

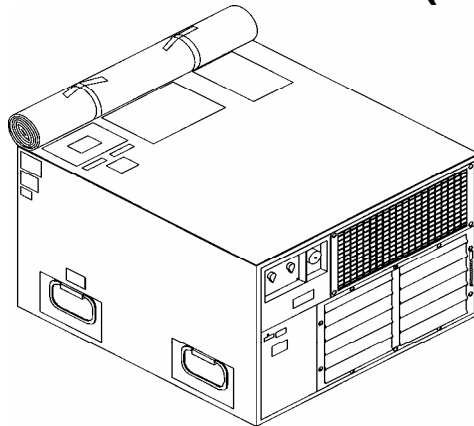
TECHNICAL MANUAL

OPERATOR'S, UNIT, DIRECT SUPPORT,
AND GENERAL SUPPORT
MAINTENANCE MANUAL FOR

**AIR CONDITIONER, HORIZONTAL COMPACT,
18,000 BTU/HR
230 VOLT, 1 PHASE, 50/60 HERTZ,
ENVIRONMENTAL SYSTEMS S9150-18KH-1
NSN 4120-01-523-4131 (EIC N/A)**

AND

**AIR CONDITIONER, HORIZONTAL COMPACT,
18,000 BTU/HR
208 VOLT, 3 PHASE, 50/60 HERTZ,
ENVIRONMENTAL SYSTEMS S9160-18KH-3
NSN 4120-01-523-4472 (EIC N/A)**



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HEADQUARTERS, DEPARTMENT OF THE ARMY

1 February 2006

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.

EXPLANATION OF SAFETY WARNING ICONS



ELECTRICAL - electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.



HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique.



HOT AREA - hand over object radiating heat shows that part is hot and can burn.



EYE PROTECTION - person with goggles shows that the material will injure the eyes.



MOVING PARTS - hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.



HEAVY PARTS - heavy object on human figure shows that heavy parts present a danger to life or limb.

GENERAL SAFETY WARNINGS DESCRIPTION

WARNING



Whenever possible, input power supply to the equipment must be shut off before beginning work. Take particular care to discharge capacitors likely to hold a dangerous potential charge. Refer to WP 0040 00 Schematic Diagram.

Do not work on electrical equipment alone. Be sure another person is nearby who can give first aid.

In the event that first aid is required for injured operating or maintenance personnel, refer to FM 4-21.11 for proper first aid procedures.

For safe operation, the air conditioner must be grounded prior to use.



WARNING

DEATH ON CONTACT or severe injury may result if personnel fail to observe safety precautions. Always disconnect the air conditioner from power source before performing maintenance on this equipment. Make sure equipment is grounded at all times. If power must remain on for troubleshooting, exercise extreme care to avoid contact with any electrical component, fan, fan motor, etc.

Ensure that the correct voltage and phase to phase power connections are made. Compressor damage may occur.



WARNING

Do not use steam, open flame, heat gun, or any other high temperature source to thaw an iced coil. Thaw an iced coil by operating unit in HEAT mode, or by leaving unit shut down until ice melts.



WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm²). Do not direct compressed air against skin. Use goggles or full face shield.



WARNING

Do not operate equipment without all grilles, guards, louvers, and covers in place and tightly secured.



WARNING

Use a mechanical lift to prevent physical injury.

EXPLANATION OF HAZARDOUS MATERIALS ICONS



CHEMICAL - drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



VAPOR - human figure in a cloud shows that material vapors present a danger to life or health.



FIRE - flame shows that a material may ignite and cause burns.

HAZARDOUS MATERIALS DESCRIPTION

WARNING



DRY CLEANING SOLVENT P-D-680

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

WARNING



OIL AND REFRIGERANT

Avoid inhaling fumes from acid formed by burn out of oil and refrigerant. Wear an air filtering mask (Item 29, Table 1, WP 0085 00) if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands. Use care to avoid spilling compressor burn out sludge. If sludge is spilled, clean area thoroughly.

WARNING



R-22 REFRIGERANT

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

CAUTION

When operating the S9150-18KH-1 unit on "50" cycles, the voltage must not exceed 220 volts. Operating at the 230 volt, 50 cycle, 1 phase power input may result in unit shutdown over an extended period of time. Compressor rating for 50 cycles operation requires a maximum of 220 volts. The manufacturer recommends 208 volts be utilized during 50 cycles operation for the S9150-18KW-1 unit. Test results have dictated this recommendation.

INSERT LATEST CHANGED PAGES / WORK PACKAGES. DESTROY SUPERSEDED DATA.

LIST OF EFFECTIVE PAGES / WORK PACKAGES

NOTE: The portion of text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages / work packages are:

Original 0 1 February 2006

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 14 AND
TOTAL NUMBER OF WORK PACKAGES IS 70 CONSISTING OF THE FOLLOWING:

Page/WP No.	*Change No.	Page/WP No.	*Change No.	Page/WP No.	*Change No.
Title.....	0	WP 0019 00	0	WP 0047 00	0
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Chapter 1 Page.....	0	WP 0025 00	0	WP 0053 00	0
WP 0001 00	0	WP 0026 00	0	WP 0054 00	0
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WP 0011 00	0	WP 0039 00	0	Chapter 10 Page.....	0
Chapter 5 Page.....	0	Chapter 7 Page.....	0	WP 0066 00	0
WP 0012 00	0	WP 0040 00	0	WP 0067 00	0
WP 0013 00	0	WP 0041 00	0	WP 0068 00	0
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*Zero in this column indicates an original page or work package.

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 February 2006

TECHNICAL MANUAL

**OPERATOR'S, UNIT, DIRECT SUPPORT,
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**AIR CONDITIONER, HORIZONTAL COMPACT,
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230 VOLT, 1 PHASE, 50/60 HERTZ,
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NSN 4120-01-523-4131 (EIC N/A)
AND
AIR CONDITIONER, HORIZONTAL COMPACT,
18,000 BTU/HR
208 VOLT, 3 PHASE, 50/60 HERTZ,
ENVIRONMENTAL SYSTEMS S9160-18KH-3
NSN 4120-01-523-4472 (EIC N/A)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. We d prefer that you submit your recommended changes electronically, either by e-mail (AMSEL-LC-LEO-PUBS-CHG@mail1.monmouth.army.mil) or online (<http://edm.monmouth.army.mil/pubs/2028.html>). Alternatively, you may mail or fax your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-located in back of this manual to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-E-ED, Fort Monmouth, NJ 07703-5006. The fax number is 732-532-3421, DSN 992-3421.

In any case, we will send you a reply.

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HOW TO USE THIS MANUAL

MANUAL OVERVIEW

This manual describes the air conditioners S9150-18KH-1 and S9160-18KH-3 and contains instructions about how to use and maintain it.

The contents of each chapter are broken down into individual work packages. Each chapter with its work packages are listed in the Table of Contents. Chapter 1 provides general information, equipment description, and theory of operation. Operator instructions of the air conditioners are located in chapter 2. Operators troubleshooting and maintenance procedures are located in chapters 3 and 4. Unit troubleshooting and maintenance procedures are located in chapters 5 and 6. Direct Support troubleshooting and maintenance procedures are located in chapters 7 and 8. Chapter 9 contains the general support maintenance procedures. Chapter 10 provides the supporting information work packages.

The manual includes an Alphabetical Index in the back that references topics to individual work packages.

The associated Repair Parts and Special Tools List (RPSTL) associated with the manual is contained in TM 9-4120-430-24P.

USAGE

You must familiarize yourself with the entire maintenance procure before beginning any maintenance task.

When first receiving this instrument, start at the front of the manual and go all the way through to the back. Become familiar with every part of this manual and the air conditioners S9150-18KH-1 and S9160-18KH-3.

CHAPTER 1

**INTRODUCTION INFORMATION WITH
THEORY OF OPERATION**

**AIR CONDITIONER, COMPACT, HORIZONTAL
GENERAL INFORMATION**

SCOPE

This technical manual contains instructions for operation, checks, adjustments, and corrective maintenance for the S9150-18KH-1 and S9160-18KH-3 air conditioners.

Type of Manual: Operator's, Unit, Direct Support, and General Support Maintenance Manual.

Model Number and Equipment Names:

S9150-18KH-1 Air Conditioner, Compact, Horizontal, 18,000 BTU/Hr, 230 Volt, 1 Phase, 50/60 Hz and
S9160-18KH-3 Air Conditioner, Compact, Horizontal, 18,000 BTU/Hr, 208 Volt, 3 Phase, 50/60 Hz.

Purpose of Equipment: The air conditioner is used primarily in mobile tactical electronics shelters to provide filtered, cooled or heated air, as required to maintain the service conditions necessary for the efficient operation of electronic equipment in the shelters. The air conditioner also provides for the comfort of operating personnel housed within the vans.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, Functional Users Manual for the Army Maintenance Management System (TAMMS); DA PAM 738-751, Functional Users Manual for the Army Maintenance Management System Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your 18K air conditioner needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to the address specified in DA PAM 750-8, or as specified by the contracting activity. We will send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using SF 368, Product Quality Deficiency Report. Use of key words such as "corrosion", "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem.

The form should be submitted to the address specified in DA PAM 750-8, Functional Users Manual for the Army Maintenance Management System (TAMMS).

OZONE DEPLETING SUBSTANCES (ODS)

The 18K air conditioner utilizes R-22 as the refrigerant.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For procedures to destroy this equipment to prevent its use by the enemy, refer to TM 750-244-2, Procedures for Destruction of Electronic Materiel to Prevent Enemy Use.

PREPARATION FOR STORAGE OR SHIPMENT

Short Term Storage

1. Disconnect power supply and remove from shelter.
2. Make sure unit is clean and dry.
3. Close all louvers and grilles.
4. Unroll canvas cover and snap into place.
5. Store in the operating (upright) position.

Long Term Storage

1. Disconnect power supply and remove from shelter.
2. Make sure unit is clean and dry. Blow-out condensate drains.
3. Close all louvers and grilles.
4. Unroll canvas cover and snap into place.
5. Package all hardware, cable connectors, technical manuals, etc. in a cushioned protective sack. Staple shut and secure to unit.

NOTE

Wrap cable connectors in cushioning material before packaging.

6. Seal all openings with polyethylene film and a half inch pressure sensitive tape.
7. Cover the entire unit with a polyethylene film shroud and secure with a half inch pressure sensitive tape.
8. Store air conditioner in a dry, dust-free space and in the operating (upright) position.
9. Storage of the air conditioner will be in accordance with TM 740-90-1, Administrative Storage of Equipment.

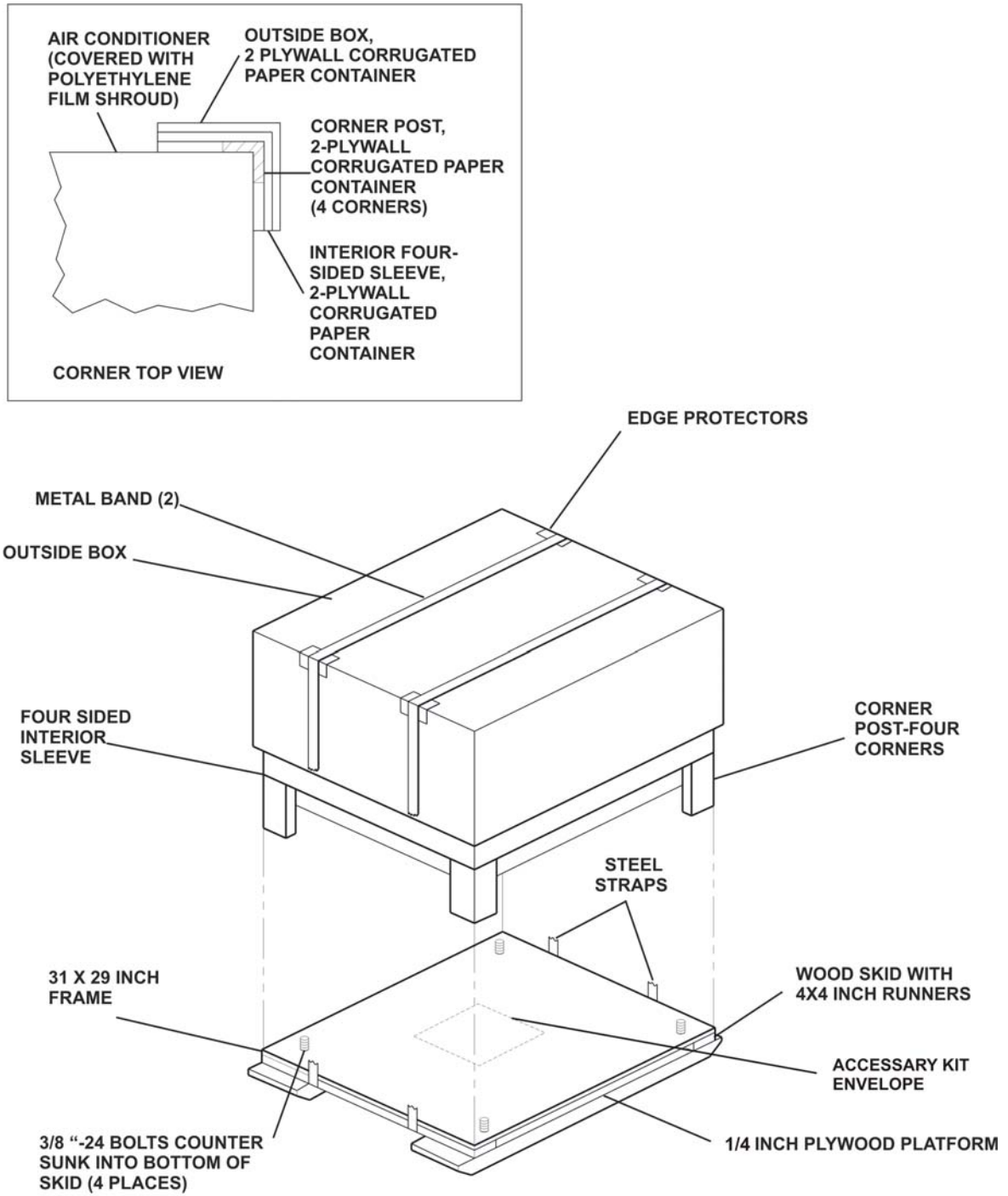
Preparation For Shipment

Prepare unit as prescribed for long term storage.

Shipping Container (See Figure 1)

1. Fabricate a corrugated paper shipping container conforming to ASTM-D-3951-95 Level AB, Domestic Type. A minimum of 1-9 inch clearance will exist between the air conditioner and walls of the box. The box will be modified with skids located so that the bolts securing the air conditioner pass through the skids. Bolt heads will be countersunk into the bottom of the skids. The bolts with washers should protrude at least 3/8 inch above the skid and not more than a half inch.
2. The air conditioner will be packed in the shipping container and secured to the skids with four bolts (3/8-24) and washers.
3. Wood spacers will be padded with water resistant cushioning material to prevent abrasion. Corner pads constructed of corrugated paper will be used on all top and bottom edges of the air conditioner.

4. The shipping container will be closed and secured with steel strapping material.
5. The air conditioner will be stored and shipped in the operating (upright) position. The words THIS END UP with arrows will be placed on each side of the shipping container. The letters will be black, at least 3 inches high, and located within the upper third of each side.



PACKING MATERIAL: 2 PLYWALL CORRUGATED PAPER

Figure 1. Shipping Container

WARRANTY INFORMATION

The 18K BTU air conditioner is warranted for 12 months from the date of acceptance for the end item air conditioner. Refer to WP 0070 00 for complete warranty information.

LIST OF ABBREVIATIONS/ACRONYMS

Abbreviation/Acronym

AC	Alternating Current
BII	Basic Issue Item
BIT	Built-In Test
BTU	British Thermal Unit
CBR	Chemical, Biological, Radiological
CHG	Change
COEI	Component of End Item
CPC	Corrosion Prevention and Control
DC	Direct Current
DISCH	Discharge
DoD	Department of Defense
EIR	Equipment Improvement Recommendations
LED	Light Emitting Diode
NSN	National Stock Number
ODS	Ozone Depleting Substance
PCB	Printed Circuit Board
PMCS	Preventive Maintenance Checks and Services
PN	Part Number
RPL	Repair Parts List
WP	Work Package

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this TM 9-4120-430-14. If quality of material requirements are not stated in this TM 9-4120-430-14, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

SAFETY, CARE, AND HANDLING

Safe and efficient air conditioner operations depend on the observance of well established safety practices and a thorough knowledge of operation procedures. The operating procedures often involve using equipment and materials that are potentially hazardous. Injury to personnel and damage to equipment caused by fire and misuse of equipment can be avoided by alert and responsible operators and technicians. Strict observance to established safety, care, and handling practices and procedures will allow personnel to perform their duties in a safe and hazard-free environment.

SUPPORTING INFORMATION FOR REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, Expendable/Durable Items (Except: Medical Department Expendable/Durable Items, as applicable to your unit.

SPECIAL TOOLS, TMDE, AND SUPORT EQUIPMENT

Refer to Table 2 of WP 0067 00, Maintenance Allocation Chart (MAC) for the listing of the equipment required to verify the performance of each of the maintenance functions: inspect, test, service, adjust, align, remove/install, replace, rebuild, overhaul, calibrate, and repair.

REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 9-4120-430-24P).

END OF WORK PACKAGE

**AIR CONDITIONER, COMPACT, HORIZONTAL
DESCRIPTION AND DATA**

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The air conditioner is a horizontal compact air conditioner with a nominal cooling capacity of 18,000 British Thermal Units per hour (BTU/hr) and a nominal heating capacity of 13,400 BTU/hr. The air conditioner is intended primarily for use in mobile technical electronics shelters. Capabilities and features are as follows:

- Lightweight, compact, and horizontal
- Wall/Floor-mounted and air-cooled
- Electric motor driven and designed for continuous operation under varying loads
- Furnishes 18,000 BTU/hr for cooling; 13,400 BTU/hr for heating
- Handles for lifting
- Alternate power input source
- Roll-up canvas condenser cover.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

The major components of the air conditioner are listed below. An overall view of the air conditioner is provided in Figure 1.

1. Canvas Cover - Protects condenser coil from extreme cold temperatures during winter months.
2. Fresh Air Screen - Filter fresh (make-up) air for evaporator compartment.
3. Condenser Guard - Protects condenser from external damage.
4. Evaporator Air Intake Louver - Horizontal adjustable louver. Directs room air into air conditioner for filtering and recycling.
5. Evaporator Air Discharge Louver - Vertical and horizontal louvers. Individually hand adjustable. Directs conditioned air into room.
6. Charging Valve Access Cover - Provides entry for servicing refrigeration system.
7. Ventilation Damper Control - Opens and closes fresh air inlet passage.
8. Condensate Drain - Allows discharge of condensate during operation.
9. Control Module - Contains operator control switches.
10. Circuit Breaker Assembly - Protects unit from electrical current overload.
11. Liquid sight Indicator - Indicates condition and level of refrigerant.
12. Main Input Power Connector (J2) (S9150-18KH-1 unit) - For connections to 230 volt, 50/60 Hz, single-phase power source.
13. Main Input Power Connector (J2) (S9160-18KH-3 unit) - For connection to 208 volt, 50/60 Hz, three-phase power source.
14. Alternate Input Power Connector (J1) - Provides an alternate power input position. Refer to Schematic Diagram, WP 0040 00 for required wiring changes for use of connector in this location.
15. Ground Stud - Provides for auxiliary grounding connection.
16. Condenser air Louvers - Adjustable louvers control amount of hot air discharge created in the condenser coil compartment.

LOCATION AND CONTENTS OF IDENTIFICATION PLATES

Refer to Table 2-1 for the listing of figure reference and description for each identification plate location.

Table 2-1. Identification Plates

Figure No.	Nomenclature	Description Indication
3	Equipment Data Plate (S9150-18K-1 Unit)	Indicates equipment data.
4	Equipment Data Plate (S9160-18K-3 Unit)	Indicates equipment data.
5	High Pressure Charging Valve Decal	Locates Charging Valve
6	Access Cover Marking	Marking identifying charging valve access cover.
7	Low Pressure Charging Valve Decal	Locates charging valve.
8	Refrigeration Diagram Plate	Indicates refrigeration components.
9	Schematic Diagram (S9150-18K-1 Unit)	Indicates electrical components and wiring.
10	Schematic Diagram (S9160-18K-1 Unit)	Indicates electrical components and wiring.
11	Vent Instruction Decal	Indicates fresh air vent position.
12	Grounding Lug Decal	Locates grounding lug.
13	Caution: Grounding Decal	Reference to TM for grounding information.
14	Danger Decal	Warning instructions on ground wire.
15	Lift Caution Decal	Indicates requirements for moving unit; mechanical lift required (three places).
16	Warning Decal	Environmental health warning on R-22.
17	Warranty Plate	Indicates technical bulletin warranty program on air conditioner.
18	Caution Decal	208 volts, disconnect power before maintenance.
19	Caution Decal	230 volts, disconnect power before maintenance.
20	Caution Decal	Indicates to connect ground prior to turning the equipment on.
21	Air Discharge Heat Danger Decal	Indicates high temperature of air exhaust.

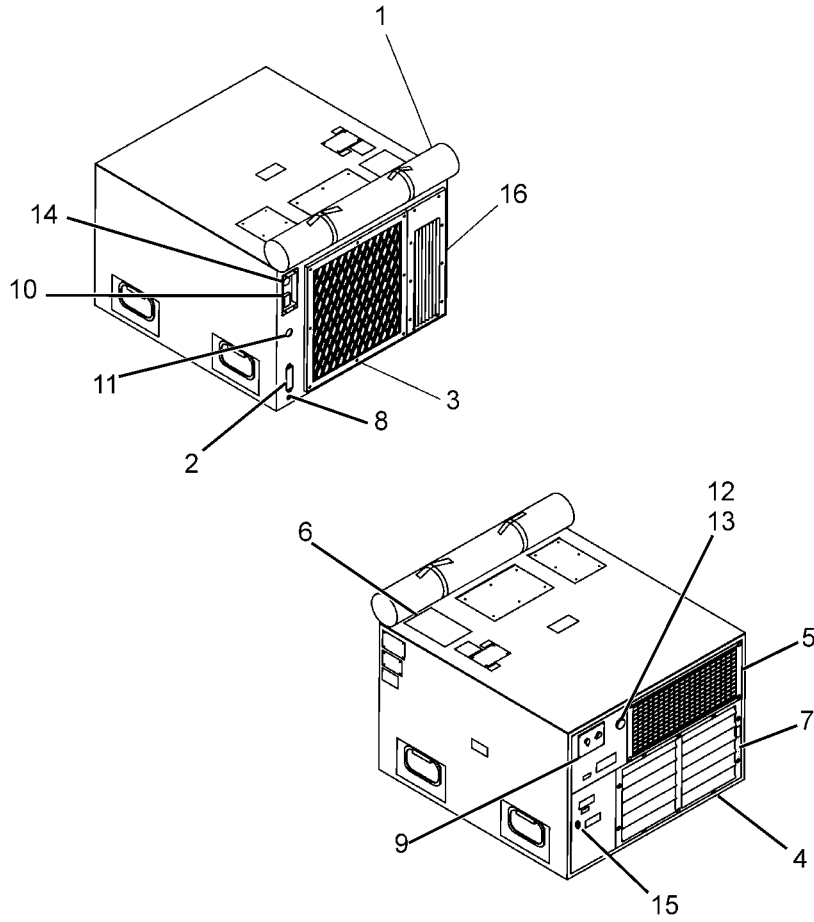


Figure 1. Location of Major Components

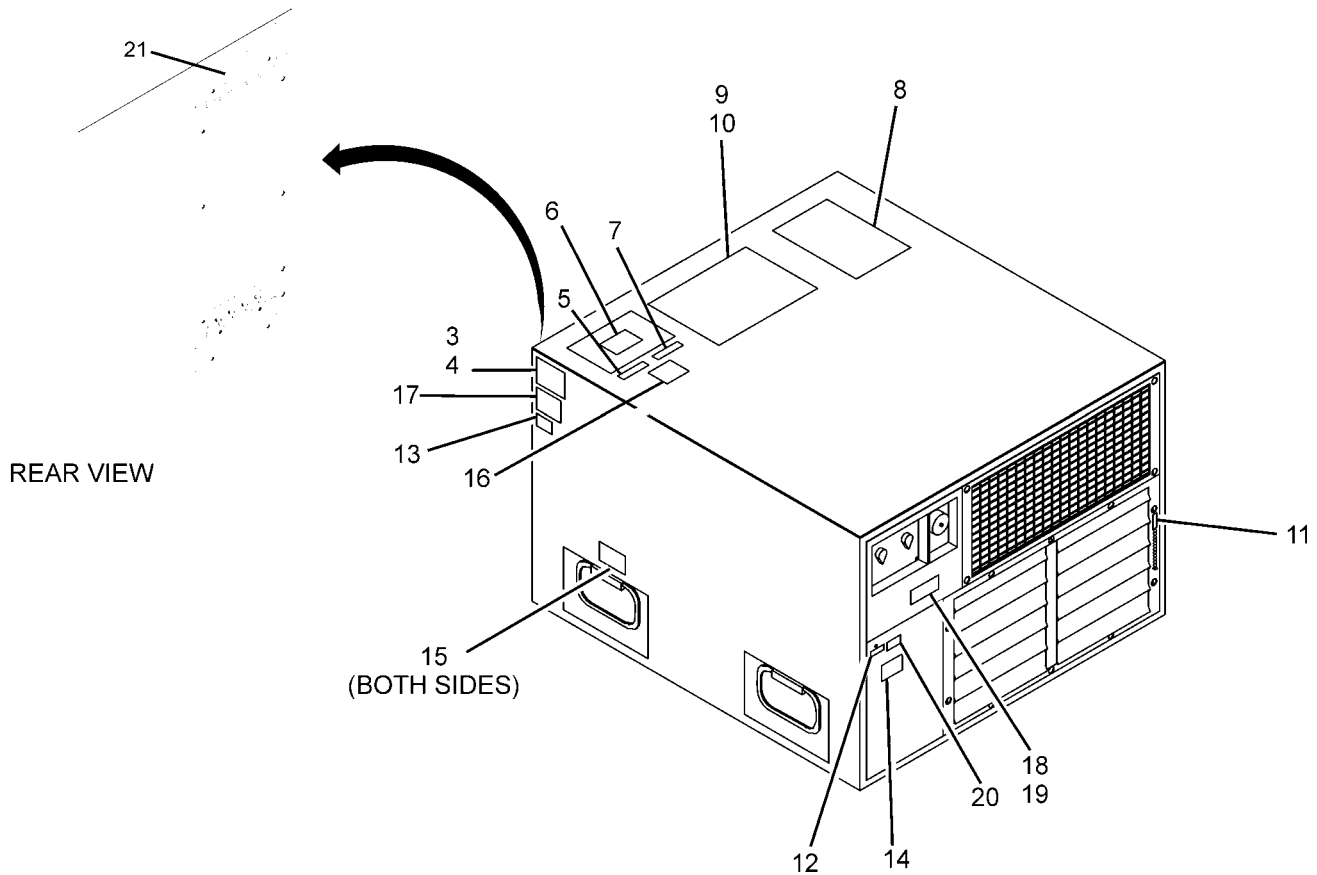


Figure 2. Location of Data Plates

U.S.ARMY	
AIR CONDITIONER	
18,000 BTU/HR - HORIZONTAL, COMPACT	
230 VOLT, 1 PHASE, 50/60 HZ	
NSN:	4120-01-523-4131
P/N:	S9150-18KH-1
S/N:	<input type="text"/>
CONTRACT:	W15P7T-04-D-A608
DATE OF MFG:	<input type="text"/> WT. 290 LBS.
REFRIGERANT:	R-22 CHARGE: <input type="text"/>
MFG. BY: ENVIRONMENTAL SYSTEMS FL. FCSM:0V5R4	

Figure 3. Equipment Data Plate (S9150-18KH-1 Unit)

U.S.ARMY	
AIR CONDITIONER	
18,000 BTU/HR - HORIZONTAL, COMPACT	
208 VOLT, 3 PHASE, 50/60 HZ	
NSN:	4120-01-523-4472
P/N:	S9160-18KH-3
S/N	<input style="width: 150px; height: 15px;" type="text"/>
CONTRACT:	W15P7T-04-D-A608
DATE OF MFG:	<input style="width: 100px; height: 15px;" type="text"/> WT. 290 LBS.
REFRIGERANT:	R-22 CHARGE: <input style="width: 80px; height: 15px;" type="text"/>
MFG. BY: ENVIRONMENTAL SYSTEMS FL. FCSM:0V5R4	

Figure 4. Equipment Data Plate (S9160-18KH-3 Unit)

**HIGH PRESSURE
CHARGING VALVE**

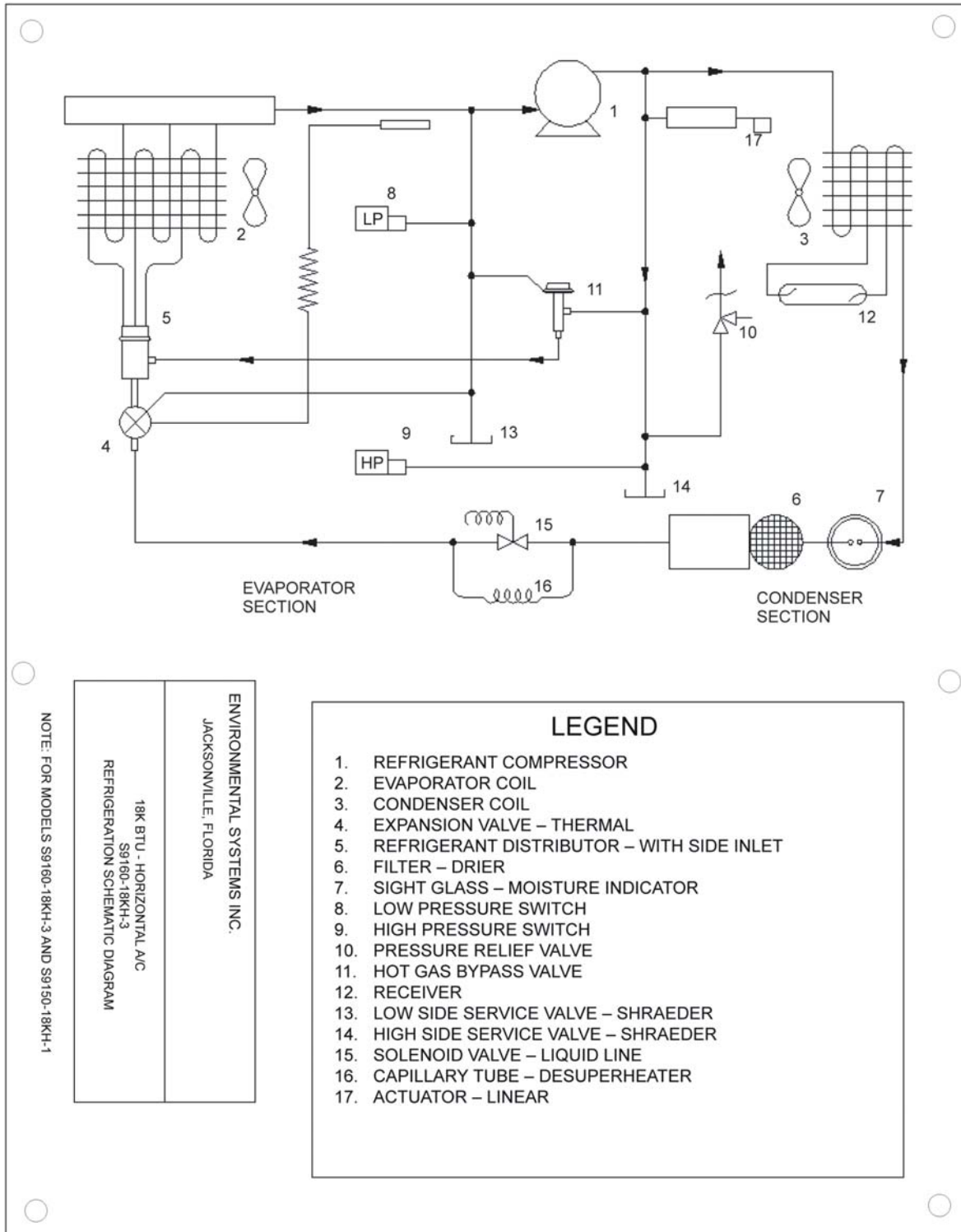
Figure 5. High Pressure Charging Valve Decal

**CHARGING
VALVE
ACCESS
COVER**

Figure 6. Access Cover Marking

**LOW PRESSURE
CHARGING VALVE**

Figure 7. Low Pressure Charging Valve Decal



ENVIRONMENTAL SYSTEMS INC.
 JACKSONVILLE, FLORIDA

18K BTU - HORIZONTAL A/C
 S9160-18KH-3
 REFRIGERATION SCHEMATIC DIAGRAM

- ### LEGEND
1. REFRIGERANT COMPRESSOR
 2. EVAPORATOR COIL
 3. CONDENSER COIL
 4. EXPANSION VALVE - THERMAL
 5. REFRIGERANT DISTRIBUTOR - WITH SIDE INLET
 6. FILTER - DRIER
 7. SIGHT GLASS - MOISTURE INDICATOR
 8. LOW PRESSURE SWITCH
 9. HIGH PRESSURE SWITCH
 10. PRESSURE RELIEF VALVE
 11. HOT GAS BYPASS VALVE
 12. RECEIVER
 13. LOW SIDE SERVICE VALVE - SHRAEDER
 14. HIGH SIDE SERVICE VALVE - SHRAEDER
 15. SOLENOID VALVE - LIQUID LINE
 16. CAPILLARY TUBE - DESUPERHEATER
 17. ACTUATOR - LINEAR

NOTE: FOR MODELS S9160-18KH-3 AND S9150-18KH-1

Figure 8. Refrigeration Diagram Plate

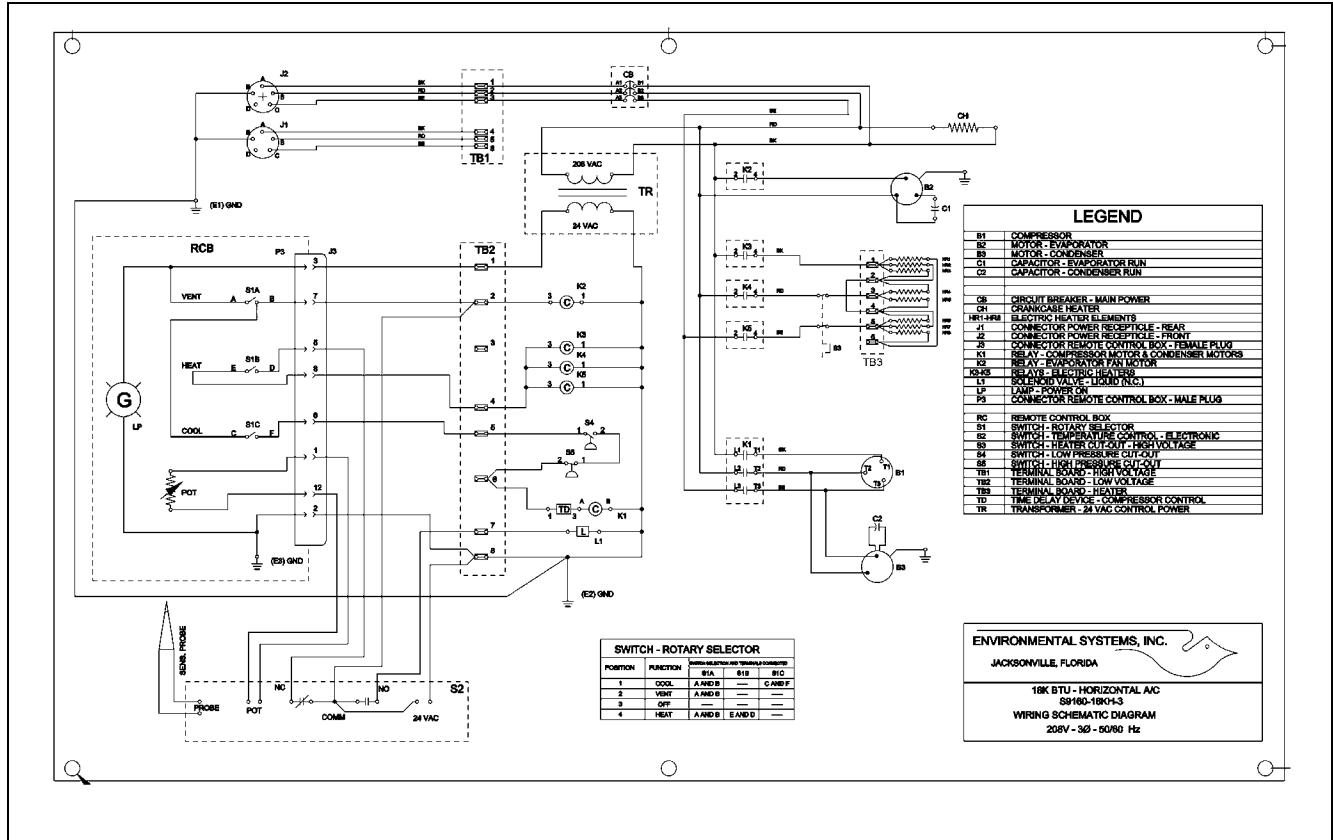


Figure 9. Schematic Diagram Plate (S9150-18KH-1 Unit)

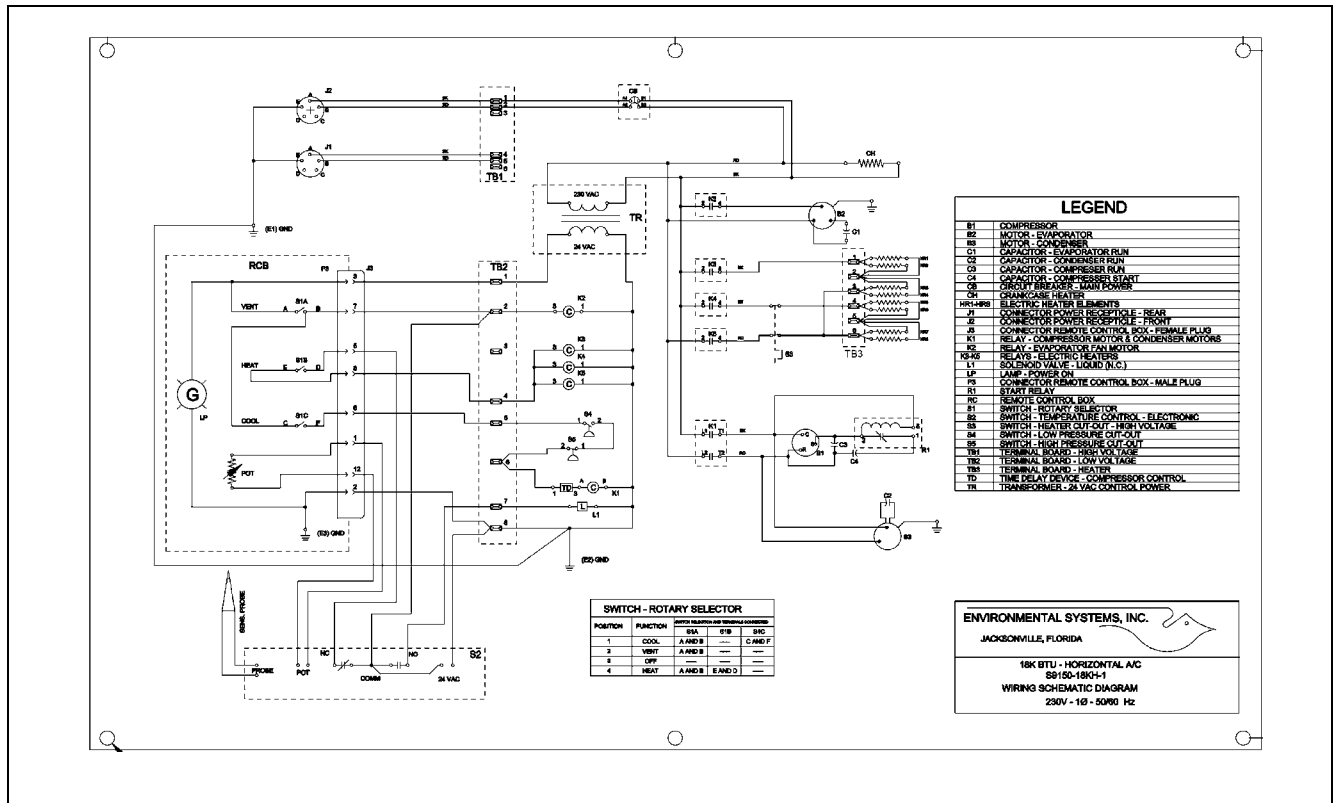


Figure 10. Schematic Diagram Plate (S9160-18KH-3 Unit)



Figure 11. Vent Instruction Decal



A horizontal rectangular decal with a black border. The text inside is centered and reads: GROUND LUG.

Figure 12. Grounding Lug Decal



A rectangular decal with a black border. The text inside is centered and reads: CAUTION, FOR SAFE OPERATION, SEE TM FOR PROPER, INTERNAL AND EXTERNAL, GROUNDING.

Figure 13. Caution Grounding Decal

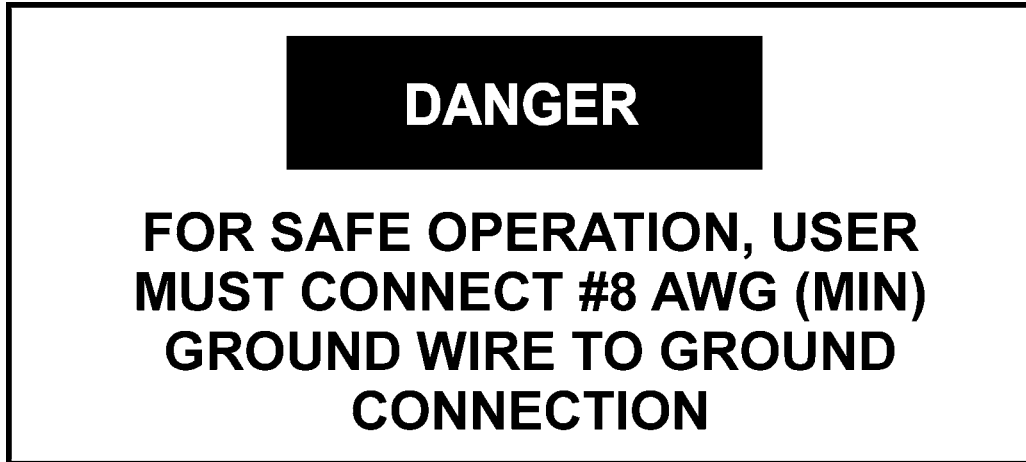


Figure 14. Danger Decal



Figure 15. Lift Caution Decal

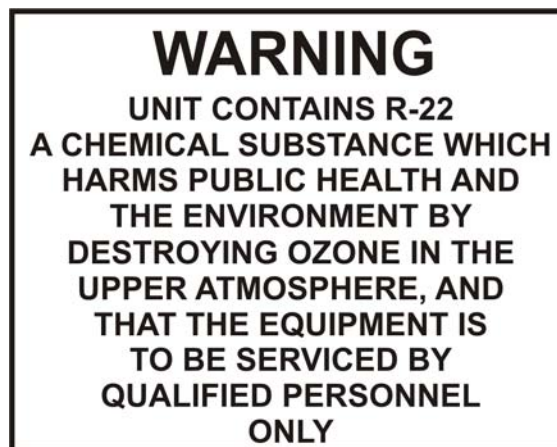


Figure 16. R-22 Warning

WARRANTY ITEM	
NSN	<input style="width: 85%;" type="text"/>
PIIN	<input style="width: 85%;" type="text"/>
MFR	<input style="width: 30%;" type="text"/> SN <input style="width: 30%;" type="text"/>
TM	<input style="width: 85%;" type="text"/>
DATE	<input style="width: 30%;" type="text"/> LIMIT <input style="width: 30%;" type="text"/>
<input style="width: 80%; height: 20px;" type="text"/>	

Figure 17. Warranty Plate

CAUTION - 230 VOLTS
BEFORE MAINTENANCE DISCONNECT POWER

Figure 18. Caution Decal S9150-18KH-1 Unit

CAUTION - 208 VOLTS
BEFORE MAINTENANCE DISCONNECT POWER

Figure 19. Caution Decal S9160-18KH-3 Unit

CAUTION
CONNECT GROUNDING CABLE TO GROUND LUG PRIOR TO TURNING ON AC UNIT

Figure 20. Caution Decal

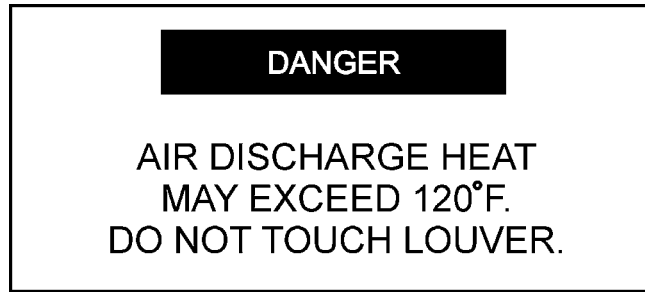


Figure 21. Air Discharge Heat Danger Decal

EQUIPMENT DATA

Air Conditioners Part No. S9150-18KH-1 and S9160-18KH-3

Nomenclature	S9160-18KH-3 Air Conditioner, Horizontal, Compact, 18,000 BTU/HR, 208 Volt, Three-Phase, 50/60 Hertz
	S9150-18KH-1 Air Conditioner, Horizontal, Compact, 18,000 BTU/HR, 230 Volt, Single-Phase, 50/60 Hertz
Manufacturer	Environmental Systems Corp., a Snowbird, ESC Company
Capacity:	
Cooling	18,000 BTU/HR (Nominal)
Heating	13,400 BTU/HR (Nominal)
Phase	Single Phase, S9150-18KH-1 Three-Phase, S9160-18KH-3
Hertz	50/60

CAUTION

When operating the S9150-18KH-1 unit on "50" cycles, the voltage must not exceed 220 volts. Operating at the 230 volt, 50 cycle, 1 phase power input may result in unit shutdown over an extended period of time. Compressor rating for 50 cycles operation requires a maximum of 220 volts. The manufacturer recommends 208 volts be utilized during 50 cycles operation for the S9150-18KW-1 unit. Test results have dictated this recommendation.

A/C Volts	230 –10%, S9150-18KH-1 208 –10%, S9160-18KH-3
Current input, full load, amperes:	
Cooling	22.9 (maximum) S9150-18KH-1 14.6 (maximum) S9160-18KH-3
Heat	22.9 (maximum) S9150-18KH-1 14.6 (maximum) S9160-18KH-3
Ventilating	3.0 (maximum)
Refrigerant	R22
Amount of Charge	2 lbs. 12 oz.

Dimensions and Weight

Depth	27.94 inches (70.970 cm) Nominal
Height	20 inches (50.8 cm) Nominal
Width	30 (76.2 cm) Nominal
Evaporator Air Discharge Grill	20.12 inches x 8.76 inches (51.10 x 22.25 cm) Nominal
Evaporator Air Intake Grill	22.52 inches x 9.96 inches (57.20 x 25.30 cm) Nominal
Weight	290pounds (maximum)

Operating Temperature Range

−50°F (−45°C) to 80°F (+26.7°C) HEATING
0°F (−17.8°C) to 120°F (+49°C) COOLING

END OF WORK PACKAGE

**AIR CONDITIONER, COMPACT, HORIZONTAL
THEORY OF OPERATION**

TECHNICAL PRINCIPALS OF OPERATION**Refrigeration Cycle - Cooling (Refer to Schematic)**

The refrigeration system removes heat from a given area. The refrigeration cycle (see Figure 1) is as follows:

1. The compressor (1) takes cold, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. The gas flows through the copper tubing to the condenser coil (3) and receiver (12).
2. The condenser fan draws outside ambient air over and through the condenser coil (3). The high temperature, high pressure gas from the compressor (1) is cooled by the flow of air and is changed into a high pressure liquid.
3. The sight glass moisture indicator (7) indicates the presence of moisture and quantity of refrigerant in the system.
4. The filter-drier (6) removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant.
5. The expansion valve (4) senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of the remote bulb and *external equalizer line*, the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil (2).
6. As the high pressure liquid refrigerant leaves the expansion valve (4) and refrigerant distributor (5), it enters the evaporator coil (2) and *flashes* to a gas. This is due to the low pressure created in the evaporator by the compressor (1). The evaporator blower circulates the warm air, from the conditioned space, over and through the evaporator coil (2). Liquid refrigerant absorbs heat as it changes from a liquid to a gas. As the air-flow from the conditioned space comes in contact with the evaporator coil (2) the air is cooled. If the air is cooled below its *dew point* moisture will condense on the evaporator coil (2) and be carried to the condensate drain. Thus providing both cooling and dehumidification.
7. The low pressure refrigerant gas is then drawn back to the compressor (1) and the cycle is repeated.

Heating

When the MODE SELECTOR switch is set for HEAT, eight heating elements located behind the evaporator coil are energized. These elements are protected from overheating by a thermal cutout switch.

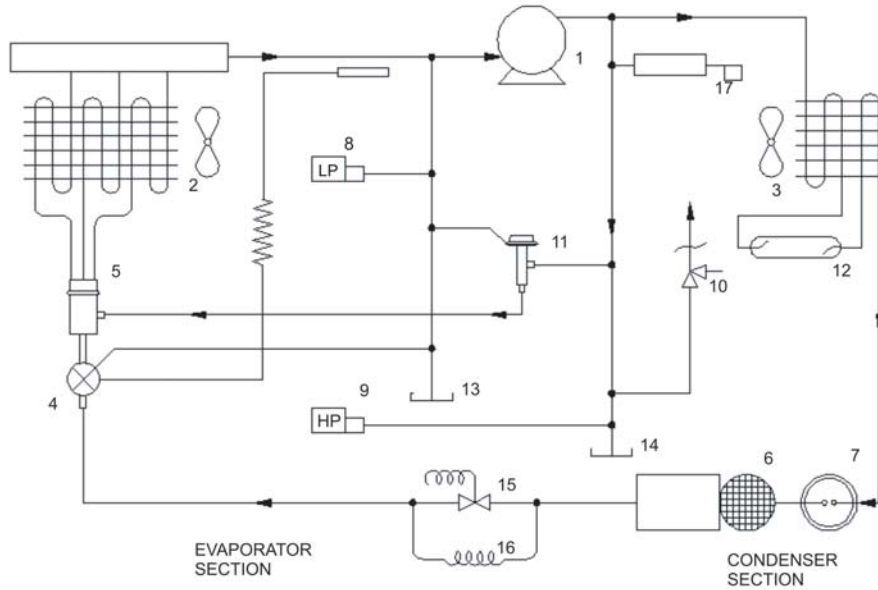
Refrigeration Cycle - Non-Cooling

In the COOL mode when the thermostat control senses return air to the unit below the thermostat set point, the compressor and fans remain operating but the refrigeration cycle is altered to produce no net cooling to the controlled space. The refrigerant cycle is then as follows:

1. The high temperature-high pressure gas from the compressor (1) flows partly to the condenser and partly to the hot gas bypass valve (11).
2. The condenser fan draws outside ambient air over and through the condenser coil (3). The high temperature, high pressure gas from the compressor (1) is cooled by the flow of air and is changed into a high pressure liquid.
3. The hot gas bypass valve (11) regulates the flow of high temperature-high pressure gas to the evaporator (2) through the side inlet of the distributor (5) to maintain a prescribed evaporator pressure (approximately 50-55 psig).
4. The liquid line solenoid valve (15) having been de-energized by the thermostat control is closed diverting the flow of high pressure liquid from the condenser (3) through the desuperheater capillary tube (16).
5. The desuperheat capillary tube (16) restricts the flow of high pressure liquid to the expansion valve (4) to the proper amount to offset the high temperature of the gas from the hot bypass valve (11) to allow for cooling of the

compressor (1). This results in only superheated low pressure gas flow through the evaporator coil (2) with little or no cooling effect.

6. The low pressure refrigerant gas is then drawn back to the compressor (1) and the cycle is repeated.



LEGEND

- 1. REFRIGERANT COMPRESSOR
- 2. EVAPORATOR COIL
- 3. CONDENSER COIL
- 4. EXPANSION VALVE - THERMAL
- 5. REFRIGERANT DISTRIBUTOR - WITH SIDE INLET
- 6. FILTER - DRIER
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- 12. RECEIVER
- 13. LOW SIDE SERVICE VALVE - SHRAEDER
- 14. HIGH SIDE SERVICE VALVE - SHRAEDER
- 15. SOLENOID VALVE - LIQUID LINE
- 16. CAPILLARY TUBE - DESUPERHEATER
- 17. ACTUATOR-LINEAR

Figure 1. Refrigerant Schematic

END OF WORK PACKAGE

CHAPTER 2
OPERATOR INSTRUCTIONS

**AIR CONDITIONER, COMPACT, HORIZONTAL
DESCRIPTION AND USE OF CONTROLS AND INDICATORS**

GENERAL

The air conditioner is a self-contained and electric powered unit that provides 18,000 BTU/HR for cooling or 13,400 BTU/HR for heating. Once started, it operates automatically due to the relationship of the components, controls and instruments.

The air conditioner is designed for a variety of installations and for operation under a wide range of climactic conditions. It is also designed for continuous or intermittent operation as a self-contained unit. Operators must be aware of any peculiarities or operational limitations for their specific installation. See the appropriate shelter or system manual for instructions peculiar to your specific installation.

The air conditioner is not equipped with a CBR filter; however, the unit could be connected to external filtering equipment for operation under CBR environmental conditions.

OPERATOR S CONTROLS

Cooling

With the MODE SELECTOR switch (see Figure 1) in COOL position, the fan motor is energized. The fan motor runs continuously. The temperature selector switch determines the cooling mode of unit. With the temperature selector switch calling for compressor operation, the liquid line solenoid valve opens and closes with the electronic thermostat switch to control the flow within the refrigerant circuit. The air conditioner is protected from current overload by a circuit breaker mounted on the rear of the A/C unit and a thermal overload in the compressor terminal cover.

Heating

With the MODE SELECTOR switch in the HEAT position, air is blown by the evaporator fan as in cooling, but the heating elements are energized instead of the refrigeration system.

Ventilation

Placing the MODE SELECTOR switch in the VENT position energizes the evaporator fan motor which forces air out of the evaporator discharge louver into the room. The amount of outdoor air used for ventilation is determined by the position of the ventilation damper door.

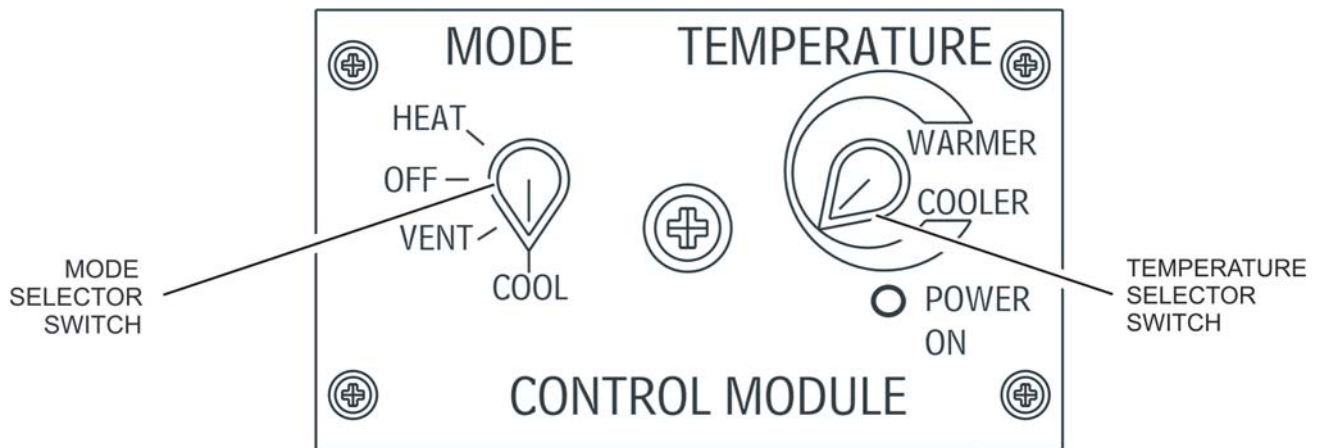


Figure 1. Remote Control Module

Alternate Input Power Operation

The air conditioner is shipped from the manufacturer wired for operation to use the main input power connector (J2) located in the front of the unit next to the control module. When unit installation makes use of the primary input power receptacle inconvenient, an alternate input power receptacle is provided to allow power connections to the air conditioner. It is located in the rear of the unit. To use an alternate input power connection, internal wiring connections to terminal board TB1 must be made. The alternate input power connector is designated as (J1). Refer to Unit Maintenance and Schematic Diagram, WP 0038 00.

END OF WORK PACKAGE

**AIR CONDITIONER, COMPACT, HORIZONTAL
OPERATION UNDER USUAL CONDITIONS**

INITIAL SETUP**References**

WP 0011 00 (PMCS)

Equipment Condition

Mode selector switch in OFF position

Correct voltage and phase power source (208 volts, three phase, 50/60 Hz for S9160-18KH-3 unit) or (230 volts, single phase, 50/60 Hz for S9150-18KH-1 unit)

Perform operator PMCS (WP 0010 00) as necessary

General Installation Site Requirements

A relatively level surface.

An unobstructed flow of air from outside the area.

An unobstructed flow of air from inside the conditioned area.

An unobstructed flow of air from outside the conditioned area to the fresh air intake.

STARTING AND OPERATING INSTRUCTIONS FOR COOLING**Starting**

1. Perform the preventive maintenance checks and services before operation.

CAUTION

When operating the S9150-18KH-1 unit on 50 cycles, the voltage must not exceed 220 volts. Operating at the 230 volt, 50 cycle, 1 phase power input may result in unit shutdown over an extended period of time. Compressor rating for 50 cycles operation requires a maximum of 220 volts. The manufacturer recommends 208 volts be utilized during 50 cycles operation for the S9150-18KW-1 unit. Test results have dictated this recommendation.

NOTE

The J2 connector is the main power input connector. The J1 connector at the back of the unit is the ALTERNATE input connector. To use the J1 ALTERNATE connector, the TB1 connections must be shifted from J2 to J1. Refer to CONNECT POWER SOURCE procedures in WP 0014 00 and to wiring schematic in WP 0038 00.

2. Check for correct voltage and phase at power source (208 volts, three phase, 50/60 Hz for S9160-18KH-3 unit) or (230 volts, single phase, 50/60 Hz for S9150-18KH-1 unit.)

3. Roll up and tie the canvas cover. See Figure 1.

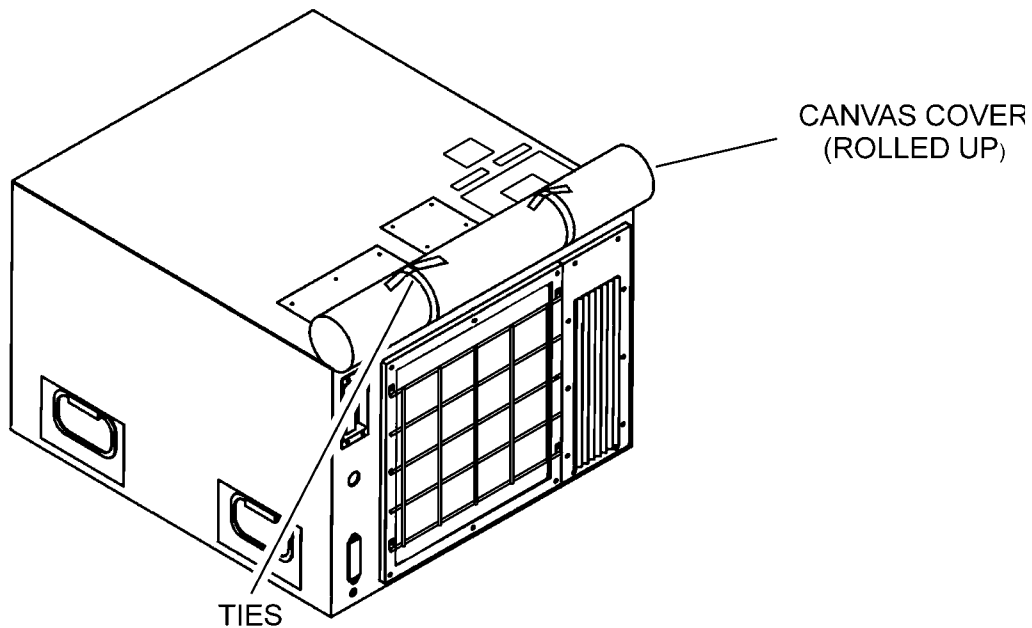


Figure 1. Canvas Cover

4. Ground the unit.
5. Connect the main power to the unit.
6. Open the evaporator intake louvers (see Figure 2) by moving the tabs up or down as required. Ensure evaporator discharge louvers are open by adjusting each louver individually.

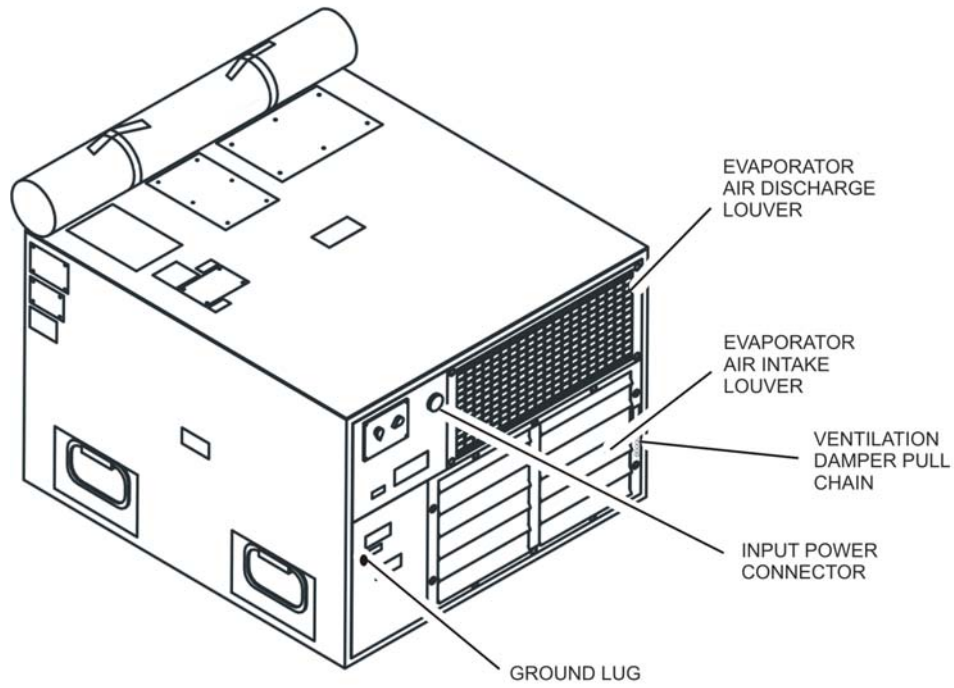


Figure 2. Air Conditioner Front View

- 7. Adjust the ventilation damper to close the damper door (release pull chain).

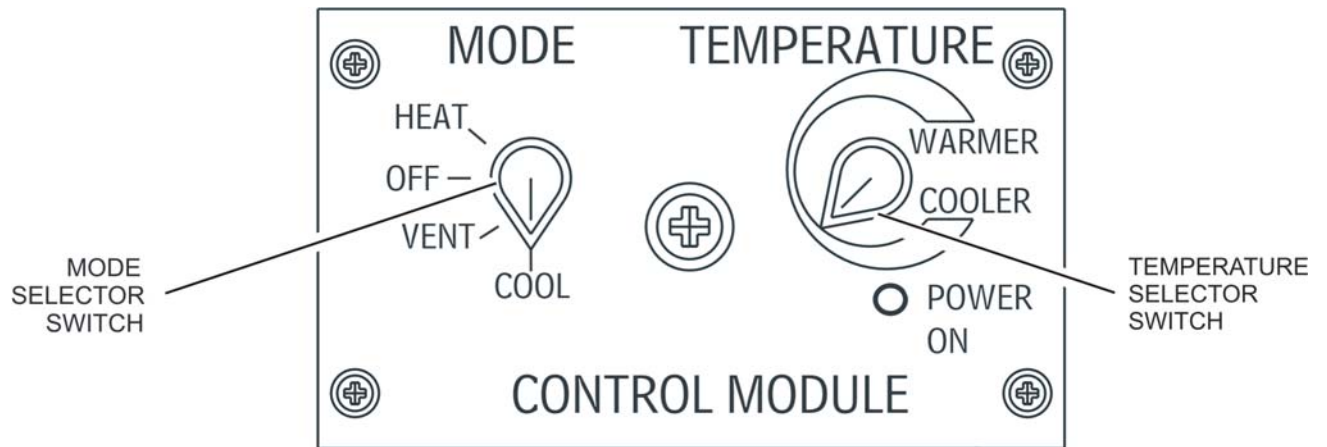


Figure 3. Remote Control Module

8. Turn the temperature selector switch to WARMER. See Figure 3.
9. Position circuit breaker to ON, and check that the green POWER ON light is lit.
10. Position the mode selector switch to VENT, then position the mode selector switch to COOL.

Cooling Operation

CAUTION

Do not operate the air conditioner in cool mode if the refrigerant is at a low level or if bubbles appear in sight glass. Equipment damage can result.

Compressor will begin operation. Allow 60 seconds delay for compressor to start. After starting the air conditioner for cooling operation:

1. Leave the mode selector switch on COOL.
2. Adjust the temperature selector switch from WARMER to COOLER to select the degree of cooling desired. See Table 1 Operator Control Setting.
3. Adjust the evaporator discharge louvers individually to direct the airflow as desired.

NOTE

Cool air is denser than warm air so it has a tendency to flow downward. To offset this tendency, it is often advisable to adjust the evaporator discharge louvers to direct the cool air slightly upward.

NOTE

To open the ventilation damper door to admit fresh air, unlock the ventilation damper control chain, pull the door to an open position (against spring closure) and secure chain in slot.

Cooling With Fresh Air

1. When the ventilation damper door is open to admit fresh air, partially close the evaporator intake louver to balance the incoming air.
2. Keep the ventilation damper door closed during heavy rain.

Stopping The Air Conditioner

1. Position the mode selector switch to OFF.
2. Adjust the ventilation damper control chain to close the damper door.

3. If a shutdown is to be for an extended period, cover condenser side of unit with canvas cover and disconnect the power cable.

STARTING AND OPERATING INSTRUCTIONS FOR HEATING

Starting



WARNING

For safe operation, the air conditioner must be grounded prior to use.

1. Perform the preventive maintenance checks and services (WP 0010 00).
2. Check for the correct voltage and phase (208 volts, three-phase, 50/60 Hz for S9160-18KH-3 unit or 230 volts, single phase, 50/60 Hz for S9150-18KH-1 unit).

NOTE

The J2 connector is the main power input connector. The J1 connector at the back of the unit is the ALTERNATE input connector. To use the J1 ALTERNATE connector, the TB1 connections must be shifted from J2 to J1. Refer to CONNECT POWER SOURCE procedures in WP 0014 00 and to wiring schematic in WP 0038 00.

3. Roll up and tie canvas cover.
4. Ground the unit.
5. Open the evaporator intake louver by moving the blades up or down as required.
6. Open the evaporator discharge louvers.
7. Adjust the ventilation damper control chain to close the damper door.
8. Turn the temperature selector switch from COOLER to WARMER (lowest heating position (ccw)).
9. Position main circuit breaker to ON.
10. Position the mode selector switch to HEAT.

Heating Operation

After starting the air conditioner in the heating mode, adjust it as follows:

1. Adjust the temperature selector switch from COOLER to WARMER to select the desired temperature. See Table 1 Operator Control Settings. Heaters will cycle to maintain setting of temperature selector switch.
2. Adjust the evaporator discharge louver blades to direct the airflow as desired.

NOTE

Warm air is less dense than cool air, so it has a tendency to rise. To obtain comfortable temperatures near the floor and lower parts of the room, it is often advisable to adjust the evaporator discharge louver blades to direct the air slightly downward.

Heating Operation with Fresh Air

1. Open the damper door by adjusting the ventilation damper control chain if fresh air is desired.
2. Partially close the evaporator intake louver blades.

Stopping The Air Conditioner

1. Position the mode selector switch to OFF.
2. Adjust the ventilation damper control to close the damper door.
3. If a shutdown is to be for an extended period, cover condenser side of unit with canvas cover and disconnect the power cable.

Ventilating Operation



WARNING

For safe operation, the air conditioner must be grounded prior to use.

To operate the air conditioner as a ventilating blower, without affecting temperature, proceed as follows:

1. Perform the preventive maintenance checks and services (WP 0010 00).
2. Check for the correct voltage and phase (208 volts, three-phase, 50/60 Hz for S9160-18KH-3 unit or 230 volts, single phase, 50/60 Hz for S9150-18KH-1 unit).

NOTE

The J2 connector is the main power input connector. The J1 connector at the back of the unit is the ALTERNATE input connector. To use the J1 ALTERNATE connector, the TB1 connections must be shifted from J2 to J1. Refer to CONNECT POWER SOURCE procedures in WP 0014 00 and to wiring schematic in WP 0038 00.

3. Roll up and tie the canvas cover.
4. Open the damper door by adjusting the ventilation damper control chain.
5. Partially close the evaporator intake louver blades.
6. Position the mode selector switch to VENT.
7. Open evaporator intake louvers.

Stopping The Air Conditioner

1. Position the mode selector switch to OFF.
2. Close the evaporator intake louver blades by pushing tabs down.
3. Adjust the ventilation damper control to close the damper door.

4. If a shutdown is to be for an extended period, cover condenser side of unit with canvas cover and disconnect the power cable.

OPERATOR CONTROL SETTINGS

Table 1 lists all operator control settings used during unit operation.

Table 1. Operator Control Settings

Mode	Mode Selector Switch	Temperature Control Thermostat	Fresh Air Damper	Evaporator Inlet Louver	Evaporator Outlet Louver	Fabric Cover
Ventilate with 100% recirculated air	VENT	Does not operate	Closed	Open	Adjust to suit	Rolled up and secured
Ventilate with makeup (fresh air)	VENT	Does not operate	Open	Partially closed	Adjust to suit	Rolled up and secured
Ventilate with 100% fresh air	VENT	Does not operate	Open	Closed	Adjust to suit	Rolled up and secured
Cooling with 100% recirculated air	COOL	Desired temperature	Closed	Open	Slightly up for best results	Rolled up and secured
Cooling with makeup (fresh air)	COOL	Desired temperature	Open	Partially closed	Slightly up for best results	Rolled up and secured
Heating with 100% recirculated air	HEAT	Desired temperature	Closed	Open	Slightly down for best results	Rolled up or snapped closed
Heating with makeup (fresh air)	HEAT	Desired temperature	Open	Partially closed	Slightly down for best results	Rolled up and secured

END OF WORK PACKAGE

**AIR CONDITIONER, COMPACT, HORIZONTAL
OPERATION UNDER UNUSUAL CONDITIONS**

INITIAL SETUP**References**

WP 0011 00 (PMCS)

Equipment Condition

Mode selector switch in OFF position

Correct voltage and phase power source (208 volts, three phase, 50/60 Hz, S9160-18KH-3 or (230 volts, single phase, 50/60 Hz for S9150-18KH-1 unit)

Perform operator PMCS (WP 0010 00) as necessary

General Installation Site Requirements

A relatively level surface.

An unobstructed flow of air from outside the area.

An unobstructed flow of air from inside the conditioned area.

An unobstructed flow of air from outside the conditioned area to the fresh air intake.

NOTE

The air conditioner can be equipped for operation in chemical biological radiological (CBR) environment by connecting filtering equipment to the rectangular covered opening to the lower left of the condenser guard in the rear of the unit.

OPERATION IN EXTREME COLD**General**

The air conditioner is designed to operate on the heating cycle in ambient temperatures as low as 50 degrees F (-45 degrees C) and on cooling cycle with 55 degrees F (12.8 degrees C) air entering the condenser and 70 degrees F (21 degrees C) air entering the evaporator.

Before Operation

Before starting operation, be sure canvas cover is rolled up and secured. Clear all ice and snow from openings. Be sure all dampers are in operating condition.

After Operation

Roll down and snap on canvas cover over condenser intake and outlet.

CAUTION

Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.

OPERATION IN EXTREME HEAT

General

The air conditioner is designed to operate satisfactorily at temperatures up to 120 degree F (49 degree C). If unit is operated at condenser inlet temperatures higher than 120 degree F (49 degree C), the cooling capacity will be lowered and long periods of operation at extended temperatures may cause compressor and condenser fan motor to overheat and trip their internal overload switches or the high pressure cutout switch to shut the unit off.

Filters

To maintain the highest capacity of the unit, the evaporator intake filter and mist eliminator filter should be cleaned weekly or more often if necessary. Dirty filters reduce the flow of air across the evaporator coil, thereby reducing the capacity of the air conditioner.

Guards and Louvers

Keep all guards and louvers clean and free of any obstructions to maintain full airflow through the air conditioner. Ensure the condenser louver in the rear of the unit is open during cooling mode.

Coils

Clean evaporator and condenser coils as frequently as necessary to prevent dirt or other matter from obstructing the air flow.

OPERATING IN DUSTY OR SANDY AREAS

1. Protection. Shield the air conditioner from dust as much as possible. Take advantage of any natural barriers which offer protection.
2. Cleaning. Keep the air conditioner as clean as possible. Pay particular attention to the louvers. Use compressed air, if available, to aid in cleaning.

NOTE

Never operate the unit without having the air filters in place.

OPERATION UNDER RAINY OR HUMID CONDITIONS



WARNING

Make sure power is disconnected from air conditioner before touching any wiring or other electrical parts.

Take special precautions to keep equipment dry. If installed outdoors, cover the equipment with a waterproof cover when it is not in use. Remove cover during dry periods. Take all necessary precautions to keep the electrical components free from moisture. Keep the fresh air vent damper door closed during heavy rain.

OPERATION IN SALT WATER AREAS**WARNING**

Ensure power source is disconnected prior to washing the air conditioner.

1. General. Wash the exterior and the condenser section of the unit with clean fresh water at frequent intervals. Be careful not to damage electrical system with water. Special attention must be given to prevent rust and corrosion.
2. Painting. Paint all exposed areas where paint has cracked, peeled, or blistered, or report condition to unit maintenance. Coat all exposed areas of polished metal with a light coat of grease.

END OF WORK PACKAGE

CHAPTER 3
OPERATOR TROUBLESHOOTING
PROCEDURES

OPERATOR TROUBLESHOOTING INTRODUCTION
AIR CONDITIONER, COMPACT, HORIZONTAL

MALFUNCTION/SYMPTOM INDEX

The malfunction/symptom index (WP 0008 00) is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in a troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

As the troubleshooting activity progresses through to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

TROUBLESHOOTING PROCEDURES

The troubleshooting work packages contain tables listing the malfunctions, tests or inspections, and corrective action required to return the air conditioner to normal operation. Perform the steps in the order they appear in the tables.

Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions which must be met before starting that task. **DON T START A TASK UNTIL:**

You understand the task.

You understand what you are to do.

You understand what is needed to do the work.

You have the things you need.

This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify unit maintenance.

GENERAL INFORMATION**Circuit Breaker**

If the circuit breaker (see Figure 1) opens (trips) after it has been reset, notify unit maintenance.

Fan and Compressor Motor Lubrications

Motors driving the evaporator, condenser fans and compressor are permanently lubricated. The compressor is a sealed unit complete with lubricant. The rotating parts do not need any lubrication.

Condenser Air Discharge Louvers and Control Linkages, Fresh Air Damper Door

Notify unit maintenance of any stiffness or binding of operation.

Air Louvers

The evaporator louvers should operate freely using finger pressure. If they bind, lubricate with a small amount of lightweight general purpose machine oil. Refer to Item 14, WP 0069 00.

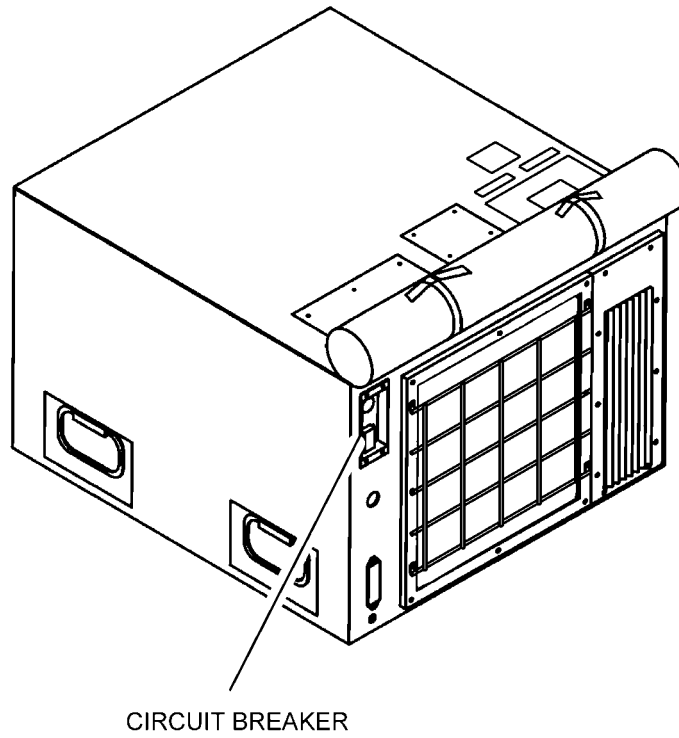


Figure 1. Air Conditioner Rear View

END OF WORK PACKAGE

OPERATOR/UNIT MALFUNCTIONS/SYMPTOM INDEX
AIR CONDITIONER, COMPACT, HORIZONTAL

MALFUNCTION/SYMPTOM	TROUBLESHOOTING PROCEDURE
Air Conditioner Fails to Operate	
1. Power cable not connected to proper voltage and phase or proper connector (J2 or J1 ALTERNATE).	WP 0009 00
2. Circuit breaker is OFF	WP 0009 00
3. Mode selector switch is in OFF position.	WP 0009 00
4. High pressure switch has not been reset.	WP 0009 00
Insufficient Cooling	
1. Mode selector switch is not properly positioned on COOL.	WP 0009 00
2. Temperature switch is not set correctly to COOLER.	WP 0009 00
3. Insufficient air is passing across the evaporator coil due to intake and discharge louver obstructions.	WP 0009 00
4. Too much outside air is entering the unit through the damper door.	WP 0009 00
5. Insufficient refrigerant in the system.	WP 0009 00
6. Insufficient air is passing through the condenser coil due to inlet and outlet louver instructions.	WP 0009 00
NOTE	
Report fault to unit maintenance personnel if any of the following conditions occurs.	
7. Solenoid coil on liquid line solenoid is inoperative.	WP 0013 00
8. Faulty evaporator blower motor bearings.	WP 0013 00
No Heat or Low Heat	
1. Temperature selector switch is not set correctly to WARMER setting.	WP 0009 00
2. Insufficient air is passing over heaters due to obstructions of evaporator air intake and discharge louvers.	WP 0009 00
3. Insufficient air is passing over heaters due to evaporator air intake louver blades being closed.	WP 0009 00

NOTE

Report fault to unit maintenance personnel if any of the following conditions occurs.

- | | |
|---|------------|
| 4. Faulty evaporator blower motor bearings. | WP 0013 00 |
|---|------------|

MALFUNCTION/SYMPTOM	TROUBLESHOOTING PROCEDURE
Compressor Will Not Start	
1. High or low pressure cut-out switch may have an open contact.	WP 0013 00
2. Possible loose electrical connections or faulty wiring.	WP 0013 00
3. Control circuit may have an open circuit.	WP 0013 00
4. Transformer winding may be faulty.	WP 0013 00
5. Time delay device may be faulty.	WP 0013 00
6. Faulty compressor contactor contacts or coil.	WP 0013 00
7. Damage of mode selector switch.	WP 0013 00

NOTE

If fault is not found, notify Direct Support maintenance.

Evaporator/Condenser Fan Motor Fails to Operate

1. Faulty fan motor or bad start capacitor.	WP 0013 00
2. Evaporator/condenser fan or motor binding.	WP 0013 00
3. Poor continuity of wiring or terminals.	WP 0013 00
4. Bad fan motor relay contacts or coil.	WP 0013 00
5. Damage of mode selector rotary switch.	WP 0013 00

END OF WORK PACKAGE

**OPERATOR TROUBLESHOOTING PROCEDURES
AIR CONDITIONER, COMPACT, HORIZONTAL**

THIS WORK PACKAGE COVERS:

Air Conditioner Fails to Operate, Insufficient Cooling, No Heat or Low Heat

INITIAL SETUP:**Maintenance Level**

Operator

FAULT PROCEDURE 1. AIR CONDITIONER FAILS TO OPERATE.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

AIR CONDITIONER FAILS TO OPERATE.

- Step 1. Verify that power cable is connected to proper voltage and phase with receptacle J2 or J1 ALTERNATE.
Connect power cable to receptacle. See WP 0038 00 schematic diagram.

NOTE

The J2 connector is the main power input connector. The J1 connector at the back of the unit is the ALTERNATE input connector. To use the J1 ALTERNATE connector, the TB1 connections must be shifted from J2 to J1. Refer to CONNECT POWER SOURCE procedures in WP 0014 00 and to wiring schematic in WP 0038 00.

- Step 2. Verify that internal power connections are for power receptacle being used (J2 or J1 ALTERNATE).
See WP 0040 00 Schematic Diagram for proper power connection for power receptacle being used.
- Step 3. Check to be sure that circuit breaker is on and the green POWER ON light is lit on the remote control module.
Reset circuit breaker.
- Step 4. Make sure that mode selector switch is not in OFF position.
Turn selector knob to desired operation.
- Step 5. Check that high pressure switch has been reset.
Wait for the pressure switch to auto reset and for the compressor to start.

FAULT PROCEDURE 2. INSUFFICIENT COOLING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

INSUFFICIENT COOLING

- Step 1. Check to be sure that mode selector switch is properly positioned.
Set switch to COOL.
- Step 2. Make sure that temperature switch is set correctly.
Adjust setting to COOLER.
- Step 3. Determine that sufficient air is passing across evaporator coil by placing a piece of paper in front of the evaporator air intake louver. The paper should be held against the louver blades by the air.
Open evaporator air intake louver blades. Remove any obstructions from evaporator air intake and discharge louvers. Direct discharge air louvers away from intake air. Refer to WP 0011 00.
- Step 4. Make sure that there is not too much outside air entering unit.
Close or adjust fresh air damper door.
- Step 5. Check liquid sight indicator to see whether there is sufficient refrigerant in the system.
If sight glass is not full and clean, report to Direct Support Maintenance Personnel.
- Step 6. Check to see that sufficient air is passing through condenser coil by placing a piece of paper on the condenser guard. The paper should be held against the guard by the air.
Remove any obstructions from condenser inlet and outlet. Make sure that condenser discharge louver vane outlets are open and directed away from the condenser coil (preventing recirculation of hot air). Refer to WP 0021 00.

FAULT PROCEDURE 3. NO HEAT OR LOW HEAT

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

NO HEAT OR LOW HEAT

- Step 1. Check to be sure that mode selector switch is properly positioned.
Set switch to HEAT.
- Step 2. Make sure that temperature selector switch is set correctly.
Adjust setting to warmer.
- Step 3. Check for sufficient air movement over heaters by placing a piece of paper in front of the evaporator air intake louver. The paper should be held against the louver by the air.
Remove any obstructions from evaporator air intake and discharge louvers. Make sure that evaporator air intake louver blades are open. Direct discharge air louvers away from intake air. Refer to WP 0011 00.
- Step 4. Make sure that there is not too much outside air entering unit.
Close or adjust fresh air damper door.

NOTE

If fault is not found, report to Unit maintenance.

END OF WORK PACKAGE

CHAPTER 4
OPERATOR MAINTENANCE
INSTRUCTIONS

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES
AIR CONDITIONER, COMPACT, HORIZONTAL

INITIAL SETUP:**Maintenance Level**Operator

INTRODUCTION**General**

Preventive Maintenance Checks and Services (PMCS) (refer to Table 1) are performed to keep the air conditioner in operating condition. The checks are used to find, correct, or report problems. Operator is to do the PMCS jobs as shown in the PMCS table. PMCS are done before and after the air conditioner is operated, using the PMCS table. Pay attention to WARNING and CAUTION statements. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged.

Before you operate, perform Before PMCS.

During operation, perform During PMCS.

After operation, perform After PMCS.

If you find something wrong when performing PMCS, fix it if you can, using troubleshooting procedures and/or maintenance procedures.

The right-hand column of the PMCS table lists conditions that make the air conditioner not fully mission capable. Write up items not fixed on DA Form 2404 for unit maintenance. For further information on how to use this form, see DA PAM 750-8.

If tools required to perform PMCS are not listed in WP 0083 00, notify unit maintenance.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS)

NOTE

Within designated intervals, these checks are to be performed in the order listed. Refer to Figure 1.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
1	Before	Ground Stud	Ensure unit is grounded with stud near control module.	Unit not grounded.
2	Before	Panels and Covers	Inspect for security of attachment and cleanliness. Report damaged condition to Unit Maintenance personnel.	Panels or covers missing or severely damaged.
3	Before	Fresh Air Filter	Inspect for cleanliness, obstructions, and insecure mountings. Remove obstructions.	Filter obstructed, damaged, loose, missing or requires cleaning.
4	Before	Condenser Coil Guard	Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to Unit Maintenance personnel.	Guard requires cleaning, if obstructed, damaged, loose or missing.
5	Before	Evaporator Air Discharge Louver	Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to Unit Maintenance personnel.	Louver requires cleaning, if obstructed, damaged, loose or missing.
6	Before	Evaporator Air Intake Louver	Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to Unit Maintenance personnel.	Louver requires cleaning, if obstructed, damaged, loose or missing.
7	Before	Condenser Louvers	Check for insecure mountings and damaged louver blades. Report damaged condition to Unit Maintenance personnel.	Louvers require cleaning if obstructed, damaged or loose.
8	Before	Information Plates	Check for security and legibility.	
9	Before	Condensate Drain Tubes	Inspect drains for obstructions. Remove obstructions as required.	Obstructions cannot be removed.
10	Before	Control Module	Ensure knobs are in place and check to see that switches function properly. Report damaged condition to Unit Maintenance personnel.	Knobs are missing or switches do not function properly.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
11	During	Liquid Sight Indicator	After approximately 5 minutes in COOL mode operation, check for moisture and low refrigerant charge. Yellow indicates moisture; bubbles or milky appearance indicates low charge. Report abnormal condition to Direct Support.	Moisture or low charge is indicated.

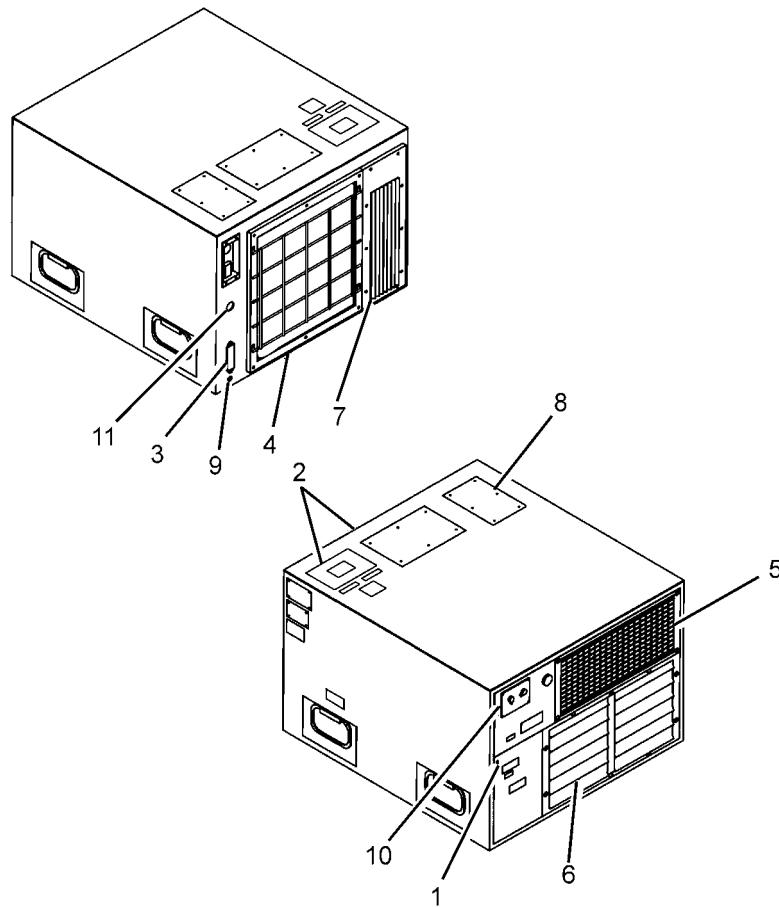


Figure 1. Air Conditioner Check Points

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
12	After	Panels and Covers	Inspect for security of attachment and cleanliness. Report damaged condition to Unit Maintenance personnel.	Panels and covers missing or severely damaged.
13	After	Fresh Air Filter	Inspect for obstructions and insecure mountings. Remove obstructions.	Filter missing, loose or damaged.
14	After	Condenser Coil Guard	Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to Unit Maintenance personnel.	Guard requires cleaning, if obstructed, damaged, loose or missing.
15	After	Evaporator Air Discharge Louver	Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to Unit Maintenance personnel.	Louver requires cleaning, if obstructed, damaged, loose or missing.
16	After	Evaporator Air Intake Louver	Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to Unit Maintenance personnel.	Louver requires cleaning, if obstructed, damaged, loose or missing.
17	After	Condenser Louvers	Check for insecure mountings and damaged louver blades. Report damaged condition to Unit Maintenance personnel.	Louvers require cleaning if obstructed, damaged or loose.
18	After	Information Plates	Check for security and legibility.	Safety decals missing.
19	After	Condensate Drain Tubes	Inspect drains for obstructions. Remove obstructions as required.	Obstructions cannot be removed.

END OF WORK PACKAGE

**OPERATOR MAINTENANCE INSTRUCTIONS
AIR CONDITIONER, COMPACT, HORIZONTAL
SERVICE, CLEANING, ADJUST**

INITIAL SETUP:**Materials/Parts**

Dry Cleaning Solvent (Item 16, WP 0069 00)
Brush
Cleaning Cloth (Item 9, WP 0069 00)

Personnel Required

One

WARNING

Ensure power source is disconnected before performing any maintenance function.

WARNING

Do not use compressed air for cleaning purposes except where reduced to less than 30 psi (2.1 kg/cm²) and then only with effective chip guarding and personnel protective equipment.

WARNING**DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

SERVICE AND CLEANING**Screens and Guards**

1. Brush off any loose dirt or foreign matter, and remove obstructions from the condenser guard and fresh air screen. See Figure 1.
2. Wipe off with a cloth moistened with dry cleaning solvent (WP 0069 00).
3. Inspect for security of attachment and damage.
4. Report damaged condition to unit maintenance personnel.

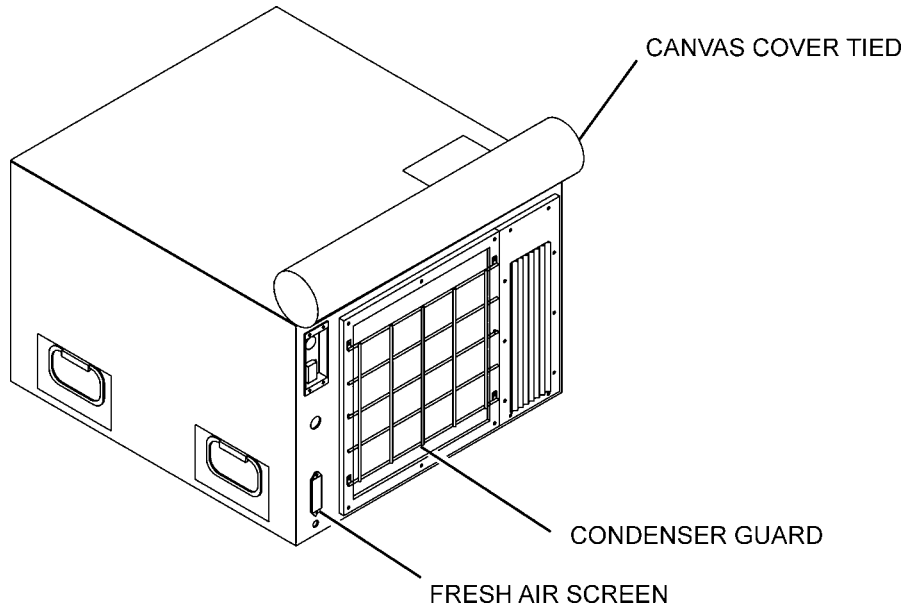


Figure 1. Screens and Guards

ADJUST

Evaporator Louvers

1. Position the evaporator air intake louver (see Figure 2) so that the louvers are fully open when the ventilation damper door is in the closed position. Partially close the evaporator inlet louver when the ventilation damper door is in the open position.
2. It is recommended that the evaporator air discharge louver be adjusted to direct the airflow slightly upward when the air conditioner is operated in the cool mode, and slightly downward when the air conditioner is operated in the heat mode.

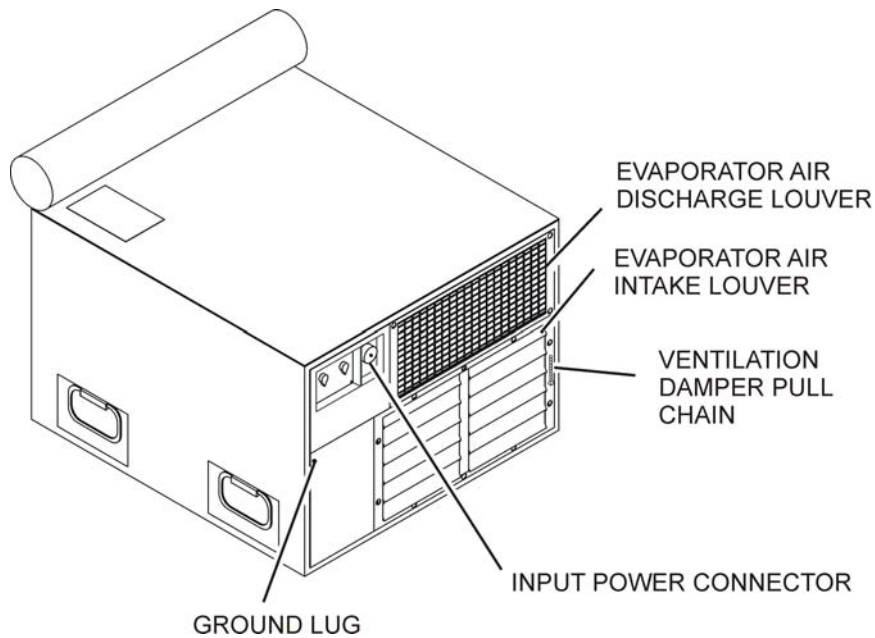


Figure 2. Evaporator Louvers

Ventilation Damper Control

1. Check for binding; remove obstructions.
2. Brush off any loose dirt or foreign matter.
3. Inspect for security of attachment and damage.
4. Report damaged condition to unit maintenance personnel.
5. Adjust ventilation damper control to desired degree of fresh air.

Remote Control Module

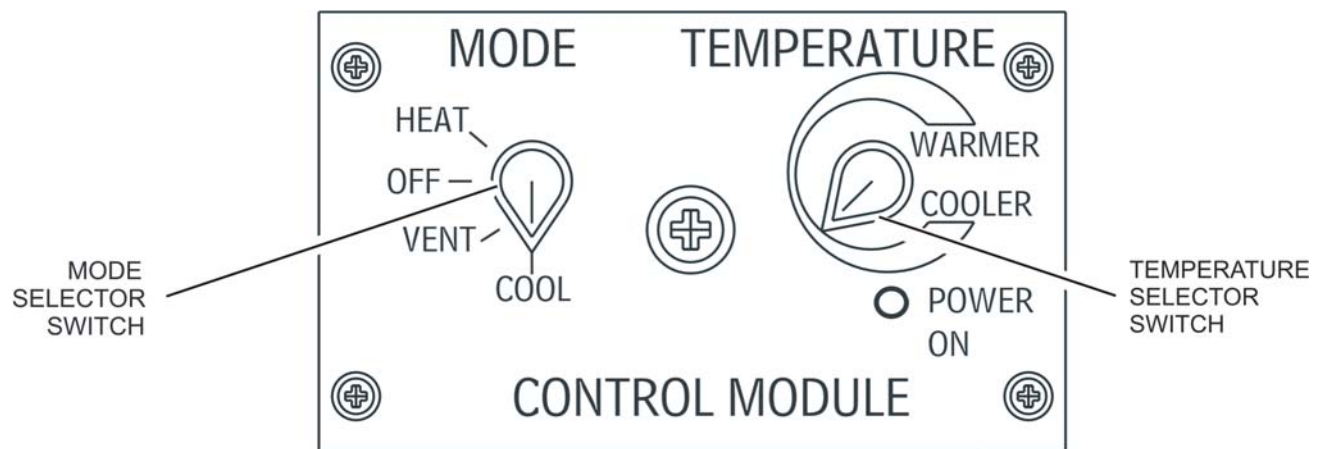


Figure 3. Remote Control Module

1. Rotate the temperature selector switch (see Figure 3) to cooler (counterclockwise) or warmer (clockwise) while the air conditioner is being operated in either the cool or heat mode in order to achieve the desired temperature in the conditioned area.
2. Rotate the mode selector switch to the vent, heat or cool position (clockwise), or to the heat position (counterclockwise).

END OF WORK PACKAGE

CHAPTER 5
UNIT TROUBLESHOOTING

UNIT TROUBLESHOOTING INTRODUCTION
AIR CONDITIONER, COMPACT, HORIZONTAL

MALFUNCTION/SYMPTOM INDEX

The malfunction/symptom index (WP 0008 00) is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in a troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

As the troubleshooting activity progresses through to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

TROUBLESHOOTING PROCEDURES

The troubleshooting work packages contain tables listing the malfunctions, tests or inspections, and corrective action required to return the air conditioner to normal operation. Perform the steps in the order they appear in the tables.

Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions which must be met before starting the task. **DO NOT START A TASK UNTIL:**

You check the power source voltage and phase.

You understand the task.

You understand what you are to do.

You understand what is needed to do the work.

You have the things you need.

This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify unit maintenance.

GENERAL INFORMATION**Fan and Compressor Motor Lubricants**

Motors driving the evaporator/condenser fan and compressor are permanently lubricated. The compressor is a sealed unit complete with lubricant. The rotating parts do not need any lubrication.

Mechanical Lubrication

The only mechanical items which may require lubrication are the conditioned air supply and return louvers, the condenser air discharge louver and control linkages. These points should be checked and lubricated, as necessary, during preventive maintenance service. A few drops of light oil should be applied to pivot points, bearing surfaces, and linkages to prevent or eliminate stiffness or binding. Be sure to wipe off all excess oil with a cloth or paper towel. These items are in an area of high volume air flow and excess oil will tend to attract and accumulate dust particles from the passing air. Graphite may be used as an alternate lubricant during extreme cold weather operation.

END OF WORK PACKAGE

UNIT TROUBLESHOOTING
AIR CONDITIONER, COMPACT, HORIZONTAL

THIS WORK PACKAGE COVERS:

Air Conditioner Fails to Operate, Insufficient Cooling, Fan Motor Fails to Operate, Compressor Will Not Start, Insufficient Heating

INITIAL SETUP:**Personnel Required**

One

Reference

WP 0008 00, Malfunction/Symptom Index

General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective actions in the order listed. Refer to the malfunction/symptom index (WP 0008 00) as a quick reference index for troubleshooting procedures.

This manual cannot list all malfunctions that may occur nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Control Circuit

The cause of a systems failure to operate can be greatly narrowed if the control that caused the failure can be isolated. It is the function of safety devices to open the circuit under certain conditions; therefore, additional checking may be required to determine whether the safety device is open because it is bad or because it is doing what it is supposed to do. The following steps contain instructions for checking the control circuit.

1. Disconnect power from the air conditioner and position Mode Selector rotary switch to OFF.
2. Test continuity across each control in the affected circuit, using an ohmmeter. Refer to the appropriate schematic diagram (WP 0038 00) as a guide to the connections in the circuit.
3. Replace defective parts.

Safety Devices

When testing the control circuit and other equipment, you must take into consideration the fact that open safety devices may not be bad. It may be normal for the device to be open under the existing conditions, or it may indicate trouble elsewhere in the air conditioner.

WARNING**R-22 REFRIGERANT**

Refrigerant under pressure is used in the operation of this equipment.

NOTE

Before using fault procedures, be sure you have performed all applicable operating checks.

FAULT PROCEDURE 1. AIR CONDITIONER FAILS TO OPERATE.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIR CONDITIONER FAILS TO OPERATE.

- Step 1. Make sure that you are using the correct voltage and phase.
Check line voltage with multimeter for 208 V ac, three-phase, 50/60 Hz power (S9160-18KH-3 unit) or 230 V ac, single phase, 50/60 Hz (S9150-18KH-1 unit).

NOTE

The J2 connector is the main power input connector. The J1 connector at the back of the unit is the ALTERNATE input connector. To use the J1 ALTERNATE connector, the TB1 connections must be shifted from J2 to J1. Refer to CONNECT POWER SOURCE procedures in WP 0014 00 and to wiring schematic in WP 0038 00.

- Step 2. Check to see that main power cable is connected to air conditioner and power source.
Connect power cable to receptacle. See WP 0038 00 schematic diagram.
- Step 3. Check to see whether CIRCUIT BREAKER is in the OFF position or is defective.
Reset circuit breaker.
Make continuity check with multimeter. Refer to WP0027 00.
- Step 4. Inspect main power receptacle connections for breaks.
Replace connector. (Refer to WP 0029 00).
- Step 5. Inspect rotary selector switch for incorrect setting. (See Table of Operator Control Settings.)
Turn selector switch to COOL or VENTILATE.
- Step 6. Disconnect control circuit transformer and make continuity check of primary and secondary windings, and from windings-to-case, using ohmmeter.
If windings do not show continuity or if windings-to-case continuity exists, replace transformer. (Refer to WP0030 00).

FAULT PROCEDURE 2. INSUFFICIENT COOLING.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

INSUFFICIENT COOLING

- Step 1. Check to see that Mode Selector switch is properly positioned.
Turn selector switch to COOL.

FAULT PROCEDURE 2. INSUFFICIENT COOLING - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

INSUFFICIENT COOLING

- Step 2. Check liquid sight indicator level to see that refrigerant is colorless and clear. Yellow indicates moisture in system. Milky or bubbly refrigerant indicates low level refrigerant charge.
Report condition to Direct Support Maintenance personnel.
- Step 3. Inspect condenser coil for dirt.
Clean coil with 25-30 psi (1.76-2.11 kg/cm²) compressed air.
- Step 4. Inspect evaporator air intake filter for dirt.
Clean filter.
- Step 5. Check for inoperative coil on liquid line solenoid valve.
 - a. Turn selector switch to OFF.
 - b. Turn circuit breaker to OFF.
 - c. Remove top cover (WP 0018 00).
 - d. Check wiring for loose connections and frayed wiring.
 - e. Remove coil from liquid line solenoid (WP 0032 00).
 - f. Turn on circuit breaker.
 - g. Turn selector switch to vent.
 - h. Check for magnetic field of coil.
 - i. Replace solenoid coil if no magnetic field is present (WP 0032 00).
- Step 6. Check for inoperative fan motor.
 - a. Check fan for operation by feeling for air flow from evaporator discharge louver.
 - b. Open fresh air damper and turn selector switch to vent and recheck for air flow.
 - c. If not air flow, turn unit off at remote control module and circuit breaker. Remove evaporator air intake louver (WP 0020 00) and check for faulty evaporator motor bearings. Use TEST procedure steps of WP 0035 00.

FAULT PROCEDURE 3. COMPRESSOR WILL NOT START.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

COMPRESSOR WILL NOT START



WARNING

Ensure the power source is disconnected.

- Step 1. Make sure that circuit breaker or selector switch is properly set.
Reset controls properly.

FAULT PROCEDURE 3. COMPRESSOR WILL NOT START - Continued

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR WILL NOT START

- Step 2. Check for open contacts of high-or-low-pressure cut-out switches (S4 and S5). (Refer to figure 1 and WP 0038 00.)

Check continuity of S4 and S5-pressure cut-out switches.

If continuity is found on the S4 low pressure switch, report fault to Direct Support Maintenance personnel if condition continues.

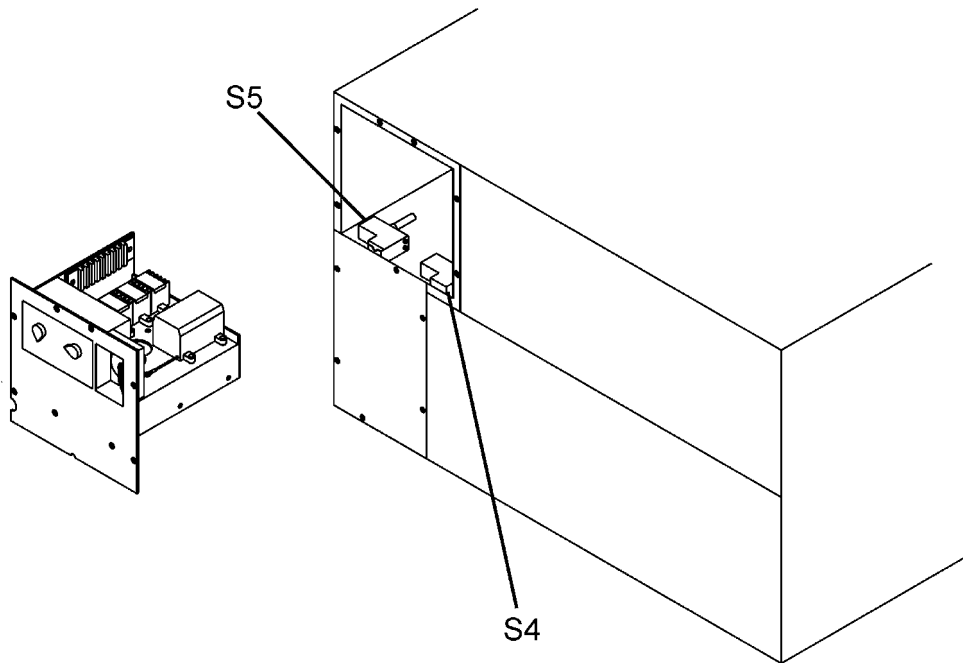


Figure 1. S4 and S5 Cutout Switches Location

- Step 3. Check for loose electrical connections.
Tighten loose connections. If wiring replacement is necessary, notify direct support.
- Step 4. Make continuity check of control circuit to determine whether open circuit exists. (Refer to WP 0038 00.)
Repair open circuit or replace wire. (Refer to WP 0031 00.)
- Step 5. Check continuity across primary winding and across secondary winding of control transformer to see whether windings are good. (Refer to WP 0030 00.)
Replace bad transformer. (Refer to WP 0030 00.)
- Step 6. Observe operating of time delay device and check continuity. (Refer to WP 0028 00.)
Replace bad time delay device. (Refer to WP 0028 00.)
- Step 7. Check that the Mode Selector switch is in the COOL position.
Switch to COOL position. Replace bad Mode Selector switch. (Refer to WP 0026 00.)

FAULT PROCEDURE 3. COMPRESSOR WILL NOT START - Continued

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR WILL NOT START

- Step 8. For S9150-18KH-1 unit, check start kit capacitors (C3 and C4) and relay for continuity. Replace faulty components (WP 0033 00).

FAULT PROCEDURE 4. INSUFFICIENT HEATING

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

INSUFFICIENT HEATING

- Step 1. Check that the MAIN CIRCUIT BREAKER is in the ON position and green POWER ON light is lit. Switch to ON position. Replace bad MAIN CIRCUIT BREAKER. (Refer to WP 0027 00.)
- Step 2. Check that Mode Selector switch is in HEAT position. Switch to HEAT position. Replace bad Mode Selector switch. (Refer to WP 0026 00.)
- Step 3. Check that Temperature Selector switch is in WARMER position. Switch to WARMER position. Replace bad Temperature Control. (Refer to WP 0028 00.)
- Step 4. Check for inoperative fan motor.
- Check fan for operation by feeling for air flow from evaporator discharge louver.
 - Open fresh air damper and turn selector switch to vent and recheck for air flow.
 - If not air flow, turn unit off at remote control module and circuit breaker. Remove evaporator air intake louver (WP 0020 00) and check for faulty evaporator motor bearings. Use TEST procedure steps of WP 0035 00.
- Step 5. Check continuity of two heater cutout switches at room temperature. Continuity should exist. (Refer to WP 0034 00.) Replace fault switch. See WP 0034 00.
- Step 6. Disconnect heater relay. Apply 24-28 volts to actuate relay and check continuity at power terminals. Continuity should exist. (Refer to WP 0028 00.) Replace faulty relay. (Refer to WP 0028 00.)
- Step 7. Check continuity of mode selector switch, temperature selector switch and thermostat. (Refer to WP 0034 00 and WP 0035 00.) Replace faulty switch. (Refer to WP 0026 00 and WP 0028 00.)
- Step 8. Check heater wiring and control circuit for loose connections or broken wires. Tighten loose connections. Replace or repair broken wires. (Refer to WP 0026 00, WP 0028 00, WP 0034 00, and WP 0038 00.)

NOTE

If fault is not found, report to Direct Support maintenance.

END OF WORK PACKAGE

CHAPTER 6
UNIT MAINTENANCE INSTRUCTIONS

**SERVICE UPON RECEIPT
AIR CONDITIONER, COMPACT, HORIZONTAL**

THIS WORK PACKAGE COVERS:

Unloading, Unpacking, Checking Unpacked Equipment, Installation, Connect to Power Source, Operation, Check and Adjustment

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

References

WP 0002 00 (Location of Main Components)
WP 0010 00 (Unit PMCS)
WP 0026 00 (Main Power Input Connector)
WP 0038 00 (Electronic Schematics)

Personnel Required

One

Equipment Condition

Main power source is disconnected.

UNLOADING

The air conditioner is packaged in a container designed for shipment and handling with the unit in an upright position. The base of the container is constructed as a shipping pallet with provisions for the insertion of the tongs of a forklift. The unit may be lifted by forklift, crane, or sling. To unload the air conditioner, perform the following steps.

1. Remove all blocking and tie downs that may have been used to secure the container to the carrier.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the equipment.

CAUTION

Use care when handling to avoid damage to the air conditioner. If an overhead lifting device must be used, use an appropriate sling so that the weight of the unit is supported by the base of the shipping container.

2. Use a forklift truck or other suitable material handling equipment to remove the unit from the carrier.

UNPACKING**CAUTION**

To protect the air conditioner and prevent damage, the air conditioner should be left packaged until it is moved to the location where it is to be installed.

NOTE

The shipping container is of such design that it may be retained for re-use for mobility purposes if frequent relocation of the air conditioner is anticipated.

1. Remove shipping container.
2. Cut the metal bands that hold the top of the container to the base.
3. Remove staples that secure fiberboard container to pallet.
4. Remove the cushioning around the top of the cabinet and retain if re-use is anticipated.
5. Remove the preservation barrier by tearing around the bottom of the cabinet.
6. Remove the technical publications envelope and accessory sack and put them in a safe place.

NOTE

It is recommended that the cabinet be left bolted to the shipping pallet until time to place it in the installation position. All receiving inspection actions can be conducted without removal from the pallet.

7. Remove pallet.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the equipment.

CAUTION

Use care when handling to avoid damage to the air conditioner. If an overhead lifting device must be used, use an appropriate sling so that the weight of the unit is supported by the base of the shipping container.

8. Attach an overhead hoist with an appropriate sling and spreader bar to the lifting fittings provided at each side of the cabinet, then raise the cabinet and remove the bolts that hold the air conditioner to the pallet.
9. Remove and retain the pallet and bolts if re-use is anticipated. Be sure to remove all remaining barrier material from the underside of the cabinet base.
10. Lower the cabinet to the floor in the desired position and remove the sling and hoist.
11. Refer to Table 1 for service upon receipt checklist.

Table 1. Service Upon Receipt Checklist

LOCATION	ITEM	ACTION	REFERENCE
1. Exterior	Louvers, Covers, Drains, Guards, Controls, Switches	Perform operator PMCS before you operate.	WP 0010 00
2. Front	Main Power Connectors	a. Inspect connectors for damage. b. Replace damaged connector.	WP 0029 00 WP 0029 00

CHECKING UNPACKED EQUIPMENT

1. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DA Form 368 Quality Deficiency Report (QDR).
2. Check the equipment against the packing slip to see if the shipment is correct and complete. Report all discrepancies in accordance with the instructions of DA PAM 738-8
3. Check to see whether the equipment has been modified.

INSTALLATION**General**

1. Air conditioner is assembled and ready for operation.
2. It contains full charge of refrigerant and compressor oil.

Mounting

1. Place the unit on a firm, level surface to permit proper drainage of water that condenses out of the air or rain.
2. Position the unit so that the control panel, the condenser, and the evaporator louvers are accessible to the operator and to maintenance personnel.
3. Check that there are no obstructions in front of any air intake or discharge louvers or other openings.
4. Refer to Figure 1. The dimensions for base-mounting holes on the enclosure mount (6) are shown on the dimension and hardware location illustration. The resilient mount (3), washer (2), spacer (4), elastomeric tube (5), and cap screw (1) are shipped with the air conditioner. Refer to Figure 2 showing front, top, and rear views for installation dimensions.
5. Connect a drain line if necessary.

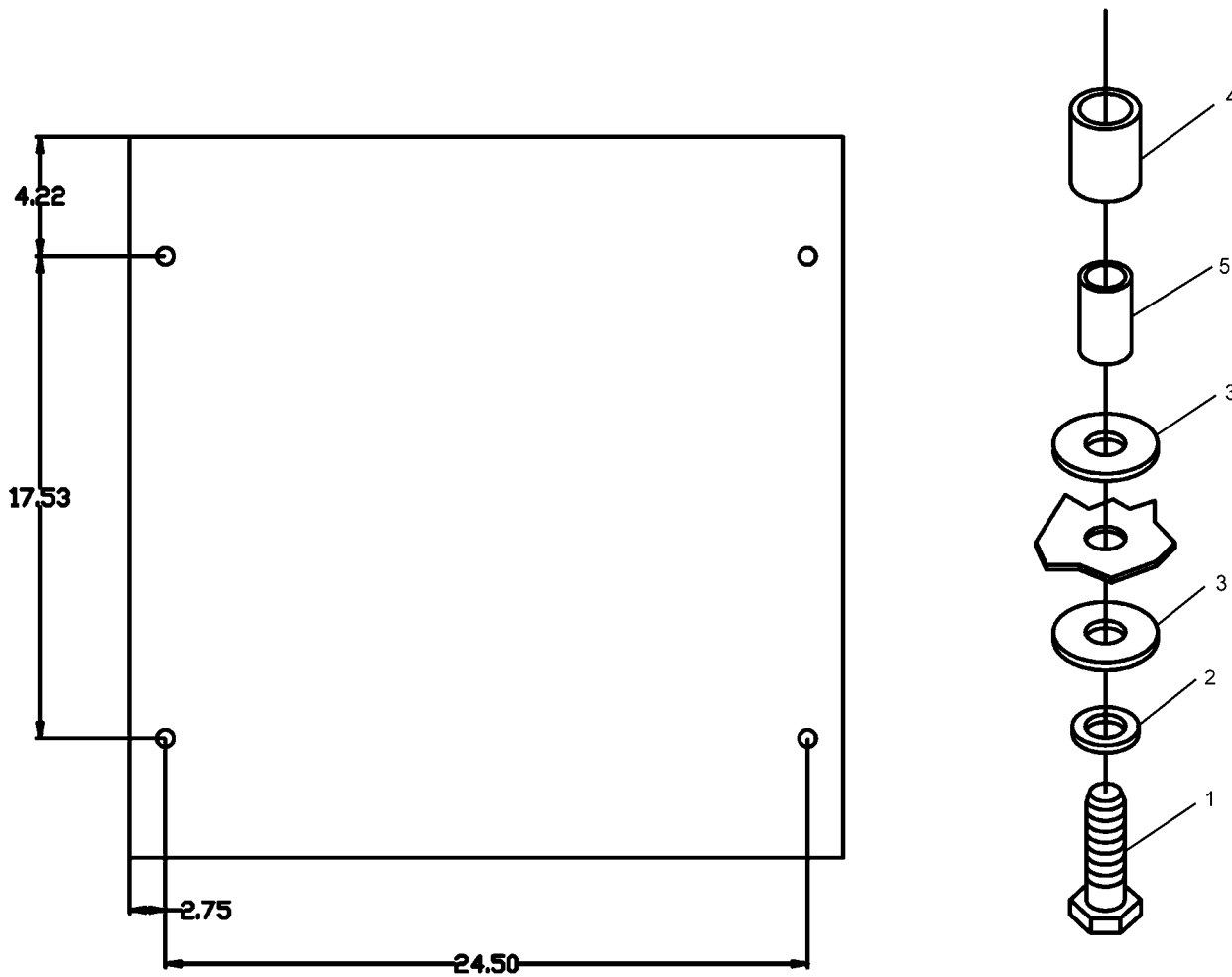


Figure 1. Base Mounting Holes

Grounding

1. Clean front of ground connection to obtain a bright metal surface.
2. Remove insulation from ends of grounding wire (8 AWG) or use bare ends. Make loop at wire ends.
3. Using 1/4-20 nut and washer, attach one end of wire to air conditioner front panel ground stud.
4. Wrap a suitable length of perforated strap around clean surface on water pipe or grounding rod.
5. Using a 1/4-20 screw, two washers and nut, attach other end of grounding wire to strap in a manner such as to securely tighten strap to pipe or grounding rod, (8 AWG) and wire to strap. If vehicle chassis is used, secure other end of grounding wire to vehicle chassis using screw, nut, and lockwasher. The screw shall fit in a tapped hole in the chassis or frame or it shall be held in hole by nut.

WARNING



The vehicle chassis (if used) must be grounded before power is supplied to the unit.

CONNECT POWER SOURCE**CAUTION**

For safe operation, be sure a ground wire (at least No. 8 AWG) is connected to the unit ground connection and a ground source.

CAUTION

Make sure the mode selector switch and circuit breaker are in the OFF position.

1. Connect a compatible air conditioner power cable to a 208 V ac, 50/60 Hz, three phase power source (S9160-18KH-3 unit) or 230 V ac, single phase, 50/60 Hz (S9150-18KH-1 unit).

NOTE

The J2 connector is the main power input connector. The J1 connector at the back of the unit is the ALTERNATE input connector. To use the J1 ALTERNATE connector, the TB1 connections must be shifted from J2 to J1. Refer to wiring schematic (WP 0038 00).

2. To change to the J1 ALTERNATE power input connector for the S9150-18KH-1 unit, perform the following:
 - a. Turn off the circuit breaker at the back of the unit.
 - b. Disconnect the power source if connected.
 - c. Partially remove the junction box assembly from the unit (WP 0028 00).
 - d. Remove two lock nuts and marker strip from terminal board TB1.
 - e. Disconnect black wire from CB-A1 to TB1-1 at TB1-1 and reconnect it at TB1-4.
 - f. Disconnect red wire from CB-A2 to TB1-2 at TB1-2 and reconnect it at TB1-5.
 - g. Install marker strip over terminal board TB1 and secure with two lock nuts.
 - h. Install junction box assembly into unit (WP 0028 00).
3. To change to the J1 ALTERNATE power input connector for the S9160-18KH-3 unit, perform the following:
 - a. Turn off the circuit breaker at the back of the unit.
 - b. Disconnect the power source if connected.
 - c. Partially remove the junction box assembly from the unit (WP 0028 00).
 - d. Remove two lock nuts and marker strip from terminal board TB1.
 - e. Disconnect black wire from CB-A1 to TB1-1 at TB1-1 and reconnect it at TB1-4.
 - f. Disconnect red wire from CB-A2 to TB1-2 at TB1-2 and reconnect it at TB1-5.

- g. Disconnect blue wire from CB-A3 to TB1-3 at TB1-3 and reconnect it at TB1-6.
- h. Install marker strip over terminal board TB1 and secure with two lock nuts (16).
- i. Install junction box assembly into unit (WP 0028 00).

OPERATION CHECK AND ADJUSTMENTS

1. Check operation of unit.
2. Check for proper power wiring sequence (ABC) which effects compressor direction of rotation. Incorrect wiring results in noisy compressor operation with little or no cooling. Prolonged operation in reverse direction will damage compressor.

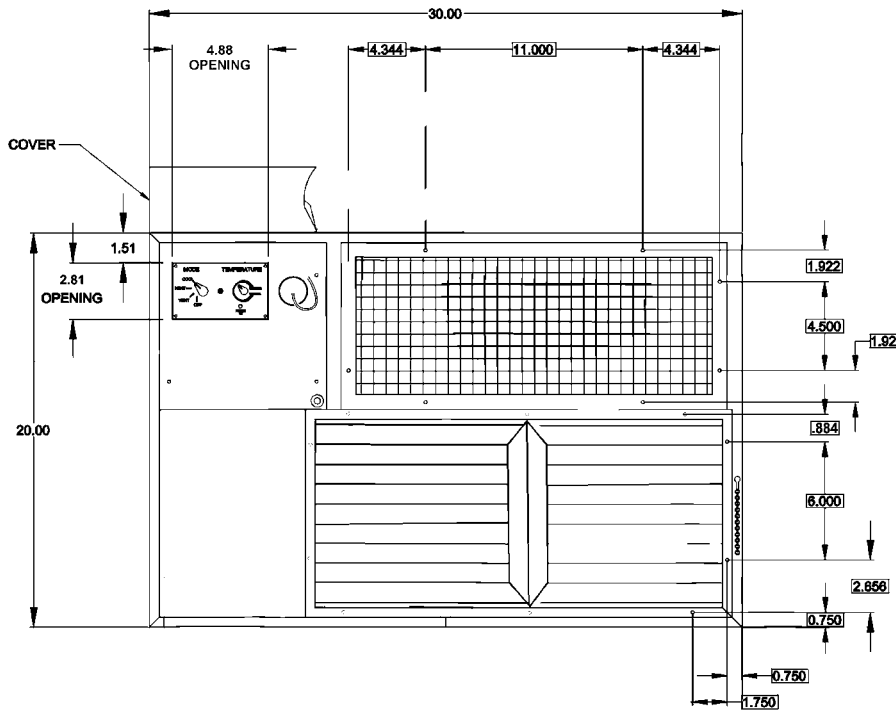


Figure 2. Installation Dimensions (Sheet 1 of 2)

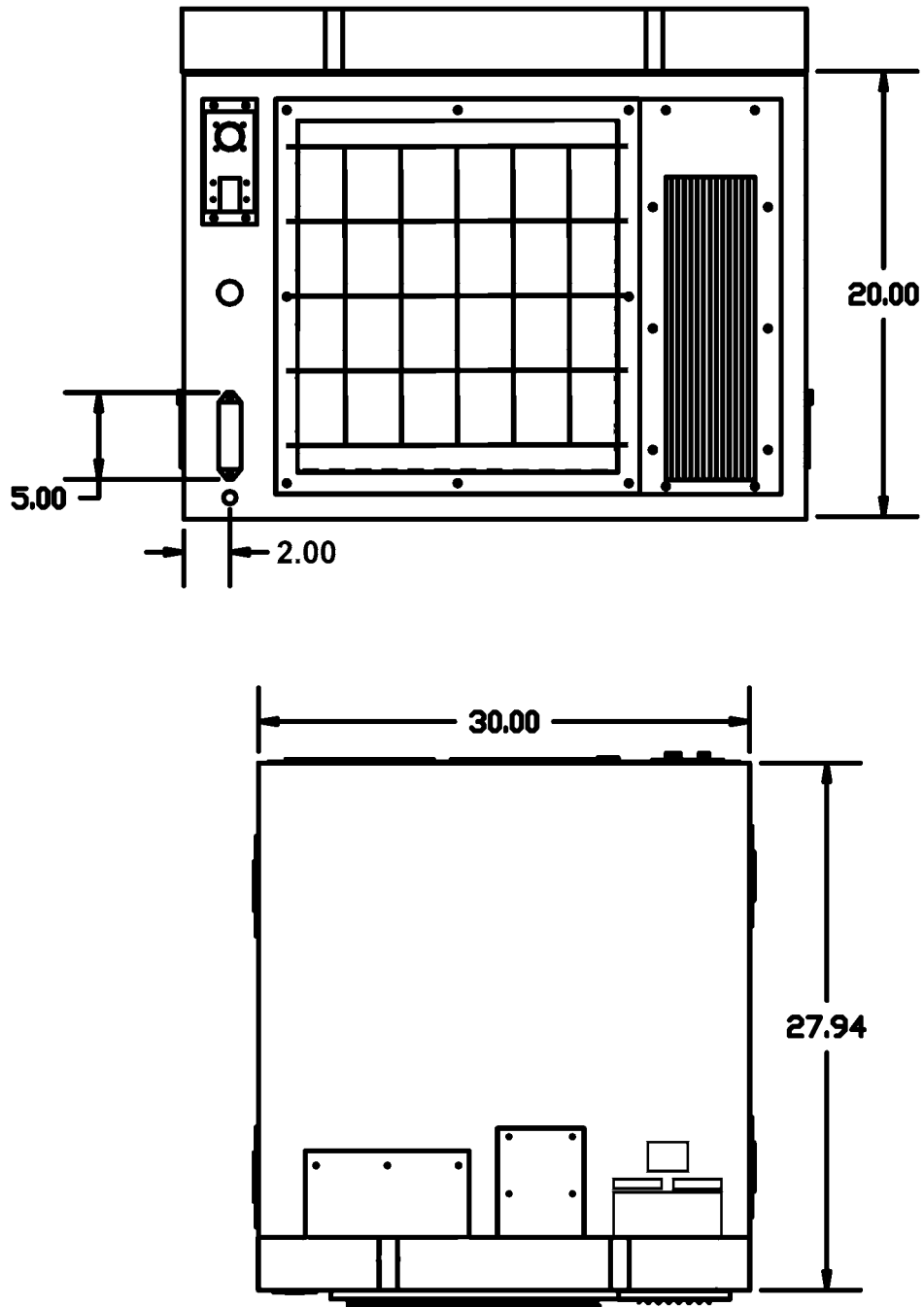


Figure 2. Installation Dimensions (Sheet 2)

END OF WORK PACKAGE

**UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES
AIR CONDITIONER, COMPACT, HORIZONTAL**

INITIAL SETUP:**Personnel Required**

One

Materials/Parts

Filter-kote (Item 17, WP 0069 00)

References

0018 00 (Top cover)

0020 00 (Louvers)

0024 00 (Condensate drains)

0028 00 (Electrical components)

Wire List and Schematic Diagram (WP 0038 00)

Equipment Condition

Main power source is disconnected.

INTRODUCTION**General**

To ensure that the air conditioner is ready for operation at all times, it must be inspected systematically so that the defects may be discovered and corrected before the result is serious damage or failure. Defects discovered during operation of the unit shall be noted for future corrections to be made as an operation has ceased. Stop operation which would damage the equipment if operation were to continue. All deficiencies and shortcomings shall be recorded together with the corrective action taken on DA Form 2404 or DA Form 5988E, Equipment Inspection and Maintenance Inspection Worksheet, at the earliest opportunity. If your equipment fails to operate, troubleshoot with proper equipment. Report any deficiencies using proper forms. See DA PAM 750-8.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLE**WARNING**

Ensure power source is disconnected to air conditioner.

WARNING**DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

WARNING



Do not use compressed air for cleaning purposes, except when reduced to less than 30 psi (2.1 kg/cm²) and then only with effective chip guarding and personal protective equipment.

Interval Column. Weekly and quarterly intervals are shown opposite the appropriate check. A weekly check is performed weekly. If the check is accomplished quarterly, it is shown as a quarterly interval.

Table 1. Unit Preventive Maintenance Checks and Services (PMCS)

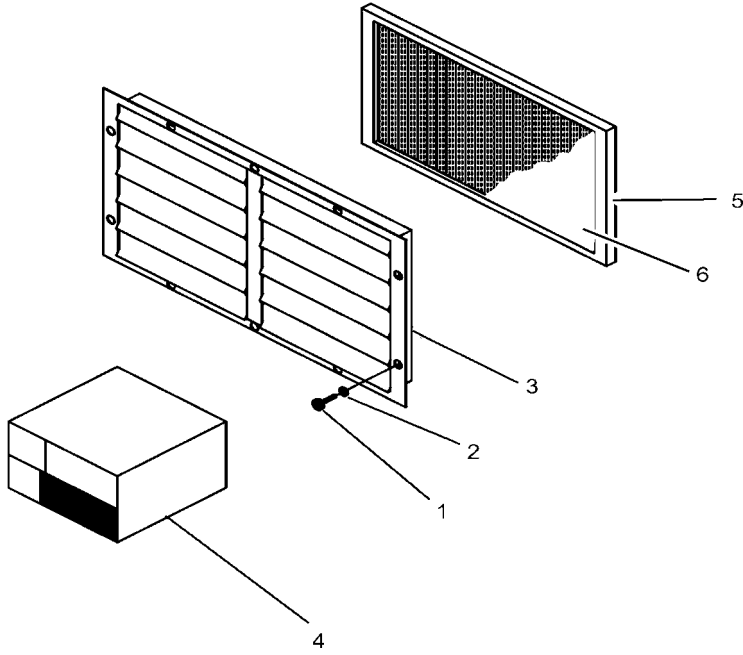
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
1	Weekly	Evaporator Air Intake Filter and Evaporator Air Intake Louver	 <ol style="list-style-type: none"> 1. See figure 1. Remove screws (1) and washers (2) to release evaporator air intake louver (3) from unit (4). Remove air filter (5) and filter media (6) by sliding filter out from either side of louver casing. 2. Inspect air filter (5) and filter media (6) for damage. Replace if damaged. 3. Clean air filter (5) and filter media (6) with mild soap and water solution. 	Items are damaged, missing, or clogged.

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) - Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
2.	Weekly	Evaporator Air Discharge Louver	<ol style="list-style-type: none"> 4. Inspect louver (3) for bent blades. Straighten or replace. 5. Lubricate air filter (5) with filter-kote (Item 17, WP 0069 00). Drain off excessive oil. 6. Slide air filter (5) and filter media (6) into attached clips of louver housing (3). 7. Install evaporator air intake louver (3) with screws (1) and washers (2). <ol style="list-style-type: none"> 1. See figure 2. Check louver (1) for dirt or damage. 2. Clean or replace damaged parts. 3. Inspect louver for bent blades. Straighten or replace. 	Louver is missing or needs to be replaced.

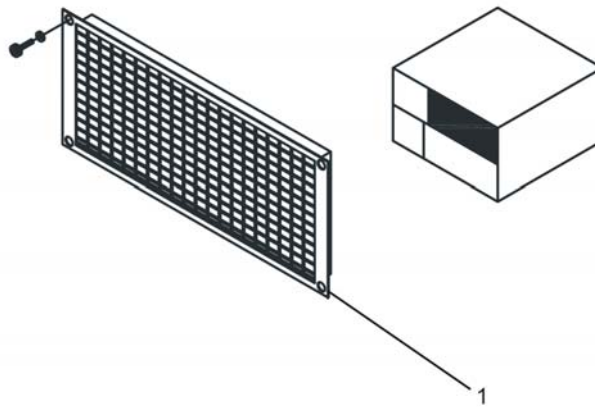


Figure 2. Evaporator Air Discharge Louver

3	Quarterly	Mist Eliminator	<ol style="list-style-type: none"> 1. See figure 3. Remove top cover (1). See WP 0018 00. 2. Slide mist eliminator (2) and filter media (3) out of the mist eliminator holder brackets (4 and 5). 3. Inspect mist eliminator (2) and filter 	Items are damaged, missing or clogged.
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Table 1. Unit Preventive Maintenance Checks and Services (PMCS) - Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			media (3) for damage. Replace if damaged. 4. Clean mist eliminator (2) and filter media (3). 5. Install mist eliminator (2) and filter media (3) in holder brackets (4 and 5).	
<p><i>Figure 3. Mist Eliminator</i></p>				
4	Quarterly	Evaporator and Condenser Fans and Motors	1. Remove top cover (WP 0018 00) and evaporator intake louver (WP 0020 00). 2. See Figure 4. Inspect evaporator motor (1), condenser motor (2) and impellers (3) and (4) for security of attachment, rubbing and free turning. 3. Check wiring for damage.	Items are loose or damaged.

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) - Continued

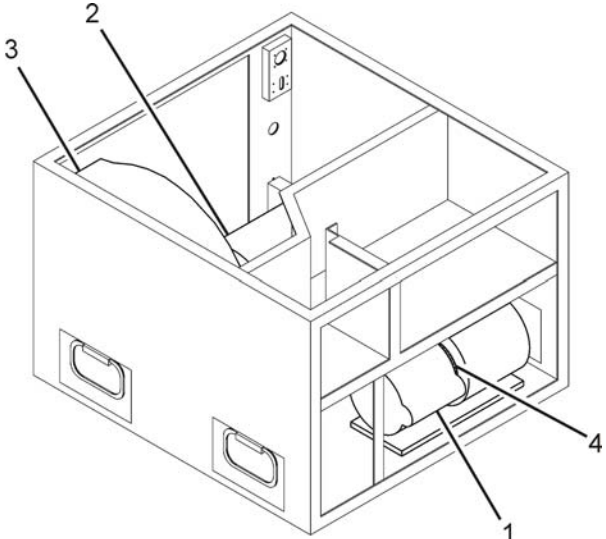

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
			4. Replace damaged impellers (3) or (4) or motors (1 and 2) (WP 0035 00 and WP 0037 00).	
				
<p><i>Figure 4. Evaporator and Condenser Fan Assemblies PMCS</i></p>				
5	Quarterly	Electric Heater Assembly	<p style="text-align: center;">WARNING</p> <div style="display: flex; align-items: center;">  <p>Ensure power source is disconnected before doing any maintenance work on this unit.</p> </div> <ol style="list-style-type: none"> 1. Remove covers. See WP 0018 00. 2. Check for breaks in wiring (1) and insulation. See figure 5. Tighten loose connections. 3. Check heating elements (2) for damage. 4. Clean heating elements (2). 5. Replace electric heating elements (2) if damaged (WP 0036 00). 	

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) - Continued

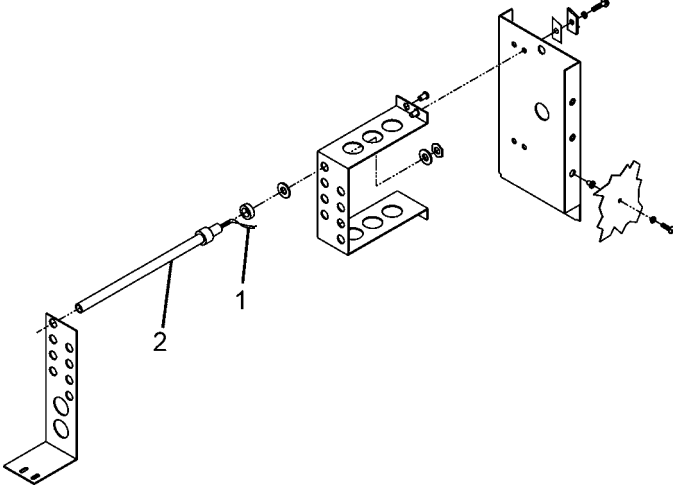
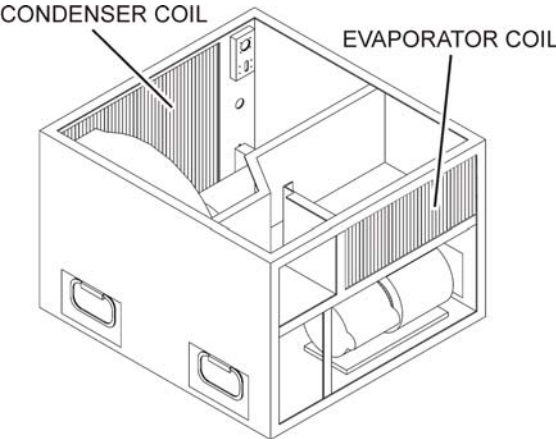
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
 <p data-bbox="581 892 998 924"><i>Figure 5. Electric Heater Assembly</i></p>				
6	Quarterly	Evaporator Coil and Condenser Coil	<ol style="list-style-type: none"> 1. Inspect coils for dirt or damage. Clean or report damage to Direct Support Maintenance personnel. 2. Inspect coils and tubing joints for leaks. Report damage to Direct Support Maintenance personnel. 	Item is dirty, damaged or leaking refrigerant.
 <p data-bbox="662 1722 917 1753"><i>Figure 6. Coil PMCS</i></p>				
7	Quarterly	Condensate Drain Lines and Openings	<ol style="list-style-type: none"> 1. Inspect condensate drain tubes and openings for blockage and bacteria growth. See Figure 7 and WP 0024 00. 	Drain tubes are blocked.

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) - Continued

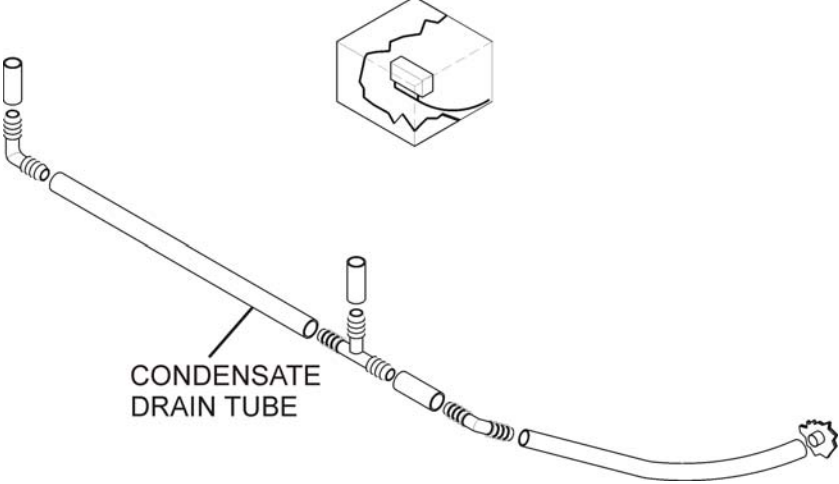
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				
<p><i>Figure 7. Condensate Drains</i></p>				
8	Quarterly	Louver Actuator-Linear Assembly and Fresh Air Damper Actuator Chain.	<ol style="list-style-type: none"> 1. Remove top cover (WP 0018 00). 2. Check that the chain and Fresh Air Damper operate smoothly and without binding . 3. Check that linear actuator and Condenser Discharge Louver operate smoothly and without binding (requires unit operation). Ensure the vanes of the Condenser Discharge Louver are angled outward and away from the condenser coil, eliminating the recirculation of heat. 4. Lubricate moving parts with small amount of oil (Item 14, WP 0069 00). 5. Check for loose or missing mounting hardware, bent louver or mechanical parts. 	Condenser Discharge Louver and/or Fresh Air Discharge Damper inoperative.
9	Quarterly	Control Box	<ol style="list-style-type: none"> 1. Pull out control box. Check for loose or disconnected wiring, cracks, or breaks. See WP 0028 00. 2. Check for loose or missing hardware. 	Disconnected wires, loose or missing hardware.

Table 1. Unit Preventive Maintenance Checks and Services (PMCS) - Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
10	Annually	Coil (Solenoid)	<ol style="list-style-type: none"> 1. Remove top covers (WP 0018 00). 2. Check wire leads for cracks, breaks, burns, rubbing and chaffing. 3. Check wiring clamp tie-down for loose or missing hardware. 4. Check tightness of all electrical terminals and connections. 5. Check electrical components for cracks, burns, or electrical arcing or tracking. 	<p>Repair or replace if any defects are found.</p> <p>Repair or replace if any defects are found.</p>

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
MECHANICAL AND ELECTRICAL REPAIRS

WARNING



Disconnect air conditioner power supply.

Maintenance of Mechanical Parts

The mechanical maintenance covered in this chapter include:

Canvas Cover.....	WP 0017 00
Condensate Drain Tube Assembly	WP 0024 00
Condenser Air Discharge Louver	WP 0021 00
Condenser Coil Guard	WP 0024 00
Covers and Fresh Air Screen	WP 0018 00
Evaporator Air Intake Filter.....	WP 0023 00
Evaporator Louvers	WP 0020 00
Fresh Air Damper	WP 0025 00
Information Plates.....	WP 0019 00
Installation Hardware	WP 0039 00
Louver Actuator Cables.....	WP 0032 00
Mist Eliminator.....	WP 0022 00

Maintenance of Electrical System

The electrical system is made up of:

Circuit Breaker	WP 0027 00
Coil (Solenoid Valve).....	WP 0032 00
Compressor (S9150-18K-1) Capacitors (C3) and (C4)	WP 0033 00
Condenser Fan and Motor	WP 0037 00
Electrical Components	WP 0028 00
Evaporator Fan Assembly	WP 0035 00
Heater Cutout Switch S3	WP 0034 00
Electrical Heater Elements	WP 0036 00
Main Power Input Connectors (J1) and (J2).....	WP 0029 00
Remote Control Module	WP 0026 00
Transformer	WP 0030 00
Unit Wiring.....	WP 0031 00
Wire Lists and Schematic Diagrams.....	WP 0038 00

Testing and Inspecting the Electrical System

WARNING



Ensure air conditioner power source is disconnected.

Troubleshooting procedures for testing the electrical system to isolate causes of trouble are discussed in WP 0013 00. More detailed test information is contained in specific paragraphs about the electrical components. Use a multimeter set on low-resistance range to test for continuity.

Use an insulation tester or a multimeter set on a high-resistance range to test for short circuits between the circuit in a component and the outside casing of the component.

When testing an electrical component, check for visible damage, and inspect all wiring in the area for damage.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CANVAS COVER - SERVICES
REMOVAL, INSPECTION AND CLEANING, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Dry Cleaning Solvent (Item 16, WP 0069 00)

Cloth, lint free (Item 9, WP 0069 00)

Personnel Required

One

WARNING

Ensure power source is disconnected.

REMOVAL

1. Loosen tie strap (1) on the canvas cover (2) (if rolled) and unroll cover. See Figure 1.

NOTE

Do not leave rolled up when wet. Spread canvas cover out flat until it is dry.

2. Remove four screws (3), four lockwashers (4) and four flat washers (5) to remove canvas cover (2) from top of unit (6).

INSPECTION AND CLEANING

1. Inspect for cuts, rips, tears, and fraying.

WARNING**DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

2. Inspect for stains, clean with detergent and water or dry cleaning solvent (Item 16, WP 0069 00) and lint free cloth.

NOTE

Do not roll up immediately after cleaning. Spread canvas cover out flat until it is dry.

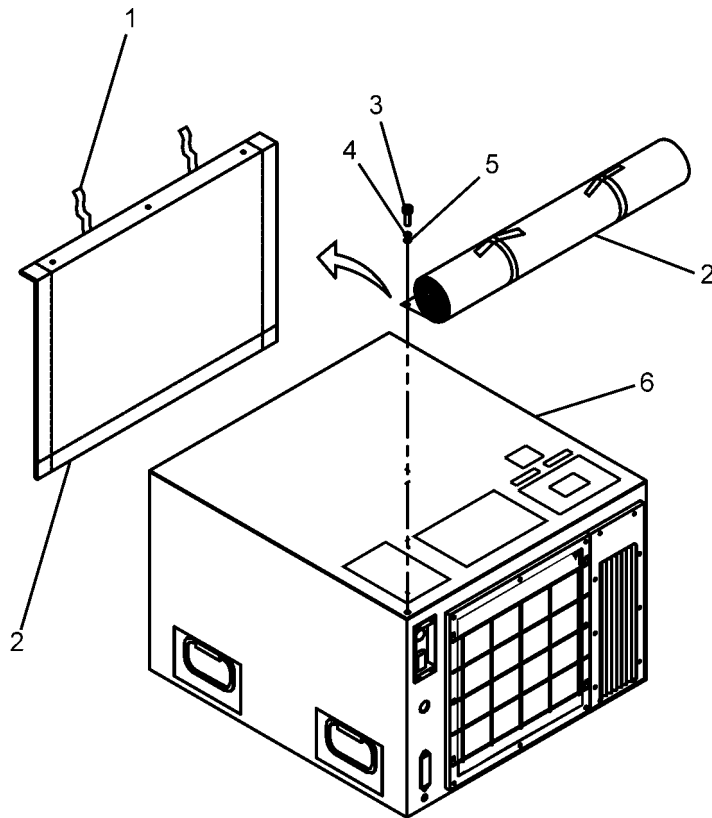


Figure 1. Canvas Cover

REPAIR

1. Repair minor fabric rips, cuts, tears or punctures by applying a patch of duct tape inside surface.
2. If damage to fabric cover is extensive, replace fabric cover.

INSTALLATION

1. Position canvas cover (2) on top cover (6) and align cover with corresponding holes.
2. Secure canvas cover (2) with four screws (3), four lockwashers (4), and four flat washers (5).
3. Button snap cover shut or roll up and tie with straps.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
COVERS AND FRESH AIR SCREEN - SERVICE
REMOVAL, CLEANING, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Warm, soapy water

Equipment Condition

Canvas covered removed (WP 0017 00)

Personnel Required

One

WARNING

Ensure power source is disconnected.

REMOVAL**Top Cover**

1. Remove 37 screws (1) securing top cover (2) to housing (8). See Figure 1.
2. Remove top cover (2).

Access Cover

1. Remove four screws (3) securing access cover (4).
2. Remove access cover (4).

Ventilation Guard

1. Remove two screws (5) and lock washers (6) securing fresh air screen (7).
2. Remove fresh air screen (6).

CLEANING

Clean dirty covers and fresh air screen with warm soapy water.

INSTALLATION**Ventilation Guard**

Align fresh air screen (7) to rear of unit and secure with two lock washers (6) and screws (5).

Access Cover

Align access cover (4) and secure with four screws (3).

Front Top Panel

1. Align top cover (2) and secure with 37 screws (1).
2. Attach canvas cover. See WP 0017 00.

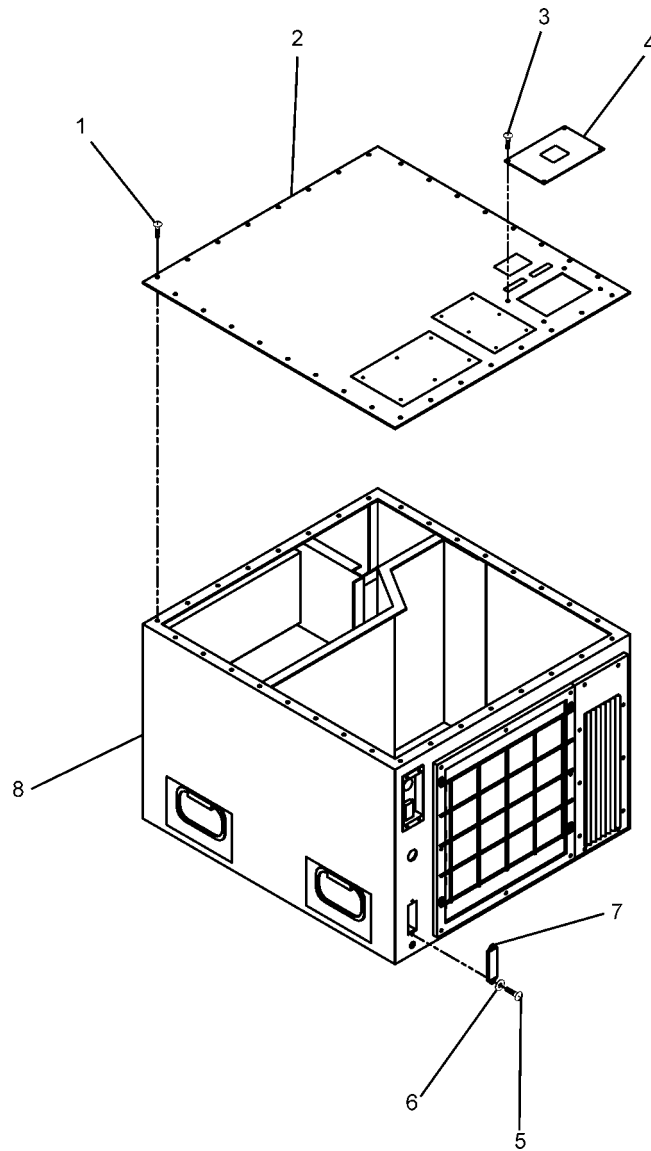


Figure 1. Covers and Fresh Air Screen

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
INFORMATION PLATES MAINTENANCE
REMOVAL AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Dry Cleaning Solvent (Item 16, WP 0069 00)

Warm soapy water

Personnel Required

One

Equipment Condition

Main power source disconnected

WARNING

Ensure power source is disconnected.

NOTE

Remove and replace only badly damaged, unreadable information plates. Refer to WP 0002 00 for text on each plate or decal.

REMOVAL**Decals**

Using a flathead screwdriver, remove the following decals (see Figure 1):

- High pressure charging valve decal (5)
- Charging valve access cover (6)
- Low pressure charging valve decal (7)
- Vent instruction decal (11)
- Grounding lug decal (12)
- Caution grounding decal (13)
- Danger decal (14)
- Lift caution decal (15)
- Warning decal (16)
- Caution (208 or 230) volts decal (18 or 19)
- Caution connect ground decal (20)

Plates

Using a 1/8 diameter drill, remove rivets (1 and 2) from the following information plates:

- Equipment data plate (3 or 4)
- Refrigeration diagram plate (8)
- Schematic diagram plate (9 or 10)
- Warranty plate (17)

INSTALLATION

1. Clean area on side of unit where identification plates will be installed with soap and water.
2. Remove protective paper from back of new decals to expose sticky surface.
3. Align decals to proper position and press in place.
4. Secure information plates (3 or 4), (8), (9 or 10), and (17) with rivets (1 or 2).

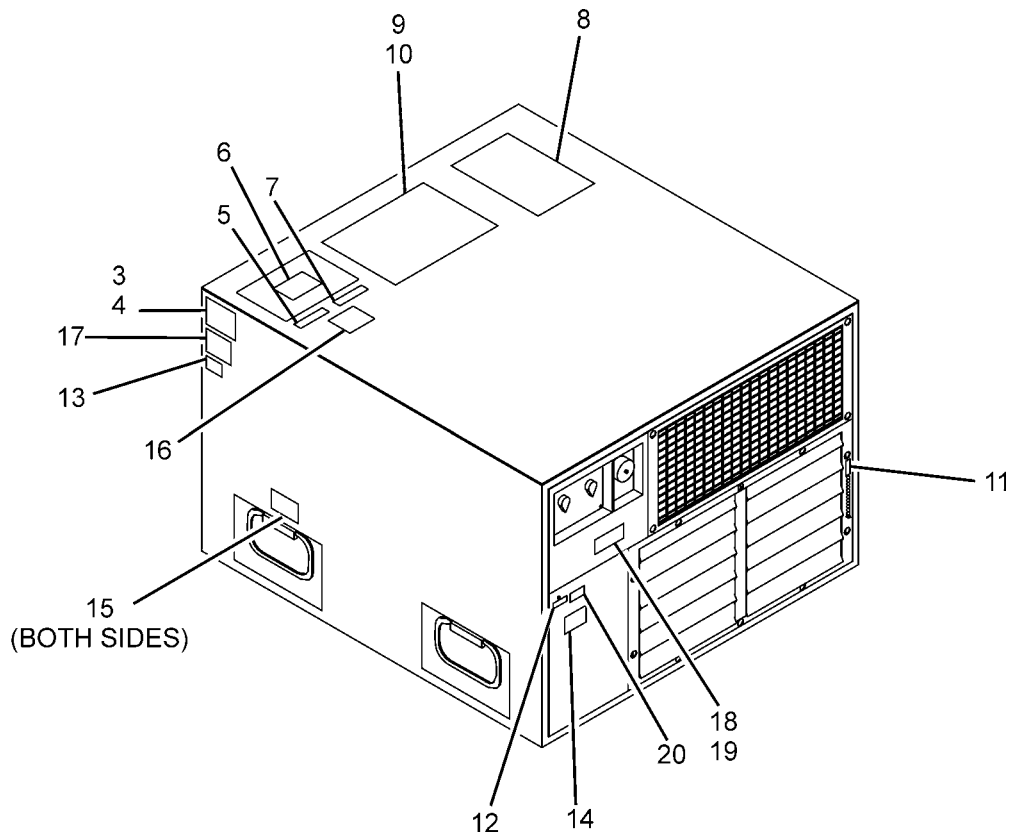


Figure 1. Decals and Plates Locations

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
EVAPORATOR LOUVERS SERVICE
REMOVAL, INSPECTION, CLEANING, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Personnel Required

One

Materials/Parts

Cloth, lint free (WP 0069 00)

Dry cleaning solvent (Item 16, WP 0069 00)

WARNING

Ensure power source is disconnected.

REMOVAL**Evaporator Air Intake Louver**

1. Remove eight screws (1) and eight lockwashers (2) securing louver (3) to housing. See figure 1.
2. Remove louver (3).
3. Remove evaporator air inlet filter (4) by sliding the filter out from either side of louver casing.

Evaporator Air Discharge Louver

1. Remove six screws (5) and six lockwashers (6) securing louver (7) to housing.
2. Remove louver (7).

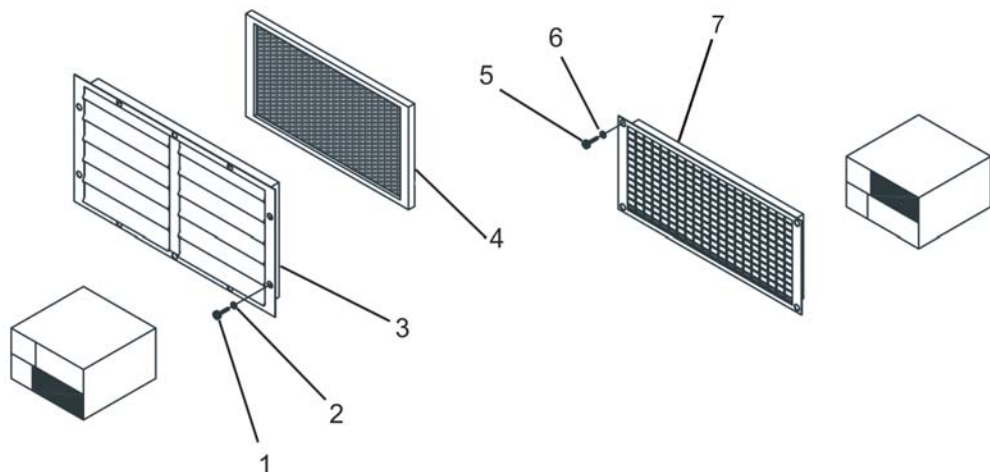


Figure 1. Evaporator Louvers

INSPECTION

1. Inspect louver blades for bends or damage and straighten.
2. Inspect evaporator air intake louver and evaporator air discharge louver for other damage.

CLEANING**WARNING****DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

1. Clear obstructions from louver blades using dry cleaning solvent or warm soapy water.
2. Clean louver blades of obstructions.

INSTALLATION**Evaporator Air Discharge Louver**

Align and secure louver (7) to housing using six screws (5) and six lockwashers (6), respectively.

Evaporator Air Intake Louver

1. Install evaporator air intake filter (4) into louver (3) by sliding the filter into either side of louver casing.
2. Align and secure louver (3) to housing using eight screws (1) and eight lockwashers (2), respectively.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CONDENSER AIR DISCHARGE LOUVER MAINTENANCE
REMOVAL, CLEANING, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Dry Cleaning Solvent (Item 16, WP 0069 00)

Personnel Required

One

Equipment Condition

Canvas cover detached (WP 0017 00)

Top cover removed (WP 0018 00)

WARNING

Ensure power source is disconnected.

REMOVAL**Condenser Guard**

Remove condenser guard (1) by removing five screws (2), lockwashers (3), and flat washers (4). See figure 1.

Condenser Air Discharge Louver

1. Remove five recessed screws (5) and two snap fastener cap screws (6) securing condenser air discharge louver (7) to housing.
2. Remove condenser air discharge louver (7) from housing by removing push-on nut (8) on pin of pivot arm (9) and lifting louver linkage off pin of pivot arm (9).

CLEANING**Condenser Guard and Louver**

1. Straighten condenser guard bent frame.

WARNING**DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

- Clean with warm soapy water or dry cleaning solvent (Item 16, WP 0069 00).

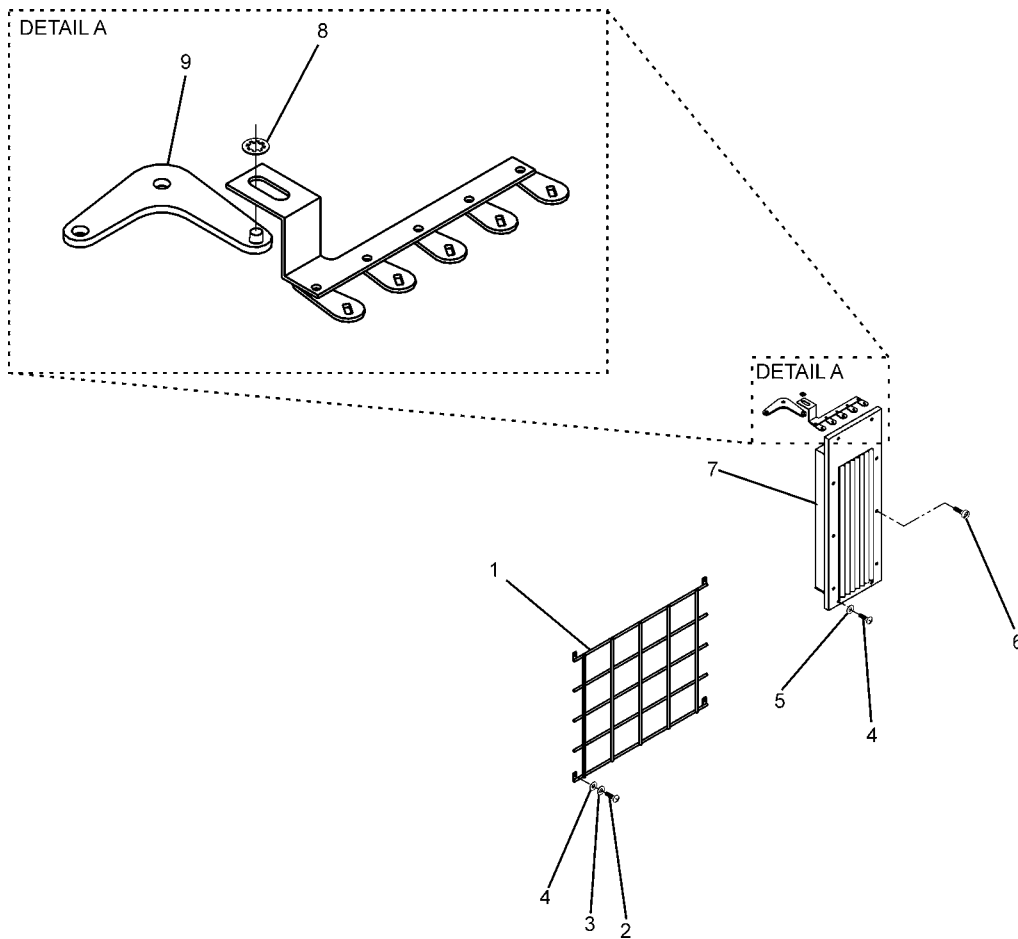


Figure 1. Air Discharge Louver and Condenser Guard

INSTALLATION

Condenser Air Discharge Louver

- Place condenser air discharge louver (7) into housing while inserting the louver linkage over the pin of the actuator-linear pivot arm (9). Install retainer push-on nut (8) over pin of pivot arm (9).
- Install five recessed screws (5) and two snap fastener cap screws (6) on the right side of the louver and on the top and bottom of the louver. The left side of the louver uses the same screws that secure the condenser guard.

Condenser Guard

- Install condenser guard (1) using five flat washers (4), lockwashers (3) and screws (2).
- Attach top cover. See WP 0018 00.
- Attach canvas cover. See WP 0017 00.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
MIST ELIMINATOR - SERVICE AND REPAIR
REMOVAL, CLEANING, REPAIR, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Hose, with running water

Personnel Required

One

Equipment Condition

Top cover removed (WP 0018 00)

WARNING

Ensure power source is disconnected.

REMOVAL

Slide mist eliminator (1) and filter media (2) up and out of mist eliminator holder brackets (3). See figure 1.

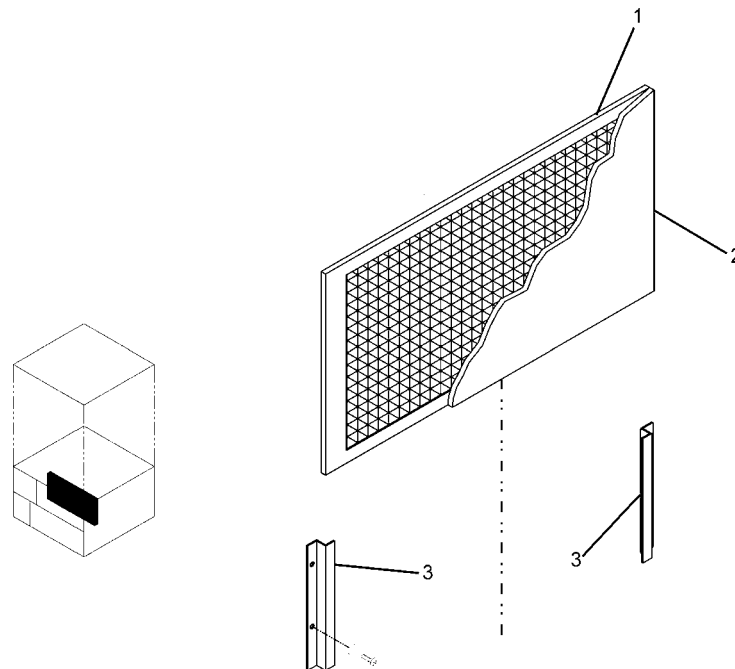


Figure 1. Mist Eliminator

CLEANING

1. Inspect mist eliminator for dirt, bends or warped frame.
2. Clean mist eliminator (1) and filter media (2) by hosing water through in opposite direction of airflow.

REPAIR

Replace bent or damaged mist eliminator.

INSTALLATION

1. Insert mist eliminator (1) and filter media (2) into mist eliminator holder brackets (3).

NOTE

Heed airflow direction arrow on mist eliminator frame.

2. Install cover. See WP 0018 00.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
EVAPORATOR AIR INTAKE FILTER - SERVICE/REPLACE
REMOVAL, CLEANING, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Hose, with running water

Filter-kote or oil (Item 17, WP 0069 00)

Dry Cleaning Solvent (Item 16, WP 0069 00)

Personnel Required

One

Equipment Condition

Evaporator inlet louver removed (WP 0019 00)

WARNING

Ensure power source is disconnected.

REMOVAL

With the evaporator air intake louver (1) removed, remove evaporator air inlet filter (2) and filter media (3) by sliding the filter and filter media out from either side of louver casing. See figure 1.

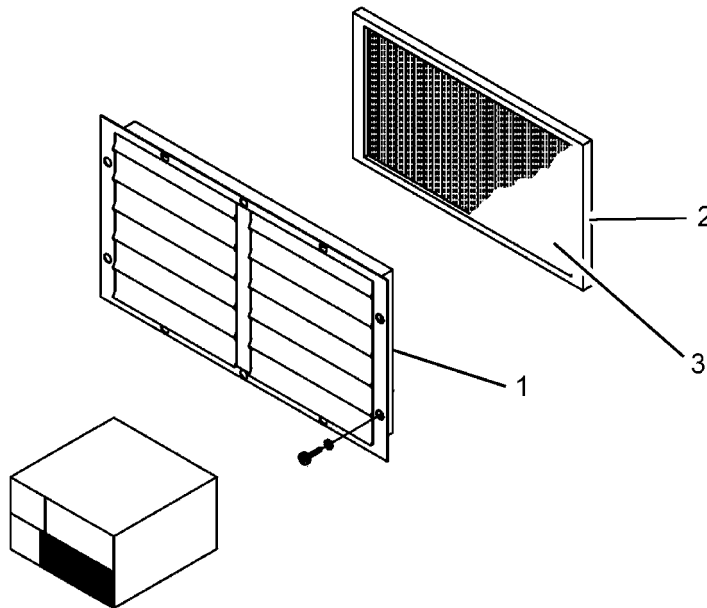


Figure 1. Evaporator Air Intake Filter

CLEANING**WARNING****DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

1. Inspect filter (2). Replace damaged filter and filter media. Clean with warm soapy water or dry cleaning solvent (Item 16, WP 0069 00). Hose with water in both directions.
2. Replace filters having breaks, tears, excess accumulations of dirt or grease, or other major damage.
3. Lubricate air filter with filter-kote (Item 17, WP 0069 00).

INSTALLATION

1. Install evaporator air intake filter (2) and filter media (3) into evaporator air intake louver (1) by sliding the filter and filter media into either side of lower casing.
2. Install evaporator air intake louver. (See WP 0019 00.)

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CONDENSATE DRAIN TUBE ASSEMBLY MAINTENANCE
REMOVAL, INSPECTION, CLEANING, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Water, warm soapy
Wire, soft 10-12 gage
Bleach and water solution, mild

Personnel Required

One

Equipment Condition

Top cover removed (WP 0018 00)
Evaporator inlet louver removed (WP 0020 00)
Mist eliminator removed (WP 0022 00)

WARNING

Ensure power source is disconnected.

REMOVAL

1. Detach the drain tubing (1 and 2) from the two condensate drains of the evaporator discharge compartment. See figure 1.
2. Detach the drain tubing (3) from the condensate drain pipe (4) at the rear of the evaporator inlet compartment.
2. Remove drain tube assembly from inside evaporator inlet compartment.

INSPECTION AND CLEANING

1. Clean tubing using warm soapy water or replace. Rinse with mild solution of bleach and water. Replace tubing if defective.
2. Clear obstructions from drains at bottom of evaporator compartment using soft wire. Rinse area with bleach solution.
3. Clear obstructions from drain outlets using soft wire. Insert wire from evaporator drain openings.
4. Replace damaged tubing, tee (7), or elbows (8 and 9) as necessary.

INSTALLATION

1. Reassemble tubing (1, 2, 3, 5, and 6) to elbows (8 and 9) and tee (7).
2. Install drain tube assembly by attaching tubing onto evaporator drains and rear drain pipe. Ensure tubing assembly slopes to outlet drain without trapping condensate.

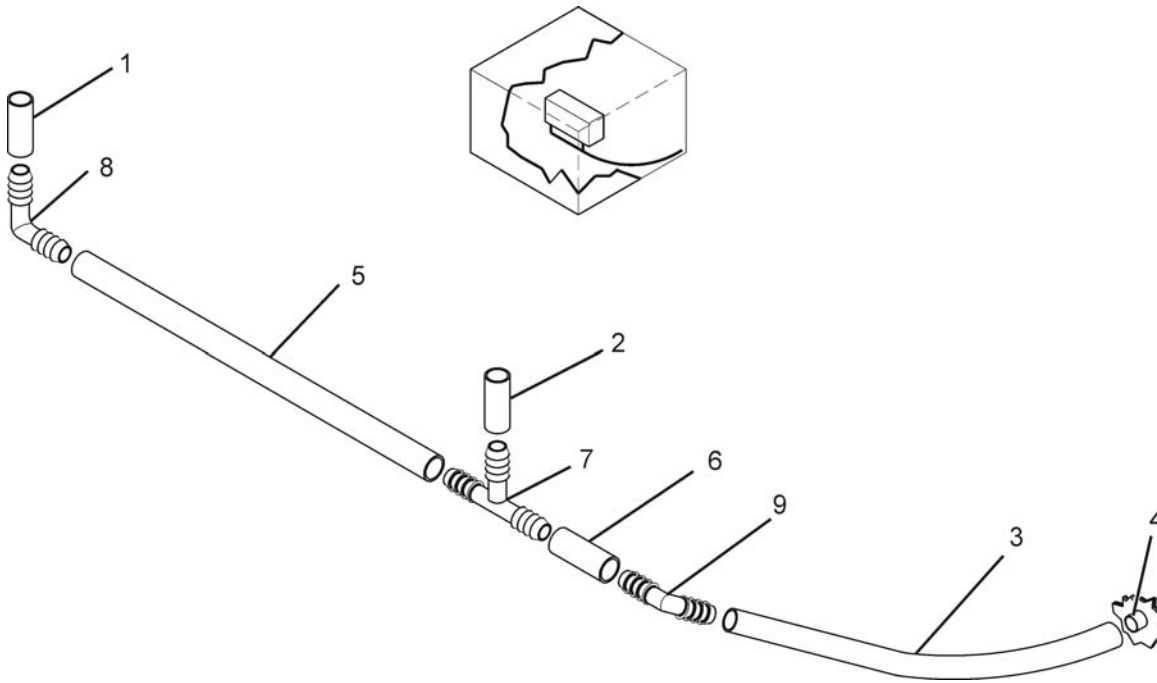


Figure 1. Condensate Drain Tube Assembly

3. Install mist eliminator. See WP 0022 00.
4. Align and install top cover. See WP 0018 00.
5. Install evaporator inlet louver. See WP 0020 00.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
FRESH AIR DAMPER ASSEMBLY MAINTENANCE
REMOVAL, DISASSEMBLY, INSPECTION, CLEANING, REPAIR,
ASSEMBLY, INSTALLATION, AND TEST

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Cloth, Lint Free (Item 8, WP 0069 00)

Dry Cleaning Solvent (Item 16, WP 0069 00)

Personnel Required

One

Equipment Condition

Evaporator air intake louver removed (WP 0020 00)

WARNING

Ensure power source is disconnected.

REMOVAL**Fresh Air Ventilation Damper**

1. Release ventilation damper chain (8) to close damper door (10). See figure 1.
2. Remove locknut (1) and screw (2) to release clamp (23) from side of unit housing.
3. Remove locknut (3) from screw (4) to release spring (13) from ventilation closeout at rear of unit housing.
4. Remove two screws (5) to release damper from side of unit housing.
5. Remove the ventilation damper from unit housing.

DISASSEMBLY

1. Remove screw (6) and nut (7) to release chain (8) from L-bracket (9) on damper door (10).
2. Remove screw (11) and nut (12) to release spring (13) from L-bracket (14) on damper door (10).
3. Remove screw (15) that secures L-bracket (9) to damper door (10).
4. Remove screw (16) and locknut (17) that secures L-bracket (14) to damper door (10).
5. Remove cotter pins (18) and shaft (19) that secure the damper door (10) to the hinge (20).

INSPECTION

1. Inspect ventilation damper parts for bending and warping.
2. Inspect insulation (21) for damage.

3. Inspect spring (13) for sufficient tension.
4. Inspect chains length to ensure proper action of damper plate.
5. Inspect condition of insulation tubing (22). Replace if necessary.

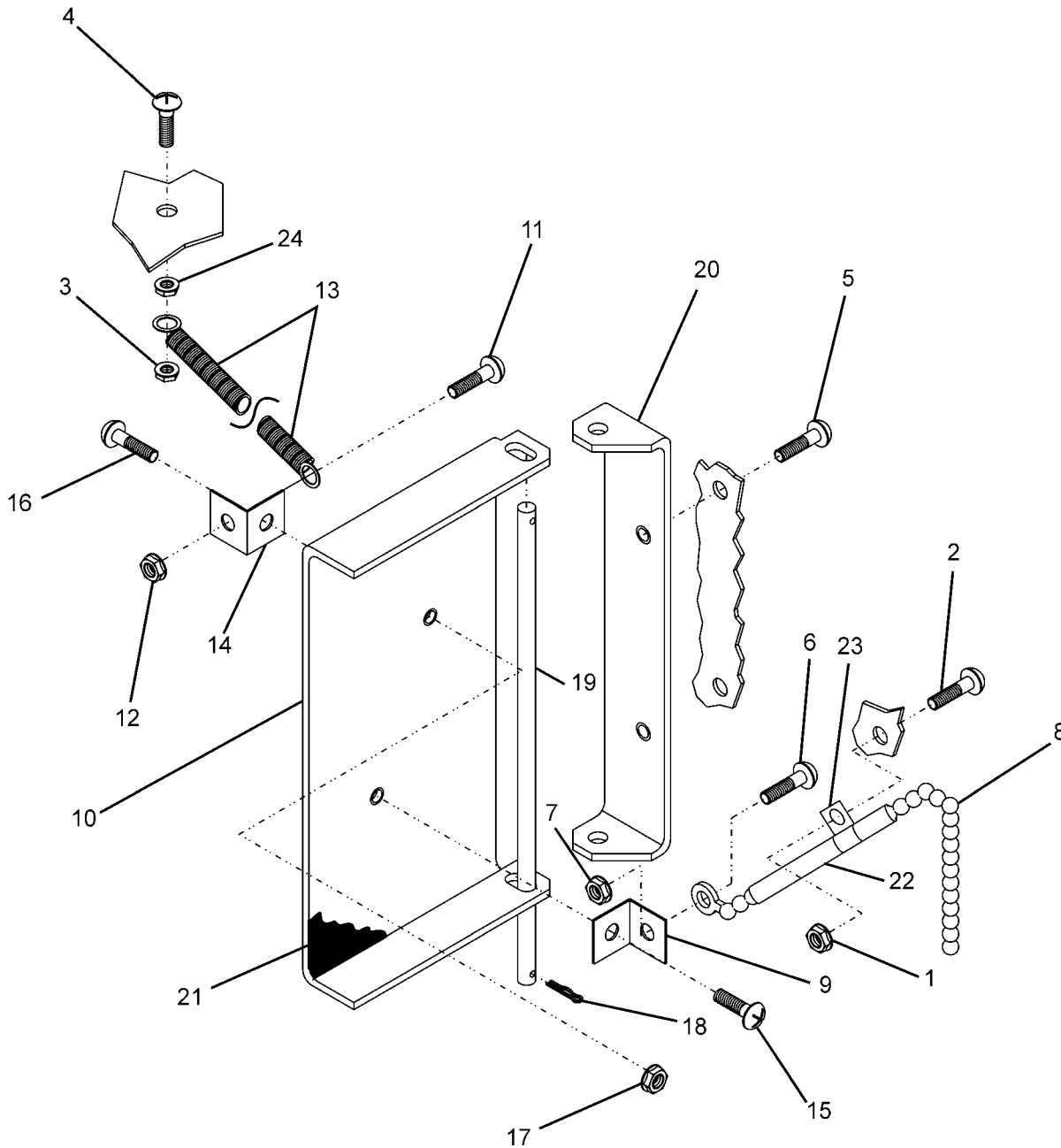


Figure 1. Fresh Air Damper Assembly

CLEANING

Wipe off dirt with clean lint-free cloth (Item 9, WP 0069 00) moistened with warm soapy water or dry cleaning solvent (Item 16, WP 0069 00).

WARNING



DRY CLEANING SOLVENT P-D-680

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

REPAIR

1. Straighten damper door (10) and hinge (20) if bent or warped. Replace if necessary.
2. Replace damaged insulation (21).
3. Replace spring (13) if has loose tension.
4. Replace chain (8) if too short.
5. Replace damaged tubing (22).

ASSEMBLY

1. Attach damper door (10) to hinge (20) with shaft (19) and cotter pins (18).
2. Attach L-bracket (14) to damper door (10) with screw (16) and locknut (17).
3. Attach L-bracket (9) to damper door (10) with screw (15).
4. Attached spring (13) to L-bracket (14) on damper door (10) with screw (11) and locknut (12).
5. Attached chain (8) to L-bracket (9) on damper door (10) with screw (6) and locknut (7).

INSTALLATION

1. After replacing defective parts, place ventilation damper into unit housing.
2. Install two screws (5) to secure hinge (20) of ventilation damper to side of unit housing.
3. Ensure screw (4) is attached tightly with locknut (24) to ventilation closeout at rear of unit housing.
4. Insert spring (13) onto screw (4) in ventilation closeout at rear of unit housing and secure with locknut (3).
5. Install clamp (23) with screw (2) and locknut (1) to side of unit housing.

TEST

1. Position ventilation damper actuator chain (8) to fully closed position.
2. Shine flashlight into fresh air damper screen side of unit while looking into vent housing from compartment. Ensure no light can be seen around edges of damper insulation seal. If test fails, service or replace ventilation damper as necessary.
3. Install evaporator air intake louver (WP 0020 00).

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REMOTE CONTROL MODULE MAINTENANCE
REMOVAL, INSPECTION, TEST, DISASSEMBLY, REPAIR, ASSEMBLY, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 15, WP 0069 00)

Test Equipment

Multimeter

References

Wire List and Schematic Diagram, WP 0038 00

Personnel Required

One

Equipment Condition

Air conditioner shut down and cool.

Power disconnected from unit.

Top cover removed (WP 0018 00)

WARNING

Ensure power source is disconnected.

REMOVAL**Control Module**

1. Loosen connector post screw counterclockwise until remote control module is freed from unit. See figure 1.

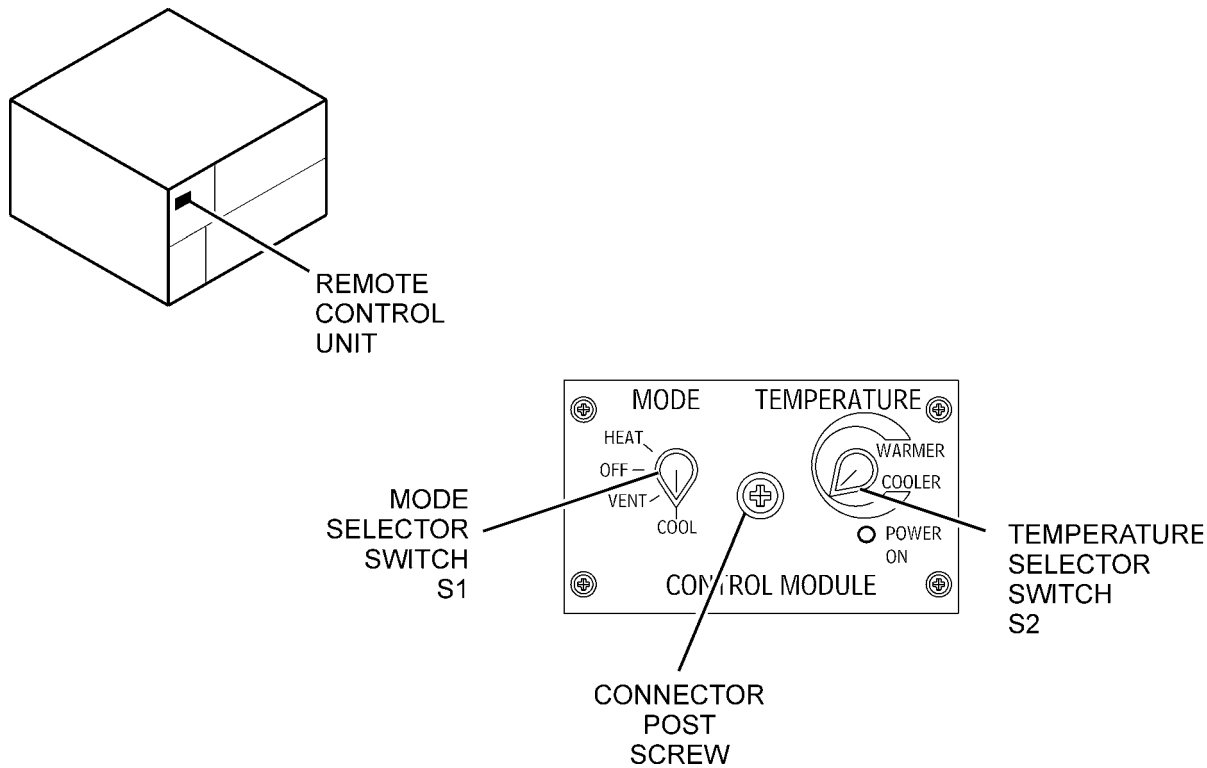


Figure 1. Control Module. Front Panel

- Carefully pull remote control module straight out of unit to disconnect connector P3 from J3 in rear of remote control module. See schematic diagram (WP 0038 00).

INSPECTION

Temperature Selector Switch S2(15) (Refer to Exploded View Figure 3)

- Turn temperature control knob (4) from stop-to-stop to ensure smooth operation. Replace if binding occurs.
- Inspect temperature control knob (4) for chips, cracks, or if indicator line cannot be readily seen. Replace if found defective.

Mode Selector Switch S1(12) (Refer to Exploded View Figure 3)

- Inspect selector knob (3) for chips, stripping out, cracks, or damage. Replace if found defective.
- Inspect for distinct click when changing positions. Replace switch if not found.

TEST

NOTE

Test of temperature selector switch (S2) and mode selector switch S1 can be performed prior to disassembly by using connector P3 pin contacts as test points. Refer to schematic diagram (WP 0038 00).

Temperature Selector Switch S2(15) (Refer to Exploded View Figure 3)

1. Turn mode selector switch S1(10) to OFF position.
2. Check for continuity using a multimeter on the lowest ohm setting. Place probes on the connector pins 1 and 12 of connector P3. Continuity should be indicated.
3. Turn switch to COOLER (fully counterclockwise). No continuity should exist.

NOTE

Switch operates in temperature range of 90 degrees F to 60 degrees F (32.2 degrees C to 15.5 degrees C).

4. Turn switch to WARMER (fully clockwise). Meter should show continuity as setting becomes higher than bulb temperature.

Mode Selector Switch S1(12) (Refer to Exploded View Figure 3 and Table 1)

1. Ensure temperature selector switch (S2) (15) is in WARMER position.
2. Check continuity of mode selector switch S1 as follows:
 - a) Switch in OFF position. No continuity should be indicated between connector pins 3 and 7; 5 and 8; or 6 and 1.
 - b) Switch in VENT position. Continuity should be indicated between connector pins 3 and 7.
 - c) Switch in HEAT position. Continuity should be indicated between connector pins 5 and 8.
 - d) Switch in COOL position. Continuity should be indicated between connector pins 6 and 1.
3. Replace if switch fails test.

Table 1. Switch Selection and Terminals

MODE SELECTOR SWITCH				
POSITION	FUNCTION	SWITCH SELECTION AND TERMINALS CONNECTED		
		S1A	S1B	S1C
1	OFF	----	----	----
2	VENT	A AND B	----	----
3	HEAT	A AND B	E AND D	----
4	COOL	A AND B	----	C AND F

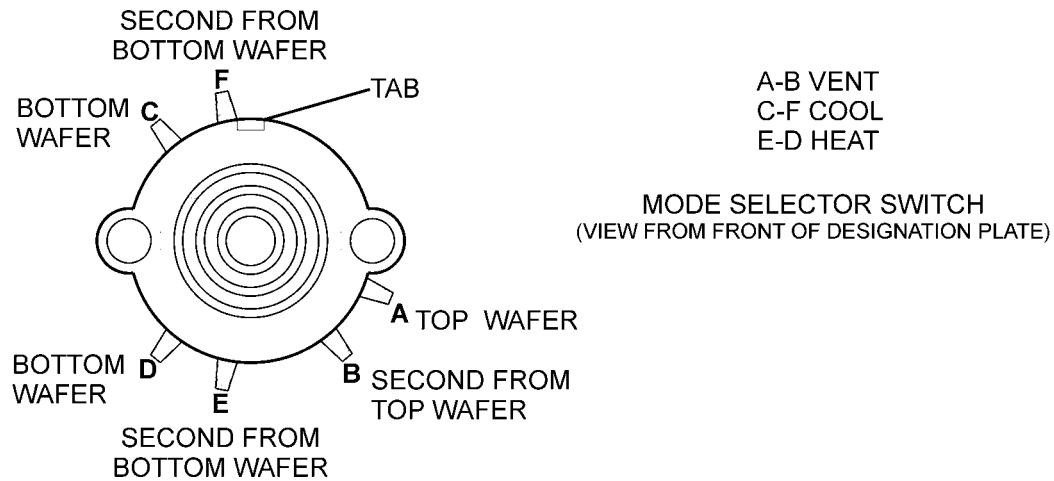


Figure 2. Mode Selector Switch

DISASSEMBLY (Refer to Exploded View Figure 3)

NOTE

Disassembly should be limited to the replacement of defective parts.

1. Loosen setscrew on knob (3) and remove knob from mode selector switch (12).
2. Loosen setscrew on knob (4) and remove knob from potentiometer (15).
3. Remove four screws (5), four flat washers (7), and four lock washers (6), to open control box (9) and control panel (8). Be careful of the wiring.
4. Remove mode selector switch S1 (12) from control panel (8) by removing nut (10) and star washers (11).
5. Remove temperature selector switch S2 (15) from control panel (8) by removing nut (13) and star washer (14).
6. If to be replaced after inspection and test, tag and disconnect wires (22) from defective mode selector switch S1 (12) and temperature selector switch S2 (15).
7. Remove two nuts (19), two flat washers (18), two lock washers (17) and two screws (16), and connector P3 (21) from control box (9).
8. Remove nut (27) to release ground wire. Remove wire ties (24) as required.
9. Leave insulation (30) and flexible tubing (23) and (31) in place unless damaged. If damaged, replace.
10. Leave stop nut (28) and lock washer (29) in place unless defective. If defective, replace.

REPAIR

Control Panel

1. Remove dents or deformation, if minor. Replace if major.
2. Replace if marking is illegible.

Connector with Leads (20).

1. Inspect wiring for breaks, fraying, discoloration, or damage. Replace if found.
2. Inspect soldered connections for breaks or damage. Repair or replace if found.
3. Inspect pins for bending or corrosion. Straighten bent pins if possible. Clean minor corrosion. Replace if necessary.
4. Inspect electrical contacts for corrosion. Replace or clean as necessary.
5. Tag leads if disassembly is required.
6. Check for continuity by touching the test probes of a multimeter set on low-resistance range, to the ends of wire and/or corresponding pin of connector. See WP 0040 00, schematic diagram.
7. Replace pins and wire if continuity is not indicated.

ASSEMBLY

1. Attach connector P3 (21) to control box (9) and install two screws (16), two flat washers (18), two lock washers (17), and two nuts (19).
2. Install temperature selector switch S2 (15) into control panel (8) with star washer (14) and nut (13).
3. Install mode selector switch S1 (12) into control panel (8) with star washers (11) and nut (10).
4. Refer to tags installed during removal and reconnect all wires to mode selector switch S1 (12) and temperature selector switch S2 (15), and then remove tags.
5. Reconnect ground wire with screw (25), washer (26), and nut (27).
6. Install screw (2), lock washer (29), and nut (28) into control panel (8), if removed.
7. Install control panel (8), with four lock washers (6), four flat washers (7), and four screws (5).
8. Install knob (4) with set screw onto temperature selector switch S2(15).
9. Install knob (3) with set screw onto mode selector switch S1 (12).

INSTALLATION

1. Place remote control module (1) into opening in front of unit.
2. Ensure connector P3 (21) on back of remote control module is mated securely to connector J3 on junction box panel. See schematic diagram (WP 0038 00).

3. Secure remote control module (1) with screw (2) by turning screw clockwise.
4. Install top cover (WP 0018 00).
5. Reconnect air conditioner to power source.

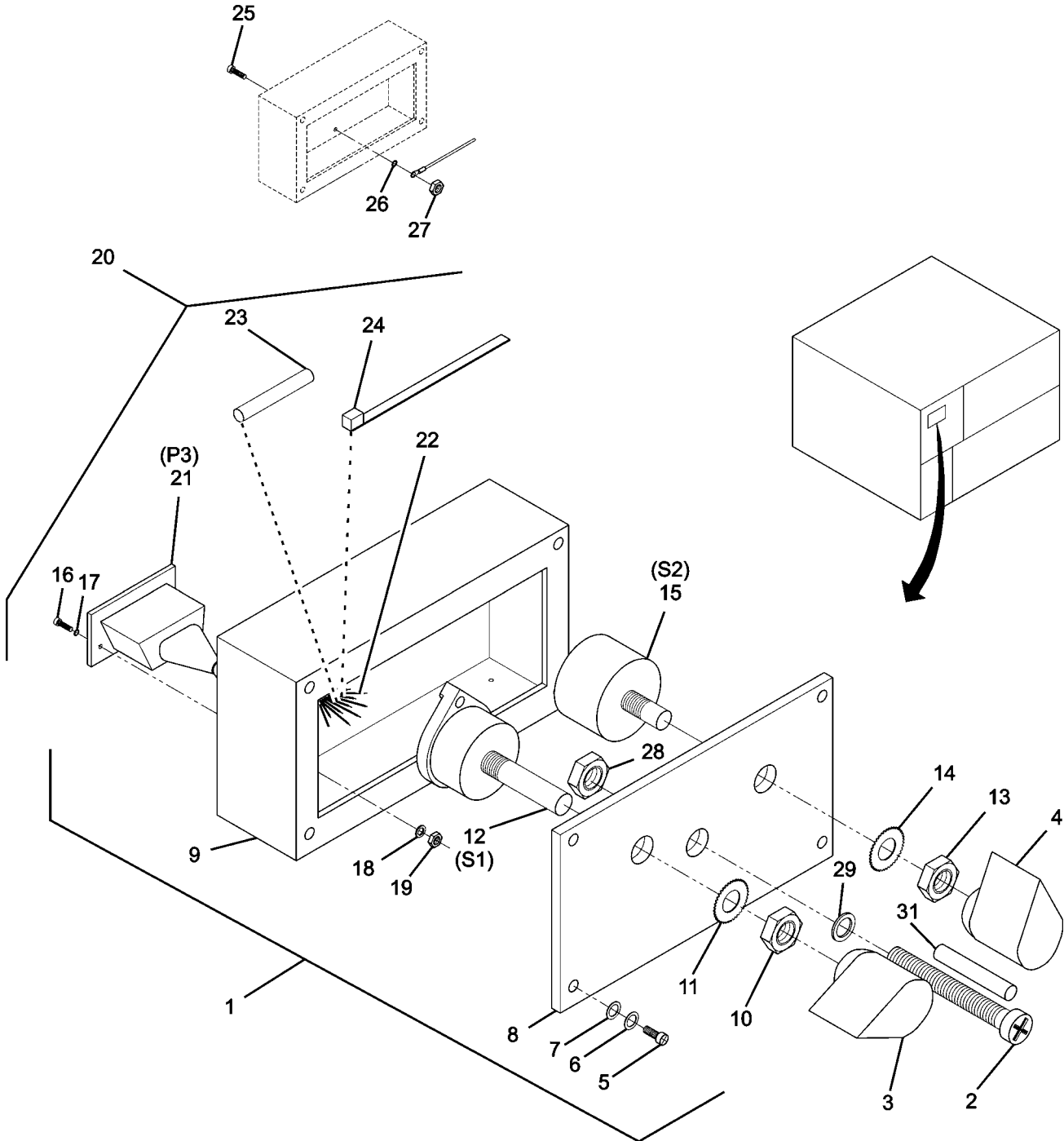


Figure 3. Remote Control Module. Exploded View

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CIRCUIT BREAKER ASSEMBLY MAINTENANCE
REMOVAL, INSPECTION, TEST, REPAIR, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 2, WP 0069 00)

Heat Gun (Item 6, WP 0069 00)

Test Equipment

Multimeter

Continuity Tester

References

Wire Lists and Schematic Diagram (WP 0038 00)

Personnel Required

One

Equipment Condition

Top cover removed (WP 0018 00)

WARNING

Ensure power source is disconnected.

NOTE

Work package procedures apply to either the three pole circuit breaker assembly (S9160-18KW-3 unit) or the two pole circuit breaker assembly (S9150-18KW-1 unit).

REMOVAL

1. Remove four screws (1) from housing rivet nuts (2) that secure the circuit breaker mounting bracket (3 or 4) to the rear of the unit housing (5). See figure 1.
2. Pull the circuit breaker assembly away from the housing.

INSPECTION**Circuit Breaker (9 or 10)**

1. Inspect toggle for chips, creaks, or damage. Replace circuit breaker if found.
2. Inspect wiring for breaks or damage. Replace if found.
3. Inspect for distinct click and engagement of circuit breaker when placed in ON position. Replace if not found.

4. Inspect for smooth motion to OFF position. Replace if not found.
5. Inspect weather boot (6 or 18) for damage or wear. Replace if necessary.

Connector J2 (17)

1. Inspect wiring for breaks, fraying, discoloration, or damage. Replace if found.
2. Inspect soldered connections for breaks or damage. Repair or replace if found.
3. Inspect pins for bending or corrosion. Straighten bent pins if possible. Clean minor corrosion. Replace if necessary.
4. Inspect electrical contacts for corrosion. Replace or clean as necessary.

TEST

Circuit Breaker (9 or 10)

1. Tag and disconnect leads.
2. On the S9160-18K-3 units, check for continuity in ON position between contacts A1 and B1; A2 and B2; A3 and B3. Continuity should exist. No continuity should exist between these contacts in the OFF position.
3. On the S9150-18K-1 units, check for continuity in the ON position between contacts A1 and B1; A2 and B2. Continuity should exist. No continuity should exist between these contacts in the OFF position.
4. Replace if fails test.

Wiring and Connectors

1. Leave soldered connections secure.
2. Check for continuity by touching the test probes of a multimeter set on low-resistance range, to the ends of wire and/or the corresponding pin of connector. See WP 0038 00, schematic diagram.
3. Replace pins and wire if not found.

REPAIR

NOTE

Repair of circuit breaker and/or connector J2 is by replacement of components.

Circuit Breaker (9 or 10)

1. Verify labels with wire list (WP 0038 00) and disconnect leads from the circuit breaker. These are terminal lugs. Leave soldered connections secure to connector.
2. Remove screws (7) and flat washers (8) securing circuit breaker (9 or 10) and weather boot (6 or 18) to mounting bracket (3 or 4).
4. Slide circuit breaker (9 or 10) and weather boot (6 or 18) through back of mounting bracket (3 or 4) and remove and replace.

NOTE

Perform removal of connectors only if assured that they are damaged and need replacement.

5. Secure circuit breaker (9 or 10) and weather boat (6 or 18) to mounting bracket (3 or 4) with screws (7) and flat washers (8).

Connector J2 (17)

1. Remove one screw (11) and nut (12) that attaches eyelet of J2 cover wire (13).
2. Remove three screws (14) and nuts (15) to remove connector J2 (17) and cover (16).
2. Tag wires, desolder and replace connector J2 (17).
3. Secure connector J2 (17) to mounting bracket (3 or 4) with three screws (14) and nuts (15).
4. Install one screw (11) and nut (12) to attach eyelet of J2 cover wire (13).

INSTALL

1. Place circuit breaker mounting bracket (3 or 4) into position on rear of housing. Connect leads to circuit breaker (9 or 10).
2. Secure circuit breaker mounting bracket (3 or 4) with screws (1).
3. Install top cover. See WP 0018 00.

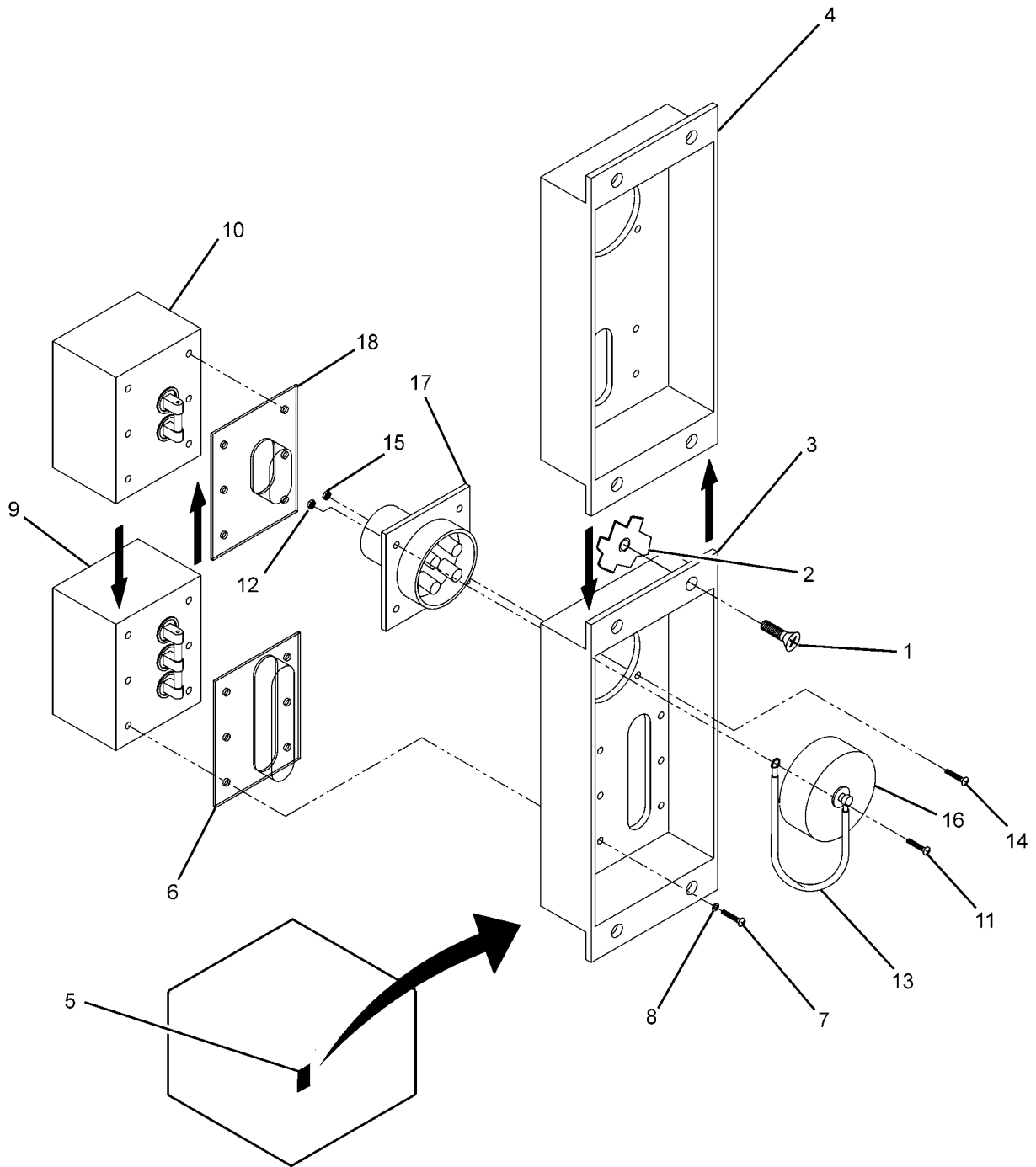


Figure 1. Circuit Breaker

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
ELECTRICAL COMPONENTS MAINTENANCE
REMOVAL, INSPECTION, TEST, REPAIR, AND REPLACEMENT

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 15, WP 0069 00)

Test Equipment

Multimeter

Variable voltage power source (AC/DC)

References

WP 0038 00 (Wire Lists and Schematic Diagram)

WP 0029 00 (Main Power Input Connectors)

WP 0030 00 (Transformer)

Personnel Required

One

Equipment Condition

Power disconnected from unit.

Evaporator air intake louver removed (WP 0020 00)

Top cover removed (WP 0018 00)

Remote control module removed (WP 0026 00)

WARNING

Ensure power source is disconnected.

REMOVAL AND INSPECTION

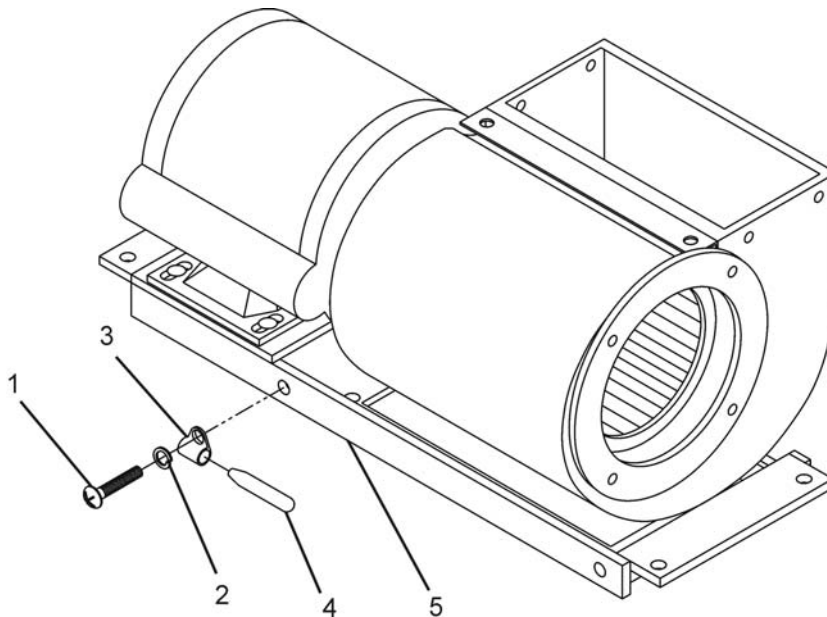


Figure 1. Temperature Selector Switch Electronic Probe

Temperature Selector Switch Electronic Probe (Figure 1)

1. Loosen screw (1) and washer (2) to release electronic probe (4) from clamp (3) on evaporator fan assembly (5).
2. Carefully slide out probe (4) from clamp (3).

Junction Box and Lower Housing Plate (Figure 2)

1. Inspect junction box for damage.
2. Remove seven screws (1) that secure the junction box (2) to the unit housing.
3. Remove five screws (3) to remove the lower housing plate (4) from the unit housing.
4. Partially remove the junction box by pulling it forward and out of the air conditioner. Care must be taken with the wiring.
5. Support the junction box to relieve strain on wiring.

NOTE

It is not necessary to remove junction box completely from unit. Most repairs and replacements can be made without removing junction box completely. Junction box can be moved out approximately 18 inches from the unit.

6. Inspect wiring for cracked or frayed insulation and loose connections.
7. Replace junction box if damaged enough to prevent normal operation of air conditioner.

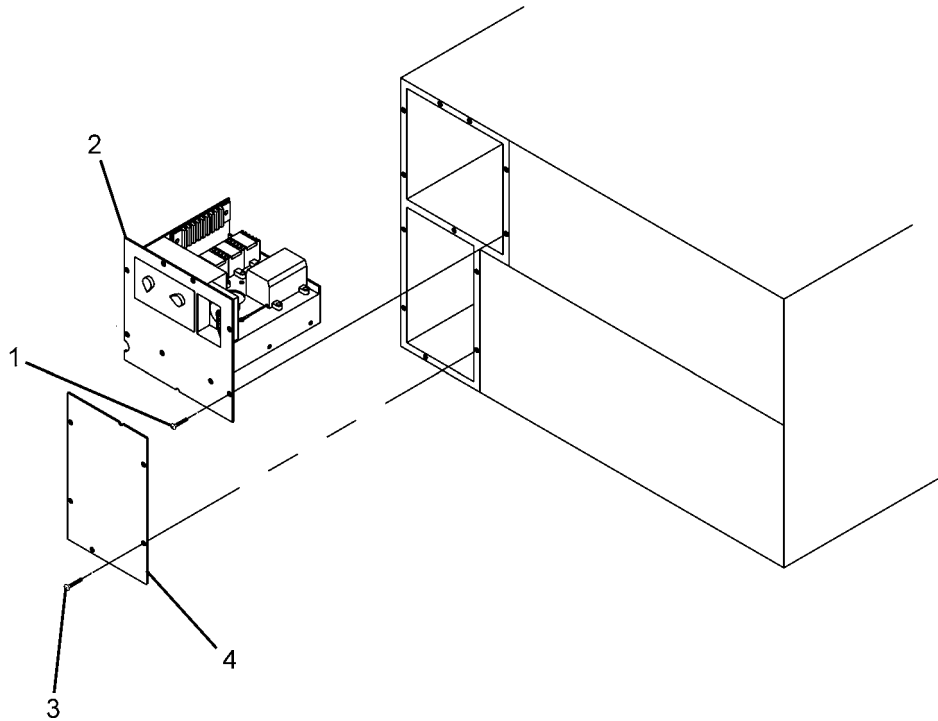


Figure 2. Junction Box and Lower Housing Plate

Compressor Motor and Condenser Motors Relay (K1), Heater Element Relays (K3, K4, and K5), Evaporator Fan Motor Relay (K2), Time Delay Device (TD) (Figure 3)

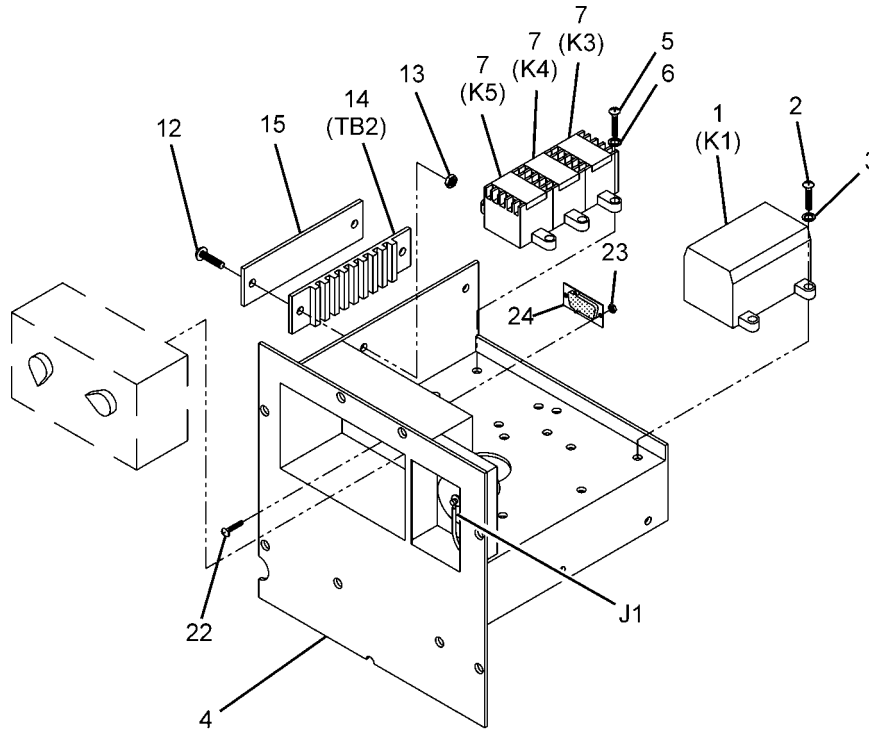
1. Inspect relays for any external damage to housing.
2. If damaged enough to prevent normal operation of relay, replace relay.

Terminal Boards (TB1 and TB2) and Marker Strips

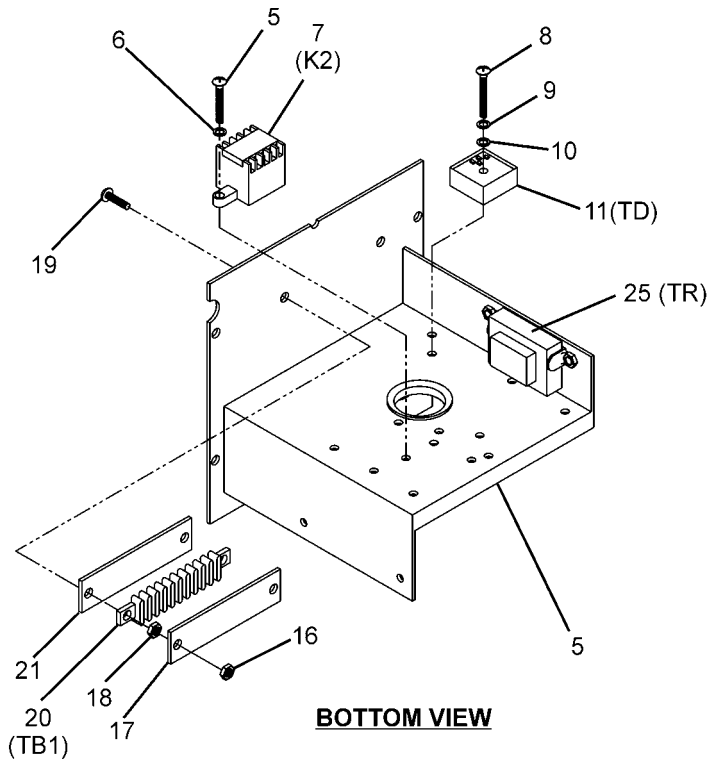
1. Inspect terminal boards for dents, breaks, nicks or damaged terminals.
2. If unrepairable, replace terminal board.
3. Inspect marker strips for illegibility or damage.
4. Replace marker strip if damaged.

Connectors J1 and J3

1. Inspect wiring for breaks, fraying, discoloration, or damage. Replace if found.
2. Inspect soldered connections for breaks or damage. Repair or replace if found.
3. Inspect pins for bending or corrosion. Straighten bent pins if possible. Clean minor corrosion. Replace if necessary.
4. Inspect electrical contacts for corrosion. Replace or clean as necessary.



TOP VIEW



BOTTOM VIEW

Figure 3. Electrical Components

Unit Grounding Lug (Figure 4)

1. Disconnect grounding lug (1, figure 4), by removing screw (2), flat washer (3), and star washer (4) from rivet nut (5) on unit housing.
2. Inspect unit grounding lug for damage, corrosion or missing parts. Replace as necessary.

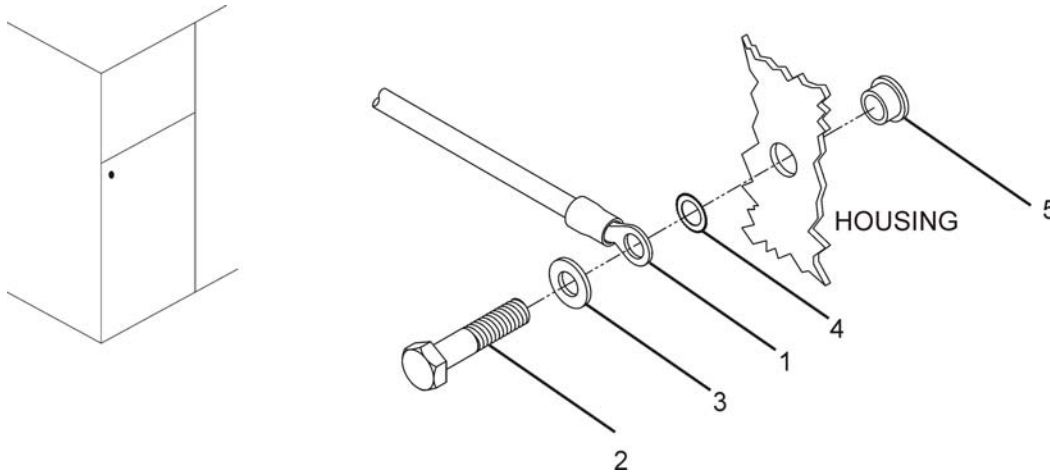


Figure 4. Unit Grounding Lug

TEST

Compressor Control Time Delay Device (TD) (Figure 3)

1. Tag and disconnect wire leads from all terminals.
2. Using a known functional relay, such as K1, connect the relay coil A terminal to time delay device terminal No. 1.
3. Apply a 24 plus/minus 5 V ac power source to terminal No. 2 on time delay device and B terminal on relay. Test relay should *pull-in* in approximately 60 plus/minus 20 seconds.
4. Replace if it fails test.

Compressor Motor and Condenser Motor Relay (K1), S9160-18K-3 Unit

1. Tag and disconnect wire leads.
2. Use a multimeter and check continuity. Set the lowest ohm to check continuity between terminals L1 to T1, L2 to T2, and L3 to T3. All contacts should be open. If there is continuity, replace the relay. See schematic in WP 0040 00.
3. Check continuity between terminals A and B. If there is no continuity, the coil is open. Replace the relay.
4. Apply 24 V ac across terminals A and B and repeat continuity checks between terminals L1 to T1, L2 to T2, and L3 to T3. All three contacts should be closed. If there is no continuity, replace the relay.

Compressor Motor and Condenser Motor Relay (K1), S9150-18K-1 Unit

1. Tag and disconnect wire leads.

2. Use a multimeter and check continuity. Set the lowest ohm to check continuity between terminals L1 to T1 and L2 to T2. All contacts should be open. If there is continuity, replace the relay. See schematic in WP 0040 00.
3. Check continuity between terminals A and B. If there is no continuity, the coil is open. Replace the relay.
4. Apply 24 V ac across terminals A and B and repeat continuity checks between terminals L1 to T1 and L2 to T2. All three contacts should be closed. If there is no continuity, replace the relay.

Evaporator Fan Motor (K2) and Heater Element Relays (K3, K4, and K5)

1. Tag and disconnect wire leads.
2. Use a multimeter and check continuity. Set the lowest ohm to check continuity between terminals L1 to T1. All contacts should be open. If there is continuity, replace the relay. See schematic in WP 0040 00.
3. Check continuity between terminals 3 and 1. If there is no continuity, the coil is open. Replace the relay.
4. Apply 24 V ac across terminals 1 and 1 and repeat continuity checks between terminals L1 to T1. All contacts should be closed. If there is no continuity, replace the relay.

Electronic Box Thermostat (Figure 5)

1. Remove and tag thermostat (3) wire from terminal board TB2-8.
2. Apply a 24 plus/minus 5 V ac power source to the thermostat wire removed from TB2-8 and to terminal board TB2-2.
3. With temperature selector switch (S2) in COOLER position (full counterclockwise) and mode selector switch (S1) in COOL position, warm the thermostat probe (4) by holding in hand.
4. Check voltage (24 Vac) between terminal board TB2-2 and TB2-7.
5. Replace if no voltage present.
6. With temperature selector switch (S2) in WARMER position (full clockwise) and mode selector switch (S1) in HEAT position, cool the thermostat probe (4) in ice bath.
7. Check voltage (24 Vac) between terminal board TB2-2 and TB-2.
8. Replace if no voltage present.

Wiring and Connectors

1. Leave soldered connections secure.
2. Check for continuity by touching the test probes of a multimeter set on low-resistance range, to the ends of wire and/or the corresponding pin of connector. See WP 0038 00, wiring schematic diagram.
3. Replace pins and wire if not found.

REPAIR

Repair is accomplished by replacement of components.

REPLACEMENT

NOTE

Ensure wire leads are tagged before disconnecting.

Compressor Motor and Condenser Motor Relay (K1) (Figure 3)

1. Remove the relay (K1) (1) from the junction box (4) by removing four screws (2) and lockwashers (3).
2. Install replacement relay (K1) (1) on the junction box chassis (4) with four lockwashers (3) and screws (2).

Heater Element Relays (K3 to K5), Evaporator and Condenser Motor Relay (K2)

1. Remove the relays (K2-K5) (7) from the junction box (4) by removing two screws (5) and lockwashers (6) from each relay.
2. Install replacement relays (K2-K5) (7) on the junction box chassis (4).
3. Secure each relay (7) to junction box chassis (4) with lockwashers (6) and two screws (5).

Compressor Time Delay Device (TD)

1. Remove time delay device (TD) (11) from junction box chassis (4) by removing screw (8), lockwasher (9), and flat washer (10).
2. Install replacement time delay device (TD) (11) on junction box chassis (4). Position as shown on exploded view.
3. Secure time delay device to junction box with flat washer (10), lockwasher (9), and screw (8) removed in step 1 above.

Terminal Board (TB2) and Marker Strip

1. Remove two screws (12) and lock nuts (13).
2. Remove terminal board (TB2) (14) and marker strip (15) from junction box chassis (4).
3. Install replacement terminal board (TB2) (14) and marker strip (15) on junction box chassis (4) using two screws (12) and lock nuts (13).

Terminal Board (TB1) and Marker Strips

1. Remove two lock nuts (16) and marker strip (17).
2. Remove two lock nuts (18) and two screws (19) and remove terminal board (TB1) (20) and marker strip (21) from side of junction box chassis (4).
3. Install replacement marker strip (21) and terminal board (TB1) (20) on chassis (4) with two screws (19) and two nuts (18).
4. Install marker strip (17) over terminal board (TB1) (20) and secure with two lock nuts (16).

Electronic Box Thermostat (Figure 5)

1. With the lower housing plate removed, remove the electronic box thermostat (3) from side of unit housing by removing two screws (1) and lock nuts (2).
2. Remove defective electronic box thermostat (3) and wiring along with connector J3 and probe (4, Figure 1).

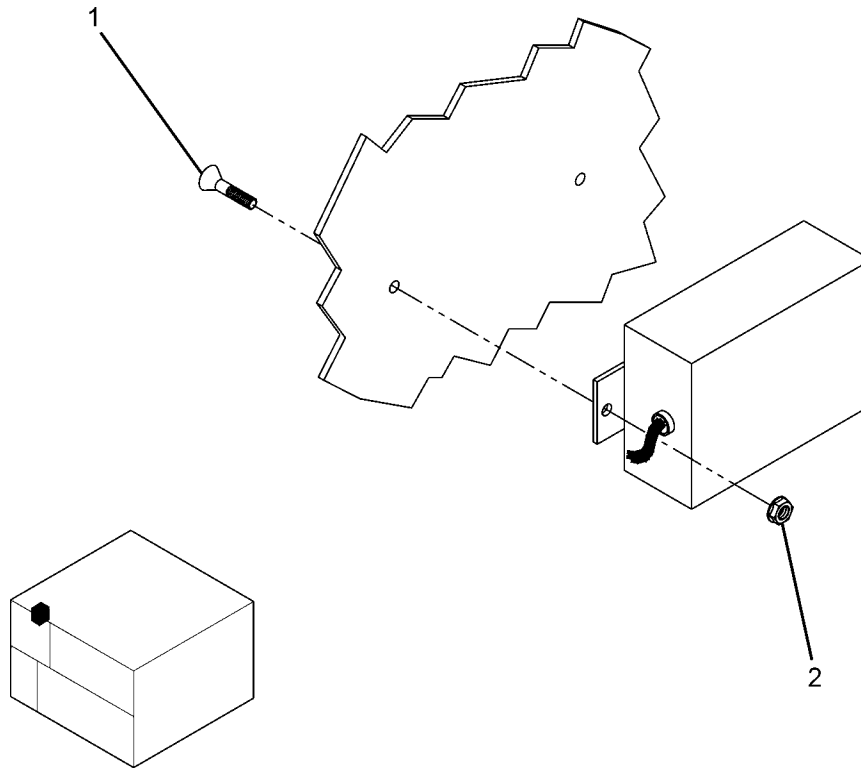


Figure 5. Electronic Box Thermostat

3. Install replacement electronic box thermostat (3) and wiring along with connector J3 and probe.
4. Secure electronic box thermostat (3) to side of unit housing with two screws (1) and lock nuts (2).
5. Install replacement probe (4, Figure 1) to evaporator fan chassis (5) with clamp (3), flat washer (2), and screw (1).
6. Install wiring and connector J3.
7. Ensure all wire connections and grounds are correct and secure. See schematic diagram WP 0040 00. Remove tags.
8. Install lower housing plate (6, figure 2) to unit housing with four lockwashers (5) and screws (4).

Connectors J1, J2, and J3

1. Refer to WP 0029 00 for replacement procedures for connector J1.
2. Refer to WP 0027 00 for replacement procedures for connector J2.

3. To remove connector J3 (24, figure 3), remove two screws (22) and two lock nuts (23).
4. Verify wire labels to wire list (WP 0038 00) and desolder and replace connector J3 (24).
5. Secure connector J3 (24) to junction box chassis (4) with two screws (22) and two lock nuts (23).

Transformer (TR) (25, Figure 3)

See WP 0030 00 for maintenance instructions.

Junction Box

1. Carefully install junction box (2, Figure 2) into the unit housing and secure with seven screws (1).
2. Position wiring away from blower inlet housing.
3. Install lower housing plate (4) onto housing and secure with five screws (3).
4. Connect unit grounding lug (1, figure 4) to unit housing with star washer (4), flat washer (3), and screw (2).
5. Install evaporator air intake louver (WP 0020 00).
6. Install remote control module (WP 0026 00).
7. Install top cover (WP 0018 00).

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
MAIN POWER INPUT CONNECTORS (J1) AND (J2) MAINTENANCE
INSPECTION, REMOVAL, TEST, REPAIR, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 2, WP 0069 00)

Test Equipment

Multimeter

Continuity Tester

References

Wire Lists and Schematic Diagram (WP 0038 00)

J2 Connector Removal (WP 0027 00)

Personnel Required

One

Equipment Condition

Top cover removed (WP 0018 00)

Circuit breaker assembly partially removed (WP 0027 00).

Junction box partially removed (WP 0028 00).

WARNING

Ensure power source is disconnected.

INSPECTION

1. Inspect all installed wiring for cracked or frayed insulation and loose conductor strands at connections.
2. Repair or replace bad wiring.
3. Inspect electrical connectors for damage.
4. Replace damaged connectors.

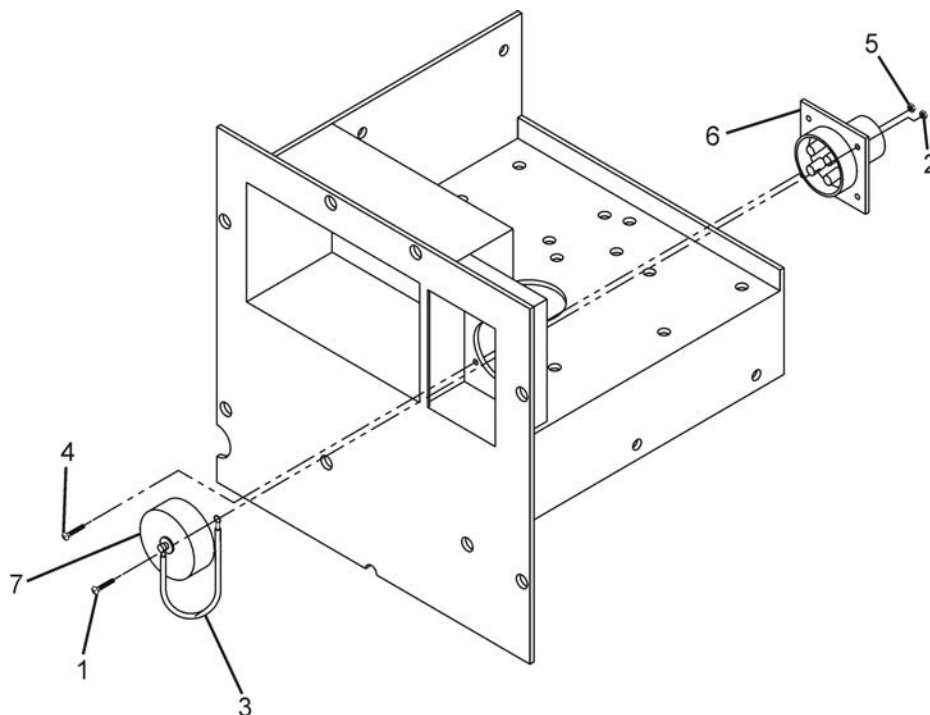


Figure 1. J1 Connector

NOTE

Use Schematic Diagram, WP 0038 00 for the following instructions.

REMOVAL

1. Verify all wire labels to wire lists and schematics (WP 0038 00) or tag all wire leads prior to removal.
2. Refer to WP 0027 00 for J2 connector removal.
3. For J1 connector removal, remove one screw (1) and nut (2) that attaches eyelet of J1 cover wire (3). See figure 1.
4. Remove three screws (4) and nuts (5) to remove J1 connector (6) and cover (7).

TEST

1. Test for continuity on wiring.
2. Touch the test probes of a multimeter, set on low-resistance range, to ends of wire and/or corresponding pin of connector.
3. If continuity is not indicated, repair or replace wire or damaged connector.

REPAIR

1. Remove the insulation to expose $\frac{1}{8}$ inch (1.27 cm) of bare wire on each side of break or damaged insulation.
2. Insert the ends into a splice-connector; splice and crimp the connector to make firm electrical contact.
3. Alternatively, heat shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered, so as to cover the spliced area.
4. Be sure that no bare wire is exposed after the splice is complete.
5. Replace broken terminal lugs with exact duplicates.
6. To replace electrical plugs or connectors, tag and unsolder wires from the solder-wells of the inserts.
7. Insert bare ends of the wires in corresponding holes of new insert, and solder in place.
8. Check continuity terminal-to-terminal.

INSTALLATION

1. Verify wiring labels to wire lists and schematics (WP 0038 00).
2. Refer to WP 0027 00 for J2 connector installation.
3. Secure J1 connector (6) to junction box with three screws (4) and nuts (5).
4. Install one screw (1) and nut (2) to attach eyelet of J1 cover wire (3).
5. Connect all connector plugs and terminals and remove tags. Use Schematic Diagram, WP 0038 00.
6. Install top cover (WP 0018 00).
7. Install circuit breaker assembly (WP 0027 00).
8. Install junction box (WP 0028 00).

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
TRANSFORMER MAINTENANCE
REMOVAL, TEST, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Test Equipment

Multimeter

Variable voltage power source (AC/DC)

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 15, WP 0069 00)

References

Wire List and Schematic Diagram (WP 0038 00)

Personnel Required

One

Equipment Condition

Power disconnected from unit

Top covers removed (WP 0018 00)

Junction box partially removed from unit (WP 0028 00)

**WARNING**

Ensure power source is disconnected.

REMOVAL

1. Remove two screws (1) and two lock nuts (2) to remove transformer (3) from junction box chassis (4). See figure 2.
2. Verify labels to wire list and schematic diagram (WP 0038 00) and disconnect transformer leads (1/4 in. quick connects).
3. Lift transformer (3) out of unit.

TEST

1. Using a multimeter set on lowest OHMS scale, check for continuity across primary terminals COMN and (208 Vac). Continuity should be indicated. See figure 1.
2. Using a multimeter set on lowest OHMS scale, check for continuity across secondary terminals (24 volts). Continuity should be indicated.
3. Using a multimeter set on lowest OHMS scale, check for continuity between primary (208 Vac) and secondary (24 Vac) coils. Multimeter should read NO continuity.
4. If transformer fails steps 1, 2, or 3, transformer is defective. Replace transformer.

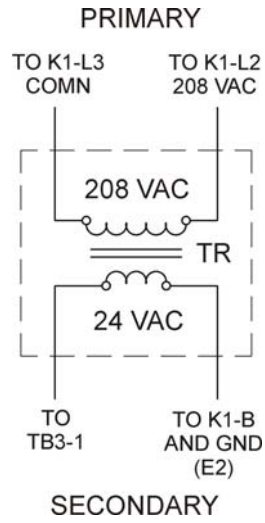


Figure 1. Transformer Continuity Check

INSTALLATION

1. Connect transformer leads and verify wire labels to wire list and schematics (WP 0040 00).
2. Secure transformer (3) to junction box chassis (4) using two lock nuts (2) and two screws (1).
3. Install junction box (WP 0028 00).
4. Install front top cover (WP 0018 00).

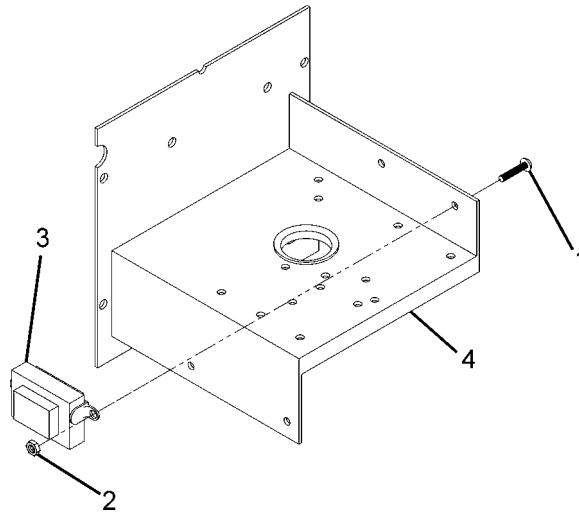


Figure 2. Transformer Removal

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
UNIT WIRING MAINTENANCE
INSPECTION, TEST, REMOVAL, REPAIR, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Soldering Gun Kit (Item 9, WP 0067 00)

Heat Gun (Item 6, WP 0067 00)

Test Equipment

Multimeter

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 15, WP 0069 00)

References

Wire list and schematic diagram (WP0038 00)

Personnel Required

One

Equipment Condition

Power disconnected from unit.

Top cover removed (WP 0018 00).

Evaporator air intake louver removed (WP 0020 00).

Junction box partially removed from unit (WP 0028 00).

Circuit Breaker assembly removed (WP 0027 00).

WARNING

Ensure power source is disconnected.

INSPECTION

1. Inspect all installed wiring for cracked or frayed insulation. Pay particular attention to wires routed around sharp edges.
2. Repair or replace bad wiring.
3. Inspect electrical input power connectors (J2 and J1 ALTERNATE) for damage. Inspect electrical connector J3 for damage.
4. Replace damaged connectors.

TEST

1. Test for continuity on wiring.
2. Touch the test probes of a multimeter set on low-resistance range to ends of wire and/or corresponding pin of connector.

3. If continuity is not indicated, repair or replace wire or damaged connector.

REMOVAL

1. Verify all labels on all wire leads prior to removal. Refer to wire lists (WP 0038 00).
2. Refer to WP 0029 00 for connectors J2 and J3 removal and WP 002700 for connector J1 removal.
3. Disconnect all terminals.
4. Carefully remove connectors from unit.

REPAIR

1. Remove the insulation to expose 1/8 inch (1.27 centimeters) of bare wire on each side of break or damaged insulation.
2. Insert the ends into a splice-connector, splice and crimp the connector to make firm electrical contact.
3. Alternatively, heat-shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered, so as to cover the spliced area.
4. Be sure that no bare wire is exposed after splice is complete.
5. Replace broken terminal lugs with exact duplicates.
6. Check continuity terminal-to-terminal.

INSTALLATION

1. Install new labels on new wires. Refer to wire lists (WP 0038 00).
2. Install connectors (J1 and J2). Refer to WP 0029 00.

Pin Assignments for S9150-18KH-1 (Figure 1)

<u>PIN</u>	<u>1-PHASE POWER</u>	<u>WIRE COLOR</u>
A	LINE A	BLACK
B	LINE B	RED
D	NEUTRAL	(NOT USED)
E	GROUND	GREEN

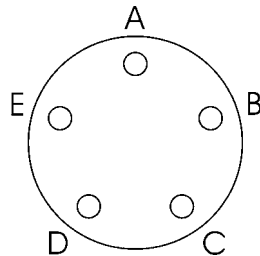


Figure 1. S9150-18KH-1 Pin Assignments for J1 and J2 Connectors

Pin Assignments for S9150-18KH-3 (Figure 2)

<u>PIN</u>	<u>3-PHASE POWER</u>	<u>WIRE COLOR</u>
A	LINE A	BLACK
B	LINE B	RED
C	LINE C	BLUE
D	NEUTRAL	(NOT USED)
E	GROUND	GREEN

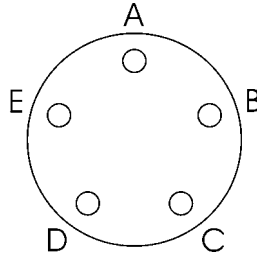


Figure 2. S9150-18KH-3 Pin Assignments for J1 and J2 Connectors

3. Install connector J3. Refer to WP 0028 00.
4. Verify correct labels on wires and connect all terminals. Use schematic diagram and wire list (WP 0038 00).
5. Install circuit breaker. See WP 0027 00.
6. Install control module. See WP 0026 00.
7. Install junction box. See WP 0028 00.

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
COIL (SOLENOID VALVE) MAINTENANCE
TEST, REMOVAL, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Test Equipment

Multimeter

References

Wire list and Schematic Diagram (WP 0038 00)

Personnel Required

One

Equipment Condition

Power disconnected from unit.
Top cover removed (WP 0018 00).

WARNING

Ensure power source is disconnected.

TEST

1. Using multimeter set on the lowest OHMS scale, check for continuity between leads of coil. If continuity is not found, coil is open and must be replaced.
2. Using multimeter set on lowest OHMS scale, check for continuity between each lead and coil casing. If continuity is found between either lead and the casing, the coil is grounded and must be replaced.

REMOVAL

1. Tag and disconnect wires connected for solenoid valve coil (3). See figure 1.
2. Remove screw (1) and star washer (2).
3. Slide solenoid coil (3) off stem of solenoid valve (4).

INSTALLATION

1. Slide solenoid coil (3) onto valve stem of solenoid valve (4) and secure with star washer (2) and screw (1).
2. Refer to wire tags installed during removal and reconnect wires of coil as indicated and then remove tags.
3. Install top cover. See WP 0018 00.
4. Reconnect air conditioner to power source.

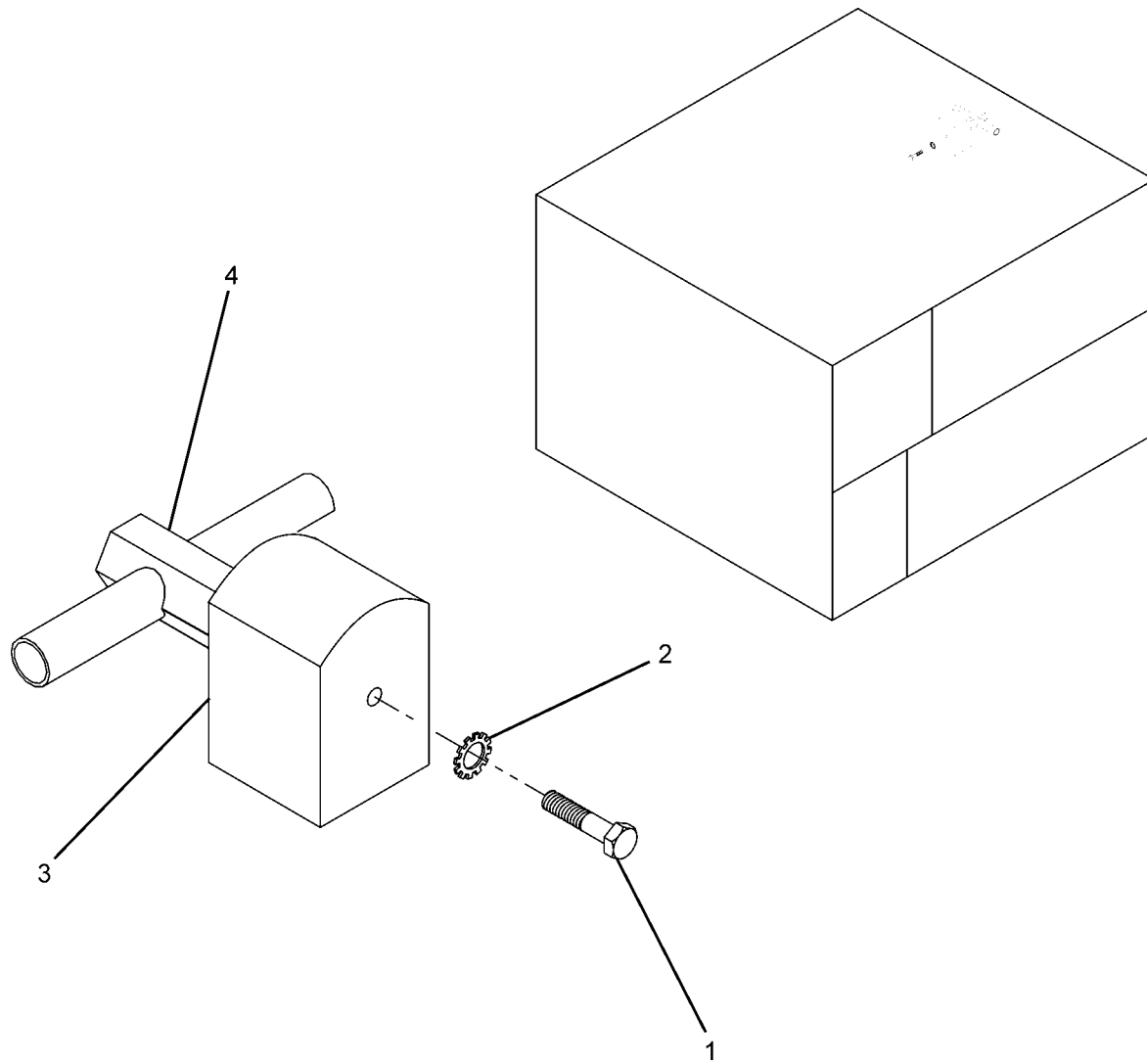


Figure 1. Solenoid Valve Coil

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
COMPRESSOR (S9150-18K-1 UNIT) CAPACITORS (C3) AND (C4) AND CURRENT SENSING RELAY
MAINTENANCE
REMOVAL, TEST, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Test Equipment

Multimeter

References

Wire List and Schematic Diagram, WP 0038 00

Personnel Required

One

Equipment Condition

Air conditioner shut down.

Power disconnected from unit.

Evaporator air intake louver removed (WP 0023 00)

Lower housing plate removed (WP 0028 00).

WARNING

Ensure power source is disconnected.

Ensure all capacitors are grounded before touching.

REMOVAL**Capacitor Assembly Cover**

1. Remove two screws (1) and lockwashers (2) that secure capacitor cover (3) to capacitor mounting plate (17). See figure 1.
2. Lift the hooking edge of cover from slots on capacitor mounting plate (17) and remove cover from unit.

Compressor Start Capacitor (C3)

1. Using an instrument with an insulated handle, discharge capacitor.
2. Verify labels on wires to wiring list (WP 0038 00) and disconnect leads.
3. Remove or loosen screw (4) with lockwasher (5) securing strap (6) holding capacitor C3 (7) to capacitor mounting plate (17).
4. Remove capacitor C3 (7) by sliding out from strap (6).

Compressor Run Capacitor (C4)

1. Using an instrument with an insulated handle, discharge capacitor.
2. Verify labels on wires to wiring list (WP 0038 00) and disconnect leads.

3. Remove or loosen screw (8) with lockwasher (9) securing strap (10) holding capacitor C4 (11) to capacitor mounting plate (17).
4. Remove capacitor C4 (11) by sliding out from strap (10).

Current Sensing Relay

1. Verify labels on wires to wiring list (WP 0038 00) and disconnect leads.
2. Remove two screws (12) and lockwashers (13) securing current sensing relay (14) to capacitor mounting plate (17).
3. Remove current sensing relay (14).

Capacitor Mounting Plate

1. Remove four screws (15) and lockwashers (16) that secure the capacitor mounting plate (17) to the housing inside bulkhead.
2. Remove the capacitor mounting plate (17) from the unit housing.

TEST

Compressor Start Capacitor (C3)

1. Check for internal condition by placing the test leads of a multimeter on the terminals of the capacitor.
2. Multimeter needle should move rapidly toward top of the scale; then, slowly return toward zero if the capacitor is good.
3. If needle moves to top of scale and remains there, the capacitor is internally short-circuited; if the needle does not move, the capacitor contains an open circuit.
4. Replace capacitor with short/open circuits.

Compressor Run Capacitor (C4)

1. Check for internal condition by placing the test leads of a multimeter on the terminals of the capacitor.
2. Multimeter needle should move rapidly toward top of the scale; then, slowly return toward zero if the capacitor is good.
3. If needle moves to top of scale and remains there, the capacitor is internally short-circuited, if the needle does not move, the capacitor contains an open circuit.
4. The capacitor has a metal case, check for short-circuits to case by placing a lead of the multimeter on each of the terminals of the capacitor and the other lead on the case. There will be no deflection of the multimeter needle if the capacitor is good. If the needle does deflect, and remains there, replace the capacitor.
5. Replace capacitor with short/open circuits.

INSTALLATION

Capacitor Mounting Plate

1. Position the capacitor mounting plate (17) into the unit housing.

2. Secure the capacitor mounting plate (17) to the inside bulkhead of unit housing with four lockwashers (16) and screws (15).

Current Sensing Relay

1. Position current sensing relay (14) onto capacitor mounting plate (17) and secure with two lockwashers (13) and screws (12).
2. Verify labels on wires to wiring list (WP 0038 00) and reconnect wire leads.

Compressor Start Capacitor (C3)

1. Install good capacitor (C3) (7) in strap (5).
2. Tighten screw (4) with lockwasher (5) attaching capacitor (C3) (7) and strap (6) to capacitor mounting plate (17).
3. Refer to wiring list (WP 0038 00) and reconnect wiring leads.

Compressor Run Capacitor (C4)

1. Install good compressor run capacitor (C4) (11) into strap (10).
2. Tighten screw (8) with lockwasher (9) attaching capacitor (C3) (11) and strap (10) to capacitor mounting plate (17).
3. Refer to wiring list (WP 0038 00) and reconnect wiring leads.

Capacitor Assembly Cover

1. Position hooking edge of capacitor cover (3) onto capacitor mounting plate (17).
2. Install two screws (1) with lockwashers (2) that secure the capacitors cover (3) to the capacitor mounting plate (17).
3. Install evaporator air intake louver (WP 0023 00).
4. Install the lower housing plate (WP 0028 00).

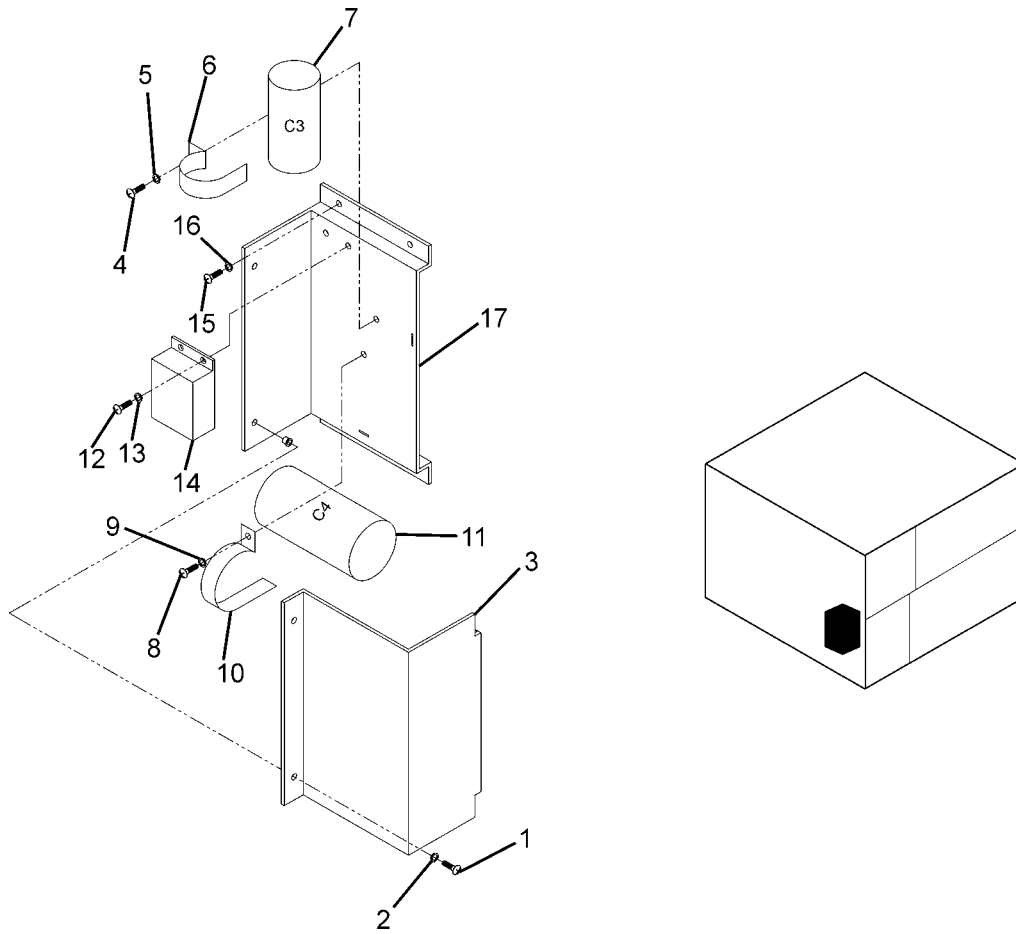


Figure 1. Compressor B1 Start Kit

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
HEATER CUTOUT SWITCH S3 MAINTENANCE
INSPECTION, REMOVAL, TEST, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Test Equipment

Multimeter

References

Wire List and Schematic Diagram (WP 0038 00)

Personnel Required

One

Equipment Condition

Power disconnected from unit.
Top cover removed (WP 0018 00)

WARNING

Ensure power source is disconnected.

WARNING

Allow heating elements to cool for 15 minutes before touching.

INSPECTION

Inspect for wiring damage.

REMOVAL

1. Verify wiring labels with wire list (WP 0038 00) and remove wire leads.
2. Remove screw (1), lockwasher (2), and flat washer (3) that secure the thermostatic switch bracket (4) to the evaporator coil top rail.
3. Detach and lift the thermostatic switch bracket (4) from the evaporator coil top rail.
4. Take out two screws (5) and lockwashers (6) to remove the high voltage heater cutout switch S3 (7) from the thermostatic switch bracket (4). See figure 1.

TEST

1. Using a multimeter on the lowest possible setting, test for continuity between contacts 1 and 2 and between contacts 3 and 4 on switch S3. See schematic diagram, WP 0038 00.
2. Replace if defective.

INSTALLATION

1. Attach switch S3 (7) to thermostatic switch bracket (4) with two lockwashers (6) and screws (5).
2. Attach the thermostatic switch bracket (4) to the top inner rail of the evaporator coil with flat washer (3), lockwasher (2), and screw (1).
3. Connect leads to switch S3 (7). Refer to wire list and schematic diagram (WP 0038 00).
4. Install top cover. See WP 0018 00.

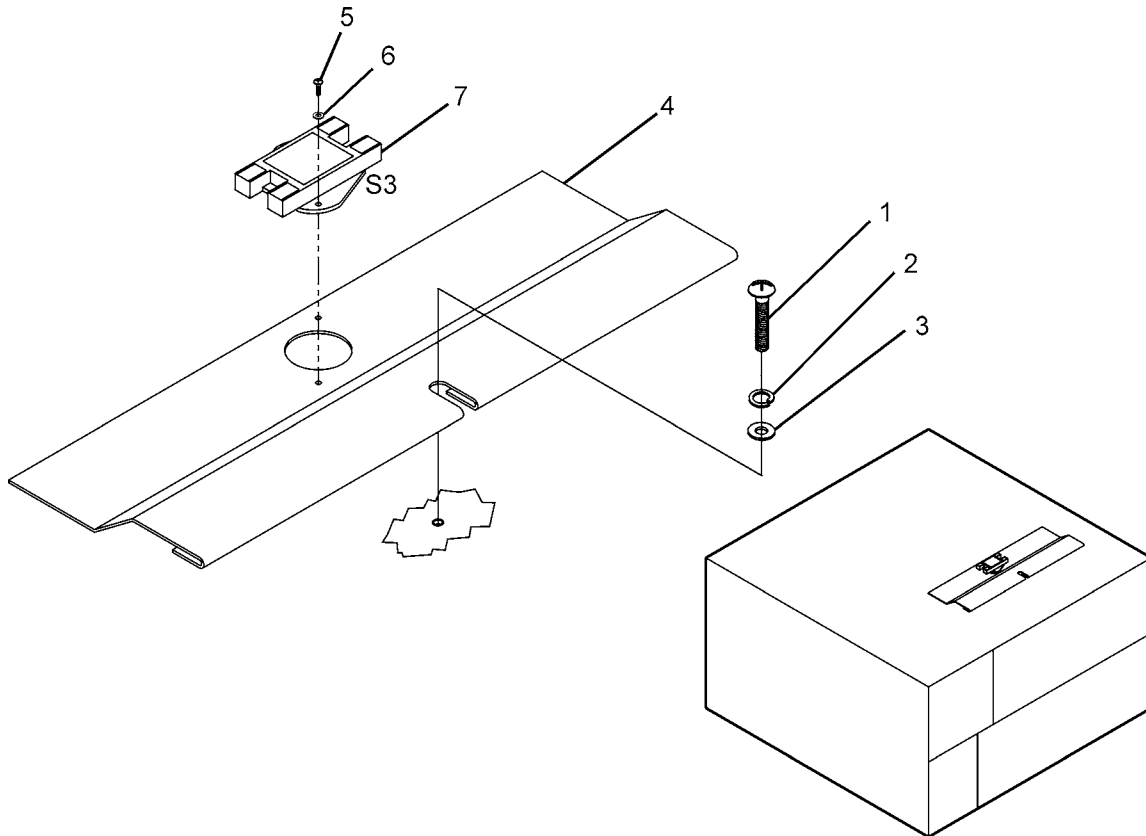


Figure 1. Heater Cutout Switch

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
EVAPORATOR FAN ASSEMBLY MAINTENANCE
REMOVAL, DISSEMBLY, INSPECTION, TEST, REASSEMBLY, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Solder (Item 2, WP 0069 00)

Flux (Item 15, WP 0069 00)

Test Equipment

Multimeter

Continuity Tester

References

Wire List and Schematic Diagram (WP 0038 00)

Personnel Required

One

Equipment Condition

Evaporator inlet louver removed (WP 0020 00)

Condensate drain tubing removed (WP 0024 00)

WARNING

Ensure power source is disconnected.

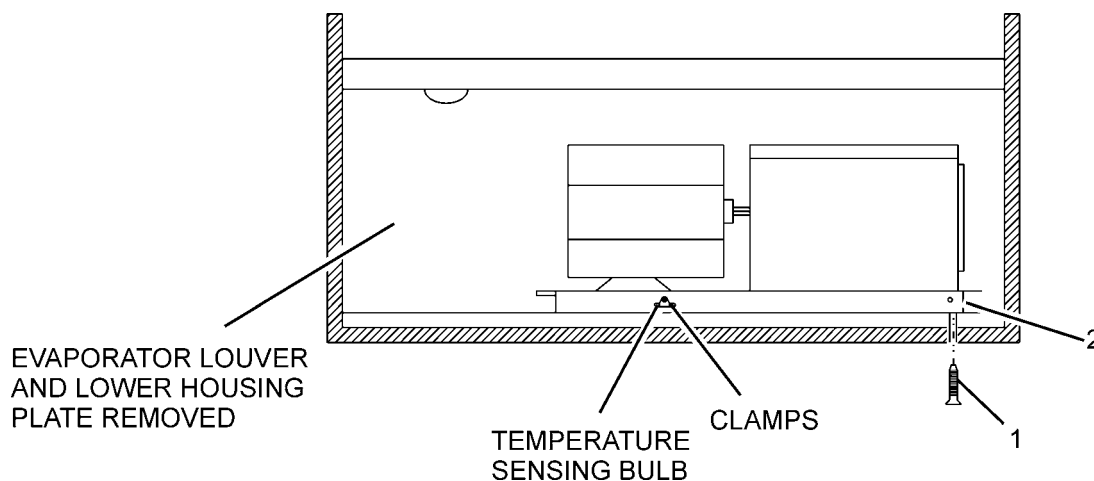
REMOVAL

Figure 1. Front View Showing Temperature Sensing Bulb Location

1. Verify labels on motor wiring to wire list (WP 0038 00) and disconnect the motor wiring.
2. Loosen clamp holding temperature selector switch sensing bulb, move bulb to clear housing. Refer to figure 1, front view illustration.
3. Remove two screws (1, Figure 2) and lockwashers (2) and remove close off angle (3) from firewall bracket (4) of the inner housing bulkhead. Refer to figure 2, exploded view.
4. Remove four screws (1, Figure 1) securing the fan and motor base (2) to the unit.
5. Lift out fan and motor assembly from the unit housing.

DISASSEMBLY

1. Loosen setscrew (5, Figure 2) on flat side of motor shaft and slide off impeller (6) from motor shaft.
2. Remove motor mounting bracket (7) with motor (8) by removing four hex head screws (9) and lockwashers (10).
3. Remove four screws (11) and lockwashers (12) securing blower housing (13) to evaporator blower rails (14) and (15).
4. Remove four screws (16) and lockwashers (17) to loosen inlet rings (18) from each end of blower housing (13).
5. Carefully remove impeller (6) from blower housing (13) through housing opening.
6. Remove four locking nuts (19) and flat washers (20) from motor mounting screws (21) and flat washers (22) that secure motor (8) to motor mounting bracket (7).

INSPECTION

1. Inspect fan rings (18), impeller (6) and fan housing (13) for visible out-of-round conditions, dents, burrs and nicks.
2. Replace defective items.
3. Check impeller (6) for damaged or bent vanes. Straighten or replace impeller (6), if required.
4. Inspect exterior case of motor for cracks, dents, oil, and evidence of overheating or any other abnormalities. Replace defective motor.

TEST

1. Turn motor (8) shaft by hand and listen for clicking sounds that indicate bad bearings. Replace motor if motor bearings are bad.
2. If the shaft cannot be rotated, the bearings may have seized. Replace motor.
3. Test the thrust bearings by attempting to push and pull the motor shaft axially.
4. If end play is excessive (i.e., can be felt on manual push-pull), the thrust bearings and shims are worn beyond limits and motor should be replaced.
5. Use a multimeter or continuity tester to check continuity between leads. See wiring diagram (WP 0038 00). Check to be sure that continuity exists between leads. This means that open circuits do not exist. Replace motor if either open or short circuits exist.

REASSEMBLY

1. Assemble motor (8) to motor mounting bracket (7) by inserting four screws (21) with flat washers (22) through mounting holes. Secure motor (8) by installing flat washer (20) and locking nuts (19) onto screws (21).
2. Carefully insert impeller (6) into blower housing (13).
3. Attach inlet rings (18) to each end of blower housing with four lockwashers (17) and screws (16).
4. Attach evaporator blower rails (14) and (15) to blower housing with four lockwashers (12) and screws (11).
5. Position motor mounting bracket (7) with motor (8) between evaporator blower rails (14) and (15), sliding impeller (6) onto motor shaft.
6. Secure motor mounting bracket (7) to evaporator blower rails (14) and (15) with lockwashers (10) and screw (9).
7. Tighten only the one setscrew (5) that is over the flat surface of the shaft to secure impeller (6) onto motor shaft.
8. Check position of impeller (6) to spin free and clear of housing. Readjust position as necessary.

INSTALLATION

1. Position evaporator fan and housing assembly into unit housing and secure with four screws (1, Figure 1).
2. Install close off angle (3, Figure 2) onto firewall bracket (4) of the inner housing bulkhead and secure with two lockwashers (2), and screws (1).
3. Place the temperature selector switch sensing bulb in clamp and tighten screw. Refer to figure 1, front view illustration.
4. Install condensate drain tubing. See WP 0024 00.
5. Reconnect motor connections. Refer to wire list and schematic diagram (WP 0038 00).
6. Install the evaporator inlet louver. See WP 0020 00.

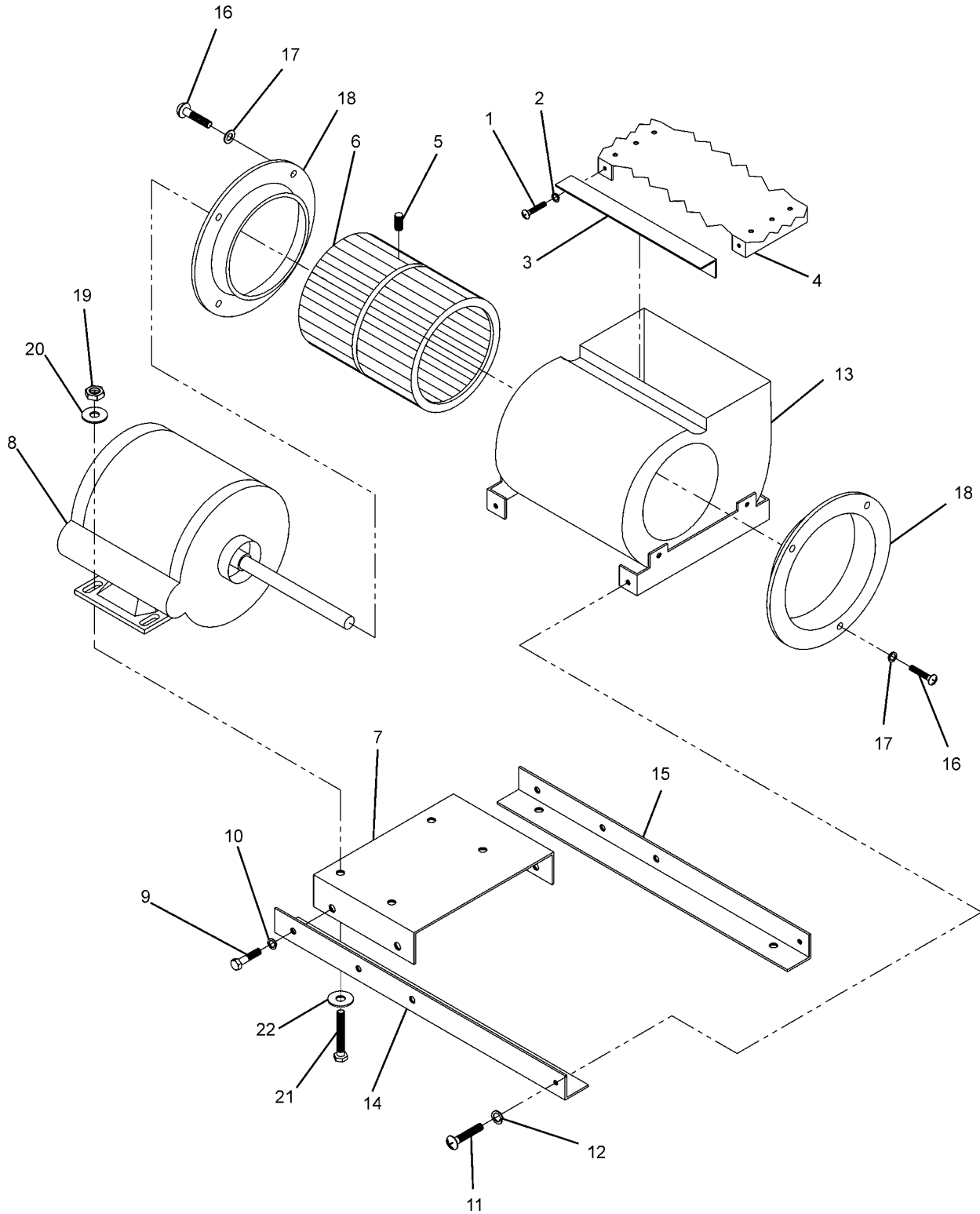


Figure 2. Evaporator Fan Assembly Exploded View

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
ELECTRICAL HEATER ELEMENTS MAINTENANCE
INSPECTION, TEST, REMOVAL, REPAIR, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Lint Free Cloth (Item 9, WP 0069 00)

Dry Cleaning Solvent (Item 16, WP 0069 00)

Test Equipment

Multimeter

References

Wiring List and Schematic Diagram (WP 0038 00)

Heater Cutout Switch (WP 0034 00)

Personnel Required

One

Equipment Condition

Air conditioner shut down and cool.

Power disconnected from unit.

Top cover removed (WP 0018 00).

Junction box assembly partially removed (WP 0028 00).

Heater cutout switch S3 tested (WP 0034 00).

WARNING

Allow heating elements to cool for 15 minutes or more before touching.

WARNING

Ensure power source is disconnected.

INSPECTION**Heater Elements and Electrical Wiring**

1. Inspect for damage to elements (18) or leads (12 and 13). See figure 1.
2. Replace damaged leads and bad elements.

Heater Support Brackets (4, 7, and 19)

1. Inspect for warping or cracking.
2. Replace as necessary.

Terminal Board (TB3) (20) and Marker Strip (21)

1. Inspect terminal board for dents, breaks, nicks or damaged terminals.

2. If unrepairable, replace terminal board.
3. Inspect marker strip for illegibility or damage.
4. Replace marker strip if damaged.

TEST

1. Test heater elements (18) by checking for continuity between the two electrical leads (12 and 13) of each heater element. Refer to schematic diagram (WP 0038 00). If continuity does not exist, replace element.
2. Test heater cutout switch S3. See WP 0034 00.

REMOVAL

1. Remove heater cutout switch S3. See WP 0034 00.
2. Verify wire labels to wiring list (WP 0038 00) and disconnect leads to terminal board TB3.
3. Remove two screws (1), lockwashers (2), and flat washers (3) securing heater support bracket (4) to unit housing.
4. Remove one screw (5) and lockwasher (6) securing heater support bracket (7) to unit housing.
5. Remove three screws (8) and lockwashers (9) securing heater mounting bracket (7) to inner bulkhead of unit housing.
6. Lift heater assembly (10) from unit housing, sliding bracket (7) away from H-channel seal (11).

DISASSEMBLY

1. Remove heater support bracket (4) from ends of heating elements (18).
2. For each heater element (18), disconnect leads (12 and 13) to TB3. Refer to wiring list and schematic WP 0038 00.
3. For each heater element (18), remove nut (14), internal tooth lockwasher (15) and flat washer (16) securing heater element (18) to heater element mounting bracket (19).
4. Slide each heater element (18) from heater element mounting bracket (19).
5. Remove flat washer (16) and insulator washer (17) from each heater element (18).
6. Remove terminal board (TB3) (20) and marker strip (21) by removing two screws (22) and lockwashers (23).
7. With TB3 removed, remove bracket (19) from bracket (7) by removing two screws (24) and lockwashers (25).

ASSEMBLY**WARNING****DRY CLEANING SOLVENT P-D-680**

P-D-680 solvent vapors are toxic. Avoid prolonged or repeated breathing of vapors or solvent contact with skin. Use only with adequate ventilation. Solvent is flammable and should not be used near open flame. Fire extinguishers should be readily available when solvent is used.

1. Clean heater brackets (4, 7, and 19) with dry cleaning solvent (Item 16, WP 0069 00) and lint-free cloth (Item 9, WP 0069 00).
2. Attached bracket (19) to bracket (7) with two lockwashers (25) and screws (24).
3. Attached marker strip (21) and terminal board (TB3) (20) to bracket (7) with two lockwashers (25) and screws (24).
4. Install insulator washer (17) and flat washer (16) onto each heating element (18) and insert into bracket (19). Secure heating element with internal tooth lockwasher (15) and nut (14).
5. For each heating element (18), connect leads (12 and 13) to TB3. Refer to wiring list and schematic (WP 0038 00).
6. Slide heater support bracket (4) over ends of heating elements (18).

INSTALLATION

1. Insert and position heater assembly (10) into unit housing.
2. Insert H-channel seal (11) between heater mounting bracket (7) and the evaporator coil.
3. Secure heater mounting bracket (7) to base of unit housing using one lockwasher (6) and screw (5).
4. Secure heater mounting bracket (4) to base of unit housing using two flat washers (3), lockwashers (2), and screws (1).
5. Secure heater support bracket (7) to inner bulkhead of unit housing using three lockwashers (9), and screws (8).

NOTE

Screws (8) are also used to secure support clamps on the compressor side of the inner bulkhead.

6. Refer to wire lists (WP 0038 00) and connect leads (1 and 2) to terminal board (TB3).
7. Install junction box. See WP 0028 00.
8. Install heater cutout switch S3. See WP 0034 00.
9. Install top cover. See WP 0018 00.

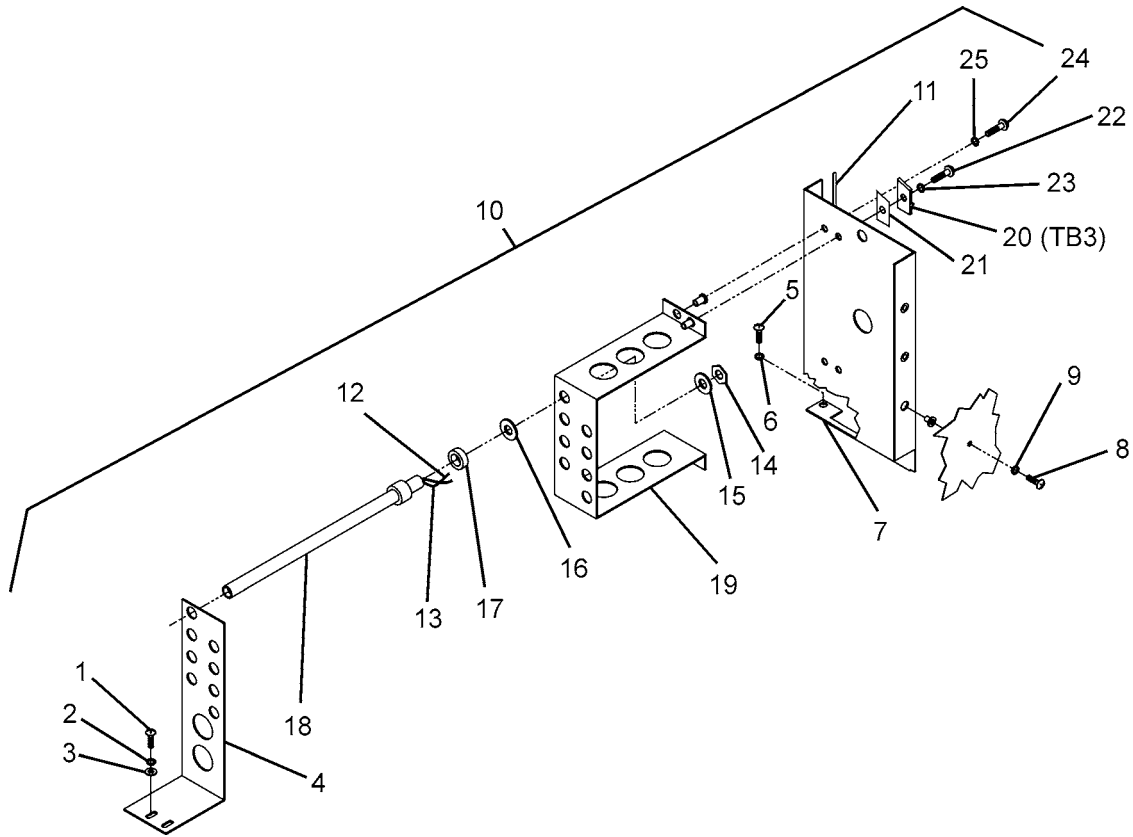


Figure 1. Electrical Heater Elements

END OF WORK PACKAGE

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CONDENSER FAN AND MOTOR MAINTENANCE
TEST, REMOVAL, DISASSEMBLY, INSPECTION, ASSEMBLY, AND INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Grease, General Purpose (Item 28, Table 1, WP 0069 00)

Test Equipment

Multimeter

References

Wire lists and Schematic Diagram (WP 0038 00)

Personnel Required

One

Equipment Condition

Power disconnected from unit.

Top cover removed (WP 0018 00)

Condenser discharge louver removed (WP 0021 00)

NOTE

Refer to Direct Support Maintenance (WP 0063 00) for an alternate procedure for removing the condenser fan and motor from the unit housing.

WARNING

Ensure power source is disconnected.

TEST

1. Remove black lead and red lead from condenser fan motor B3. Refer to wire lists and schematic diagram (WP 0038 00).
2. Using an ohmmeter set on lowest ohms scale, check continuity between black lead and red lead on motor. Continuity should be indicated between these leads.
3. Rotate motor shaft very slowly and check for smooth and quiet operation of shaft. Shaft should rotate smoothly and should not make grinding or binding noises.
4. If condenser motor fails any of the above tests, motor must be replaced.

REMOVAL

1. Verify labels and disconnect all wires from condenser fan motor being replaced. Refer to wire list and schematic diagram (WP 0038 00).

2. Using a socket head screw key (Item 13, Table 2, WP 0067 00), loosen two setscrews (1) from shaft extension (2) to release motor (3) from shaft extension (2). See figure 1.
3. Separate motor shaft from shaft extension (2) and impeller (4).
4. Remove four capscrews (5) and flat washers (6) from locking rib nuts of motor mount (7) that secure the motor mounting plate (8) to motor mount.

CAUTION

Take care to avoid damaging the condenser coil while removing motor and mounting plate from unit.

5. Lift out the motor (3) and mounting plate (8) and set aside.
6. Loosen fan housing (11) by removing six countersunk screws (9) from the bottom of unit housing and one countersunk screw (10) on the side of unit housing.
7. Remove two capscrews (12), lockwashers (13), and flat washers (14) that attaches the linear-actuator bracket (15) to the fan housing (11).
8. Disconnect clamps (18) on service valves (19) by removing screws (16) and flat washers (17).
9. Remove screw (20), flat washer (21), and clamp (22) that secure the pressure relief valve (23) to the fan housing (11).
10. Remove screws (24), flat washers (25), and clamps (26) that secure the tubing (27) of the high and low pressure switches to the fan housing (11).

CAUTION

Handle tubing at service valves, pressure relief valve, high and low pressure switches, and linear-actuator with special care to avoid kinking or creating leaks at brazed joints.

11. Bend back tubing at service valves, pressure relief valve, high and low pressure switches, and linear-actuator with extreme care to permit housing to be rotated.
12. Rotate housing (11) and lift carefully from the unit housing.

DISASSEMBLY

1. Remove four screws (28) and flat washers (29) to remove inlet bell (30) from fan housing scroll (11).
2. Remove impeller (4) from fan housing (11). (Do not force.)
3. Using a socket head screw key (Item 13, Table 2, WP 0067 00), loosen two setscrews (31) on impeller (4) to release shaft extension (2) from impeller (4).
4. Remove four nuts (31), flat washers (32), and screws (33) that secure the motor (3) to the motor mounting plate (8). Remove motor from motor mounting plate.

INSPECTION

1. Inspect inlet bell (30), impeller (4) and fan housing (11) for out-of-round conditions, dents, burrs, and nicks.
2. Replace defective items.

3. Check impeller (4) for damaged or bent vanes. Straighten or replace impeller.
4. Inspect exterior case of motor for cracks, dents, oil, and evidence of overheating or any other abnormalities. Replace defective motor.
5. Turn motor shaft by hand and listen for clicking sounds that indicate bad bearings. Replace if bearings are bad.
6. If the shaft cannot be rotated, the bearings may have seized. Replace motor.
7. Test the thrust bearings by attempting to push and pull the motor shaft axially.
8. If end play is excessive (i.e., can be felt on manual push-pull), the thrust bearings and shims are worn beyond limits and motor should be replaced.
9. Use a multimeter or continuity tester to check continuity between leads. See wiring diagram (WP 0038 00).
10. Check to be sure that continuity exists between leads. This means that open circuits do not exist. Replace motor if either open or short circuits exist.

ASSEMBLY

1. Install motor (3) on motor mounting plate (8) with four screws (33), flat washers (32), and nuts (31).
2. Insert shaft extension (2) into impeller (4) and tighten two setscrews (31) on impeller (4) by using a socket head screw key (Item 13, Table 2, WP 0067 00).
3. Without using excessive force, insert impeller (4) into fan housing (11).
4. Attach the inlet bell (30) to the fan housing (11) with four flat washers (29) and screws (28).

INSTALLATION

1. Insert fan housing (11) back into position in unit housing.

CAUTION

Handle tubing at service valves, pressure relief valve, high and low pressure switches, and linear-actuator with special care to avoid kinking or creating leaks at brazed joints.

2. Bend tubing (27) from high and low pressure switches and service valves (19), pressure relief valve (23), and linear-actuator (15) back into position with extreme care.
3. Install clamps (26), flat washers (25), and screws (24) that secure the tubing (27) of the high and low pressure switches to the fan housing (11).
4. Install clamp (22), flat washer (21), and screw (20) that secure the pressure relief valve (23) to the fan housing (11).
5. Install clamps (18) on service valves (19) and attach to fan housing (11) with flat washers (17) and screws (16).
6. Attach the linear-actuator bracket (15) to the fan housing (11) with two flat washers (14), lockwashers (13), and capscrews (12).
7. Secure the fan housing (11) to the unit housing by installing six countersunk screws (9) on the bottom of unit housing and one countersunk screw (10) on the side of unit housing.

CAUTION

Take care to avoid damaging the condenser coil while removing motor and mounting plate from unit.

8. Place the motor (3) and mounting plate (8) into position in the unit housing.
9. Attach the shaft extension (2) with impeller (4) onto the shaft motor by loosely tightening setscrews (1).
10. Secure the motor mounting plate (8) to motor mount (7) with four flat washers (6) and capscrews (5).
11. Center the impeller (4) in the fan housing (11) while looking through the louver opening of the unit housing. Then tighten the setscrews (1) on the shaft extension (2).
12. Reconnect wiring, See wiring list and schematic diagram WP 0038 00.
13. Connect the condenser louver (WP 0021 00).
14. Install top cover (WP 0018 00).

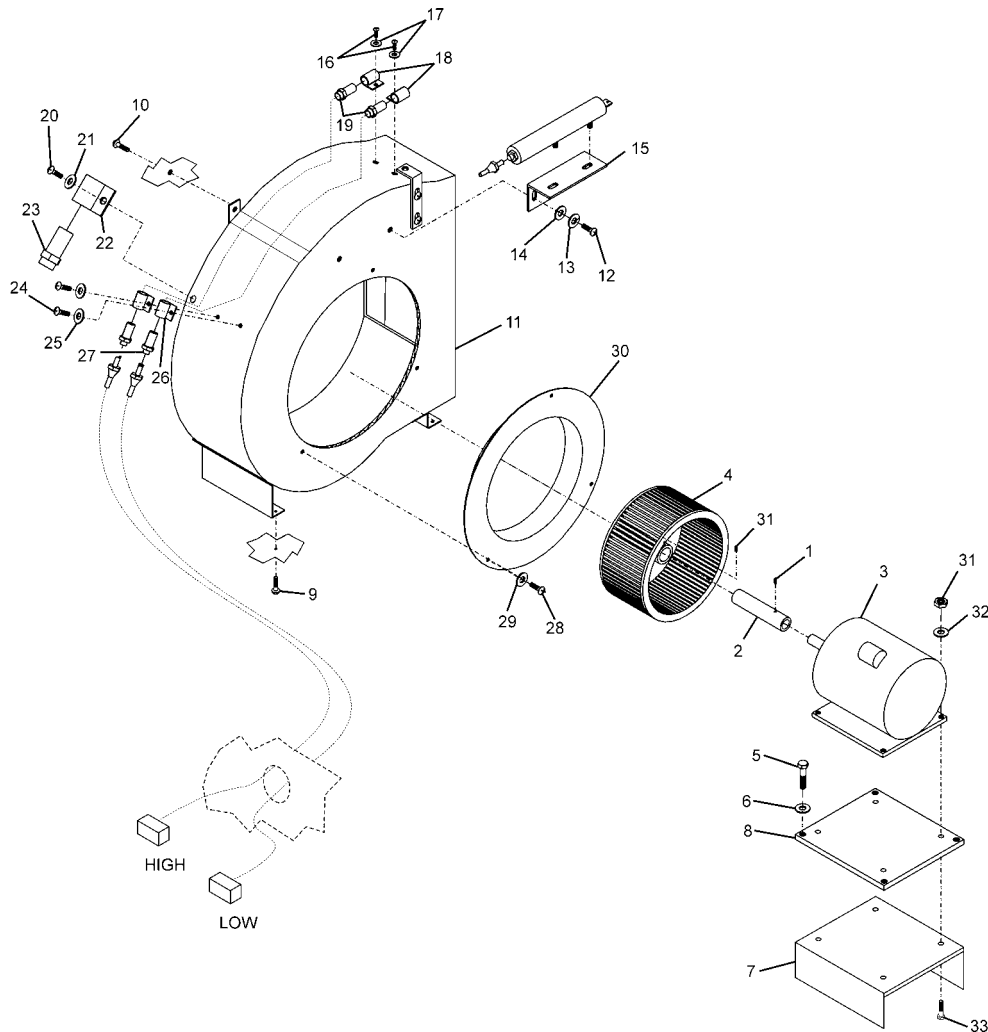


Figure 1. Condenser Fan Assembly

END OF WORK PACKAGE

**UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
WIRE LISTS AND SCHEMATIC DIAGRAMS**

WIRE LISTS

Table 1 provides the following information for the S9160-18K-3 unit:

- The wire from-to destination by item reference designation/pin number by label description
- Wire size
- Color
- Type of connection (end to end)
- Length of wire
- Pertinent remarks, if applicable.

Table 2 provides a listing of paper labels for the S9160-18K-3 unit.

Table 3 provides the same information as described above for the S9150-18K-1 unit.

Table 4 provides a listing of paper labels for the S9150-18K-1 unit.

SCHEMATIC DIAGRAMS

The schematic diagram for the S9160-18K-3 unit is shown in figure 1.

The schematic diagram for the S9150-18K-1 unit is shown in figure 2.

Table 1. Wire List for S9160-18KH-3 Unit

Labels From To		Wire Size AWG	Wire Color	Type of End to End Connection		Length Of Wire	Remarks
J1-A	TB1-4	12	BLACK	SOLDER	#10 RING	97	J1
J1-B	TB1-5	12	RED	SOLDER	#10 RING	96	
J1-C	TB1-6	12	BLUE	SOLDER	#10 RING	95	
J1-E	CASE GND (E1)	12	GREEN	SOLDER	#10 RING	70	
J1-D	NOT USED	--	--	PIN ONLY			
J2-A	TB1-1	12	BLACK	SOLDER	#10 RING	16	J2
J2-B	TB1-2	12	RED	SOLDER	#10 RING	15	
J2-C	TB1-3	12	BLUE	SOLDER	#10 RING	14	
J2-E	GND (E2)	12	GREEN	SOLDER	#10 RING	7	
J2-D	NOT USED	--	--	PIN ONLY		7	
CASE GND (E1)	GND (E2)	12	GREEN	#10 RING	#10 RING	35	
CB-A1	TB1-1	12	BLACK	FLAG	#10 RING	100	CB
CB-A2	TB1-2	12	RED	FLAG	#10 RING	99	
CB-A3	TB1-3	12	BLUE	FLAG	#10 RING	98	
CB-B1	K1-L1	12	BLACK	FLAG	#10 RING	96	
CB-B2	K1-L2	12	RED	FLAG	#10 RING	97	

Labels From To		Wire Size AWG	Wire Color	Type of End to End Connection		Length Of Wire	Remarks
CB-B3	K1-L3	12	BLUE	FLAG	#10 RING	98	
CH	K1-L1	20	BLACK	BUTT SPLICE	RING	74	CH
CH	K1-L2	20	RED	BUTT SPLICE	RING	75	
K1-T1	B1-T1	12	BLACK	#10 RING	SOLDER FLAG	78	B1
K1-T2	B1-T2	12	RED	#10 RING	SOLDER FLAG	77	
K1-T3	B1-T3	12	BLUE	#10 RING	SOLDER FLAG	82	
K2-4	B2-BLK	FBO		SPADE	MTR		B2
K1-L2	B2-WHT	FBO		SPADE	MTR		
B2-GRN	GND (E1)	FBO		---	MTR		
K1-T2	B3-BLK	FBO		RING	MTR		B3
K1-T3	B3-WHT	FBO		RING	MTR		
B3-GRN	GND E1	FBO		---	MTR		
HR1-1	TB3-1	FBO					HEATER
HR1-2	TB3-6	FBO					
HR2-1	TB3-1	FBO					
HR2-2	TB3-2	FBO					
HR3-1	TB3-1	FBO					
HR3-2	TB3-2	FBO					
HR4-1	TB3-3	FBO					
HR4-2	TB3-2	FBO					
HR5-1	TB3-3	FBO					
HR5-2	TB3-4	FBO					
HR6-1	TB3-5	FBO					
HR6-2	TB3-4	FBO					
HR7-1	TB3-5	FBO					
HR7-2	TB3-4	FBO					
HR8-1	TB3-5	FBO					
HR8-2	TB3-6	FBO					
TB3-2	TB3-4	12	BLACK	SPADE	SPADE	4	
K3-4	TB3-1	12	BLACK	SPADE	SPADE	78	
K4-4	S3-1	12	RED	SPADE	RING	57	
K5-4	S3-2	12	BLUE	SPADE	RING	52	
S3-3	TB3-3	12	RED	RING	SPADE	16	
S3-4	TB3-5	12	BLUE	RING	SPADE	16	
TD-1	TB2-6	20	RED	SPADE	SPADE	11	CONTROL BOX
TD-3	K1-A	20	RED	SPADE	FLAG	11	
TR-208VAC	K1-L1	20	BLACK	FLAG	RING	11	
TR-COMM	K1-L2	20	RED	FLAG	RING	12	
K2-2	K1-L1	20	BLACK	SPADE	SPADE	15	
K3-2	K1-L1	20	BLACK	SPADE	SPADE	4	
K4-2	K1-L2	20	RED	SPADE	SPADE	3	
K5-2	K1-L3	20	BLUE	SPADE	SPADE	6	

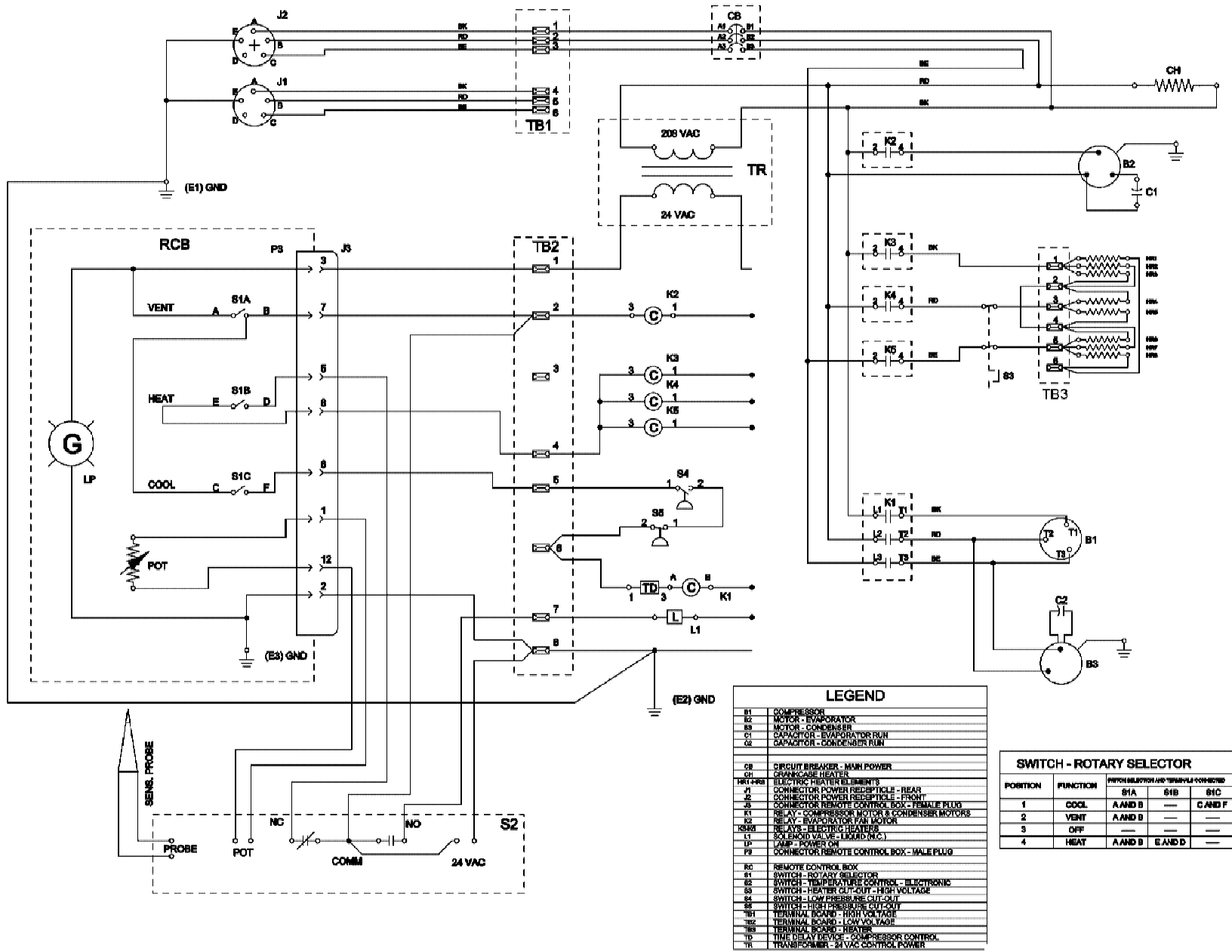
Labels From To		Wire Size AWG	Wire Color	Type of End to End Connection		Length Of Wire	Remarks
TR-24VAC	TB2-1	20	RED	FLAG	SPADE	15	
TR-24VAC(GND)	E2(GND)	20	BLACK	PIGGY	RING	9	
TB2-8	E2(GND)	20	BLACK	SPADE	RING	11	
K2-1	TR-24 VAC (GND)	20	BLACK	PIGGY	SPADE	8	
K3-1	K2-1	20	BLACK	PIGGY	SPADE	15	
K4-1	K3-1	20	BLACK	PIGGY	SPADE	3	
K5-1	K4-1	20	BLACK	PIGGY	SPADE	3	
K1-B	K5-1	20	BLACK	FLAG	SPADE	8	
K2-3	TB2-2	20	RED	SPADE	SPADE	13	
K3-3	K4-3	20	RED	SPADE	PIGGY	3	
K4-3	K5-3	20	RED	SPADE	PIGGY	3	
K5-3	TB2-4	20	RED	SPADE	SPADE	6	
S4-1 (LOW)	TB2-5	20	BLUE	FLAG	SPADE	35	
S5-2 (HIGH)	TB2-6	20	RED	FLAG	SPADE	35	
S4-2 (LOW)	S5-1 (HIGH)	20	BLACK	FLAG	FLAG	10	
L1	CASE (GND)E1	20	BLACK	SPADE	RING	58	L1
L1	TB2-7	20	RED	SPADE	SPADE	88	
P3-2	GND(E3)	20	BLACK	PIN	RING	6	RCB
P3-3	S1A-A	20	BLACK	PIN	SOLDER	6	
P3-5	S1B-D	20	RED	PIN	SOLDER	6	
P3-6	S1C-F	20	BLUE	PIN	SOLDER	6	
P3-7	S1A-B	20	BLACK	PIN	SOLDER	6	
P3-8	S1B-E	20	RED	PIN	SOLDER	6	
S1A-B	S1C-C	20	BLUE	SOLDER	SOLDER	6	
P3-1	POT	FBO	--	PIN	--	--	
P3-12	POT	FBO	--	PIN	--	--	
LP	S1A-A	FBO	--	--	SOLDER	--	
LP	GND(E3)	FBO	--	--	RING	--	
J3-1	POT	20	BLUE	PIN	FLAG	36	BLACK BOX
J3-2	TB2-8	20	BLACK	PIN	SPADE	16	
J3-3	TB2-1	20	RED	PIN	SPADE	21	
J3-5	NC	20	RED	PIN	PIGGY	36	
J3-6	TB2-5	20	RED	PIN	SPADE	17	
J3-7	TB2-2	20	RED	PIN	SPADE	19	
J3-8	TB2-4	20	RED	PIN	SPADE	17	
J3-12	POT	20	BLUE	PIN	FLAG	36	
S2-NO	TB2-7	20	RED	PIGGY	SPADE	39	
S2 24VAC(GND)	TB2-8	20	BLACK	FLAG	SPADE	38	
S2-COMM(2W)	TB2-2	20	RED	*FLAG	SPADE	43	
S2-COMM(2W)	S2-24VAC	20	RED	*FLAG	NON INSUL	3	
S2-PROBE	BULB/SENSOR	FBO	--	FLAG	--	--	

*Crimp end same flag

Table 2. Paper Labels for S9160-18KH-3 Unit

Label	Component
TB1	
TB2	
TB3	
E1	
E2	
J3	
K1	
K2	
K3	
K4	
K5	
TR	
TD	
A	
B	
S2	
S3	
CB	
CBA1	
CBA2	
CBA3	
CBB1	
CBB2	
CBB3	

Figure 1. Schematic Diagram for the S9160-18KH-3 Unit



LEGEND

B1	COMPRESSOR
B2	MOTOR - EVAPORATOR
B3	MOTOR - CONDENSER FAN
B4	CONDENSER FAN MOTOR RUN
C2	CAPACITOR - CONDENSER RUN
CB	CIRCUIT BREAKER - MAIN POWER
CH	CHARMORSE HEATER
TR1-TR3	ELECTRIC HEATER ELEMENTS
J1	CONNECTOR POWER RECEPTACLE - HEAT
J2	CONNECTOR POWER RECEPTACLE - FRONT
J3	CONNECTOR REMOTE CONTROL BOX - FEMALE PLUG
J5	CONNECTOR REMOTE CONTROL BOX - MALE PLUG
K1	RELAY - COMPRESSOR MOTOR & CONDENSER MOTORS
K2	RELAY - EVAPORATOR FAN MOTOR
K3, K4	RELAYS - ELECTRIC HEATERS
K5	RELAY - HEATER OUT-GO
L1	SOLENOID VALVE - LIQUID (N.C.)
LP	LAMP - POWER ON
P2	CONNECTOR REMOTE CONTROL BOX - MALE PLUG
RCB	REMOTE CONTROL BOX
S1	SWITCH - ROTARY SELECTOR
S2	SWITCH - TEMPERATURE CONTROL - ELECTRONIC
S3	SWITCH - HEATER OUT-GO - HIGH VOLTAGE
S4	SWITCH - LOW PRESSURE CUT-OUT
S5	SWITCH - HIGH PRESSURE CUT-OUT
TB1	TERMINAL BOARD - HIGH VOLTAGE
TB2	TERMINAL BOARD - LOW VOLTAGE
TB3	TERMINAL BOARD - HEATERS
TD	TIME DELAY DEVICE - COMPRESSOR CONTROL
TR	TRANSFORMER - 24 VAC CONTROL POWER

SWITCH - ROTARY SELECTOR

POSITION	FUNCTION	POSITION 1 AND 2 TERMINALS CONNECTED	POSITION 3 AND 4 TERMINALS CONNECTED
1	COOL	A AND B	C AND F
2	VENT	A AND B	---
3	OFF	---	---
4	HEAT	A AND B	E AND D

Table 3. Wire List for S9150-18KH-1 Unit

Labels From To		Wire Size AWG	Wire Color	Type of End to End Connection		Length Of Wire	Remarks
J1-A	TB1-4	12	BLACK	SOLDER	#10 RING	97	J1
J1-B	TB1-5	12	RED	SOLDER	#10 RING	96	
J1-E	CASE GND (E1)	12	GREEN	SOLDER	#10 RING	66	
J1-C	NOT USED	--	--	PIN ONLY		--	
J1-D	NOT USED	--	--	PIN ONLY		--	
J2-A	TB1-1	12	BLACK	SOLDER	#10 RING	16	J2
J2-B	TB1-2	12	RED	SOLDER	#10 RING	15	
J2-E	GND (E2)	12	GREEN	SOLDER	#10 RING	7	
J2-C	NOT USED	--	--	PIN ONLY		--	
J2-D	NOT USED	--	--	PIN ONLY		--	
CASE GND (E1)	GND (E2)	12	GREEN	#10 RING	#10 RING	35	GND
CB-A1	TB1-1	12	BLACK	FLAG	#10 RING	100	CB
CB-A2	TB1-2	12	RED	FLAG	#10 RING	99	
CB-B1	K1-L1	12	BLACK	FLAG	#10 RING	96	
CB-B2	K1-L2	12	RED	FLAG	#10 RING	97	
CH	K1-L1	20	BLACK	BUTT SPLICE	RING	74	CM
CH	K1-L2	20	RED	BUTT SPLICE	RING	75	
K1-T1	B1-C	12	BLACK	#10 RING	SOLDERFLAG	78	B1 START KIT
K1-T2	B1-R	12	RED	#10 RING	SOLDERFLAG	77	
C3-B	B1-S	12	ORANGE	FLAG	SOLDERFLAG	62	
C3-A	C4-A	12	RED	FLAG	FLAG	10	
C3-A	K1-T2	12	RED	FLAG	RING	49	
R1-5	K1-T1	20	BLACK	FLAG	RING	50	
C3-B	R1-2	12	ORANGE	FLAG	FLAG	9	
C4-B	R1-1	12	BLACK	FLAG	FLAG	8	
K2-4	B2-BLK	FBO	BLACK	SPADE	MTR		B2
K1-L2	B2-WHITE	FBO	WHITE	SPADE	MTR		
B2-GRN	GNDE1	FBO	GREEN	--	MTR		
K1-T1	B3-BLK	FBO	BLACK	RING	MTR		B3
K1-T2	B3-WHT	FBO	WHITE	RING	MTR		
B3-GRN	GND E1	FBO	GREEN	---	MTR		
K3-4	TB3-1	12	BLACK	SPADE	SPADE	48	HEATER
K4-4	S3-1	12	BLACK	SPADE	RING	57	
K5-4	S3-2	12	RED	SPADE	RING	52	
S3-3	TB3-4	12	BLACK	RING	SPADE	16	
S3-4	TB3-6	12	RED	RING	SPADE	16	
TB3-3	TB3-6	12	RED	SPADE	SPADE	4	
HR1-1	TB3-1	FBO					
HR1-2	TB3-2	FBO					
HR2-1	TB3-1	FBO					
HR2-2	TB3-2	FBO					

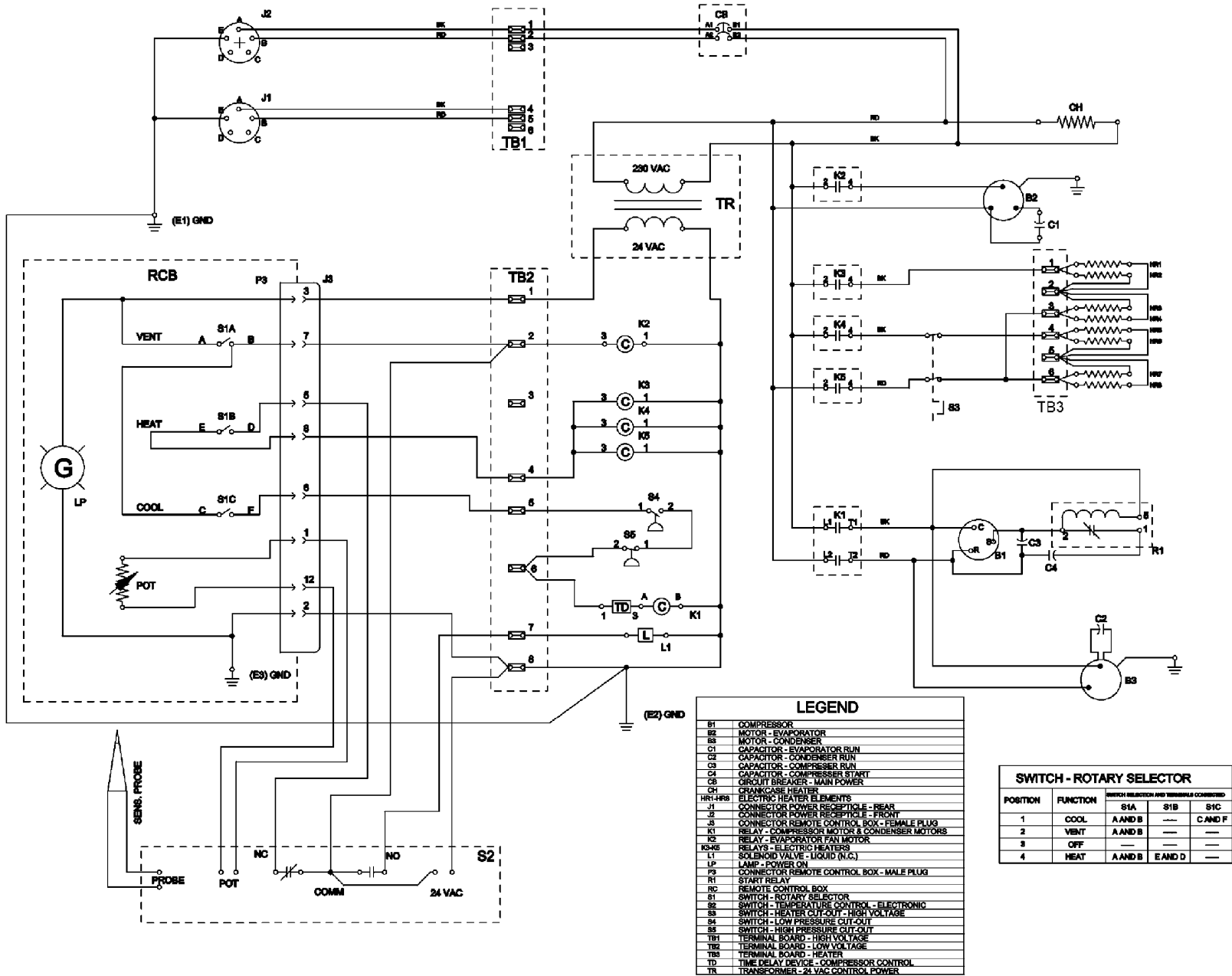
Labels From To	Wire Size AWG	Wire Color	Type of End to End Connection		Length Of Wire	Remarks		
HR3-1	TB3-2	FBO						
HR3-2	TB3-3	FBO						
HR4-1	TB3-2	FBO						
HR4-2	TB3-3	FBO						
HR5-1	TB3-4	FBO						
HR5-2	TB3-5	FBO						
HR6-1	TB3-4	FBO						
HR6-2	TB3-5	FBO						
HR7-1	TB3-5	FBO						
HR7-2	TB3-6	FBO						
HR8-1	TB3-5	FBO						
HR8-2	TB3-6	FBO						
TR-208VAC	K1-L1	20	BLACK	FLAG	SPADE	11	CONTROL BOX	
TR-COMM	K1-L2	20	RED	FLAG	SPADE	12		
K2-2	K3-2	20	BLACK	SPADE	PIGGY	15		
K3-2	K4-2	20	BLACK	SPADE	PIGGY	3		
K4-2	K1-L1	20	BLACK	SPADE	SPADE	3		
K5-2	K1-L2	20	RED	SPADE	RING	4		
TR-24VAC	TB2-1	20	RED	FLAG	SPADE	15		
TR-24VAC(GND)	E2(GND)	20	BLACK	PIGGY	RING	9		
TB2-8	E2(GND)	20	BLACK	SPADE	RING	11		
K2-1	TR-24 VAC (GND)	20	BLACK	PIGGY	SPADE	8		
K3-1	K2-1	20	BLACK	PIGGY	SPADE	15		
K4-1	K3-1	20	BLACK	PIGGY	SPADE	3		
K5-1	K4-1	20	BLACK	PIGGY	SPADE	3		
K1-B	K5-1	20	BLACK	FLAG	SPADE	8		
TD-1	TB2-6	20	RED	SPADE	SPADE	11		
TD-3	K1-A	20	RED	SPADE	FLAG	11		
K2-3	TB2-2	20	RED	SPADE	SPADE	13		
K3-3	K4-3	20	RED	SPADE	PIGGY	3		
K4-3	K5-3	20	RED	SPADE	PIGGY	3		
K5-3	TB2-4	20	RED	SPADE	SPADE	6		
S4-1 (LOW)	TB2-5	20	BLUE	FLAG	SPADE	35		
S5-2 (HIGH)	TB2-6	20	RED	FLAG	SPADE	35		
S4-2 (LOW)	S5-1 (HIGH)	20	BLACK	FLAG	FLAG	10		
L1	CASE (GND)	E1	20	BLACK	SPADE	RING	58	L1
L1	TB2-7	20	RED	SPADE	SPADE	88		
P3-2	GND(E3)	20	BLACK	PIN	RING	6	RCB	
P3-3	S1A-A	20	BLACK	PIN	SOLDER	6		
P3-5	S1B-D	20	RED	PIN	SOLDER	6		
P3-6	S1C-F	20	BLUE	PIN	SOLDER	6		
P3-7	S1A-B	20	BLACK	PIN	SOLDER	6		
P3-8	S1B-E	20	RED	PIN	SOLDER	6		
S1A-B	S1C-C	20	BLUE	SOLDER	SOLDER	6		
P3-1	POT	FBO	--	PIN	--	--		
P3-12	POT	FBO	--	PIN	--	--		
LP	S1A-A	FBO	--	--	SOLDER	--		
LP	GND(E3)	FBO	--	--	RING	--		

Labels From To		Wire Size AWG	Wire Color	Type of End to End Connection		Length Of Wire	Remarks
J3-1	POT	20	BLUE	PIN	FLAG	36	BLACK BOX
J3-2	TB2-8	20	BLACK	PIN	SPADE	16	
J3-3	TB2-1	20	RED	PIN	SPADE	21	
J3-5	NC	20	RED	PIN	PIGGY	36	
J3-6	TB2-5	20	RED	PIN	SPADE	17	
J3-7	TB2-2	20	RED	PIN	SPADE	19	
J3-8	TB2-4	20	RED	PIN	SPADE	17	
J3-12	POT	20	BLUE	PIN	FLAG	36	
S2-NO	TB2-7	20	RED	PIGGY	SPADE	39	
S2 24VAC(GND)	TB2-8	20	BLACK	FLAG	SPADE	38	
S2-COMM(2W)	TB2-2	20	RED	*FLAG	SPADE	43	
S2-COMM(2W)	S2-24VAC	20	RED	*FLAG	PIGGY	3	
S2-PROBE	BULB/SENSOR	FBO	--	FLAG	--	--	

Table 4. Paper Labels for S9150-18KH-1 Unit

Label	Component
TB1	
TB2	
TB3	
E1	
E2	
J3	
K1	
K2	
K3	
K4	
K5	
TR	
TD	
A	
B	
R1	
C3	
C4	
CB	
S2	
S3	
CBA1	
CBA2	
CBB1	
CBB2	

Figure 2. Schematic Diagram for the S9150-18KH-1 Unit



LEGEND

B1	COMPRESSOR
B2	MOTOR - EVAPORATOR
B3	MOTOR - CONDENSER
C1	CAPACITOR - EVAPORATOR RUN
C2	CAPACITOR - CONDENSER RUN
C3	CAPACITOR - COMPRESSOR RUN
C4	CAPACITOR - COMPRESSOR START
CH	CRANKCASE HEATER
H1-H5	ELECTRIC HEATER ELEMENTS
J1	CONNECTOR POWER RECEPTACLE - REAR
J2	CONNECTOR POWER RECEPTACLE - FRONT
J3	CONNECTOR REMOTE CONTROL BOX - FEMALE PLUG
K1	RELAY - COMPRESSOR MOTOR & CONDENSER MOTORS
K2	RELAY - EVAPORATOR FAN MOTOR
K3-K5	RELAYS - ELECTRIC HEATERS
L1	SOLENOID VALVE - LIQUID (N.C.)
LP	LAMP - POWER ON
P3	CONNECTOR REMOTE CONTROL BOX - MALE PLUG
R1	START RELAY
RC	REMOTE CONTROL BOX
S1	SWITCH - ROTARY SELECTOR
S2	SWITCH - TEMPERATURE CONTROL - ELECTRONIC
S3	SWITCH - HEATER CUT-OUT - HIGH VOLTAGE
S4	SWITCH - LOW PRESSURE CUT-OUT
S5	SWITCH - HIGH PRESSURE CUT-OUT
TB1	TERMINAL BOARD - HIGH VOLTAGE
TB2	TERMINAL BOARD - LOW VOLTAGE
TB3	TERMINAL BOARD - HEATER
TD	TIME DELAY DEVICE - COMPRESSOR CONTROL
TR	TRANSFORMER - 24 VAC CONTROL POWER

SWITCH - ROTARY SELECTOR

POSITION	FUNCTION	WHICH HEATERS AND TERMINALS CONTROLLED		
		S1A	S1B	S1C
1	COOL	A AND B	---	C AND F
2	VENT	A AND B	---	---
3	OFF	---	---	---
4	HEAT	A AND B	E AND D	---

UNIT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
INSTALLATION HARDWARE MAINTENANCE
REMOVAL, INSPECTION, AND INSTALLATION

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Personnel Required

Two

Equipment Condition

Main power source is disconnected.

WARNING



Ensure power source is disconnected.

REMOVAL

1. Remove four screws (1) and flat washers (2) from bottom of air conditioner and enclosure mounting plate (6). See Figure 1.
2. Remove four resilient mounts (3), four elastomeric tubes (5) and four spacers (4) from bottom of enclosure mounting plate (6).
3. Remove air conditioner from atop of four remaining resilient mounts (3) and the enclosure mounting plate (6).
4. Remove the remaining four resilient mounts (3) from atop of enclosure mounting plate (6).

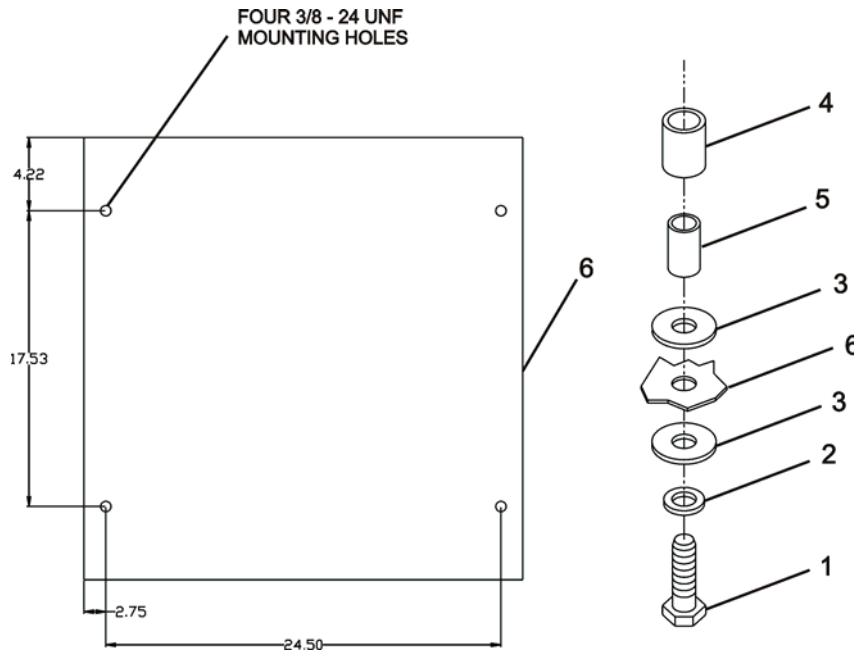


Figure 1. Installation Hardware

INSPECTION

1. Inspect four screws (1) and flat washers (2) for damage.
2. Inspect eight resilient mounts (3), four elastomeric tubes (5) and four spacers (4) for damaged or worn out conditions.
3. Replace damaged hardware.

INSTALLATION

1. Assemble onto each of four screws (1), a flat washer (2), a spacer (4), an elastomeric tube (5) and a resilient mount (3).
2. Install the above screws, flat washers, spacers, elastomeric tubes and resilient mounts through the bottom of enclosure plate and then install one additional resilient mount (3) on each of the four screws (1), on top of the enclosure mounting plate (6).
3. Align the air conditioner on top of the resilient mounts (3) and screws (1), which attach the air conditioner to the enclosure mounting plate (6).
4. Tighten the screws (1) into the bottom of air conditioner.

END OF WORK PACKAGE

CHAPTER 7
DIRECT SUPPORT
TROUBLESHOOTING PROCEDURES

DIRECT SUPPORT TROUBLESHOOTING INTRODUCTION
AIR CONDITIONER, COMPACT, HORIZONTAL

MALFUNCTION/SYMPTOM INDEX

The malfunction/symptom index (WP 0008 00 and WP 0041 00) are quick reference indexes for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in a troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

As the troubleshooting activity progresses through to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

TROUBLESHOOTING PROCEDURES

The troubleshooting work packages contain tables listing the malfunctions, tests or inspections, and corrective action required to return to the normal operation. Perform the steps in the order they appear in the tables.

Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions which must be met before starting the task. **DO NOT START A TASK UNTIL:**

You understand the task.

You understand what you are to do.

You understand what is needed to do the work.

You have the things you need.

This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

END OF WORK PACKAGE

**DIRECT SUPPORT MALFUNCTION/SYSTEM INDEX
AIR CONDITIONER, COMPACT, HORIZONTAL**

MALFUNCTION/SYMPTOM	TROUBLESHOOTING PROCEDURE
Compressor Will Not Start	
1. Control circuit may have an open circuit	WP 0042 00
2. Faulty circuit breaker	WP 0042 00
3. Bad continuity of compressor motor or wiring	WP 0042 00
4. Faulty HIGH or LOW pressure switch	WP 0042 00
5. Faulty power input plugs (P2 or P1 alternate)	WP 0042 00
Compressor Starts, But Stops At Once Or After Short Run Period Due To Tripped Circuit Breaker	
1. Defective circuit breaker	WP 0042 00
Compressor Starts, But Stops At Once Or After Short Run Period Due To Tripped Low Pressure Switch	
1. Unit activation requires time delay (wait and observe)	WP 0042 00
2. Defective low pressure switch	WP 0042 00
3. System refrigerant loss	WP 0042 00
Compressor Starts, But Stops At Once Or After Short Run Period Due To Tripped High Pressure Switch	
1. System refrigerant overcharged	WP 0042 00
2. Bad condenser fan or motor	WP 0042 00
3. Obstruction of air flow through condenser, grill or louvers	WP 0042 00
4. Faulty high pressure switch	WP 0042 00
Compressor Starts, But Stops At Once Or After Short Run Period Due To Tripping of Compressor Overload Switch	
1. Faulty compressor	WP 0042 00
2. Faulty expansion valve	WP 0042 00
Insufficient Cooling	
1. Bad filter-drier	WP 0042 00
2. Expansion valve obstructed or damaged	WP 0042 00

MALFUNCTION/SYMPTOM	TROUBLESHOOTING PROCEDURE
3. Insufficient refrigerant or leaks	WP 0042 00
4. Faulty compressor	WP 0042 00
5. Excess refrigerant	WP 0042 00
Compressor Runs But Does Not Cool	
1. Improper power supply	WP 0042 00
2. Excessively high temperature in conditioned area	WP 0042 00
3. Faulty compressor	WP 0042 00
4. Low refrigerant charge	WP 0042 00
5. High discharge pressure	WP 0042 00
6. Faulty liquid solenoid valve	WP 0042 00
Compressor Excessively Noisy	
1. Low suction line temperature	WP 0042 00
2. Over charge of refrigerant	WP 0042 00
3. Improper power supply	WP 0042 00
Suction Pressure Too Low	
1. Faulty expansion valve	WP 0042 00
2. Bad filter-drier	WP 0042 00
Suction Pressure Too High	
1. Defective solenoid valve	WP 0042 00
2. Broken or loose louver cables	WP 0042 00
3. Defective actuator cylinder	WP 0042 00
4. Faulty expansion valve	WP 0042 00
Low Heat or No Heat	
1. Loose connections or broken wires	WP 0042 00
2. Poor continuity of mode selector switch and/or temperature control	WP 0042 00
3. Faulty heating elements	WP 0042 00

- 4. Faulty heater cutout switches WP 0042 00
- 5. Faulty heater relay WP 0042 00
- 6. Bad evaporator fan or motor WP 0042 00

END OF WORK PACKAGE

**DIRECT SUPPORT TROUBLESHOOTING PROCEDURES
AIR CONDITIONER, COMPACT, HORIZONTAL**

THIS WORK PACKAGE COVERS:

Compressor Will Not Start, Compressor Starts But Stops At Once, Insufficient Cooling, Compressor Runs But Does Not Cool, Compressor Excessively Noisy, Suction Pressure Too Low or Too High, Low Heat or No Heat

INITIAL SETUP:

Tools and Special Tools

- Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
- Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
- Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
- Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

- Multimeter
- Electronic refrigerant gas leak detector

References

Schematic Diagrams WP 0038 00

Personnel Required

One

Equipment Condition

- Mode selector switch in OFF position
- Main power source is disconnected
- Top cover removed (WP 0018 00)

WARNING



Ensure power source is disconnected.

FAULT PROCEDURE 1. COMPRESSOR WILL NOT START.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR WILL NOT START

- Step 1. Make continuity check of control circuit and components. See WP 0038 00 for control circuit schematic diagram.
 - a. Check for 24 volts at transformer (TR).
 - b. Check for power to K1 relay.
 - c. For S9150-18KH-1 unit, check continuity of B1 starter kit components (C3, C4, R1).
 - d. Repair loose or broken connections. Replace bad components. (Refer to WP 0026 00 through WP 0033 00).
- Step 2. If fans do not operate, make continuity check of circuit breaker. (Refer to WP 0027 00).
Replace bad circuit breaker. (Refer to WP 0027 00.)

FAULT PROCEDURE 1. COMPRESSOR WILL NOT START - Continued

MALFUNCTION
 TEST OR INSPECTION
 CORRECTIVE ACTION

COMPRESSOR WILL NOT START

- Step 3. Check continuity of compressor motor, and the wiring to motor using multimeter. (Refer to WP 0059 00.)
 - a. Using a multimeter, test for continuity between pins T1 and T2, T2 and T3, and T3 and T1 of the compressor electrical receptacle. Continuity should exist. If not, replace compressor.
 - b. Check for continuity between pins T1, T2 and T3 and the compressor housing. No continuity should exist. If continuity exists, replace compressor.
 Replace bad compressor or bad wiring. (Refer to WP 0059 00).

- Step 4. Check continuity of HIGH and LOW pressure switches at room temperature. Continuity should exist. (Refer to WP 0055 00).
 If continuity does not exist, press reset button and recheck. Replace faulty HIGH or LOW pressure switch. (Refer to WP 0055 00.)

- Step 5. For S9160-18KH-3 unit, check power input plugs (P2 or P1 alternate) using multimeter at TB1 as follows:
 Replace power input plug which does not pass test. (Refer to WP 0029 00.)

<u>CONNECTOR PLUG PIN</u>	TB1 TERMINAL (See Note)
A	1 or 4
B	2 or 5
C	3 or 6
E	GROUND

A to B should be 208 V ac
 B to C should be 208 V ac
 A to C should be 208 V ac
 A to E should be 120 V ac
 B to E should be 120 V ac
 C to E should be 120 V ac

NOTE

When making test for voltage and phase reading, TB1 terminals 4, 5, and 6 are used with P1 alternate plug. Refer to WP 0038 00 schematic diagram.

- Step 5. For S9150-18KH-1 unit, check power input plugs (P2 or P1 alternate) using multimeter at TB1 as follows:
 Replace power input plug which does not pass test. (Refer to WP 0029 00.)

<u>CONNECTOR PLUG PIN</u>	TB1 TERMINAL (See Note)
A	1 or 4
B	2 or 5
E	GROUND

A to B should be 230 V ac
 A to E should be 120 V ac
 B to E should be 120 V ac

FAULT PROCEDURE 2. COMPRESSOR STARTS, BUT STOPS AT ONCE OR AFTER SHORT RUN PERIOD. (Due to Tripped Circuit Breaker)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

COMPRESSOR STARTS, BUT STOPS

NOTE

When making test for voltage and phase reading, TB1 terminals 4 and 5 are used with P1 alternate plug. Refer to WP 0038 00 schematic diagram.

- Step 1. Check compressor for short to ground.
 Replace bad compressor or bad lead. (Refer to WP 0059 00.)
- Step 2. Check circuit breaker by observing amperes at moment of trip.
 Replace defective circuit breaker. See WP 0027 00.

FAULT PROCEDURE 3. COMPRESSOR STARTS, BUT STOPS AT ONCE OR AFTER SHORT RUN PERIOD. (Due to Tripped Low Pressure Switch)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

COMPRESSOR STARTS, BUT STOPS

- Step 1. Leave the unit alone for one minute.
 Wait.
- Step 2. After one minute, see if compressor comes on.
 Wait and observe when low pressure switch cuts out.
- Step 3. Wait another one minute.
 If compressor does not come on, perform continuity test on low pressure switch. Replace defective switch (WP 0055 00).

NOTE

Sequence of waiting and observing may occur several times depending on temperature.

- Step 4. Perform pressure testing (WP 0051 00) on system to determine if refrigerant is low.
 If pressure is low, perform leak check (WP 0047 00) and repair leak (WP 0046 00).

FAULT PROCEDURE 4. COMPRESSOR STARTS, BUT STOPS AT ONCE OR AFTER SHORT RUN PERIOD. (Due to Tripped High Pressure Switch)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR STARTS, BUT STOPS

- Step 1. Perform pressure testing on system to determine if an overcharge of refrigerant is indicated. See WP 0050 00.
If overcharged, partially discharge the system and retest. See WP 0044 00 and WP 0050 00.
- Step 2. Check for proper operation of condenser fan and motor.
Replace bad motor or fan. (Refer to WP 0037 00.)
- Step 3. Inspect condenser coil, intake grill and condenser discharge louvers for dirt, obstructions or closed discharge louver.
Clean or remove obstruction or set discharge louver to full open. See WP 0060 00.
Check linear-actuator linkage for missing hardware.
- Step 4. Turn off power; short-circuit (jumper) the high pressure switch. Turn on power, wait one minute for time delay to allow compressor to start. Allow compressor to run for a maximum of 12 seconds to see whether compressor operates normally.
If operation of unit is satisfactory, replace faulty high pressure switch. See WP 0055 00.

FAULT PROCEDURE 5. COMPRESSOR STARTS, BUT STOPS AT ONCE OR AFTER SHORT RUN PERIOD. (Due to Tripping of Compressor Internal Overload)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR STARTS, BUT STOPS

CAUTION

Do not exceed 12-second operating time for compressor as high pressure may develop in the refrigeration system that could cause the pressure relief valve to open or may result in damage to the system.

- Step 1. Check compressor current draw at moment of trip.
If over specified current draw, replace faulty compressor. See WP 0059 00.
- Step 2. Check for proper operation of refrigerant expansion valve superheat at compressor suction.
If in excess of 25 degrees F (-3.88 degrees C) replace expansion valve. See WP 0057 00.

FAULT PROCEDURE 6. INSUFFICIENT COOLING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

INSUFFICIENT COOLING

- Step 1. Feel filter-drier to see whether it is cold to the touch, or is frosted or sweating.
If so, replace filter-drier. (Refer to WP 0051 00.)
- Step 2. Check evaporator coil for overall temperature.
If part of coil is relatively warm and evaporator inlet is sweaty or frosty, expansion valve or distributor may be obstructed or damaged. (Refer to WP 0061 00.)
- Step 3. Check liquid sight indicator for bubbles or cloudiness, which indicates insufficient refrigerant.
Recharge system after checking for and repairing leaks. (Refer to WP 0043 00 through WP 0050 00.)
- Step 4. Check for high suction and low discharge pressure to see whether compressor is pumping. (Refer to Table 1, WP 0050 00.)
Replace faulty compressor. (Refer to WP 0059 00.)
- Step 5. Check for high discharge pressure. (Refer to Table 1, WP 0050 00.)
Bleed off excess refrigerant.

FAULT PROCEDURE 7. COMPRESSOR RUNS BUT DOES NOT COOL

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

COMPRESSOR RUNS BUT DOES NOT COOL

- Step 1. Check for continuity of temperature selector switch and thermostat (in COOL mode).
Replace defective switch. (Refer to WP 0026 00 and WP 0028 00.)
- Step 2. For S9160-18KH-1, check electrical rotation of power supply must be A-B for proper compressor rotation.
Refer to schematic diagram (WP 0038 00) for proper connections.
For S9160-18KH-3, check electrical rotation of power supply. Must be A-B-C for proper compressor rotation.
- Step 3. Check for excessively high temperature in conditioned area.
Close doors, windows or other openings. Insulate areas of high heat gain.
- Step 4. Check compressor for noisy operation, high suction pressure or excessively low discharge pressure indicating leaky internal valves. (Refer to WP 0050 00 and Table 1, WP 0050 00.)
Replace compressor. (Refer to WP 0059 00.)
- Step 5. Check liquid sight indicator for bubbles indicating low charge of refrigerant.
Repair leaks or replace leaking component. Recharge system. (Refer to WP 0043 00 through WP 0050 00.)

FAULT PROCEDURE 7. COMPRESSOR RUNS BUT DOES NOT COOL - Continued

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR RUNS BUT DOES NOT COOL

- Step 6. Check for high discharge pressure. (Refer to Table 1, WP 0050 00.)
Bleed off excess refrigerant.
- Step 7. Check operation of liquid solenoid valve. Unit may be in standby operation.
Check continuity of solenoid coil. Replace defective coil. Cycle equipment several times.
Perform refrigeration system pressure testing for low or expected discharge pressure. Refer to WP 0050 00 for pressure testing.

FAULT PROCEDURE 8. COMPRESSOR EXCESSIVELY NOISY

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR EXCESSIVELY NOISY

- Step 1. Listen for knocking.
Check for low suction line temperature indicating that liquid refrigerant is returning to compressor. (Refer to WP 0050 00 and Table 1, WP 0050 00.)
- Step 2. Check for high discharge pressure indicating overcharge of refrigerant. (Refer to WP 0055 00 and Table 1, WP 0050 00.)
Bleed off excess refrigerant. Check HIGH pressure switch.
- Step 3. Check three phase power sequence, must be A-B-C for proper compressor rotation.
Refer to schematic diagram (WP 0038 00) for proper connections.

FAULT PROCEDURE 9. SUCTION PRESSURE TOO LOW

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

SUCTION PRESSURE TOO LOW

- Step 1. Stop compressor and check expansion valve.
Remove remote bulb in suction line. Place bulb in ice water for 1-2 minutes. Start compressor. Remove bulb from ice water and hold it in one hand to warm it. At the same time, check the suction line for rapid change of temperature, which indicates flood-through of liquid refrigerant. If liquid floods through valve, it is operating satisfactorily. If not, valve or remote bulb is faulty.

CAUTION

Do not let liquid flood back into compressor or compressor will be seriously damaged.

FAULT PROCEDURE 9. SUCTION PRESSURE TOO LOW - Continued**MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION****SUCTION PRESSURE TOO LOW**

Replace faulty expansion valve. (Refer to WP 0057 00.)

- Step 2. Feel filter-drier for temperature difference. Discharge end will feel cooler than input end if clogged, or discharge end may be frosty or sweaty (for low suction pressure).

Replace filter-drier. (Refer to WP 0051 00.)

FAULT PROCEDURE 10. SUCTION PRESSURE TOO HIGH**MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION****SUCTION PRESSURE TOO HIGH**

- Step 1. Check suction line and accumulator for excessive sweating and flood back of liquid to compressor. Expansion valve is truck open. Replace expansion valve. See WP 0062 00.
- Step 2. Check for defective linear actuator, broken or loose louver actuator linkage. Repair or replace defective linear actuator. (Refer to WP 0060 00.) Repair or replace louver actuator linkage. (Refer to WP 0021 00 and WP 0060 00.)
- Step 3. Test for defective expansion valve. Test for properly functioning expansion valve per WP 0057 00. Replace defective expansion valve. (Refer to WP 0057 00.)

FAULT PROCEDURE 11. LOW HEAT OR NO HEAT**MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION****LOW HEAT OR NO HEAT**

- Step 1. Check operation of evaporator fan and motor. (Refer to WP 0035 00.) Repair or replace faulty fan or motor. (Refer to WP 0035 00.)
- Step 2. Disconnect and remove heater elements, and apply 115-volt AC power to check for open circuit in element or check resistance. Element should heat. Replace faulty heating elements. (Refer to WP 0036 00.)

END OF WORK PACKAGE

CHAPTER 8
DIRECT SUPPORT
MAINTENANCE INSTRUCTIONS

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM DESCRIPTION**

Description**WARNING****REFRIGERANT-22 (R-22)**

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

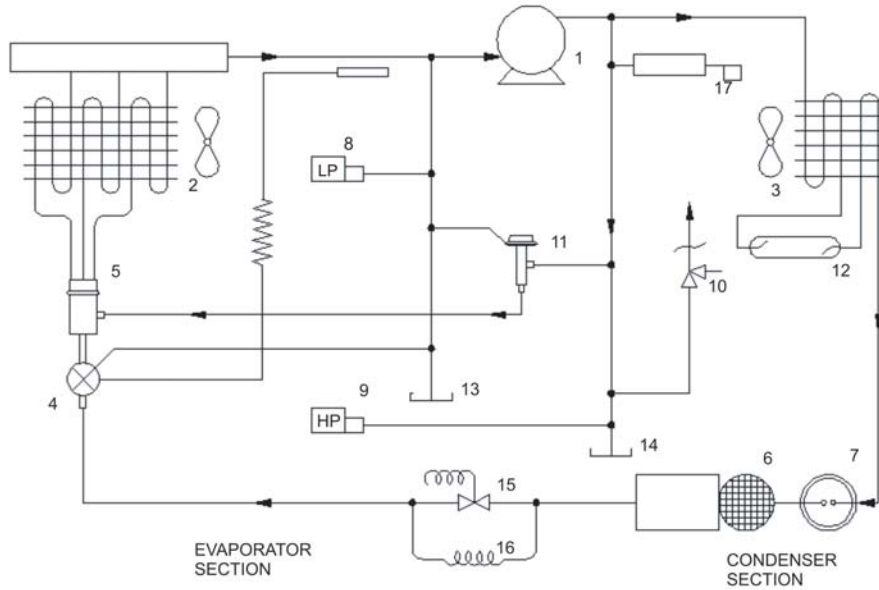
WARNING

Whenever it is necessary to open the refrigeration system for any reason, discharge the refrigerant carefully. Avoid contact with liquid refrigerant. As a minimum, all personnel must wear thermal protective gloves, a face shield or goggles and an air filtering mask when working in any situation to avoid R-22 contact with the skin or eyes. Severe freezing of body tissues can take place with extreme rapidity. Avoid excessive inhalation of refrigerant gas and ventilate the area in which it is released. Refrigerant gas in contact with flame or hot surfaces is converted to phosgene a highly toxic gas having an odor similar to newly mown grass or hay.

1. The refrigeration system illustrated by the refrigerant flow diagram is a mechanical, vapor-cycle circuit consisting of the evaporator thermal expansion valve, compressor, condenser, and the necessary valves and cutout devices for automatic control during operation and servicing.
2. The thermal expansion valve releases high-pressure liquid refrigerant into the evaporator at reduced pressure.
3. The liquid refrigerant begins to vaporize by absorbing heat from the air passing over the outside surface of the evaporator coil.
4. The heated vapor is sucked out of the evaporator section by the compressor, and is forced into the condenser section under high pressure where it is cooled and condensed back into a liquid.
5. The heat released during condensation is carried off by the condensing air stream.
6. The liquid refrigerant flows from the condenser to a filter-drier, sight glass and then to the thermal expansion valve to repeat the cycle.
7. If the temperature control (evaporator return-air thermostat) becomes satisfied (the evaporator return-air temperature is lower than the point at which you have set the control) the refrigeration system will go into Standby Refrigeration Operating Condition (no effective cooling but compressor remains operating).
8. When the temperature control again calls for cooling (the evaporator return air temperature is higher than the point at which the control is set) the refrigeration system will come out of the *Standby Refrigeration Operating Condition* to *Full Refrigeration Operating Condition* (full cooling operation). If the system was shut-off (for any reason) the equalization solenoid valve (15) will open equalizing the system pressure and a time delay of one minute will be encountered before compressor will restart.

Refrigeration System Repair

1. The following paragraphs cover repairs of commonly used hardware, tubing and valves of the refrigeration system. Re-use or repair of seals and gaskets should not be attempted; new parts should be used at assembly. When heating refrigeration piping to debraze or unsolder connections (see work package WP 0046 00) as well as to solder or braze them, the piping should be protected with a continuous flow of dry nitrogen to prevent scaling or oxidation of the inside surface.
2. Replace the filter-drier each time a repair is made on the refrigeration system or each time the refrigeration system has been opened.



LEGEND

- 1. REFRIGERANT COMPRESSOR
- 2. EVAPORATOR COIL
- 3. CONDENSER COIL
- 4. EXPANSION VALVE - THERMAL
- 5. REFRIGERANT DISTRIBUTOR - WITH SIDE INLET
- 6. FILTER - DRIER
- 7. SIGHT GLASS - MOISTURE INDICATOR
- 8. LOW PRESSURE SWITCH
- 9. HIGH PRESSURE SWITCH
- 10. PRESSURE RELIEF VALVE
- 11. HOT GAS BYPASS VALVE
- 12. RECEIVER
- 13. LOW SIDE SERVICE VALVE - SHRAEDER
- 14. HIGH SIDE SERVICE VALVE - SHRAEDER
- 15. SOLENOID VALVE - LIQUID LINE
- 16. CAPILLARY TUBE - DESUPERHEATER
- 17. ACTUATOR - LINEAR

Figure 1. Refrigerant Schematic

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (DISCHARGING)**

INITIAL SETUP:

Tools and Special Tools

- Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
- Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
- Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
- Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)

Personnel Required

One

Equipment Condition

- Mode selector switch in OFF position
- Main power source is disconnected
- Panels removed (WP 0018 00)
- Air conditioner removed from shelter, if necessary.

Special Environmental Condition

WARNING



REFRIGERANT-22 (R-22)

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.



WARNING

Ensure power source is disconnected.



WARNING

Be sure that the manifold hoses are correctly connected.
BLUE Hose = Low Pressure, RED Hose = High Pressure.

SERVICE -- DISCHARGING

Rear Top of Unit

1. Remove screws from service valve access cover. See figure 1.
2. Remove service valve access cover.
3. Unscrew hose connection protective caps from service valves.

WARNING**REFRIGERANT-22 (R-22)**

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

WARNING**CARBONYL CHLORIDE (PHOSGENE)**

Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

4. Connect the charging manifold hoses to the manifold and air conditioner service valves.
5. Attach a hose assembly to the center connection of the manifold.
6. The open end of the center connection hose must be connected to the recovery/recycling unit that is located in a well ventilated area.

WARNING

Discharge refrigerant in an open area and not around an open flame.

CAUTION

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

7. Slowly open the low pressure service valve to allow refrigerant gas to flow slowly out of the hose.
8. Slowly open high pressure service valve to allow refrigerant gas to flow slowly out of the hose.
9. Check the discharge hose for the presence of oil. Adjust (close slightly) valves if necessary to prevent oil discharge.

10. When gas stops flowing, close both service valves.

11. Go to WP 0050 00 for purging the system.

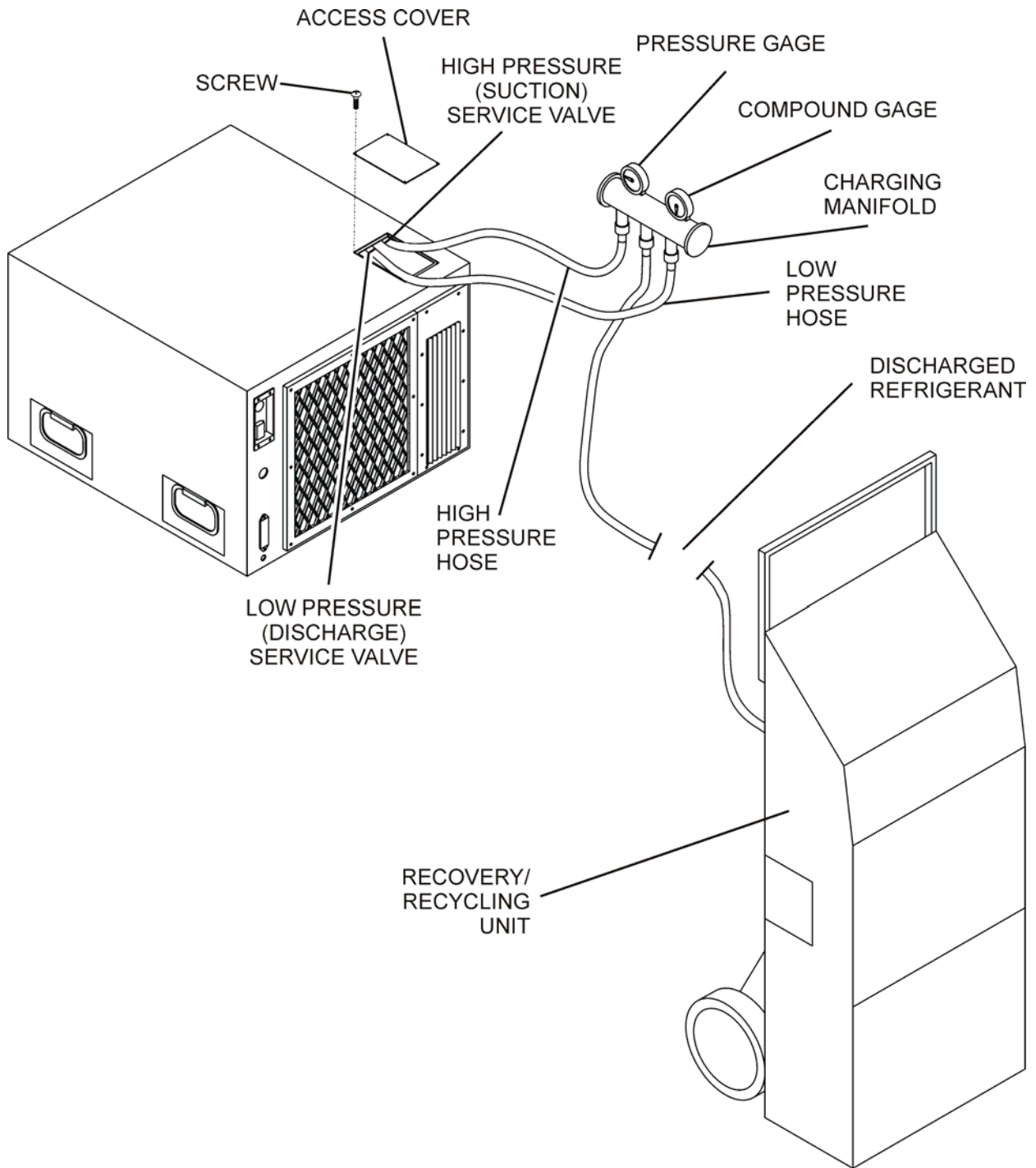


Figure 1. Discharging Refrigerant Setup

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (PURGING)**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)

References

WP 0083 00 (MAC)

Personnel Required

One

Equipment Condition

Refrigerant system discharged (WP 0049 00)
Main power source is disconnected

**WARNING**

Ensure power source is disconnected.

**WARNING**

Be sure that the manifold hoses are correctly connected.
BLUE Hose = Low Pressure, RED Hose = High Pressure.

**WARNING**

The refrigeration system must be purged with dry nitrogen, during any brazing operation performed on any component. A flow of dry nitrogen at the rate of less than 1 to 2 cfm (0.028-0.057 m³/minute) should be continued during all brazing operations to minimize internal oxidation and scaling.

CAUTION

Nitrogen cylinders are pressurized containers. The pressure in the cylinder can exceed 2000 psi. A nitrogen pressure regulator must be used at all times when nitrogen is used for leak check or purge operations.

CAUTION

Nitrogen is an inert gas. However, it presents the danger of asphyxiation and therefore, must be discharged in a ventilated location.

SERVICE PURGING

Verify that the system has been discharged using a manifold as described in WP 0044 00, proceed as follows:

1. See specific component removal/repair instructions.
2. Be sure that refrigerant has been discharged (see WP 0044 00).
3. Connect the center hose from the charging manifold to a nitrogen regulator and dry nitrogen tank. See Figure 1.
4. The hose from the high pressure service valve to the charging manifold must be connected.
5. The hose from the low pressure service valve must be disconnected from the charging manifold.
6. Both service valves on the unit will be open by virtue of hose connections.
7. Close the unused valve (suction) on the charging manifold, and open the one (discharge) with the nitrogen tank hooked up.
8. Open the nitrogen cylinder valve and adjust the regulator so that less than 1-2 cfm (0.028-0.057 m³/minute) of nitrogen flows through system.
9. Check discharge from hose attached to the low pressure service valve to be sure that no oil is being forced out of the system.
10. Allow nitrogen to sweep through the system at the rate of less than 1-2 cfm (0.028-0.057 m³/minute) for a minimum of 5 minutes, before starting any brazing operation. Then allow it to continue to flow at the same rate until all brazing operations are completed. (See WP 0046 00 for brazing/debrazing procedures.)
11. After installation brazing operations are completed, allow nitrogen to flow for a minimum of 5 minutes.
12. Close nitrogen cylinder valve, nitrogen regulator, and charging manifold valve.\
13. Disconnect the hose from the nitrogen tank regulator.
14. When all repairs are completed, go to WP 0047 00 for leak test procedures.

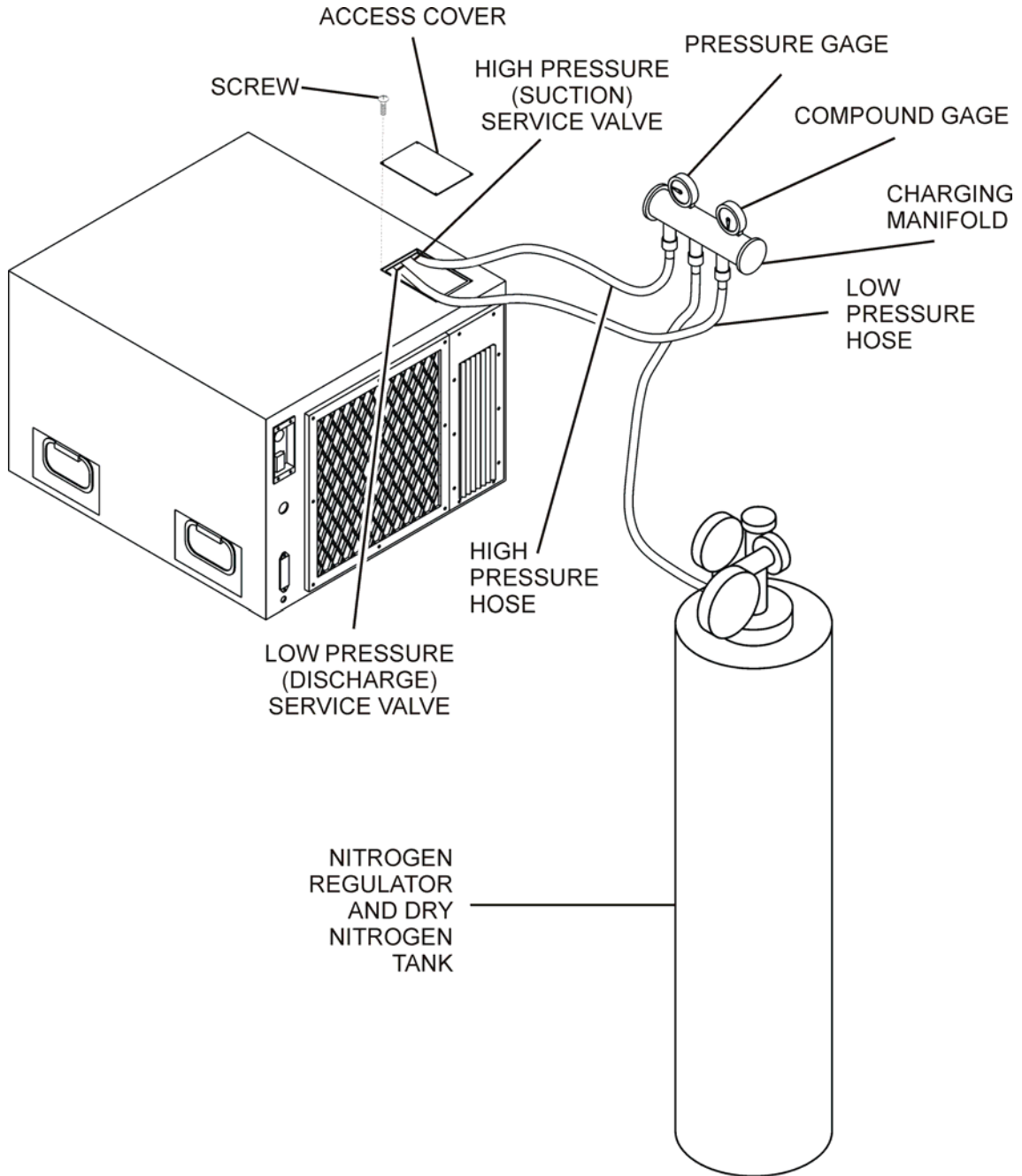


Figure 1. Purging Setup

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (BRAZING/DEBRAZING)
SERVICE (GENERAL INFORMATION, FILLER ALLOY, DEBRAZING, CLEANING
DEBRAZE JOINTS, REASSEMBLY, BRAZING)**

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Materials/Parts

Brazing alloy (silver) (Items 5 and 5, Table 1, WP 0069 00)
Nitrogen cylinder (Item 4, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)
Abrasive cloth (Item 8, Table 1, WP 0069 00)
Rags (Item 9, Table 1, WP 0069 00)

References

WP 0083 00 (MAC)

Personnel Required

One

Equipment Condition

Refrigeration system discharged (WP 0044 00)
Refrigeration system purged (WP 0045 00)
Main power source is disconnected



WARNING

Ensure power source is disconnected.



WARNING

Be sure that the manifold hoses are correctly connected.
BLUE Hose = Low Pressure, RED Hose = High Pressure.

SERVICE

General Information

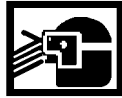
All tubing in the refrigeration system is copper with a finish that permits thorough cleaning. All interconnecting fittings, such as elbows, tees, etc., are also copper. The bodies of all valves and all connections on other components are brass. All joints, except those provided with flare fittings, are made by brazing in accordance with MIL-B-7883, except that radiographic examination is not required.

Filler Alloy Information

Grade IV or VI brazing alloy and Type B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III brazing alloy may be substituted for Grade IV or VI for copper to copper joints; flux is not required for copper to copper joints.

Debrazing

Debraze joints for removal of refrigeration system components as follows:



WARNING

All refrigerant-22 must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any debrazing operation.

1. Determine which joints are to be debrazed. Due to the limited work space inside the air conditioner, it may be more convenient to remove a part of the interconnecting tubing with the component rather than debrazing the joints on the component itself.
2. Before debrazing a joint on a valve, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.



WARNING

The elastomeric foam used as insulation in the air conditioner may be damaged and break down to form toxic gases if exposed to the flame of a torch at brazing temperature.

3. Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields.
4. Be sure the work area is well ventilated. Be sure the refrigeration system is fully discharged and purged, and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m³/minute.)
5. Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted. Remove heat as soon as the joint separates.

Cleaning Debrazed Joints

All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler alloy is melted and then wipe it away with a dry cloth. Be sure no filler alloy or other debris are left inside any tubing, fitting or component.

Reassembly

If tubing sections or fittings were removed with a component, debraze them from the component, clean the joints, and braze them to the new component before reinstallation.

Brazing

Braze joints within the air conditioner as follows:

1. Position the component to be installed.
2. To prepare a joint on a valve for brazing, disassemble the valve to the extent possible. Then wrap all but the joint with a wet rag to act as a heat sink.
3. Protect insulation, wiring harnesses, and surrounding components with appropriate shields.
4. Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m³/minute).
5. Apply sufficient heat uniformly around the joint to quickly raise it to a temperature that will melt the filler alloy. Remove heat as soon as brazing is completed.

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (LEAK TEST)**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)

Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, Table 1, WP 0069 00)

Refrigerant R-22 (Item 10, Table 1, WP 0069 00)

References

WP 0044 00

WP 0045 00

WP 0049 00

Personnel Required

One

Equipment Condition

Main power source is disconnected

**WARNING**

Ensure power source is disconnected.

**WARNING**

Be sure that the manifold hoses are correctly connected.
BLUE Hose = Low Pressure, RED Hose = High Pressure.

NOTE

After repair or replacement of a refrigeration component, replace the filter-drier prior to leak testing. See WP 0051 00.

SERVICE LEAK TEST**General**

The entire repaired area should be thoroughly leak tested after repair or replacement of any component, before it is recharged with refrigerant-22. Leak testing is also the method for troubleshooting when a system has lost all or part of its refrigerant charge through an undetermined cause..

Testing Method

There are two acceptable methods for leak testing the refrigeration system.

1. Refrigerant gas leak detector. If an electronic refrigerant gas leak detector is available, it should be used in accordance with the procedures contained in TM 9-4940-509-14&P, *Leak Detector, Refrigerant Gas*.

NOTE

The electronic refrigerant gas leak detector is highly sensitive to the presence of a minute quantity of gas in the air, due to this factor, it is quite effective in the detection of a small leak. However, due to the rapid dispersion of refrigerant gas into the surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in a well-ventilated but draft-free area.

2. Soap solutions. In this method, a strong solution of a liquid detergent and water is brushed onto all points of possible leakage while closely watching for the formation of bubbles.

Testing Procedure

To perform leak testing by use of the electronic detector, it is necessary that the system be pressurized with a proportion of refrigerant gas. To perform leak testing by use of the soap solution method, the system may be pressurized with dry nitrogen alone.

1. To pressurize a system that has some refrigerant charge, for either leak testing method:
 - a. Remove the hose connection protective caps from the high and low pressure service valves.
 - b. Connect the hoses from a charging manifold to the service valves.

NOTE

If it is possible that the problem may not be a leak and that you may not have to replace a refrigeration system component, refrigerant-22 may be substituted for the nitrogen in the following test. If nitrogen is used, you will have to discharge, evacuate, and recharge the system after this test is completed.

- c. Connect a nitrogen pressure regulator and nitrogen bottle to the center hose connection of the charging manifold.
 - d. Open the unit service valves and the charging manifold valves.
 - e. Open the nitrogen tank valve and pressurize the system to 300 psig (21.2 kg/cm²).
 - f. Perform leak tests.
 - g. If a leak is found, discharge and purge the system and repair leak. See specific instructions for components to be removed.
 - h. If a leak was not found and refrigerant-22 was used to pressurize the system, see charging instructions (see WP 0054 00).
2. To pressurize a system that has been discharged and purged for leak testing with an electronic detector:
 - a. Remove the hose connection protective caps from the high and low pressure service valves.
 - b. Connect the hoses from a charging manifold to the service valves.
 - c. Connect a cylinder of refrigerant-22 to the center hose connection of the charging manifold.

CAUTION

Connect the refrigerant-22 cylinder so that only gas will be used for pressurization.

- d. Open both unit service valves and the charging manifold valves.
 - e. Open the refrigerant cylinder valve slightly and adjust as necessary to prevent formation of frost, and allow system pressure to build up until the gauges read 40-50 psi (2.8-3.5kg/cm²).
 - f. Close the charging manifold valves and the refrigerant cylinder valve.
 - g. Remove the refrigerant-22 cylinder from the center hose connection.
 - i. Open the charging manifold valves and the nitrogen cylinder and regulator valve. Allow system pressure to build up until gauges read 300 psig (21.2 kg/cm²).
 - j. Perform leak tests, then discharge and purge the system, in accordance with WP 0044 00 and WP 0045 00 before performing maintenance, or before evacuating and charging the system, as appropriate.
3. Final leak testing. Always perform a final leak test after performing any repair or replacement of components before the air conditioner is reassembled and the refrigeration system is evacuated and charged.

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (EVACUATION)**

INITIAL SETUP:**Maintenance Level**

Direct Support

Tools and Special Tools

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)

Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Vacuum pump (Item 3, Table 2, WP 0067 00)

Materials/Parts

Nitrogen (Item 4, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)

WP 0059 00

WP 0047 00

WP 0049 00

Personnel Required

One

Equipment Condition

Refrigerant system leak tested (WP 0047 00)

Refrigerant system discharged (WP 0044 00)

Main power source is disconnected

**WARNING**

Ensure power source is disconnected.

**WARNING**Be sure that the manifold hoses are correctly connected.
BLUE Hose = Low Pressure, RED Hose = High Pressure.**CAUTION**

Do not evacuate a leaking system. The vacuum created can cause air, moisture, and dirt to enter system.

NOTE

Replace filter-dryer whenever refrigerant system is opened.

NOTE

In the event the compressor was replaced as a result of burn-out, check that compressor burn-out procedures were followed. See WP 0059 00.

SERVICE EVACUATION

1. Connect the hose from the low pressure service valve to the compound gauge side of the charging manifold. The hose from the high pressure service valve shall be connected to the high pressure gauge side of the charging manifold. See figure 1.
2. Open both service valves.
3. Attach center hose assembly charging manifold to vacuum pump.
4. Start vacuum pump.
5. Open charging manifold valves.
6. Run the vacuum pump until approximately a 300 micron vacuum is reached.

NOTE

Inability to reach 300 microns may indicate either a leak or a problem with the pump.

7. Close manifold valves and check compound gauge. Record reading. Let unit sit for one hour. Observe compound gauge reading.
8. If the system holds the vacuum without change of pressure, proceed to step 10.
9. If the vacuum cannot be held for one hour, one of the following reasons may account for the problem.
 - a. Presence of water vapor in the system. Continued pumping will correct this condition.
 - b. Leak in the refrigeration system. Break the vacuum with dry nitrogen and retest for leaks. See WP 0047 00.
 - c. Internal leakage of vacuum pump. Test the pump by connecting a vacuum gauge directly to the vacuum pump intake and continue to pump. If pump still fails to reach approximately 300 microns, the pump is faulty.
10. Close charging manifold valves.
11. Stop vacuum pump.
12. Disconnect pump from center hose connection.
13. Charge system with refrigerant-22. See WP 0049 00.

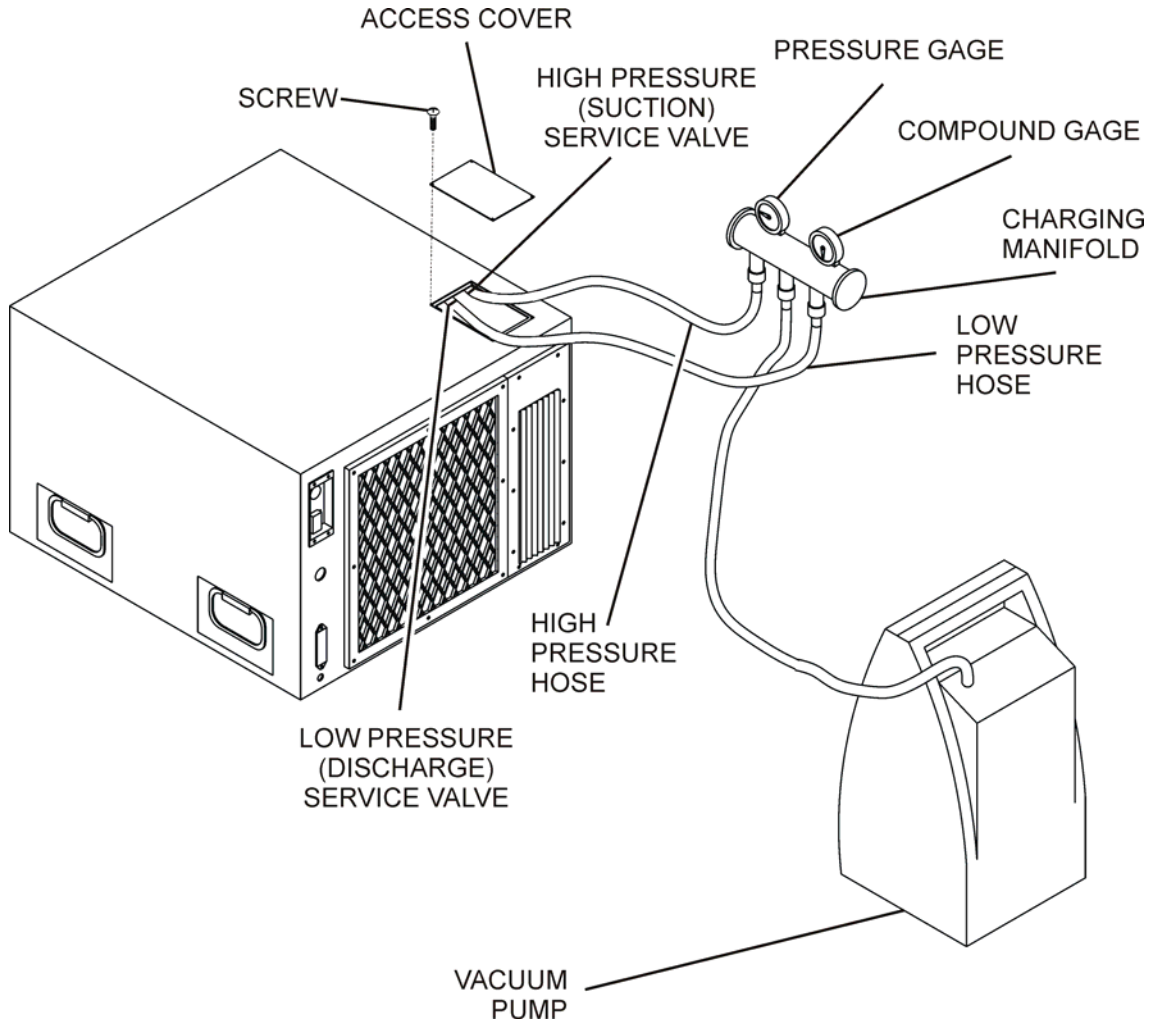


Figure 1. Evacuation Setup

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (CHARGING)**

Maintenance Level

Direct Support

Tools and Special Tools

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)

Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Charging cylinder or scale

Materials/Parts

Refrigerant-22, R-22 (Item 10, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)

Personnel Required

One

Equipment Condition

Refrigerant system evacuated (WP 0048 00)

Main power source is disconnected

**WARNING**

Ensure power source is disconnected.

**WARNING**

Be sure that the manifold hoses are correctly connected.
BLUE Hose = Low Pressure, RED Hose = High Pressure.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) service valve.

NOTE

After the system has been satisfactorily evacuated, it must be fully charged with R-22.

SERVICE CHARGING

1. Connect the hose from the low pressure service valve to the compound gauge side of the charging manifold. The hose from the high pressure service valve should be connected to the high pressure gauge side of the manifold. See figure 1.
2. Connect the center hose from the charging manifold to a well-charged cylinder of refrigerant-22, or a charging cylinder.
3. Loosen the hose connection to the center of charging manifold.
4. Open the refrigerant-22 or charging cylinder valve slightly to allow a small amount of refrigerant to purge air from the hose. Tighten the hose connection at the charging manifold.
5. Using accurate scales, measure and record the weight of the charged refrigerant-22 cylinder.
6. Fully open the refrigerant-22 cylinder valve.
7. Open the low pressure valve of the charging manifold. Allow refrigerant gas to enter the system until the system pressure has equalized.
8. Connect power to air conditioner.
9. Press and release high pressure switch reset button. It may be necessary to jumper low pressure switch.
10. Turn air conditioner on and operate in the COOL mode with the temperature control thermostat set at a maximum COOLER position.
11. Monitor the weight of the refrigerant cylinder as the air conditioner compressor pulls additional refrigerant gas into the system until the full 6.00 pounds (2.72 kg) charge is obtained. When the system is fully charged immediately close the refrigerant cylinder valve, and the charging manifold low pressure (suction) valve.
12. Run the air conditioner in COOL mode with temperature control thermostat in full COOLER position for 15 minutes.

NOTE

Do not skip the next step.

13. After 15 minutes, observe the liquid sight indicator (sight glass) on left rear of unit.
 - a. Green center means the refrigerant moisture content is acceptable.
 - b. Yellow center means there is too much moisture in the system. It must be discharged, evacuated and charged again.
 - c. Milky white or bubbly liquid means the system has a low charge.
 - d. Clear bubble-free liquid around the center means the system is fully charged.
14. If charge is low, add more gas refrigerant.
 - a. Open the cylinder valve and the manifold low pressure valve.
15. Check air conditioner for proper cooling. There should be at least a 15 degrees F temperature difference between evaporator discharge air and intake air. Turn mode selector switch to OFF.

16. Remove charging manifold hoses.
17. Install service valve protective caps.
18. Secure service valve access cover using four screws.

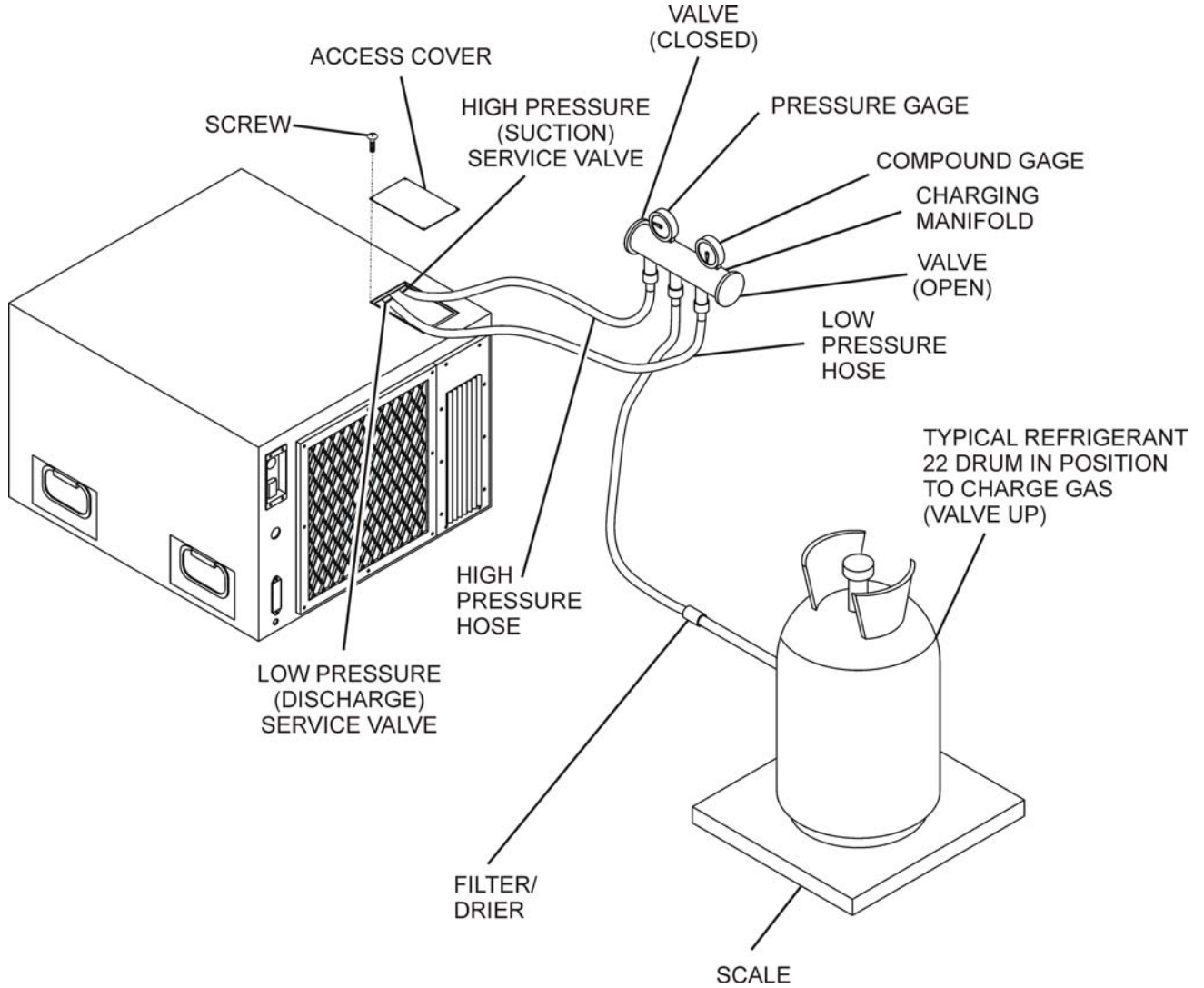


Figure 1. Refrigerant Charging Setup

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
REFRIGERANT SYSTEM SERVICE - (PRESSURE TESTING)**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, Table 2, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)

Personnel Required

One

Equipment Condition

Main power source is disconnected

SERVICE PRESSURE TESTING**WARNING**

Ensure power source is disconnected.

**WARNING**

Be sure that the manifold hoses are correctly connected. BLUE Hose = Low Pressure, RED Hose = High Pressure

Service Valve Access Cover

1. Remove screws from service valve access cover.
2. Remove service valve access cover.

Charging Valve Caps

Remove caps from high and low pressure service valves.

Refrigeration System Pressure Testing

1. Connect low pressure gauge hose of manifold valve to suction service valve. See Figure 1.
2. Check the manifold valves are closed.
3. Connect high pressure hose of manifold valves to discharge service valve.
4. Purge hoses. Open momentarily and close discharge and suction hose connections at charging manifold.
5. Start air conditioner. With the unit operating, allow gauges to stabilize. Take reading of the two gauges.

6. Compare gauge readings with the normal range of system pressure as shown on the Table of Normal Temperature Pressure Relationships.
7. Disconnect gauges.
8. Install service valve access cover with screws.

Table 1. Normal Temperature Pressure Relationships

Temperatures Outdoor Ambient Evaporator Intake	Pressure Range (PSIG)			
	50 F (10 C)	75 F (24 C)	100 F (38 C)	120 F (52 C)
90 F (32 C) Air to Unit (Dry Bulb)	55-65 Suction 150-180 Discharge	66-76 Suction 200-240 Discharge	76-86 Suction 280-325 Discharge	95-100 Suction 390-428 Discharge
80 F (27 C) Air to Unit (Dry Bulb)	50-60 Suction 140-170 Discharge	61-71 Suction 190-230 Discharge	71-81 Suction 270-315 Discharge	80-90 Suction 360-410 Discharge

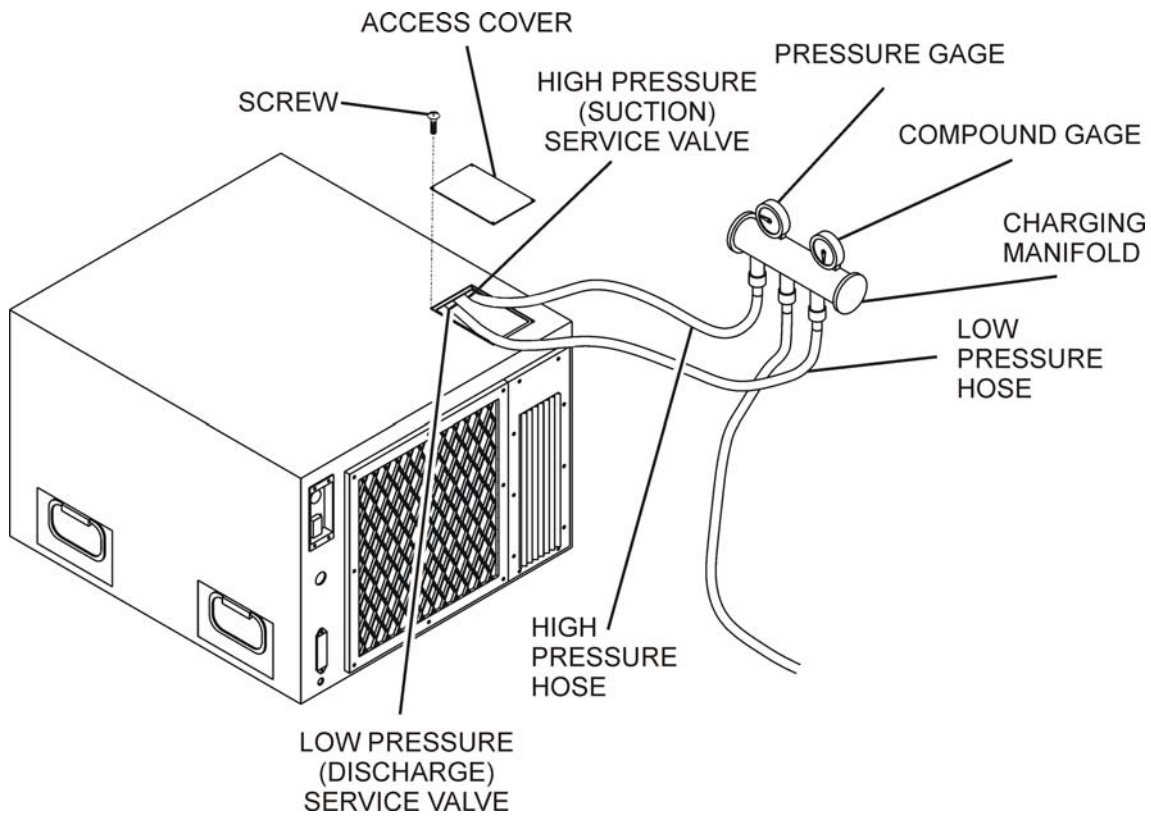


Figure 1. Pressure Testing Setup

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
FILTER-DRYER MAINTENANCE
INSPECT, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector

Materials/Parts

Nitrogen (Item 4, WP 0069 00)

References

WP 0069 00 (MAC)

Personnel Required

One

Equipment Condition

Main power source is disconnected
Refrigerant system discharged (WP 0044 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

INSPECT

Check filter-drier for leaks or damage.

NOTE

The filter-drier must be replaced each time the refrigeration system has been opened. It should be installed just before unit is leak tested.

FILTER-DRIER LOCATION

The filter-drier is located on the top center wall of the housing. See figure 1.

REMOVAL



WARNING

Ensure power source is disconnected.
Ensure the refrigerant system is discharged.

1. Debraze refrigerant lines (1 and 2) from filter-drier (3) (WP 0046 00).
2. Remove screw (4), lock nut (5), and strap (6).
3. Remove filter-drier (3).

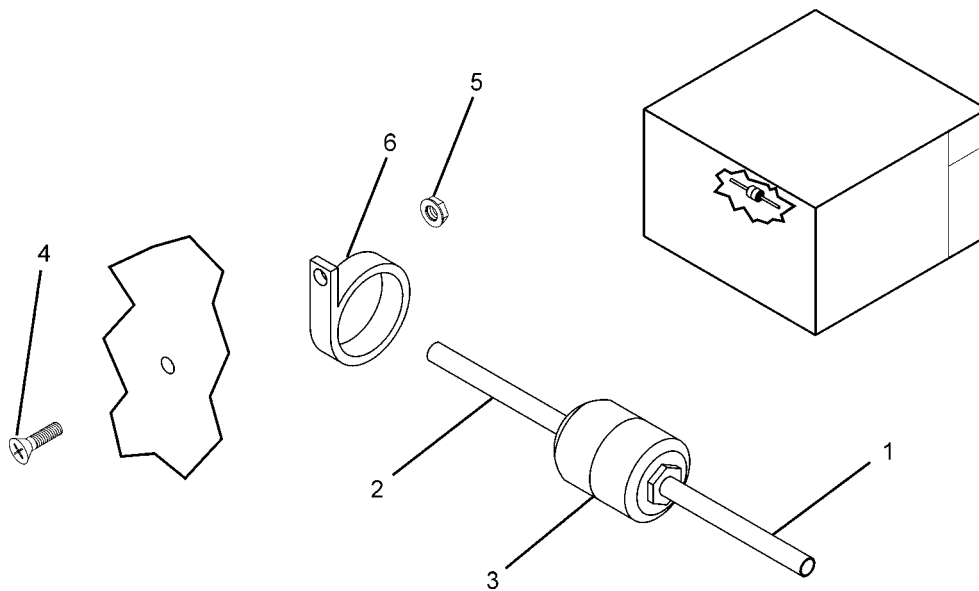


Figure 1. Filter-Dryer

INSTALLATION

CAUTION

Replacement filter-drier are packaged with sealing caps on the flare fittings to prevent moisture contamination of the desiccant filtering media. Remove these caps immediately prior to installation. Never install a filter-drier from which caps have been removed for an extended or unknown period of time.

1. Check the direction arrow marked on the filter-drier (3).
2. Position filter-drier (3) between refrigerant lines (1 and 2).

3. Insert and braze refrigerant lines (1 and 2) to filter-dryer (3) (WP 0046 00).
4. Install strap (6) with screw (4) and lock nut (5).
5. Leak test refrigerant system (WP 0047 00).
6. Evacuate refrigerant system (see WP 0048 00).
7. Charge refrigerant system (see WP 0049 00).
8. Install top panel (WP 0018 00).

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
SOLENOID VALVE AND HOT GAS BYPASS VALVE MAINTENANCE
TEST, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)
WP 0032 00 (Coil)
TM 9-4940-509-14&P

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)
System purged with nitrogen (WP 0050 00)
Related tube connections debrazed (WP 0046 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.

Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

**WARNING**

Ensure power source is disconnected.

TEST**Liquid Line Solenoid Valve (2, figure 1)****NOTE**

This is a test for valve operation. The valve functions in COOL mode to control cooling output of unit by supplying liquid refrigerant to the cooling coil (evaporator).

1. Operate the unit in COOL mode and observe (evaporator) supply air temperature.
2. With temperature selector in coolest position, the supply air temperature should be cold (approximately 15 degrees F below ambient).
3. With the temperature selector in warmest position, the supply air temperature should be same as ambient temperature or 1 or 2 degrees warmer.
4. When the unit is operating as in step 2 above, but with supply air temperature not cold, remove top cover (WP 0018 00) and check solenoid coil by removing the solenoid coil to feel the magnetic attraction of the coil to the valve.
5. If no magnetic attraction of coil to valve, problem is electrical and not the solenoid valve.
6. If observations in step 2 and step 3 are not stated, solenoid valve is defective and must be replaced.

Hot Gas Bypass Valve (11)**NOTE**

This is a test for valve operation and the maintenance of suction refrigerant pressure above 50 psig (freezing temperature) to prevent evaporator coil freeze-up.

1. Connect service gauges to service valve and observe system pressure when operating in the COOL mode with temperature selector switch in the coolest position.
2. Block indoor air return and note refrigerant suction pressure reading.
3. Suction pressure should be above 55 psig under normal operation and blocked indoor air return conditions.
4. If suction pressure is above 55 psig under normal operation and below 55 psig under blocked indoor air return condition, adjust the valve as follows:
 - a. Remove top rear cover and large valve cap on top of valve to expose adjustment stem. Turn adjustment stem clockwise until suction pressure is above 55 psig.
 - b. If adjustment does not result in the suction pressure above 55 psig, valve is defective and must be replaced.

WARNING

Ensure power source is disconnected. Ensure refrigerant system is discharged.

REMOVAL

1. Remove coil (1) from solenoid valve (2) (see WP 0033 00).
2. Remove screw (3), lock nut (4), spacer (5), and clamp (6) from liquid line (7).
3. Debraze tubing connected to solenoid valve (2) (see WP 0046 00) and removed solenoid valve (2).
4. Remove two screws (8), lockwashers (9), and spacers (10) securing top part of hot gas by-pass valve (11) to bulkhead bracket (15).
5. Remove two screws (12), lockwashers (13), and spacers (14) securing bottom part of hot gas by-pass valve (11) to bulkhead bracket (15).
6. Debraze tubing connected to hot gas by-pass valve (11) (see WP 0046 00) and removed hot gas by-pass valve (11).

INSTALLATION

1. Position hot gas by-pass valve (11) between refrigerate tubing and onto bulkhead bracket (15). Secure with two lockwashers (9), spacers (10), and screws (8).
2. Secure lower part of hot gas by-pass valve (11) to bulkhead bracket (15) and with two lockwashers (13), spacers (14), and screws (12).
3. Braze tube joints of refrigerant tubing to hot gas by-pass valve (11) (see WP 0046 00).
4. After noting arrow direction on valve body, position liquid line solenoid valve (2) in position between liquid line tubing (7) and place tubing connections onto valve. Braze the tube joints (see WP 0046 00).
5. Secure liquid line to side bulkhead of unit housing with clamp (6), spacer (5), screw (3), and lock nut (4).
6. Install solenoid coil (1) onto solenoid valve (see WP 0032 00).
7. After noting arrow direction on filter-drier body, replace filter-drier (see WP 0051 00).
8. Install top cover (see WP 0018 00).
9. Service the refrigeration system (see WP 0047 00 thru WP 0050 00).

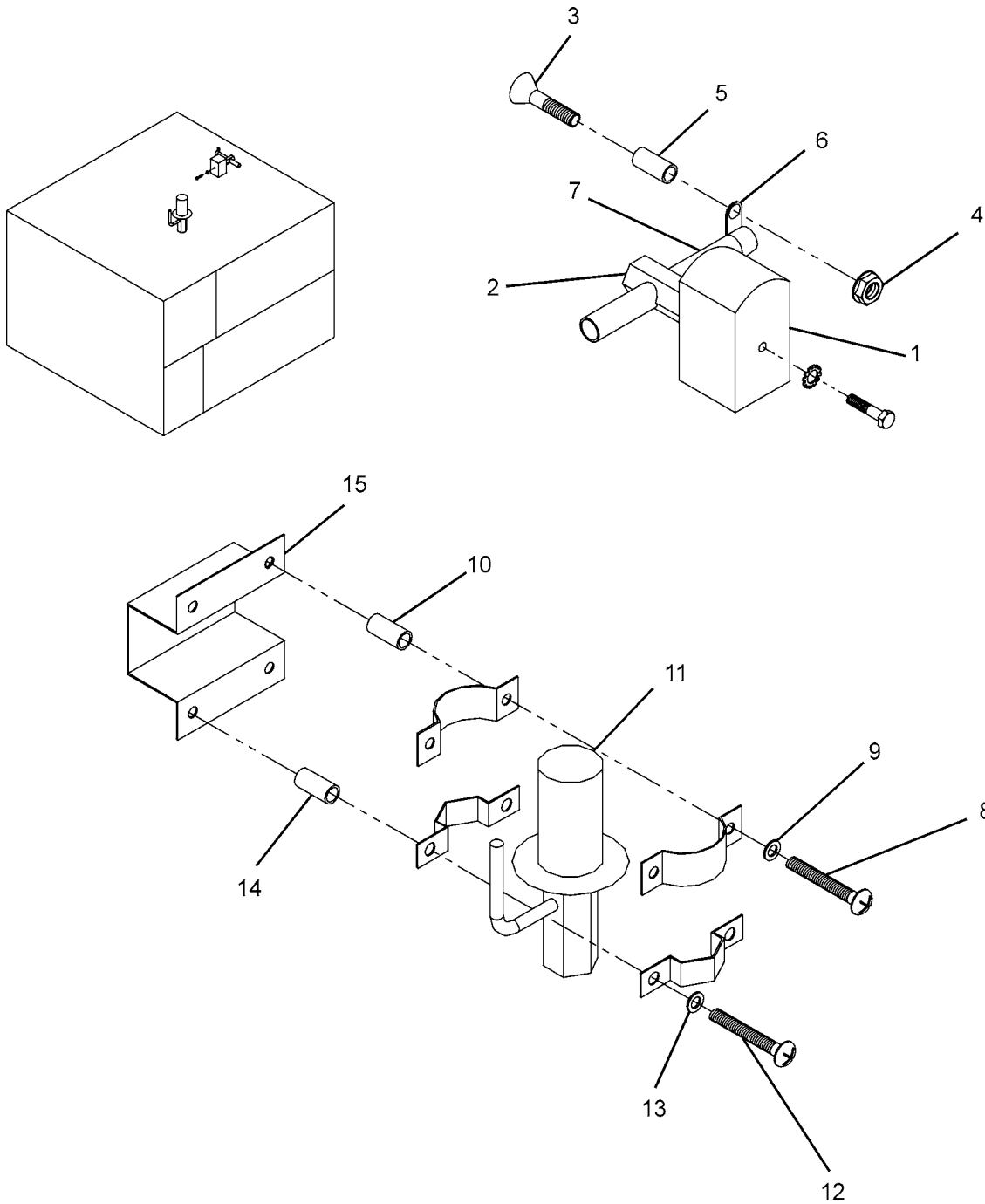


Figure 1. Solenoid and Hot Gas By-Pass Valves

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
RECEIVER MAINTENANCE
REMOVAL AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)
TM 9-4940-509-14&P

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)
System purged with nitrogen (WP 0045 00)
Related tube connections debrazed (WP 0046 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

**WARNING**

Ensure power source is disconnected. Ensure refrigerant system is discharged.

REMOVAL

1. Remove screw (1), locknut (2), and receiver clamp (3) which hold receiver (4) onto side bulkhead of unit housing.
2. Debraze tubing connected to receiver (4) (see WP 0046 00) and remove receiver (4) from unit.

INSTALLATION

1. Place receiver (4) into unit and loosely install receiver clamp (3) with screw (1) and locknut (2).
2. Place tubing connections onto receiver (3).
3. Braze the tube joints (see WP 0046 00).
4. Tighten hardware installed in step (1).
5. Replace filter drier (see WP 0051 00).
6. Install top cover (see WP 0018 00).
7. Service the refrigeration system (see WP 0047 00 thru WP 0050 00).

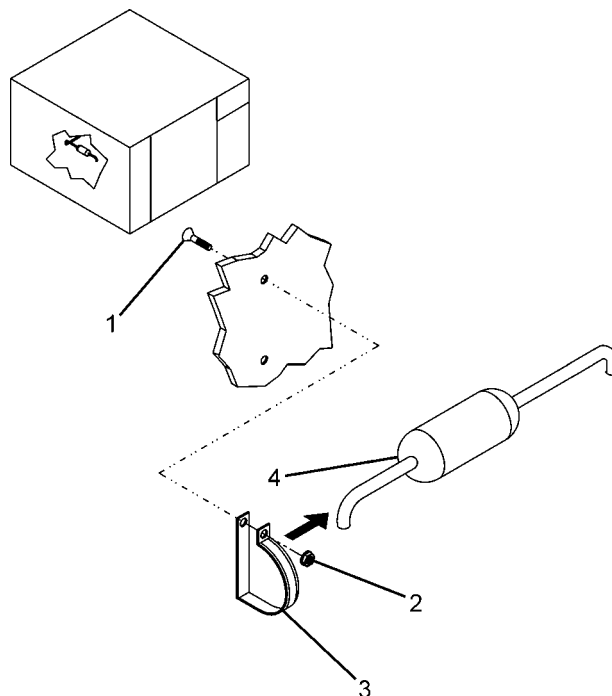


Figure 1. Refrigerant Receiver

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
PRESSURE RELIEF VALVE MAINTENANCE
INSPECT, REMOVAL, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Lubricating oil (Item 14, WP 0069 00)

References

WP 0067 00 (MAC)
TM 9-4940-509-14&P

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

**WARNING**

Ensure power source is disconnected. Ensure refrigerant system is discharged.

INSPECT

Check valve and tubing for damage.

REMOVAL

1. Remove screw (1), flat washer (2), and clamp (3) that secure the pressure relief valve (4) to the fan housing (6). See figure 1.
2. Debraze the pressure relief valve (4) from threaded female fitting (5) and remove valve from unit.

INSTALLATION**NOTE**

It may be necessary to replace the female threaded fitting along with a new pressure relief valve.

1. Install the threaded relief valve into the female threaded fitting (5). Braze and seal the connection sealing the pressure relief valve (4) to the female threaded fitting. (See WP 0046 00).
2. Install clamp (3), flat washer (2), and screw (1) that secure the pressure relief valve (4) to the fan housing (6).
3. Replace filter-drier (see WP 0051 00).
4. Leak test refrigeration system (see WP 0047 00).
5. Evacuate refrigeration system (see WP 0048 00).
6. Charge refrigeration system (see WP 0049 00).
7. Install top cover (see WP 0018 00).

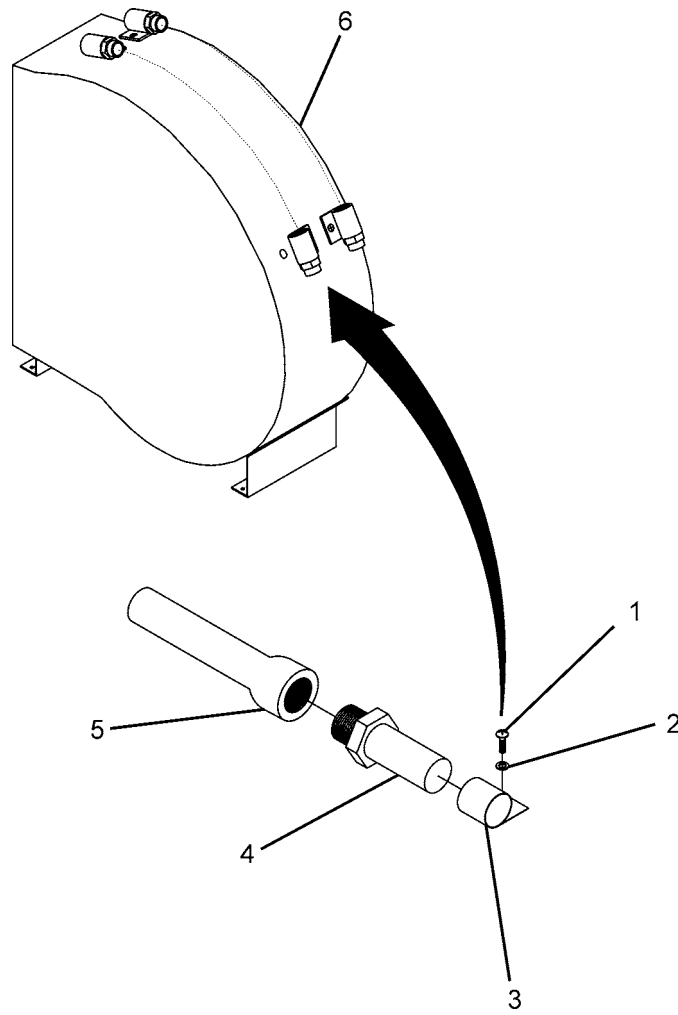


Figure 1. Pressure Relief Valve

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
PRESSURE SWITCHES MAINTENANCE
INSPECT, REMOVAL, TEST, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
 Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
 Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
 Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Multimeter
 Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)

References

WP 0067 00 (MAC)

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
 Main power source is disconnected
 Top cover removed (WP 0018 00)
 Evaporator air discharge louver removed (WP 0020 00)
 Junction box partially removed (WP 0028 00)
 Refrigerant system discharged (WP 0044 00)
 System purged with nitrogen (WP 0045 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

**WARNING**

Ensure power source is disconnected.

INSPECT**Front of Housing**

Check wiring and sensing tube for damage.

REMOVAL

1. Remove two screws (1) and lockwashers (2) to remove high pressure cutout switch (4) from bracket (3). See figure 1.
2. Remove two screws (5) and lockwashers (6) to securing low pressure cutout switch (7) to interior housing bulkhead.
3. Unhook the electrical leads from the pressure switches. Tag leads for identification at assembly.
4. Remove grommet (8) from housing partition (9).
5. Unscrew flare nuts (10) from capillary tube connections (11). Carefully pull capillary tubes (11) through housing partition (9).
6. Remove pressure switches (4 and 7).

TEST

1. Test for continuity across terminals of high pressure switch (4). If no continuity exists, replace the defective switch.
2. Using nitrogen, pressurize low pressure cutout switch (7) (15-20 psig range/1.05-1.40 kg/cm² range).
3. Check for continuity across terminals.
4. If continuity does not exist, replace defective switch.
5. Using nitrogen, pressurize high pressure cutout switch (4) (470-490 psig range/33.04-34.45 kg/cm² range).
6. Check for continuity across terminals.
7. If continuity exists, replace defective pressure switch.

INSTALLATION

1. Insert ends of capillary tubes (12) through hole in housing partition (9), being careful to avoid kinking tubes.
2. Connect capillary tube flare nuts (10) to fittings (11).
3. Install grommet (8) into housing partition (9).
4. Position low pressure switch (7) into unit housing and secure to interior bulkhead with two lockwashers (6) and screws (5). Keep excess capillary tubing coiled neatly without kinks.
5. Position high pressure switch (4) into unit housing and secure to bracket (3) with two lockwashers (2) and screws (1). Keep excess capillary tubing coiled neatly without kinks.

6. Connect electrical leads and remove tags.
7. Install air discharge louver (see WP 0020 00).
8. Install junction box (see WP 0028 00).
9. Replace filter-drier (see WP 0051 00).
10. Leak test refrigerant system (see WP 0047 00).
11. Evacuate refrigerant system (see WP 0048 00).
12. Charge system (see WP 0049 00).
13. Install top cover (see WP 0018 00).

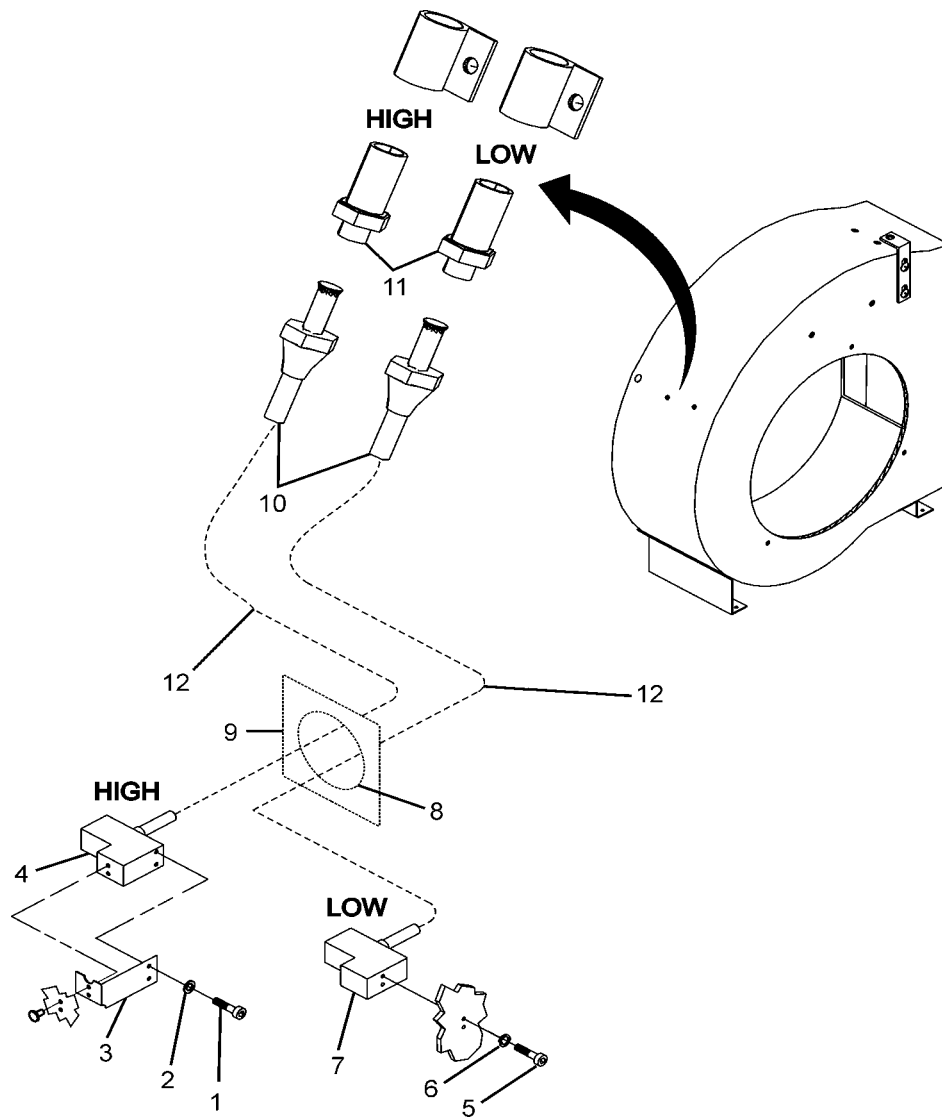


Figure 1. Pressure Cutout Switches

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
SERVICE VALVES MAINTENANCE
INSPECT, REMOVAL, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP0069 00)

References

WP 0067 00 (MAC)
WP 0044 thru WP 0049 00
WP 0051 00 (Filter-Dryer)
TM 9-4940-509-14&P

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

**WARNING**

- Ensure power source is disconnected.
- Ensure system is discharged of refrigerant.

INSPECT**Interior of Housing**

1. Visually inspect all valves for signs of damage.
2. Inspect valve fittings for leaks.
3. Inspect internal valve core (tire type valve). Replace if defective.

REMOVAL

1. Remove two screws (1), flat washers (2), eyelets of cap chain (3), and clamps (4) to release service valves (5) and tubing (6) from condenser fan housing (7).
2. Debraze service valves (5) from tubing (6) (see WP 0046 00).

INSTALLATION

1. Purge system (see WP 0045 00).
2. Braze service valves (5) to refrigerant tubing (6) (see WP 0046 00).
3. Secure service valves (5) and eyelet of cap chain (3) to condenser fan housing (7) with clamps (4), flat washers (2), and screws (1).
4. Replace filter-drier (see WP 0051 00).
5. Leak test refrigeration system (see WP 0047 00).
6. Evacuate refrigeration system (see WP 0048 00).
7. Charge refrigeration system (see WP 0049 00).
8. Secure valve caps (8).
9. Install top cover (see WP 0018 00).

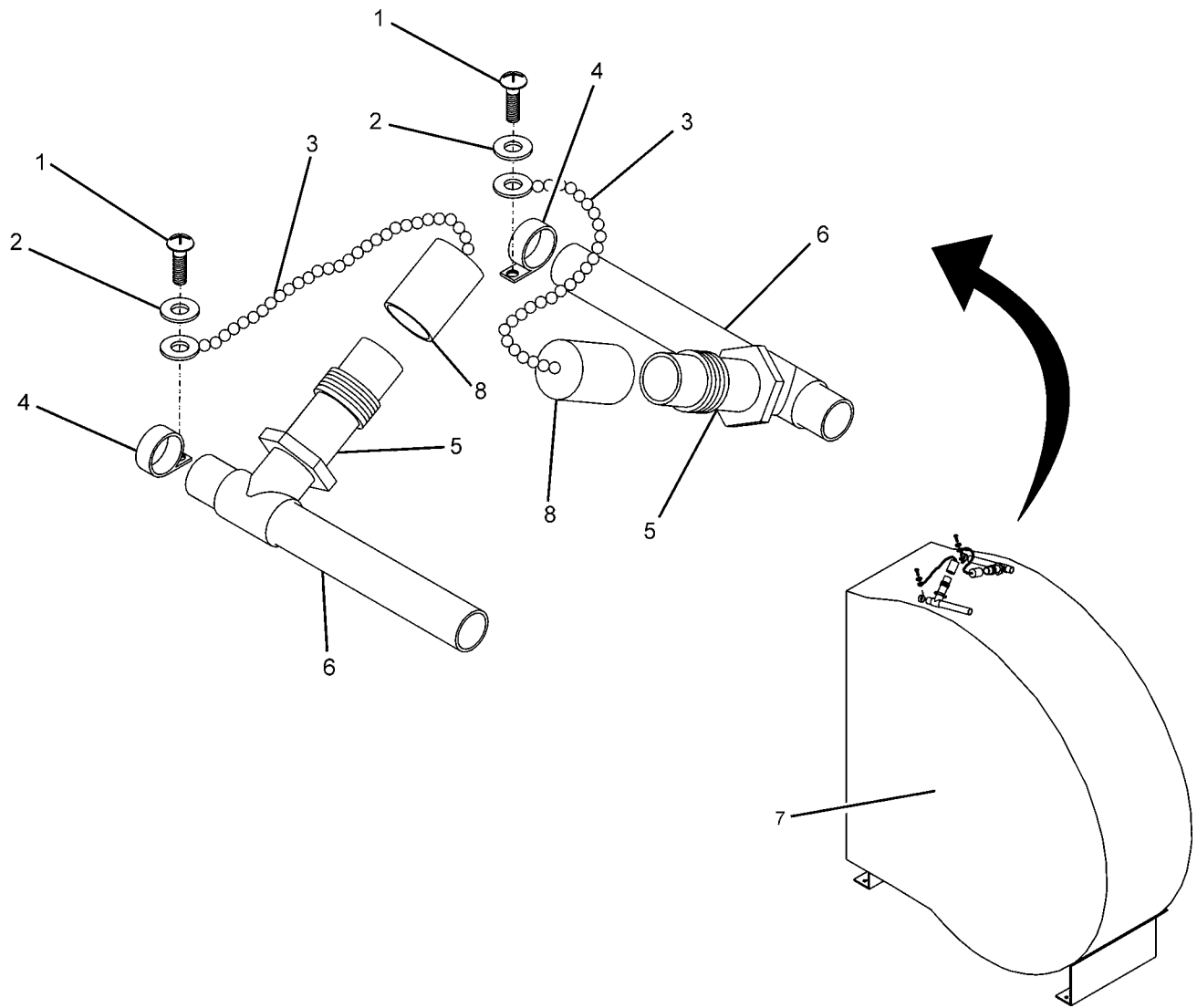


Figure 1. Service Valves

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
EXPANSION VALVE MAINTENANCE
REMOVAL AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, WP 0069 00)
Brazing flux (Item 7, WP 0069 00)
Warm soapy water
Cloth, lint-free (Item 9, WP 0069 00)

References

WP 0067 00 (MAC)
WP 0046 00 thru WP 0049 00
WP 0056 00 (Filter-Dryer)

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

WARNING

Individuals, who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this environment.

WARNING

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. Use an air-filtering mask. In case of refrigerant leaks, ventilate area immediately.

CAUTION

When performing brazing/debrazing operations, wrap valves with wet rags to act as a heat sink.

NOTE

Replace filter-drier whenever refrigerant system is opened.

REMOVAL**Expansion Valve**

1. Locate bulb (1) strapped with insulation (2) to suction line (3). See figure 1.
2. Remove insulation (2) covering bulb (1).
3. Withdraw bulb (1) from suction line (3) taking care to prevent damage to capillary tubes (4).
4. With dry nitrogen flowing through refrigerant system, debraze tubing to valve (8) at debrazing points (5, 6, and 7) (see WP 0046 00).
5. Remove expansion valve (8) from unit.

CAUTION

Damaged capillary will cause unit to malfunction. Use care not to damage or kink capillary.

INSTALLATION**Expansion Valve**

1. With dry nitrogen flowing through refrigeration system, braze valve to tubing (see WP 0046 00).

CAUTION

Take care to avoid kinking capillary tube.

2. Coil excess capillary tubing.

3. Secure bulb (1), with insulation (2), to suction line (3).
4. Insulate bulb and area around bulb.
5. Replace filter-drier (WP 0051 00).
6. Leak test refrigeration system (WP 0047 00).
7. Evacuate refrigeration system (WP 0048 00).
8. Charge refrigeration system (WP 0049 00).
9. Install top panels (WP 0018 00).

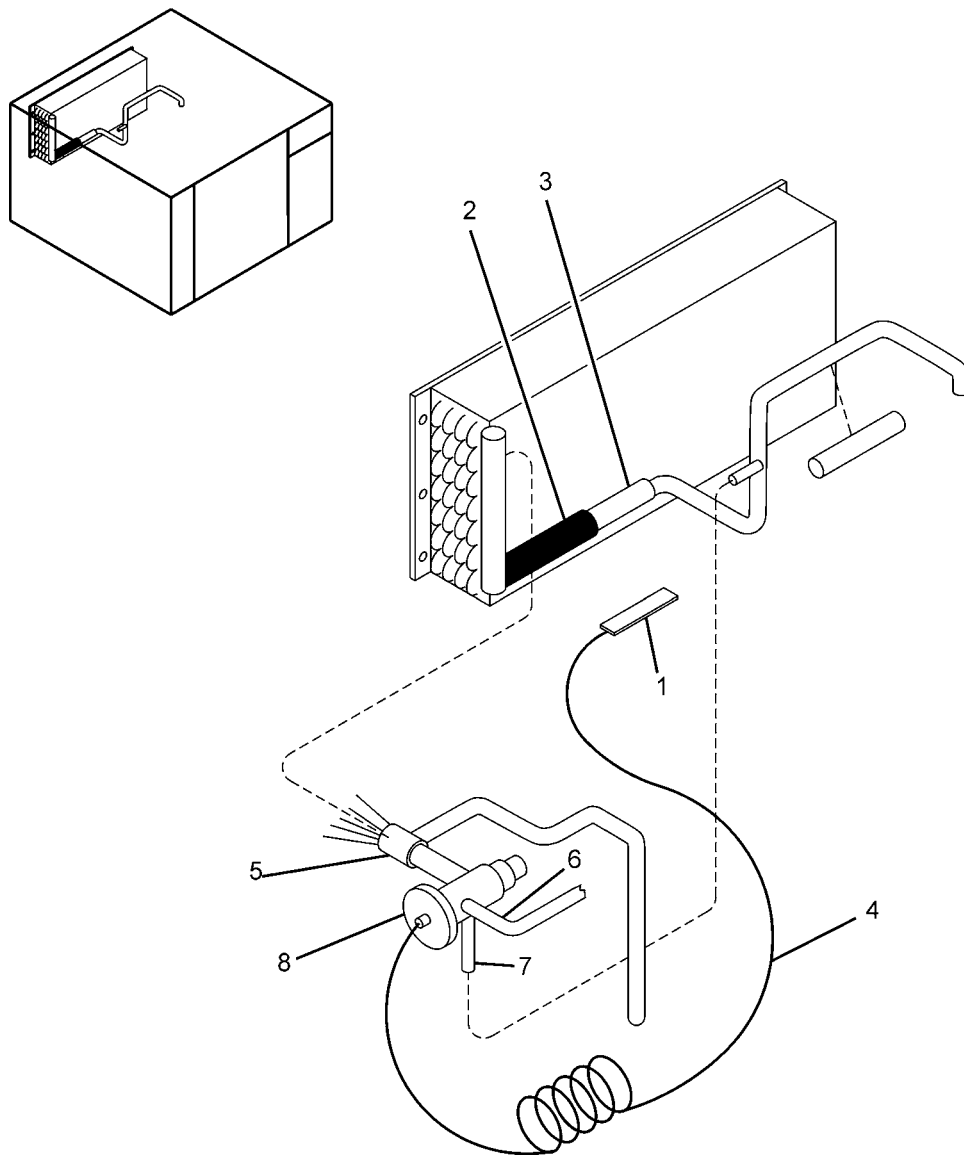


Figure 1. Expansion Valve

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
LIQUID SIGHT INDICATOR MAINTENANCE
REMOVAL AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP0069 00)

References

WP 0067 00 (MAC)
WP 0046 00 thru WP 0049 00
WP 0051 00 (Filter-Dryer)

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)
System purged with nitrogen (WP 0045 00)
Related tube connections debrazed (WP 0046 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

**WARNING**

- Ensure power source is disconnected.
- Ensure system is discharged of refrigerant.

REMOVAL

1. Remove two screws (1), washers (2) and mounting bracket (3) to release the liquid sight indicator (4) from rear of housing. See figure 1.
2. With a steady flow of dry nitrogen through refrigeration system, debraze liquid sight indicator (4) from condenser coil and attached tubing (see WP 0045 00 and WP 0046 00).
3. Remove liquid sight indicator (4) from unit housing.

INSTALLATION

1. With a steady flow of dry nitrogen through refrigeration system, braze liquid sight indicator onto condenser coil and tubing (see WP 0045 00 and WP 0046 00).
2. Secure the liquid sight indicator (4) to rear of unit housing with mounting bracket (3), washer (2), and two screws (1).
3. Install filter-drier (see WP 0051 00).
4. Leak test refrigeration system (see WP 0047 00).
5. Evacuate refrigerant system (see WP 0048 00).
6. Charge refrigerant system (see WP 0049 00).
7. Install top cover (see WP 0018 00).

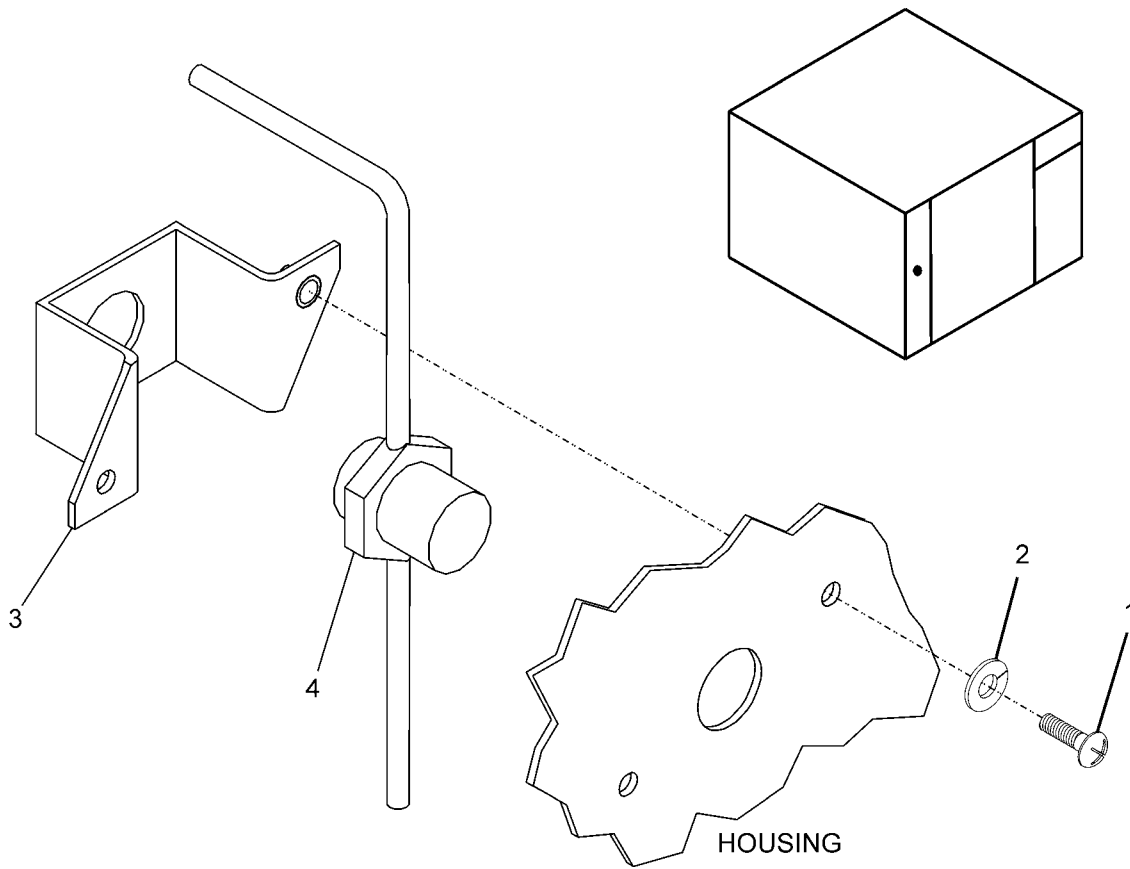


Figure 1. Liquid Sight Indicator

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
COMPRESSOR MAINTENANCE
TEST, REMOVAL, DECONTAMINATION, REPAIR, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)
Lifting Device

Test Equipment

Multimeter

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)
WP 0046 00 thru WP 0049 00
WP 0051 00 (Filter-Dryer)

Personnel Required

Two

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Condenser fan motor removed (WP 037 00)
Refrigerant system discharged (WP 0044 00)
System purged with nitrogen (WP 0045 00)
Related tube connections debrazed (WP 0046 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

**WARNING**

Ensure power source is disconnected.

**WARNING**

Compressor weighs as much as 92 lbs. (41.72 kg) and could cause injury to personnel and damage to equipment if not handled properly while removing from unit. Two personnel are required to lift the compressor.

**CAUTION**

When an overhead lifting device is used to remove the condenser fan supports (WP 0064 00), use an appropriate sling so that the weight of the unit is supported by the base of the shipping container.

**WARNING**

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the equipment.

WARNING

- Purge system with dry nitrogen prior to soldering or desoldering; refrigerant heated by flame or hot surfaces creates phosgene gas, a highly toxic gas.
- Do not let refrigerant touch you or inhale refrigerant gas. Be especially careful to prevent refrigerant from coming in contact with your eyes. Use an air filtering mask. In case of refrigerant leaks, ventilate area at once.
- Follow general debrazing instructions given in WP 0051 00. Provide a flow of dry nitrogen through the refrigeration system while debrazing connections.

**WARNING**

Never operate compressor without the compressor terminal cover secured in place.

TEST

1. Test the compressor heater (12) to see if it is still functioning. See figure 1.

NOTE

It is easier to use the old compressor heater with a new compressor than cut and splice wires for the compressor heater that comes with the new compressor.

- a. Connect main power source and turn on circuit breaker to unit.
 - b. Using a multimeter, check for 0.5 amps to compressor heater.
 - c. If heater is still good, pop out the heater from the old compressor.
 - d. Turn off circuit breaker to unit and disconnect the main power source.
2. Remove cover from compressor (8) terminal box (1).
 3. Verify labels and disconnect terminal lugs. See wiring lists and schematic diagram, WP 0040 00.
 4. Using a multimeter, test for continuity between pins T1 and T2, T2 and T3, and T3 and T1 of the compressor electrical receptacle. Continuity should exist. If not, replace compressor.
 5. Check for continuity between pins T1, T2 and T3 and the compressor housing. No continuity should exist. If continuity exists, replace compressor.

REMOVAL

1. With dry nitrogen flowing through refrigerant system, debraze tubing attached to compressor (see WP 0051 00).
2. Disconnect the electrical wiring at the compressor electrical receptacle. Refer to wire list and schematic diagram (WP 0040 00).
3. Remove four nuts (2), four flat washers (3) and four grommets (4) securing compressor (8) to the four mounting bolts (11).



WARNING

Compressor weighs as much as 92 lbs. (41.72 kg) and could cause injury to personnel and damage to equipment if not handled properly while removing from unit. Two personnel are required to lift the compressor.

4. Carefully lift up compressor from unit.
5. Remove four resilient mounts (5) from compressor. Inspect for wear or damage. Replace as necessary.
6. Remove four spacers (6) and (7). Inspect for damage. Replace as necessary.

DECONTAMINATION

1. After removal of a bad compressor from the refrigeration system, tip the compressor toward the discharge port to drain sample of oil into a clear glass container.

WARNING

Avoid inhaling fumes and burns from any acid formed by burnout of oil and refrigerant.

2. If the oil is clean and clear, and does not have a burnt acid smell, the compressor did not fail because of motor burn out. If a burn out is not indicated, refer to direct support troubleshooting WP 0047 00 for other malfunction causes.
3. If the oil is black, contains sludge, and has a burnt acid odor, the compressor failed because of motor burn out. Proceed to replace the compressor.

REPAIR**Wiring**

1. Remove the insulation to expose 1/2 inch (1.27 cm) of bare wire on each side of break or damaged insulation.
2. Insert the ends into a splice-connector, splice and crimp the connector to make firm electrical contact.
3. Alternatively, heat-shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered so as to cover the spliced area.
4. Be sure that no bare wire is exposed after the splice is complete.
5. Replace broken terminal lugs with exact duplicates.
6. Check continuity terminal-to-terminal.

INSTALLATION

1. Install four rubber spacers (7) onto the four compressor mounting bolts (11).
2. Install four spacers (6) onto the four mounting bolts (11).
3. Install four resilient mounts (5).
4. Install four grommets (4) onto compressor mounting hole.
5. Carefully position new compressor having a full and proper charge of synthetic oil on compressor mounting plate bolts (11).
6. Secure compressor with four flat washers (3) and nuts (2).
7. Connect the compressor heater (12) if required.
8. Connect electrical wiring at the compressor electrical receptacle. Refer to wire list and schematic diagram (WP 0038 00).
9. Replace filter-drier. See WP 0051 00.
10. Connect piping. Provide a flow of dry nitrogen through the system to protect inside surfaces of refrigerant piping from scaling while brazing (WP 0046 00).
11. Install condenser fan motor. See WP 0037 00.
12. Preliminary leak test unit. See WP 0047 00.

13. Evacuate the system. See WP 0048 00.
14. Charge unit with refrigerant R-22. See WP 0049 00.
15. Install top cover. See WP 0018 00.
16. Start the air conditioner and operate the unit for 3 hours.

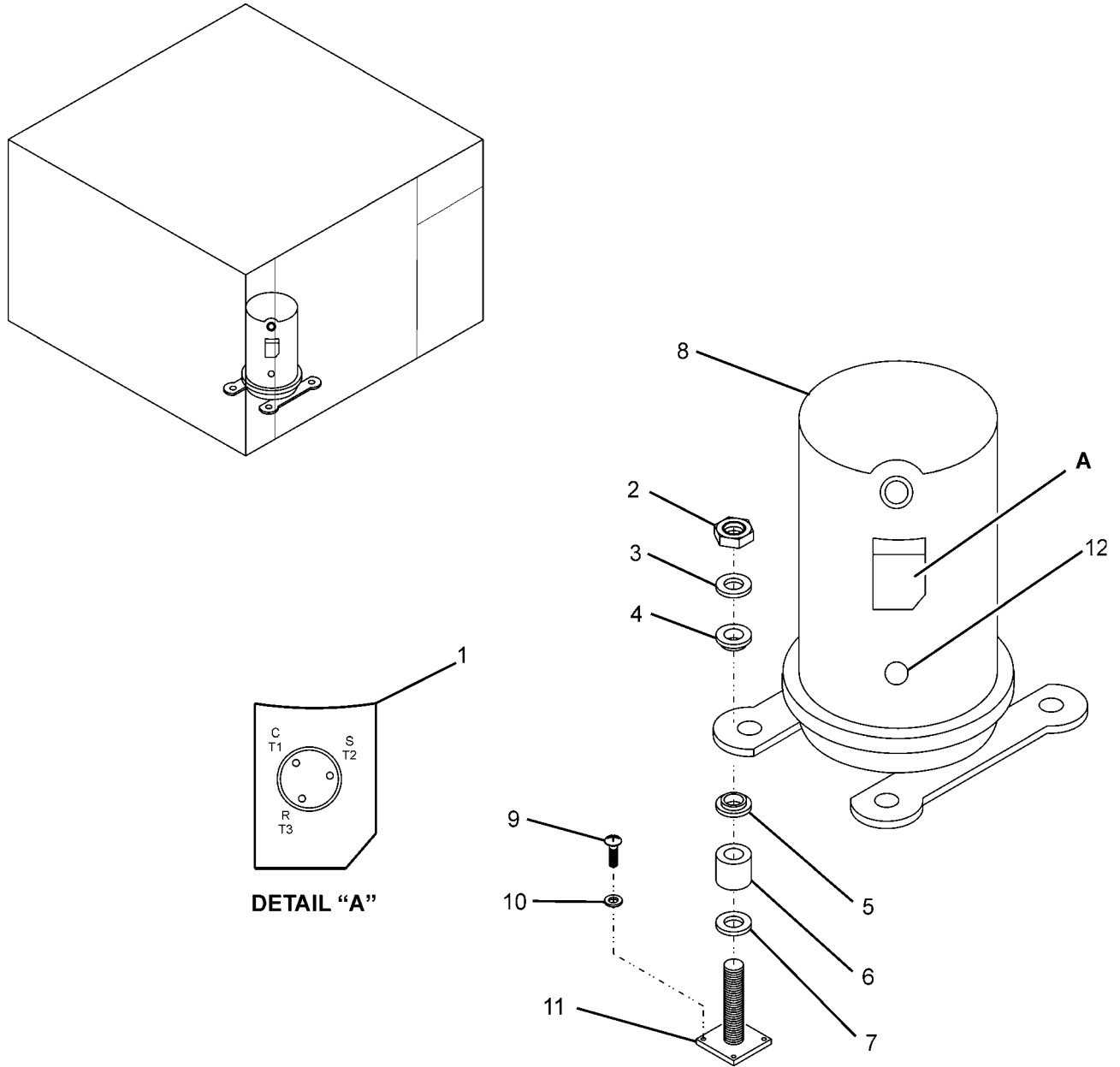


Figure 1. Compressor

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
LINEAR-ACTUATOR MAINTENANCE
INSPECT, REMOVAL, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)

References

WP 0067 00 (MAC)

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)
System purged with nitrogen (WP 0045 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

**WARNING**

Ensure power source is disconnected. Ensure refrigerant system is discharged.

INSPECT

1. Check linkage between linear actuator and condenser discharge damper. Ensure fasteners and brackets are secure and tight. Ensure pivot arm engages both the linear-actuator bracket and the condenser air discharge louver.
2. Check for free movement of linear-actuator pivot arm.

REMOVAL

1. Remove screw (1), flat washer (2), plastic washer (3), and lockwasher (4), and remove the pivot arm (5) from the linear-actuator bracket (7) and shaft (6) of pivot arm bracket.
2. Disconnect flare nut (8) to linear-actuator (9).
3. Remove linear-actuator (9) by removing two capscrews (10) and lockwashers (11) that attaches the linear-actuator bracket (12) to the condenser fan housing (13).
4. Remove the two nuts (14) that attach the linear-actuator (9) to the linear-actuator bracket (12).

INSTALLATION

1. Attach the linear-actuator (9) to the linear-actuator bracket (12) with two nuts (14).
2. Secure the linear-actuator bracket (12) to the fan housing (13) with two lockwashers (11) and capscrews (10).
3. Position the pivot arm (5) on shaft (6) of pivot arm bracket and onto the linear-actuator bracket (7).
4. Install lockwasher (4), plastic washer (3), flat washer (2), and screw (1) and secure pivot arm (5) onto shaft (6) of pivot arm bracket.
5. Connect flare nut (8) to linear-actuator (9).
6. Install top cover (see WP 0018 00).
7. Service the refrigeration system (see WP 0044 00 thru WP 0050 00).

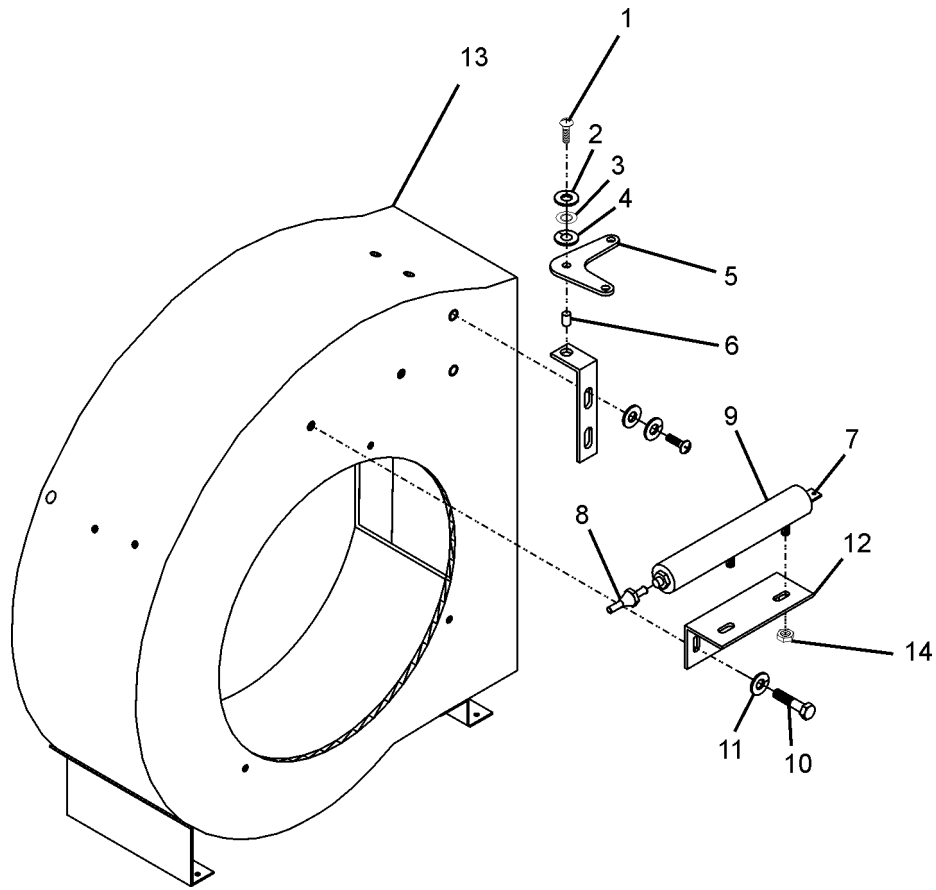


Figure 1. Linear-Actuator

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
EVAPORATOR COIL MAINTENANCE
REMOVAL, INSPECTION, CLEANING, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)
Warm soapy water
Brush, wire
Cloth, lint-free (Item 9, Table 1, WP 0069 00).

References

WP 0067 00 (MAC)
WP 0046 00
WP 0051 00

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Evaporator air discharge louver removed (WP 0020 00).
Mist eliminator removed (WP 0026 00).
Heating elements and high temperature cutout switch S3 removed (WP 0034 00 and WP 0036 00).
Refrigerant system discharged (WP 0044 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

**WARNING**

Ensure power source is disconnected.

WARNING

- Purge system with dry nitrogen prior to soldering or desoldering; refrigerant heated by flame or hot surfaces creates phosgene gas, a highly toxic gas.
- Do not let refrigerant touch you or inhale refrigerant gas. Be especially careful to prevent refrigerant from coming in contact with your eyes. Use an air-filtering mask. In case of refrigerant leaks, ventilate area at once.
- Follow general debrazing instructions given in WP 0046 00. Provide a flow of dry nitrogen through the refrigeration system while debrazing connections.

REMOVAL

1. Remove six screws (1) and lockwashers (2) securing evaporator coil (3) to housing.
2. Debraze tubing from evaporator coil and expansion valve subassembly. See debrazing joints (4 and 5).
3. Remove the hot gas and suction block off plates from the inner housing bulkhead.
4. Carefully lift the evaporator coil and expansion valve subassembly from the air conditioner.
5. Debraze the distributor (6) from the expansion valve (7) (see WP 0046 00).
6. Remove insulation to release sensor bulb (9) from suction return line (8).
7. Debraze suction return line (8) from evaporator coil (3) (see WP 0046 00).
8. Remove filter-drier (WP 0051 00).

INSPECTION

Inspect the evaporator coil for bent or torn fins and for damaged connections.

CLEANING

WARNING



Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent, P-D-680, Type III, which is used to clean parts, is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100-138 degrees F (38-59 degrees C).

Clean coil using cleaning solvent (Item 16, Table 1, WP 0069 00) and soft brush.

INSTALLATION

1. Connect tubing to coil (3), distributor (6) and expansion valve (7) to form the evaporator coil and expansion valve subassembly.
2. Install sensor bulb (9) and insulation to suction line (8).
3. Place the subassembly into the unit and braze at brazing joints (4) and (5). Before brazing joints, provide a flow of dry nitrogen through refrigeration system to protect internal surfaces of the tubing and fittings (see WP 0046 00).
4. Secure coil to housing with six lockwashers (2) and screws (1).
5. Install new filter-dryer (see WP 0051 00).
6. Install the hot gas and suction block off plates onto the inner housing bulkhead.
7. Leak test system (see WP 0047 00).
8. Evacuate system (see WP 0048 00).
9. Charge system (see WP 0049 00).
10. Install evaporator air discharge louver (see WP 0020 00).
11. Install mist eliminator (see WP 0022 00).
12. Install top cover (see WP 0018 00).

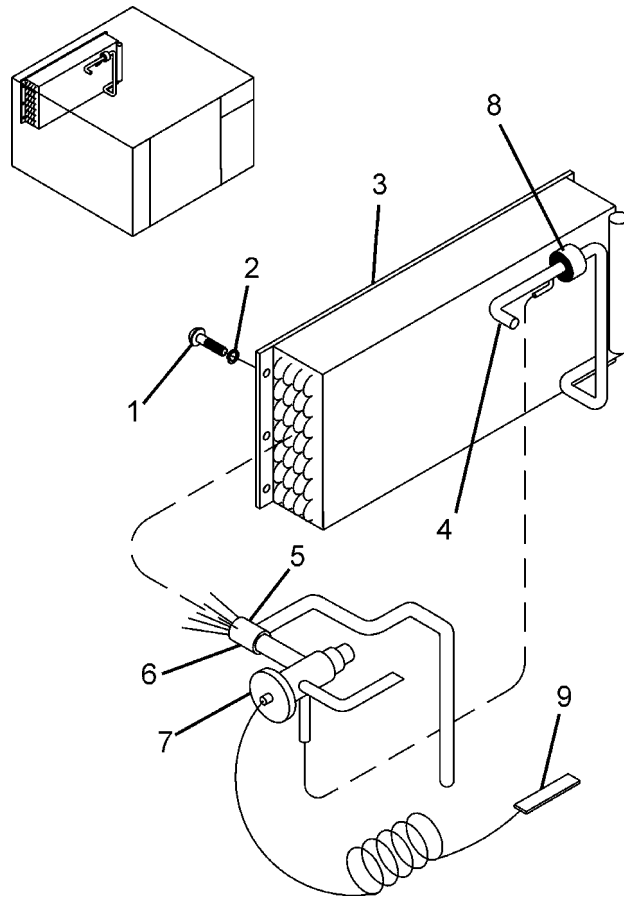


Figure 1. Evaporator Coil

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CONDENSER COIL MAINTENANCE
REMOVAL AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
 Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
 Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
 Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
 Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
 Brazing flux (Item 7, Table 1, WP 0069 00)
 Warm soapy water
 Brush, wire
 Cloth, lint-free (Item 9, Table 1, WP 0069 00)
 Oil (Item 14, Table 1, WP 0069 00)

References

WP 0051 00 (Filter-Dryer)	WP 0047 00 (Leak Test)
WP 0058 00 (Liquid Sight Indicator)	WP 0048 00 (Evacuation)
WP 0045 00 (Purging)	WP 0049 00 (Charging)
WP 0046 00 (Brazing/De brazing)	

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
 Main power source is disconnected
 Top cover removed (WP 0018 00)
 Circuit breaker assembly removed (WP 0027 00)
 Refrigerant system discharged (WP 0044 00)
 Condenser Guard and Air Condenser Discharge Louver removed (WP 0021 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by AUTHORIZED PERSONNEL ONLY.

**WARNING**

Ensure power source is disconnected.

REMOVAL

1. Purge system (see WP 0045 00).
2. Reposition electrical wiring away from tubing area to be debrazed.
3. Debraze compressor discharge line at coil and the liquid line at the filter-dryer (7). See figure 1 and WP 0046 00.
4. Remove the liquid line bracket that secures the liquid sight indicator (6) to unit housing by removing two screws and lockwashers (see WP 0058 00).
5. Remove two recessed screws (1) and one screw (2), lockwasher (3), and flat washer (4) that secure condenser coil (2) to unit housing.

CAUTION

Use extreme care in removing condenser coil from housing to avoid damaging fins and coil piping.

6. Remove condenser coil (5) with the liquid sight indicator (6) attached from unit housing.
7. Debraze liquid sight indicator (6) from condenser coil (see WP 0046 00).

INSTALLATION

1. Braze the liquid sight indicator (3) onto the condenser coil (see WP 0046 00).

CAUTION

Use extreme care in installing condenser coil assembly into housing to avoid damaging fins, coil, piping and refrigerant system tubing.

2. Place condenser coil (5) and liquid sight indicator (6) into air conditioner. Secure coil (5) with two recessed screws (1) and one screw (2) with lockwasher (3), and flat washer (4).
3. Purge system (see WP 0045 00).
4. Braze condenser tube connections (see WP 0046 00).
5. Replace filter-drier (7) (see WP 0051 00).
6. Install condenser guard and condenser and air discharge louver (see WP 0021 00).
7. Secure liquid sight indicator (3) to unit housing with two screws, two lockwashers, and mounting plate (see WP 0058 00).
8. Leak test refrigeration system (see WP 0047 00).

9. Reposition electrical wiring to original position and tie as required.
10. Install circuit breaker assembly (see WP 0027 00).
11. Install top cover (see WP 0018 00).
12. Evacuate refrigeration system (see WP 0048 00).
13. Charge refrigeration system (see WP 0049 00).

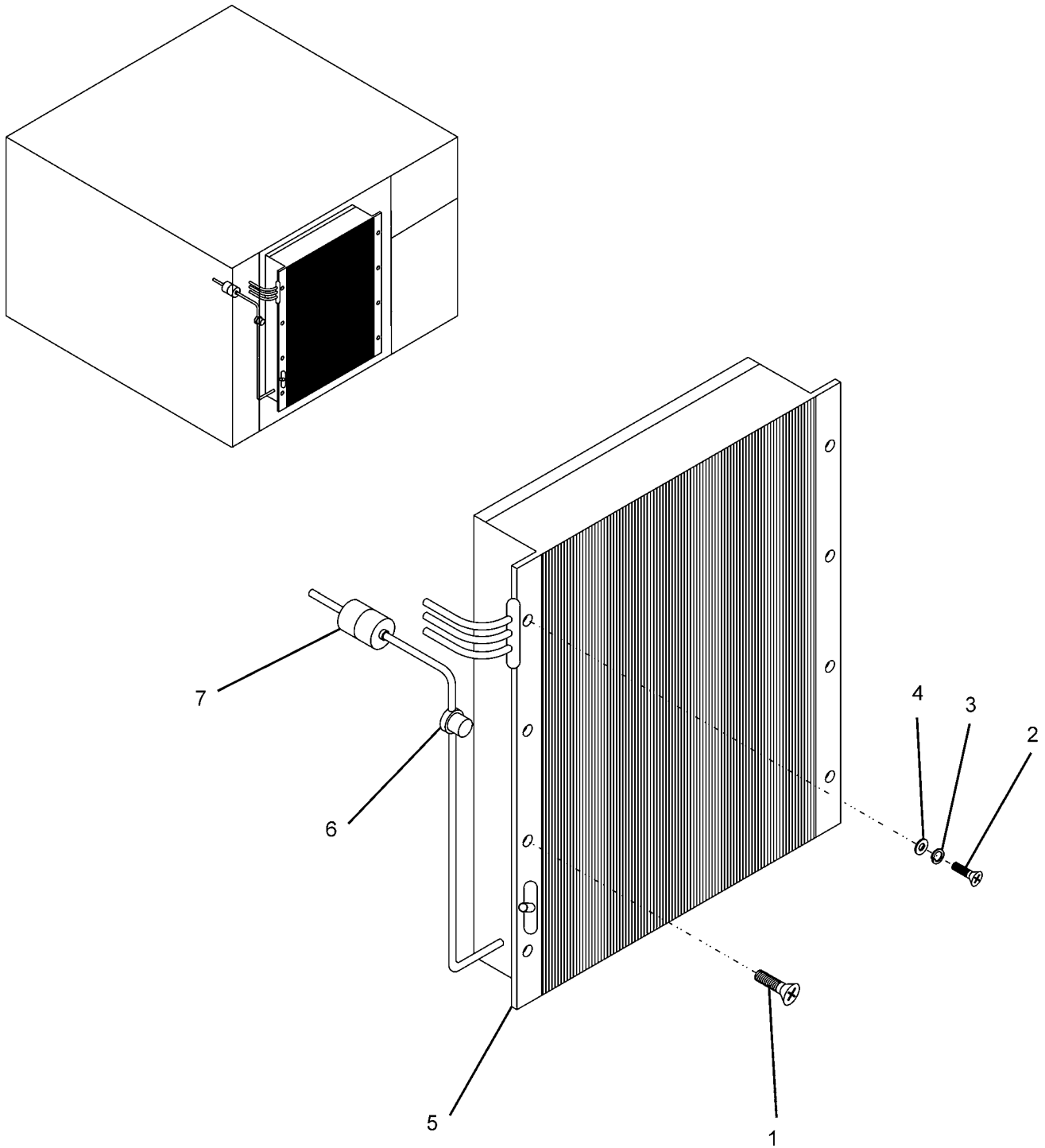


Figure 1. Condenser Coil

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
TUBING AND FITTINGS MAINTENANCE
TEST, REMOVAL, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Tool Kit, Service, Refrigeration Unit (Item 2, WP 0067 00)
Recovery and Recycle Unit, Refrigerant (Item 5, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Test Equipment

Electronic refrigerant gas leak detector (See TM 9-4940-509-14&P)

Materials/Parts

Nitrogen (Item 4, WP 0069 00)
Brazing alloy (Item 5 or 6, Table 1, WP 0069 00)
Brazing flux (Item 7, Table 1, WP 0069 00)

References

TM 9-4940-509-14&P
WP 0046 00 (Brazing/Debrazing)
WP 0051 00 (Filter-Dryer)
WP 0067 00 (MAC)

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected
Top cover removed (WP 0018 00)
Refrigerant system discharged (WP 0044 00)
System purged with nitrogen (WP 0045 00)

Special Environmental Condition**WARNING****REFRIGERANT-22 (R-22)**

- Unit contains R-22, a chemical substance which harms public health and the environment by destroying ozone in the upper atmosphere, and that the equipment is to be serviced by qualified personnel only.
- Operation of the recovery/recycling unit must be by **AUTHORIZED PERSONNEL ONLY**.

**WARNING**

Ensure power source is disconnected.

TEST

1. Check all piping and connections with a General Electric Type H-2 halogen test detector (or approved equal).
2. Calibrate the detector with a General Electric LS-20 leak standard (or approved equal) for a pure refrigerant leak rate of 0.1 ounce (2.8349 gms) per year.
3. Replace any piping or connection that is leaking beyond the rate of 0.1 ounce (2.8349 gms) per year.

REMOVAL

1. Debraze and remove tubing only when necessary to remove a defective part.
2. When brazing, constantly purge the refrigerant system with dry nitrogen to prevent scale formation within the refrigerant system (see WP 0046 00).

INSTALLATION

1. Braze all copper-to-copper joints with silver solder (Item 21, Table 1, WP 0069 00).
2. Braze all copper-to-brass or copper-to-steel with silver solder.
3. Braze melting point is 1160 degrees F (625 degrees C).
4. Make all braze joints with an atmosphere of inert gas to prevent internal oxidation (see WP 0046 00).
5. Replace filter-drier prior to leak testing (see WP 0051 00).
6. Service refrigeration system after repairs (see WP 0044 00 through WP 0050 00).
7. Secure top cover (see WP 0018 00).

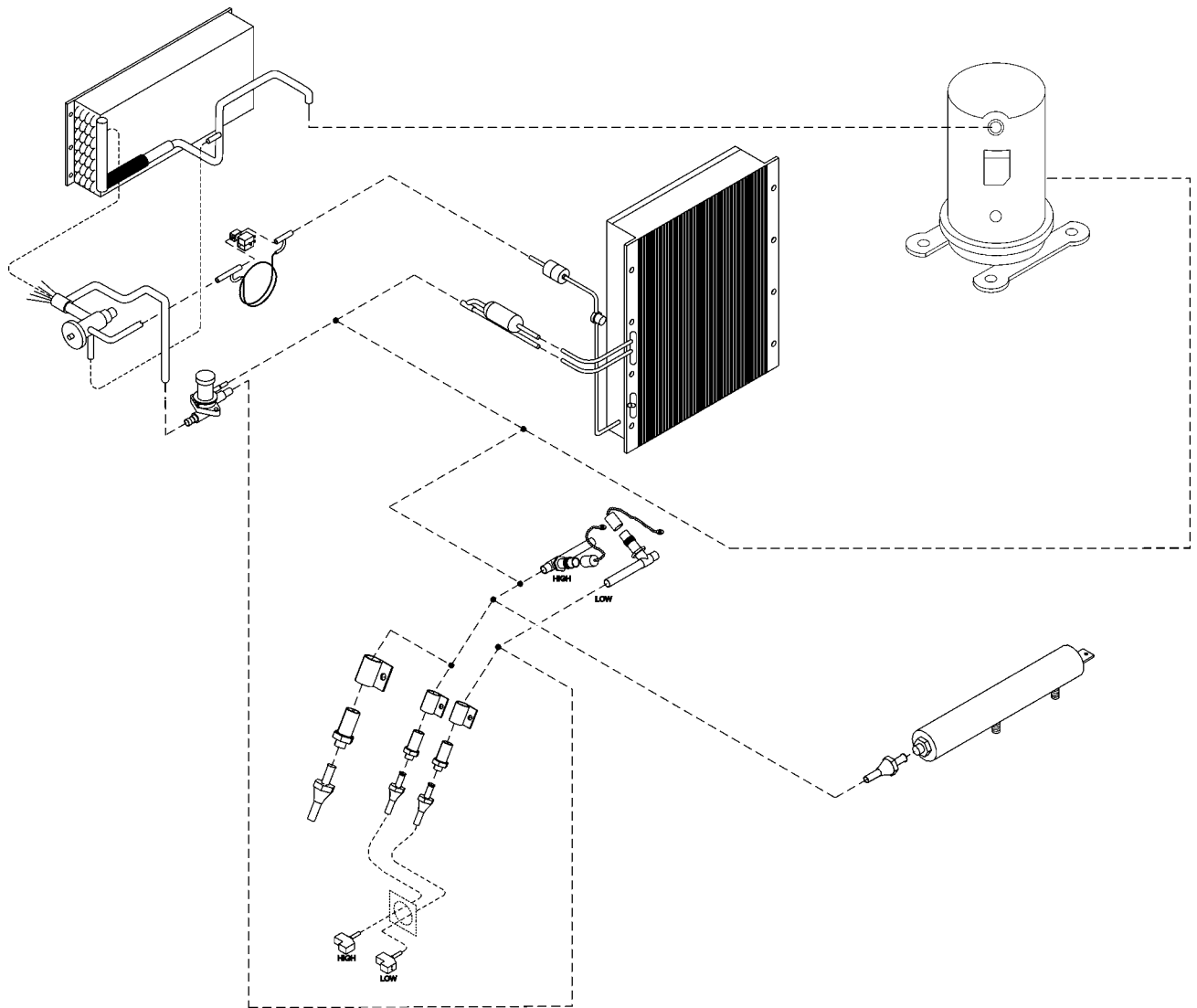


Figure 1. Tubing and Fittings

END OF WORK PACKAGE

**DIRECT SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
CONDENSER FAN AND MOTOR MAINTENANCE
TEST, REMOVAL, DISASSEMBLY, INSPECTION, ASSEMBLY, AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)

Materials/Parts

Grease, General Purpose (Item 28, Table 1, WP 0069 00)

Test Equipment

Multimeter

References

Wire lists and Schematic Diagram (WP 0038 00)

Refrigerant System Service - (Brazing/Debrazing) (WP 0046 00)

Personnel Required

One

Equipment Condition

Power disconnected from unit.

Top cover removed (WP 0018 00)

WARNING

Ensure power source is disconnected.

TEST

1. Remove black lead and red lead from condenser fan motor B3. Refer to schematic diagram (WP 0038 00).
2. Using an ohmmeter set on lowest ohms scale, check continuity between black lead and red lead on motor. Continuity should be indicated between these leads.
3. Rotate motor shaft very slowly and check for smooth and quiet operation of shaft. Shaft should rotate smoothly and should not make grinding or binding noises.
4. If condenser motor fails any of the above tests, motor must be replaced.

REMOVAL

1. Remove condenser coil (WP 0062 00).
2. Remove linear-actuator (WP 0060 00).
3. Verify labels and disconnect all wires from condenser fan motor being replaced. Refer to wire list and schematic diagram (WP 0038 00).
4. Disconnect flare nuts (27) to pressure switches. Refer to figure 1.

5. Disconnect clamps (18) on-service valves (19) by removing screws (16) and flat washers (17).
6. Remove screw (20), flat washer (21), and clamp (22) and disconnect and remove the pressure relief valve (23).
7. Remove screws (24), flat washers (25), and clamps (26) that secure tubing (27) of the high and low pressure switches to the fan housing (11).
8. Using a socket head screw key (Item 13, Table 2, WP 0067 00), loosen two setscrews (1) to release shaft extension (2) from motor shaft.
9. Debraze refrigerant lines (34 and 35) on the high and low side at the hot gas bypass valve (36). Refer to WP 0046 00.
10. Remove four capscrews (5) and flat washers (6) from locking rib nuts of motor mount (7) that secure the motor mounting plate (8) to the motor mount.
11. Slide out motor shaft from shaft extension (2) and impeller (4).
12. Lift out motor (3) and mounting plate (8) from unit.
13. Remove condenser fan housing (11) by removing six countersunk screws (9) from the bottom of unit housing and one countersunk screw (10) on the side of unit housing.

DISASSEMBLY

1. Using a socket head screw key (Item 13, Table 2, WP 0067 00), loosen two setscrews (31) from impeller (4) to release impeller (4) from shaft extension (2).
2. Remove four screws (28) and four flat washers (29) to remove inlet bell (30) from fan housing (11).
3. Remove impeller (4) from fan housing (11).
4. Remove four nuts (31), lockwashers (32), and screws (33) that secure the motor (3) to the motor mounting plate (8). Remove motor from motor mounting plate.

INSPECTION

1. Inspect inlet bell (30), impeller (4) and fan housing (11) for out-of-round conditions, dents, burrs, and nicks.
2. Replace defective items.
3. Check impeller (4) for damaged or bent vanes. Straighten or replace impeller (4).
4. Inspect exterior case of motor for cracks, dents, oil, evidence of overheating or any other abnormalities. Replace defective motor.
5. Turn motor shaft by hand and listen for clicking sounds that indicate bad bearings. Replace if bearings are bad.
6. If the shaft cannot be rotated, the bearings may have seized. Replace motor.
7. Test the thrust bearings by attempting to push and pull the motor shaft axially.
8. If end play is excessive (i.e., can be felt on manual push-pull), the thrust bearings and shims are worn beyond limits and motor should be replaced.
9. Use a multimeter or continuity tester to check continuity between leads. See wiring diagram (WP 0038 00).

10. Check to be sure that continuity exists between leads. This means that open circuits do not exist. Replace motor if either open or short circuits exist.

ASSEMBLY

1. Install motor (3) on motor mounting plate (8) with four screws (33), lockwashers (32), and nuts (31).
2. Attach shaft extension (2) to impeller (4) by using a socket head screw key (Item 13, Table 2, WP 0067 00) to tighten two setscrews (31) on impeller (4).
3. Insert impeller (4) into fan housing (11).
4. Attach the inlet bell (30) to the fan housing (11) with four flat washers (29) and screws (28).

INSTALLATION

1. Insert fan housing (11) back into position in unit housing.
2. Secure the fan housing (11) to the unit housing by installing six countersunk screws (9) on the bottom of unit housing and one countersunk (10) on the side of unit housing.
3. Place the motor (3) and mounting plate (8) into position in the unit housing.
4. Secure the motor mounting plate (8) to motor mount (7) with four flat washers (6) and capscrews (5).
5. Braze refrigerant lines (34 and 35) on the high and low sides of hot gas bypass valve (36). Refer to WP 0046 00.
6. Install clamps (26), flat washers (25), and screws (24) that secure the tubing (27) of the high and low pressure switches to the fan housing (11).
7. Install pressure relief valve (23) and secure to fan housing (11) with clamp (22), flat washer (21), and screw (20).
8. Install clamps (18) on service valves (19) and attach to housing (11) by with flat washers (17) and screws (16).
9. Attach the shaft extension (2) with impeller (4) onto the shaft motor by loosely tightening setscrews (1).
10. Center the impeller (4) in the fan housing (11) while looking through the condenser louver opening. Then tighten the setscrews (1) on the shaft extension (2).
11. Reconnect wiring, See wire list and schematic diagram WP 0038 00.
12. Connect the condenser louver (WP 0021 00).
13. Install linear-actuator (WP 0060 00).
14. Install condenser coil (WP 0062 00).
15. Install top cover (WP 0018 00).

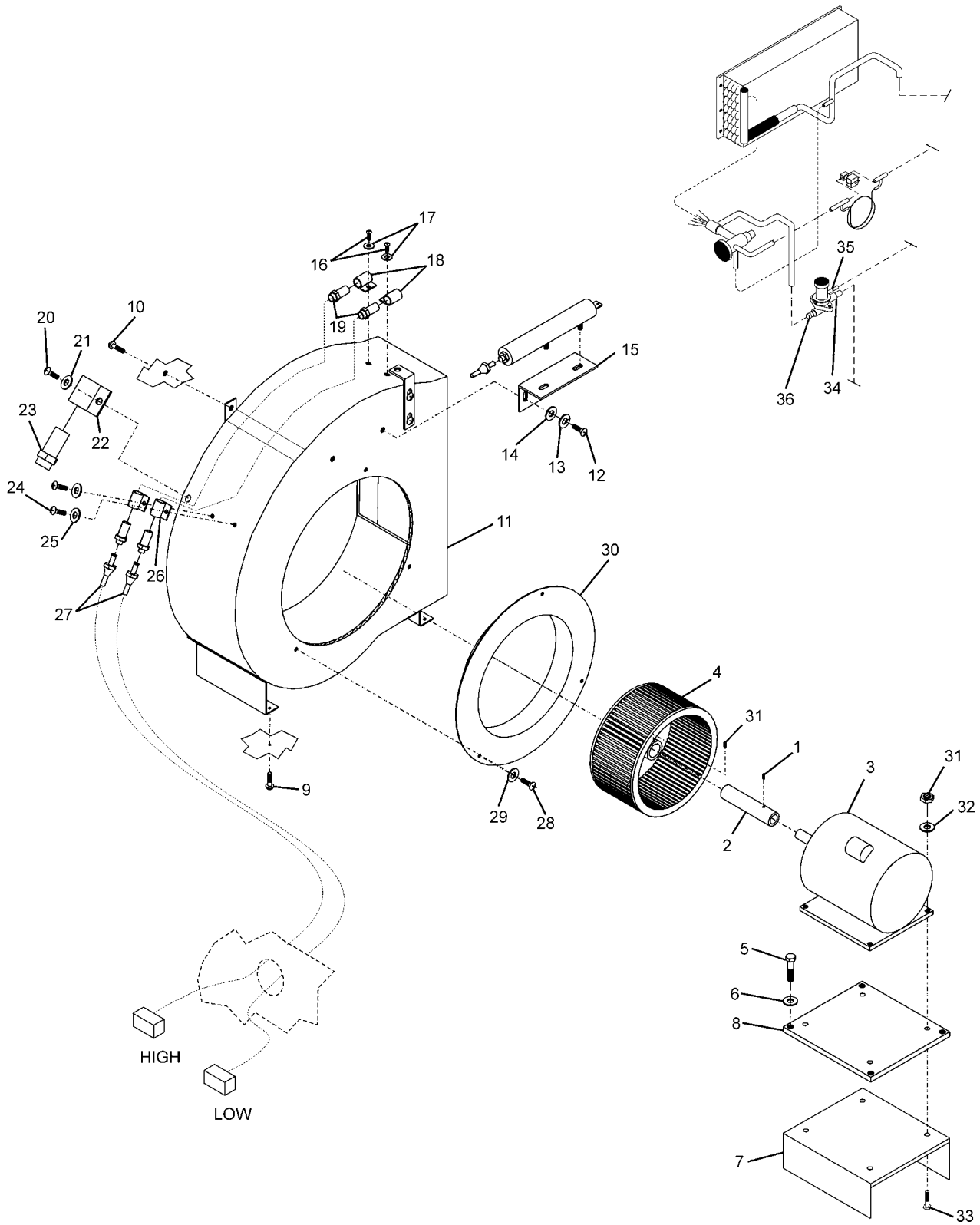


Figure 1. Condenser Fan Assembly

END OF WORK PACKAGE

CHAPTER 9
GENERAL SUPPORT
MAINTENANCE INSTRUCTIONS

**GENERAL SUPPORT MAINTENANCE
AIR CONDITIONER, COMPACT, HORIZONTAL
HOUSING MAINTENANCE
INSPECTION, REMOVAL, AND REPAIR**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanics (Item 1, Table 2, WP 0067 00)
Mask, Air Filtering (Item 29, Table 1, WP 0069 00)

Materials/Parts

Adhesive (Item 18, Table 1, WP 0069 00)
Cellular rubber strips (Item 19, Table 1, WP 0069 00)
Elastomeric thermal insulation (Item 20, Table 1, WP 0069 00)
Cloth, lint-free (Item 9, Table 1, WP 0069 00)
Acetone (Item 22, Table 1, WP 0069 00)
Methyl-ethyl ketone (MEK) (Item 23, Table 1, WP 0069 00)
Paint, forest green (MIL-C-46168)
Paint brush
Sandpaper, 240 grit
Primer (TT-P-1757)

References

WP 0067 00 (MAC)
TM 43-0139 (Painting Instructions)

Personnel Required

One

Equipment Condition

Mode selector switch in OFF position.
Main power source is disconnected

**WARNING**

Ensure power source is disconnected.

WARNING

Acetone and methyl-ethyl ketone are flammable and their vapors are explosive. Prolonged or repeated inhalation of fumes or contact with the skin can be toxic. Use in a well-ventilated area, wear gloves and an air filtering mask, and keep away from sparks or flame.

INSPECTION

1. Inspect for damage. Look for loose, frayed, cracked and missing insulation (items 1 thru 10). Refer to figure 1.
2. Visually check for excessive drying of insulation or shrinkage.

REMOVAL

1. Scrape and pull off as much of the damaged insulation as possible.
2. Soften the remaining insulation and adhesive with acetone or MEK (methyl-ethyl ketone).
3. Repeat the softening and scraping process as required.
4. Clean up metal surfaces with cloth moistened in acetone or MEK.

INSULATION REPAIR

1. Repair loose or torn insulation (items 1 thru 10) with adhesive.
2. Replace frayed, cracked or missing insulation.
3. Cut a sheet of the proper insulating material to correct shape.
4. Coat the attaching side with adhesive, using a paint brush to ensure complete coverage.
5. Coat the metal with adhesive to which the insulation is to be attached.
6. Let both surfaces air dry until the adhesive becomes tacky but will not stick to the fingers.
7. Starting at one corner or at a narrow edge, carefully bring the insulation into full contact with the metal.
8. Press into firm contact all over.
9. Allow sufficient time to dry thoroughly before installation.

HOUSING REPAIR

1. Visually inspect for nicks, gouges, dents, bare spots in paint and other defects which can be repaired.
2. Repair/replace handles and associated hardware.
3. Sand and paint any repaired area in housing, referencing TM 43-0139, Painting Instructions for Field Use.
4. Remove minor dents, and paint.
5. Remove any rust or other minor corrosive damage, and paint.

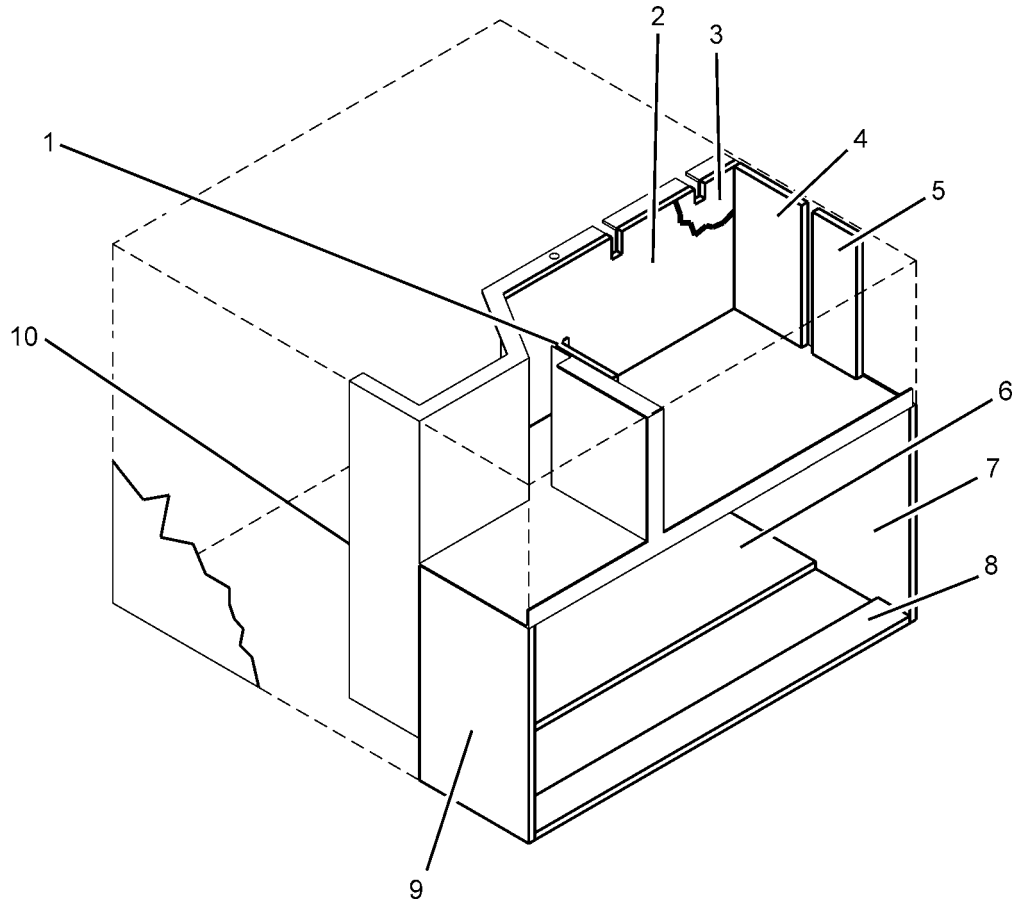


Figure 1. Housing Insulation

END OF WORK PACKAGE

CHAPTER 10
SUPPORTING INFORMATION

REFERENCES
AIR CONDITIONER, COMPACT, HORIZONTAL

SCOPE

This work package lists all field manuals, forms, technical manuals, and miscellaneous publications referenced in this manual.

FIELD MANUALS

FM 20-31 Electric Motor and Generator Repair

FM 4-21.11 First Aid

FORMS

DA Form 2028-2 Recommended Changes to DA Publications

DA Form 2404 Equipment Inspection and Maintenance Work Sheet

DA Form 368 Quality Deficiency Report

DA Form 5988E Equipment Inspection and Maintenance Work Sheet (Electronic)

TECHNICAL MANUALS

TB 5-4200-200-10 Hand Portable Fire Extinguishers Approved for Army Users

DA PAM 738-8 The Army Maintenance Management System (TAMMS)

DA PAM 750-8 Aviation Functional Users Manual for the Army Maintenance Management System (TAMMS)

TM 43-0139 Painting Instructions for Field Use

TM 9-4120-430-24P Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List

TM 740-90-1 Administrative Storage of Equipment

TM 750-244-2 Procedure for Destruction of Equipment to Prevent Enemy Use

TM 9-4940-509-14 Leak Detector, Refrigerant Gas

TB 43-0135 Environmentally Safe Substances For Use with Communications and Electronics

AR 700-138 Army Logistics Readiness and Sustainability

CTA 50-970 Expendable/Durable Items (Except Medical, Class V, Repair Parts and Heraldic Items)

END OF WORK PACKAGE

MAINTENANCE ALLOCATION CHART
AIR CONDITIONER, COMPACT, HORIZONTAL

INTRODUCTION**The Army Maintenance System MAC**

This introduction provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component.

This MAC utilizes the Two-Level Maintenance (TLM) System that combines the Unit and Direct Support (DS) levels of maintenance, under the heading of *Field Maintenance*. Similarly, the combination of GS and Depot levels are combined under the heading of *Sustainment Maintenance*. On-System Maintenance characterizes field maintenance, and it normally repairs equipment and returns it to the user. Sustainment Maintenance is characterized by *off-system maintenance* and primarily repairs and returns equipment to the supply system.

The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field...includes two subcolumns, Unit (C (operator/crew) and O (unit) maintenance) and Direct Support (F) maintenance

Sustainment...includes two subcolumns, general support (H) and depot (D).

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions will be limited to and defined as follows:

1. *Inspect*. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).
2. *Test*. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis.
3. *Service*. Operations required periodically to keep an item in proper operating condition, e.g., to clean (includes decontamination, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.
4. *Adjust*. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.
5. *Align*. To adjust specified variable elements of an item to bring about optimum or desired performance.
6. *Calibrate*. To determine the cause and corrections to be made or adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. This consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

7. *Remove/Install*. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow proper functioning of the equipment or system.
8. *Replace*. To remove an unserviceable item and install a serviceable counterpart in its place. *Replace* is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
9. *Repair*. The application of maintenance services including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the *Repair* maintenance function:

Service... Inspect, test, service, adjust, align calibrate, and/or replace.

Fault location/troubleshooting... The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

*Disassembly/Assembly...*The step-by-step breakdown (taking apart) of a spare/ functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions... Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

10. *Overhaul*. That periodic maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
11. *Rebuild*. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles, etc.) considered in classifying Army equipment/ components.

Explanation of Columns in the MAC

Column (1) -- Group Number. Column (1) lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) -- Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) -- Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to *Maintenance Functions* outlined above.)

Column (4) -- Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate sub-column. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. Should the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time

(including any necessary disassembly/ assembly time), troubleshooting/fault location time, and quality assurance time, in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

- C Operator or crew maintenance
- O Unit maintenance
- F Direct support maintenance

Sustainment:

- H General support maintenance
- D Depot maintenance

NOTE

The *L* maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the *H* column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) - Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools) common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) - Remarks Code. When applicable, this column contains a letter code, in alphabetic order, which is keyed to the remarks table entries.

Explanation of Columns in the Tools and Test Equipment Requirements

Column (1) - Tools/Test Equipment Reference Code. The tool and test equipment code correlates with a code used in column (5) of the MAC.

Column (2) - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) - Nomenclature. Name or identification of the tool or test equipment.

Column (4) - National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) - Tool Number. The manufacturer's part number, model number, or type number.

Explanation of Columns in the Remarks

Column (1) - Remarks Code. The code recorded in Column (6) of the MAC.

Column (2) - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER, COMPACT HORIZONTAL:

Table 1. MAC for AIR CONDITIONER, COMPACT HORIZONTAL

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND TEST EQUIPMENT	(6) REMARKS CODE
			FIELD		SUSTAINMENT				
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
00	AIR CONDITIONER S9150-18KH-1 18K BTU/Hr, 230V, 1PH, 50/60 Hz	INSPECT	0.1						A
		SERVICE	0.3	0.1				1	B
		SERVICE			2.0			1	P
		TEST		0.5				1	M
		REPLACE		0.5				1	P
		REPAIR		0.5				1,6,7	D,E,F
		REPAIR		0.5	8.0			1 THRU 5	L,P
	REPAIR				2.0		8	C,F	
	AIR CONDITIONER S9160-18KH-3 18K BTU/Hr, 208V, 3PH, 50/60 Hz	INSPECT	0.1						A
		SERVICE	0.3	0.1				1	B
		SERVICE			2.0			1	P
		TEST		0.5				1	M
		REPLACE		0.5				1	P
		REPAIR		0.5				1,6,7	D,F
REPAIR			0.5	8.0			1 THRU 5	L,P	
REPAIR				2.0		8	C,F		
01	HOUSING	INSPECT	0.1	0.3					B,P
		SERVICE	0.1	0.3				1	P
		REPAIR				1.0		1	C
		REPLACE				8.0		1	P
0101	COVERS, PANELS, AND SCREENS	INSPECT	0.1	0.3					B
		SERVICE	0.1	0.3				1	B
		REPAIR		0.2				1	D
		REPLACE		0.5				1	P
0102	INFORMATION PLATES	INSPECT	0.1	0.3					B
		SERVICE	0.1	0.3				1	B
		REPLACE		0.3				1	P
0103	LOUVERS	SERVICE		0.3				1	B,P
		REPLACE		0.5				1	P
0104	CONDENSATE DRAIN TUBE ASSEMBLY	INSPECT	0.2	0.2					B
		SERVICE		0.3				1	B,P
		REPAIR		1.2				1	D,F
		REPLACE		1.5				1	P
02	AIR CIRCULATING SYSTEM	ADJUST	0.1					1	I,P
		INSPECT		0.2					P
		SERVICE		0.5				1	P
		REPAIR		1.5				1	D,F
		REPLACE		1.5				1	P
0201	AIR INTAKE FILTER	INSPECT	0.1	0.1					B
		SERVICE		0.3				1	P
		REPLACE		0.3				1	P
0202	FRESH AIR DAMPER ASSEMBLY	ADJUST	0.1					1	I,P
		INSPECT		0.2					P
		SERVICE		0.5				1	P
		REPAIR		1.5				1	D,F
REPLACE		1.5				1	P		
03	ELECTRICAL COMPONENTS AND JUNCTION BOX	INSPECT		1.0				1	B,P
		TEST		1.0				1	J
		REPAIR		1.0				1,6,9	E,P
		REPLACE		1.0				1,6,9	P
0301	REMOTE CONTROL MODULE	INSPECT	0.1	0.3					B
		ADJUST	0.1					1	I
		TEST		0.5				1	H,P
		REPAIR		0.5				1	F,O
		REPLACE		1.0				1	P

Table 1. MAC for AIR CONDITIONER, COMPACT HORIZONTAL - Continued

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND TEST EQUIPMENT	(6) REMARKS CODE
			FIELD		SUSTAINMENT				
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0302	THERMOSTAT, RELAYS, AND TRANSFORMER	TEST		0.3				1	J,P
		REPLACE		0.3				1	P
0303	WIRING HARNESS	TEST		0.3				1	J,P
		REPAIR		0.5				1	E
		REPLACE		0.5				1	P
04	EVAPORATOR FAN MOTOR, AND HEATER	INSPECT		0.3					B
		REPAIR		0.5				1,6,9	E,F
		REPLACE		1.0				1,6,9	P
0401	EVAPORATOR FAN ASSEMBLY	INSPECT		0.3					B
		TEST		0.5				1	G
		REPAIR		0.5				1,6,9	F
		REPLACE		1.0				1,6,9	P
0402	ELECTRICAL HEATING ELEMENTS	INSPECT		0.3					B
		TEST		0.5				1,6,9	M
		REPLACE		1.0				1,6,9	P
05	CONDENSER FAN AND MOTOR	INSPECT		0.3					B
		TEST		0.3				1	M
		REPAIR		0.5				1,6,9	E
		REPLACE		0.5				1,6,9	P
06	COMPRESSOR ASSEMBLY	TEST			0.5			1	N
		REPLACE			2.0			1 THRU 5	P
		REPAIR			2.0			1 THRU 5	L,P,F
0601	COMPRESSOR (S9150-18KH-1 UNIT)	TEST			0.5			1	N
		REPLACE			2.0			1 THRU 5	P
		REPAIR			2.0			1 THRU 5	P,F
060101	COMPRESSOR START KIT (S9150-18KH-1 UNIT)	TEST		0.3				1	J
		REPLACE		0.5				1	P
		REPAIR		0.5				1	F
06010101	RELAY	TEST		0.3				1	J
		REPLACE		0.3				1	P
06010102	CAPACITORS	TEST		0.3				1	J
		REPLACE		0.3				1	P
0602	COMPRESSOR (S9160-18KH-3 UNIT)	TEST			0.5			1	N
		REPLACE			2.0			1 THRU 5	P
07	REFRIGERATION COMPONENTS	INSPECT	0.1						P
		SERVICE			1.5			1 THRU 5	P
		TEST			0.3			1,2	K
		REPLACE			1.5			1 THRU 5	P
		REPAIR			1.5		1 THRU 5	L,P,F	

TOOL AND TEST EQUIPMENT REQUIREMENTS FOR AIR CONDITIONER, COMPACT, HORIZONTAL

Table 2. Tools and Test Equipment for Air Conditioner, Compact, Horizontal

(1) TOOLS OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER	(5) TOOL NUMBER
<p>NOTE</p> <p>Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Table 1.</p>				
1	O,F,H	Tool Kit, General Mechanics	5180-00-699-5273	SC5180-90-CL-N05
2	O,F,H	Tool Kit, Service, Refrigeration Unit	5180-00-596-1474	SC5180-90-CL-N18
3	F	Pump, Vacuum	4310-00-289-5967	
4	F	Nitrogen Regulator	6680-00-503-1327	
5	F	Recovery and Recycle Unit, Refrigerant	4130-01-338-2707	
6	O	Heat Gun	4940-01-042-4855	
7	O,F,H	Rivet Gun	5120-00-508-1588	
8	F,H	Welding Shop, Trailer Mounted	3431-01-090-1231	SC-3431-95-CL-A04
9	O,F,H	Solder Gun Kit	3439-00-930-1638	

REMARKS FOR AIR CONDITIONER:

Table 3. Remarks for Air Conditioner, Compact, Horizontal

REMARKS CODE	REMARKS
A	External at C and O maintenance level.
B	Preventive Maintenance Checks and Services (PMCS).
C	Limited to housing repair (including information plates) and insulation replacement.
D	Repair is limited to replacement of component part at O level maintenance (Housing Covers, Panels, Grills, Screens, Air Filter, Information Plates, Mist Eliminator, Fresh Air Damper Assembly, and Condensate Drain Tube Assembly)
E	Repair is limited to replacement of component part at O level maintenance (Circuit Breakers, Connectors, Time Relay Device, Thermal Boards, Cutout Switches, High Voltage Heater Cutout Switch, Relays, Power Receptacle Connectors, Thermostat Switch, Transformer, Thermostat Electronic Box, Wiring Harness, Evaporator Fan Motor and Heater, Evaporator Fan Assembly, Electrical Heating Elements, Condenser Fan and Motor, Wiring Harness, and Motor Brackets and Chassis).
F	Repair is limited to replacement of defective assembly or component.
G	Test is limited to Evaporator Fan Motor.
H	Test is limited to Temperature Control Thermostat and Mode Selector Switch.
I	Adjust is limited to Remote Control Module, Temperature Control Thermostat, Mode Selector Switch, Louvers, and Fresh Air Damper.
J	Test is limited to Relays, Thermostat Electronic Box, compressor start kit (relay and capacitors) and Wiring Harness.
K	Test is limited to Solenoid Valves and Coils.
L	Repair is limited to replacement of component part at F level maintenance (Compressor (S9150-18K-1), Filter Dryer, Evaporator Coil, Thermal Expansion Valve, Liquid Line Solenoid Valve, Desuperheater Capillary Tube, Charging Valve, Pressure Relief Valve, Condenser Coil, Sight Liquid Indicator, Receiver, Hot Gas By-Pass Valve, Linear Actuator, Tubing and Fittings).
M	Test at O level maintenance is limited to Heating elements, Heater Cutout Switch, Condenser Fan Motor, Circuit Breaker, and Transformer.
N	Test at F level maintenance is limited to compressor.
O	Repair is limited to replacement of Temperature Control Thermostat and Mode Selector Switch
P	IAW maintenance procedure in TM.

END OF WORK PACKAGE

**COMPONENTS OF END ITEM (COEI), AND BASIC ISSUE ITEMS (BII) LISTS
AIR CONDITIONER, COMPACT, HORIZONTAL**

INTRODUCTION

Scope

This work package lists COEI and BII for the air conditioner to help you inventory items for safe and efficient operation of the equipment.

General

The COEI and BII information is divided into the following lists:

Components of End Item (COEI). This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the Air Conditioners S9150-18KH-1 and S9160-18KH-3. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the Air Conditioners S9150-18KH-1 and S9160-18KH-3 in operation, operate it, and do emergency repairs. Although shipped separately packaged, BII must be with the Air Conditioners S9150-18KH-1 and S9160-18KH-3 during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MOE. Illustrations are furnished to help you find and identify the items.

Explanation of Columns in the COEI List and BII List

The following is an explanation of columns found in the tabular listings.

Column (1) - Illus Number. Gives you the number of the item illustrated.

Column (2) - National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (3) - Description, CAGEC, and Part Number. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the CAGEC (commerical and Government entity code) (in parenthesis) and the part number.

Column (4) - Usable on Code. When applicable, gives you a code if the item you need is not the same for different models of equipment. These codes are identified below:

<u>Code</u>	<u>Used On</u>
-------------	----------------

Column (5) - Unit of Issue (U/I). Indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) - Qty Rqr. Indicates the quantity required

COMPONENTS OF END ITEM (COEI) LIST

Table 1. Components of End Item List

<i>(1)</i> <i>ILLUS</i> <i>NUMBER</i>	<i>(2)</i> <i>NATIONAL</i> <i>STOCK</i> <i>NUMBER</i>	<i>(3)</i> <i>DESCRIPTION, CAGEC,</i> <i>AND PART NUMBER</i>	<i>(4)</i> <i>USABLE</i> <i>ON CODE</i>	<i>(5)</i> <i>U/I</i>	<i>(6)</i> <i>QTY</i> <i>RQR</i>
		Connector, Electrical 75-190024-79S (71389)		EA	1

BASIC ISSUE ITEMS (BII) LIST

Table 2. Basic Issue Items List

<i>(1)</i> <i>ILLUS</i> <i>NUMBER</i>	<i>(2)</i> <i>NATIONAL</i> <i>STOCK</i> <i>NUMBER</i>	<i>(3)</i> <i>DESCRIPTION, CAGEC,</i> <i>AND PART NUMBER</i>	<i>(4)</i> <i>USABLE</i> <i>ON CODE</i>	<i>(5)</i> <i>U/I</i>	<i>(6)</i> <i>QTY</i> <i>RQR</i>
		Department of the Army Technical Manual: Operator s, Unit, Direct Support and General Support Maintenance Manual, TM 9-4120-430-14 and Repair Parts and Special Tools List, TM 9-4120-430-24P			

END OF WORK PACKAGE

**EXPENDABLE AND DURABLE ITEMS LIST
AIR CONDITIONER, COMPACT, HORIZONTAL**

INTRODUCTION**Scope**

This work package lists expendable and durable items that you will need to operate and maintain the air conditioner. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-790, Expendable/Durable Items (except medical, class V repair parts, and heraldic items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items list

Column (1) - Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use lubricating oil (Item 25, WP 5230-00)).

Column (2) - Level. This column identifies the lowest level of maintenance that requires the item (C = Operator/Crew).

Column (3) - National Stock Number. This is the NSN assigned to the item which you can use to requisition it.

Column (4) - Item Name, Description, Commercial and Government entity Code (CAGEC), and Part Number. This column provides the other information you need to identify the item.

Column (5) - Unit of Issue (U/M). This code indicates the physical measurement or count of the item as per National Stock Number shown in column (2).

Table 1. Expendable and Durable Items List

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC, PART NUMBER	(5) U/I
1	O		Silicone Adhesive Sealant, RTV, General, Mil-A-46106, Type I	
2	O		Solder, Lead-Tin, QQ-S-571, Type SN60WRP2	
3	F	3040-00-664-0439	Adhesive, General Purpose, 1 pint container	ea
4	F	6830-00-292-0732	Nitrogen	cy
5	F		Brazing Alloy, Silver, QQ-B-654, Grade O, I, or II	
6	F		Brazing Alloy, Silver, QQ-B-654, Grade III	
7	F	3439-00-640-3713	Flux, Brazing, O-F-499, Type B	
8	F	5350-00-192-5047	Abrasive Cloth	pg
9	C,O,F	7920-00-205-1711	Rags	
10	F	6850-00-837-9927	Monochlorodifluoromethane, Technical: w/cylinder 22 lbs. (Refrigerant-22), BB-F-1421, Type 22 (81348)	cy
11	O,F		Tape PPP-T-60, Type IV, Class I	roll
12	F	6830-00-872-5120	Trichloromonofluoromethane, Technical: w/cylinder 50 lbs. (Refrigerant-11), BB-F-1421, Type II (81348)	

Table 1. Expendable and Durable Items List - Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC, PART NUMBER	(5) U/I
13	F	8030-00-889-3534	Tape, Antiseize, Polytetrafluorethylene, MIL-T-22730, Size I	roll
14	O,F		Lubricating Oil, VV-L-825, Type IV	qt
15	O,F	3439-01-045-7940	Flux, Soldering, Liquid Rosin Base, MIL-F-14256	qt
16	O,F	6850-01-331-3349	Dry Cleaning Solvent, P-D-680 Type III (81348)	5 gal.
17	O		Coater, Air Filter, MIL-L-2104 (81348)	
18	O,H		Adhesive, MMM-A-121	qt
19	H		Cellular Rubber Strips, MIL-R-6130, Tyhpe I, Grade A	ft
20	H		Flexible Elestomeric Thermal Insulation (ASTM C 534, Type 2, Sheet)	shts
21	O,F		Solder, Silver, QQ-S-561, Type 3, 4 or 6A	
22	H		Acetone	pt
23	O,F		Insulation, Sheet, Cellular, MIL-I-14511	
24	O,F		Plastic Foam, Unicellular, Sheet Form, MIL-P-15280	
25	O,F		Adhesive, MMM-A-132, Type I, Class I	
26	F		Industrial Sealant 800	
27	O,F		Acid Swab Brush	
28	F	9150-00-985-7316	Grease, General Purpose	
29	O,F,H	4240-01-152-3555	Mask, Air Filtering	pkg

END OF WORK PACKAGE

**SUPPORTING INFORMATION
AIR CONDITIONER, COMPACT, HORIZONTAL
WARRANTY INFORMATION**

GENERAL

This work package describes the manufacturers warranty for the Air Conditioners S9150-18KH-1 and S9160-18KH-3. Environmental Systems, Inc. warrants each air conditioner against defects in material and/or workmanship for the warranty period. The warranty period of the air conditioner is limited to: One (1) year from acceptance only.

EXPLANATION OF

The following terms, applicable to this work package, are explained to help the reader understand the application and extent of the warranty.

1. **Abuse.** The improper use, repair, or handling of warranted items such that the warranty may become void.
2. **Acceptance date.** The date an item of equipment is accepted into the Army inventory by the execution of the acceptance block and signing of a DD Form 250, or approved acceptance document, by an authorized representative of the Government.
3. **Acquiring command or activity.** An activity which procures the items or material for a user.
4. **Alterations/modifications.** Any alteration after production such as retrofit, conversion, remanufacture, design change, engineering change and the like.
5. **Contractor support.** Those services that are to be performed and those responsibilities that are placed upon the contractor by the government as specified in the warranty contract/provisions. This support, which may include such things as labor, parts, tools, training, technical packages, etc., will be used in support of the warranted equipment during the specified warranty period.
6. **Defect.** Any condition or characteristic in any supplies or services furnished by the contractor under the contract that is not in compliance with the requirements of the contract.
7. **Failed item.** A part, component, or end item that fails to perform its intended use.
8. **False return rate.** The return of suspected defective warranty items to the manufacturer that are eventually determined to be serviceable.
9. **Manufacturers recall.**
 - a. **Safety recall.** A manufacturer recalls an item to repair or replace a defective part or assembly which may affect public safety.
 - b. **Service recall.** A manufacturer recalls an item to repair or replace a defective part or assembly which does not affect the use of the item.
10. **Primary damage.** The damage suffered by a part, component, or end item itself upon its failure.
11. **Prime contractor.** A party that enters into an agreement directly with the United States to furnish part or all of a weapon system.
12. **Reimbursement.** A written provision in a warranty contract whereby the user may make the necessary repairs with or without prior approval of the contractor and the Government will be reimbursed for the repair parts and/or labor costs.
13. **Repair.** To restore an item to serviceable condition without affecting the warranty.
14. **Reparable.** An item that may be reconditioned or economically repaired for reuse when it becomes unserviceable.

15. **Secondary damage.** The damage suffered by an item because of a failure of another item within the same configuration.
16. **Serviceable.** The condition of an item which may be new or used that meets all the requirements and performs the functions for which it was originally intended.
17. **Subcontractor.** Any supplier, distributor, vendor or firm that furnishes supplies or service to or for a prime contractor or another subcontractor.
18. **Tailoring.** The process of evaluating individual potential requirements to determine their pertinence and cost effectiveness for a specific system or equipment acquisition, and modifying these requirements to ensure that each contributes to the optimal balance and cost. The tailoring of data requirements shall consist of determining the essentially of potential CDRL items and shall be limited to the exclusion of information requirement provisions.
19. **Turnaround time.** That amount of time that is permitted for an item to be replaced/repared by the contractor/maintenance repair facility and returned to the user. The time is measured from the time the contractor/repair facility receives the request.
20. **Validation.** The process by which the contractor shall test/measure the warranty work package to assure its accuracy as it pertains to the warranty item(s).
21. **Verification.** The process of determining the accuracy and adequacy of the warranty work package provided by the contractor. This process is performed by the Government/user.
22. **WARCO.** Warranty Control Offices established at the intermediate General Support/Director of Industrial Operations Level or equivalent who serve as the intermediary between the troops owning the equipment and the local dealer, contractor, or manufacturer. All warranty claim actions will be processed through the WARCO. If WARCO is not available, contact Logistics Assistance Representative (LAR).
23. **Warranty.** A promise or statement of fact from a seller to a purchaser on the nature, usefulness, or condition of the supplies or performance of services to be furnished. The main purposes of a warranty in a government contract are to outline the rights and obligations of the contractor and the government for defective items and services. It also serves to foster quality performance by the contractor but is not a substitute for an adequate quality assurance program.
24. **Warranty claim.** Action started by the equipment user for authorized warranty repair, replacement, or reimbursement made from the local dealer or manufacturer.
25. **Warranty period.** Time during which the warranty is in effect. Normally measured as the maximum number of years, months, days, miles, or hours used.
26. **Warranty start date.** The date the warranty is put into effect.

COVERAGE SPECIFIC

The specifics of coverage for this warranty are listed in Table 1. This warranty applies to Models S9150-18KH-1 and S9160-18KH-3 air conditioners as defined in TM 9-4120-430-14.

Table 1. Specifics of Coverage

Nomenclature	Air Conditioner, Horizontal, Compact, 18,000 BTU/HR, 230 Volt, Single-Phase, 50/60 Hz Air Conditioner, Horizontal, Compact, 18,000 BTU/HR, 208 Volt, Three-Phase, 50/60 Hz
Line Item Number	
Model Numbers	S9150-18KH-1 and S9160-18KH-3
National Stock Numbers	NSN 4120-01-523-4131 (S9150-18KH-1) NSN 4120-01-523-4472 (S9160-18KH-3)
Manufacturer and Part Number	ENVIRONMENTAL SYSTEMS 4874 VICTOR ST. JACKSONVILLE, FL 32207 (904) 739-1306 Snowsec@aol.com CAGEC: QV5R4
Part Numbers	S9150-18KH-1 S9160-18KH-3
Serial Numbers	See individual air conditioner Data Plate
Contract Number	W15P7T-04-D-A608
Length of Time Coverage	12 months from the date of acceptance for the end item air conditioner.
Type of Coverage	This warranty provides both individual item coverage and Systemic defect coverage as follows for all warranted items: a. Individual Item Coverage: Warranty coverage that requires individual warranty claim actions for each defect. These claim actions will be made only on a warranted item or a component of that item is required to be sent to the contractor for repair or replacement. b. Systemic Defect Coverage: Warranty coverage that provides protection to the lowest level of impact or expense. Requires a contract remedy in accordance with this contract. c. Requirements: Will conform to the design and manufacturing requirements specifically delineated in this contract and any amendment thereto; will be at the time of acceptance, free from all defects in material and workmanship; will conform to all performance requirements delineated in PD 4120-0131 and PD4120-0132 entitled, AIR CONDITIONER, 18,000 BTUH, HORIZONTAL, COMPACT.

CONTRACTOR RESPONSIBILITIES

1. **Replacement parts.** Only new or repaired parts will be used as replacement parts for warranted items.
2. **Cost to Government.** Replacements for warranted items will be furnished at no cost to the Government.
3. **Return Item.** Items covered by this warranty will be shipped within 30 days of receipt of failed item, unless agreement has been obtained from the Government for an alternate period.
4. **Failure to deliver promptly.** If failed parts are not promptly replaced, the contractor will pay costs incurred by the Government in procuring such parts from another source. The Contracting Officer will determine when this applies.
5. **Warranty Performance Report.** The contractor will prepare and furnish a warranty performance report in accordance with Data Item DID DI-MNTY-81217 of the contract as long as this warranty is installed.
6. **Unit Testing.** The contractor will repair, rework or modify all parts reported by the warranty notice, of the air conditioner used during testing to a like new condition. The warranty of those items will start at the time the item is installed.
7. **Warranty Coverage of Replaced or Repaired Items.** Supplies and parts that are replaced or repaired during the warranty period will be covered through the conclusion of the original air conditioner warranty.
8. **Shipping Costs.** The contractor shall be responsible for the cost of transporting warranted items returned for repair/replacement from the contractor repair center back to the Government. Shipment will be made by the same or more expedient means than the incoming mode. The Government will assume risk of loss to the supplies in transit to the contractor s repair facility and the contractor assuming the risk of loss in the return of repaired/replaced items. Items while in the possession of the Contractor shall be governed by the *Government Property* clause, except that loss, damage or destruction of warranted items caused by and occurring during rework, repair or retest shall be the responsibility of the Contractor.

GOVERNMENT RESPONSIBILITIES/IDENTIFICATION

This paragraph will identify the Government s responsibilities as they apply to this warranty contract. The administrative functions relative to assuring that this warranty program is effective is:

1. **Headquarters.** U.S. Army Communications Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS, Fort Monmouth, New Jersey 07703-5000. DSN: 992-3234/5721 or commercial (732) 532-3234/5721. Business hours 0730-1600. A 24-hour Hot Line is available at DSN: 992-1276 or commercial (732) 532-1276.
2. **Removal/Installation Labor.** The Government is responsible for the labor for field removal and reinstallation of components and parts.
3. **Inspection of Equipment.** Only trained or qualified personnel that have knowledge of the equipment and its requirements will inspect the equipment for non-conformance deficiencies.
4. **Documentation of Equipment.** The Government will fully document the cause, if known, and description of each defect. This information will be provided with the returned part.
5. **Packaging of Returned Items.** Returned items will be packaged in proper containers that will prevent shipping damage.
6. **Shipping Costs.** The Government is responsible for shipping costs for all items that are defective through no fault of the contractor.

GOVERNMENT MAINTENANCE

The Government is responsible to perform normal care, servicing and preventive maintenance in accordance with the requirements of TM 9-4120-430-14. See the Maintenance Allocation Chart (MAC) (WP 0067 00) to determine maintenance level that is approved to perform these tasks.

OWNING UNIT RESPONSIBILITIES

The owning unit is responsible to perform the Service Upon Receipt procedures (WP 0014 00). The owning unit is responsible to perform normal care, servicing and preventive maintenance in accordance with the requirements of TM 9-4120-430-14.

WARRANTY CONTROL OFFICE RESPONSIBILITY

The local Warranty Control Office (WARCO) serves as intermediary between troops owning the air conditioners and Environmental Systems, Inc. All warranty claims will be processed through Environmental Systems, Inc. If WARCO not available, contact the Logistics Assistance Representative (LAR).

ALTERATIONS/MODIFICATIONS

Alterations and modifications shall not be made unless expressly authorized or directed by: U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-CCS-G-EC, DSN 992-1716 or 992-4540, commercial (732) 532-1716 or (732) 532-4540.

DESIGN/PERFORMANCE SPECIFICATIONS

1. **Air Conditioner Specification.** See PD 4120-0131 and PD 4120-0132, dated 25 Feb 2004 for specific design, performance and testing requirements.
2. **Routine Testing.** See TM 9-4120-430-14 for routine air conditioner acceptance at point of delivery or testing after service and maintenance.
3. **Testing Personnel Qualifications.** Should testing in accordance with PD 4120-0131 and PD 4120-032 become necessary, it should be done only by qualified, experienced personnel. This type of testing also requires controlled conditions as outlined in the specification. Personnel used for testing in accordance with TM 9-4120-430-14 is governed by the Maintenance Allocation Chart (WP 0067 00).
4. **Warranty Item Label.** (See Figure 1.) See WP 0002 00 for location of warranty label.

WARRANTY ITEM			
NSN	<input style="width: 100%;" type="text"/>		
PIIN	<input style="width: 100%;" type="text"/>		
MFR	<input style="width: 100%;" type="text"/>	SN	<input style="width: 100%;" type="text"/>
TM	<input style="width: 100%;" type="text"/>		
DATE	<input style="width: 100%;" type="text"/>	LIMIT	<input style="width: 100%;" type="text"/>
<input style="width: 100%;" type="text"/>			

Figure 1. Warranty Label

NULLIFICATION

Warranty Void If

This warranty will not apply to supplies or parts that have been subject to:

- Abuse
- Misuse
- Neglect
- Accident
- Items that have been repaired, maintained or altered in any way that has adversely affected their condition
- Combat damage
- Improper use or installation. See TM 9-4120-430-14 for operation and installation instructions.

ABUSE DETERMINATION

When damage to warranted item is not obvious, but suspected to be the result of abuse, the activity responsible for the equipment shall carefully document the nature, extent, probable cause, and estimated time and place of occurrence of the damage. The documented data shall be analyzed and compared to similar cases (if existent) to determine whether the damage was accidental or intentional. Appropriate action shall be taken to prevent recurrence of accidental or intentional abuse through training, added precautionary and/or handling and usage labeling or instruction and personnel disciplinary measures.

CLAIM PROCEDURES

1. **Tag Failed Items.** Failed warranty items will immediately be tagged/identified to prevent improper repair or use.
2. **Tags and Forms:**
 - DA Form 2402-Exchange Tag
 - DA Form 2407-Maintenance
 - DA Form 5504-Maintenance Request Form
3. Refer to DA Pam 750-8 for claim procedure instructions. A 24-hour Hot Line is available at DSN: 992-1276 or commercial (732) 532-1276.

DISPOSITION

The following items will depict the handling, repair and evacuation of failed warranty items.

1. **False Returns.** In the event that it is determined that a failure was not subject to the guarantees described in this work package, Environmental Systems, Inc. will be reimbursed for any and all expenses incurred by the Warranty Claim Action (WCA).

The submitting Government Unit may be penalized in one or all of the following ways:

- Cost of item
 - Loss of time
 - Non-availability of air conditioner
2. **Monitoring False Returns.** False returns will be monitored by the responsible activity, usually the commodity command.
 3. **Receipts/Verification of Contractor Repairs.** Upon receipt of a warranty item, Environmental Systems, Inc. shall inspect and verify the problem areas defined by the warranty service notification and make disposition to their accuracy and will advise the cognizant Army representative of the findings upon receipt and inspection.

SPECIAL AREA OF REQUIREMENTS

When limitations exist and adjustments or changes are required at different commands, theaters, or locations; these conditions shall be identified. When the list of these exceptional conditions is extensive, it shall appear in the Warranty Program appendix and referenced in the text.

REIMBURSEMENT FOR ARMY REPAIR

When it has been determined that the Army has made the necessary repairs and/or rework of a warranted item, authorization to perform these repairs and/or reworks must first be defined and accepted by Environmental Systems, Inc. and said repair must be advised in writing with an actual cost purchase order authorization to the Army Warranty Control Office. When the repair has been authorized and accomplished, reimbursement by Environmental Systems, Inc. will be done by an actual Army invoice submitted for payment.

CLAIM DENIALS/DISPUTES

It is understood that there will occur from time to time claim denial or disputes occurring from a warranty item claim. When such a dispute occurs, the disputes clause of the base contract will be used to accomplish a resolution.

REPORTING

Reporting or recording action on a failed item shall be on DA Forms 2407/5504 following Army standard procedures as defined in DA Pam 750-8. Contractor unique forms will not be used.

STORAGE/SHIPMENT/HANDLING

See TM 9-4120-430-14 for storage and packaging information pertaining to the total air conditioner.

1. **Component Packaging.** Individual components must be carefully packaged in appropriate containers that will prevent damage during shipment or storage.
2. **Shipment.** Shipment of failed warranty items shall not be made without direct authority from the supporting warranty control office. Notify WARCO. If local WARCO not available, contact your local LAR.
3. **Handling.** When special handling of warranty items is necessary because potential hazards exist or damage may be caused to the items or other items/equipment when improperly handled, instructions shall be provided.

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 10 July 1975

PUBLICATION NUMBER TM 11-5840-340-20	PUBLICATION DATE 23 Jan 74	PUBLICATION TITLE Radar Set AN/PRC-76
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BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO	PARA GRAPH	FIGURE NO	TABLE NO	
2-25	2-28			<p>Recommend that the installation antenna alignment procedure be changed throughout to specify a 20 IFF antenna lag rather than 10.</p> <p>REASON: Experience has shown that with only a 10 lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 20 without degradation of operation.</p>
3-10	3-3		3-1	<p>Item 5, Functional column. Change 2 dB" to 3 dB".</p> <p>REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 dB (500 watts) adjustment to light the TRANS POWER FAULT indicator.</p>
5-6	5-8			<p>Add new step f.1 to read, "Replace cover plate removed in step f.1, above."</p> <p>REASON: To replace the cover plate.</p>
		FO-3		<p>Zone C 3. On J1-2, change +24 VDC" to +5 VDC".</p> <p>REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.</p>

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PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:



SANDRA R. RILEY
Administrative Assistant to the
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