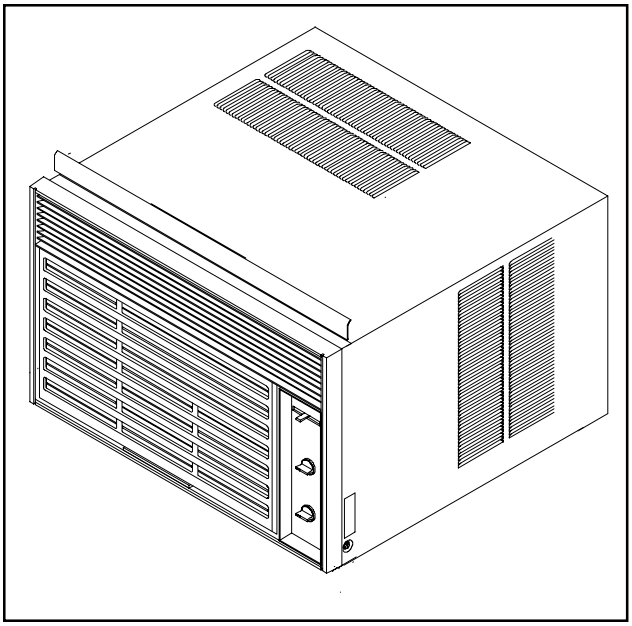
Base manual covers general information on Room Air Conditioners. Refer to individual technical sheets for information on specific models

Service

International Compact Room Air Conditioners

Service manual for
Amanaò



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
Raytheon Appliances

RS5100002
Revision 0
July 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, you assume all 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 contact:

Consumer Affairs Department
Amana Appliances
Amana, Iowa, USA 52204

If outside the United States contact:

Amana Appliances
ATTN: International Division
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, 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 electrical shock, personal injury, or death, disconnect electrical power to unit before attempting to service the unit.

WARNING

Electrical Earthing Notice: Devices covered in this manual are equipped with an earthing plug for protection against possible shock hazards. If a non-earthing wall receptacle is encountered, contact a qualified electrician and have the receptacle replaced with a properly earthed wall receptacle that complies with all applicable building codes.

DO NOT, under any circumstances, alter the earthing plug. Air conditioner must be earthed at all times. Do not remove warning tag from power cord.

WARNING

The standard accepted color coding for earthing wires is **green** or **green with a yellow stripe**. These earthing wires are **NOT** to be used as current carrying conductors. Electrical components such as the compressor and fan motor are earthed through an individual wire attached to the electrical component and to another part of the air conditioner. Earthing 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 earthing wires before completing service.

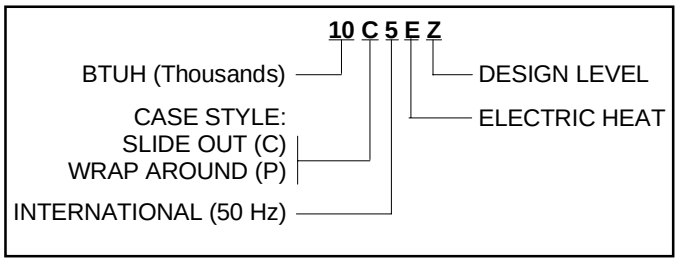
WARNING

To avoid death or illness from excessive heat, do not use this room air conditioner as an unattended cooling or life support device for persons or animals unable to react to its failure. Failure of a room air conditioner may result in extreme heat in the area it is intended to cool. Extreme heat can cause 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 how to read 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.

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 describe how to properly install an Amana Room Air Conditioner. Before attempting to install the 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 electrical shock, personal injury, or death:

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

Observe all local codes and ordinances.

Earthing Instructions

⚠ WARNING

To avoid risk of electrical shock or property damage due to overheating, do not under any circumstances alter earthing plug. Do not bend or trim power prongs on plug to make them fit a receptacle for which they are not intended.

For your personal safety, air conditioner must be earthed. This air conditioner includes a power supply cord with an earthing plug. To minimize possible electrical shock hazard, the power cord must only be plugged into a matching earthing wall receptacle that complies with all applicable codes and ordinances. If a matching earthing-type wall receptacle is not available, it is the responsibility of the consumer to have a properly earthed wall receptacle installed by a qualified electrician.

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

Do not use an extension cord. If power cord supplied with air conditioner is too short, have a qualified electrician install an appropriate receptacle closer to unit.

Receptacle Wiring

Receptacle wiring should be 14 gauge, minimum. Use copper wire only. It is the responsibility of the consumer to provide proper and adequate receptacle wiring, installed by a qualified electrician.

Electrical Connection

Electrical earth is required on this appliance.

Electrical Requirements

A separate circuit, serving only this appliance, MUST be provided. Devices covered in this manual require a 50 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:

- Have someone help install the unit. The air conditioner weighs between 40 and 48 kg (depending upon model). When lifting the unit up or setting the unit down, use proper lifting techniques to prevent injury or strain.
- Inspect location where unit is to be installed. Be sure it will support the weight of the unit over an extended period of time.
- This appliance must be installed according to all applicable codes and ordinances.
- Handle air conditioner with care. Wear protective gloves whenever lifting or carrying the unit. AVOID the 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:

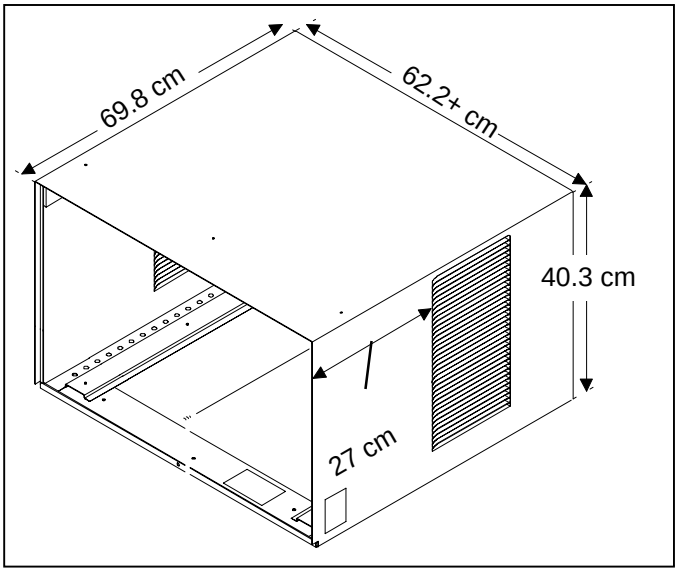
- Flat head screwdriver
- Phillips head screwdriver
- Carpenter's level
- Tape measure
- Electric or hand drill
- Circular saw with wood, masonry, and/or concrete blades.
- 9/64 inch drill bit

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.

Typical Cabinet Dimensions

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



Typical Cabinet Dimensions

Installation Instructions

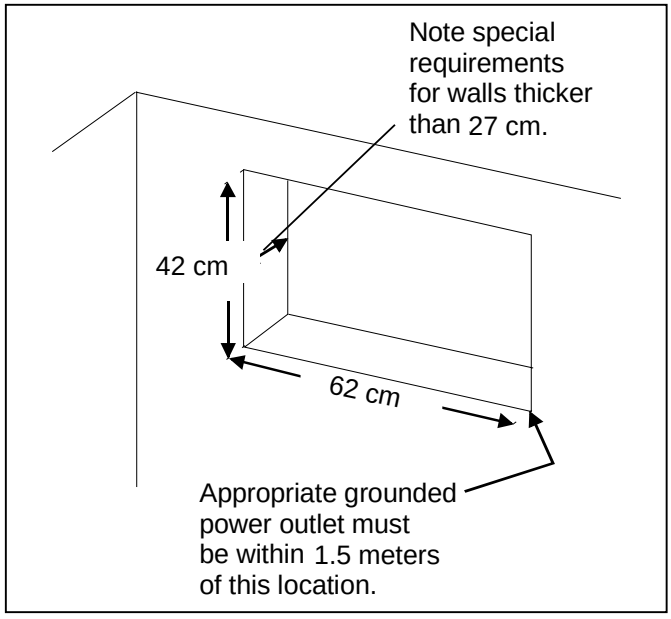
General Instructions
A finished opening in wall is required. Dimensions of opening are 62 cm wide X 42 cm high. The lower right inside corner of opening must be within 1.5 meters of an appropriate electrical outlet.

When installed, back of case should be 1 cm lower than front of case for proper condensate drainage. Inside edge of case must extend 1.3 cm 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 cased. 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 1.3 cm beyond molding.

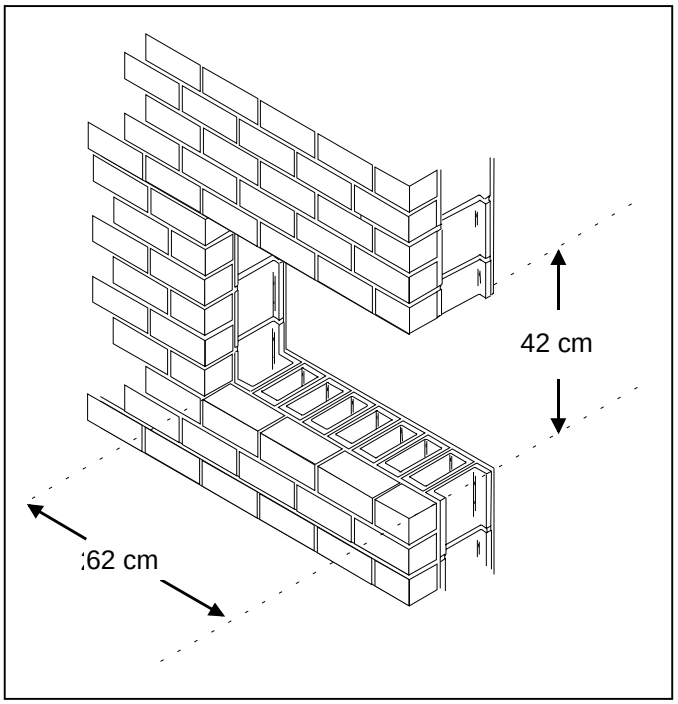
When wall thickness exceeds 27 cm, provisions must be made to allow air to enter the condenser side louvers. See paragraph **Installation in Walls Exceeding 27 cm**.



Typical Wall Opening

Brick Veneer or Frame Wall Construction

A framed, finished opening 62 cm wide X 42 cm high high should be cut out or built into wall. Frame opening with 5 cm X 10 cm lumber to permit attachment of outer case.



Brick Veneer Wall Installation

Masonry Construction

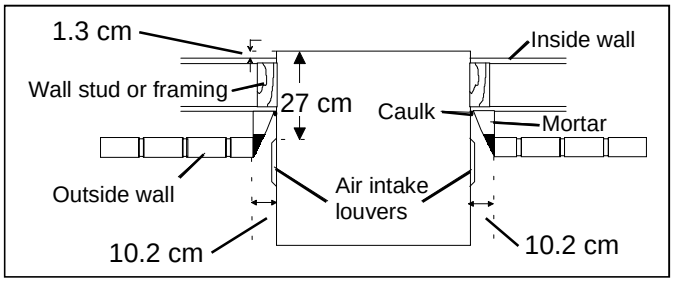
A finished opening 62 cm wide X 42 cm high should be cut out or built into masonry wall. Seal outer case in place with mortar, or secure to wall with concrete nails driven through sides of case.

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

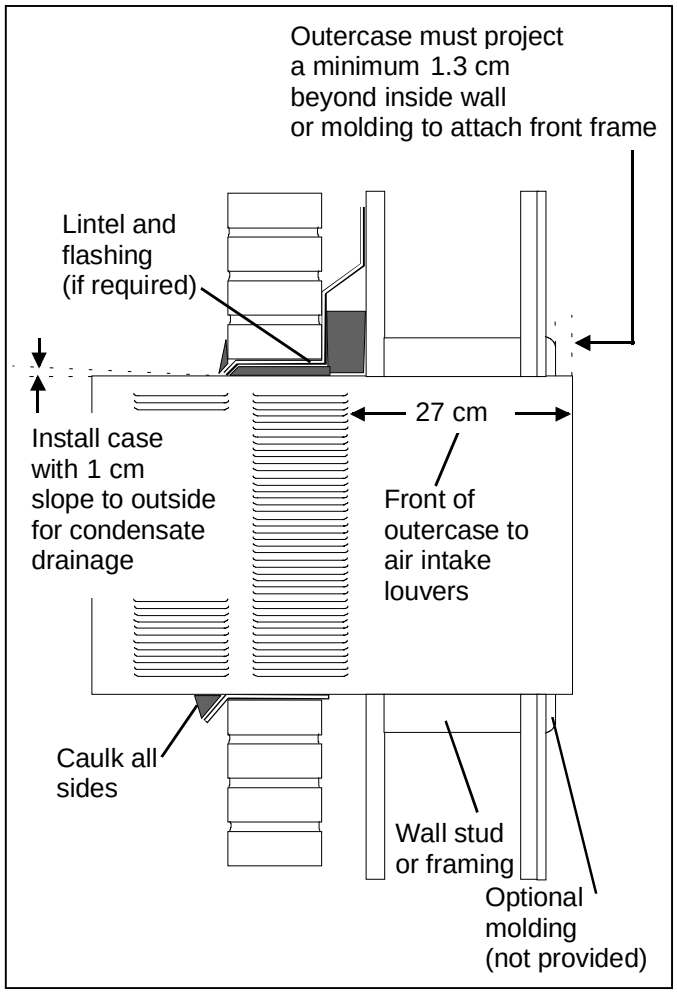
Installation Instructions

Installation in Walls Exceeding 27 cm

All air conditioner models have side louvers on outer case. When air conditioner is installed in walls over 27 cm thick, provisions must be made in the 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 27 cm (Top View)

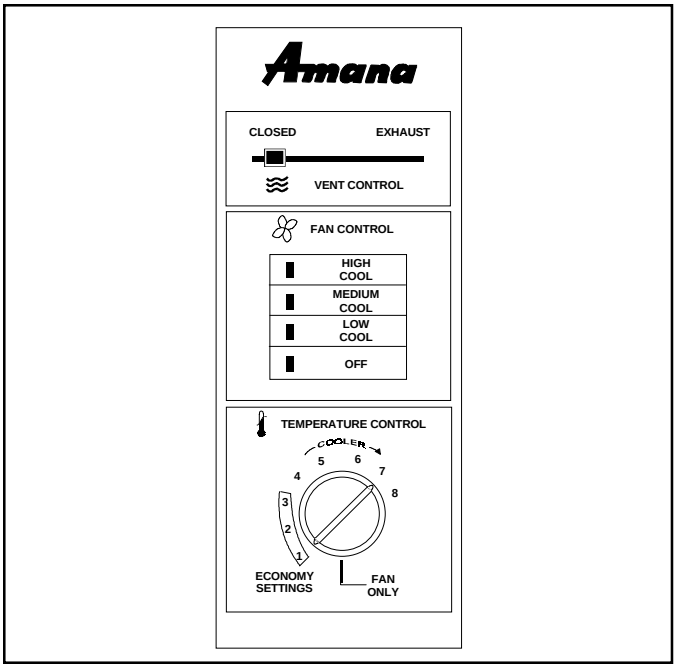


Walls Exceeding 27 cm (Side View)

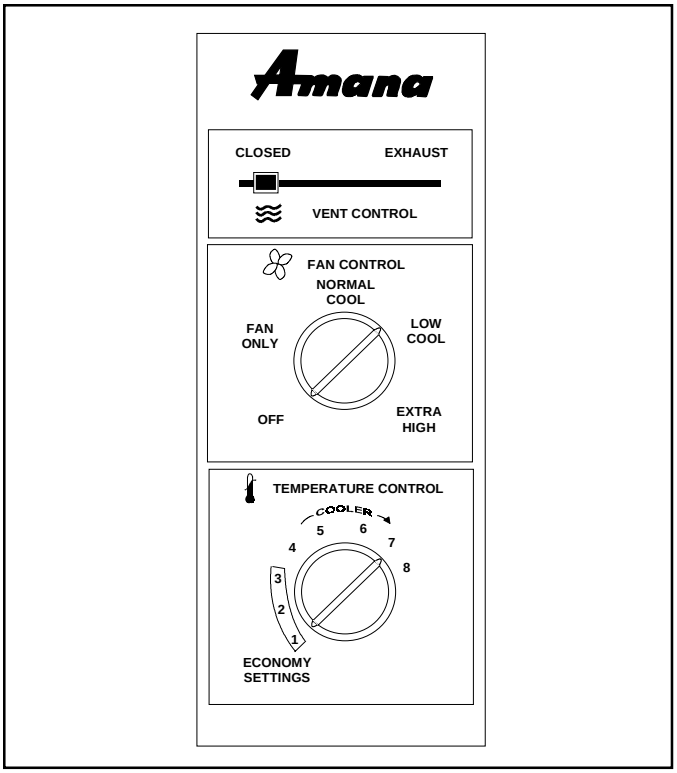
Operating Instructions

Air Conditioner Controls

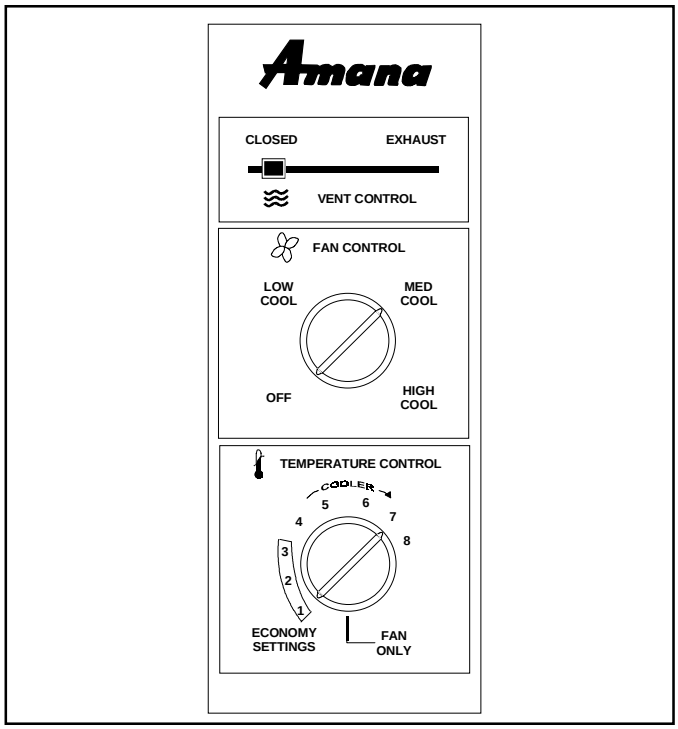
There are three types of air conditioner control panels available: a touch control, a rotary control, and an alternate rotary control.



Touch Control



Rotary Control



Alternate Rotary Control

Each control panel (regardless of its type) has the following three controls:

VENT CONTROL

FAN CONTROL

TEMPERATURE 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, *TEMPERATURE CONTROL* should be in *FAN ONLY* position when using exhaust feature.

Operating Instructions

Fan Control
The *FAN CONTROL* controls operation of indoor fan. This fan circulates air in area being cooled.

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.

The *FAN CONTROL* settings include:

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.

MEDIUM COOL, NORMAL COOL, or MED COOL (touch control, rotary control, or alternate rotary control, respectively)— 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.

HIGH COOL or EXTRA HIGH (touch control/alternate rotary control, or rotary control)—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.

FAN ONLY (rotary control 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.

⚠ CAUTION

To avoid tripping circuit breakers or blowing fuses, wait two minutes after turning air conditioner off, before turning unit on again.

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).

Turning control fully counterclockwise to *FAN ONLY* position (touch control and alternate rotary control) 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.

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 the *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 an earthing plug. If a non-earthing wall receptacle is encountered, contact a qualified electrician and have the receptacle replaced with a properly earthed wall receptacle that complies with all applicable building codes.

DO NOT, under any circumstances, alter the earthing plug. Air conditioner must be earthed 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. Turn *FAN CONTROL* to highest cooling position and *TEMPERATURE CONTROL* to coldest position (fully clockwise).
5. Make sure *VENT CONTROL* is closed. For maximum efficiency and cooling, vent control should be closed whenever air conditioner is cooling.
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 electrical shock, personal injury, or death, disconnect electrical power to unit before attempting to service the unit.

Horizontal Insert

The horizontal insert (front grille) is removable, to access air filter. Horizontal insert is removed by grasping bottom center of insert, then lifting and pulling out. Clean insert and cabinet with a mild soap or detergent. 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 will cause polycarbon to warp, turn brittle, splinter or crack.

Air Filter

Each unit has a permanent, removable air filter. Air filter should be inspected regularly, and cleaned if necessary. It can be cleaned with a vacuum cleaner or washed in a mild detergent. Filter should be thoroughly dried before it is replaced.

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.

Use of an algicide tablet (placed in the base pan) is suggested in areas where algae formation is common.

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 earth 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 seal 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 malfunctions. Each malfunction 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 earth 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.
	Fan control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty.
	Temperature control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace 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.
	Faulty fan motor faulty.	Check fan motor windings for shorts/opens. Replace if faulty.
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.	Cycles on motor protector.	Replace motor.
	Fan control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty.
	Wire(s) disconnected or loose.	Ensure all connections are tight and secure. Correct 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 earth wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
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/low 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.	Supply voltage out of specification.	Check input voltage for proper levels. Take appropriate action if voltage levels out of specification.
	Wire(s) disconnected or loose.	Ensure all connections are tight and secure. Correct as required.
	Temperature control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty.
	Compressor motor capacitor faulty.	Check capacitor for open/ short. Replace if faulty. **NOTE**: Discharge capacitor before testing.
	Compressor faulty.	Check compressor motor windings for open shorts. Perform compressor direct wiring test. **NOTE**: Discharge capacitor before testing. Replace compressor if faulty.
	Overload protector open.	Check protector for continuity. If open, replace. **NOTE**: Ensure compressor/ overload are below trip temperature before testing.

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 earth wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Compressor cycles on and off.	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 coil for dirt. Clean as required. Check condenser fins for damage. Straighten fins if bent, attempt other repairs as necessary. Replace condenser if repairs cannot be made.
	Compressor motor capacitor faulty.	Check capacitor for open/ short. Replace if faulty. **NOTE**: Discharge capacitor before testing.
	Wire(s) disconnected or loose.	Ensure all connections are tight and secure. Correct as required.
	Sealed refrigerant system fault.	Test sealed system for proper charge, leaks, and restrictions. Repair as required.
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 coil for dirt. Clean as required. Check condenser fins for damage. Straighten fins if bent, attempt other repairs as necessary. Replace condenser if repairs cannot be made.

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 earth wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Insufficient cooling.	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.
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.
	Worn fan motor bearings.	Check bearings for wear/low lubricant. Replace motor if either condition is 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.
	Copper tubing loose.	Inspect copper tubing for looseness. Secure tubing as required.
	Compressor internal noise.	Inspect compressor for proper operation. Replace as required.
	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.

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 earth wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
Excessive condensate in base.	Unit operating under excessive humidity conditions.	Remove condensate drain plug in base. **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 in seal system.	Evacuate/recharge sealed system.
	Compressor faulty.	Check compressor motor windings for open shorts. Check compressor seals. Perform compressor direct wiring test. Replace compressor if faulty.
	Temperature control faulty.	Ensure all control connections are tight and secure. Check control for proper operation. Replace if faulty.
Wattage slowly decreases below minimum specification.	Undercharged, restricted strainer or plugged capillary tube.	Test sealed system for proper charge. Check system for leaks/restrictions. 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.

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 earth wires are connected before certifying unit as repaired and/or operational.

Symptom	Possible Causes	Corrective Action
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 condenser fins for damage. Straighten fins if bent, attempt other repairs as necessary. Replace condenser if repairs cannot be made.
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 condenser fins for damage. Straighten fins if bent, attempt other repairs as necessary. Replace condenser if repairs cannot be made.

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 earth 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 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 (on units so equipped) is not repairable. If any component in the control is faulty, entire control must be replaced.

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

Testing Capacitors

All compressors 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.

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 earth 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.

Troubleshooting Information

⚠ WARNING

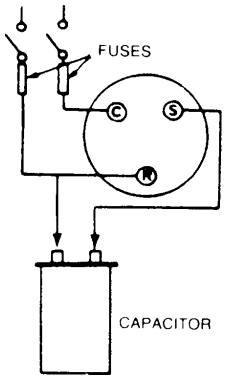
To avoid risk of electrical shock, personal injury, or death, disconnect electrical power source to unit and discharge capacitor through a 10,000 ohm resistor before attempting to service, unless test procedures require power to be connected. Ensure all earth wires are connected before certifying unit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

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



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.
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 the 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.).
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 152°C. Bottom fuse link opens at 93°C. If either or both are open, replace.
5. Check disc type thermostat for continuity (opens at 52°C ±3°C, closes at 38°C ±4°C automatic reset). If open replace.

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 earth 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, capture refrigerant in system for safe disposal.

NOTE: Do not use captured or recycled refrigerant in Amana units. Captured or recycled refrigerant voids any Amana and/or compressor manufacture's warranty.

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

If a compressor is suspected of burning out:

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 (3.2 mm on portables, 6.4 mm on high efficiency and 12.7 mm on compacts).

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

5—8,000 Btu units	6.4 cm
10—12,000 BTU units	38.2 cm
14—21,000 BTU units	25.4 cm

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 and 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 seal system, evacuate system (see paragraph **Evacuation**).

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 earth 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 CFC22 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 can not 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 760°C. **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 650°C.
- **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).

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 earth 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 through out (no sudden drops at any point along tubing):
   - If temperature of condenser tubing is consistent through out, 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 seal 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 any Amana and/or compressor manufacture's warranty.

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.

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 earth wires are connected before certifying unit as repaired and/or operational.

Evacuation

⚠ WARNING

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, capture refrigerant in system 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

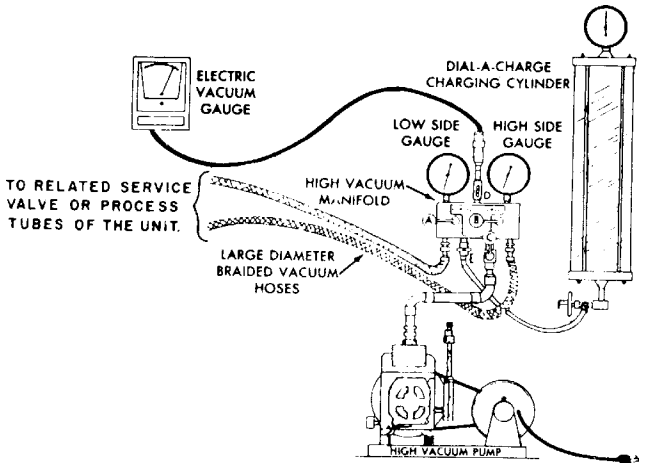
To avoid damage to compressor motor, never use air conditioner compressor as a vacuum pump or run compressor when system is under high vacuum.

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.

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.
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 (3) 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.

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 earth wires are connected before certifying unit as repaired and/or operational.

Charging

NOTE: Do not use captured or recycled refrigerant in Amana units. Captured or recycled refrigerant voids any Amana and/or compressor manufacture's warranty.

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 should 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 earth 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. Both 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 prior to service (retest unit after servicing).

NOTE: Performance tests should not be run on installed units when outside temperature is more than 14°C (20°F) below room temperature at testing location.

Cooling Performance Test

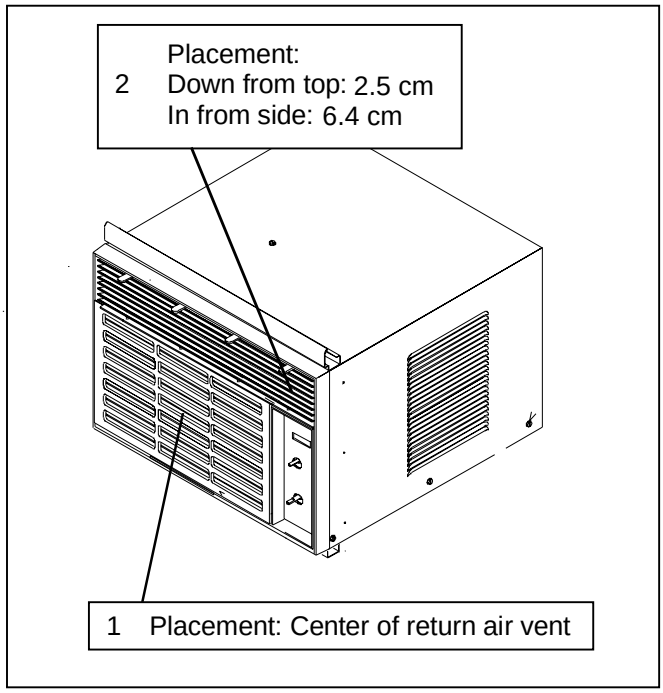
A common reason for inefficient cooling is reduced air movement caused by a dirty condenser and/or air filter. Inspect both before performing following test, and clean if necessary.

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

Using Cooling Performance Test Thermometers

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 a minimum of 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 1.6 m in front of unit, approximately 1.2 m 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 earth wires are connected before certifying unit as repaired and/or operational.

Performing Cooling Test

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 a minimum of 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 discharged 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 degree of temperature recorded at air conditioner return 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.

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.)

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 earth 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.

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.)

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 indoor fan motor.
Cooling wattage below minimum requirement, cooling range exceeds maximum requirement.	Restricted air flow (dirty filter, dirty evaporator 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 earth 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. Reassembly is opposite of disassembly unless noted otherwise.

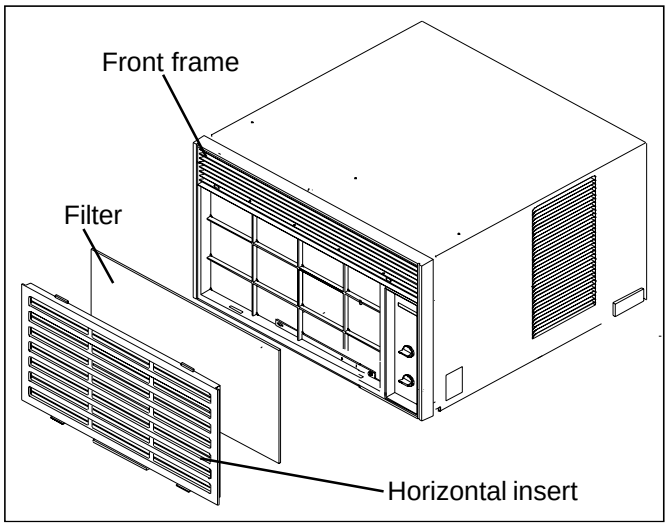
WARNING

The standard accepted color coding for earthing wires is **green** or **green with a yellow stripe**. These earthing wires are **NOT** to be used as current carrying conductors. Electrical components such as the compressor and fan motor are earthed through an individual wire attached to the electrical component and to another part of the air conditioner. Earthing 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 earthing 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

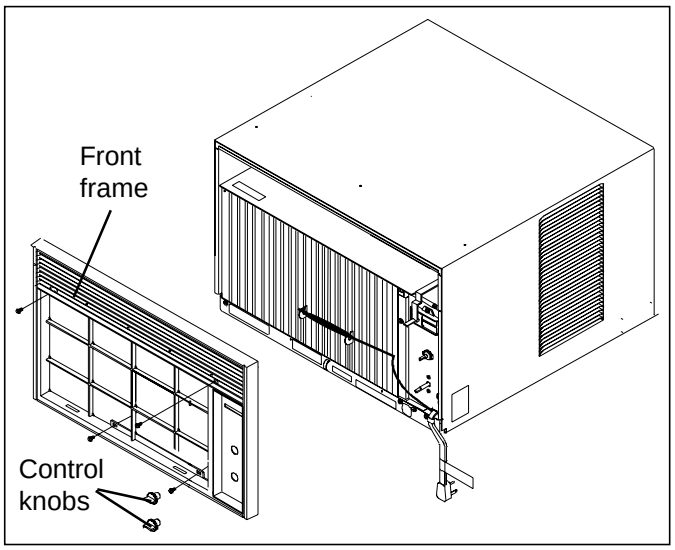
⚠ WARNING

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 earth 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 control knobs by pulling straight out on knobs.
3. Remove four 1/4 inch screws (2 on top, 2 on bottom) securing front frame to air conditioner chassis.
4. Pull front frame out and away from air conditioner.



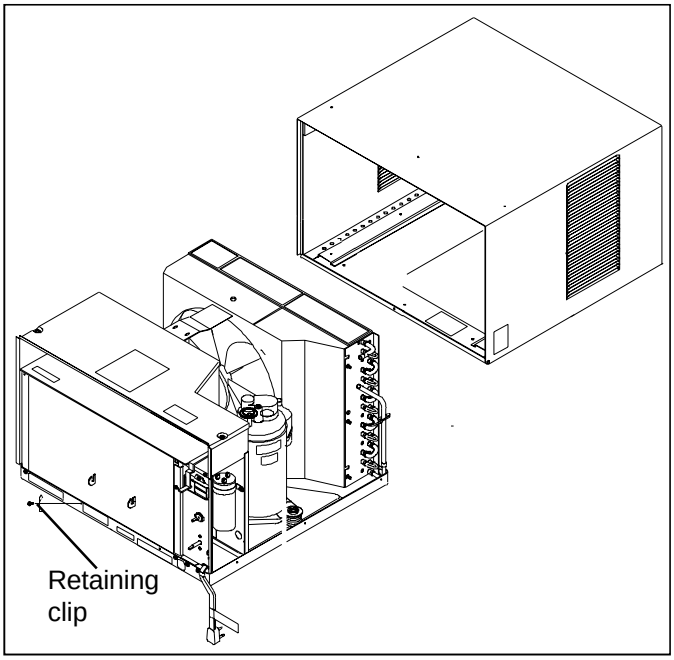
Front Frame Removal

Outer case Removal

To remove outer case:

1. Remove front frame (see paragraph **Front Frame Removal**).
2. Remove 1/4 inch screw securing retaining clip located at bottom center on front of unit.
3 Slide (pull) air conditioner chassis out of outer case assembly.

NOTE: New air conditioners are shipped with packing material (rigid foam/plywood blocks) around compressor, to prevent compressor 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 earth wires are connected before certifying unit as repaired and/or operational.

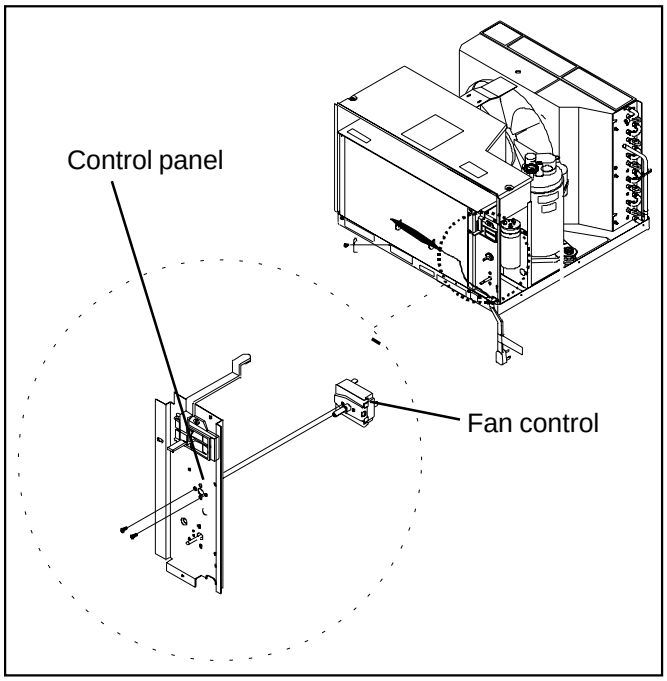
Fan Control Removal

To remove fan control:

1. Remove outer case (see paragraph **Outer case Removal**).
2. Disconnect wires from rear of switch.

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

3. Remove two Phillips head screws securing fan control to control panel.
4. Pull fan control out and away from control panel.



Fan Control Removal

Temperature Control Removal

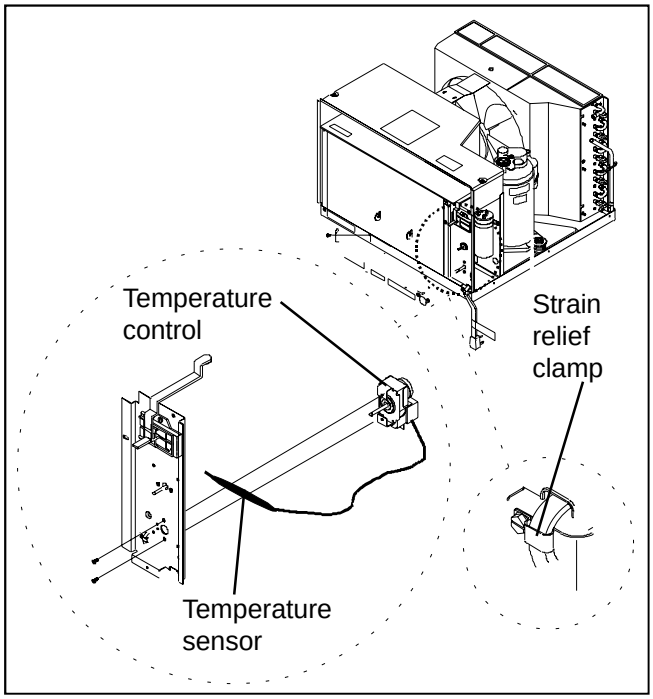
To remove temperature control:

1. Remove outer case (see paragraph **Outer case Removal**).
2. Disconnect wires from rear of switch.

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

3. Remove strain relief clamp securing power cord to chassis.
4 Remove temperature sensing probe from two clips securing probe in front of indoor coil.
5. Remove two Phillips head screws securing temperature control to control panel.
6. Pull temperature control and attached temperature sensing probe out and away from control panel.

NOTE: Use care when removing temperature control, especially attached temperature sensor. Do not crimp or break tubing between sensor and control.



Temperature Control Removal

Disassembly Procedures

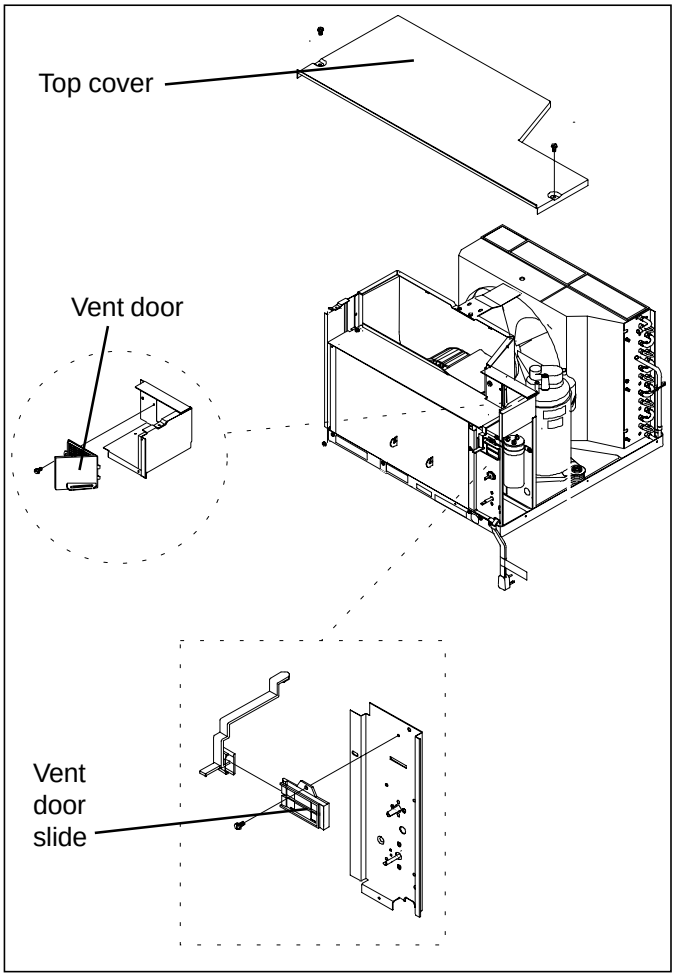
⚠ WARNING

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 earth wires are connected before certifying unit as repaired and/or operational.

Vent Control Assembly Removal

To remove vent control assembly:

1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove top cover.
3. Remove 1/4 inch screw securing vent door to barrier control.
4. Remove 1/4 inch screw securing vent door slide to control panel.
5. Lift vent control assembly out and away from chassis.



Vent Control Removal

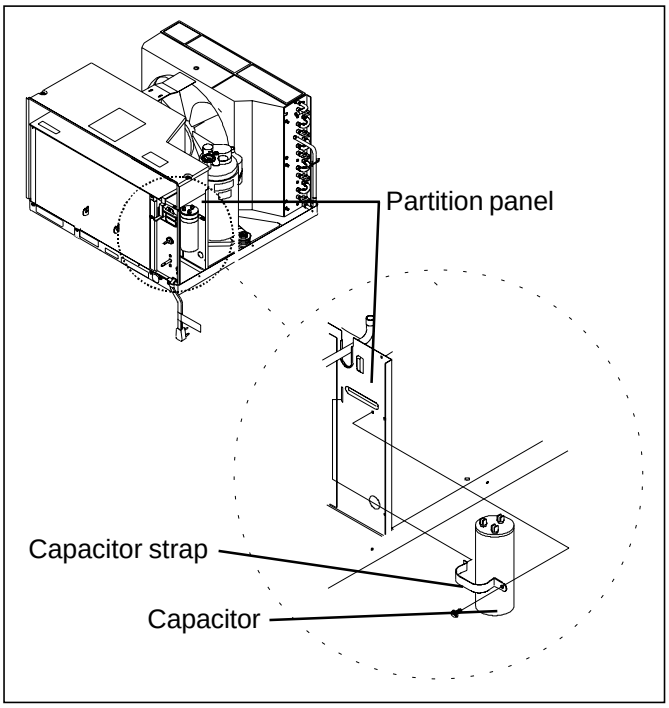
Capacitor Removal

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 1/4 inch screw securing capacitor mounting strap to partition panel.
5. Pull capacitor strap away from capacitor, then pull capacitor out and away from chassis.



Capacitor 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 earth wires are connected before certifying unit as repaired and/or operational.

Blower Wheel Removal

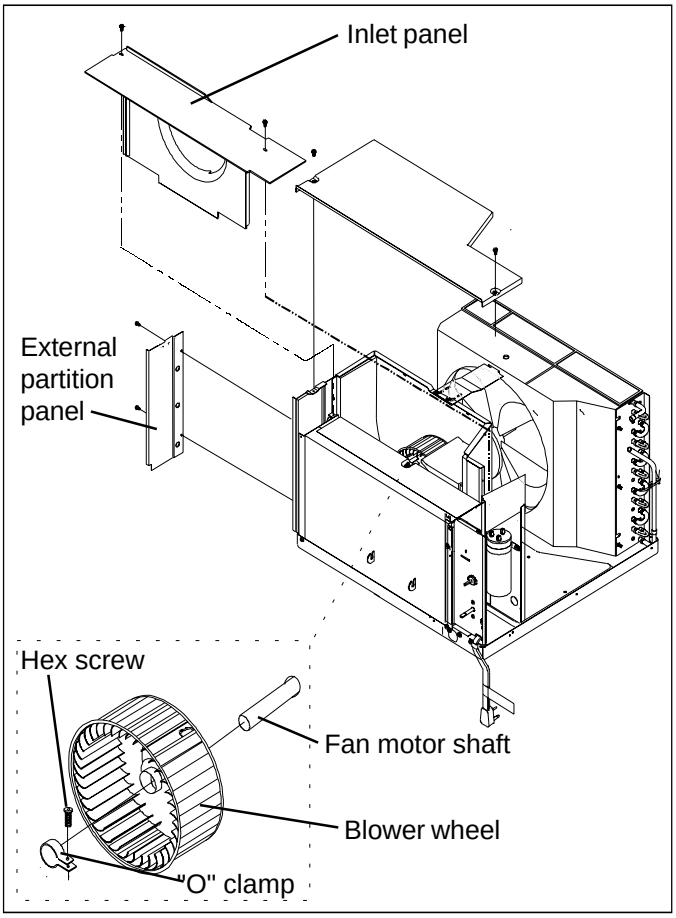
To remove blower wheel:

1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove vent control assembly (see paragraph **Vent Control Assembly Removal**).
3. Remove two 1/4 inch screws securing external partition panel to partition panel, then remove external partition panel.
4. Remove two 1/4 inch screws securing inlet panel to heater shield, then remove inlet panel.
5. Remover electric heater assembly (on units so equipped) (see paragraph **Electric Heater Assembly Removal**).

NOTE: Blower wheel is secured to fan motor shaft by an "O" clamp. "O" clamp is tightened in place by a 5/32 inch hex head screw. A cutout in one fin of blower wheel allows access to hex head screw using a long (6 inch) 5/32 inch hex driver.

6. Loosen 5/32 inch hex screw securing "O" clamp to blower wheel/fan motor shaft.
7. Pull blower wheel off fan motor shaft.

NOTE: When installing blower wheel, ensure "O" clamp and hex head screw are aligned so screw can be tightened from access hole in blower wheel.



Blower Wheel 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 earth wires are connected before certifying unit as repaired and/or operational.

Condenser Fan and Fan Motor Removal

To remove condenser fan (includes attached slinger ring) and fan motor:

NOTE: To remove condenser fan only, perform steps 1 through 7. Perform all steps to remove fan motor.

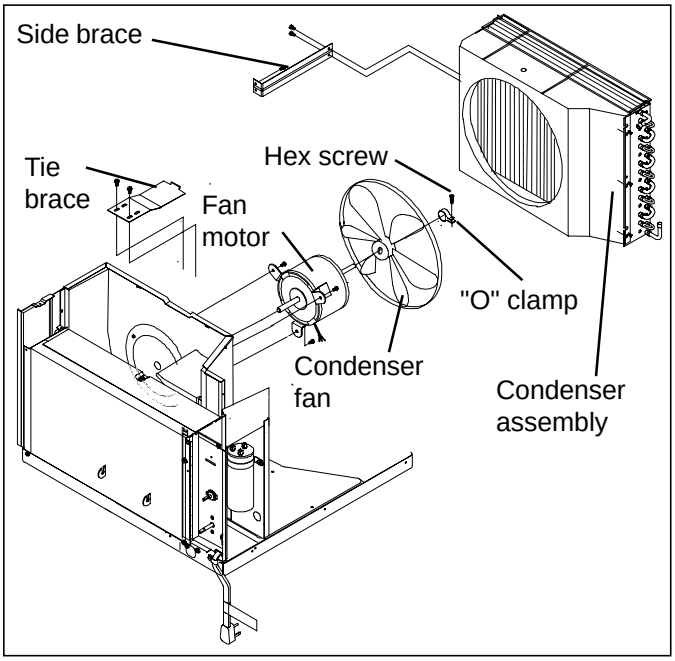
1. Remove blower wheel (see paragraph **Blower Wheel Removal**).
2. Remove two 1/4 inch screws securing tie brace to partition panel, then remove brace by lifting up and back.
3. Remove two 1/4 inch screws securing side brace to partition panel and two 1/4 inch screws securing side brace to condenser assembly (4 screws total). Remove side brace.
4. Evacuate sealed system (see paragraph **Evacuation**, in **Troubleshooting Information** section.

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

5. Remove condenser assembly (see paragraph **Condenser Removal**).

NOTE: Condenser fan is secured to fan motor shaft by an "O" clamp. "O" clamp is tightened in place by a 5/32 inch hex head screw.

6. Loosen 5/32 inch hex screw securing "O" clamp to condenser fan/fan motor shaft.
7. Pull condenser fan off fan motor shaft.
8. Disconnect fan motor leads:
   - Brown and white leads attach to capacitor.
   - Red, blue, and black leads attach to fan control.
9. Pull fan motor leads through routing hole on partition panel.
10. Remove three 3/8 inch tap screws securing fan motor to partition panel. Lift motor up and away from chassis.



Condenser Fan 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 earth wires are connected before certifying unit as repaired and/or operational.

Condenser Removal

To remove the condenser:

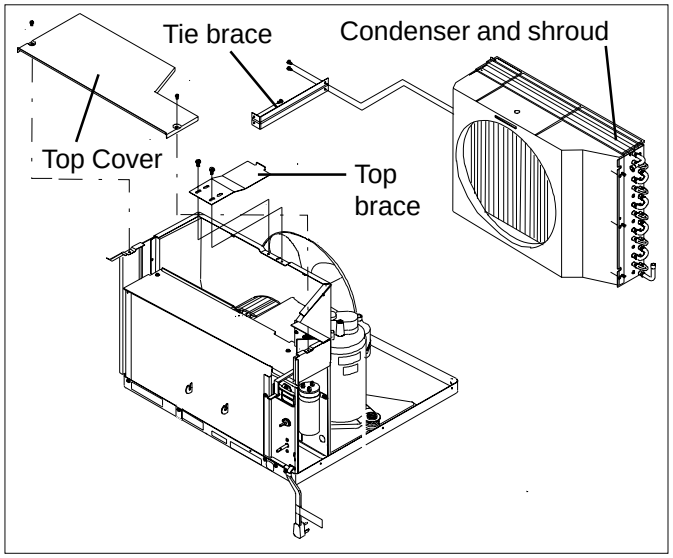
1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove two 1/4 inch screw securing top cover assembly to partition panel, then remove top cover assembly.
3. Remove two 1/4 inch screws securing tie brace to partition panel, then remove brace by lifting up and back.
4. Remove two 1/4 inch screws securing side brace to partition panel and two 1/4 inch screws securing side brace to condenser assembly (4 screws total). Remove side brace.
5. 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.

6. Unbraze condenser suction connection to compressor.
7. Unbraze condenser connection to capillary tube.
8. Remove two 1/4 inch screws securing condenser to base pan.
9. Remove condenser and condenser shroud from chassis.
10. Remove two 1/4 inch screws securing condenser shroud to condenser, then remove shroud from condenser.



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 earth wires are connected before certifying unit as repaired and/or operational.

Compressor Removal

To remove compressor:

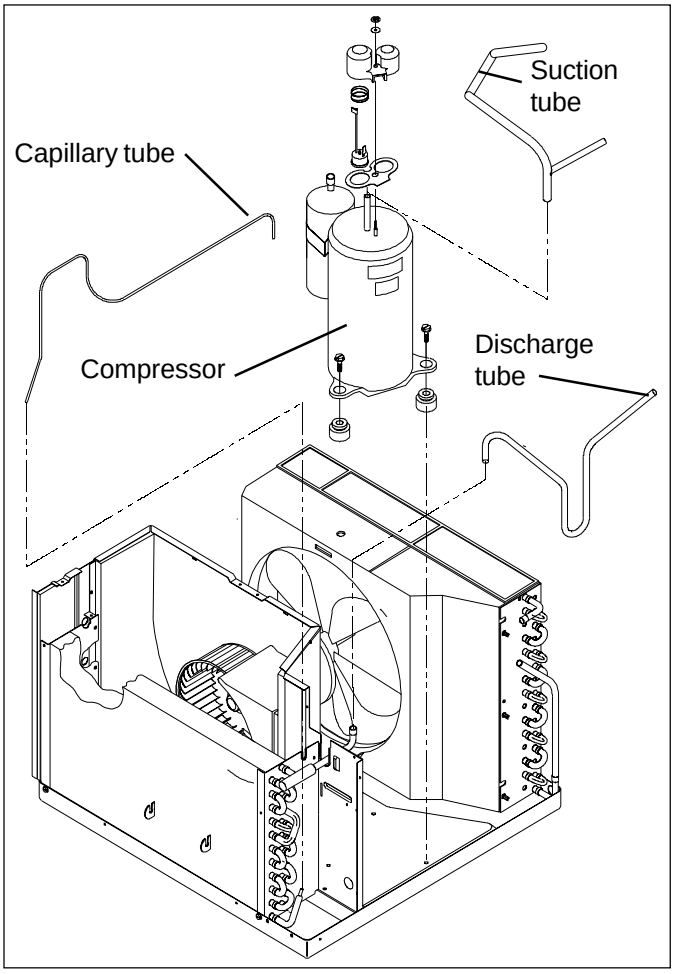
1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove compressor overload protector (see paragraph **Compressor Overload Protector Removal**).
3. Disconnect compressor leads.
4. Pull compressor leads through routing hole on partition panel.
5. Evacuate sealed system (see paragraph **Evacuation**, 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.

6. Unbraze compressor suction tube connection to condenser (outside coil).
7. Unbraze compressor discharge tube connection to evaporator (indoor coil).
8. Remove three 3/8 inch screws securing compressor to base pan.
9. 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 earth wires are connected before certifying unit as repaired and/or operational.

Evaporator (Indoor Coil) Removal

To remove the evaporator:

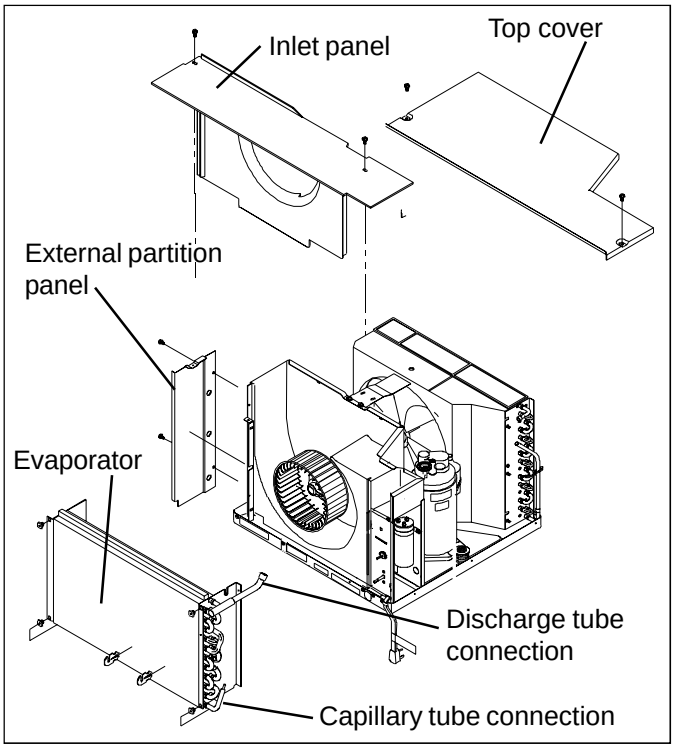
1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove vent control assembly (see paragraph **Vent Control Assembly Removal**).
3. Evacuate sealed system (see paragraph **Evacuation**, in **Troubleshooting Information** section).

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.

4. Unbraze evaporator discharge tube connection to compressor.
5. Unbraze evaporator connection to capillary tube.
6. Remove two 1/4 inch screws securing external partition panel to partition panel, then remove external partition panel.
7. Remove two 1/4 inch screws securing inlet panel to heater shield, then remove inlet panel.
8. Remove temperature sensing probe from two clips securing probe in front of indoor coil.
9. Remove two 1/4 screws securing evaporator to left side of partition panel.
10. Remove two 1/4 inch screws securing top front of evaporator.
11. Remove two 1/4 screws securing bottom front of evaporator to base pan.
12. Remove 1/4 inch screw securing evaporator to control panel.



Evaporator Removal

Disassembly Procedures

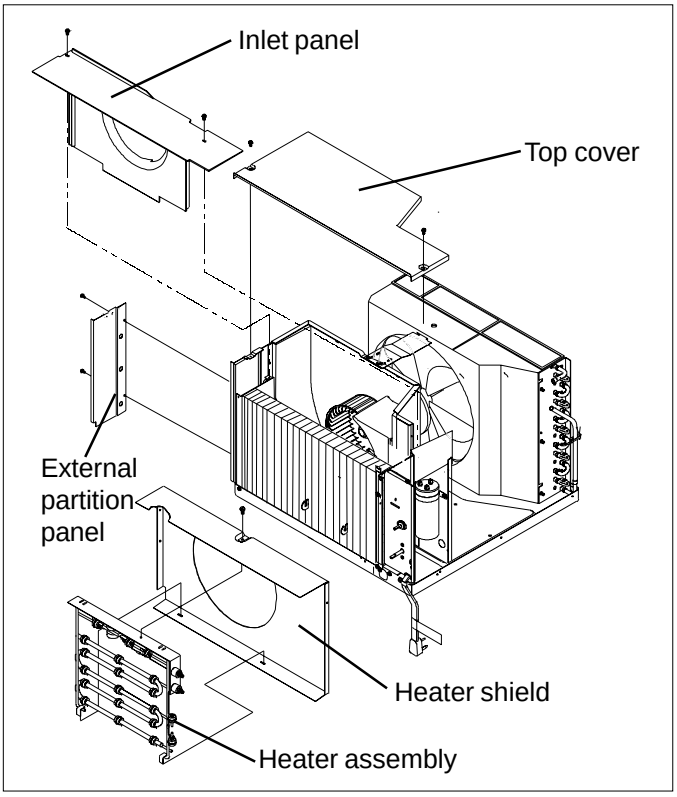
WARNING

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 earth wires are connected before certifying unit as repaired and/or operational.

Electric Heater Assembly Removal

To remove the electric heater assembly:

1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove vent control assembly (see paragraph **Vent Control Assembly Removal**).
3. Remove two 1/4 inch screws securing external partition panel to partition panel, then remove external partition panel.
4. Remove two 1/4 inch screws securing inlet panel to heater shield, then remove inlet panel.
5. Disconnect electric heater leads:
   - One lead attaches to capacitor.
   - Second lead attaches to fan control.
6. Remove two 1/4 inch screws securing heater assembly to evaporator.
7. Lift electric heater assembly up and out of chassis.
8. Remove 1/4 inch screw securing heater assembly to heater shield, then separate heater from shield.

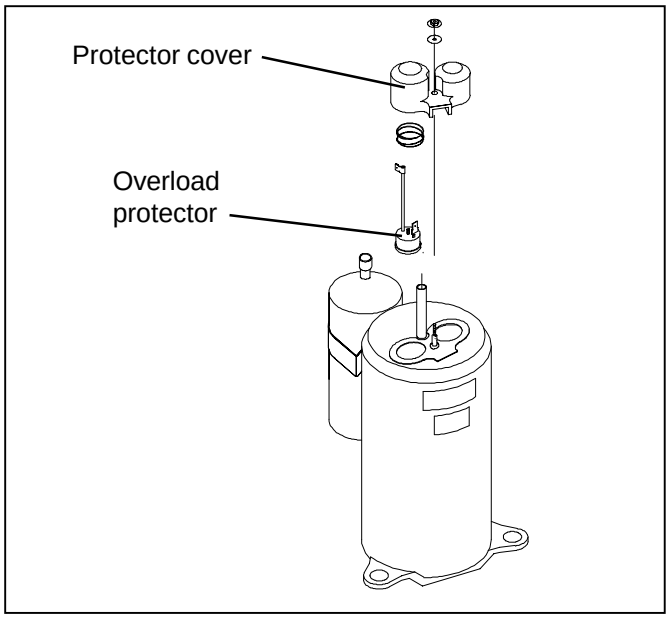


Electric Heater Assembly Removal

Compressor Overload Protector Removal

To remove compressor overload protector:

1. Remove outer case (see paragraph **Outer case Removal**).
2. Remove 5/16 inch nut securing protective cover to compressor, then lift protective cover up and away from compressor.
3. Disconnect overload protector leads.
4. Lift overload protector up and away from compressor.



Compressor Overload Protector Removal