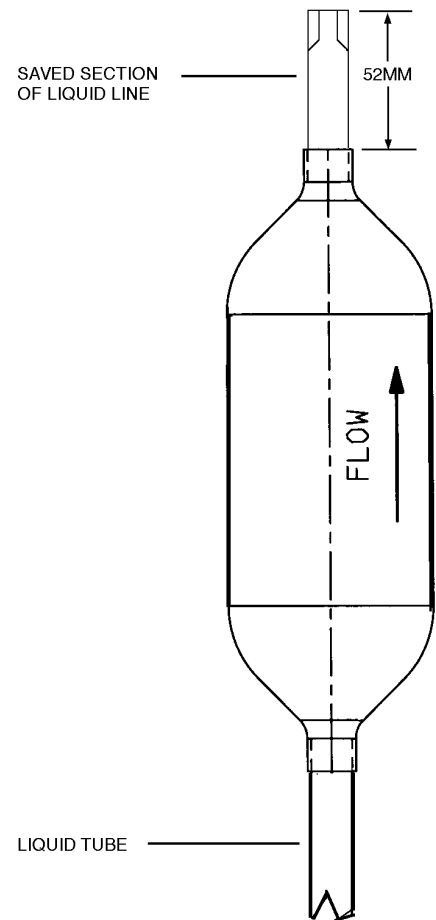


FIGURE 39 — INSTALLED FILTER DRIER

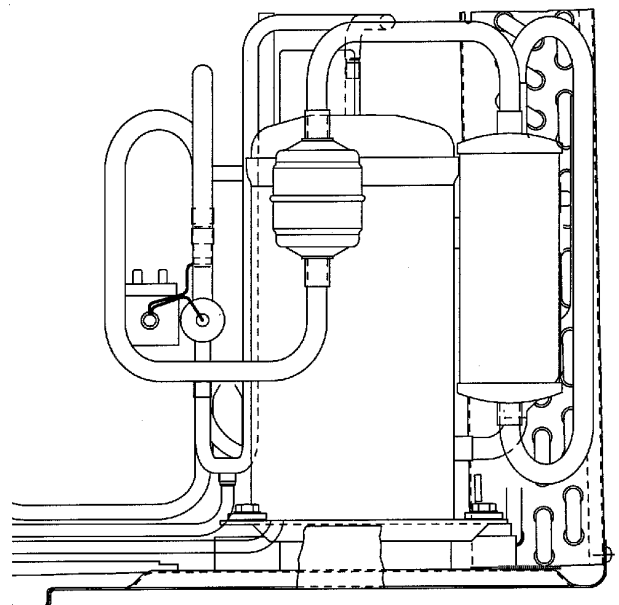


FIGURE 40 — SUCTION LINE FILTER DRIER

HEATERS

The heater in 52S units is located directly behind the evaporator coil. The heater assembly includes the heater (2.3 kW, 3.4 kW or 5 kW), a primary limit switch, and a secondary limit switch (Figure 41). The primary and secondary limit switches are safety switches that regulate heater operation. The primary limit switch disables current to the heater when the temperature exceeds the setting on the switch.

For example, a 3.4 kW heater may have a primary limit switch setting of 150 F. If the temperature at the switch exceeds 150 F, the primary limit switch will electrically open and shut off power to the heater. Once the temperature drops below 110 F, the primary limit switch will automatically reset.

The secondary limit switch works in the same manner as the primary limit switch, except it is a one time switch and has a slightly higher temperature setting. Once this switch is thermally opened, it must be replaced. Together the primary and secondary switches help maintain safe temperature limits for unit operation.

COMMON CAUSES OF HEATER FAILURE

Heater failure may result from broken heater coils, primary limit switch failure, or an open secondary limit switch. These conditions are generally caused by low or no airflow.

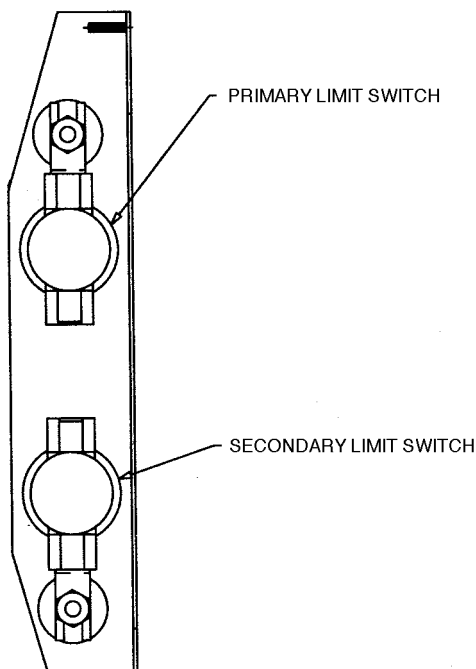


FIGURE 41 — LIMIT SWITCH LOCATION

HEATER REMOVAL

Before working on the heater, read the instructions thoroughly and gather the necessary tools for the job. Review all safety information on the unit and in the product literature.

⚠ WARNING

Before performing any cleaning, servicing, or maintenance to the unit, **Disconnect All Power** to avoid the possibility of electric shock and personal injury.

The manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Consider the following safety issues:

- Prior to performing any service or maintenance on electrical equipment you must **Disconnect All Power**.
- New and unfamiliar tasks should be performed under the supervision of an experienced service technician.
- Personal protective equipment, such as safety glasses and work gloves, should be worn.
- The floor around the work area should be clean and free of debris.
- Make sure tools are the correct tools for the job, and that they are working properly and in good condition.

■ **TOOLS NEEDED** — The following list includes recommended tools and devices for working on the heater section of 52S units.

Phillips Head Screw Driver
Needle Nose Pliers
Volt-ohmmeter
Nut Drivers, 5/16-in. and 1/4-in.

Perform the following steps to **remove the Heater Assembly**.

1. **DISCONNECT ALL POWER TO UNIT.**
2. Remove the front panel of the unit by grasping panel on each side, lifting upward and out. See Figure 1.

3. Remove the unit from the sleeve as detailed in the GENERAL DISASSEMBLY section.
4. Remove the discharge air grille and the discharge air deck as detailed in the GENERAL DISASSEMBLY section. Save screws.
5. Once the air discharge deck is removed, the heater assembly is exposed. After noting positions of wires and labelling them, use a pair of needle nose pliers to carefully remove the wires connected to the heater assembly.
6. Remove the two 1/4-in. screws mounting the heater assembly to the inside of the partition. Save the screws. See Figure 42.
7. Remove the heater assembly (Figure 43).

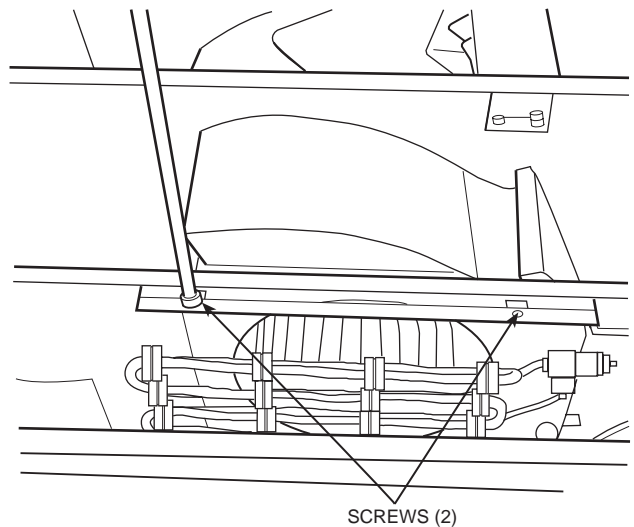


FIGURE 42 — REMOVING HEATER SCREWS

Examine the heater as follows to determine if it is operational:

Perform a visual inspection. The heater coil should be free of breaks. If there are any breaks in the coil, replacement of the heater assembly is necessary.

Coil resistance must also be checked to verify the heater is operating correctly. The resistance of the heater coils must meet approximate levels for the heater to perform at its optimum efficiency. See Figure 44 for approximate resistance for heaters at 75 F. Before checking the heater coil resistance, **be sure all power to unit is off.**

To check resistance, set the volt-ohmmeter selector switch to the lowest ohms value. Next connect the volt-ohmmeter leads to each side of the heater coil at the studs that hold the limit switches in place. Incorrect readings can be obtained if the wires are not removed from the limit switches on the heater assembly. If the resistive reading is infinite or zero, the heater is failed and replacement is necessary. Reinstall the heater assembly by reversing steps 1 - 7.

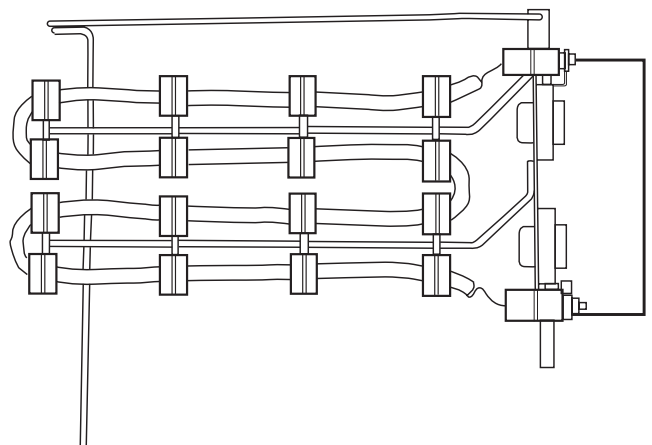


FIGURE 43 — HEATER REMOVED

HEATER SIZE	WATTS	VOLTS	ACCEPTABLE RESISTANCE (Ohms)
2.3 kW	2300	230	20 - 23
	2300	265	28 - 31
3.4 kW	3400	230	13 - 16
	3400	265	19 - 21
5.0 kW	5000	230	9 - 11
	5000	265	13 - 15

FIGURE 44 — ACCEPTABLE HEATER RESISTANCE VALUES

OPERATING CONTROLS

The controls and components used in the **52S cooling only or heat/cool units** are as follows: the selector switch, the indoor thermostat, the dual capacitor, the temperature limiter, the vent lever, and the fan cycle switch (Figure 45).

The *selector switch* is used to determine the mode of operation: heat, cool, fan, or off. The *indoor thermostat* controls the room ambient temperature and cycles the heater or the compressor based on the selector switch setting. The *dual capacitor* aids in the start-up of the compressor and the fan motor. The *temperature limiter* is mounted on the thermostat under the escutcheon. It is a mechanical device that restricts the amount of rotation of the thermostat. The temperature limiter device may be adjusted by moving the plastic temperature selector tabs to another temperature location on the device. The *vent lever* is located in the upper right corner of the control box. It is a slide mechanism that opens and closes the vent door. The control may be accessed by removing the front panel of the unit. The *fan cycle switch* is used to provide 2 options of fan control. The first option, CON, causes the fan to run continuously. The second option, CYC, causes the fan to cycle on when venting, heating, or cooling is requested and off when the thermostat is satisfied.

The **52S heat pump unit** contains all the components of the heat/cool and cooling only unit, and the following additional ones: the *outdoor frost thermostat* and the *reversing valve*. The outdoor frost thermostat prevents operation of the unit in the heat pump mode when the outdoor coil temperature drops below 15 F, or at about 30 to 35 F outdoor ambient temperature (about 40 to 45 F outdoor ambient temperature for 1999 models). The unit automatically engages the electric heat strip under these conditions.

The outdoor frost thermostat has a *manual override* to place the unit in *electric heat mode operation only*. The override switch is located behind the front panel on the right side of the unit control box. Placing the override switch into electric heat mode operation will *disable the compressor for ALL heating or cooling operations*.

The *reversing valve* allows for operation in reverse cycle heat pump mode. The valve is located in the piping system and is controlled by the reversing valve solenoid coil. The coil is energized only during the heating mode.

For **52S remote control (RC) units**, all controls are located on the wall mounted thermostat except the vent lever and outdoor thermostat. *Remote control is a factory-installed option only*. There are 2 styles of thermostats qualified for use with 52S series Remote Control units. See Figures 46 and 47. For all other 52S units, room controls are located on the unit or unit control panel. Remote control units do not have a fan cycle switch.

See Figure 48 for sample control panels and Figure 49 for controls locations.

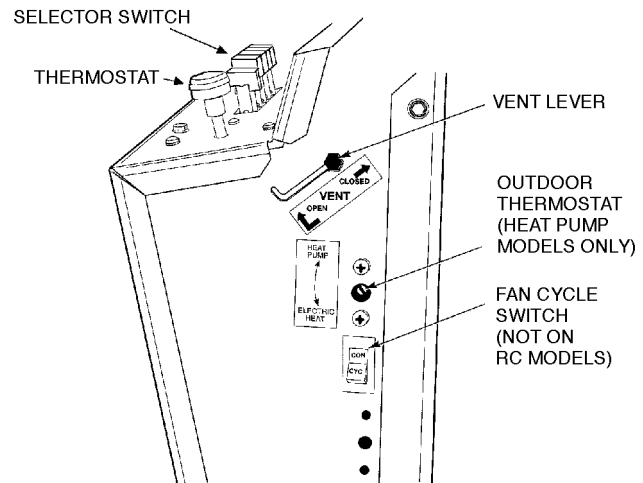


FIGURE 45 — TYPICAL 52S UNIT OPERATING CONTROLS

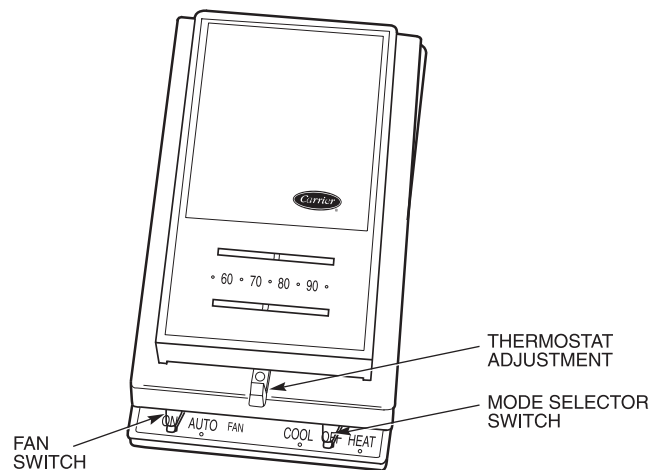
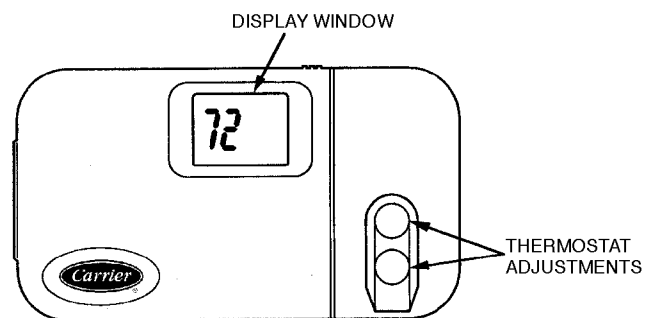


FIGURE 46 — MANUAL THERMOSTAT

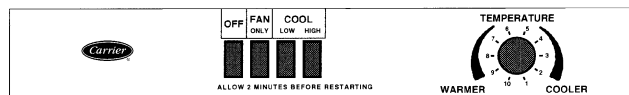


RCD P/N TSTATCCPAC01-A or TSTATCCPHP01-A

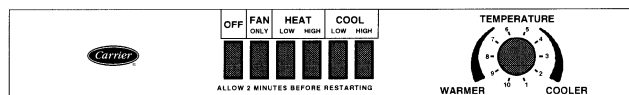
FIGURE 47 — PROGRAMMABLE THERMOSTAT

DESCRIPTION OF SWITCH SETTINGS

- **OFF BUTTON** — The OFF button terminates unit operation.
- **FAN ONLY BUTTON** — Push button for air circulation without heating or cooling.
- **HIGH HEAT OR HIGH COOL** — Push button and rotate temperature knob to desired comfort level. This function provides maximum heating or cooling, and is recommended to raise or lower the room temperature quickly.
- **LOW HEAT OR LOW COOL** — Push button and rotate the temperature knob to desired comfort level. This function provides minimum heating or cooling with maximum dehumidification. This setting also allows for very quiet fan operation.
- **FINDING TEMPERATURE SETTING FOR COMFORT LEVEL** — Set temperature knob between number 5 and number 6. Push High or Low Heat or Cool button and allow unit to run for 15 to 30 minutes. If room is not comfortable, turn knob one number setting at a time. When room is comfortable, keep control knob at that position.



A. 52S COOLING ONLY UNIT



B. 52S COOLING/HEATING UNIT



C. 52S COOLING/HEATING UNIT WITH REMOTE CONTROL (BLANK PLATE)

FIGURE 48 — SAMPLE CONTROL PANELS

NON-USER ADJUSTABLE SWITCHES

- **OUTSIDE OR VENT AIR** — Push the FAN ONLY button and slide vent lever to OPEN position.
- **FAN CYCLE** — The fan cycle switch allows the fan to operate in 2 modes:
 CON — Fan runs continuously, circulating air even when the temperature setting has been satisfied. This helps to maintain the room temperature closer to the thermostat setting.
 CYC — Fan cycles on and off with the compressor during heating or cooling. Fan stops when the temperature setting is satisfied. This results in longer unit off-time and slightly larger variations in room temperature and humidity.
- Units built after the start of 1996 incorporate single-pole, double-throw fan cycle switches that have only 3 terminals. Units built prior to 1996 incorporate a double-pole, double-throw fan cycle switch with 6 terminals and a thermostat bulb heater. The additional terminals control the thermostat bulb heater.
- **OUTDOOR THERMOSTAT (52SQ Units Only)** — The outdoor thermostat has 2 operating modes. The heat pump mode (selector screw set fully clockwise), allows the unit to operate normally in the reverse cycle mode. The electric heat mode (selector screw set fully counterclockwise), disables all **compressor** operating modes, both heating and cooling.

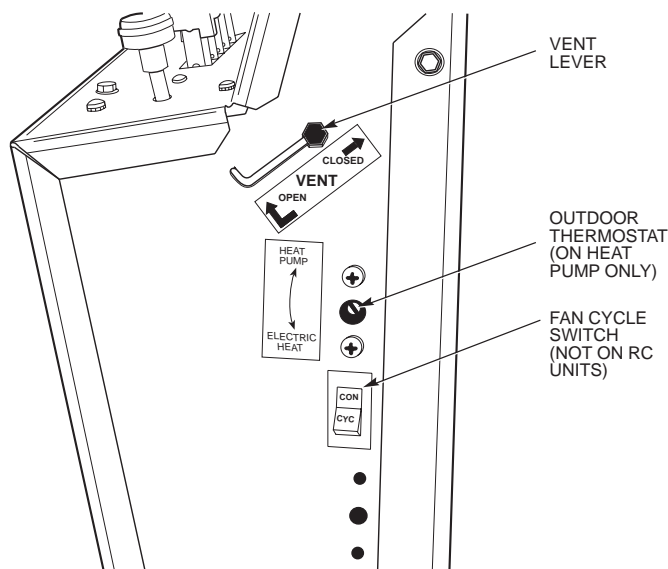


FIGURE 49 — CONTROLS LOCATION

52S SERIES

SEQUENCE OF OPERATION

■ HEAT/COOL UNITS

(Figure 50)

Fan Mode — With the selector switch set to FAN and the fan switch set to fan cycle, contacts L1 to LO and FCS1 to LS are made.

Cooling (Low) — With the selector switch set to low speed cooling and the fan switch set to fan cycle, contacts FCS2 to LO, COMP to FCS1, and COMP to IT3 are made.

NOTE: The contact in low cooling sequence of operation for FCS2 is MED on units built prior to 1996.

Cooling (High) — With the selector switch set to high speed cool and the fan switch set to fan cycle, contacts FCS2 to HI, COMP to FCS1, and COMP to IT3 are made.

Heating (Low) — With the selector switch set to low speed heat and the fan switch set to fan cycle, contacts FCS2 to LO, IT1 to LS, L2 to HTR, and FCS1 to LS are made.

NOTE: The contact in low heating sequence of operation for FCS2 is MED on units built prior to 1996.

Heating (High) — With the selector switch set to high speed heat and the fan switch set to fan cycle, contacts FCS2 to HI, IT1 to LS, L2 to HTR, and FCS1 to LS are made.

SWITCH POSITION	CONTACTS MADE
OFF	FCS TO LS
FAN	L1 TO LO*, FCS1 TO LS
LO HEAT	FCS2 TO LO, IT1 TO LS, L2 TO HTR, FCS1 TO LS
HI HEAT	FCS2 TO HI, IT1 TO LS, L2 TO HTR, FCS1 TO LS
LO COOL	FCS2 TO LO, COMP TO FCS1, COMP TO IT3
HI COOL	FCS2 TO HI, COMP TO FCS1, COMP TO IT3

*L1 to MED, some models.

FIGURE 50 — SELECTOR SWITCH CONTACTS, ALL 52SE AA AND CP MODELS

■ COOLING ONLY UNITS (Figure 51)

Fan Mode — With the selector switch set to FAN and the fan switch set to fan cycle, contact L1 to LO is made.

Cooling (Low) — With the selector switch set to low speed cooling and the fan switch set to fan cycle, contacts FCS to LO and L1 to IT3 are made.

NOTE: The contact in low cooling sequence of operation for FCS2 is MED on units built prior to 1996.

Cooling (High) — With the selector switch set to high speed cool and the fan switch set to fan cycle, contacts FCS to HI, L1 to IT3 are made.

SWITCH POSITION	CONTACTS MADE
OFF	NONE
FAN	L1 TO LO*
LO COOL	L1 TO IT3, FCS TO LO
HI COOL	L1 TO IT3, FCS TO HI

*L1 to MED, some models.

FIGURE 51 — SELECTOR SWITCH CONTACTS, ALL 52SC AA AND CP MODELS

■ HEAT PUMP UNITS (Figure 52)

Fan Mode — With the selector switch set to fan cycle, contacts L1 to LO are made.

Cooling (Low) — With the selector switch set to low cool and the fan switch set to fan cycle, contacts L1 to IT3 and FCS to LO are made.

NOTE: The contact in low cooling sequence of operation for FCS2 is MED on units built prior to 1996.

Cooling (High) — With the selector switch set to high cool and the fan switch set to fan cycle, contacts L1 to IT3 and FCS to HI are made.

Heating (Low) — With the selector switch set to low heat and the fan switch set to fan cycle, contacts L1 to IT1, FCS to LO and L2 to HTR are made.

Heating (High) — With the selector switch set to high heat and the fan switch set to fan cycle, contacts L1 to IT1, FCS to HI, and L2 to HTR are made.

Defrost Cycle — When heat pump unit is operating in reverse cycle, the outdoor coil may begin to frost. As frost accumulates on the outdoor coil the unit may switch into defrost mode. The defrost mode is activated when the outdoor frost thermostat sensor detects a temperature below 15 F on the coil. At this point, the thermostat deenergizes the compressor and activates the electric heat. The unit will remain in electric heat mode until the outdoor thermostat senses 35 F. The defrost mode is a passive operation and may take some time before the coil defrosts.

SWITCH POSITION	CONTACTS MADE
OFF	NONE
FAN	L1 TO LO*
LO HEAT	L1 TO IT1, FCS TO LO, L2 TO HTR
HI HEAT	L1 TO IT1, FCS TO HI, L2 TO HTR
LO COOL	L1 TO IT3, FCS TO LO
HI COOL	L1 TO IT3, FCS TO HI

*L1 to MED, some models.

FIGURE 52 — SELECTOR SWITCH CONTACTS, ALL 52SQ AA AND CP MODELS

COMPONENT OPERATION AND TROUBLESHOOTING

■ TOOLS NEEDED

Volt-Ohmmeter
Flat and Phillips Screw Drivers
5/16-in. Nut Driver
Side Cutting Pliers

⚠ WARNING

Before cleaning, servicing, performing maintenance or removing the chassis from the wall sleeve, disconnect all power to the unit to avoid the possibility of electrical shock and personal injury. Only trained and qualified service personnel should perform installation and service procedures on these units. Untrained personnel may perform basic maintenance tasks such as cleaning and replacing filters. Refer to GENERAL DISASSEMBLY section of this manual for proper procedures to disconnect power to 52S units.

The Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

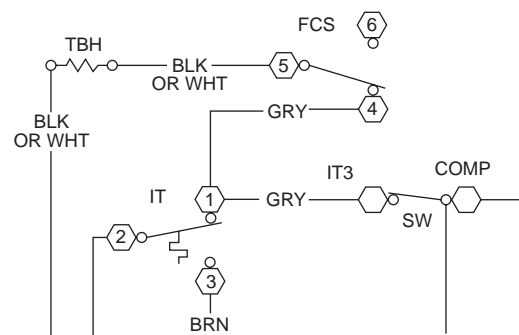
Consider the following safety issues:

- Prior to performing any service or maintenance on electrical equipment you must **Disconnect All Power**.
- New and unfamiliar tasks should be performed under the supervision of an experienced service technician.
- Personal protective equipment, such as safety glasses and work gloves, should be worn.
- The floor around the work area should be clean and free of debris.
- Make sure tools are the correct tools for job, and that they are working properly and in good condition.
- The 52S unit may weigh up to 150 pounds. Use a lifting device or ask for assistance if the unit must be moved.

■ **INDOOR THERMOSTAT (Heat/Cool and Cool Only Units) (Figure 53)** — The thermostat maintains the selected temperature by cycling the compressor on and off during cooling operation and the electric heater during heating operation. **The thermostat DOES NOT switch from heating to cooling, or cooling to heating.** If the switch is in the **CYCLE** position, then the fan will be cycled off when the thermostat satisfies. A bulb heater was incorporated on models built prior to 1996 to help provide closer temperature control. This heater does not affect the mechanical operation of the switch.

To verify the operation of the thermostat switch, a continuity test may be performed as follows:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
2. Remove wire leads from thermostat. Note their locations to ease re-assembly.
3. Place one of the leads of the continuity tester on the terminal marked 2, and the other lead on either the terminal marked 1 or the terminal marked 3.
4. Adjust the thermostat up or down to verify the contacts of the switch open and close. When verifying continuity of a *closed* switch, the ohm reading should be 0 ohms. An *open* switch will show OL on the meter.
5. When testing is complete, reconnect the leads.



See Legend on page 28.

FIGURE 53 — INDOOR THERMOSTAT (IT) CONTACTS, ALL 52SE AA AND CP MODELS

■ **INDOOR THERMOSTAT (Heat Pump Units) (Figure 54)** — The heat pump indoor thermostat uses a two-stage switch for the heating mode. The first stage engages the compressor and reversing valve, and the unit operates in normal heat pump mode. The indoor thermostat maintains the selected temperature by cycling the compressor on and off in cooling mode. In the heating mode, the indoor thermostat will cycle the compressor or the heater, depending on the difference between the actual room temperature and the thermostat temperature setting.

When the room temperature is more than 4 F cooler than the indoor thermostat setting, the second heating stage of the indoor thermostat engages the electric heat strip. This design feature allows the user to rapidly warm the room with the electric heat strip by turning the thermostat to its highest setting. When room temperatures approach the desired temperature, the user may adjust the thermostat to a personal comfort setting, which allows for normal heat pump operation.

NOTE: For outdoor temperatures below approximately 35 F (45 F for 1999 models), the outdoor frost thermostat prevents heat pump mode operation and immediately engages the electric heat strip upon a call for heating. The electric heat strip is NEVER energized at the same time as the compressor.



52S SERIES

■ **INDOOR THERMOSTAT (Heat Pump Units) (cont)** (Figure 54) — To verify operation of the heat pump indoor thermostat switch, a continuity test may be performed as follows:

1. Turn off unit power as described in GENERAL DISASSEMBLY section.
2. Remove wire leads from thermostat. Note their locations to ease re-assembly.
3. To test stage A, place one lead of the continuity tester on the terminal marked 2, and the other lead on either the terminal marked 1 or the terminal marked 3.
4. Adjust the thermostat up or down to verify the contacts of the switch open and close. When verifying continuity of the *closed* switch, the reading on the meter should be 0 ohms. An *open* switch will show OL on the meter.
5. To test stage B contacts, place one lead of the continuity tester on contact 5 and the other lead on either contact 4 or contact 6.
6. Adjust the thermostat up or down to verify the contacts of the switch open and close as in Step 4.
7. When testing is complete, reconnect the leads.

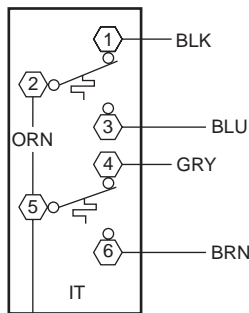


FIGURE 54 — INDOOR THERMOSTAT (IT) CONTACTS, ALL 52SQ AA AND CP MODELS

■ **OUTDOOR FROST THERMOSTAT (Heat Pump Units) (Figure 55)** — The Outdoor Frost Thermostat (OFT) is a thermostat that uses a single-pole switch with a manual override selector. The thermostat switches between electric heat and compressor operation when the temperature of the outdoor coil falls below 15 F or rises above 35 F. Switching the override selector to electric heat disables the reverse cycle operation of the thermostat is manually switched to electric heat operation, the compressor is disabled for heating and cooling operations.

To verify the OFT is operational, a continuity test may be performed as follows:

1. Turn off unit power as described in GENERAL DISASSEMBLY section.
2. Remove the leads from the OFT. Note their locations to ease re-assembly.
3. Connect the continuity tester to the switch terminals marked 1 and 2.
4. Rotate the override switch to the electric heat setting and verify that there is continuity between terminals 1 and 2.
5. To check the other contacts, move the lead on terminal 1 to terminal 3. Rotate the override switch to the heat pump setting. There should now be continuity between terminals 2 and 3.
6. Once the test is complete, reconnect the leads.

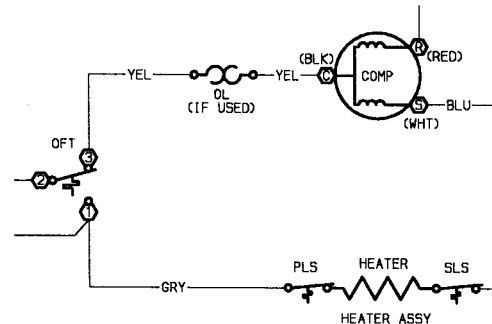


FIGURE 55 — OUTDOOR FROST THERMOSTAT (OFT) CONTACTS, ALL 52SQ AA AND CP MODELS

LEGEND (Figures 53 - 55)

COMP	—	Compressor
FCS	—	Fan Control Switch
IT	—	Indoor Thermostat
OFT	—	Outdoor Frost Thermostat
OL	—	Overload
PLS	—	Primary Limit Switch
SLS	—	Secondary Limit Switch
TBH	—	Thermostat Bulb Heater

■ **CAPACITOR** — The 52S units use a *dual capacitor*. One part of the capacitor is used with the fan motor. The other part of the capacitor is used by the compressor.

Run circuits on single-phase compressor motors use capacitors which dramatically affect the motor operation. *Run capacitors are connected to the motor circuit at all times.*

To evaluate the capacitor, perform a visual check first. A shorted capacitor may give a visual indication of its failure. For example, the pop-out hole at the top of a start capacitor may bulge or blow out. A run capacitor may bulge or leak. In these instances, the capacitor must be replaced with one recommended by the manufacturer. If there are no visual signs of capacitor failure, testing of the capacitor resistance may be done with a volt-ohmmeter as detailed below:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section but do not unplug the service cord; it will supply ground connection for the unit chassis. **Check to ensure power is off and LOCKED OUT.**
2. Connect one lead of a 20,000 ohm, 2-watt resistor to the center group of terminals on the dual capacitor. Attach the other lead from the resistor to an unpainted metal section of the unit chassis. This allows that section of the dual capacitor to discharge. Repeat this process between the other group of terminals.

⚠ CAUTION

Capacitors are capable of holding charge similar to a battery and may cause an electrical shock.

3. Locate and disconnect the wires from the start and/or run capacitor to isolate them from the remainder of the circuit. Refer to the unit wiring diagram if you need assistance locating wires.
4. Set up the volt-ohmmeter to measure resistance by connecting the meter across the capacitor terminals. See Figure 56.
5. The reading on the meter should first indicate zero, or a low resistance, then slowly rise toward infinity or some high value or measurable resistance. This indicates the capacitor is most likely good. If the reading goes to zero or a low resistance and stays there, the capacitor is likely shorted and needs replacement. If the reading immediately indicates infinity, the capacitor is likely open and must be replaced.
6. Replace the capacitor if failed and rewire according to the WIRING SCHEMATICS located in the control box of the unit.

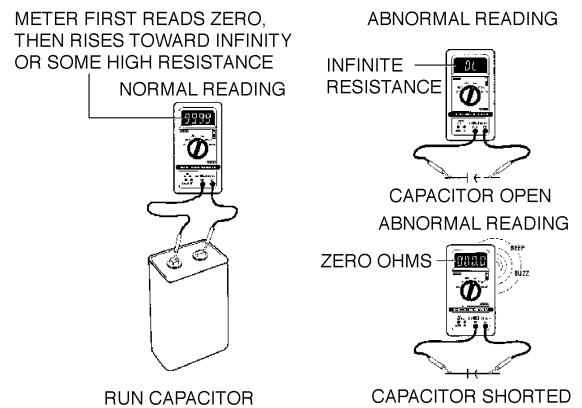


FIGURE 56 — CAPACITOR TEST

■ **FAN CYCLE SWITCH** — The fan cycle switch has 2 operating modes, continuous (CON) and cycle (CYC). To verify the fan cycle switch is operational, a continuity test may be performed as follows:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
2. Label and remove the leads connected to fan cycle switch. See Figure 57.
3. Connect the volt-ohmmeter for 1X ohms and check for continuity from terminal 2 to 1 then change the switch position and check for continuity from terminal 2 to 3. For a 6-terminal switch this test should be done on terminals 5 to 4 and 5 to 6 as well.
4. Once test is complete, reconnect the leads.

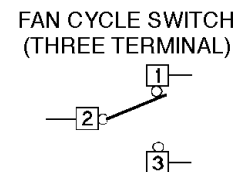


FIGURE 57 — FAN CYCLE SWITCH (3 Terminal)

ELECTRICAL COMPONENTS REMOVAL AND REPLACEMENT

- **INDOOR THERMOSTAT** — To remove the indoor thermostat, perform the following steps:
 1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
 2. Remove the thermostat knob.
 3. Remove control box escutcheon (Figure 58) to expose 2 Phillips head mounting screws. Remove the temperature limiter by gently lifting it off the thermostat knob shaft (Figure 59).
 4. Open the control box as described in the GENERAL DISASSEMBLY section of this manual.
 5. Remove the thermostat bulb from the clip by gently pressing it down and out of the clip. See Figure 27.
 6. Remove the 2 screws mounting the thermostat to the control box.
 7. Remove the leads from the indoor thermostat and remove it. Route the capillary out of the control box. Note the wire locations to ease re-assembly.
 8. Reverse Steps 1 - 7 to reinstall.

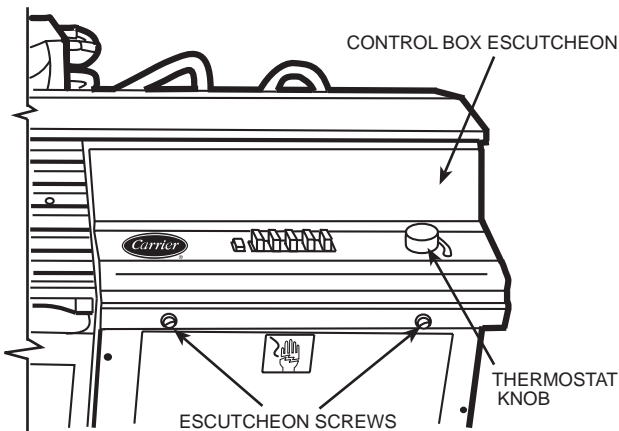


FIGURE 58 — ESCUTCHEON REMOVAL

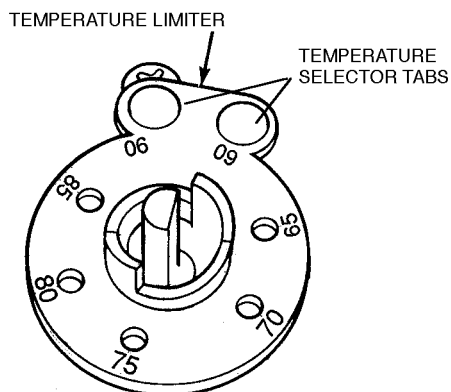


FIGURE 59 — TEMPERATURE LIMITER

- **OUTDOOR FROST THERMOSTAT (Heat Pump Units)** — To remove the outdoor frost thermostat (OFT), perform the following steps:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
2. Remove the 2 screws mounting the thermostat to the right side of the control box. See Figure 60.
3. Remove the thermostat capillary from the outdoor coil and clip any wire ties holding the capillary in place.
4. Disconnect the wires and carefully remove the thermostat and capillary from the unit.
5. Reverse Steps 1 - 4 to reinstall.

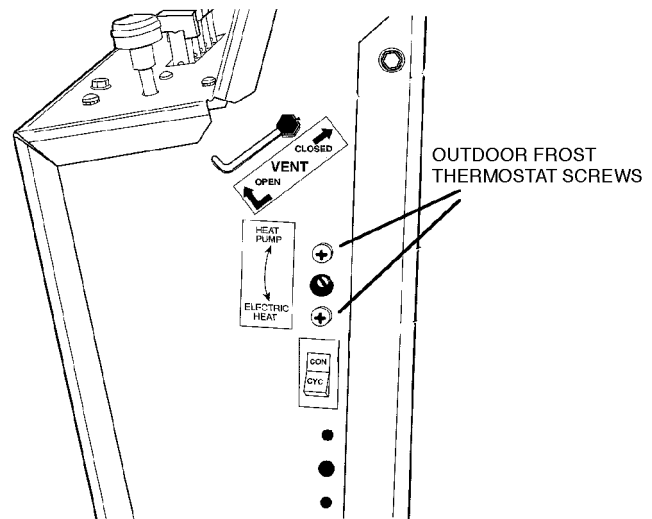


FIGURE 60 — OUTDOOR FROST THERMOSTAT SCREWS

■ **CAPACITOR** — To remove the capacitor, perform the following steps:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
2. Open the control box (Figure 61) as detailed in the GENERAL DISASSEMBLY section of this manual.
3. Properly discharge the capacitor as described in the Capacitor section under **Component Operation and Troubleshooting**.
4. Remove the leads to the capacitor. Note the wire locations to ease re-assembly.
5. Close the control box door and remove the screw holding the capacitor.
6. Open the control box door and remove capacitor.
7. Reverse Steps 1 - 6 to reinstall.

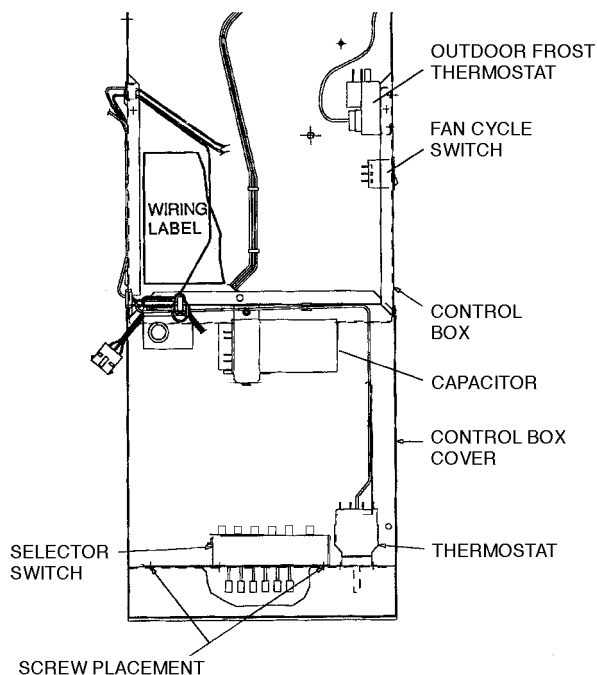


FIGURE 61 — COMPONENT LOCATIONS IN OPEN CONTROL BOX

■ **FAN CYCLE SWITCH** — The fan cycle switch is located on the right side of the control box. To remove the fan cycle switch, perform the following steps:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
2. Open the control box as described in GENERAL DISASSEMBLY section of this manual.
3. Remove the 3 wires from the fan cycle switch. See Figure 61 for location.
4. Push the snaps of the switch housing toward the switch with a pair of pliers or small screwdriver. Gently push the switch out of the housing.
5. Reverse Steps 1 - 4 to reinstall.

■ **SELECTOR SWITCH** — To remove the selector switch from the unit, perform the following steps:

1. **Turn off unit power** as described in GENERAL DISASSEMBLY section.
2. Remove thermostat knob and unit escutcheon. See Figure 58.
3. Open control box as described in the GENERAL DISASSEMBLY section of this manual.
4. Remove all the wires to the selector switch. Label wires to simplify re-assembly.
5. Remove the 2 screws mounting the switch and remove switch. See Figure 61.
6. Reverse Steps 1 - 5 to reinstall.

FAN MOTOR

The fan motor is a permanent split capacitor (PSC) type motor. This motor is common in air-conditioning system applications. A PSC motor does not require the use of a relay and always has a run capacitor connected between the run and start windings of the motor. See Figure 62.

The 52S series fan motor has a motor shaft extended through both ends. It powers both the indoor and the outdoor fans. It has permanently sealed bearings that require no lubrication. There are many different fan motor models, but they typically are 2 speed or 3 speed and in 2 voltage categories, 208/230 and 265 volts.

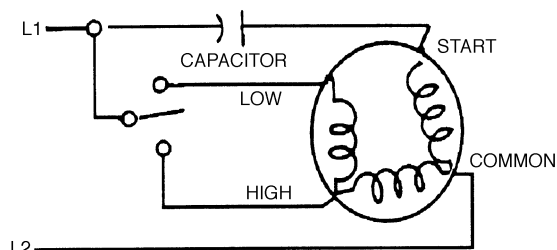


FIGURE 62 — TWO-SPEED, PERMANENT SPLIT CAPACITOR MOTOR (PSC)

FAN MOTOR TROUBLESHOOTING

Refer to Figure 63 for a basic fan motor troubleshooting chart.

■ **TOOLS NEEDED** — The following list includes recommended tools and devices for working on the fan motor of 52S units.

Gloves
Safety Glasses
Regular and Phillips Head Screw Drivers
Small Adjustable Wrench
Allen Wrench Set (extra length)
3/8-in. Socket Set
Channel Lock Pliers
Volt-ohmmeter
5/16-in. and 1/4-in. Nut Drivers

⚠ WARNING

Before cleaning, servicing, performing maintenance or removing the chassis from the wall sleeve, disconnect all power to the unit to avoid the possibility of electrical shock and personal injury. Only trained and qualified service personnel should perform installation and service procedures on these units. Untrained personnel may perform basic maintenance tasks such as cleaning and replacing filters. Refer to GENERAL DISASSEMBLY section of this manual for proper procedures to disconnect power to 52S units.

The Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Consider the following safety issues:

- Prior to performing any service or maintenance on electrical equipment you must **Disconnect All Power**.
- New and unfamiliar tasks should be performed under the supervision of an experienced service technician.
- Personal protective equipment, such as safety glasses and work gloves, should be worn.
- The floor around the work area should be clean and free of debris.
- Make sure tools are the correct tools for the job, and that they are working properly and in good condition.
- The 52S unit may weigh up to 150 pounds. Use a lifting device or ask for assistance if the unit must be moved.

BASIC FAN MOTOR ELECTRICAL TESTS

There are 2 basic electrical tests for PSC fan motors that will determine the electrical state of the motor. The first test requires checking the electrical resistance between the motor windings. The second test requires checking the electrical resistance between the motor windings and ground. These tests may be accomplished by performing the following steps:

1. **DISCONNECT ALL POWER TO UNIT.**
2. Remove the unit from the sleeve and open the control box as detailed in the GENERAL DISASSEMBLY section.
3. Label and disconnect the fan motor wires from the push button switch and capacitor as shown in Figure 5. Two-speed motors have 2 wires on the capacitor and 2 wires on the push button switch. Three-speed motors have 2 wires on the capacitor and 3 wires on the push button switch. Refer to the unit wiring diagram inside the control box.
4. Measure and record the resistance between the black wire and each of the other wires. Make sure the motor is cool before attempting to measure resistance. The internal thermostat of the motor may be electrically open and will not close until the motor cools. See Figure 64 for typical motor winding resistance measurements. The resistance values in the table are approximate. Values that are within 10% of those listed are acceptable. If the motor in your model is not listed, find a motor of similar horsepower and voltage on the chart and compare it to the resistance measurements of your motor.
5. Measure the resistance of each of the motor wires to the motor casing. The resistance should be infinite. Make sure the motor is cool before attempting to measure resistance. The internal thermostat of the motor may be electrically open and will not close until the motor cools. A motor that has measurable resistance to ground is shorted to ground and must be replaced.

SYMPTOM ↓ POSSIBLE CAUSE ↓	MOTOR HUMS BUT DOES NOT START	MAKES NO NOISE AND DOES NOT START	STARTS BUT STOPS AFTER SHORT TIME	STARTS BUT RUNS SLOW	RUNS ON ONE SPEED, NOT ON OTHERS
DEFECTIVE BEARING	X		X	X	
CAPACITOR DEFECTIVE	X		X		
SWITCH DEFECTIVE		X			X
LOW LINE VOLTAGE	X		X	X	
SHORTED MOTOR WINDING	X	X			X
NO POWER TO UNIT		X			
INTERNAL THERMOSTAT OPEN		X			
MISWIRED	X	X	X		X
FAN STUCK	X				
BROKEN MOTOR WIRE	X	X	X		X
MOTOR WINDING GROUNDED	X	X			
OPEN MOTOR WINDING	X	X	X		X

FIGURE 63 — FAN MOTOR TROUBLESHOOTING CHART

TYPICAL 208/230 VOLT MOTORS

CARRIER PART NUMBER	HC37CE246	HC37CE242	HC35CE234	HC37CE211
MANUFACTURER'S PART NUMBER	5KCP39BGT165S	5KCP39BGR198S	5KCP39CGT162S	5KCP39DGT164S
MOTOR VOLTAGE	208/230	208/230	208/230	208/230
MOTOR HORSEPOWER	1/15	1/10	1/8	1/6
MOTOR SPEEDS	2	3	2	2
RESISTANCE (OHMS) BLACK TO WHITE WIRE	147	90	74	58
RESISTANCE (OHMS) BLACK TO BROWN WIRE	169	71	53	24
RESISTANCE (OHMS) BLACK TO BLUE WIRE	N.A.	38	N.A.	N.A.
RESISTANCE (OHMS) BLACK TO RED WIRE	42	31	28	41

NOTE: Resistance values are approximate.

TYPICAL 265 VOLT MOTORS

CARRIER PART NUMBER	HC29CE273	HC33CE267	HC35CE268	HC37CE266
MANUFACTURER'S PART NUMBER	5KCP39BGT161S	5KCP39BGR199S	5KCP39CGT163S	5KCP39EGT171S
MOTOR VOLTAGE	265	265	265	265
MOTOR HORSEPOWER	1/15	1/10	1/8	1/6
MOTOR SPEEDS	2	3	2	2
RESISTANCE (OHMS) BLACK TO WHITE WIRE	172	85	78	52
RESISTANCE (OHMS) BLACK TO BROWN WIRE	197	52	45	26
RESISTANCE (OHMS) BLACK TO BLUE WIRE	N.A.	43	N.A.	N.A.
RESISTANCE (OHMS) BLACK TO RED WIRE	49	34	34	43

NOTE: Resistance values are approximate.

FIGURE 64 — TYPICAL 52S FAN MOTORS



FAN MOTOR REPLACEMENT

Perform the following steps to **remove and reinstall the fan motor**:

1. **DISCONNECT ALL POWER TO UNIT.**
2. Remove the unit from the sleeve as detailed in the GENERAL DISASSEMBLY section and place the unit on a large flat surface.
3. Remove the discharge air grille, the aluminum top panel, the top cover, and the discharge air deck as detailed in the GENERAL DISASSEMBLY section under **To Access Indoor-Air Section Components** (Figures 14 - 17). Save the screws.
4. Remove $\frac{5}{16}$ -in. screw, located below the motor, that secures the sheet metal air block and the motor ground wire to the partition. Remove the air block.
5. Remove the gusset, and detach the condenser orifice from the outdoor coil as detailed in the GENERAL DISASSEMBLY section under **To Access Outdoor-Air Section Components**. See Figures 18 and 19.
6. Loosen the mechanical fastener that holds the indoor fan to the fan motor shaft. The indoor fan may be secured to the fan motor shaft by either an Allen screw or a square head bolt. This may require removing the electric heat assembly. If so, refer to the HEATERS section of this manual under **Heater Removal**.
7. Open the control box as detailed in the GENERAL DISASSEMBLY section. Label and disconnect the fan motor wires from the push button switch and capacitor. Two-speed motors have 2 wires on the capacitor and 2 wires on the push button switch. Three-speed motors have 2 wires on the capacitor and 3 wires on the push button switch. Refer to the unit wiring diagram inside the control box.
8. Using the $\frac{5}{16}$ -in. nut driver, remove the 2 screws that hold the outdoor coil to the basepan. See Figure 19.
9. Gently lift the outdoor coil up and just outside of the unit basepan. This allows access to the spring clip that secures the outdoor fan to the fan motor.

⚠ CAUTION

Do not kink or break the tubes that connect to the coil. The system still has refrigerant in it. Wear gloves, the coil fins are sharp and can cut your hands.

10. **WEAR SAFETY GLASSES!** Using the adjustable pliers, carefully remove the spring clip that secures the fan to the fan shaft. See Fig. 65. Using 2 screwdrivers, gently slide the outdoor fan off the motor shaft. See Figure 66.
11. Remove the 3 mounting bolts that secure the fan motor to the partition and remove the fan motor from the unit.
12. Reinstall the new fan motor by reversing Steps 1 through 11.

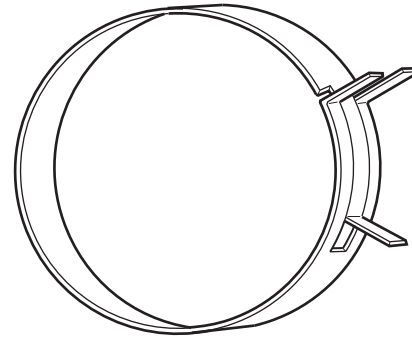


FIGURE 65 — SPRING CLIP

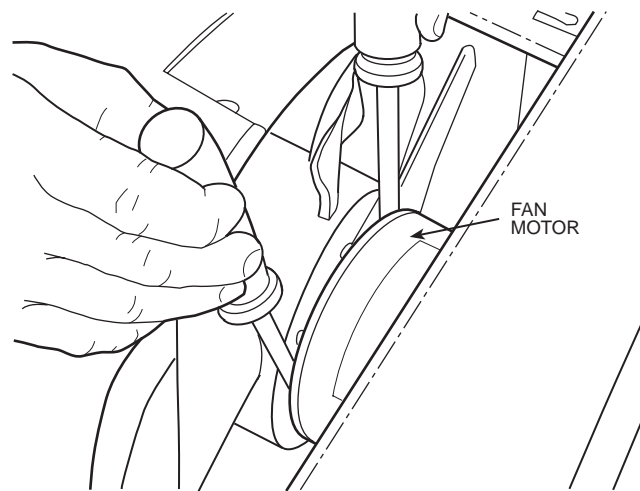


FIGURE 66 — REMOVING OUTDOOR FAN FROM MOTOR SHAFT

FIELD TEMPERATURE CHARTS

See Figures 67 - 82 for field temperature data.

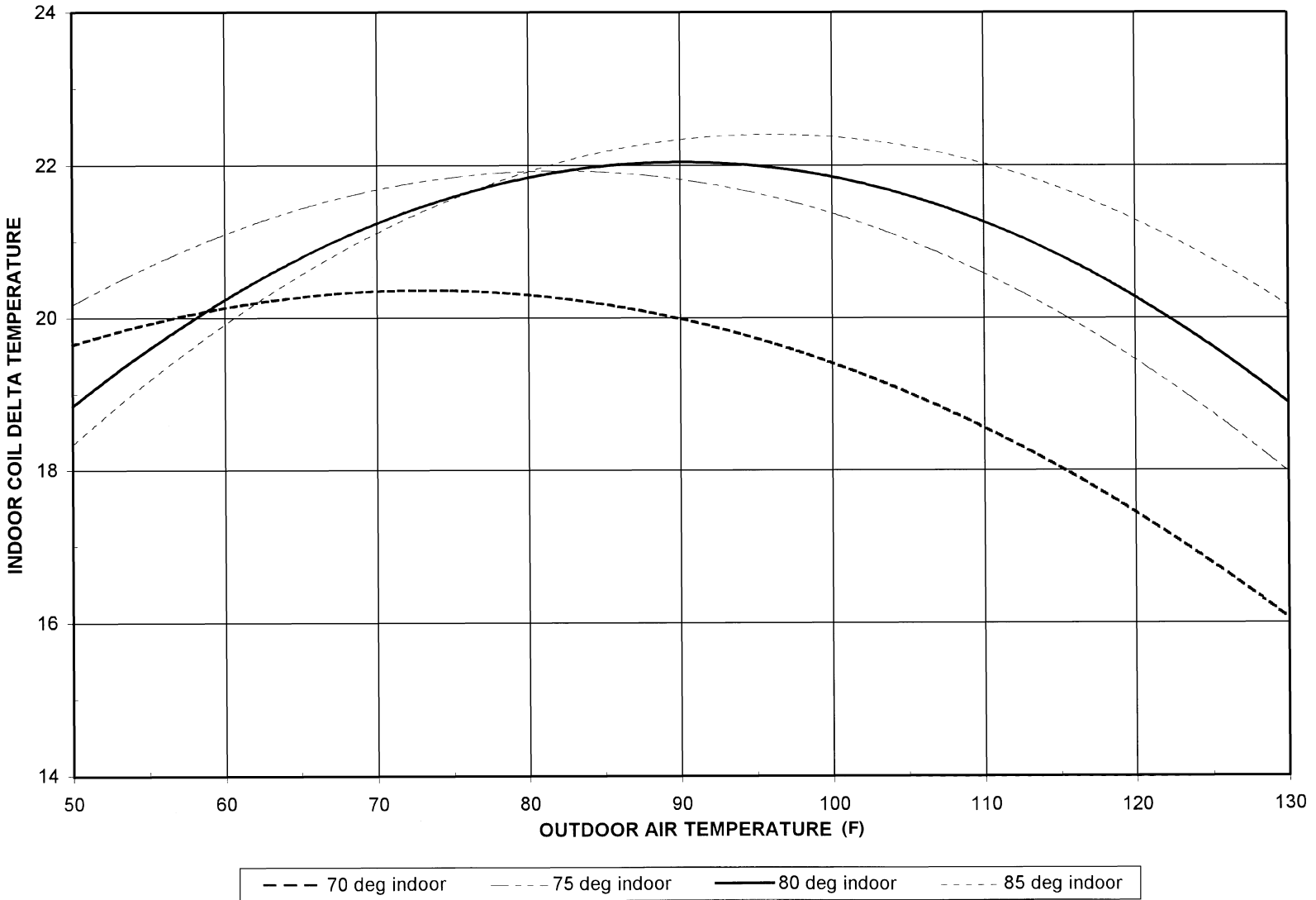


FIGURE 67 — 52S 7,000 BTU UNIT FIELD TEMPERATURE CHART — LOW COOL — 50% RH



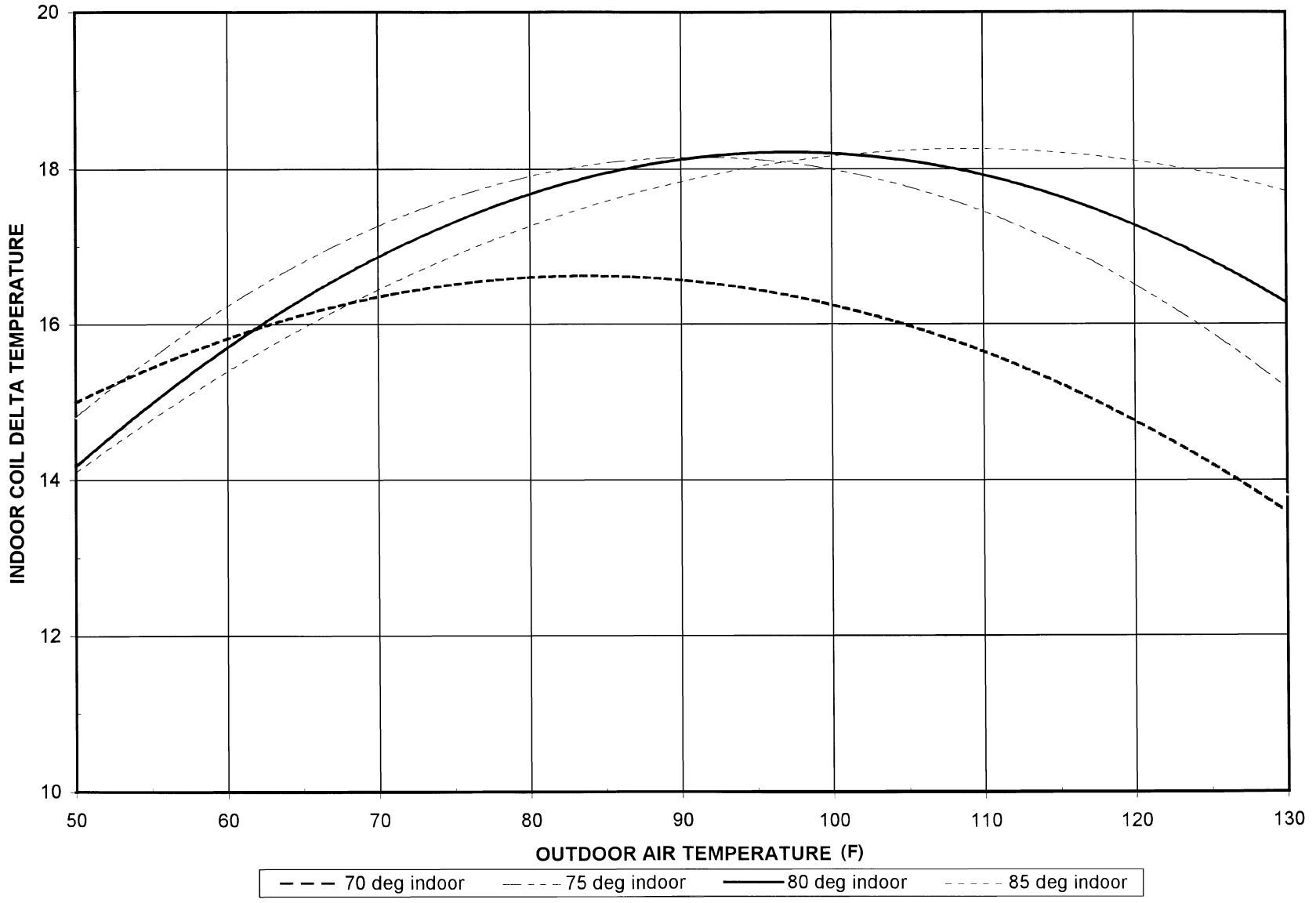


FIGURE 68 — 52S 7,000 BTU UNIT FIELD TEMPERATURE CHART — HIGH COOL — 50% RH

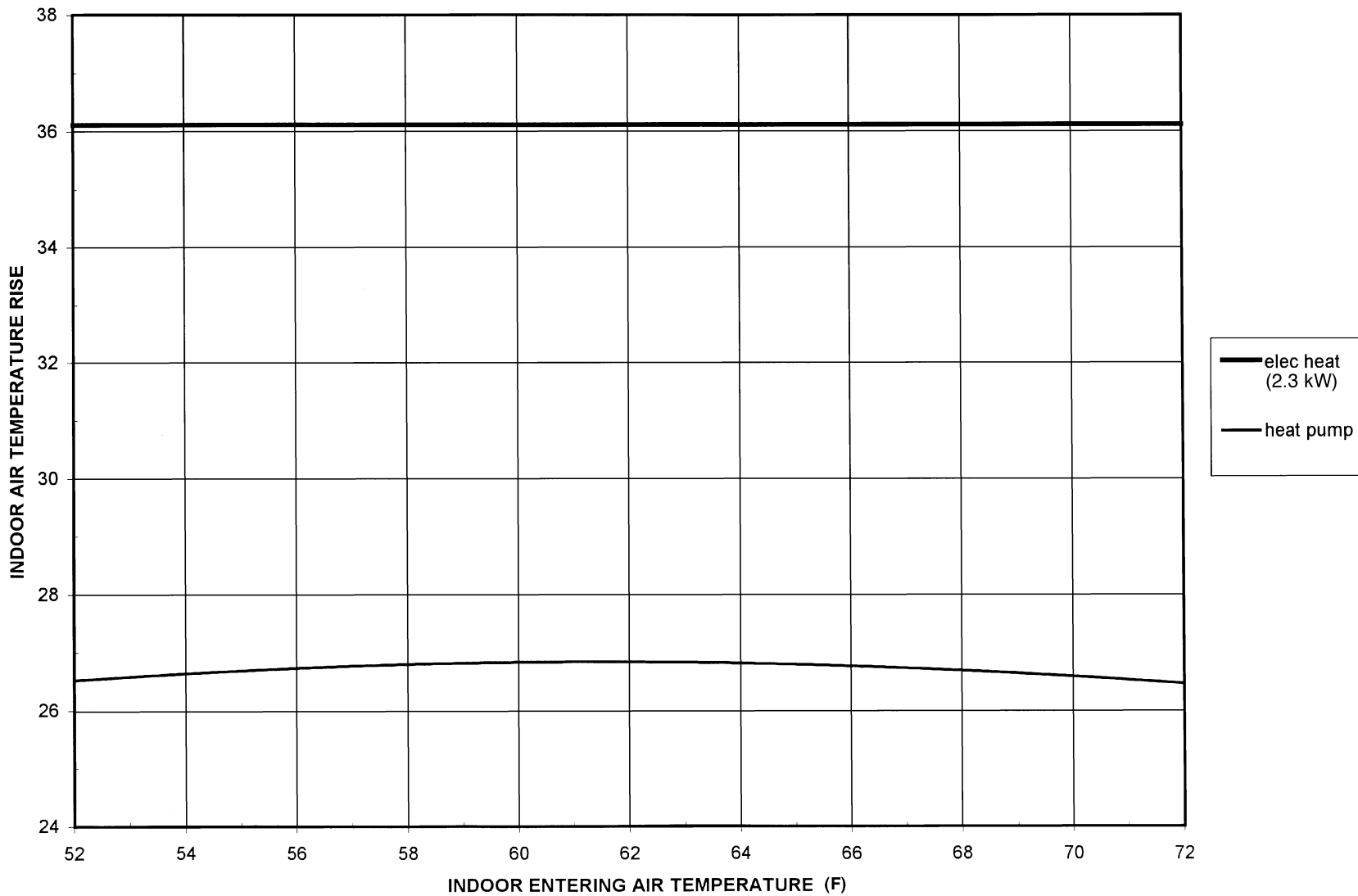


FIGURE 69 — 52S 7,000 BTU UNIT FIELD TEMPERATURE CHART, LOW HEAT MODE (47 F OUTDOOR TEMPERATURE)

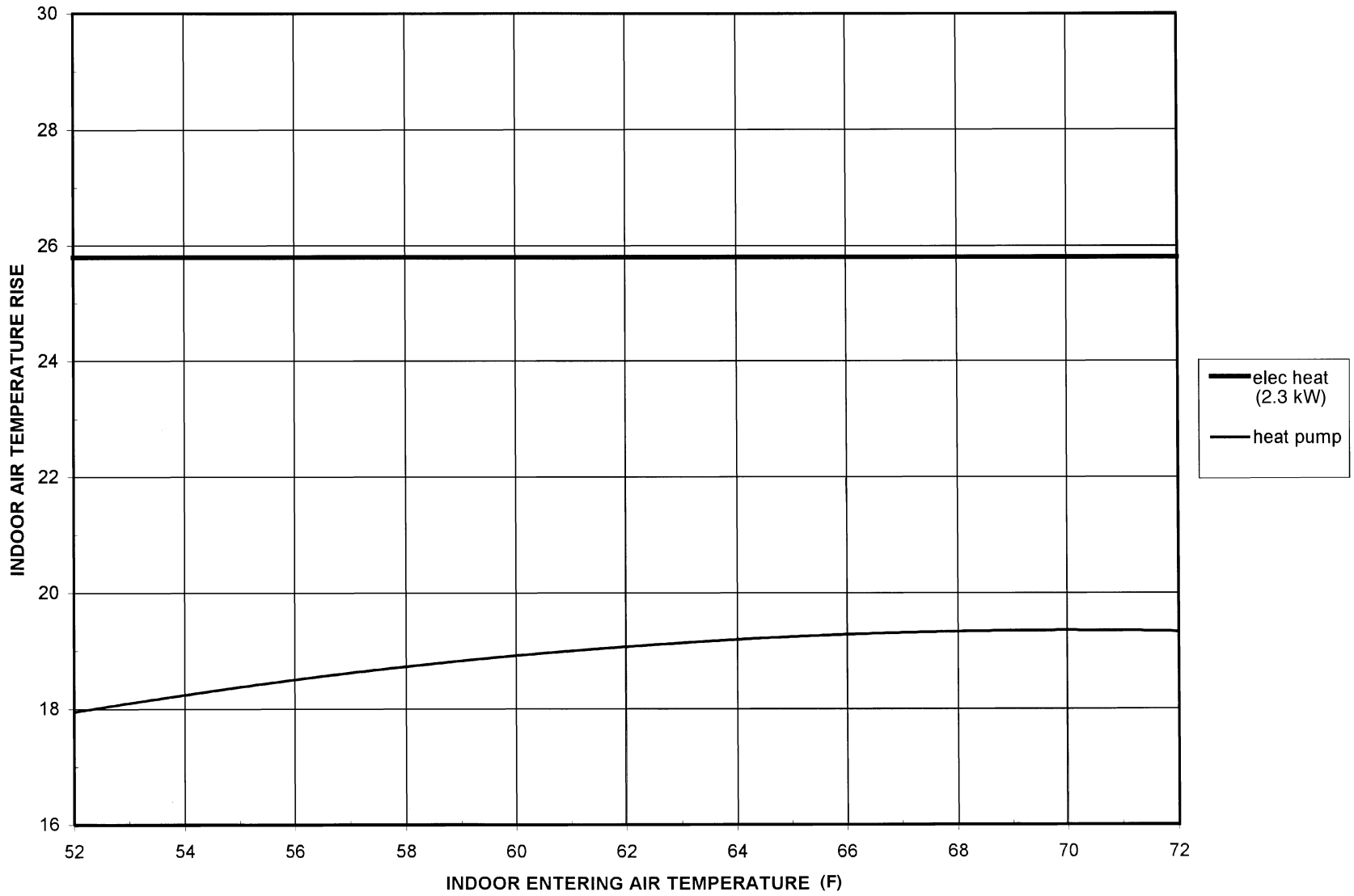


FIGURE 70 — 52S 7,000 BTU UNIT FIELD TEMPERATURE CHART, HIGH HEAT MODE (47 F OUTDOOR TEMPERATURE)

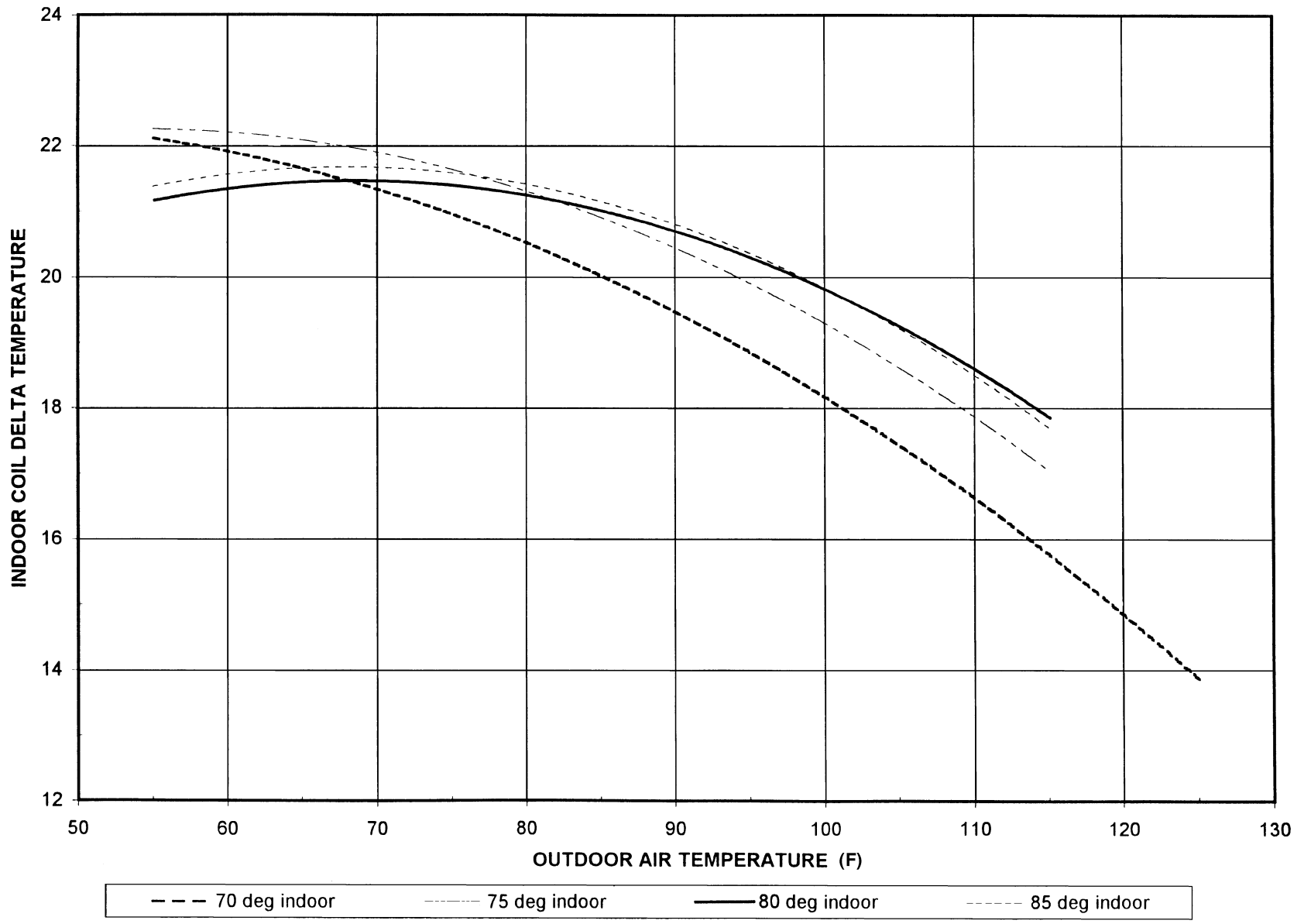
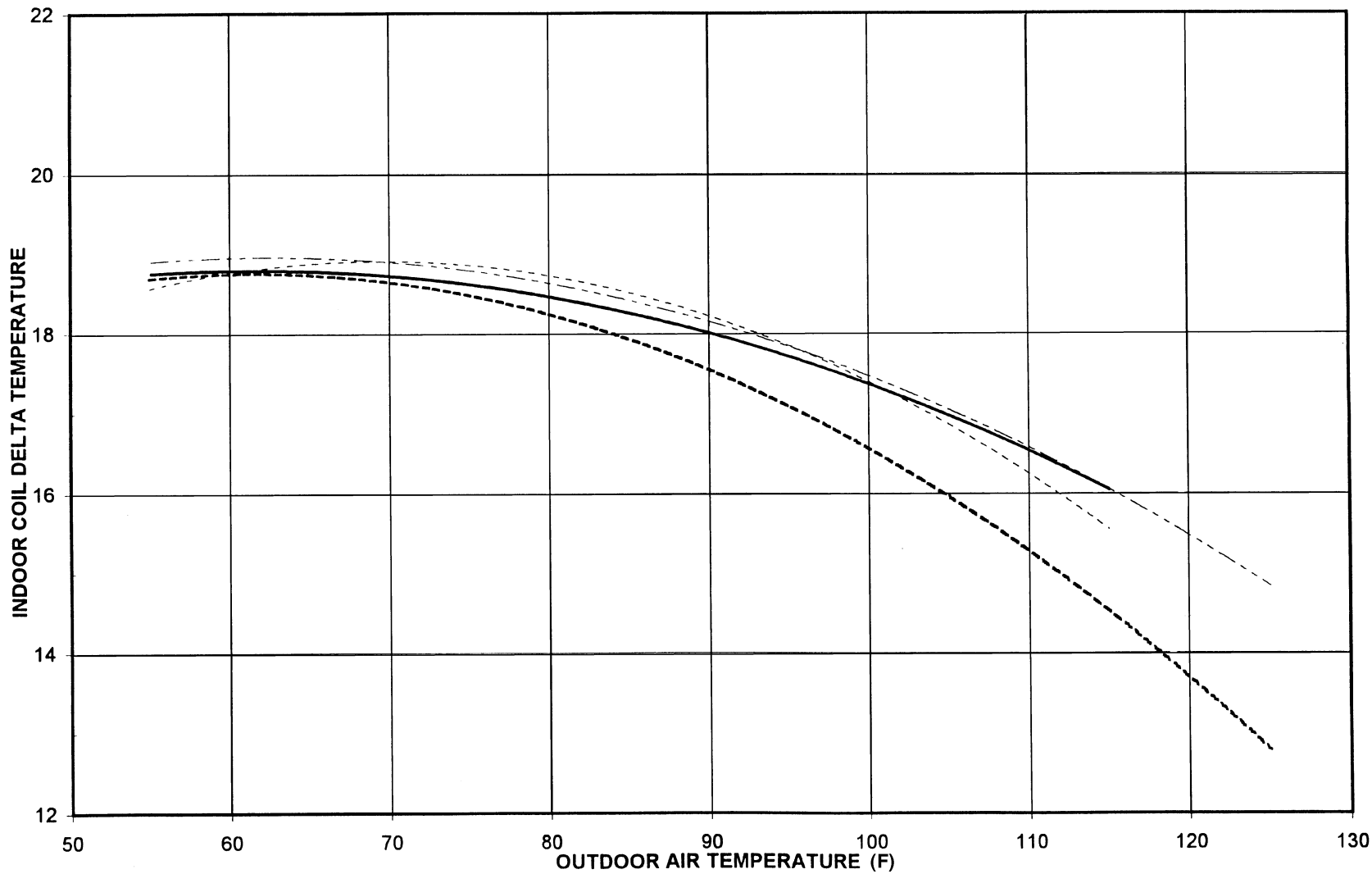


FIGURE 71 — 52S 9,000 BTU UNIT FIELD TEMPERATURE CHART — LOW COOL — 50% RH

52S
SERIES



--- 70 deg indoor -.-.- 75 deg indoor ——— 80 deg indoor 85 deg indoor

FIGURE 72 — 52S 9,000 BTU UNIT FIELD TEMPERATURE CHART — HIGH COOL — 50% RH

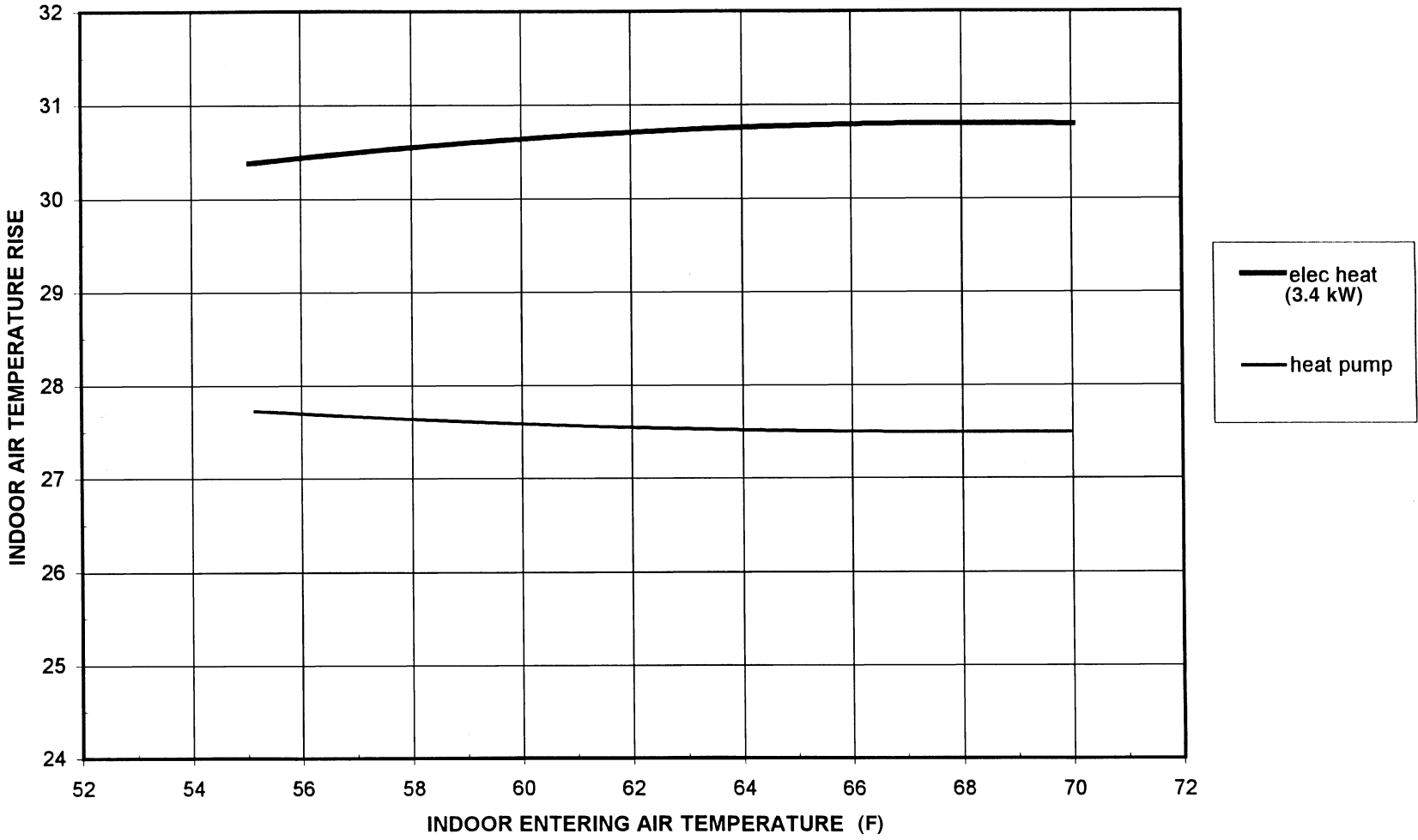


FIGURE 73 — 52S 9,000 BTU UNIT FIELD TEMPERATURE CHART, LOW HEAT MODE (47 F OUTDOOR TEMPERATURE)



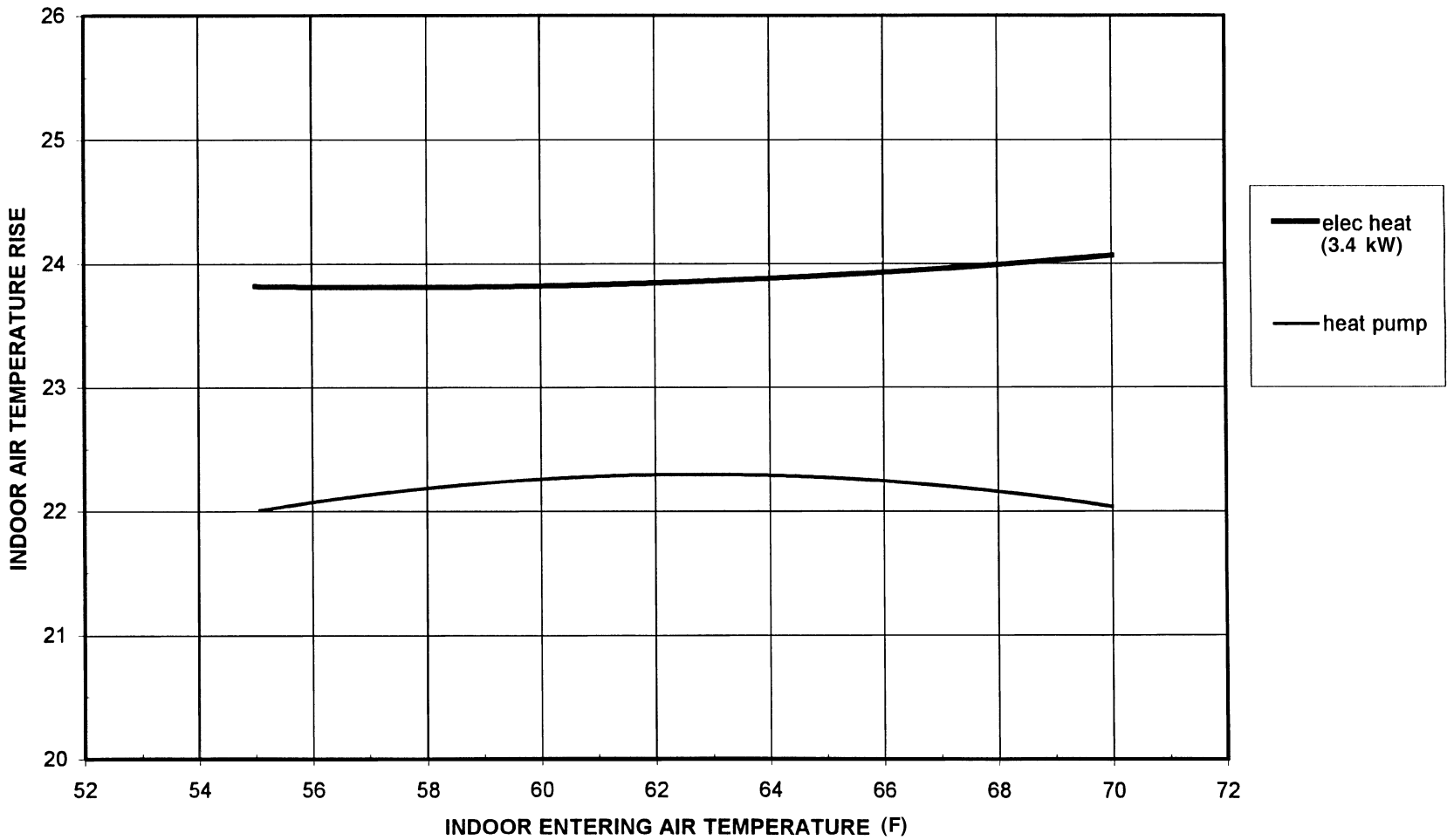


FIGURE 74 — 52S 9,000 BTU UNIT FIELD TEMPERATURE CHART, HIGH HEAT MODE (47 F OUTDOOR TEMPERATURE)

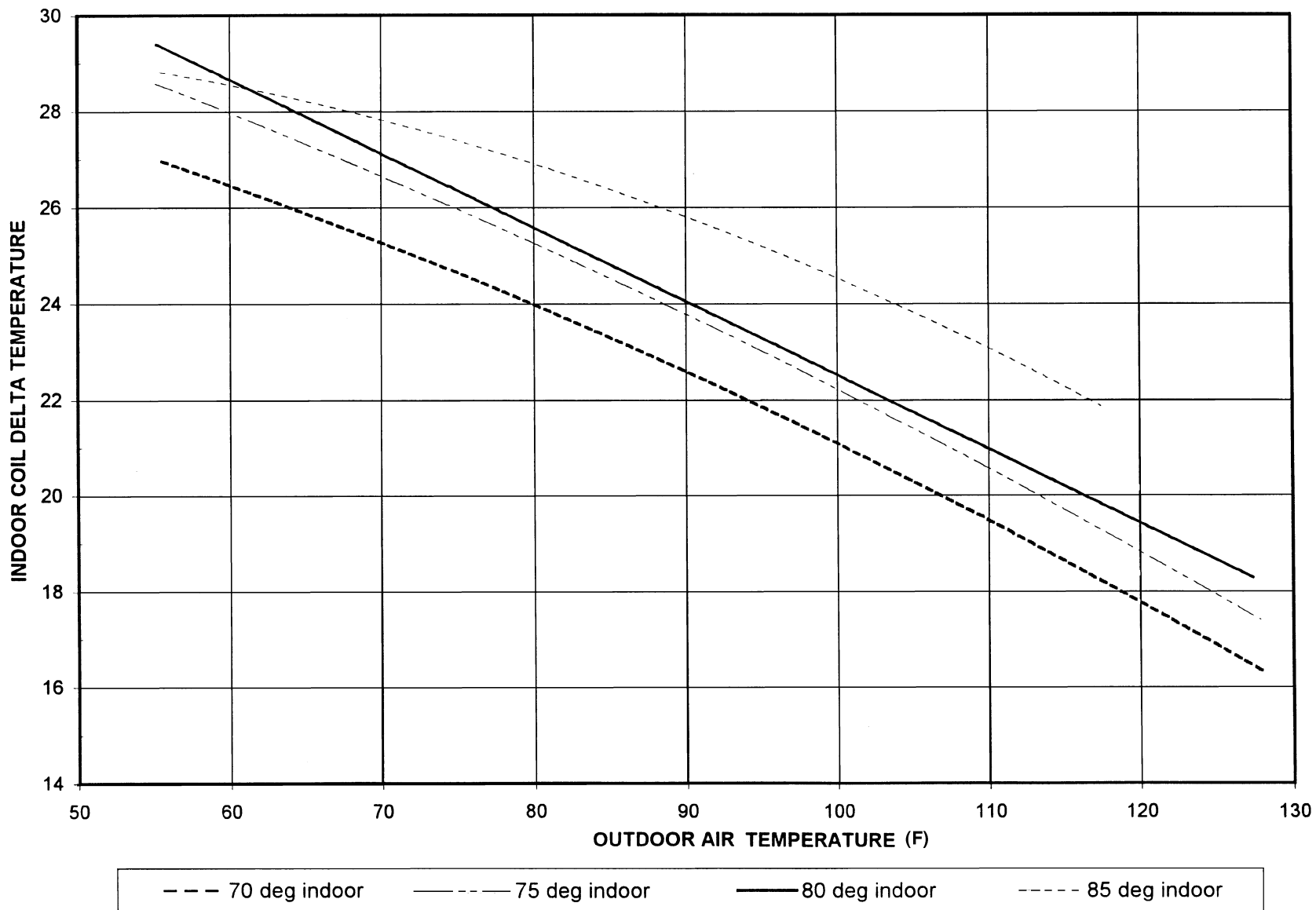


FIGURE 75 — 52S 12,000 BTU UNIT FIELD TEMPERATURE CHART — LOW COOL — 50% RH

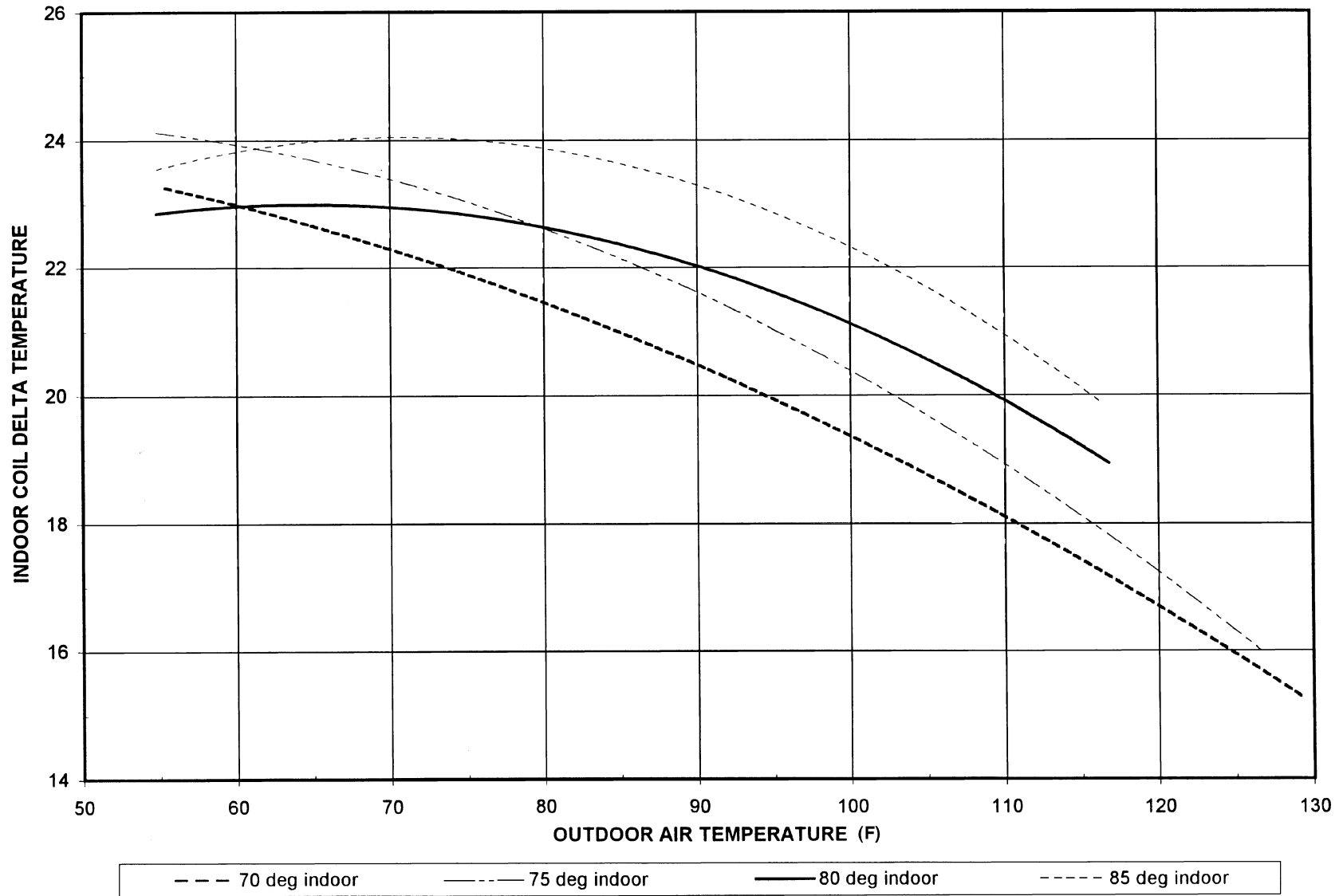


FIGURE 76 — 52S 12,000 BTU UNIT FIELD TEMPERATURE CHART — HIGH COOL — 50% RH

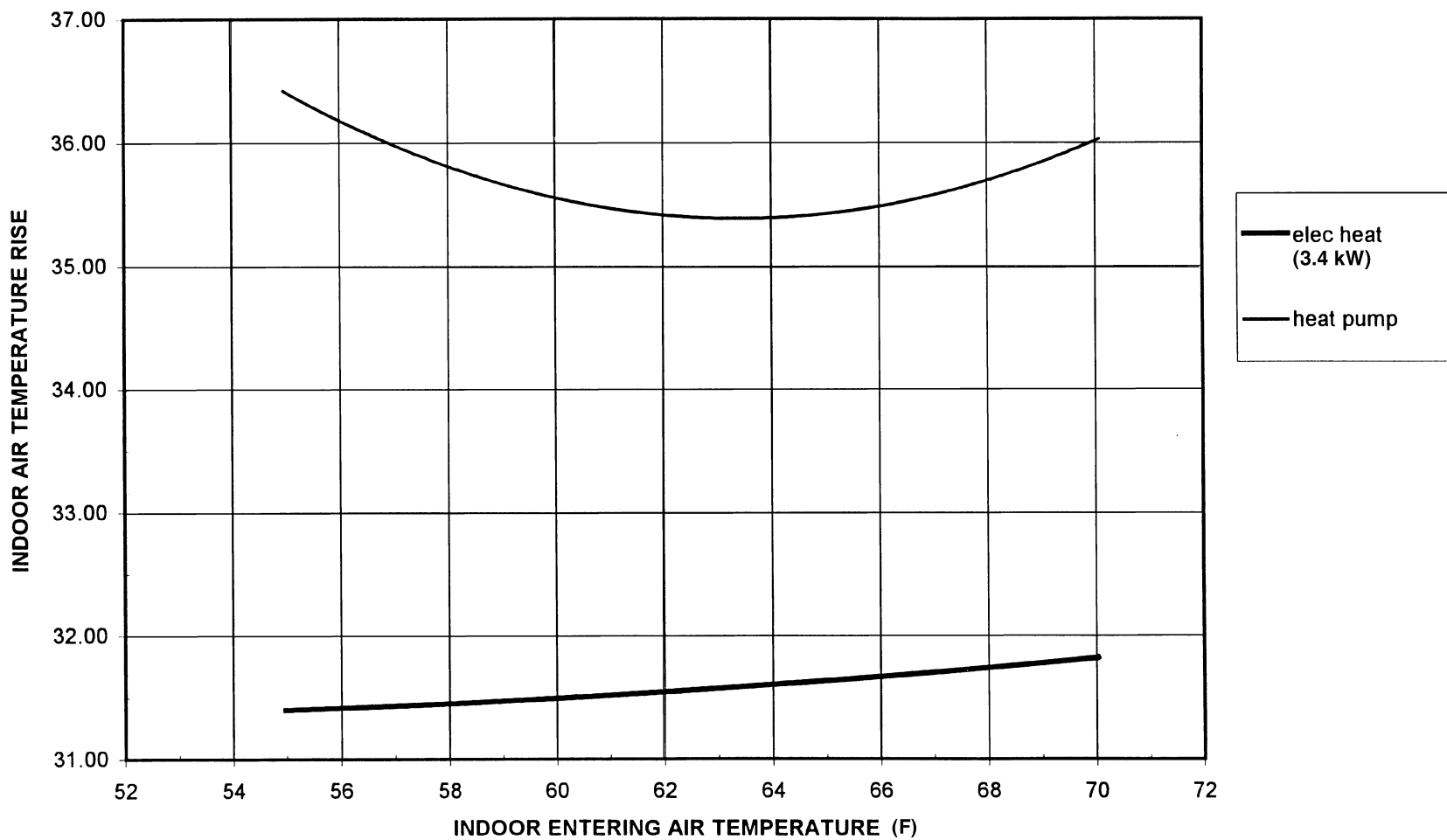


FIGURE 77 — 52S 12,000 BTU UNIT FIELD TEMPERATURE CHART, LOW HEAT MODE (47 F OUTDOOR TEMPERATURE)

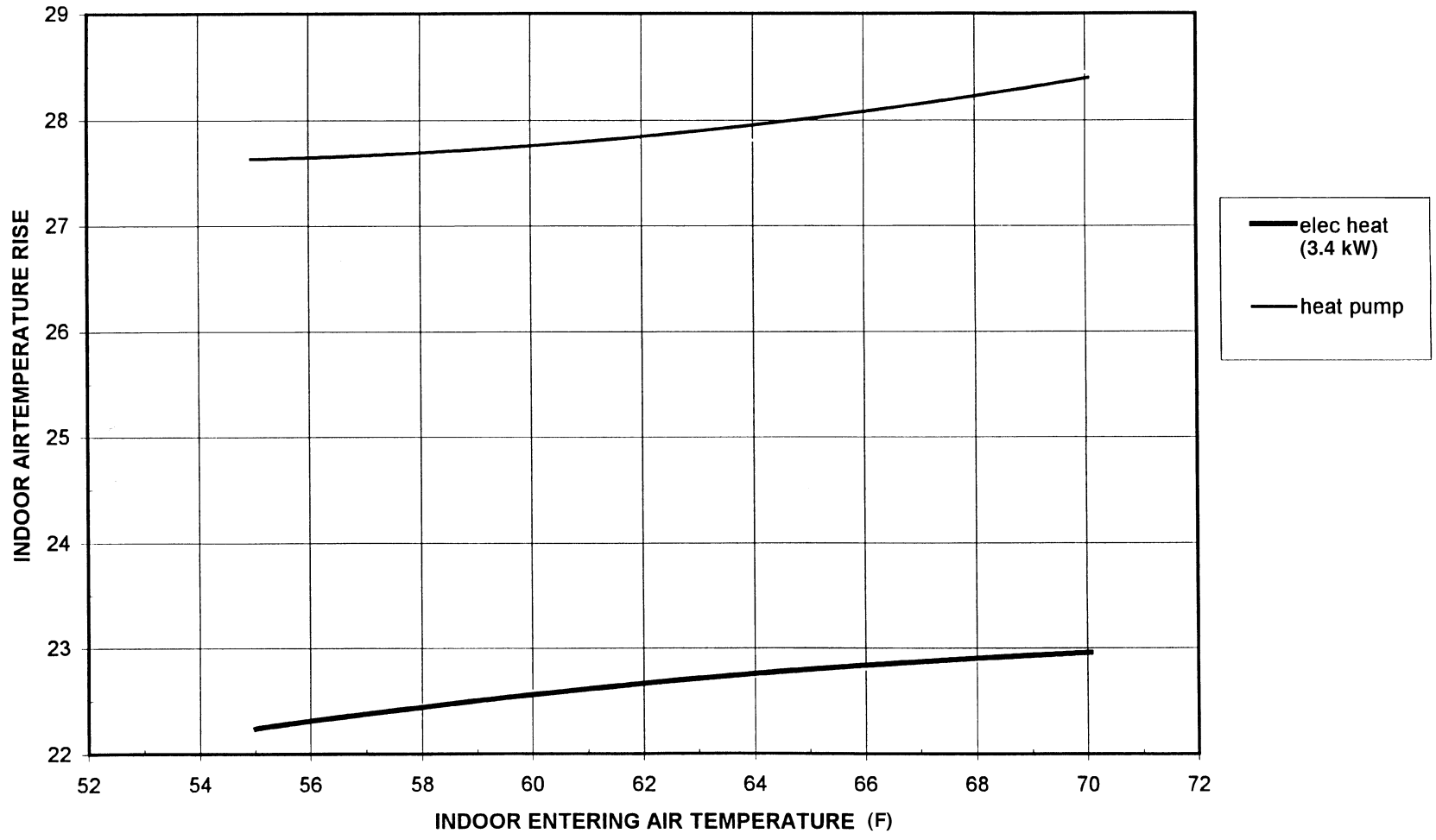


FIGURE 78 — 52S 12,000 BTU UNIT FIELD TEMPERATURE CHART, HIGH HEAT MODE (47 F OUTDOOR TEMPERATURE)

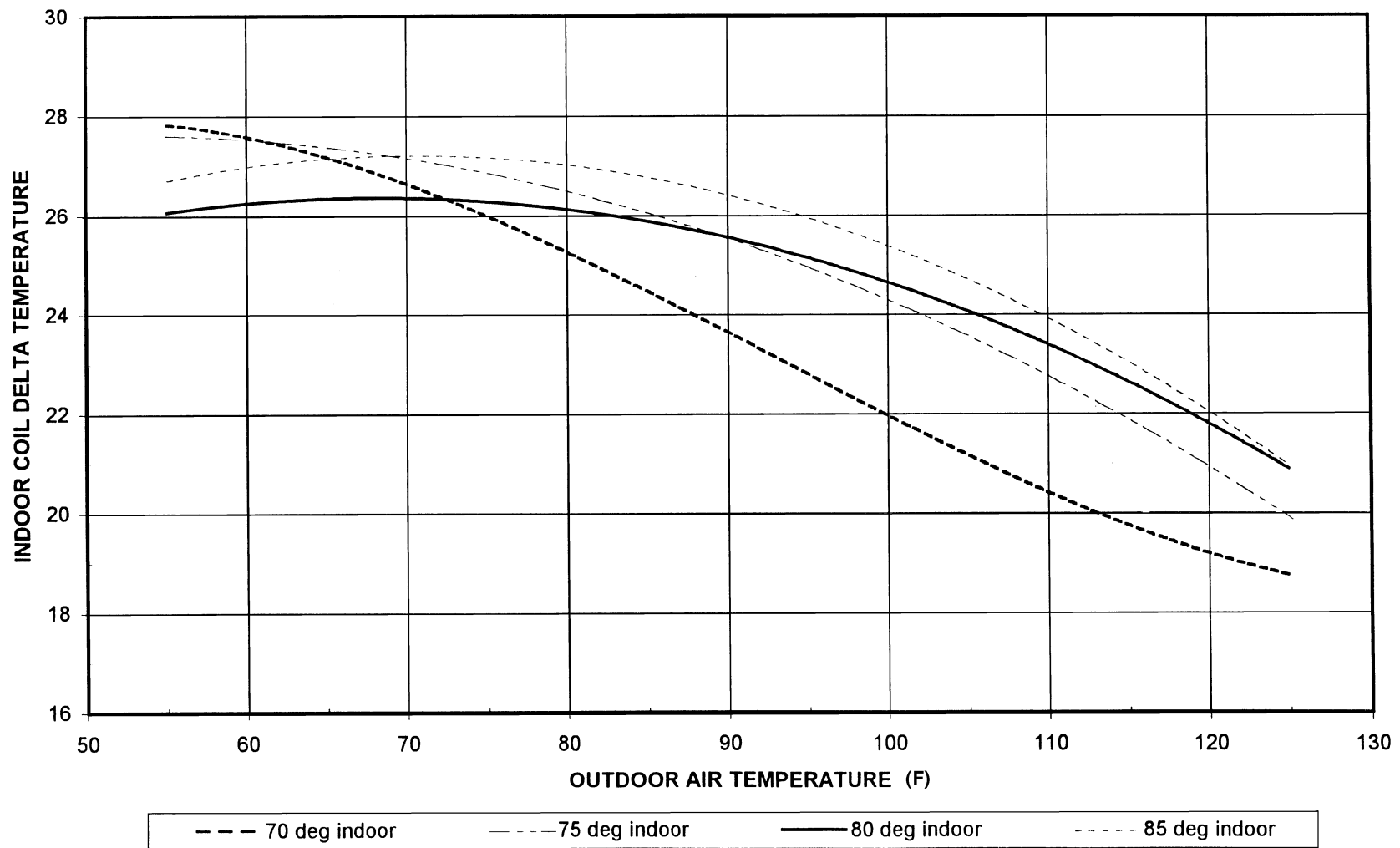


FIGURE 79 — 52S 14,000 BTU UNIT FIELD TEMPERATURE CHART — LOW COOL — 50% RH

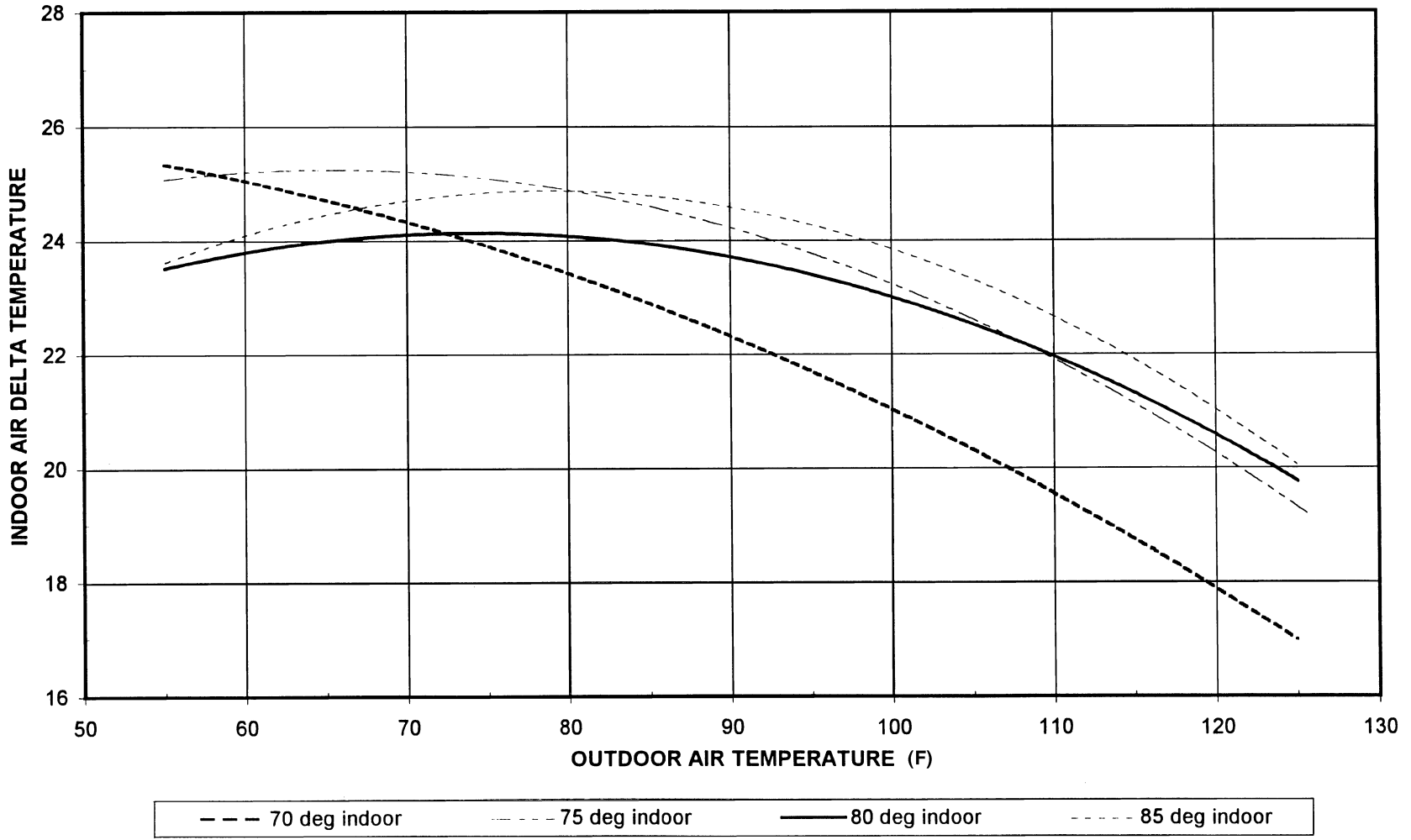


FIGURE 80 — 52S 14,000 BTU UNIT FIELD TEMPERATURE CHART — HIGH COOL — 50% RH

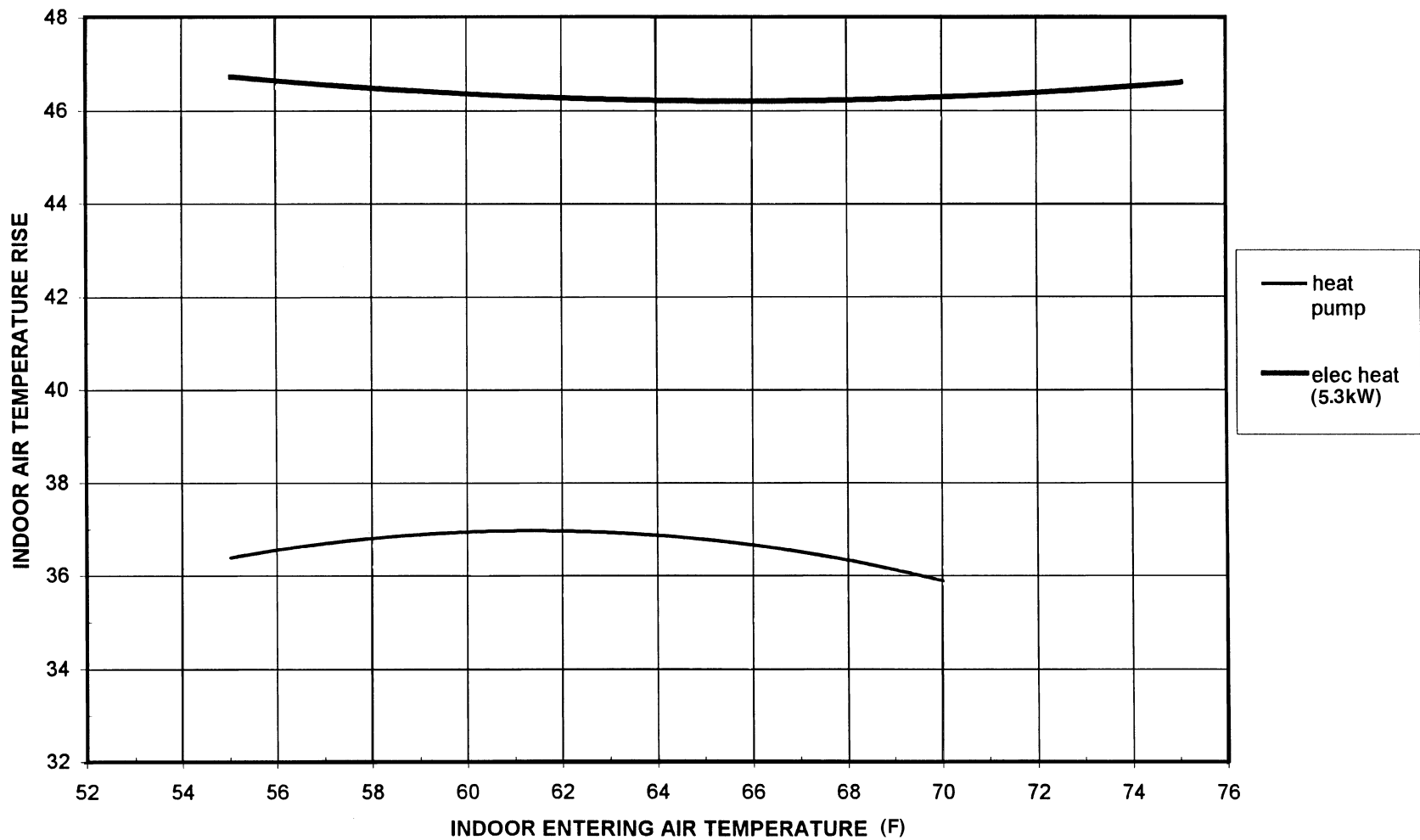


FIGURE 81 — 52S 14,000 BTU UNIT FIELD TEMPERATURE CHART, LOW HEAT MODE (47 F OUTDOOR TEMPERATURE)

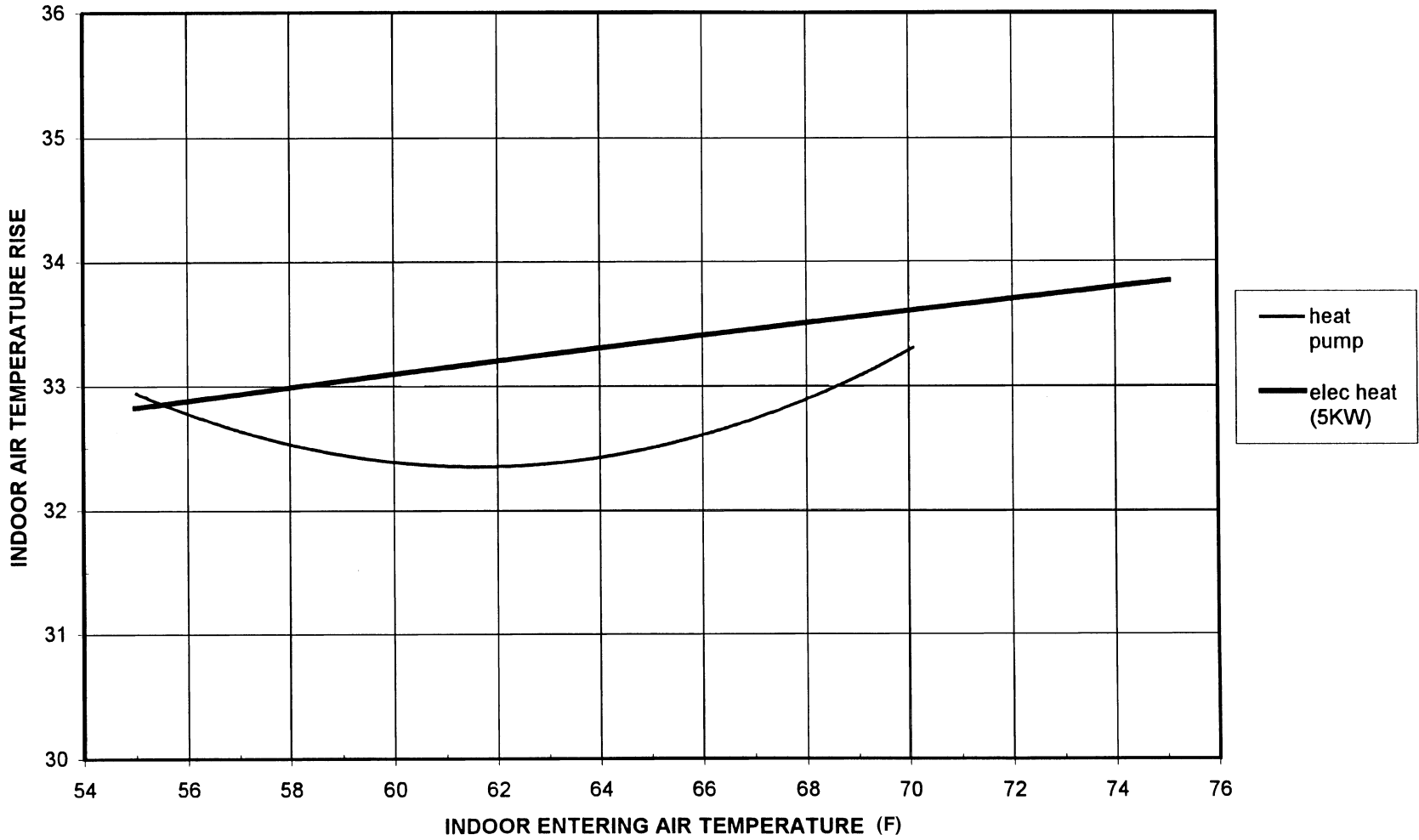
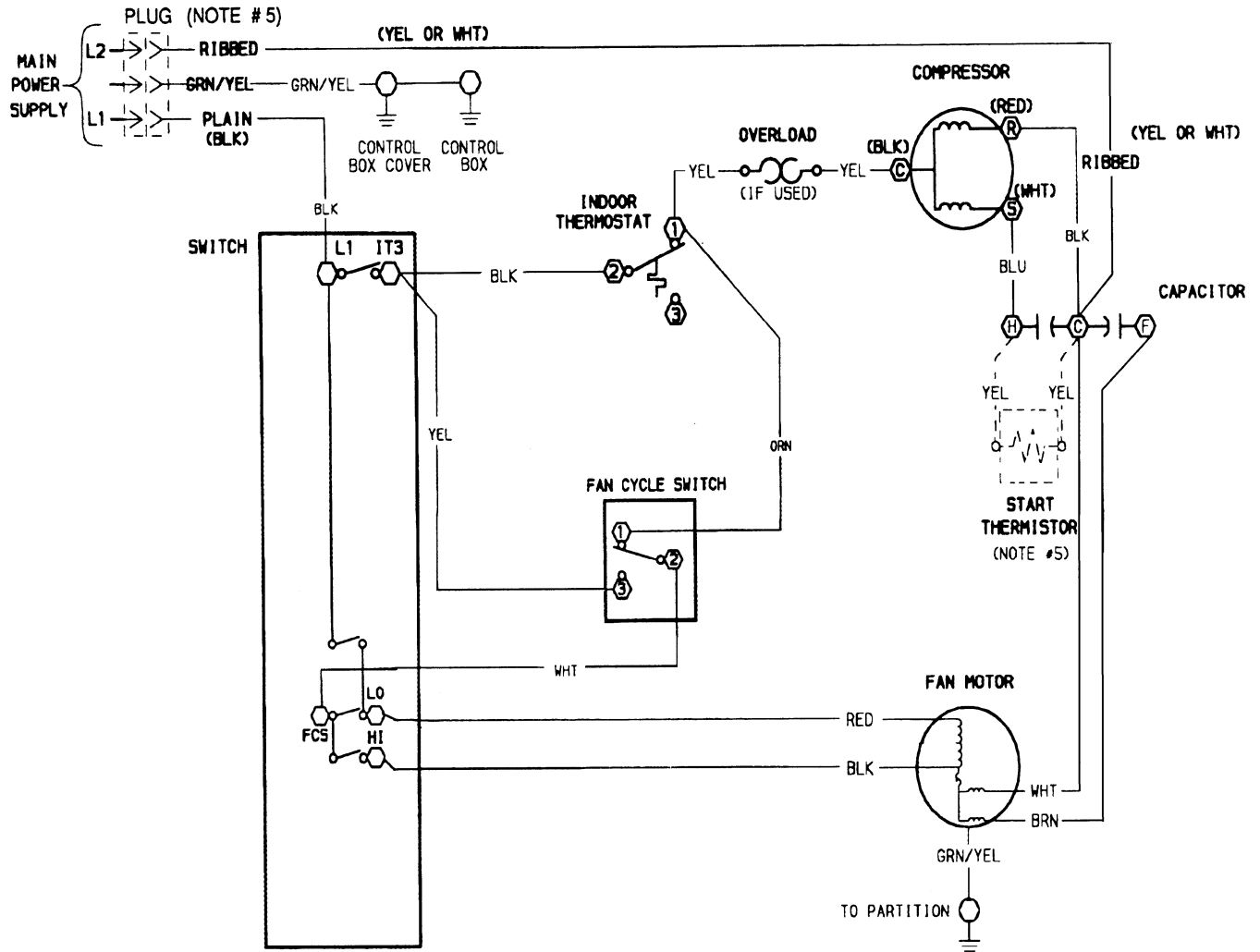


FIGURE 82 — 52S 14,000 BTU UNIT FIELD TEMPERATURE CHART, HIGH HEAT MODE (47 F OUTDOOR TEMPERATURE)

WIRING SCHEMATICS

Refer to Figures 83 - 87 for typical 52S unit wiring schematics.

NOTE: Figures 83 - 87 should not be substituted for the schematic located next to the unit control box.



FCS — Fan Cycle Switch
IT — Indoor Thermostat
L — Power Supply Line

Component Connections (Marked)

LEGEND

Component Connection (Unmarked)
 - - - - - Accessory or Optional Wiring
 ————— Factory Wiring

NOTES:

1. Recommended for use on grounded power supply only.
2. Compressor and fan motor thermally protected.
3. Use copper conductors only.
4. All wiring must conform with NEC (National Electrical Code) and local codes.
5. Dashed lines indicate components when used.

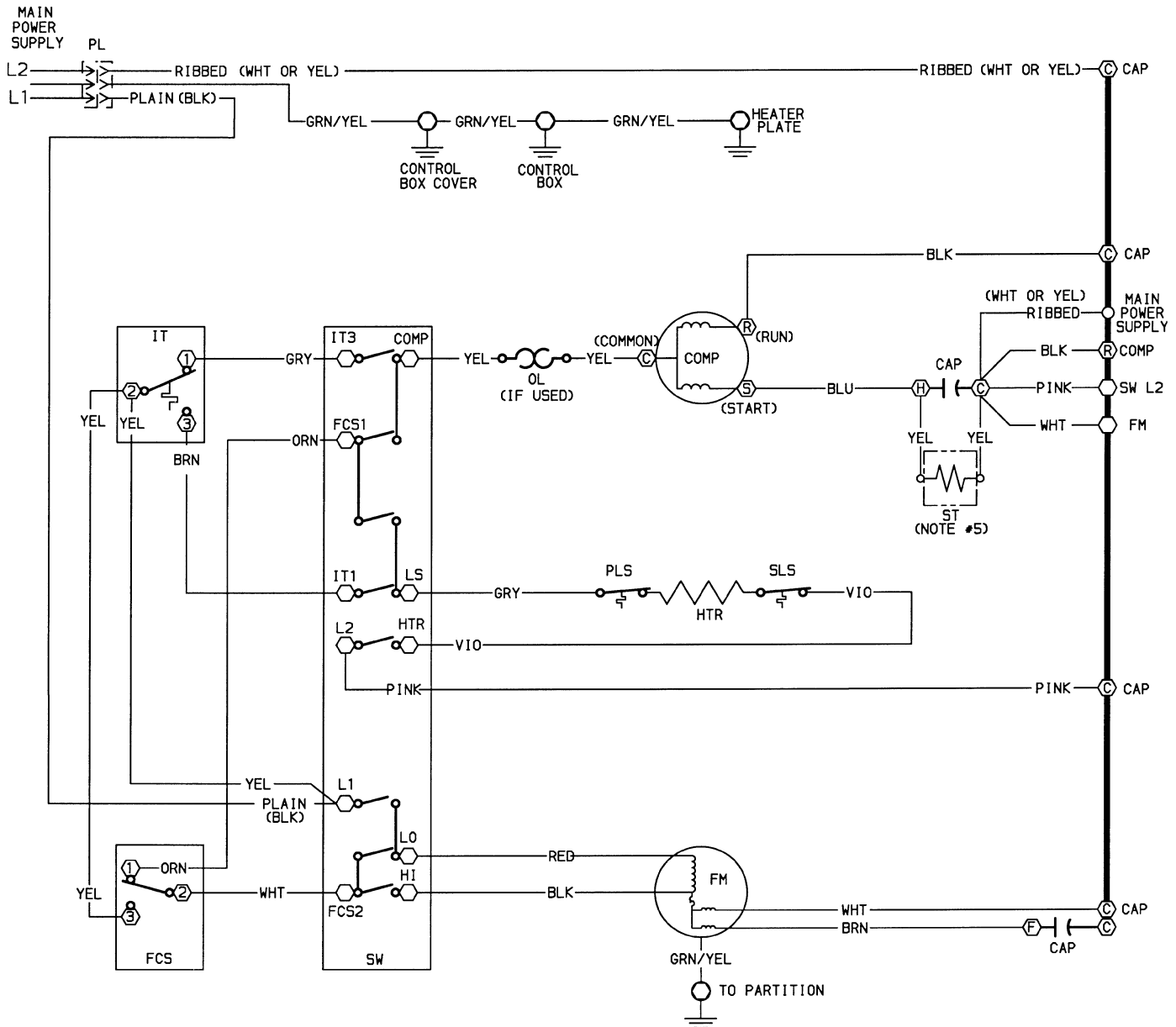
SWITCH POSITION	CONTACTS MADE
OFF	NONE
FAN	L1 TO LO*
LO COOL	L1 TO IT3, FCS to LO
HI COOL	L1 TO IT3, FCS TO HI

*L1 to MED, some models.

FIGURE 83 — WIRING SCHEMATIC; 52SC — 208/230 V AND 265 V AA AND CP UNITS



52S SERIES



- CAP** — Capacitor
- COMP** — Compressor
- FCS** — Fan Cycle Switch
- FM** — Fan Motor
- HTR** — Heater
- IT** — Indoor Thermostat
- L** — Power Supply Line
- OL** — Overload
- PL** — Plug
- PLS** — Primary Limit Switch
- SLS** — Secondary Limit Switch

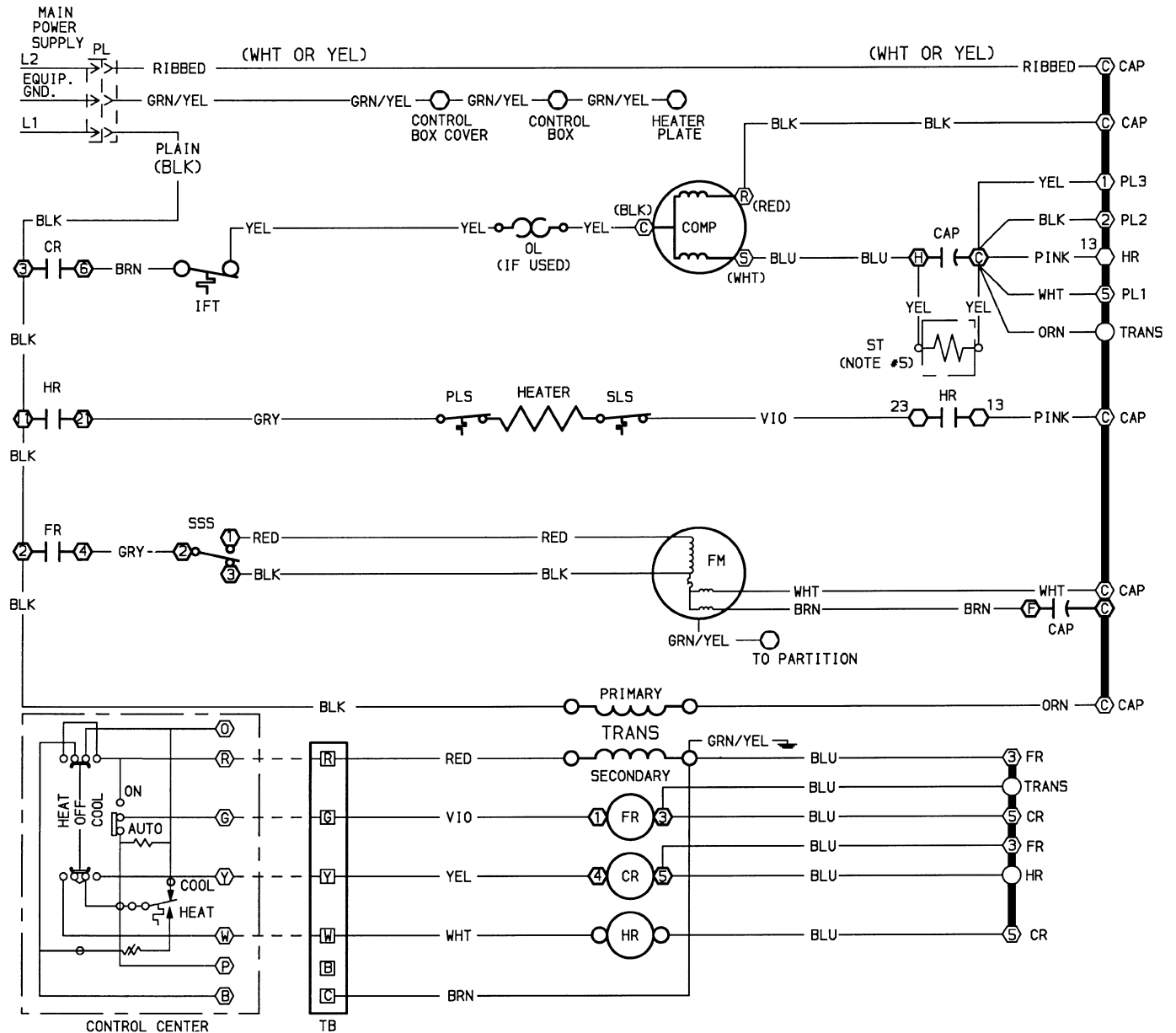
- LEGEND**
- ST** — Start Thermistor
 - SW** — Selector Switch
 - — Component Connection (Marked)
 - ⬡ — Component Connection (Unmarked)
 - — Accessory or Optional Wiring
 - — Factory Wiring
 - — To Indicate Common Potential Only. Not to Represent Wire

SWITCH POSITION	CONTACTS MADE
OFF	FCS TO LS
FAN	L1 TO LO*, FCS1 TO LS
LO HEAT	FCS2 TO LO, IT1 TO LS, L2 TO HTR, FCS1 TO LS
HI HEAT	FCS2 TO HI, IT1 TO LS, L2 TO HTR, FCS1 TO LS
LO COOL	FCS2 TO LO, COMP TO FCS1, COMP TO IT3
HI COOL	FCS2 TO HI, COMP TO FCS1, COMP TO IT3

- NOTES:**
1. Recommended for use on grounded power supply only.
 2. Compressor and fan motor thermally protected.
 3. Use copper conductors only.
 4. All wiring must conform with NEC (National Electrical Code) and local codes.
 5. Dashed lines indicate components when used.

*L1 to MED, some models.

FIGURE 84 — WIRING SCHEMATIC; 52SE — 208/230 V AND 265 V AA AND CP UNITS



- CAP** — Capacitor
- COMP** — Compressor
- CR** — Cooling Relay
- EQUIP GND** — Equipment Ground
- FM** — Fan Motor
- FR** — Fan Relay
- HR** — Heating Relay
- IFT** — Indoor Frost Thermostat
- L** — Power Supply Line
- OL** — Overload

- PL** — Plug
 - PLS** — Primary Limit Switch
 - SLS** — Secondary Limit Switch
 - SSS** — Speed Selector Switch
 - ST** — Start Thermostat
 - TB** — Terminal Board
 - TRANS** — Transformer
- Component Connection (Unmarked)
 □ Terminal Board Connection

- Field Ground Wiring
- - - Field Control Wiring
- Accessory or Optional Wiring
- Factory Wiring
- To Indicate Common Potential Only. Not to Represent Wire

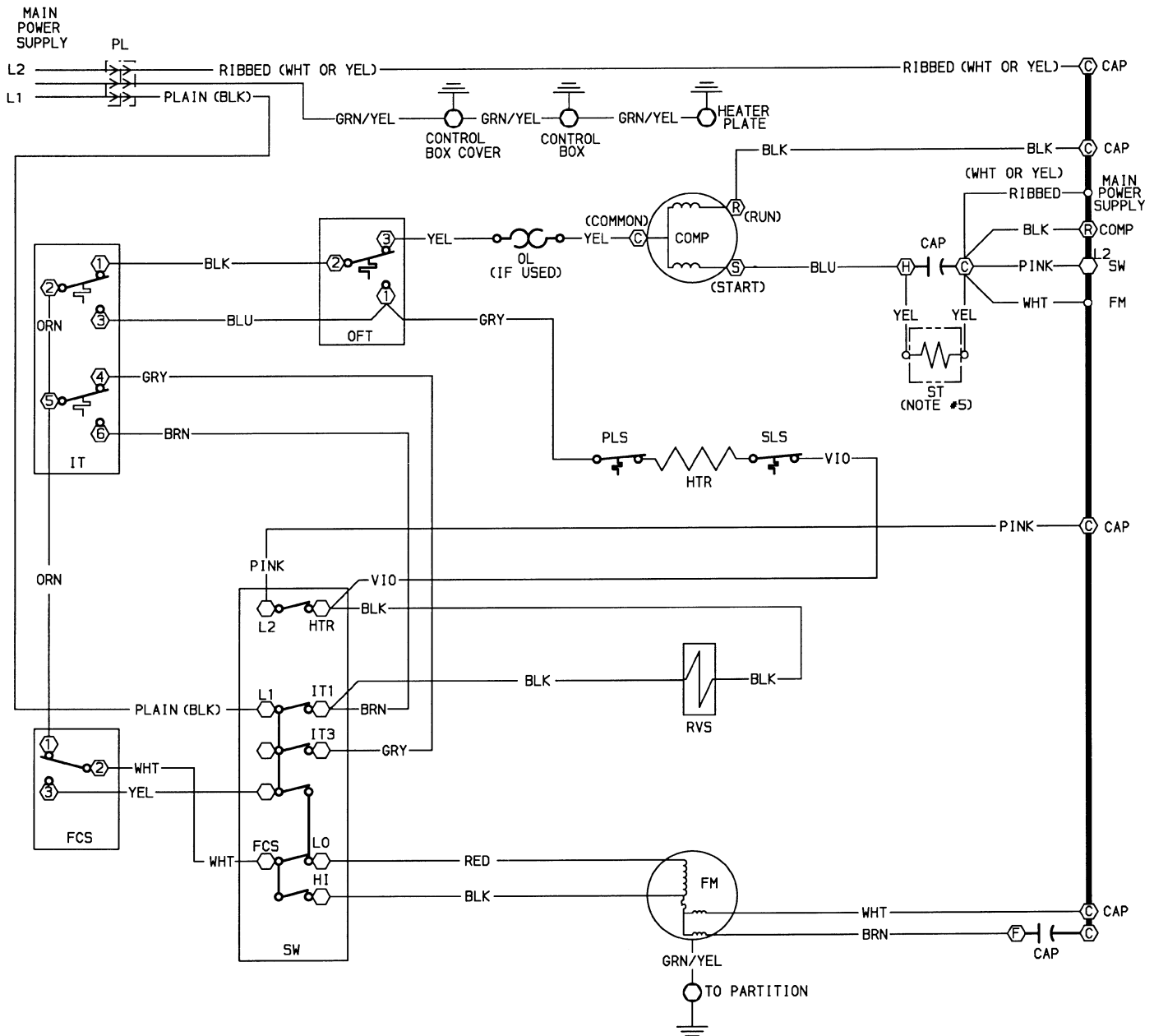
NOTES:

1. Recommended for use on grounded power supply only.
2. Compressor and fan motor thermally protected.
3. Use copper conductors only.
4. All wiring must conform with NEC (National Electrical Code) and local codes.
5. Dashed lines indicate components when used.
6. Control center uses thermostat part no. HH01AD045 or equivalent.
7. Field control wire suitable for NEC class 2 control circuit, at 24 volts.

FIGURE 85 — WIRING SCHEMATIC; 52SE — 208/230 V AND 265 V RC UNITS



52S SERIES



- CAP** — Capacitor
- COMP** — Compressor
- FCS** — Fan Cycle Switch
- FM** — Fan Motor
- HTR** — Heater
- IT** — Indoor Thermostat
- L** — Power Supply Line
- OL** — Overload
- PL** — Plug
- PLS** — Primary Limit Switch
- RVS** — Reversing Valve Solenoid
- SLS** — Secondary Limit Switch

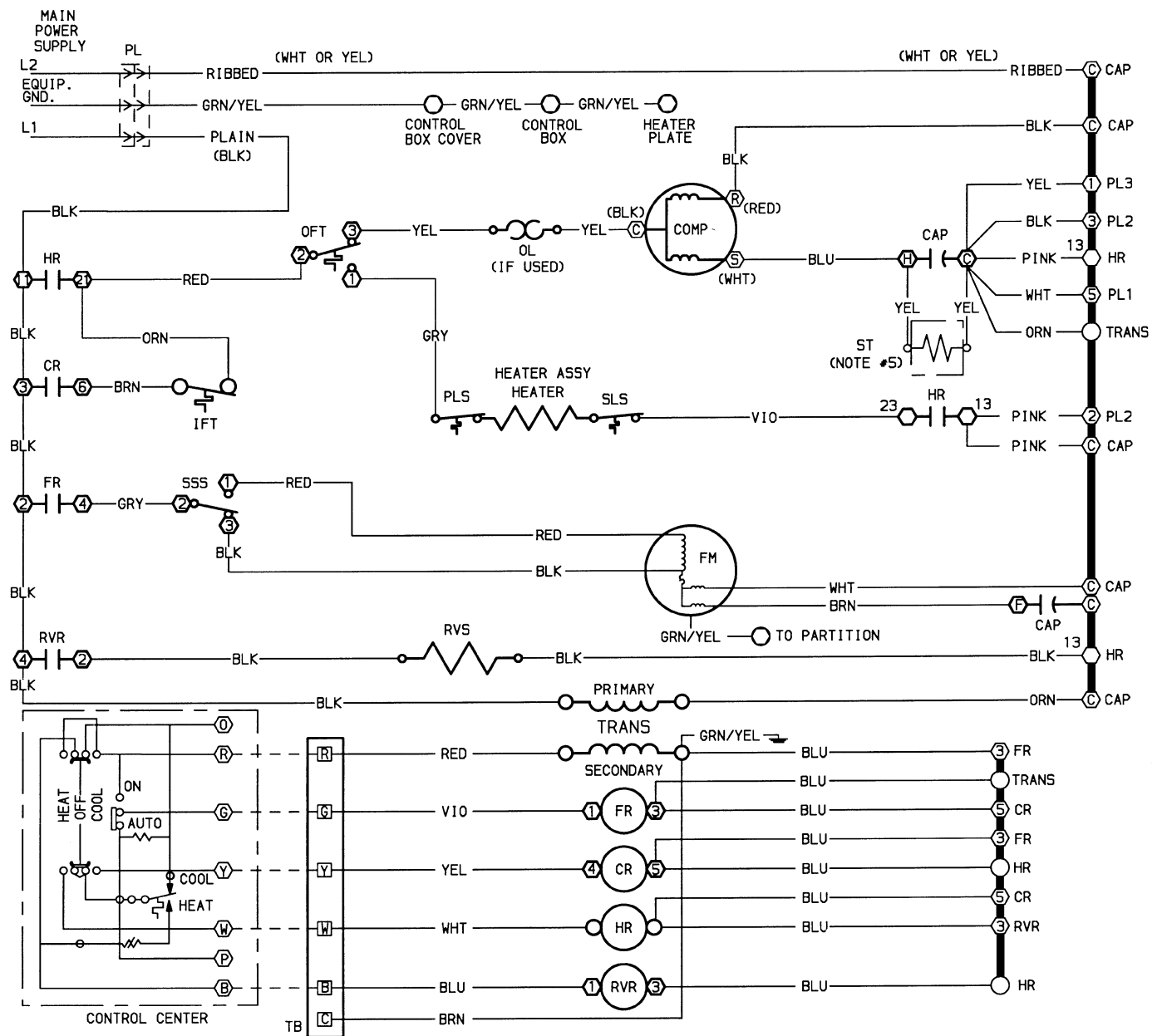
- LEGEND**
- ST** — Start Thermistor
 - SW** — Switch
 - Component Connection (Marked)
 - Component Connection (Unmarked)
 - Accessory or Optional Wiring
 - Factory Wiring
 - To Indicate Common Potential Only. Not to Represent Wire

SWITCH POSITION	CONTACTS MADE
OFF	NONE
FAN	L1 TO LO*
LO HEAT	L1 TO IT1, FCS TO LO, L2 TO HTR
HI HEAT	L1 TO IT1, FCS TO HI, L2 TO HTR
LO COOL	L1 TO IT3, FCS TO LO
HI COOL	L1 TO IT3, FCS TO HI

*L1 to MED, some models.

- NOTES:**
1. Recommended for use on grounded power supply only.
 2. Compressor and fan motor thermally protected.
 3. Use copper conductors only.
 4. All wiring must conform with NEC (National Electrical Code) and local codes.
 5. Dashed lines indicate components when used.

FIGURE 86 — WIRING SCHEMATIC; 52SQ — 208/230 V AND 265 V AA AND CP UNITS



- CAP** — Capacitor
- COMP** — Compressor
- CR** — Cooling Relay
- EQUIP GND** — Equipment Ground
- FM** — Fan Motor
- FR** — Fan Relay
- HR** — Heating Relay
- IFT** — Indoor Frost Thermostat
- L** — Power Supply Line
- OFT** — Outdoor Frost Thermostat

- OL** — Overload
- PL** — Plug
- PLS** — Primary Limit Switch
- RVR** — Reversing Valve Relay
- RVS** — Reversing Valve Solenoid
- SLS** — Secondary Limit Switch
- SSS** — Speed Selector Switch
- ST** — Start Thermistor
- TB** — Terminal Board
- TRANS** — Transformer

- Component Connection (Marked)
- Component Connection (Unmarked)
- Terminal Board Connection
- Field Control Wiring
- Accessory or Optional Wiring
- Factory Wiring
- To Indicate Common Potential Only. Not to Represent Wire

NOTES:

1. Recommended for use on grounded power supply only.
2. Compressor and fan motor thermally protected.
3. Use copper conductors only.
4. All wiring must conform with NEC (National Electrical Code) and local codes.
5. Dashed lines indicate components when used.
6. Control center use thermostat part no. HH01AD045 or equivalent.
7. Field control wire suitable for NEC class 2 control circuit, at 24 volts.

FIGURE 87 — WIRING SCHEMATIC; 52SQ — 208/230 V AND 265 V RC UNITS



MOST FREQUENT PTAC SERVICE QUESTIONS

1. Can remote thermostats be used on standard (AA) models?	No, only for use on remote control (RC) models.
2. Which remote thermostats are acceptable for use on 52S products?	HH01AD045 — Manual changeover thermostat TSTATCCPAC01 — Programmable AC thermostat TSTATCCPHP01 — Programmable HP thermostat
3. How many 52S series units can be controlled by one remote thermostat?	Only 2.
4. What is the vent capacity of the 52S products?	35 cfm (standalone). Capacity can be increased with the use of an external exhaust fan.
5. How do the 52S series models handle condensate removal?	By using a slinger ring to evaporate the water on the outdoor coil, and by using an optional accessory drain kit.
6. At what temperature will the outdoor (defrost) thermostat switch the unit (heat pumps only) into defrost (emergency heat) mode?	15 F coil temperature/approx 35 F ambient (approx 40 to 45 F ambient for 1999 models).
7. Can the PTAC unit be configured to allow continuous fan operation?	Yes. A switch located on the side of the control box is used to toggle between continuous or cycle fan mode.
8. Can the discharge air grille be changed to alter the direction of the airflow?	Yes. Remove the 2 screws and flip the grille over 180 degrees.
9. How does the Emergency Management (EM) accessory kit work?	In series with the 24-volt control circuit (transformer is field-supplied) it disconnects the power at the front desk during unoccupied periods. The unit will be energized in emergency heat mode, provided the push button switch is selected for heating, if the room temperature drops below 55° F to prevent freezing.
10. When must the accessory subbase be used?	When the wall sleeve is more than 4 in. inside the room. The subbase can be adjusted to a maximum height of 5½ inches.
11. How does the PTAC unit prevent condensate water from freezing in the basepan?	A temperature-activated drain opens when the temperature drops below 45 F, draining the water into the sleeve to prevent freezing.
12. What does the outdoor thermostat switch do?	The toggle switch, located on the side of the control box, prevents the compressor from energizing in heating mode during subfreezing conditions to ensure adequate heating capacity. The switch must be returned to the “heat pump” position for compressor operation during cooling modes.