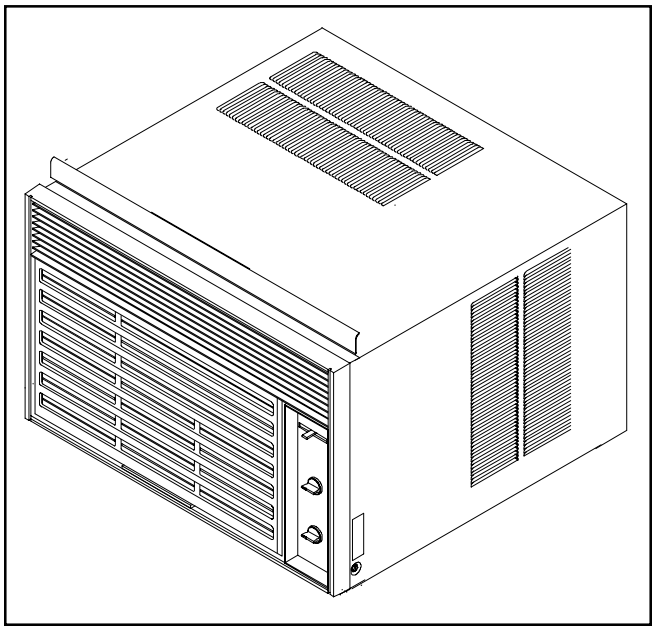
Base manual covers general information on Compact Quiet Zone Room Air Conditioners. Refer to individual technical sheets for information on specific models.

Service

Compact Quiet Zone Room Air Conditioners



This manual to be used by qualified appliance technicians only. Amana does not assume any responsibility for property damage or personal injury for improper service procedures done by an unqualified person.

Amana

RS4100004
Revision 0
September 1997

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Important Information

Pride and workmanship go into every product to provide our customers with quality products. It is possible, however, that during its lifetime a product may require service. Products should be serviced only by a qualified service technician who is familiar with the safety procedures required in the repair and who is equipped with the proper tools, parts, testing instruments and the appropriate service manual. **REVIEW ALL SERVICE INFORMATION IN THE APPROPRIATE SERVICE MANUAL BEFORE BEGINNING REPAIRS**.

Important Notices for Consumers and Servicers

⚠ WARNING

To avoid risk of serious injury or death, repairs should not be attempted by unauthorized personal, dangerous conditions (such as exposure to electrical shock) may result.

⚠ CAUTION

Amana will not be responsible for any injury or property damage from improper service procedures. If performing service on your own product, assume responsibility for any personal injury or property damage which may result

To locate an authorized servicer, please consult your telephone book or the dealer from whom you purchased this product. For further assistance please call:

1-800-628-5782 (NATL SVC) **OR CONTACT**

Consumer Affairs Department
Amana
Amana, Iowa 52204

If outside the United States contact:

Amana
ATTN: Consumer Affairs Department
Amana, Iowa, USA 52204
Telephone: (319) 622-5511
Facsimile: (319) 622-2180
TELEX: 4330076 AMANA
CABLE: "AMANA", AMANA, IOWA, USA

Recognize Safety Symbols, Words, and Labels

⚠ DANGER

DANGER—Immediate hazards which **WILL** result in severe personal injury or death.

⚠ WARNING

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

⚠ CAUTION

CAUTION—Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

Important Safety Information

⚠ WARNING

To avoid personal injury or death from improper servicing, make sure you read and understand the descriptions and meaning of various safety symbols, words and labels used in this manual, before attempting any procedures described in the manual. Failure to understand and comply with safety information may result in severe personal injury or death.

General Information

This Service Manual describes the operation, disassembly, troubleshooting, and repair of Amana Room Air Conditioners. It is intended for use by authorized servicers who troubleshoot and repair these units.

NOTE: It is assumed that users of this manual are familiar with the use of tools and equipment used to troubleshoot and repair electrical, mechanical, and refrigeration systems; and understand the terminology used to describe and discuss them.

Related Publications

This is a base service manual, covering a range of similar models. It is intended to be used in conjunction with the Parts Manual and Technical Sheet covering specific model being serviced.

General Precautions and Warnings

⚠ WARNING

To avoid risk of personal injury or death due to electrical shock, disconnect electrical power to unit before attempting to service the unit.

⚠ WARNING

To avoid risk of personal injury or death due to electrical shock, devices covered in this manual are equipped with a three-prong grounding plug. If a two-prong (non-grounding) wall receptacle is encountered, contact a qualified electrician and have the receptacle replaced with a properly grounded wall receptacle in accordance with the National Electrical Code.

⚠ WARNING

To avoid risk of personal injury or death due to electrical shock, DO NOT, under any circumstances, alter the grounding plug. Air conditioner must be grounded at all times. Do not remove warning tag from power cord.

⚠ WARNING

To avoid risk of personal injury or death due to electrical shock, grounding wires and wires colored like grounding wires are **NOT** to be used as current carrying conductors. The standard accepted color coding for ground wires is **green** or **green with a yellow stripe**. Electrical components such as the compressor and fan motor are grounded through an individual wire attached to the electrical component and to another part of the air conditioner. Grounding wires should not be removed from individual components while servicing, unless the component is to be removed and replaced. It is extremely important to replace all removed grounding wires before completing service.

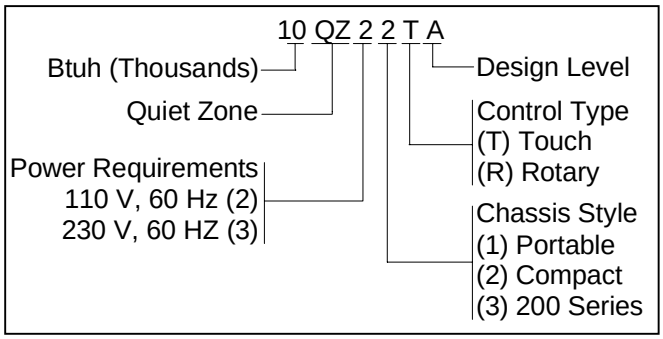
⚠ WARNING

To prevent heat related illness or death, do not use this device for unattended cooling for persons or animals unable to react to failure of the product. Failure of an unattended air conditioner may result in extreme heat in the area it is intended to cool, causing heat related illness or death to persons or animals.

Product Identification

Every Amana® Room Air Conditioner has an identification plate showing the model number, P (manufacturing part) number, serial number, etc. of unit. Identification plate is located on front of unit, behind air filter, in lower left corner. Use plate to positively identify specific model of unit being serviced.

The following diagram explains Room Air Conditioner model numbers. Model numbers contain information about cooling capacity, chassis type, power requirements, feature set, and design series for unit.



Design Information

Many design features are incorporated into all Amana Room Air Conditioners. Basic concepts of balance in refrigeration and air handling components are used in all models.

The outer case of unit, regardless of style, is designed to help circulate air across evaporator, condenser, compressor and fan motor. It must be in place to ensure maximum efficiency of unit, to prevent overheating of components, and to maintain the balance and capacity of the system.

Structural components of room air conditioners are heavy, zinc-coated steel that is further treated with zinc phosphate, and electro-coated. Exterior surfaces are given an additional coat of baked-on polyester.

Acoustical and thermal insulation are used on the partition panel and in the air discharge plenum to reduce noise and increase efficiency.

Large evaporator and condenser coils are designed to provide maximum heat transfer. Coils are manufactured from rifled copper tubing and rippled edge aluminum fins to achieve maximum heat transfer. Vibration loops in refrigeration tubes dampen and isolate system vibrations.

Fan motors are sealed to prevent moisture and dirt contamination of motor windings. Motor bearings are permanently lubricated. Large blower wheels and condenser fans reduce noise levels.

Condenser fans contain an integral slinger ring for condensate removal. The slinger ring picks-up condensate and sprays it against the condenser, increasing condenser evaporative cooling. Alternatively (in areas of excessive humidity), condensate can drain from the base pan by puncturing or removing a grommet in the base pan.

⚠ CAUTION

To prevent condenser damage, use care when puncturing or removing base pan grommet. Avoid using tools long enough to reach the condenser.

NOTE: Drain grommet should only be punctured or removed in areas of high humidity, when excessive condensate accumulates in the base pan. Condensate removal through the slinger ring increases the cooling capacity of the air conditioner.

In addition to standard design features, Quiet Zone™ model room air conditioners feature:

- Vibration dampening sound mastic
- Precision balanced fan motors
- Quieter compressors
- Additional insulation
- Rotary electronic controls

Sizing Instructions

Sizing Room Air Conditioners for Area Being Cooled

Many problems with room air conditioners are a result of units that are oversized or undersized for a given area. Oversized units cool an area before humidity can be adequately removed, resulting in air that feels cold and clammy. Undersized units do not provide sufficient cooling.

The following table contains guidelines for sizing a room air conditioner for a given area. To size unit:

1. Determine size (in square feet) of area to be cooled, then locate size in table.
2. Based on location of room in building, select appropriate column in table associated with size of room:
   - Room below attic; insulated ceiling above.
   - Room with occupied room above.
   - Top floor under insulated roof.

Number shown in table cell corresponding to room size/ location is approximate capacity (in Btu/hour) required of an air conditioner to ensure adequate cooling of area.

NOTE: Make sure additional conditions, shown at bottom of table, are taken into account when determining size of unit.

Size of Area to be Cooled (in square feet)	**Required Air Conditioner Cooling Capacity—Btu/hour**		
	Room below attic; insulated ceiling above	Room with occupied room above	Top floor under insulated roof (no attic)
100	3500 to 4000	4000 to 4500	4500 to 5000
150	4000 to 5000	4500 to 5000	5500 to 6500
200	4500 to 5500	5000 to 6000	6000 to 7000
250	5000 to 6000	5500 to 6500	7500 to 8500
300	6000 to 7000	6500 to 7500	8500 to 9500
350	6500 to 7500	7000 to 8000	10000 to 11000
400	7000 to 8000	8000 to 9000	11000 to 12000
450	7500 to 8500	8500 to 9500	11500 to 12500
500	8000 to 9000	9500 to 10500	13000 to 14000
600	9500 to 10500	11000 to 12000	15000 to 16000
700	10500 to 11 500	12000 to 13000	17000 to 18000
800	11500 to 13000	13500 to 14500	19000 to 20000
900	12500 to 14000	14500 to 16000	21000 to 22000
1000	13500 to 15000	15500 to 17000	23000 to 24500
1200	16000 to 17500	18000 to 20000	26500 to 28500
1400	18000 to 20000	21000 to 23000	30500 to 32500
1600	20000 to 22000	23000 to 25000	
1800	22000 to 24000	25500 to 27500	
2000	24000 to 26000	28000 to 30000	

Additional conditions:

- If average occupancy of area is more than two people, add 600 Btu/hour per person. If average is one person, subtract 600 Btu/hour.
- Add 1200 Btu/hour if area includes a kitchen.
- If room is heavily shaded, subtract 10 percent from capacity. Increase capacity by 10 percent if area is very sunny.

Note: For best results, select a room air conditioner with cooling capacity (Btu/hour rating) closest to, but not exceeding, estimated size.

Installation Instructions

Installing Room Air Conditioners

Proper installation of a room air conditioner helps ensure trouble free operation of the unit. Improper installation of this device can result in problems ranging from noisy operation to property or equipment damage.

The following paragraphs provide general instructions and information on installing an Amana Room Air Conditioner. Detailed instructions, included with unit or with a separately purchased mounting kit, should be used to perform actual installation.

Before attempting to install unit:

- Carefully read all instructions pertaining to installation. Make sure each step or procedure is understood and any special considerations are taken into account.
- Assemble all tools and hardware needed to complete installation. Some items may need to be purchased locally. Make sure required tools and hardware are on hand before starting.
- After deciding where to install unit, closely look the location over, both inside and outside. Note any potential obstacles or problems that might be encountered. Choose a more suitable location if necessary.

Electrical Requirements

WARNING

To avoid risk of personal injury or death due to electrical shock:

- Electrical grounding is required on this device.
- DO NOT ground to gas line.
- If cold water pipe is interrupted by plastic, nonmetallic gaskets, or other insulating (non conducting) materials, DO NOT use it for ground.
- Check with a qualified electrician if you are not sure this appliance is properly grounded.
- DO NOT modify plug on power cord. If plug does not fit electrical outlet, have a proper outlet installed by a qualified electrician.
- DO NOT have a fuse in the neutral or ground circuit. A fuse in the neutral or ground circuit could result in an electrical shock.
- DO NOT use an extension cord with this appliance.

Observe all local codes and ordinances.

Grounding Instructions

For safety, air conditioner must be grounded. This air conditioner has a power supply cord with a three-prong grounding plug. To minimize possible electrical shock hazards, the power cord must only be plugged into a matching grounding wall receptacle in accordance with the National Electrical Code (and any applicable local codes and ordinances). If an appropriate grounding-type wall receptacle is not available, it is the responsibility of the consumer to have a properly grounded wall receptacle installed by a qualified electrician.

If codes permit, and a separate grounding wire is used, have a qualified electrician determine if grounding path is adequate and uninterrupted by plastic, nonmetallic gaskets, or other insulating (non conductive) materials.

Do not use an extension cord. If air conditioner power cord cannot reach wall receptacle, have a qualified electrician install an appropriate receptacle closer to unit.

Receptacle Wiring

Receptacle wiring must be of adequate size for unit. Refer unit identification plate or Technical Sheet for exact power requirements of unit. Minimum size of wiring, based on power requirements, is:

Units up to 20 amps:	12 gauge
Units up to 30 amps:	10 gauge

Use copper wire only. It is consumer's responsibility to provide proper and adequate receptacle wiring that conforms to all applicable codes. All wiring should be installed by a qualified electrician.

Electrical Connection

Electrical ground is required on this appliance.

Electrical Requirements

A separate circuit, serving only this appliance, MUST be provided. Devices covered in this manual require a 60 Hz supply. Refer to unit name plate or Technical Sheet for exact voltage requirements.

Installation Instructions

Preparing for Installation

CAUTION

To avoid risk of personal injury or product damage due to the weight of this device and sharp edges that may be exposed:

- Have someone help install unit. Air conditioner weighs between 80 and 105 pounds (depending upon model). Use proper lifting and carrying techniques to prevent injury or strain.
- Inspect location where unit is to be installed. Be sure it will support the weight of the unit for an extended period of time.
- Unit must be installed according to all applicable codes and ordinances.
- Handle air conditioner with care. Wear protective gloves whenever lifting or carrying unit. Avoid sharp metal fins on front and rear coils.
- Make sure air conditioner does not fall during installation.
- Do not use condensate water for drinking or cooking. It is not sanitary.

Tools Required

The following tools are required for installation:

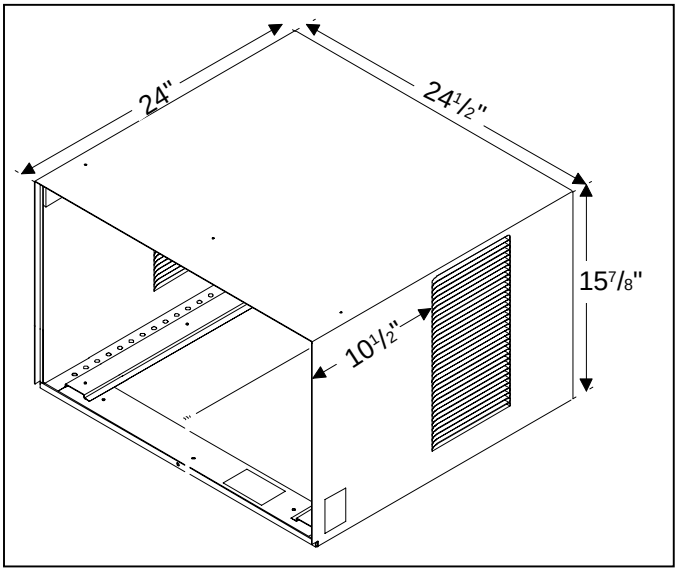
- Flat head screwdriver
- Phillips head screwdriver
- Carpenter's level
- Tape measure
- Electric or hand drill
- 9/64-inch drill bit

General Through-Wall Installation for Slide Out Chassis Model

Amana Room Air Conditioners with slide out chassis type cases are designed to be installed through a wall or in a window. The following instructions describe general procedures for wall installations. Specific instructions for installing individual models are packed with the unit. Use specific instructions to install unit.

NOTE: Window installations require a Window Mounting Kit. See an Authorized Amana Dealer for proper mounting kit.

Typical Cabinet Dimensions



Typical Compact Cabinet Dimensions

Installation Instructions

General Instructions

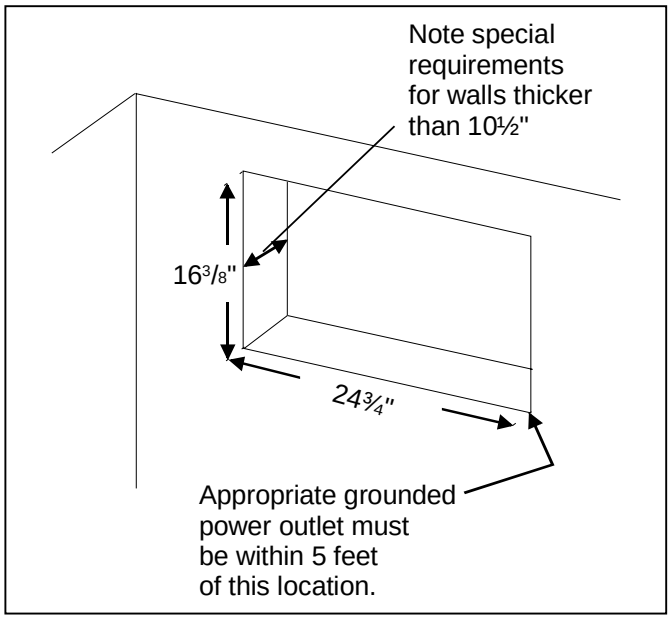
A finished opening in wall is required. Dimensions of opening are 24¾-inches wide x 16⅜-inches high. The lower right inside corner of opening must be within 5 feet of an appropriate electrical outlet.

When installed, back of case should be ⅜-inch lower than front of case for proper condensate drainage. Inside edge of case must extend ½-inch beyond inside wall to properly seat air conditioner front cover. After installation, caulk completely around outside of unit to ensure it is properly sealed. Depending on wall construction and opening location, a lintel (not included) may be required.

NOTE: To avoid sealing air conditioner in case, do not caulk exposed air conditioner base pan on bottom of case. Use foam seal strips or similar material to fill any gaps between base pan and wall opening.

For appearance sake, it may be desirable to frame inside opening with decorative molding. If molding is used, mount case in opening so inside edge of case extends ½-inch beyond molding. (Case should extend into room to compensate for thickness of molding.)

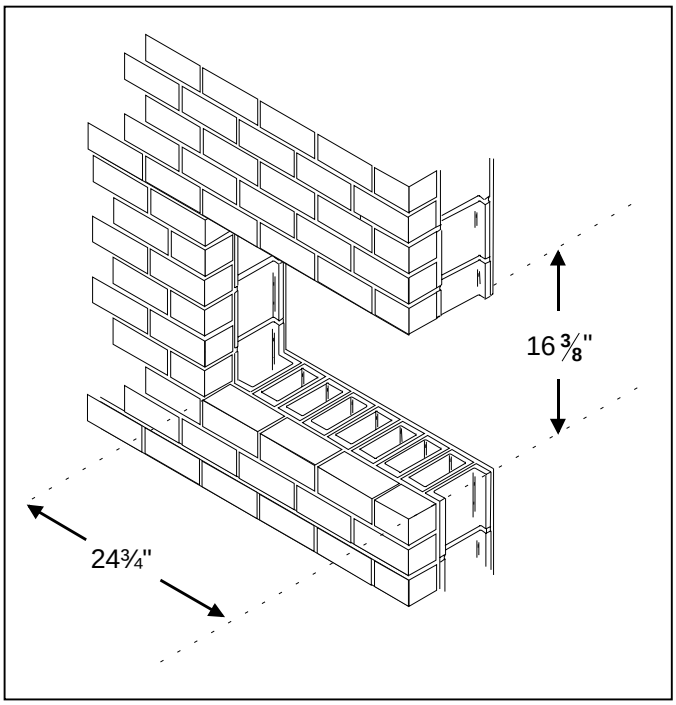
When wall thickness exceeds 10½-inches, provisions must be made to allow air to enter the condenser side louvers. See paragraph *Installation in Walls Exceeding 10½-inches*.



Typical Wall Opening

Brick Veneer or Frame Wall Construction

A framed, finished opening 24¾-inches wide x 16⅜-inches high should be cut out or built into wall. Frame opening with 2 inch x 4 inch lumber to permit attachment of outer case.



Brick Veneer Wall Installation

Masonry Construction

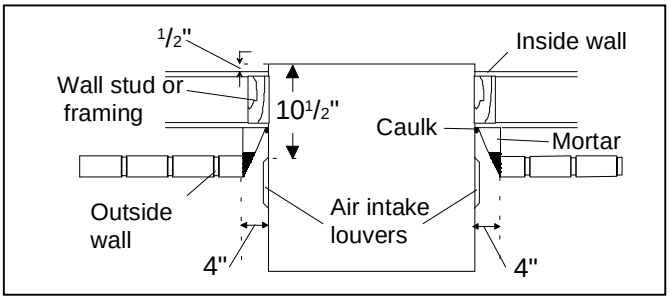
A finished opening 24¾-inches wide x 16⅜-inches high should be cut out or built into masonry wall. Seal outer case in place with mortar, or secure to wall with concrete nails driven through sides of case.

NOTE: If securing case with concrete nails, predrill holes in case before driving nails into wall.

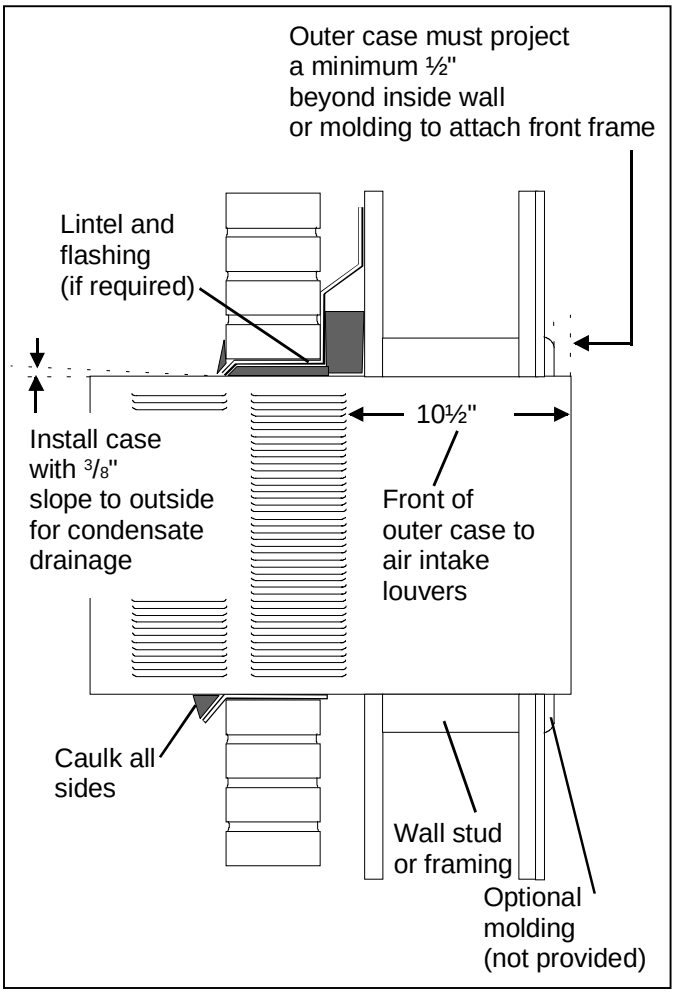
Installation Instructions

Installation in Walls Exceeding 10½-inches

All air conditioner models have side louvers on outer case. When air conditioner is installed in walls over 10½-inches thick, provisions must be made in wall opening to allow unobstructed air flow to the side louvers. This can be accomplished by chamfering the vertical portions of the outside opening as shown.



Walls Exceeding 10½-inches (Top View)

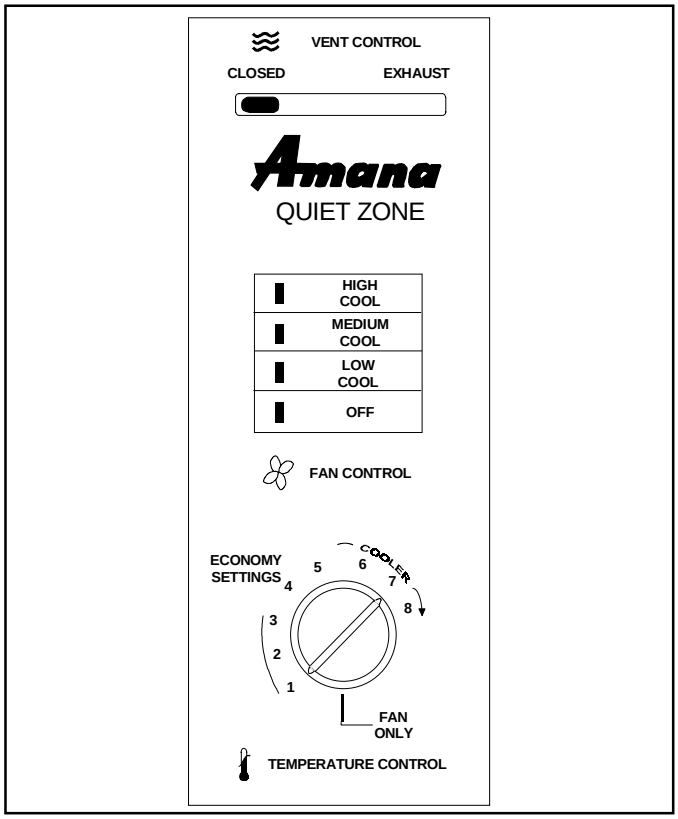


Walls Exceeding 10½-inches (Side View)

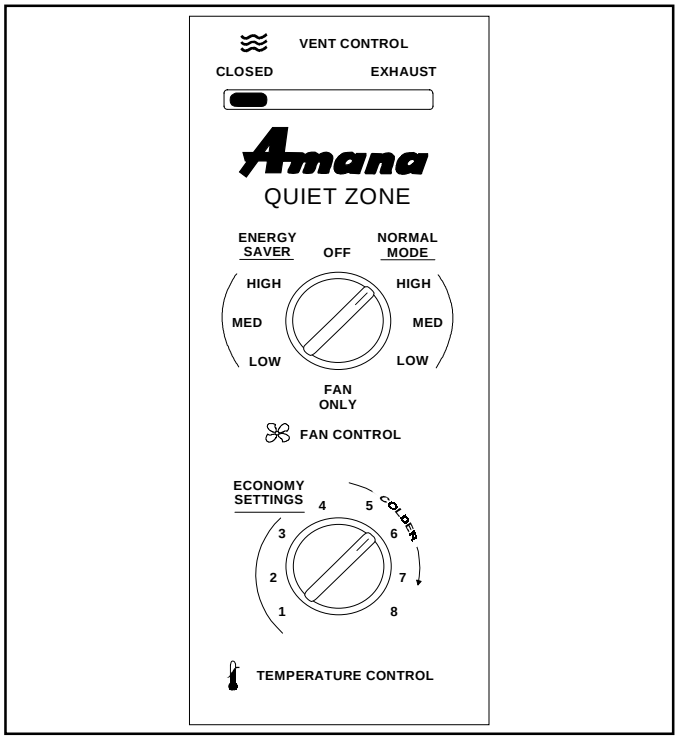
Operating Instructions

Air Conditioner Controls

Two styles of electronic controls are available for Quiet Zone™ units: a touch control or a rotary control.



Touch Control



Rotary Control

Both types have the following three controls:

VENT CONTROL (does not apply to "TA" models)

FAN CONTROL

TEMPERATURE CONTROL

The following paragraphs explain the function and operation of each control.

Vent Control

The *VENT CONTROL* is used to recirculate or exhaust room air, by controlling a damper.

When control is in *CLOSED* position, damper is closed. When closed, air in area being cooled is recirculated through air conditioner and back into room. No air is exhausted (vented) outside.

NOTE: For maximum efficiency and cooling, *VENT CONTROL* should remain in closed position any time air conditioner is cooling.

When control is in *EXHAUST* position, damper is open. When open, room air is exhausted (vented) outside. Use exhaust position to remove stale or smoky air from area.

NOTE: To conserve energy, air conditioner should not be in cooling mode when using exhaust feature.

Fan Control

The *FAN CONTROL* operates the fan motor.

On touch control panels, select desired setting by pressing appropriate touch pad until red indicator on pad appears. On rotary control panels, turn selector switch to desired setting.

Touch Control Panel Fan Settings

HIGH COOL—Fan operates continuously at high speed and compressor cycles on and off depending upon room temperature. When on, compressor cools and dehumidifies air circulating through air conditioner. Use this setting for maximum air circulation and faster cool down during initial start up.

MEDIUM COOL—Fan operates continuously at medium speed and compressor cycles on and off depending upon room temperature. When on, compressor cools and dehumidifies air circulating through air conditioner.

LOW COOL—Fan operates continuously at low speed and compressor cycles on and off depending upon room temperature. When on, compressor cools and dehumidifies air circulating through air conditioner. Select this setting for quiet operation.

OFF—Turns air conditioner off.

Operating Instructions

Rotary Control Fan Settings
Rotary fan control can be operated in two modes: *NORMAL MODE* or *ENERGY SAVER*.

In *NORMAL MODE*, fan runs continuously at selected speed and compressor cycles on and off to maintain room at desired temperature. When compressor is on, room is cooled and dehumidified.

In *ENERGY SAVER*, fan cycles on and off with compressor. Fan motor comes on when compressor cycles on, and continues running for about 45 seconds after compressor cycles off. Periodically (approximately every 5 minutes) fan turns on to sample room air temperature. Fan turns off after approximately 45 seconds if room temperature is below set point of temperature control. If room temperature is above set point, fan continues to operate and compressor cycles on to cool room.

In either mode, fan speed settings include:

HIGH—Fan operates at high speed for maximum air circulation and quicker cool down during initial start up of unit.

MED—Fan operates at medium speed. Select this speed for a combination of reduced air circulation and quieter operation.

LOW—Fan operates at slowest speed to provide quietest operation.

FAN ONLY—Fan operates continuously at high speed and compressor remains off. Use this setting to circulate air without cooling and, with *VENT CONTROL* in *EXHAUST* position, to vent room of stale air, odors, smoke, etc.

OFF—Turns air conditioner off.

NOTE: Unplug air conditioner if it is to be turned off for an extended period of time.

Temperature Control
The *TEMPERATURE CONTROL* is used to set and adjust level of cooling. The higher control is set, the cooler room or area being cooled becomes.

NOTE: *TEMPERATURE CONTROL* setting does not affect how quickly a room is cooled, it only determines how cool a room becomes. Setting control to its maximum setting will not cool a room faster.

Control settings of 3 and below are *ECONOMY SETTINGS*. Setting control in this range can result in energy savings by reducing amount of time compressor operates (because room or area is not being cooled as much as with higher settings).

On units with touch controls, turning temperature control to *FAN ONLY* position turns compressor off, but keeps fan running. Use this setting to circulate air without cooling and, with *VENT CONTROL* in *EXHAUST* position, to vent room of stale air, odors, smoke, etc.

Compressor Lockout Feature

To extend compressor life and prevent circuit overloads, units with a rotary control have a compressor lockout feature. Compressor lockout prevents compressor from cycling on for 3 to 4 minutes after:

- Compressor cycles off.
- Unit is first turned on.
- Temperature control is turned down (to a cooler setting) immediately after compressor cycles off.
- Fan control is switched from *NORMAL MODE* to *ENERGY SAVER*, or vice versa.

Low Voltage Protection

If supply voltage drops below specification, unit will automatically shut down to prevent damage to any components. When voltage returns to specified level, unit automatically resumes operation.

NOTE: On units with rotary controls, a compressor lockout occurs when unit resumes operation after low voltage shut down.

Operating Instructions

Initial Start Up

WARNING

To avoid risk of personal injury or death from fire or electric shock, read IMPORTANT SAFETY INSTRUCTIONS before operating this device.

To start air conditioner for the first time, or after it has been turned off for an extended period:

1. Ensure all doors and windows in area being cooled are tightly closed.
2. Check *FAN CONTROL* on air conditioner control panel. Control should be in *OFF* position.
3. Plug power cord on air conditioner into wall receptacle.

WARNING

To avoid risk of personal injury or death due to electrical shock, devices covered in this manual are equipped with a three-prong grounding plug. If a two-prong (non-grounding) wall receptacle is encountered, contact a qualified electrician and have the receptacle replaced with a properly grounded wall receptacle in accordance with the National Electrical Code.

WARNING

To avoid risk of personal injury or death due to electrical shock, DO NOT, under any circumstances, alter the grounding plug. Air conditioner must be grounded at all times. Do not remove warning tag from power cord.

NOTE: Unplug air conditioner if it is to be turned off for an extended period of time.

4. Make sure *VENT CONTROL* is closed. For maximum efficiency and cooling, vent control should be closed whenever air conditioner is cooling.
5. Turn *FAN CONTROL* to highest cooling position and *TEMPERATURE CONTROL* to coldest position (fully clockwise).

NOTE: Compressor lockout feature will delay start of compressor for 3 to 4 minutes after unit is turned on (applies to rotary control units only).

6. When area being cooled reaches desired temperature, slowly turn *TEMPERATURE CONTROL* counterclockwise until compressor turns off.

Temperature control will continue to cycle compressor on and off, maintaining room at desired temperature.

Care and Maintenance

⚠ WARNING

To avoid risk of personal injury or death due to electrical shock, disconnect electrical power to unit before attempting to service the unit.

Horizontal Insert

The horizontal insert (front grille) is removable, to access air filter. To remove horizontal insert grasp bottom center of insert, then lift up and pull out. Clean insert and cabinet with a sponge and soapy water. After cleaning, thoroughly remove all cleaner residue and ensure unit is completely dry before reinstalling. Do not use cleaners with abrasives or polishing compounds, they may damage plastic surfaces.

⚠ CAUTION

To avoid damage to polycarbon components (like the horizontal insert), do not use hydrocarbon based cleaners. Hydrocarbon causes polycarbon to warp, turn brittle, splinter or crack.

Air Filter

Each unit has a permanent, removable air filter. Air filter should be inspected regularly (at least once a week during continuous operation), and cleaned if necessary. It can be cleaned with a vacuum cleaner or washed in soapy water. If washed, filter should be thoroughly rinsed and dried before it is reinstalled.

NOTE: Do not operate air conditioner without a filter.

Fan Motor

The fan motor is permanently lubricated. Additional lubrication should never be applied. Contact an authorized Amana Service Center if fan malfunctions in any manner.

Annual Inspection

Have air conditioner inspected by an authorized Amana dealer or service representative once a year. If operating unit in a dusty climate or environment, remove chassis from outer case and thoroughly clean unit more frequently.

Oceanside or Corrosive Environments

Salt air and other corrosive environments may accelerate aging of air conditioner. When operated in these environments, unit should be removed from outer case and completely cleaned at least once a year. Any scratches or blisters on painted surfaces should be sanded and repainted.

Troubleshooting Information

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

⚠ CAUTION

Units covered in this manual are polarized. Reversing polarity of a unit or any of its components will cause damage. To avoid reversing polarity, any wires disconnected or removed during service *must* be reconnected to the same location. To ensure wires are reconnected to the proper location, tag or otherwise mark the wires before disconnecting or removing.

Tools and Equipment

Accurate diagnosis and repair of malfunctioning air conditioners requires proper tools and equipment. In addition to standard hand tools (screw drivers, pliers, sockets, etc.), the following equipment is required:

- Thermocouple type temperature tester, with sufficient range to meet all testing and measuring requirements.
- Multimeter (combination voltmeter, ammeter, and ohmmeter) for reading current loads during start up and normal operation, verifying voltage levels, and testing various components for continuity.
- Standard refrigeration-type test cord for "live" testing of various electrical circuits and components, and direct wiring of compressor.
- Accurate leak detector, to check for refrigerant leaks.
- Vacuum pump capable of removing all non-condensables in sealed system.
- Charging manifold and related equipment to determine and replenish exact refrigerant charges.
- Recovery cylinder and related equipment to recover and store refrigerant charge in sealed system.

Additional tools and equipment may be required.

Troubleshooting Table

Troubleshooting table on following pages contains symptoms that may be seen in a malfunctioning air conditioner. Each group of symptoms is accompanied by one or more possible causes. Each possible cause is accompanied by a remedy, or a test to determine if suspect component(s) are working properly.

Troubleshooting Information

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Fan motor will not operate.	No power supplied to unit.	Check fuse box/circuit breaker for blown fuse or tripped breaker. Replace/reset.
	Power supply cord faulty.	Check power cord for opens. Replace cord if faulty.
	Wire(s) disconnected or loose.	Ensure all connections are tight and secure.
	Fan motor capacitor faulty.	Check capacitor for open/ short. Replace if faulty. **NOTE**: Discharge capacitor before testing.
	Fan motor faulty.	Check fan motor windings for shorts/opens. Replace if faulty.
	Electronic control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty. **NOTE**: Eliminate all other possible causes before replacing electronic control.
Fan blade will not rotate.	Fan hitting shroud or blower wheel hitting scroll.	Check fan blade/blower wheel for proper alignment on motor shaft. Reposition if necessary. Check fan motor for proper position, ensure mounting nuts/bracket tight and secure.
Fan motor operates intermittently.	Unit in *ENERGY SAVER* mode.	Fan only operates when compressor is on, or to sample room temperature when compressor is off.
	Wire(s) disconnected or loose.	Ensure all connections are tight and secure. Correct as required.
	Cycling on motor protector.	Replace motor.

Troubleshooting Information

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Fan motor operates intermittently.	Electronic control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty. **NOTE**: Eliminate all other possible causes before replacing electronic control.
Fan motor noisy.	Outside coil fan blade or inside coil blower wheel loose or improperly aligned.	Check fan blade/blower wheel for proper position. Reposition if necessary. Ensure hardware attaching fan blade/blower wheel to motor shaft is tight. Tighten if loose; replace if stripped.
	Worn fan motor bearings.	Check bearings for wear/loss of lubricant. Replace motor if either condition found.
	Fan motor mounting hardware/bracket loose or grommets worn (if applicable).	Check mounting bolts/bracket for tightness. Tighten if necessary. Inspect grommets for wear. Replace if necessary.
Compressor does not run, fan motor operates normally.	Compressor lockout.	Lockout feature delays compressor start up for 3–4 minutes under certain conditions (see paragraph *Compressor Lockout Feature*).
	Wire(s) disconnected or loose.	Ensure all connections are tight and secure. Correct as required.
	Compressor motor capacitor faulty.	Check capacitor for open/ short. Replace if faulty. **NOTE**: Discharge capacitor before testing.
	Compressor faulty.	Check compressor motor windings for opens/shorts. Check compressor seals. Perform compressor direct wiring test. Replace compressor if faulty.

Troubleshooting Information

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Compressor does not run, fan motor operates normally.	Overload protector open.	Check protector for continuity. If open, replace. **NOTE**: Ensure compressor/ overload are below trip temperature before testing.
	Electronic control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty. **NOTE**: Eliminate all other possible causes before replacing electronic control.
Compressor cycles on and off.	Wire(s) disconnected or loose.	Ensure all connections are tight and secure. Correct as required.
	Supply voltage out of specification.	Check input voltage for proper levels. Take appropriate action if voltage levels out of specification.
	Overload protector open.	Check protector for continuity. If open, replace. **NOTE**: Ensure compressor/ overload are below trip temperature before testing.
	Fan motor faulty.	Check fan motor for proper operation. Replace if faulty.
	Restricted air flow.	Inspect air filter, indoor/ outdoor coil for dirt. Clean as required. Check fins on coils for damage. Straighten fins if bent, attempt other repairs as necessary. Replace faulty coil if repairs cannot be made.
	Compressor motor capacitor faulty.	Check capacitor for open/ short. Replace if faulty. **NOTE**: Discharge capacitor before testing.
	Sealed refrigerant system fault.	Test sealed system for proper charge, leaks, and restrictions. Repair as required.

Troubleshooting Information

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Insufficient cooling.	Low refrigerant charge.	Test sealed system for proper charge. Ensure system is free of leaks. Repair as required.
	Restricted air flow.	Inspect air filter, indoor/ outdoor coil for dirt. Clean as required. Check fins on coils for damage. Straighten fins if bent, attempt other repairs as necessary. Replace faulty coil if repairs cannot be made.
	Vent control in exhaust position/ vent door stuck open.	Ensure vent control in closed position when unit is cooling (consumer education). Check vent door for proper operation. Replace/repair as required.
	Unit undersized for area/room.	Reduce area being cooled or replace unit with larger capacity model.
Excessive noise.	Outside coil fan blade or inside coil blower wheel loose or improperly aligned.	Check fan blade/blower wheel for proper position. Reposition if necessary. Ensure hardware attaching fan blade/blower wheel to motor shaft is tight. Tighten if loose, replace if stripped.
	Compressor mounting hardware loose or grommets worn.	Check mounting bolts for tightness. Tighten if necessary. Inspect grommets for wear. Replace if necessary.
	Free parts, loose screws causing or allowing excessive vibration.	Inspect unit for parts that may have worked free, loose/ missing screws, other problems that may cause excessive vibration. Repair as required.
	Worn fan motor bearings.	Check bearings for wear/loss of lubricant. Replace motor if either condition is found.

Troubleshooting Information

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Excessive noise.	Fan motor mounting hardware/ bracket loose or grommets worn (if applicable).	Check mounting bolts/bracket for tightness. Tighten if necessary. Inspect grommets for wear. Replace if necessary.
	Copper tubing improperly dressed or routed.	Inspect copper tubing for excessive vibration. Secure tubing as required.
	Compressor internal noise.	Inspect compressor for proper operation. Replace as required.
Excessive condensate in base pan.	Unit operating under excessive humidity conditions.	Remove condensate drain plug in base pan. **NOTE**: Removal of plug may result in slight decrease in cooling efficiency. Removal not recommended if excessive humidity is temporary and infrequent condition for area.
No cooling.	Low refrigerant charge or leak in sealed system.	Test sealed system for proper charge. Ensure system is free of leaks. Repair as required.
	Blockage (restriction) in sealed system.	Evacuate sealed system. Remove blockage, recharge.
	Compressor faulty.	Check compressor motor windings for open shorts. Check compressor seals. Perform compressor direct wiring test. Replace compressor if faulty.
	Electronic control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty. **NOTE**: Eliminate all other possible causes before replacing electronic control.

Troubleshooting Information

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Wattage slowly decreases below minimum specification.	Undercharged, restricted strainer or plugged capillary tube.	Test sealed system for proper charge. Ensure system is free of leaks/blockage. Repair as required. Evacuate/recharge sealed system.
Wattage decreases immediately.	No refrigerant.	Test sealed system for proper charge. Ensure system is free of leaks. Repair as required.
	Compressor faulty.	Check compressor motor windings for open/shorts. Check compressor seals. Perform compressor direct wiring test. Replace compressor if faulty.
Wattage continuously high.	Refrigerant overcharge.	Test sealed system for proper charge. Repair as required.
Evaporator coil partially frosted.	System low on refrigerant.	Test sealed system for proper charge. Ensure system is free of leaks. Repair as required.
	Restricted capillary tube.	Replace capillary tube.
	Insufficient air flow.	Inspect air filter, indoor/ outdoor coil for dirt. Clean as required. Check fins on coils for damage. Straighten fins if bent, attempt other repairs as necessary. Replace faulty coil if repairs cannot be made.
	Faulty fan motor	Check fan motor for proper operation. Replace if faulty.
Evaporator completely iced.	Low outside temperature.	Turn unit off. (Consumer education)
	Restricted capillary tube.	Replace capillary tube.
	Insufficient air flow.	Inspect air filter, indoor/ outdoor coil for dirt. Clean as required. Check fins on coils for damage. Straighten fins if bent, attempt other repairs as necessary. Replace faulty coil if repairs cannot be made.

Testing Procedures

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Low Voltage

Low voltage can result in one or more of the following problems:

- Unit will not operate.
- Compressor motor cycling.
- Premature failure of overload protector.
- Frequent blown fuses or tripped circuit breakers.
- Premature failure of compressor or fan motor.
- Noticeable dimming of lights when unit is operating.
- Evaporator icing, caused by reduced fan speed.

Common causes for low voltage include inadequate supply circuit wiring; use of extension cords; and loose fuses or connections in fuse box, circuit breaker, or distribution panel.

NOTE: A good indication of voltage problems caused by inadequate or faulty wiring is voltage levels that do not remain constant under load (supply voltage fluctuates).

A less common cause for low voltage is voltage from local electric utility is low (sometimes called "brown outs"). If this is the case, have consumer contact local electric utility for assistance.

All units should operate normally if power stays within specifications (refer to Technical Sheet for unit under test).

Test for low voltage using voltmeter. Verify voltage level at circuit breaker/distribution panel for unit under test, and at electrical outlet serving unit. Take initial voltage readings with air conditioner turned off. Take additional readings during start-up of unit, and again while unit is operating. All readings should be within specifications and remain constant.

NOTE: Supply voltage may drop momentarily during initial start-up and when compressor first starts, but should always remain within specifications.

High Voltage

High voltage causes motors to overheat, cycle on their protectors, or break down electrically. This problem can only be solved by local electric utility.

Electronic Control

Electronic control is not repairable. If any component in control is faulty, entire control must be replaced.

NOTE: Repair or replace all faulty line voltage components before testing or replacing electronic control. Do not assume problems are caused by electronic control system. Opened, shorted, grounded or otherwise faulty line voltage components (including power cord and building wiring) can create problems that appear to be caused by electronic control.

Testing Capacitors

Compressors in these units use permanent split capacitor type motors, eliminating need for start capacitors and relays. A low capacitance "compressor run capacitor" assists during start, and remains in system during operation. Line side of run capacitor is marked with a dot and must be installed on line side of supply circuit. See directions on capacitor, and wiring diagram (on Technical Sheet) for unit under test.

Capacitors are also used on permanent split capacitor (PSC) fan motors.

To test capacitors:

1. Disconnect power to unit.
2. Discharge capacitor by shorting capacitor terminals through a 10,000 ohm resistor. Disconnect leads attached to capacitor terminals.
3. Set ohmmeter on highest scale. Attach ohmmeter leads to capacitor and observe ohmmeter display:
   - Good condition—indicator swings to zero and slowly returns toward infinity.
   - Shorted—indicator swings to zero and remains. Replace capacitor.
   - Open—indicator does not move. Replace capacitor.
4. Reverse ohmmeter leads on capacitor and repeat step 3.

Testing Procedures

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Checking Overload Protectors

Overload protectors protect compressor from current and temperature overloads by removing power from compressor before it is damaged.

To check overload protector:

1. Disconnect power to unit.
2. Discharge capacitor by shorting capacitor terminals through a 10,000 ohm resistor.
3. Remove overload lead from compressor terminal.
4. Use ohmmeter to test continuity between overload terminals. If open, replace overload.

Checking Compressor Windings

Resistance Test

1. Disconnect power to unit.
2. Discharge capacitor by shorting capacitor terminals through a 10,000 ohm resistor.
3. Remove leads from compressor terminals.
4. Set ohmmeter to lowest scale.
5. Attach ohmmeter to compressor terminals C and S. Note reading.
6. Attach ohmmeter to compressor terminals C and M. Note reading.

If either compressor winding reads open (infinite or very high resistance) or dead short (0 ohms), replace compressor.

NOTE: Motor windings typically have very little resistance. When checking windings for shorts, ensure ohmmeter is set on lowest scale. Good windings may indicate as little as 2 ohms of resistance.

Ground Test

1. Disconnect power to unit.
2. Discharge capacitor by shorting capacitor terminals through a 10,000 ohm resistor.
3. Remove leads from compressor terminals.
4. Set ohmmeter to highest scale.
5. Attach one lead of ohmmeter to body of compressor. Ensure connection point is clean, and makes good contact with compressor.
6. Attach remaining lead on ohmmeter to C, then S, then M terminals on compressor.

If ohmmeter indicates continuity between compressor case and any terminal, replace compressor.

Testing Procedures

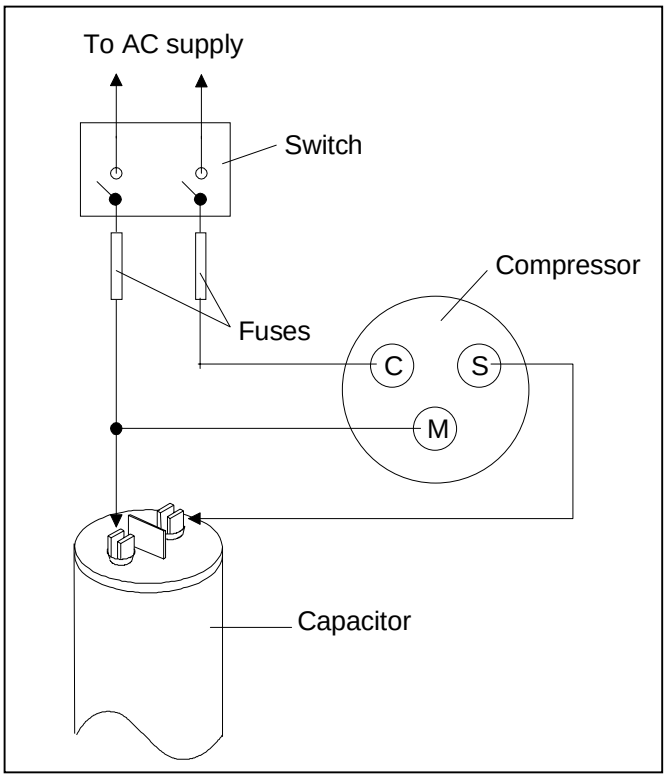
WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Operational Test (short term testing only)

If compressor voltage, capacitor, overload, and motor winding tests are successful (do not indicate a fault), perform the following test:

1. Disconnect power to unit.
2. Discharge capacitor by shorting capacitor terminals through a 10,000 ohm resistor.
3. Remove leads from compressor terminals.
4. Attach test cord to compressor windings.
   - Common lead on test cord attaches to C terminal on compressor.
   - Start lead on test cord attaches to S terminal on compressor.
   - Run lead on test cord attaches to M terminal on compressor.



Attaching Capacitor for Compressor Test

5. Connect a known good capacitor into circuit as shown above. For proper capacitor size and rating, see Technical Sheet for unit under test.

NOTE: Ensure test cord cables and fuses meet specifications for unit under test (see Technical Sheet for unit under test).

6. Replace compressor protector cover securely.
7. Plug test cord into outlet, then press and release start cord switch.

CAUTION

To avoid damage to compressor windings, immediately disconnect (unplug) test cord from power source if compressor does not start. Damage to compressor windings occurs if windings remain energized when compressor is not running.

If compressor runs when direct wired, it is working properly. Malfunction is elsewhere in system.

If compressor does not start when direct wired, recover system at high side. After system is recovered, repeat compressor direct wire test.

If compressor runs after system is recovered (but would not operate when wired direct before recovery) a restriction in sealed system is indicated.

If motor does not run when wired direct after recovery, replace faulty compressor.

Checking Electric Heater Assembly (on models so equipped)

1. Disconnect power to unit.
2. Ensure heater element is cold, then remove suspect heater and visually inspect element for obvious damage (breaks, cracks in element, etc.). Replace if faulty.
3. Attach ohmmeter to element leads. Check for continuity (14.4 ohms cold).

If element reads open (infinite or very high resistance):

4. Remove fuse links and test for continuity. Top fuse link, nearest the thermostat, opens at 305°F. Bottom fuse link opens at 200°F. If either or both are open, replace.
5. Use ohmmeter to check disc type thermostat for proper operation:
   - Heat thermostat to 125°F ±5°. Thermostat should read open.
   - Cool thermostat to 100°F ±4°. Thermostat should read closed (continuity).

   Replace thermostat if faulty.

Testing Procedures

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Compressor Burnout

WARNING

To avoid personal injury, do not allow sludge or oil from compressor to contact skin. Severe burns may result.

NOTE: Before opening any refrigeration system, EPA regulations require refrigerant in system to be captured for safe disposal.

NOTE: Do not use captured or recycled refrigerant in Amana units. Captured or recycled refrigerant voids all Amana and/or compressor manufacturer's warranties.

When a compressor burns out, high temperature causes the refrigerant, oil, and motor insulation to decompose, forming acids and sludge.

If a compressor burnout is suspected:

1. Disconnect power to unit.
2. Attach piercing valve to process tube of liquid line strainer. Discharge refrigerant in system to a recovery cylinder.
3. Remove compressor and obtain an oil sample from suction stub on compressor.
4. Analyze oil sample using Sporlan Acid Test Kit, AK-3 (or equivalent)

If oil sample is within parameters, a burnout has not occurred or is so mild that compressor replacement is not necessary. Reinstall compressor.

If acid level is unacceptable, replace compressor.

Fan Motor

1. Disconnect power to unit.
2. Discharge capacitor by shorting capacitor terminals through a 10,000 ohm resistor.
3. Disconnect fan motor leads from selector switch and respective capacitor.
4. Check for continuity between each motor lead with ohmmeter.
5. Check for ground by attaching one lead of ohmmeter to motor frame (ground). Attach remaining ohmmeter lead to each fan motor lead, one at a time.

NOTE: Ensure contact point between ohmmeter lead and motor frame is clean.

Replace fan motor if windings test open (very high or infinite resistance), or if any continuity is indicated between motor frame and windings.

When replacing fan motor:

- Replacement fan motor must be installed with motor leads below level of motor shaft.
- Drip loop in motor leads must be below wire openings in motor housing.
- Coat exposed areas of shaft from blower wheel or fan blade to end of shaft with Cosmoline or equivalent to prevent corrosion.
- Ensure evaporator blower wheel and/or condenser fan blade clearance tolerances are correct. Distance between evaporator blower wheel and orifice ring is exact and important (1/8-inch on portables, ½-inch on compacts, and ¼-inch on 200 series).

Condenser fan blade should be centered in fan shroud ring. Distance between fan blade and condenser fins should be:

5,000 to 8,000 Btu units	¼-inch
10,000 to 12,000 Btu units	1¾-inch
14,000 to 21,000 Btu units	1-inch

Dehydrating Sealed Refrigeration System

Moisture in a room air conditioner sealed system, when exposed to heat generated by the compressor and motor, reacts chemically with refrigerant and oil in the system. This chemical reaction forms corrosive hydrochloric and hydrofluoric acids. These acids contribute to the breakdown of motor winding insulation and corrosion of compressor working parts, causing compressor failure.

In addition, sludge, a residue of the chemical reaction, coats all surfaces of sealed system, and will eventually restrict refrigerant flow through capillary tube.

To dehydrate sealed system, evacuate system (see paragraph *Evacuation*).

Testing Procedures

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Leak Testing

⚠ DANGER

To prevent serious injury or death from violent explosions, NEVER use oxygen or acetylene for pressure testing or cleanout of refrigeration systems. Free oxygen will explode on contact with oil. Acetylene will explode spontaneously when put under pressure.

It is important to check sealed system for refrigerant leaks. Undetected leaks can lead to repeated service calls and eventually result in system contamination, restrictions, and premature compressor failure.

Refrigerant leaks are best detected with halide or electronic leak detectors.

NOTE: The flame on a halide detector glows green in the presence of HCFC22 refrigerant.

Testing Systems Containing a Refrigerant Charge

1. Stop the operation (turn air conditioner off).
2. Holding leak detector exploring tube as close to system tubing as possible, check all piping, joints, and fittings.

NOTE: Use soap suds on areas leak detector cannot reach or reliably test.

Testing Systems Containing No Refrigerant Charge

1. Connect cylinder of nitrogen, through gauge manifold, to process tube of compressor and liquid line strainer.
2. Open valves on nitrogen cylinder and gage manifold. Allow pressure to build within sealed system.
3. Check for leaks using soap suds.

If a leak is detected in a joint, do not to attempt to repair by applying additional brazing material. Joint must be disassembled, cleaned and rebrazed. Capture refrigerant charge (if system is charged), unbraze joint, clean all parts, then rebraze.

If leak is detected in tubing, replace tubing. If leak is detected in either coil, replace faulty coil.

Brazing

⚠ CAUTION

To reduce risk of personal injury or property damage, take necessary precautions against high temperatures required for brazing.

Satisfactory results require cleanliness, experience, and use of proper materials and equipment.

Connections to be brazed must be properly sized, free of rough edges, and clean.

Generally accepted brazing materials are:

- **Copper to copper joints**: SIL-FOS (alloy of 15 percent silver, 80 percent copper, and 5 percent phosphorous). Use without flux. Recommended brazing temperature is approximately 1400°F. **DO NOT USE FOR COPPER TO STEEL CONNECTION**.
- **Copper to steel joints**: SILVER SOLDER (alloy of 30 percent silver, 38 percent copper, 32 percent zinc). Use with fluoride based flux. Recommended brazing temperature is approximately 1200°F.
- **Steel to steel joints**: SILVER SOLDER (see copper to steel joints).
- **Brass to copper joints**: SILVER SOLDER (see copper to steel joints).
- **Brass to steel joints**: SILVER SOLDER (see copper to steel joints).

Testing Procedures

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Restriction Testing

Restrictions in sealed system generally occur in capillary tube or strainer, but can exist anywhere on liquid side of system. To determine if a restriction exists:

1. Attach gauge and manifold between suction and discharge sides of sealed system.
2. Turn unit on, and allow pressure on each side to stabilize. Inspect condenser side of system. Tubing on condenser should be warm and temperature should be equal throughout (no sudden drops at any point along tubing):
   - If temperature of condenser tubing is consistent throughout, go to step 3.
   - If temperature of condenser tubing drops at any point, tubing is restricted at point of temperature drop (if restriction is severe, frost may form at point of restriction and extend down in direction of refrigerant flow in system). Go to step 4.
3. Turn unit off and time how long it takes high and low pressure gauges to equalize:
   - If pressure equalization takes longer than 7 minutes, a restriction exists in the capillary tube/ strainer. Go to step 4.
   - If pressure equalization takes less than 7 minutes, system is not restricted. Check for other possible causes of malfunction.
4. Recover refrigerant in sealed system.

NOTE: Before opening any refrigeration system, capture refrigerant in system for safe disposal.

5. Remove power from unit.

CAUTION

To reduce risk of personal injury or property damage, take necessary precautions against high temperatures required for brazing.

6. Remove and replace restricted device.
7. Evacuate sealed system.
8. Charge system to specification.

NOTE: Do not use captured or recycled refrigerant in Amana units. Captured or recycled refrigerant voids all Amana and/or compressor manufacturer's warranties.

NOTE: Charge system with exact amount of refrigerant. See Technical Sheet or refer to unit nameplate for correct refrigerant charge. Inaccurately charged system will cause future problems.

Testing Procedures

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Evacuation

CAUTION

To avoid risk of fire, sealed refrigeration system must be air free. To reduce risk of air contamination follow evacuation procedures exactly.

NOTE: Before opening any refrigeration system, EPA regulations require refrigerant in system to be captured for safe disposal.

Proper evacuation of sealed refrigeration system is an important service procedure. Usable life and operational efficiency of air conditioner greatly depends upon how completely air, moisture and other non-condensables are evacuated from sealed system.

Air in sealed system causes high condensing temperature and pressure, resulting in increased power requirements and reduced performance.

Moisture in sealed system chemically reacts with refrigerant and oil to form corrosive hydrofluoric and hydrochloric acids. These acids attack motor windings and parts, causing premature breakdown.

Equipment required to evacuate sealed system includes:

- High vacuum pump, capable of producing a vacuum equivalent to 25 microns.
- Thermocouple vacuum gauge capable of providing true readings of vacuum in system.

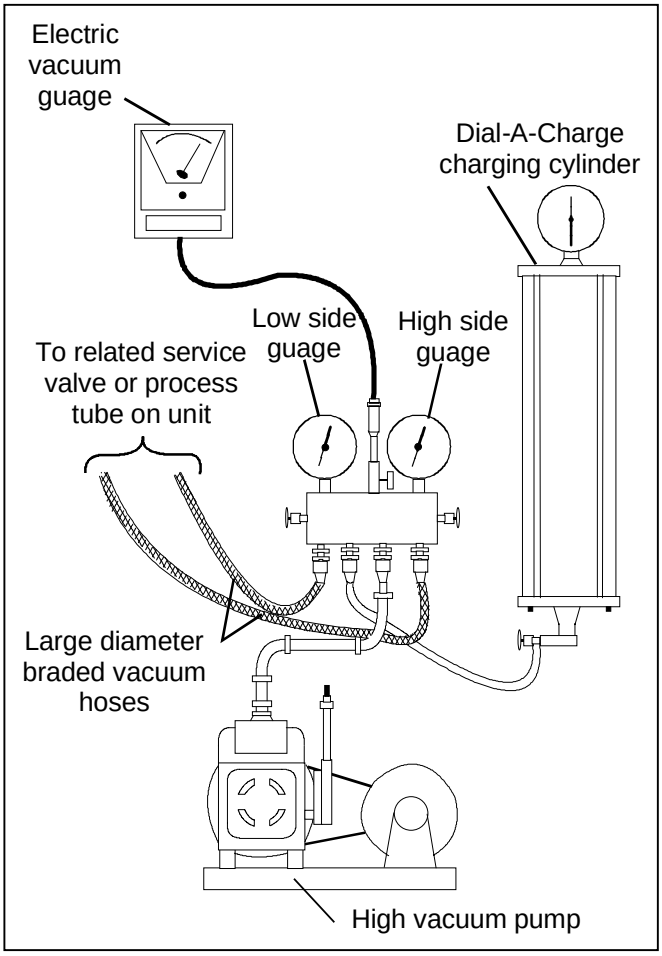
CAUTION

To avoid damage to compressor motor, never use air conditioner compressor as a vacuum pump or run compressor when system is under high vacuum.

To evacuate sealed refrigeration system:

1. Connect vacuum pump, vacuum tight manifold set with high vacuum hoses, thermocouple vacuum gauge and charging cylinder as shown in illustration.
2. Connect low side line to compressor process tube.
3. Connect high side line to process tube of liquid line strainer.

NOTE: If a compression or flare fitting cannot be attached to process tube(s) and still leave room for a pinch-off, swage tube(s) and braze on an additional length of tubing.



Evacuation Equipment Setup

4. Start vacuum pump and open shut off valve to high vacuum gauge manifold only.
5. After compound gauge (low side) drops to approximately 29 inches gauge, open valve to vacuum thermocouple gauge.
6. Ensure vacuum pump will blank-off to a maximum of 25 microns.

NOTE: A high vacuum pump can only produce a good vacuum if oil in pump is not contaminated.

7. If vacuum pump is working properly, close valve to vacuum thermocouple gauge.
8. Open high and low side valves of high vacuum manifold set. With valve on charging cylinder closed, open manifold valve to cylinder.
9. Evacuate system to at least 29 inches gauge. Open valve to thermocouple vacuum gauge.

Testing Procedures

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

10. Continue to evacuate to a maximum of 250 microns. Close valve to vacuum pump and watch rate of rise:
    - If vacuum does not rise above 1500 microns in three minutes, system can be considered properly evacuated.
    - If thermocouple vacuum gauge continues to rise, then levels off above 5000 microns, moisture and non-condensables are still present. Re-evacuate.
    - If gauge continues to rise above 5000 microns, a leak is present. Locate, repair, and re-evacuate.
11. When system is properly evacuated, close valve to thermocouple vacuum gauge and vacuum pump. Shut off pump and prepare to charge system.

Charging

NOTE: Do not use captured or recycled refrigerant in Amana units. Captured or recycled refrigerant voids all Amana and/or compressor manufacturer's warranties.

NOTE: Charge system with exact amount of refrigerant. See Technical Sheet or refer to unit nameplate for correct refrigerant charge. Inaccurately charged system will cause future problems.

To charge system:

NOTE: When using ambient compensated calibrated charging cylinder, allow liquid refrigerant to enter high side only.

1. With no power applied to unit, allow liquid refrigerant to flow into system until no more refrigerant can be added.
2. Close valve on high side of manifold.
3. Start (apply power to) system and charge to specification through low side. Do not charge through low side in a liquid form.
4. Close low side valve on manifold and pinch-off both process tubes. Remove manifold set, crimp shut open ends of process tubes and braze.
5. Recheck for refrigerant leaks.

Refrigerant Precautions

⚠ WARNING

To avoid personal injury, do not allow refrigerant to contact eyes or skin.

⚠ CAUTION

To avoid risk of property damage, do not use refrigerant other than that shown on unit serial number identification plate.

NOTE: All precautionary measures recommended by refrigerant manufacturers and suppliers apply and must be observed.

Using Line Piercing Valves

Line piercing valves can be used for diagnosis, but are not suitable for evacuating or charging due to holes pierced in tubing by valves.

NOTE: Do not leave line piercing valves on system. Connection between valve and tubing is not hermetically sealed. Leaks will occur.

Open Lines

During any processing of refrigeration system, never leave lines open to atmosphere. Open lines allow water vapor to enter system, making proper evacuation more difficult.

Performance Tests

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Performance Tests

CAUTION

To avoid damage to air conditioner, do not run performance tests when cover is off unit or unit is not installed in mounting sleeve. Operation with cover/mounting sleeve removed changes design specifications for air movement in the unit, resulting in overheating of fan motor and causing refrigeration system to become unbalanced.

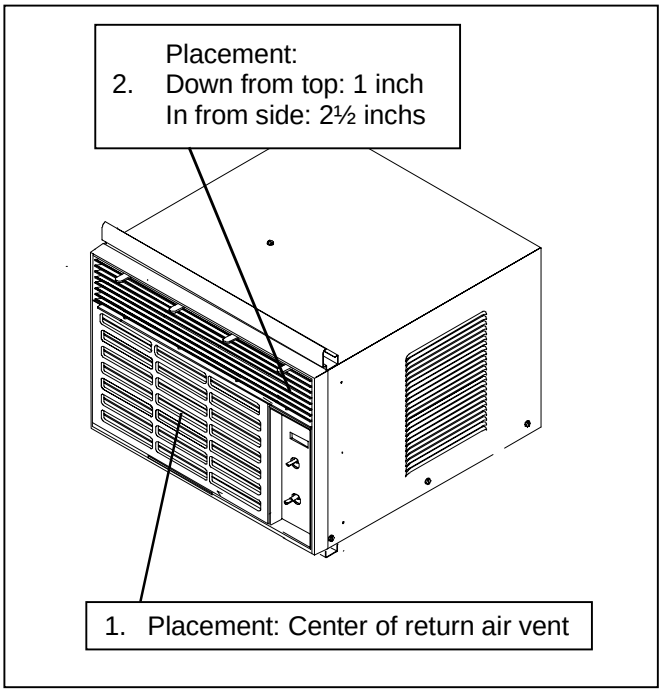
Performance tests provide reasonable assurance a unit is operating correctly and within specifications. Performance tests must be successfully completed to provide this assurance. Perform tests after service, to verify a unit is operating within specifications. Tests can also be run as a diagnostic aid before service (retest unit after servicing).

NOTE: Performance tests should not be run on installed units when outside temperature is more than 20°F below room temperature at testing location.

Test Set up

Results obtained from cooling performance test are dependent upon the thermometers used, how they are handled, and where they are placed. To obtain accurate, reliable test results:

- Use two accurately calibrated refrigeration type thermometers, or a thermocouple potentiometer. A sling psychrometer is also required for this test.
- See *Thermometer Testing Location* diagram. Secure thermometers to unit under test at locations 1 and 2 using masking tape, wire, or other suitable retainers.
- Ensure temperature scale on thermometers are readable *without having to touch or move thermometers to do* so.



Thermometer Testing Locations

Taking Sling Psychrometer Readings

The sling psychrometer obtains wet bulb temperatures used to determine percent relative humidity.

To obtain wet and dry bulb temperature readings with sling psychrometer:

1. Apply power to unit under test. Place *FAN CONTROL* in high cooling position, *TEMPERATURE CONTROL* to coolest setting, and *VENT CONTROL* to closed position. Run unit under test at least 20 minutes before any readings are taken.
2. Saturate wick on sling psychrometer with clean water, slightly below room temperature (saturate wick only once during procedure).

NOTE: Ensure cold air blowing from unit under test is not blowing on sling psychrometer during either reading.

3. Take psychrometer reading approximately 5 feet in front of unit, approximately 4 feet above floor. Record results.
4. Remove wick from sling psychrometer. Take psychrometer reading at same location as reading taken in step 3. Record results (this is the sling psychrometer dry bulb temperature).

Performance Tests

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Cooling Performance Test

A common reason for inefficient cooling is reduced air movement caused by a dirty condenser, evaporator, and/or air filter. Inspect each of these components and clean, if necessary, before performing the following test.

Best results are obtained when cooling test is conducted under "peak load" conditions.

1. Attach thermometers to unit under test at specified locations (see paragraph *Using Cooling Performance Test Thermometers*).
2. Apply power to unit under test. Place *FAN CONTROL* in high cooling position, *TEMPERATURE CONTROL* to coolest setting, and *VENT CONTROL* to closed position. Allow unit to run at least 20 minutes before any readings are taken.
3. Record following temperatures:
   A. Temperature at return air vent (Location 1 in Thermometer Testing Location diagram).
   B. Temperature at discharge vent (Location 2 in *Thermometer Testing Location* diagram).
   C. Wet bulb and dry bulb sling psychrometer readings (see paragraph *Taking Sling Psychrometer Readings*).

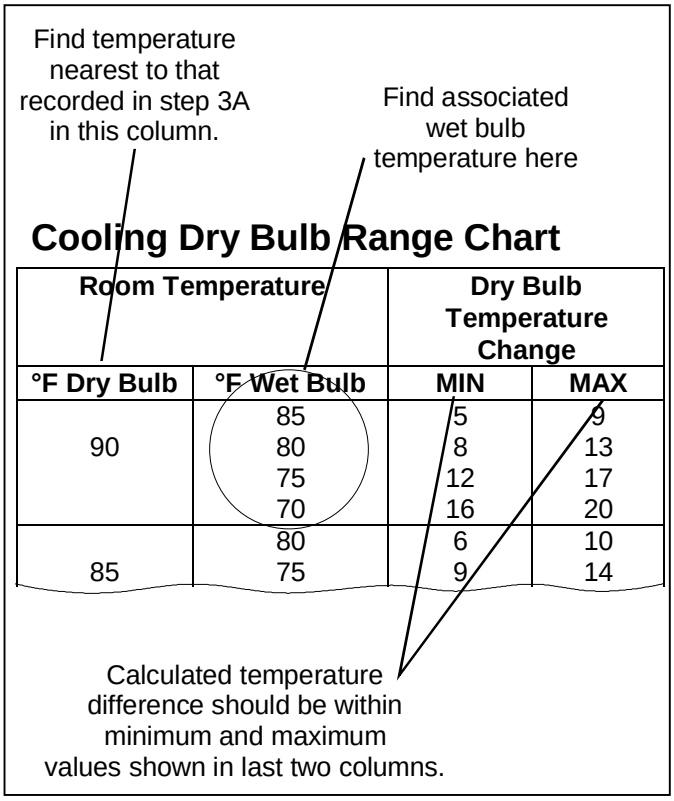
NOTE: Dry bulb sling psychrometer reading should be ±1°F of temperature recorded at return air vent.

4. Calculate difference between temperature readings taken in step 3A and 3B (subtract temperature recorded in step 3B from temperature recorded in step 3A). Record results.

NOTE: The remaining steps explain how to determine if unit under test is operating within specifications, using temperatures recorded in previous steps. See *Cooling Dry Bulb Range Chart* (on Technical Sheet for unit under test) to complete remaining steps. See *Using Cooling Dry Bulb Range Chart* graphic for additional directions.

5. Under *DRY BULB,* in *ROOM TEMPERATURE* column, find temperature nearest to the temperature recorded in step 3A (for example, if temperature recorded in step 3A was 87°F, the nearest temperature on chart would be 85°F). Use associated wet bulb temperatures (shown in next column on chart) in following step.
6. Using wet bulb temperatures associated with dry bulb temperature located in previous step, find temperature on chart nearest to wet bulb sling psychrometer reading obtained in step 3C.
7. Note minimum (MIN) and maximum (MAX) values shown to right of associated dry bulb/wet bulb temperatures.

Unit under test is within cooling specifications if temperature difference calculated in step 4 falls within minimum and maximum values noted in step 7. Unit is out of specifications if calculation from step 4 is greater or less than values from step 7. (See paragraph *Performance Test Diagnosis Guide* for additional information.)



Using Cooling Dry Bulb Range Chart

Performance Tests

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Cooling Wattage Consumption Test

To perform cooling wattage consumption test:

1. Attach wattmeter to unit under test.
2. Turn unit under test on. Place *FAN CONTROL* in (normal) high cooling position, *TEMPERATURE CONTROL* to coolest setting, and *VENT CONTROL* to closed position. Allow unit to run a minimum of 20 minutes before any readings are taken.
3. Record outdoor temperature in vicinity of air conditioner.

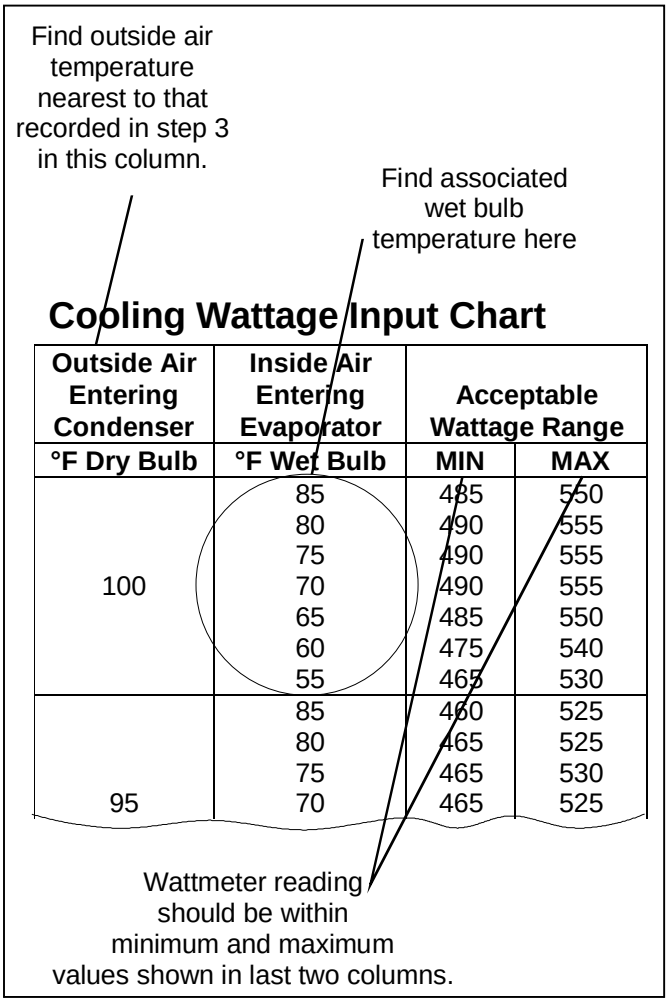
NOTE: When recording outdoor temperature, avoid exposing thermometer to direct sunlight or condenser discharge air.

4. Using sling psychrometer, record indoor wet bulb temperature (see paragraph *Taking Sling Psychrometer Readings*).
5. Record wattmeter reading.

NOTE: The remaining steps explain how to determine if unit under test is operating within specifications, using figures recorded in previous steps. See *Cooling Wattage Input Chart* (on Technical Sheet for unit under test) to complete remaining steps. See Usi*ng Cooling Wattage Input Chart* graphic for additional directions.

6. In *OUTSIDE AIR ENTERING CONDENSER* column (on chart), locate temperature nearest to temperature recorded in step 3. Use associated room air wet bulb temperatures (shown in next column on chart) in following step.
7. Using room air wet bulb temperatures associated with dry bulb temperature located in previous step, find temperature on chart nearest to wet bulb sling psychrometer reading obtained in step 4.
8. Note minimum (MIN) and maximum (MAX) values shown to right of associated dry bulb/wet bulb temperatures.

Unit under test is within wattage specifications if wattmeter reading recorded in step 5 falls within minimum and maximum values noted in step 8. Unit is out of specifications if calculation from step 5 is greater or less than values from step 8. (See paragraph *Performance Test Diagnosis Guide* for additional information.)



Using Cooling Wattage Input Chart

Performance Tests

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Performance Test Diagnosis Guide

Use following chart to determine possible causes for performance test failures.

Performance Test Results	Possible Malfunctions
Cooling wattage and cooling range both below minimum requirement.	Refrigerant charge low. Starved indoor coil. Sealed system leak. Restricted capillary tube. Weak (inefficient) compressor.
Cooling wattage and cooling range both exceed maximum requirement.	Refrigerant over charged. Slow fan motor.
Cooling wattage below minimum requirement, cooling range exceeds maximum requirement.	Restricted air flow (dirty filter, dirty evaporator coil, dirty condenser coil).

Disassembly Procedures

WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

The following paragraphs describe how to disassemble unit under test. Disassembly to some extent is required to install unit, to perform troubleshooting procedures, and to remove and replace faulty components.

Component names used throughout disassembly procedures are the same as those used in Parts Manuals.

For quicker reassembly, disassemble unit under test only to extent necessary to troubleshoot and repair. Unless noted, reassembly is opposite of disassembly.

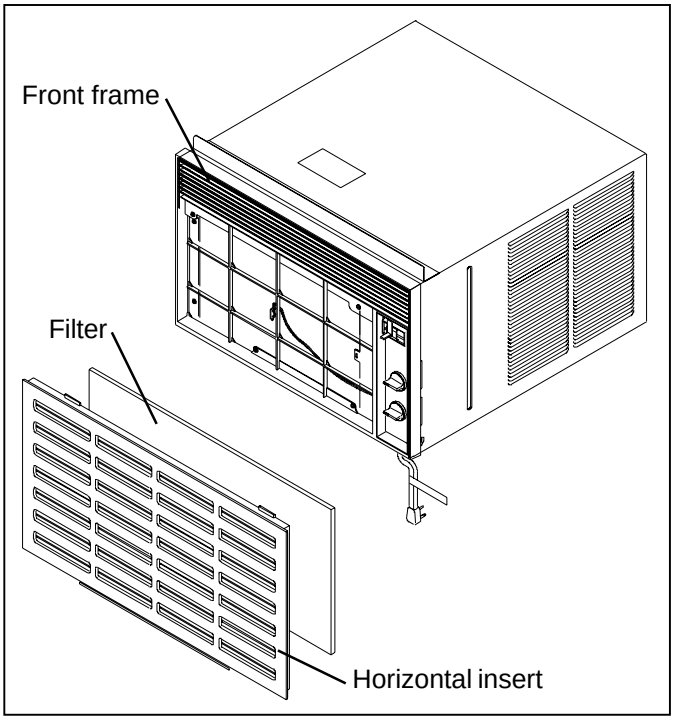
WARNING

To avoid risk of personal injury or death due to electrical shock, ground wires and wires colored like ground wires are **NOT** to be used as current carrying conductors. The standard accepted color coding for ground wires is **green** or **green with a yellow stripe**. Electrical components such as the compressor and fan motor are grounded through an individual wire attached to the electrical component and to another part of the air conditioner. Ground wires should not be removed from individual components while servicing, unless the component is to be removed and replaced. It is extremely important to replace all removed ground wires before completing service.

Horizontal Insert (Front Grille) and Air Filter Removal

To remove horizontal insert and air filter:

1. Lift up on horizontal insert, then pull insert out and away from front frame.
2. Remove air filter. If air filter is dirty, clean with vacuum, or hand wash. Ensure filter is completely dry before reinstalling in unit.



Horizontal Insert and Air Filter Removal

Disassembly Procedures

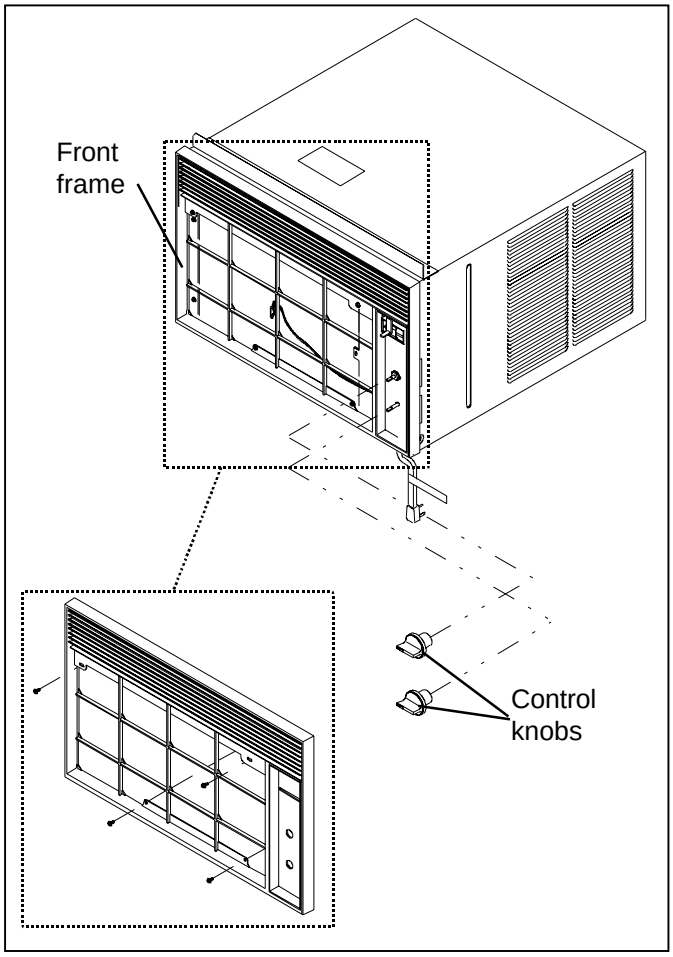
⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Front Frame Removal

To remove front frame:

1. Remove horizontal insert and air filter (see paragraph *Horizontal Insert (Front Grille) and Air Filter Removal*).
2. Remove *TEMPERATURE CONTROL* and *FAN CONTROL* knobs from control panel.
3. Remove four ¼-inch screws securing front frame to air conditioner chassis.
4. Pull front frame out and away from air conditioner.



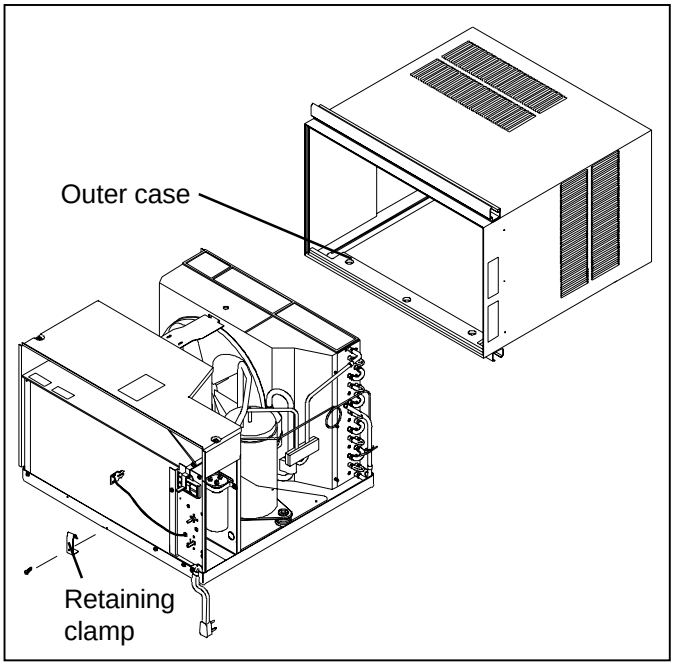
Front Frame Removal

Outer Case Removal

To remove outer case:

1. Remove front frame (see paragraph *Front Frame Removal*).
2. Remove ¼-inch screw securing retaining clamp to chassis.
3 Slide (pull) air conditioner chassis out of outer case assembly.

NOTE: New air conditioners are shipped with packing material (rigid foam/plywood blocks) on inside of unit to prevent damage during shipment. Remove packing material before operating unit.



Outer Case Removal

Disassembly Procedures

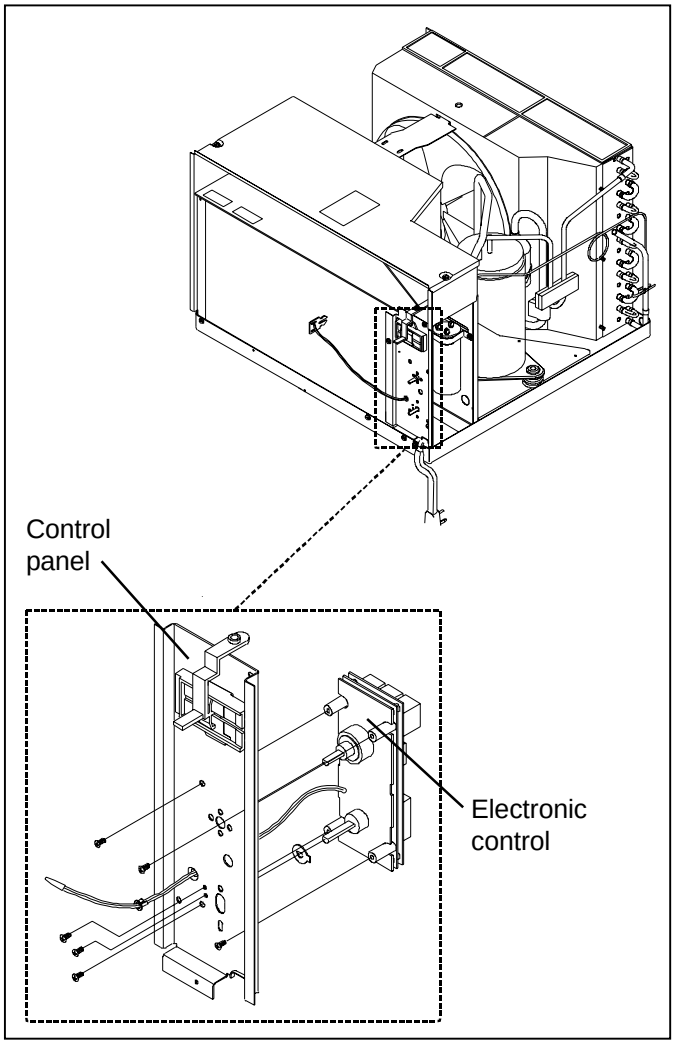
⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Electronic Control Removal

To remove electronic control:

1. Remove outer case (see paragraph *Outer Case Removal*).
2. Discharge capacitor through 10,000 ohm resistor.
3 Disconnect connector plug between control and wiring harness.
4. Remove four Phillips head screws securing electronic control to control panel.
5. Remove thermostat sensor from thermostat sensor mounting clip on front of evaporator.
6. Carefully work electronic control and attached thermostat sensor out and away from control panel.

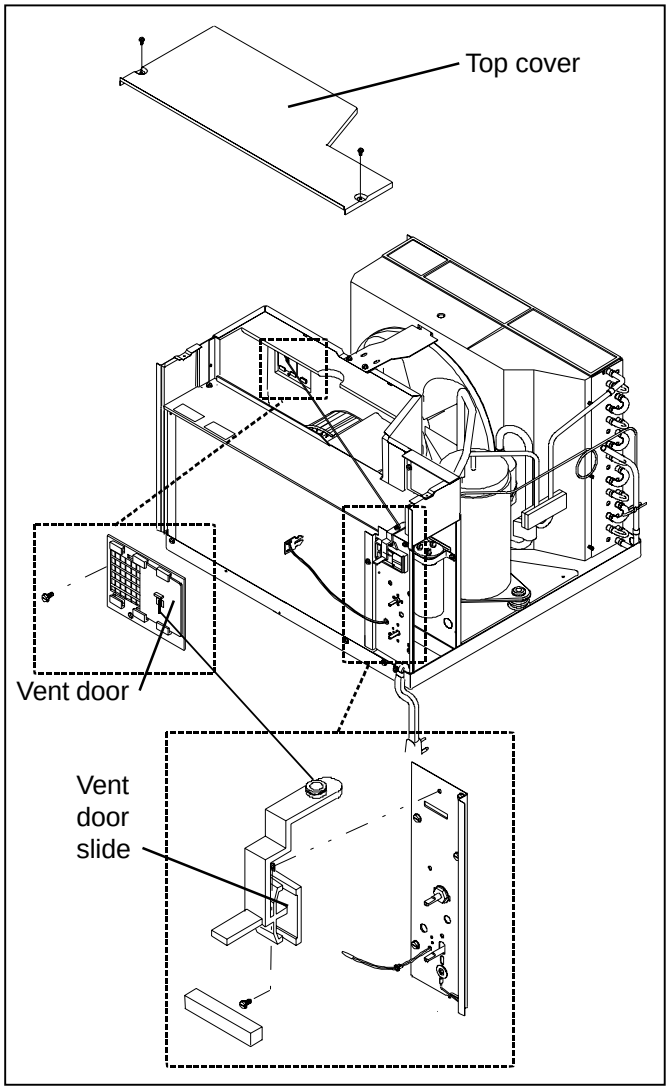


Electronic Control Removal

Vent Control Assembly Removal

To remove vent control assembly:

1. Remove outer case (see paragraph *Outer Case Removal*).
2. Remove two ¼-inch screws securing top cover to chassis, then pull top cover up and away.
3. Remove ¼-inch screw securing vent door to partition panel.
4. Remove Phillips head screw securing vent door slide to control panel.
5. Lift vent control assembly out and away from chassis.



Vent Control Removal

Disassembly Procedures

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

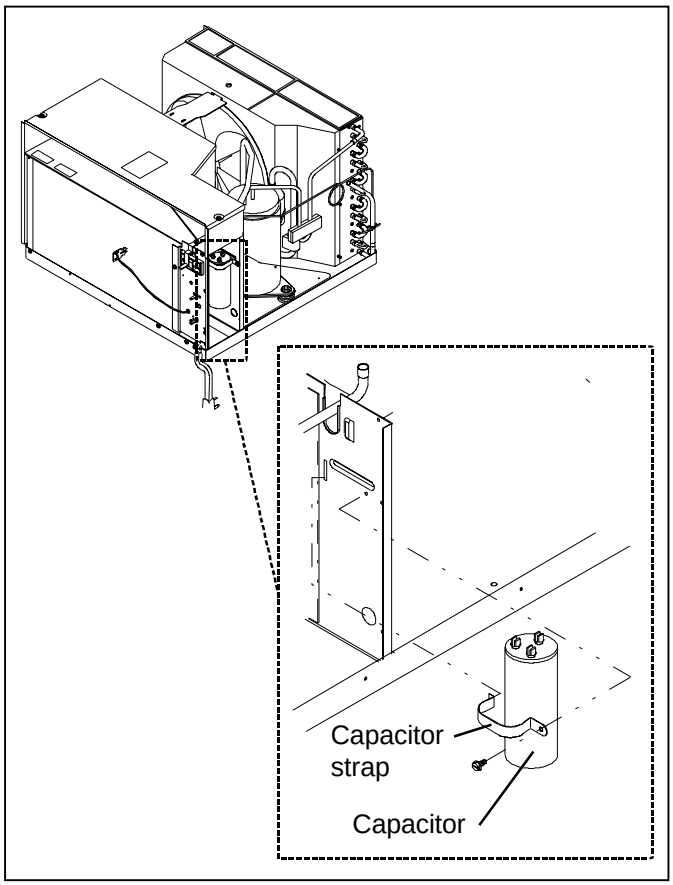
Capacitor Removal

To remove capacitor:

1. Remove outer case (see paragraph *Outer Case Removal*).
2. Discharge capacitor through 10,000 ohm resistor.
3. Disconnect wires attached to capacitor.

NOTE: Before disconnecting or removing wires, always note position or location of wires. Ensure all disconnected wires are reconnected to proper location.

4. Remove ¼-inch screw securing capacitor strap to partition panel.
5. Pull capacitor strap away from capacitor, then pull capacitor out and away from chassis.



Capacitor Removal

Condenser Removal

To remove condenser:

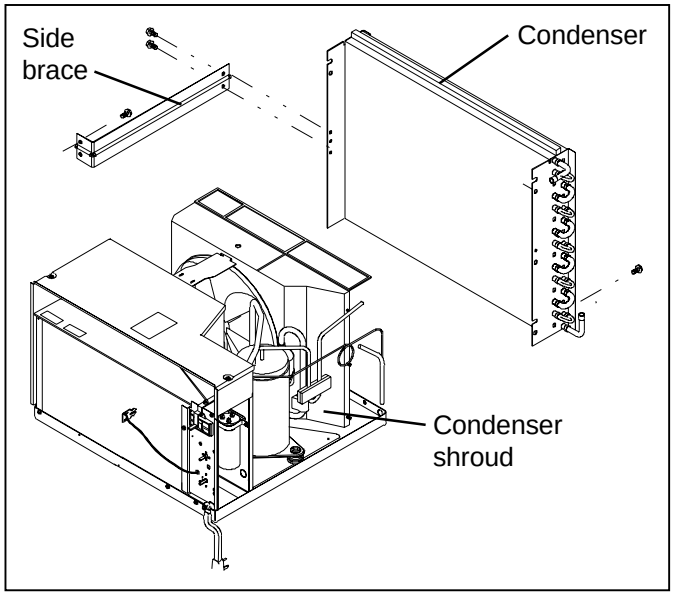
1. Remove outer case (see paragraph *Outer Case Removal*).
2. Remove two ¼-inch screws securing side brace to partition panel and two ¼-inch screws securing side brace to condenser assembly (4 screws total). Remove side brace.
3. Remove two ¼-inch screws securing condenser shroud to condenser. Shroud remains in place.
4. Evacuate sealed system (see paragraph *Evacuation*, in *Troubleshooting Information* section).

NOTE: Before opening any refrigeration system, capture refrigerant in system for safe disposal.

⚠ CAUTION

To reduce risk of personal injury or property damage, take necessary precautions against high temperatures required for brazing.

5. Unbraze compressor discharge connection to condenser.
6. Unbraze condenser connection to capillary tube.
7. Remove two ¼-inch screws securing condenser to base pan.
8. Lift condenser up and away from chassis.



Condenser Removal

Disassembly Procedures

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Condenser Fan Blade, Blower Wheel, and Fan Motor Removal

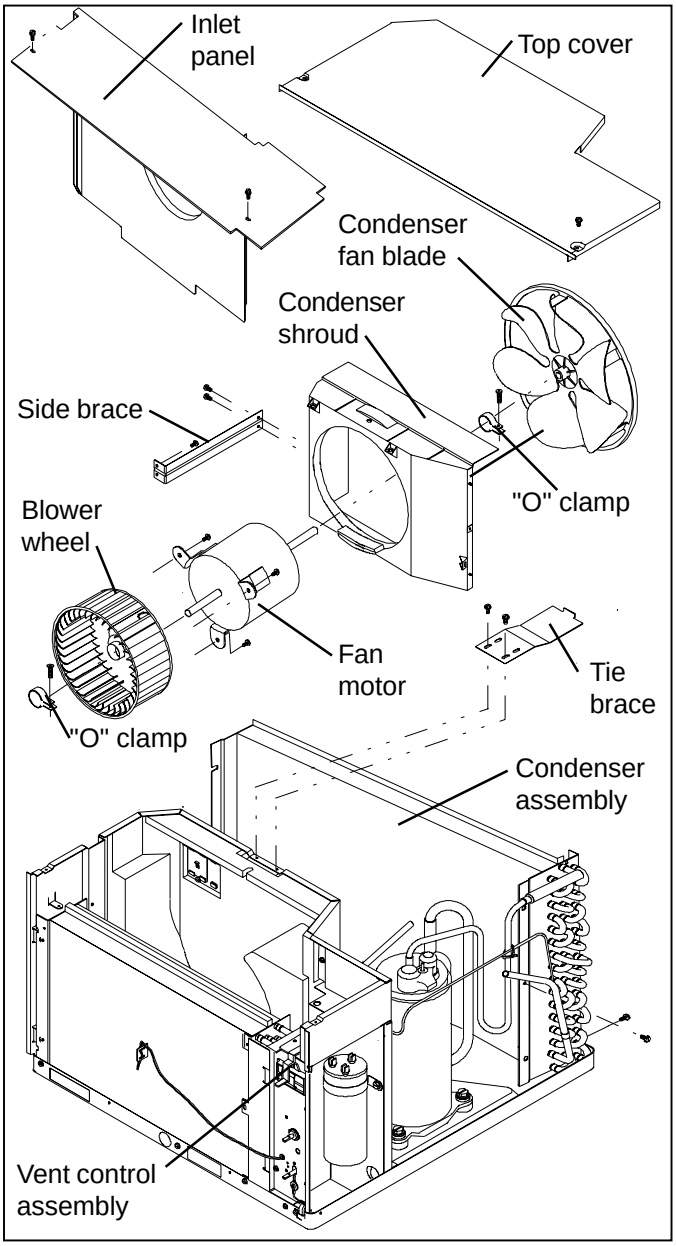
To remove condenser fan blade (includes attached slinger ring), blower wheel and fan motor:

NOTE: To remove condenser fan blade only, perform steps 1 through 6. Perform all steps to remove blower wheel or fan motor.

1. Remove outer case (see paragraph *Outer Case Removal*).
2. Remove vent control assembly (see paragraph *Vent Control Assembly Removal*).
3. Remove two ¼-inch screws securing side brace to partition panel and two ¼-inch screws securing side brace to condenser assembly (4 screws total). Remove side brace.
4. Remove two ¼-inch screws securing tie brace to partition panel, then remove tie brace.
5. Remove two ¼-inch screws securing inlet panel to partition panel (left side screw) and control barrier (right side screw), then remove inlet panel.
6. Remove two ¼-inch screws securing condenser shroud to condenser. Shroud remains in place until fan blade and attached slinger ring are removed.
7. Remove two ¼-inch screws securing condenser to base pan.
8. Loosen 5/32-inch hex screw securing "O" clamp to condenser fan blade/fan motor shaft.
9. Carefully reposition condenser to make room for condenser fan blade removal, then pull condenser fan blade off fan motor shaft, taking care not to damage condenser.
10. Disconnect fan motor leads.

NOTE: Before disconnecting or removing wires, always note position or location of wires. Ensure all disconnected wires are reconnected to proper location.

11. Pull fan motor leads through routing hole on partition panel.
12. Loosen 5/32-inch hex screw securing "O" clamp to blower wheel/fan motor shaft. Slide blower wheel as far as possible towards end of fan moter shaft. Fan motor must be removed to completely remove blower wheel from shaft.
13. Remove three 3/8-inch tap screws securing fan motor to partition panel. Pull fan motor away from partition panel enough to complete blower wheel removal from fan motor shaft.
14. Remove blower wheel from fan motor shaft, then lift motor up and away from chassis.



Condenser Fan Blade, Blower Wheel, and Fan Motor Removal

Disassembly Procedures

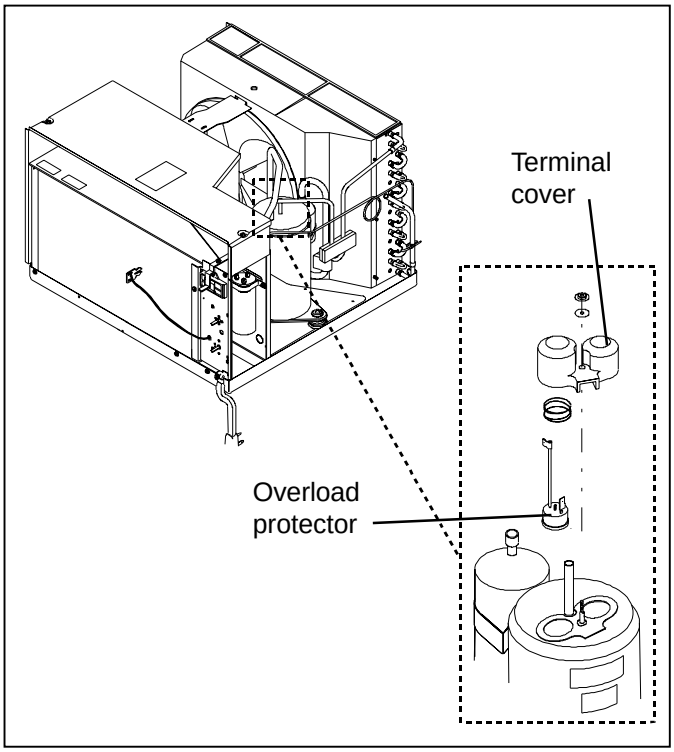
WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Compressor Overload Protector Removal

To remove compressor overload protector:

1. Remove outer case (see paragraph *Outer Case Removal*).
2. Remove nut securing terminal cover to compressor, then lift terminal cover up and away from compressor.
3. Disconnect overload protector leads.
4. Lift overload protector up and away from compressor.



Compressor Overload Protector Removal

Disassembly Procedures

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Compressor Removal

To remove compressor:

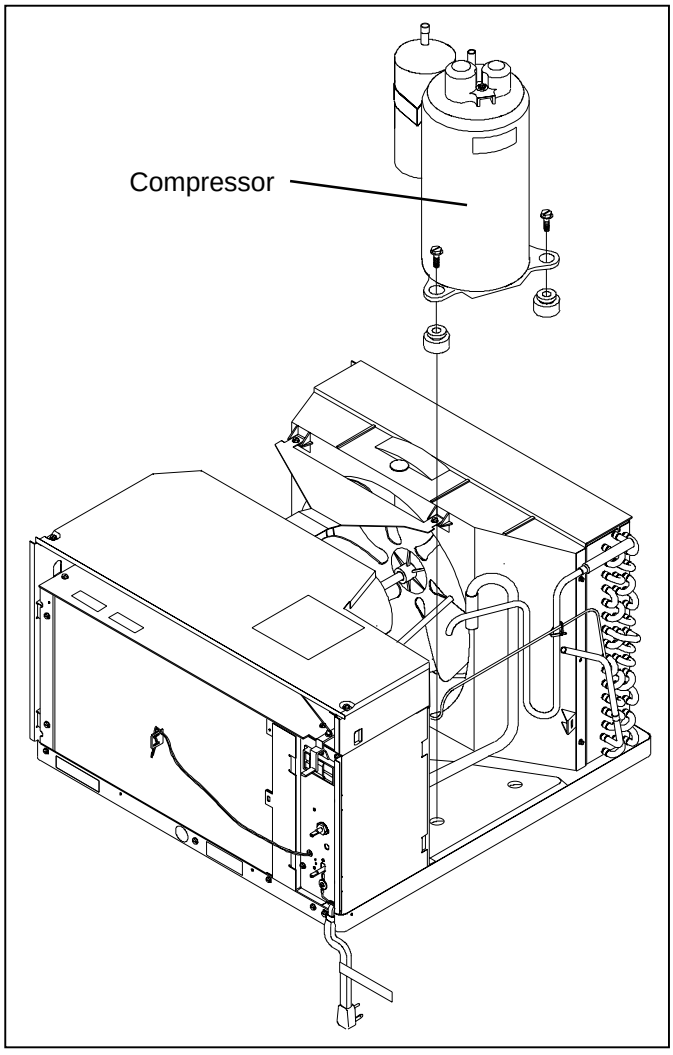
1. Remove outer case (see paragraph *Outer Case Removal*).
2. Remove compressor overload protector (see paragraph *Compressor Overload Protector Removal*).
3. Disconnect compressor leads.
4. Evacuate sealed system (see paragraph *Evacuation*, in *Troubleshooting Information* section).

NOTE: Before opening any refrigeration system, capture refrigerant in system for safe disposal.

⚠ CAUTION

To reduce risk of personal injury or property damage, take necessary precautions against high temperatures required for brazing.

5. Unbraze compressor discharge tube connection to condenser (outside coil).
6. Unbraze compressor suction tube connection to evaporator (indoor coil).
7. Remove three $^{3}/_{8}$-inch screws securing compressor to base pan.
8. Lift compressor up and away from chassis.



Compressor Removal

Disassembly Procedures

⚠ WARNING

To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all ground wires are connected before certifying unit as repaired and/or operational.

Evaporator (Indoor Coil) Removal

To remove evaporator:

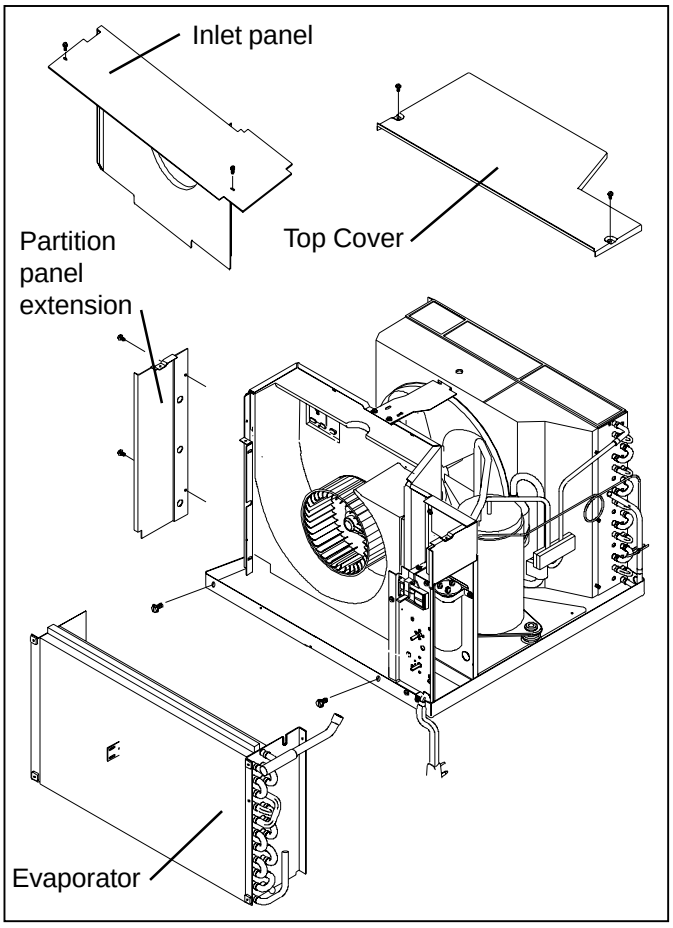
1. Remove outer case (see paragraph *Outer Case Removal*).
2. Remove vent control assembly (see paragraph *Vent Control Assembly Removal*).
3. Remove two ¼-inch screws securing partition panel extension to partition panel, then remove extension.
4. Evacuate sealed system (see paragraph *Evacuation*, in *Troubleshooting Information* section).

NOTE: Before opening any refrigeration system, capture refrigerant in system for safe disposal.

⚠ CAUTION

To reduce risk of personal injury or property damage, take necessary precautions against high temperatures required for brazing.

5. Unbraze evaporator connection to compressor.
6. Unbraze evaporator connection to capillary tube.
7. Remove two ¼-inch screws securing bottom front of evaporator to base pan.
8. Lift evaporator up and away from chassis.



Evaporator Removal