ARMY TM 9-4120-431-14
AIR FORCE TO 35E9-9-55

TECHNICAL MANUAL

OPERATOR, FIELD, AND SUSTAINMENT MAINTENANCE MANUAL

FOR

60K BTU/HR
IMPROVED ENVIRONMENTAL CONTROL UNIT (IECU)

MODEL 60K IECU

NSN 4120-01-543-0741

(EIC XXX)

DRS Sustainment Systems, Inc.

W909MY-06-C-0032

HEADQUARTERS, DEPARTMENT OF THE ARMY
01 JULY 2008

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 material icons used within the technical manual.

FIRST AID

For first aid, refer to FM 4-25.11.

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

FOR ARTIFICIAL RESPIRATION, REFER TO FM 4-25.11.

WARNING SUMMARY (Continued)

SAFETY AND HAZARDOUS MATERIAL

This manual describes physical and chemical processes that may require the use of chemicals, solvents, paints, or other commercially available material. Users of the manual should obtain the material safety data sheets (Occupational Safety and Health Act (OSHA) Form 20 or equivalent) from the manufacturers or suppliers of materials to be used. Users must be completely familiar with manufacturer/supplier information and adhere to their procedures, recommendations, warnings, and cautions for safe use, handling, storage, and disposal of these materials.

EXPLANATION OF SAFETY WARNING ICONS

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

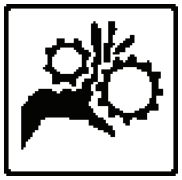
HOT AREA - hand over object radiating heat shows that part or area is hot and can burn.

EAR PROTECTION - headphones over ears shows that noise level will harm ears.

HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique or failure to share lifting task with other persons.

HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm if dropped.

HEAVY PARTS - foot with heavy object on top shows that heavy parts can crush and harm if dropped



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

SHARP OBJECT - pointed object in hand shows that a sharp object presents a danger to limb.

HEAVY OBJECT - falling object shows that a heavy item can fall and crush.

EXPLOSION - flame and burst shows that material can explode if subjected to high temperatures, sources of ignition, or high pressure.

EYE PROTECTION - human figure with goggles shows that material can injure eyes.

CRYOGENIC - hand in block of ice shows that the material is extremely cold and can injure human skin or tissue.

WARNING SUMMARY (Continued)

GENERAL SAFETY WARNINGS DESCRIPTION

WARNING

Metal jewelry will conduct electricity. Remove all jewelry when working on equipment. Failure to comply can cause injury or death to personnel by electrocution.

WARNING

High voltage and rotating parts are present when Improved Environmental Control Unit is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

WARNING

Never attempt to start or maintain the equipment unless it is properly grounded. Failure to comply can cause injury or death to personnel.

WARNING

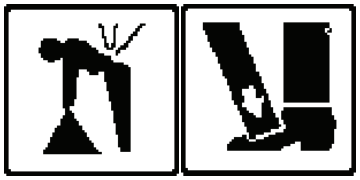
Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Allow to cool before performing preventive maintenance, checks, and services. Wear additional protective clothing as required. Failure to comply can cause injury to personnel.

WARNING

Allow heaters to cool for at least five minutes before touching. Severe burns can result from touching hot heaters.

WARNING SUMMARY (Continued)

GENERAL SAFETY WARNINGS DESCRIPTION – CONTINUED



WARNING

Avoid injury by using adequate equipment and personnel to remove compressor (weight 90 pounds) from frame. Three-person lift is required.

WARNING

Components can be extremely heavy and require an assistant and/or a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply can cause serious injury or death to personnel.

WARNING

Do not operate the equipment without all grilles, guards, louvers, and covers in place and secure.

WARNING

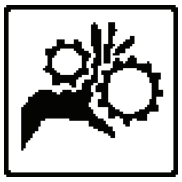
The IECU top cover is heavy. Two-person lift is required. Be sure the cover retaining rod is in position and correctly secure. Failure to secure rod can result in injury to personnel.

WARNING SUMMARY (Continued)

GENERAL SAFETY WARNINGS DESCRIPTION – CONTINUED

WARNING

Condenser fan assembly and evaporator blower are heavy (weight greater than 40 pounds) and awkward to handle. Removal will require at least two people. Failure to comply can cause serious injury to personnel.



WARNING

DO NOT wear loose clothing when performing checks, services, and maintenance. Failure to comply can cause injury or death to personnel.

WARNING

When handling coils or fan blades, wear gloves to avoid cuts and reduce fin damage on the coil.

WARNING

Do not allow anyone under equipment suspended from a lifting device. Do not allow the unit to swing while suspended from a lifting device. Lack of attention or being in an improper position during lifting operations can result in serious injury or death to personnel and damage to the equipment.

WARNING SUMMARY (Continued)

WARNING

During lifting operations, the mechanics must be visible to the lifting device operator and in a position to physically guide the Environmental Control Unit as it is lifted into position.

HAZARDOUS WARNINGS DESCRIPTION-

WARNING

FLAMMABLE solvents and cleaning materials are used in the cleaning and maintenance of this equipment. Do not use flammables in areas where open flame or other ignition sources are present. Be sure that adequate ventilation is provided. Avoid inhalation of flammable liquids. Properly dispose of rags and other materials contaminated with flammable liquids. Have flame extinguishing equipment readily available when using flammable materials.

WARNING

Be sure the refrigeration system is fully discharged and purged and that dry nitrogen is flowing through the system at the rate of less than1–2cfm (0.028–0.057cubicmeters/minute)before all brazing or debrazing operations.

WARNING

REFRIGERANT R-410A UNDER PRESSURE is used in the operation of this equipment. Never use a heating torch on any part that contains Refrigerant R-410A. Heat may cause refrigerant to decompose and release irritating, toxic, and corrosive gases. All refrigerant must be removed and recovered from system and entire system must be purged with dry nitrogen before beginning any brazing operation. DEATH or severe injury may result if you fail to observe safety precautions.

WARNING

Exposure of Refrigerant R-410A to an open flame or a very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly toxic and corrosive gas. In its natural state, Refrigerant R-410A is a colorless odorless vapor with no toxic characteristics. It is lighter than air and in a well-ventilated area will disperse rapidly. Suffocation is possible in unventilated areas. Failure to observe safety precautions may result in personnel injury or DEATH.

WARNING SUMMARY (Continued)

HAZARDOUS WARNINGS DESCRIPTION-

WARNING

Dry cleaning solvent is flammable, and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well-ventilated area, and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.

WARNING

The IECU contains R-410A refrigerant gas. The equipment may ONLY be serviced by qualified personnel. The gas shall be recaptured, and recycled or disposed of through the local servicing Defense Reutilization and Marketing Office. This action should be coordinated with the local Installation Environmental Office/Officer.

WARNING

Nitrogen cylinders are pressurized containers. The pressure in the cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times when nitrogen is used for leak check or purge operations. Nitrogen is an inert gas. However, it also presents danger as a suffocation hazard and, therefore, must be discharged in a ventilated location. Failure to observe this safety precaution may result in injury or death to personnel.

WARNING

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

WARNING

Do not attempt any disassembly of the solenoid valve other than coil removal with a Refrigerant R-410A charge in the system. Failure to observe safety precautions can result in injury or death to personnel.

WARNING SUMMARY (Continued)

HAZARDOUS WARNINGS DESCRIPTION-

WARNING

Rivets can shatter during removal or installation and cause serious personal injury or death.

WARNING

In extreme cold weather, skin can stick to metal. Avoid contacting metal items with bare skin in extreme cold weather. Failure to comply can cause injury or death to personnel.

WARNING

Dangerous chemicals are used in this equipment. Great care must be exercised to prevent contact of liquid Refrigerant R-410A, or Refrigerant R-410A gas discharged under pressure, with any part of the body. The extremely low temperature resulting from the rapid expansion of liquid Refrigerant R-410A, or Refrigerant R-410A gas released under pressure, can cause sudden and irreversible tissue damage through freezing. As a minimum, all personnel must wear thermal protective gloves and a face shield or goggles when working in any situation where Refrigerant R-410A contact with the skin or eyes is possible. Application of excessive heat to any component in a charged system will cause extreme pressure that may result in a rupture, possibly explosive in nature. DEATH or serious injury may result if personnel fail to observe proper safety precautions.

CAUTION SUMMARY

CAUTION

Do not operate the Improved Environmental Control Unit in the COOL mode if the refrigerant color has reached the yellow band or if numerous bubbles appear in the sight glass. COOL mode operation may be continued with the refrigerant color in the chartreuse band or with only an occasional bubble appearing in the window, but the sight glass should be rechecked after each four hours of operation to ensure that the condition has not become worse.

CAUTION

Turn the IECU to OFF as soon as a definite drop in temperature is felt on the suction return line. If the test conditions are continued more than few seconds, the thermostatic valve will fully open and an excessive flood-back of liquid Refrigerant R-410A may damage or destroy the compressor.

CAUTION

Failure to remove drain plugs will cause water to collect in the bottom of the evaporator section assembly and possible spillage into shelter.

CAUTION

Follow instructions for specific refrigerant recovery unit being used to avoid compressor oil loss. Loss of oil could result in compressor damage.

CAUTION

If the soap solution testing method is used, thoroughly rinse with fresh water after testing is completed. A residual soap film will attract and accumulate an excessive amount of dust and dirt during operation.

CAUTION

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

CAUTION SUMMARY (Continued)

CAUTION

Do not permit the oil to escape from the unit. If oil is escaping, close the valve(s) slightly. Do not permit the refrigerant to escape fast enough to form ice or frost on either the lines or the valve.

CAUTION

The compressor is supplied with a complete charge of oil. Take care that oil is not lost when handling and installing compressor.

CAUTION

New dehydrators 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 dehydrator from which caps have been removed for an extended or unknown period of time.

CAUTION

Excessive dust can cause damage to IECU equipment. Make sure there is a good distance between personnel and IECU when shaking air filter.

CAUTION

Expansion valve is very delicate. Make sure all gaskets remain in position, and valve cage assembly is correctly aligned. Failure to observe caution could result in equipment damage.

CAUTION

Use care when installing the transformer leads to make sure that 208 VAC leads are connected to terminals X1 and X2 on primary side of transformer. Damage to equipment will result if high voltage lines are connected to secondary terminals.

CAUTION

Use caution when opening remote box cover as they are connected internally by wiring. The cover will not completely remove and could damage wiring by trying to remove it entirely.

CAUTION SUMMARY (Continued)

CAUTION

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. Brazing a joint without nitrogen flowing through the tubing, will cause deposits to form on inside of a tube and may cause obstructions in refrigeration system or equipment damage.

CAUTION

Never introduce high discharge pressure into a refrigerant tank. This can cause the tank to rupture and may cause injury to personnel or damage equipment.

CAUTION

Take extra precaution when raising or lowering compressor as to not damage surrounding tubing or components.

CAUTION

The filter-drier is direction sensitive and must be installed correctly to prevent damage to unit or improper operation. Prior to removal, note the directional arrow on the filter.

CAUTION

The expansion valve can be damaged by high heat. Be sure to wrap valve body with wet rags as instructed to avoid damage to internal components when brazing.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: Zero in the "Change No." column indicates an original page or work package.

Dates of issue for original manual is:

Original 01 July 2008

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 32 AND TOTAL NUMBER OF WORK PACKAGES IS 75, CONSISTING OF THE FOLLOWING:

Page/WP No.	Change No	Page/WP No.	Change No
Cover-1	0	WP 0024 (2 pgs)	0
Cover-2 Blank	0	WP 0025 (4 pgs)	0
Warning Summary (14 pgs)	0	WP 0026 (2 pgs)	0
A	0	WP 0027 (2 pgs)	0
B	0	WP 0028 (2 pgs)	0
i-xii (12 pages)	0	WP 0029 (4 pgs)	0
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WP 0001 (4 pgs)	0	WP 0032 (2 pgs)	0
WP 0002 (14 pgs)	0	WP 0033 (4 pgs)	0
WP 0003 (4 pgs)	0	WP 0034 (4 pgs)	0
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WP 0009 (2 pgs)	0	WP 0044 (2 pgs)	0
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WP 0021 (4 pgs)	0	WP 0060 (4 pgs)	0
WP 0022 (4 pgs)	0	WP 0061 (4 pgs)	0
WP 0023 (4 pgs)	0	WP 0062 (2 pgs)	0

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WP 0066 (6 pgs)	0
WP 0067 (6 pgs)	0
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WP 0073 (2 pgs)	0
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FP 3 (2 pgs)	0
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Rear Cover -4 - blank	0

ARMY TM 9-4120-431-14
AF TO 35E9-9-55

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 01 JULY 2008

TECHNICAL MANUAL
OPERATOR, FIELD, AND SUSTAINMENT MAINTENANCE MANUAL
60K BTU/HR
IMPROVED ENVIRONMENTAL CONTROL UNIT (IECU)
MODEL 60K IECU
NSN 4120-01-543-0741
(EIC XXX)

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. Reports, as applicable by the requiring Service, should be submitted as follows:

(A) Army - Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual, directly to: Commander, U.S. Army CECOM Life Cycle Management Command (LCMC) and Fort Monmouth, ATTN: AMSEL-LC-LEO-E-ED, Fort Monmouth, NJ 07703-5006. You may also send in your recommended changes via electronic mail or by fax. Our fax number is 732-532-1556, DSN 992-1556. Our e-mail address is MONM-AMSELLEOPUBSCHG@conus.army.mil. Our online web address for entering and submitting DA Form 2028s is http://edm.monmouth.army.mil/pubs/2028.html.

(F) Air Force - By Air Force AFTO Form 22 (Technical Manual (TM) Change Recommendation and Reply) in accordance with paragraph 6-5, Section VI, TO 00-5-1 directly to prime ALC/MST.

A reply will be furnished to you.

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HOW TO USE THIS MANUAL

This manual is divided into Work Packages (WP). Each WP is an independent, task-oriented unit. Only essential information is provided. WPs cover the subjects of theory of operation, operating instructions, troubleshooting, preventative maintenance checks, and maintenance instructions. The Table of Contents provides a complete list of chapters and WPs. The WPs are arranged in disassembly sequence. Each maintenance WP lists the tasks covered, initial set-up requirements, tools required, equipment conditions, reference materials and material/parts required. Maintenance procedures are integrated with illustrations.

To locate information, refer to the Table of Contents in the front of the TM. References to paragraphs, tables, or figures within a WP are made by numbers, e.g. paragraph 7, Table 2, or Figure 3. A reference to another WP merely includes the WP number, e.g. WP 0003. To find a particular procedure or topic, it is necessary to refer to that WP.

To find a particular part for replacement, it will be necessary to use the Repair Parts and Special Tools List (RPSTL), TM 9-4120-431-24P (also known as the Illustrated Parts Breakdown). Detailed instructions for use of the RPSTL are found in TM 9-4120-431-24P.

GENERAL

In order to use this manual efficiently, there are several things you need to know.

All references in this manual are to work packages or to another manual.

Throughout this manual, text is keyed to illustrations by numbered callouts. When an item is called out in a procedure, a number in parentheses in the text corresponds with a number on the illustration.

INDEXES

This manual is organized to help you quickly find the information needed. There are useful indexes or lists:

Table of Contents. The Table of Contents lists, in the order of presentation, all chapters and Work Packages contained in this manual.

Troubleshooting Symptom Index. The Troubleshooting Symptom Index lists parts of the IECU and possible malfunctions with references to the corrective action.

Component of End Item (COEI): List of items that are part of the end item, but are shipped separately. It is not an authorization to requisition replacements.

Basic Issue Items (BII): List of minimum essential items required when system is in operation, and to perform emergency repairs. This manual is your authorization to request/replace BII.

CHAPTER 1
GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

OPERATOR, FIELD, AND SUSTAINMENT MAINTENANCE
60K BTU/HR IECU
GENERAL INFORMATION

SCOPE

Type of Manual. Operator, Field, and Sustainment Maintenance Manual

Model Number and Equipment Name. 60K Improved Environmental Control Unit (IECU)

Purpose of Equipment. The 60K IECU is used to cool, dehumidify, heat and filter circulating air in tents and shelters to meet equipment and personnel requirements. The 60K IECU is intended for use in worldwide military deployments.

The 60K BTU/hr IECU, Figure 1, is self-contained in a single cabinet that is ideally suited for tent or shelter type installations. The only external requirements are a source of 208 VAC, 3-phase, 50/60 hertz electrical power, a suitable level site, and an entry to a suitable wastewater drain up to 15 feet away. The drain must be lower than the base of the cabinet, in its operating location, to allow for disposal of condensate water. It is designed to operate in almost any environmental condition from arctic to tropic and is fully portable for movement from one location to another.

Each IECU has the capability of providing cooling or heating. The nominal cooling capacity is 60,000 BTU/hr. The nominal heating capacity is 33,780 BTU/hr. The IECU is designed to automatically maintain the air in the room or enclosure at the desired temperature selected on the remote box assembly.

The IECU is designed to circulate, filter, and cool or heat air in the room or enclosure to which it is attached by flexible ducts. The IECU features a variable frequency compressor motor drive to limit in-rush current. The IECU is designed for self-contained operation in biological and chemical warfare environments.

Figure 1. 60K BTU/Hr IECU

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, Functional Users Manual for the Army Maintenance Management System (TAMMS).

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your IECU 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. If you have Internet access, the easiest and fastest way to report problems or suggestions is to go to https://aeps.ria.army.mil/aepspublic.cfm (scroll down and choose the “Submit Quality Deficiency Report” bar). The Internet form lets you choose to submit an Equipment Improvement Recommendation (EIR), a Product Quality Deficiency Report (PQDR) or a Warranty Claim Action (WCA). You may also submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 via e-mail, regular mail, or facsimile using the addresses/facsimile numbers specified in DA PAM 750-8, Functional Users Manual for the Army Maintenance Management System (TAMMS). 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.

Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

SF Form 368, Product Quality Deficiency Report 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 air conditioner uses the environmentally friendly refrigerant, R410A. R410A refrigerant contains zero Ozone Depletion Potential (ODP).

DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

For destruction of material to prevent enemy use, refer to TM 750-244-7.

PREPARATION FOR MOVEMENT

Procedures to prepare the IECU for movement are contained in WP 0005.

WARRANTY INFORMATION

The 60K BTU/Hr IECU is warranted for one (1) year. The warranty starts on the date found in block 23 of DA Form 2408-9, Equipment Control Record. Report all defects to your supervisor, who will take appropriate action.

LIST OF ACRONYMS/ABBREVIATIONS

ABBREVIATION OR ACRONYM	DEFINITION
AC	Alternating Current
BII	Basic Issue Items
BTU	British Thermal Unit
C	Celsius
CB	Circuit Breaker
CD	compact disk
CFM	cubic feet per minute
CG	center-of-gravity
COEI	Component Of End Item
CPC	Corrosion Prevention Control
DA	Department of the Army
dBA	A-weighted decibel(s)
DC	Direct Current
Deg	Degrees
DIN	Deutsches Institut für Normung (German Standards Institute)
DOT	Department of Transportation
EIR	Equipment Improvement Recommendation
EMI	Electromagnetic Interference
EPA	Environmental Protection Agency
EPM	Electronic Programmable Memory
F	Fahrenheit
FM	Field Manual
Hg	mercury
HPCO	High Pressure Cutout
Hr	Hour
Hz	Hertz
IECU	Improved Environmental Control Unit
kg	kilogram
kg/cm²	kilogram per square centimeter
kPa	kilopascal
kW	kilowatts
lbs	pounds
LPCO	Low Pressure Cutout
MAC	Maintenance Allocation Chart
NBC	Nuclear/Biological/Chemical
NSN	National Stock Number
ODP	Ozone Depletion Potential
ODS	Ozone Depleting Substance
OEM	Original Equipment Manufacturer
OL	Open Line
OSHA	Occupational Health and Safety Act
PMCS	Preventive Maintenance Checks and Services

ABBREVIATION OR ACRONYM	DEFINITION
PQDR	Product Quality Deficiency Report
psi	pounds per square inch
psig	pounds per square inch gauge
REF	Reference
RMS	Root Mean Square
RPSTL	Repair Parts and Special Tools List
RTV	Room Temperature Vulcanizing
SCFM	standard cubic feet per minute
TAMMS	The Army Maintenance Management System
TC	Temperature Controller
THD	Total Harmonic Distortion
TM	Technical Manual
TO	Technical Order
V	Volts
VAC	Volts Alternating Current
VDC	Volts Direct Current
VFD	Variable Frequency Drive
WCA	Warranty Claim Action
WP	Work Package

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this manual. If qualities of material requirements are not stated in this manual, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

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

Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 9-4120-431-24P.

END OF WORK PACKAGE

OPERATOR, FIELD, AND SUSTAINMENT MAINTENANCE
60K BTU/HR IECU
EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

Mechanical System

The IECU (Figure 1) is made up of two major sections – a condenser section and an evaporator section. The condenser section (Figure 2) contains the two condenser coils, the condenser fan and operator interface controls and components. Operator controls and components consist of a remote box containing a mode selector switch and temperature control, high pressure cutout reset button, refrigerant liquid sight indicator (sight glass), circuit breaker, and service connections. The condenser section has an open interior that houses an electrical enclosure. When the IECU is configured for shipment or storage, the open interior provides an area for storing the flexible ducts, air filter, power cable, remote box/cable, and condensate drain hose.

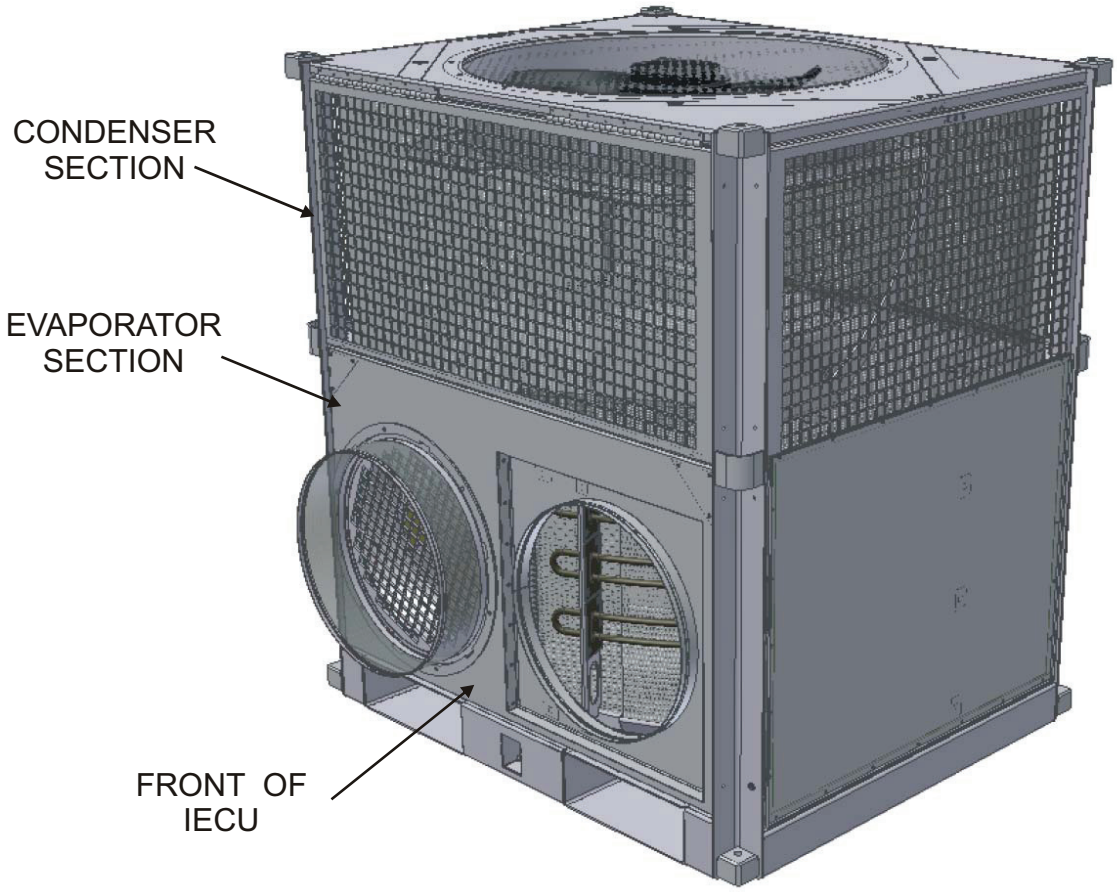


Figure 1. 60K BTU/Hr Improved Environmental Control Unit (IECU)

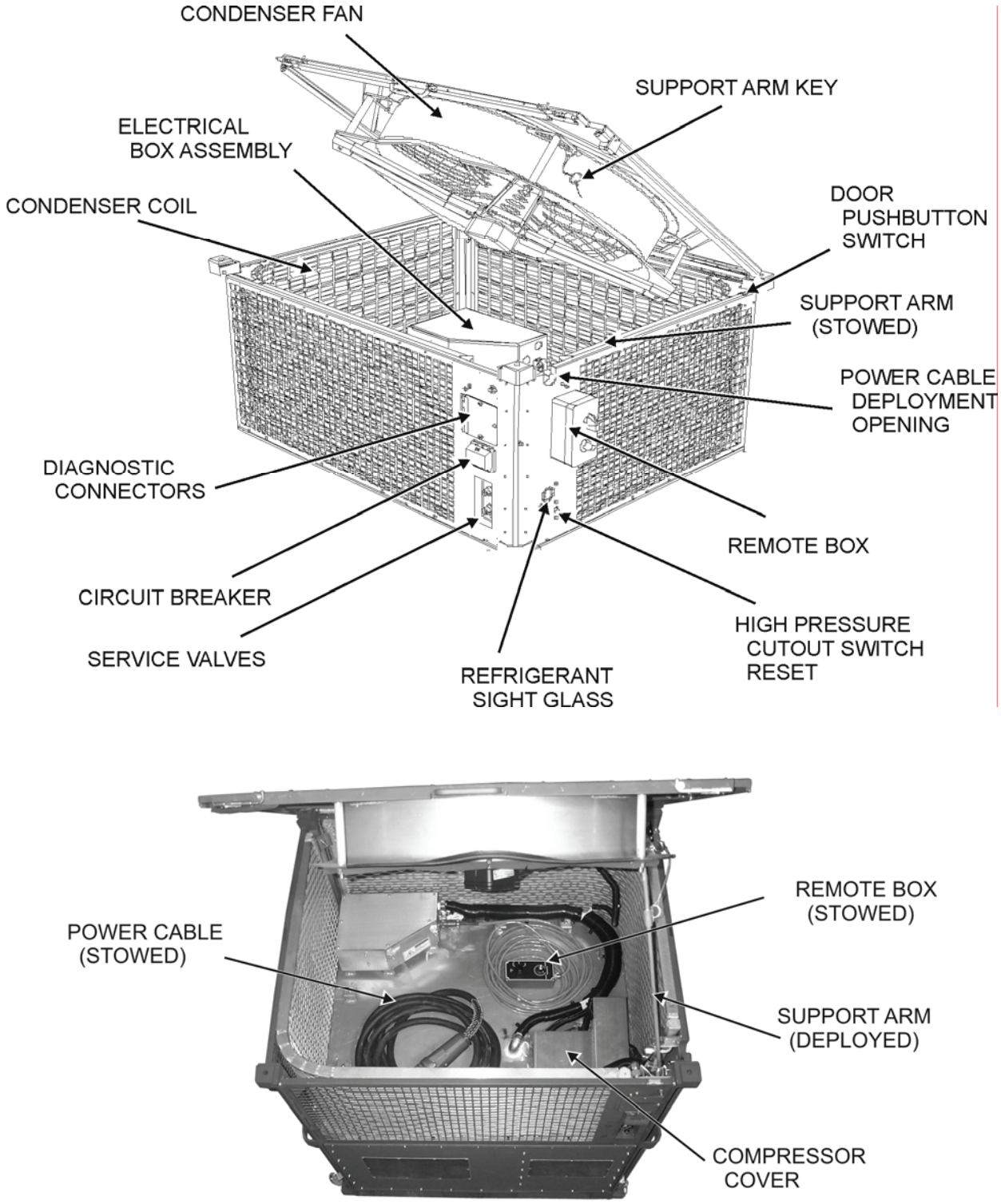


Figure 2. IECU Condenser Section

The evaporator section, Figure 3, of the IECU consists of two areas, the compressor compartment and the conditioned air section. Locating the compressor in the evaporator section of the unit provides the IECU with a low center of gravity. Components found in the compressor compartment consist of the compressor, High Pressure Cutout (HPCO) switch, Low Pressure Cutout (LPCO) switch, condenser fan pressure switch, filter-drier, and fusible plug. The conditioned air section is in a separate sealed, insulated compartment. The conditioned air section contains the evaporator coil, evaporator blower, shielded enclosure assembly (EMI/THD), electric heaters, thermostatic expansion valve, two high temperature cutout switches, and condensate drain pan.

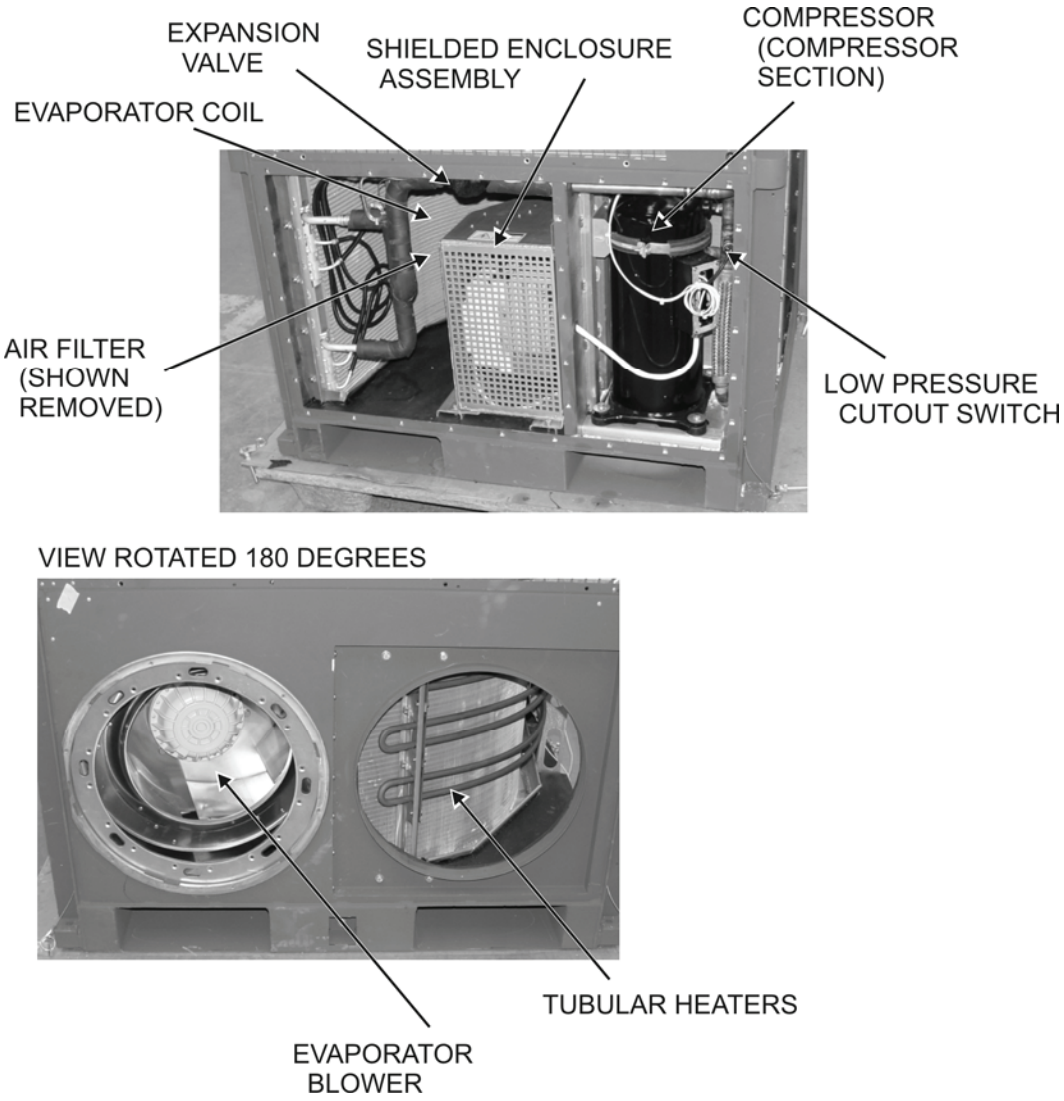


Figure 3. IECU Evaporator Section

Refrigeration System

The refrigeration system is a traditional vapor-compression refrigeration cycle. Refrigeration components for the IECU consist primarily of a refrigerant vapor compressor, refrigerant condenser, refrigerant throttling/expansion device, refrigerant evaporator, and associated components.

Electrical System

The IECU operates using 208 VAC, 3-phase electrical input power at either 60 Hz or 50 Hz. The IECU has a current load of 32 amps root mean square (RMS) maximum. The IECU utilizes a variable frequency drive (VFD) for

automatic starting in order to limit inrush current caused by motor starting. The VFD automatic starting feature will not allow inrush current to exceed 35.8 Amps.

The IECU uses electromechanical controls that provide simple maintenance and troubleshooting of the unit. Modularized electronic circuitry allows rapid fault isolation and replacement of faulty components.

A remote box assembly provides the operator with the capability to select mode of operation (COOL, VENT, OFF, or HEAT), as well as capability to adjust (WARMER or COOLER) output of the unit to desired temperature. A step-down transformer allows the remote box assembly to operate on 24 VAC low power.

The IECU uses electronic circuitry to improve overall performance of the air conditioner. The use of electronic circuitry requires a shielded enclosure assembly (EMI/THD) system to minimize the effects. Various IECU components are utilized to achieve this effect. The VFD is used to eliminate current inrush that would otherwise occur during the start-up of the compressor. Additional components of the IECU that contribute to this system include a harmonic filter, feed-thru capacitors, EMI filters, and EMI shielding devices, shielding enclosure, electrical connectors with built in filtering, and filtered terminal blocks.

The IECU embedded diagnostics system consists of two diagnostic connectors (J5, J6), temperature sensors, pressure and temperature switches, and auxiliary relay contacts. The diagnostic connectors provide the capability of obtaining real-time data measurements using a standard multimeter. Additional diagnostic capability for the compressor is provided through built-in diagnostics available from the VFD powering the compressor.

The unit is designed for use while exposed to the environment and will operate with filter blower overpressure systems developed for use in Nuclear/Biological/Chemical (NBC) environments.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Information Plates

Each unit is equipped with information plates, labels, and safety markings appropriate for the safe and effective operation and maintenance of the unit. Each 60K IECU has an identification plate (Figure 4) plate located on the front of the unit above the return and supply air openings. The plate contains National Stock Number (NSN), Serial Number, Part Number, Model Number, and other identifying information.

Each IECU has a refrigeration system schematic plate (Figure 5, Item 1), electrical schematic plate (Figure 5, Item 2), and a wiring diagram plate (Figure 5, Item 3) attached to the outside of the unit for reference. The plates display component identifying nomenclature corresponding to the markings on all items. The refrigeration system schematic plate is shown in Figure 6. The electrical schematic plate is shown in Figure 7. The wiring diagram plate is shown in Figure 8. Illustrations of the wiring diagram, electrical schematic, and refrigeration schematic can be found in WP 0063.

Figure 4. Identification Plate

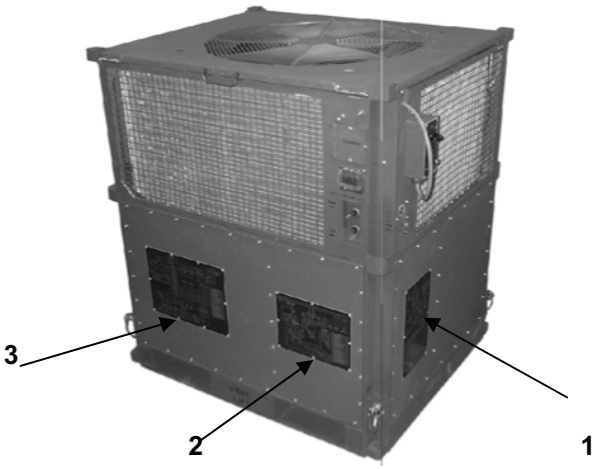
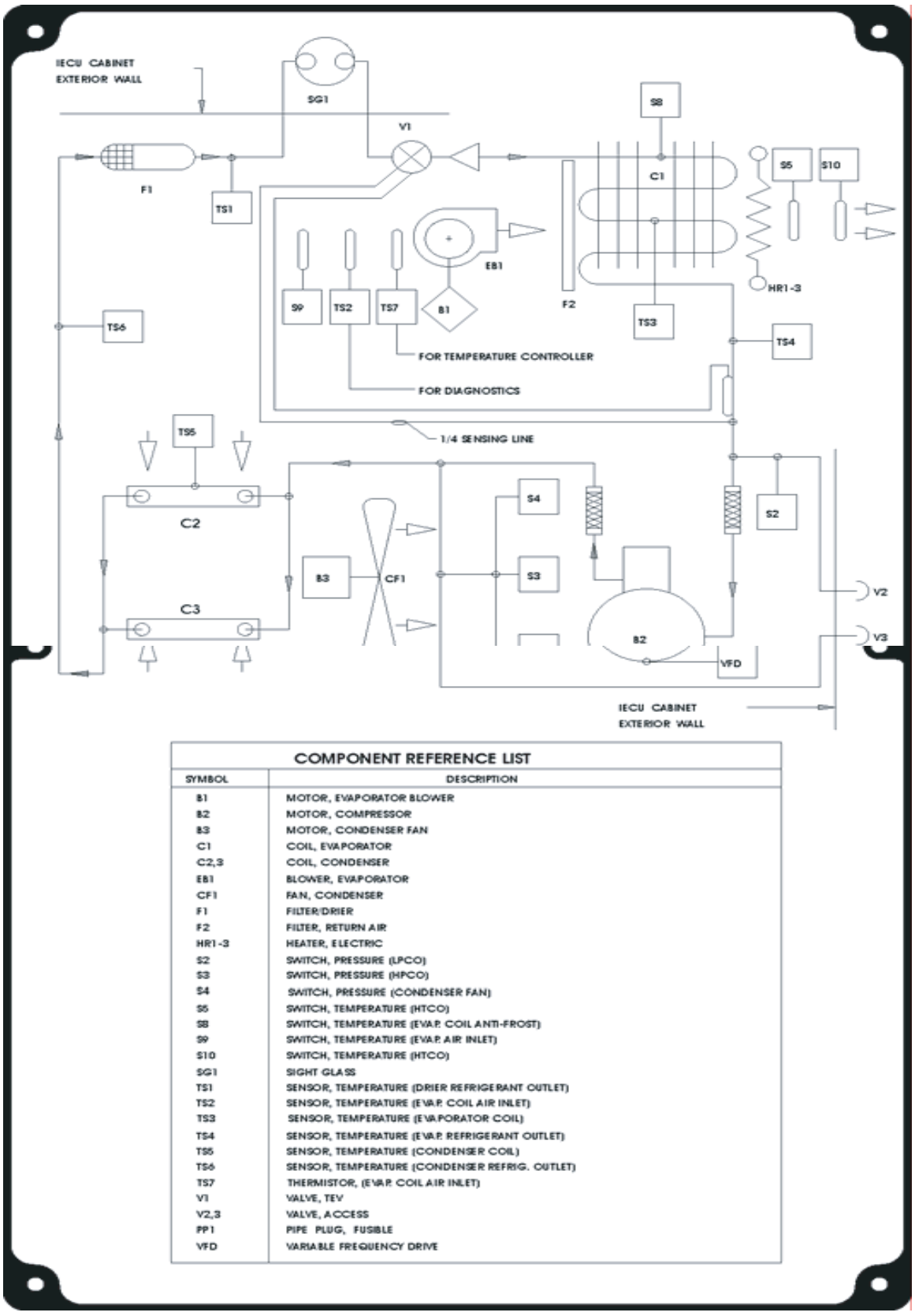


Figure 5. Information Plate Locations



COMPONENT REFERENCE LIST

SYMBOL	DESCRIPTION
B1	MOTOR, EVAPORATOR BLOWER
B2	MOTOR, COMPRESSOR
B3	MOTOR, CONDENSER FAN
C1	COIL, EVAPORATOR
C2,3	COIL, CONDENSER
EB1	BLOWER, EVAPORATOR
CF1	FAN, CONDENSER
F1	FILTER/DRIER
F2	FILTER, RETURN AIR
HR1-3	HEATER, ELECTRIC
S2	SWITCH, PRESSURE (LPCO)
S3	SWITCH, PRESSURE (HPCO)
S4	SWITCH, PRESSURE (CONDENSER FAN)
S5	SWITCH, TEMPERATURE (HTCO)
S8	SWITCH, TEMPERATURE (EVAP. COIL ANTI-FROST)
S9	SWITCH, TEMPERATURE (EVAP. AIR INLET)
S10	SWITCH, TEMPERATURE (HTCO)
SG1	SIGHT GLASS
TS1	SENSOR, TEMPERATURE (DRIER REFRIGERANT OUTLET)
TS2	SENSOR, TEMPERATURE (EVAP. COIL AIR INLET)
TS3	SENSOR, TEMPERATURE (EVAPORATOR COIL)
TS4	SENSOR, TEMPERATURE (EVAP. REFRIGERANT OUTLET)
TS5	SENSOR, TEMPERATURE (CONDENSER COIL)
TS6	SENSOR, TEMPERATURE (CONDENSER REFRIG. OUTLET)
TS7	THERMISTOR, (EVAP. COIL AIR INLET)
V1	VALVE, TEV
V2,3	VALVE, ACCESS
PP1	PIPE PLUG, FUSIBLE
VFD	VARIABLE FREQUENCY DRIVE

Figure 6. Refrigeration Scematic Plate

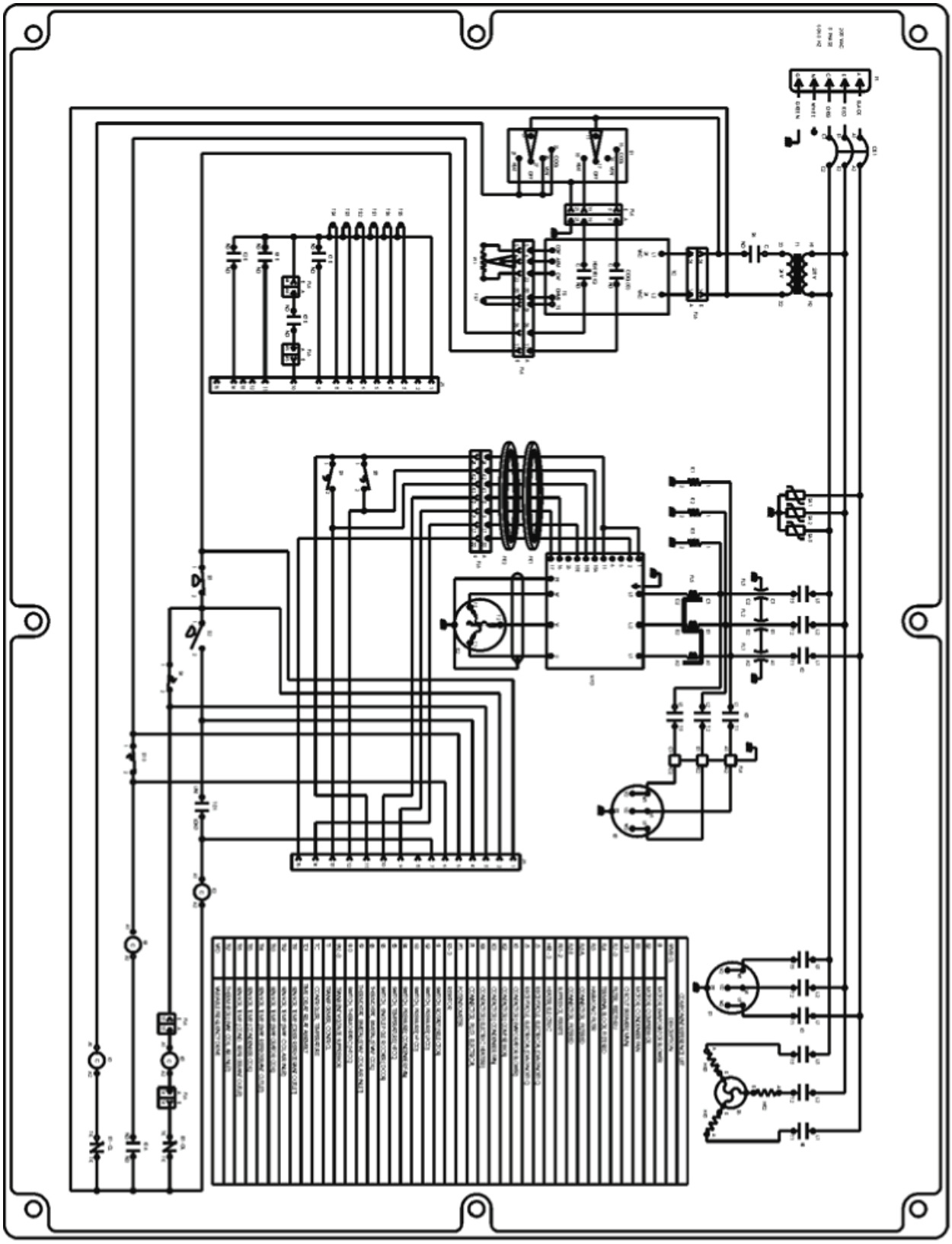


Figure 7. Electrical Schematic Plate

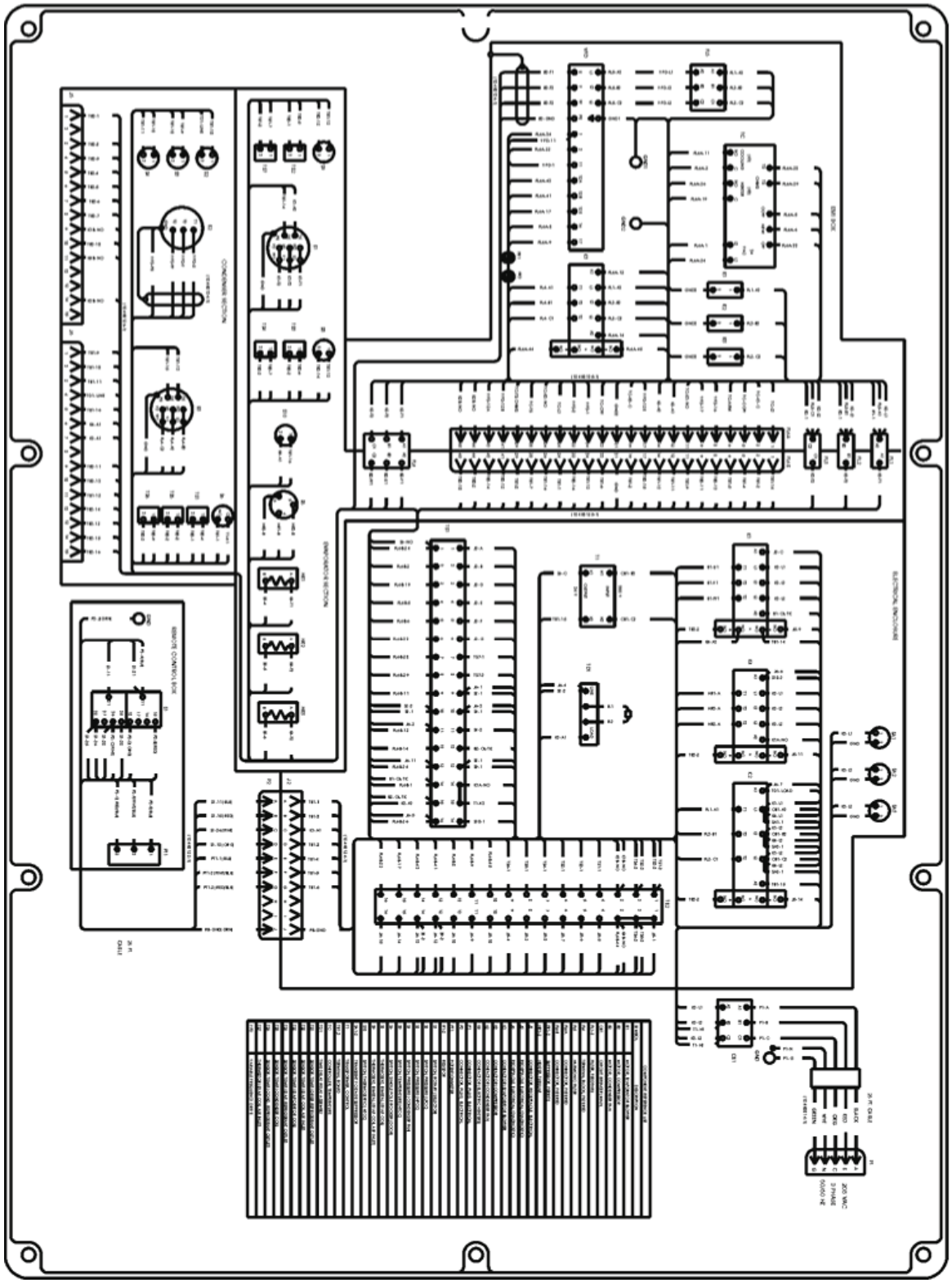


Figure 8. Electrical Wiring Diagram Plate

Major Components

Condenser Fan (B3) (Figure 2). The condenser fan draws outside ambient air through the condenser coils (C2, C3) and discharges the heated air back outside. The condenser fan has built-in overload protection.

Condenser Coils (C2, C3) (Figure 2). The two condenser coils (left and right) serve as heat exchangers by transferring heat from the refrigerant passing through the tubing to the air passing over the tubing and fins.

Power Cable (Figure 2). The electrical power input cable is used to connect the IECU to a source of 208 VAC electrical power for operation.

Sight Glass (SG1) (Figure 2). The liquid sight indicator, or sight glass, allows for a visual inspection and indicates the condition of the liquid refrigerant passing through the system in the cool mode. The sight glass also contains a moisture indicator that changes color depending upon the amount of moisture present in the refrigerant.

Service Valves (V2, V3) (Figure 2). The LOW pressure (suction) service valve (V2) and HIGH pressure (discharge) service valve (V3) provide a connection point for charging and checking the refrigerant lines.

Circuit Breaker (CB1) (Figure 2). The circuit breaker provides the maintainer with the capability to disconnect power locally and provides the IECU with overload protection during power surges and power losses.

Diagnostic Connectors (J5, J6) (Figure 2). The diagnostic connectors provide real-time data measurements that can be taken from these connectors using a standard multimeter. Diagnostic connectors provide the maintainer with information about the operation status of the IECU systems.

High Pressure Cutout (HPCO) Switch (S3) (Figure 2). This switch is factory set to shut off the compressor if the refrigerant discharge line pressure rises to 700 ±15 psig. A manual HPCO reset button is located on the exterior of the IECU to allow the system to restart after pressure has returned to a safe operating level.

Door Pushbutton Switch (Figure 2). When the top cover is lifted, the switch (S6) opens and breaks the 24 VAC power supply to the control circuit.

Compressor (Figure 3). The compressor motor (B2) cycles refrigerant through the system.

Evaporator Coil (C1) (Figure 3). This coil serves as a heat exchanger by transferring heat from the air passing over the tubing and fins to the refrigerant passing through the tubing.

Tubular Heaters (HR1, HR2, and HR3) (Figure 3). Three tubular heaters are used to supply the shelter with heating capacity in low outside (ambient) temperature conditions. Each is rated for 3,000 watts at 120V.

Evaporator Blower (B1) (Figure 3). The evaporator blower circulates the shelter air through the IECU.

Expansion Valve (V1) (Figure 3). Meters refrigerant flow to the evaporator during cooling cycles when the unit is in the COOL mode.

Low Pressure Cutout Switch (S2) (Figure 3). This switch is factory set to shut off the compressor if the refrigerant suction line pressure drops to 40 ±5 psig and automatically resets after pressure has returned to 60 ±5 psig.

Air Filter (Figure 3). The air filter removes dust and debris from the shelter air as it passes through the IECU. The air filter is installed inside of the IECU in front of the evaporator coil and is secured in place by a spring loaded clamp.

Remote Control Box and Cable (Figure 9). The remote control box provides remote and local control of the IECU. The remote control box can be mounted to the exterior of the IECU or can be routed into the shelter with its 25-foot cable. It contains a four position mode selector switch (S1) and a temperature control thermostat (PT1).

a. The TEMPERATURE control thermostat (PT1). This control allows adjustment (COOLER or WARMER) of the conditioned air temperature while operating in either the COOL or HEAT modes

b. Rotary Selector Switch (S1). Provides selection of unit operating modes (COOL, HEAT, VENT, OFF).

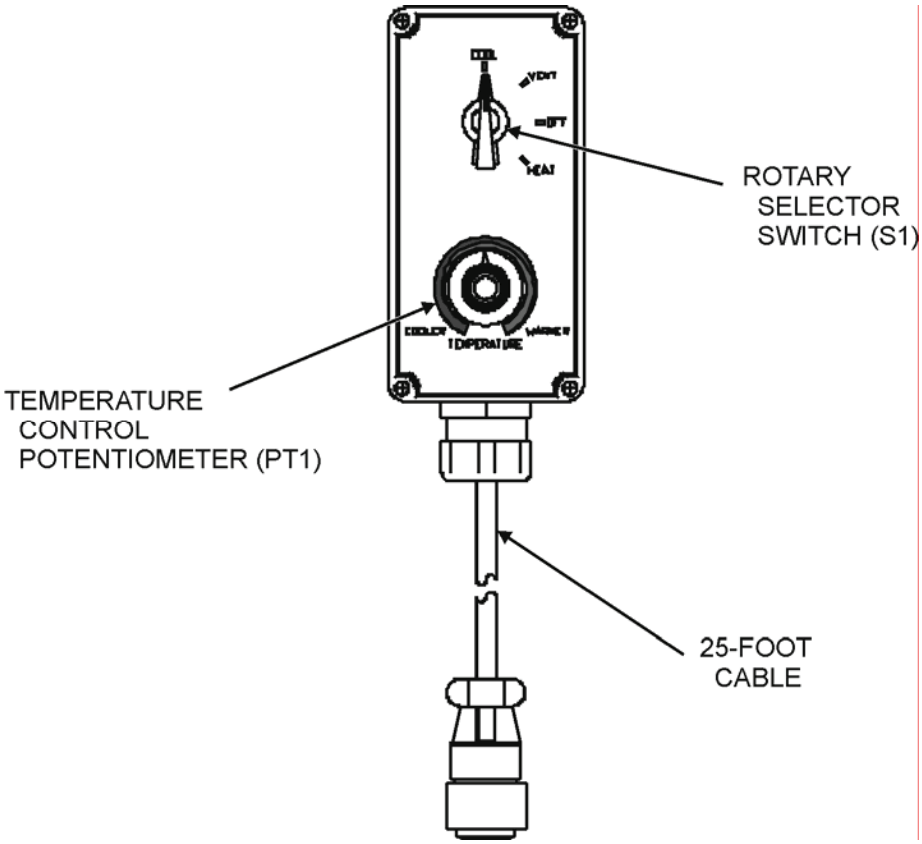


Figure 9. Remote Box Assembly

Electrical Box Assembly (Figure 10). Houses various electrical components that do not produce electrical emissions.

a. Time Delay Relay Assembly (TD1). Delays the start-up of the compressor in COOL mode.

b. Control Transformer (T1). Reduces the main line input voltage of 208 VAC to control circuit voltage level of 24 VAC.

c. Contactor (K1). Controls power to the evaporator blower and is activated by mode selector switch (S1).

d. Contactor (K4). Controls power to the tubular heaters and is activated by the temperature controller (TC).

e. Contactor (K2). Controls power to the compressor and is activated by the temperature controller (TC).

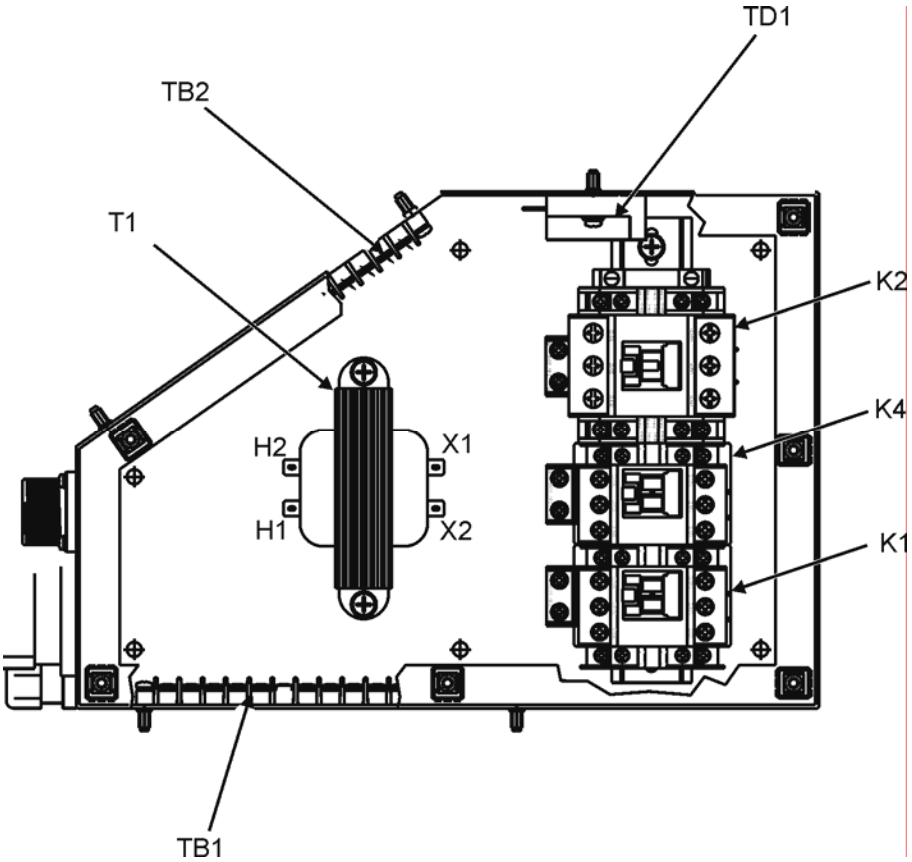


Figure 10. Electrical Box Assembly

Shielded Enclosure Assembly (Figure 11). Reduces the radiated and conducted electromagnetic interference created by the air conditioner electrical components to an acceptable level. It is also referred to as the Electromagnetic Interference (EMI)/Total Harmonic Distortion (THD) Enclosure. The shielded enclosure contains the following components:

a. Filtered Terminal Block (FL4). Helps prevent electromagnetic interference (EMI) emissions.

b. Feedthru Capacitors (FL1-FL3). Helps prevent EMI emissions.

c. Filtered Connector (FL6). Helps prevent EMI emissions.

d. Harmonic Filters (FL5) D. Reduces input current distortion.

e. Temperature Controller (TC). Reduces indoor air temperature.

f. Bleed Resistors (R1-R3). Helps prevent electric shock during maintenance.

g. Variable Frequency Drive (VFD). Electronic device that conditions and regulates compressor motor supply power according to signals sent from temperature controller.

h. Condenser Contactor (K3). Controls power to condenser fan.

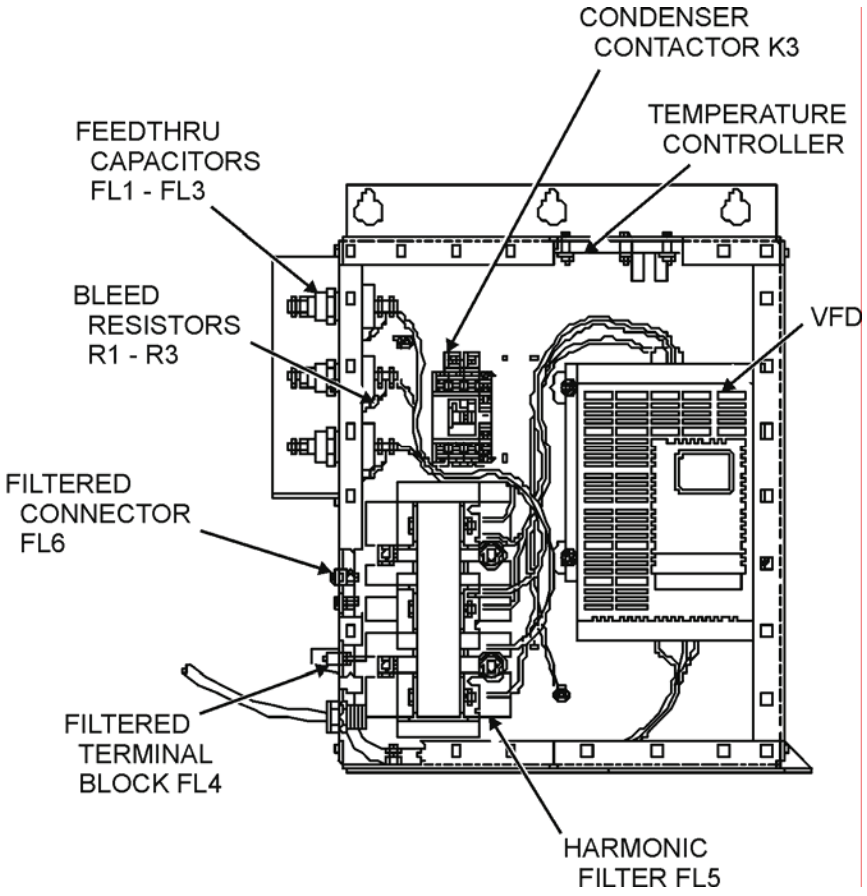


Figure 11. Shielded Enclosure Assembly

EQUIPMENT DATA

The following table lists the 60K BTU/Hr IECU system specifications.

PARAMETER	SPECIFICATION
Operating Temperatures	Cooling = 40 to 125˚F Heating = -50 to 70˚F
Control	Internally or remotely mounted control box
Power Required: Voltage Frequency Phase Current	 208 VAC 50/60 Hertz 3-phase, 5-wire 35.8 amps at 208 VAC (Maximum)
Power Consumption Maximum	 11.0 kW
Minimum Power Factor	0.90
Dimensions (Max.)	42-inch (L) x 35-inch (W) x 46-inch (H) Center-of-Gravity (CG) not higher than 23-inches from bottom
Refrigerant	R410A (5.3 lbs total charge), non-ozone depleting
Minimum Evaporator Air Flow	1,700 SCFM
Gross Weight	500 lbs.
Compressor	Oil type: Polyester Oil CPOE Capacity: 60 oz
Minimum Cooling Capacity:	Total: 60,000 Btu/hr (Minimum) Sensible: 45,000 Btu/hr (Minimum) Desired Sensible: 48,000 Btu/hr 50 Hz Total: 44,000 Btu/hr (Minimum)
Minimum Heating Capacity:	Total: 9.94 kW (33,935 Btu/hr)
Minimum Fresh Air Airflow	280 SCFM
Noise Level	<80 dbA

END OF WORK PACKAGE

OPERATOR, FIELD, AND SUSTAINMENT MAINTENANCE
60K BTU/HR IECU
THEORY OF OPERATION

GENERAL INFORMATION

THEORY OF OPERATION

Electrical System (WP 0063, FO-1, FO-2)

The electrical schematic (FO-1) and wiring diagram (F-2) for the 60K IECU are provided at the end of this manual. 208 VAC, 3-phase power is applied to connector (P1); pins A, B, and C; and routed to main circuit breaker (CB1). When CB1 is open, power is secured at that point and the IECU will not operate. When CB1 is closed, power is routed across three transient voltage suppressors (SA1, SA2, and SA3) and is available at the phase A, B, and C contacts (L1, L2, and L3, respectively) of compressor contactor (K2), evaporator blower contactor coil (K1), and electric heater contactor (K4). Transient voltage suppressors SA1 through SA3 provide the IECU with voltage stabilization from surges that may come from the 208 VAC 3-phase supply power, as well as protection from natural spikes that may occur as a result of lightning strikes.

Control transformer (T1) receives single phase 208 VAC routed from P1, pins B and C, and is available when CB1 is closed. The 24 VAC output of T1, interrupted by door switch (S6) (the top cover must be closed for proper operation), is routed through filtered connector (FL6) (pins 1 and 34) and on through to the temperature controller (TC). The 24 VAC output of T1, interrupted by S6 (the top cover must be closed for proper operation), is additionally routed to pole one and pole two of the rotary selector switch (S1).

Output from pole two of the rotary S1 (cool, vent, and heat positions) provides 24 VAC directly to the K1 (closes all contacts on K1). Output from pole two of the S1 (off position) disconnects 24 VAC from the K1 (opens all contacts on K1).

The TC requires 24 VAC inputs (cool or heat), routed through FL6 (pins 3, 19, and 21) from pole one of the S1 (cool or heat). Additional inputs include potentiometer (PT1) and thermistor (TS7) (from evaporator coil air inlet) and are used to activate the TC. When cooling or heating is required, as determined by the PT1 setting and TS7 signal, the TC closes corresponding internal cool or heat relays.

Output of the TC (cool), when active and when S1 is placed in the cool position, provides 24 VAC to the K2 (closes all contacts on K2), provided that the low pressure cutoff switch (S2) and the high pressure cutoff switch (S3) have not activated and time delay relay (TD1) contact is closed, and to the condenser contactor coil (K3) (closes all contacts on K3), provided that the condenser fan pressure switch (S4) is activated. Output from pole one of the S1 (off and vent positions) disconnects 24 VAC from the TC.

Output of TC (heat), when active and when S1 is placed in the heat position, provides 24 VAC to the heater contactor coil (K4) (closes all contacts on K4), provided that the K1 has been activated and high temperature cutout switches (S5, S10) are closed.

The condenser contactor receives 208 VAC 3-phase power only if K2 is enabled. The condenser contactor powers the condenser fan motor, provided that the condenser fan pressure switch is activated.

The Variable Frequency Drive (VFD) receives 208 VAC 3-phase power, passed through feed thru filters (FL1, FL2 and FL3) only if K2 is enabled, and then passed through harmonic filter (FL5) and on to the VFD. The VFD generates, controls, and routes 3-phase power to the compressor, and varies the compressor’s speed based on the states of thermostat switches (S8, S9).

Diagnostic connector (J5) provides access to temperature status from six temperature sensors (TS1 through TS6) and open/closed status from the four contactors (K1 through K4). TS1 is the sensor at the drier refrigerant outlet. TS2 is the sensor at the evaporator coil air inlet. TS3 is the sensor at the evaporator coil. TS4 is the sensor at the evaporator refrigerant outlet. TS5 is the sensor at the condenser coil. TS6 is the sensor at the condenser refrigerant outlet.

Diagnostic connector (J6) provides access to two status signals from the VFD, as well as open/closed status from the condenser fan pressure switch, high temperature cutout switch, evaporator coil air inlet temperature switch, evaporator coil temperature switch, high pressure cutout switch at the compressor outlet, and low pressure cutout switch at the compressor inlet.

Refrigeration System (WP 0063, FO-3)

The refrigeration schematic (FO-3) for the 60K IECU is provided at the end of this manual. The refrigeration system is a traditional vapor-compression refrigeration cycle consisting primarily of a refrigerant vapor compressor, a refrigerant condenser, a refrigerant throttling/expansion device, a refrigerant evaporator, and associated components.

The compressor (B2) is driven by an electric motor, which then “does work” on the low pressure refrigerant gas that enters the B2 through the metal (suction) hose assembly. This results in a pressure rise in the refrigerant. The gaseous refrigerant flows from the B2 through the metal (discharge) hose assembly and metal tubing passing the S3, condenser fan switch (S4), fusible plug, and discharge service valve (V3), continuing to the condenser coil (C2, C3).

The fusible plug provides operational protection if compressor temperature protector fails. It is primarily for catastrophic events such as a fire.

The condenser fan (B3) draws outside ambient air through the condenser coil (C2, C3). The high pressure, high temperature gas is cooled by the flow of air through the coil and is condensed to a high pressure liquid, which then flows through the filter-drier (F1).

The F1 contains a desiccant that removes moisture (water vapor) and any particulates carried in the liquid refrigerant.

The liquid sight indicator, or sight glass (SG1) indicates the presence of moisture and condition/quantity of refrigerant in the system. Moisture is present when the colored indicator in the center of the sight glass changes color. The sight glass allows direct visual inspection of the liquid refrigerant flowing from the condenser coil (C2, C3). Bubbles seen in the flow indicate incomplete condensation, however, it is not abnormal to see bubbles for the first 10 to 15 minutes when starting the unit, or when ambient air temperature is very low.

The thermostatic expansion valve (V1) controls the flow rate of liquid refrigerant to the evaporator coil (C1). The valve adjusts the flow rate of liquid refrigerant to maintain a desired evaporator exit refrigerant temperature (degrees of superheat). This control of the evaporator outlet temperature is necessary to reduce the introduction of liquid refrigerant into the compressor. Liquid refrigerant will cause “slugging” which will adversely affect the operation and life of the B2. As the liquid refrigerant passes through the V1, it flashes into a liquid/vapor mixture at a reduced pressure and enters C1. The reduction in pressure, and the warmer air from the heat source being drawn across the fins of the evaporator coil by the fan, causes the refrigerant to evaporate.

The evaporator blower (B1) pushes warm air through the C1 from the conditioned space or heat source. The refrigerant evaporates as it absorbs heat from the air. The exhaust air then re-circulates back to the conditioned space.

The low pressure cutout switch (LPCO) (S2) protects the IECU from damage due to low pressure extremes, in such cases where the system may lose its charge. When a low pressure condition occurs in the refrigeration system, the LPCO will activate and shut down the compressor motor.

The high pressure cutout switch (HCPO) (S3) protects the IECU from damage due to high pressure extremes. If a high pressure condition occurs in the refrigeration system, the HPCO will activate and shut down the compressor motor.

The suction service valve (V2) is provided for charging and general servicing of the low pressure side of the refrigerant system.

The discharge service valve (V3) is provided for charging and general servicing of the high pressure side of the refrigerant system.

END OF WORK PACKAGE

CHAPTER 2
OPERATOR INSTRUCTIONS

OPERATOR INSTRUCTIONS
60K BTU/HR IECU
DESCRIPTION AND USE OF CONTROLS AND INDICATORS

INTRODUCTION

The following tables and illustrations provide the description and use of the controls and indicators pertaining to the 60K BTU/Hr IECU.

Key	Control/Indicator	Function
1	Remote Box Controller	Provides remote and local operation and control of heat, vent, air conditioning
2	Circuit Breaker (CB1)	Disconnects power locally
3	Sight Glass	Indicates condition of the refrigerant
4	High Pressure Cutout Switch Reset Button	Allows the system to restart after pressure has returned to a safe operating level
5	Ground Connection	Provides electrical ground connection

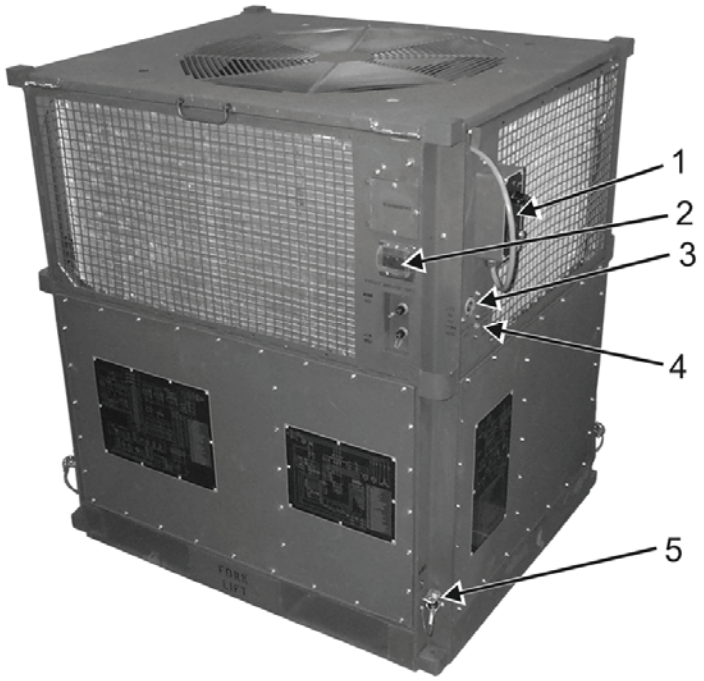


Figure 1. Controls and Indicators

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
60K BTU/HR IECU
OPERATION UNDER USUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools
Forklift (WP 0070, Item 6)
Materials/Parts
None
Personnel Required
Two
References
WP 0007
WP 0010
WP 0011
WP 0016
WP 0021
WP 0026
Equipment Condition
IECU shut down (WP 0005)
System grounded at all times

SITE REQUIREMENTS

When operating the IECU at a fixed site, select an area that is flat and level. The site should provide good water drainage away from the equipment. Locate equipment within seven feet of space to be conditioned, within twenty feet of the electrical source, and within fifteen feet of suitable drainage for condensate water. The 60K IECU will be unaffected by operation in an orientation inclined 10 degrees from horizontal in any plane.

SHELTER REQUIREMENTS

The IECU does not require any special sheltering. Storing the equipment under cover, if available, will minimize routine maintenance and improve overall temperature control.

ASSEMBLY AND PREPARATION FOR USE

Perform the following to assemble and prepare the IECU for field use.

WARNING

The IECU is heavy and awkward to maneuver. Always use two persons when attempting to move or set up the IECU for use.

1. If IECU is attached to another IECU, remove four bolts attaching each IECU together.

WARNING

A lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movements of assembly being lifted. Do not stand under lifted assembly or in a position where you could be pinned against another object. Watch your footing.

2. Use forklift to remove IECU from transport vehicle and place IECU in position near shelter on ground.

3. Inspect equipment for damage incurred during shipment per PMCS (WP 0010).
   - If equipment is damaged do not use and report damage on SF 364, Report of Discrepancy.

4. Check equipment against packing slip to see if shipment is complete.
   - Report all discrepancies following instructions of DA PAM 750-8 or DA PAM 738-751 as applicable.

5. Check to see if equipment has been modified.

Unpacking/Set up

WARNING

The IECU top cover is heavy. Two person lift is required when raising the top cover. Be sure the cover retaining rod is in position and correctly secured. Injury can occur if cover drops.

1. Raise top cover per this WP.

2. Remove two flexible air ducts, one flange assembly, one Y-shaped condensate hose, one control cable assembly (with remote box), one power cable.

3. Connect supply air duct to IECU and to space to be conditioned. Do not bend or kink ducts.

4. Install flange assembly on IECU return air by aligning then inserting locking tabs on flange assembly into return opening. Turn clockwise to fully engage locking tabs.

WARNING

Rotating parts are used in operating the IECU. Do not install or adjust return air duct when inside blower is operating. The flange assembly can disengage and come off resulting in personal injury.

NOTE

Fresh outside make-up air is recommended during normal operating conditions.

5. Connect return air duct to IECU flange assembly installed in Step 4 and to space to be conditioned.

6. Adjust fresh air inlet as needed, then secure duct with clamp, back on flange assembly far enough to expose open indicator.

NOTE

To assure a continuous supply of fresh make-up air, at least ¾ of the slotted row openings should be exposed.

7. Connect one Y-shaped condensation hose to barbed fittings at front (Figure 1) and rear base of equipment.

8. Make sure remote box assembly interconnecting cable is connected to electrical box connector in IECU.

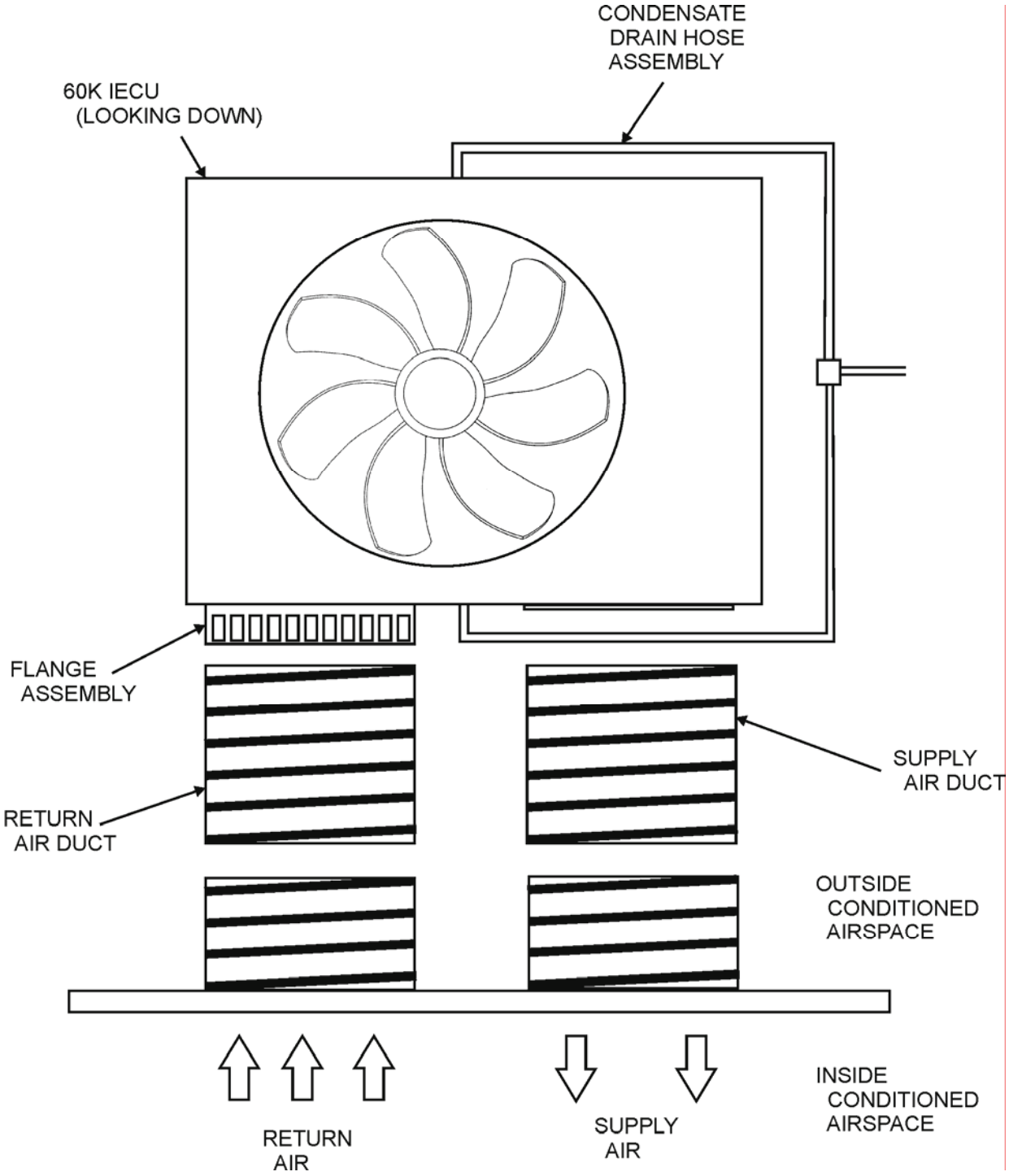


Figure 1. 60K BTU/Hr IECU Deployed

CAUTION

Make sure all items stored under the condenser fan are removed and there are no loose items inside of IECU.

9. Lower top cover per this WP.

10. Connect power cable to appropriate power source.

11. Connect ground wire so that system is grounded.

INITIAL ADJUSTMENTS

Perform the initial adjustments in Table 1 prior to first operation.

Table 1. Initial Adjustments

Location	Item	Action	Remarks
Fresh air inlet	Fresh air inlet	Adjust fresh air inlet to control air flow to shelter by completely covering or aligning duct with open indicator.	
Condenser section	Condenser coil	Check that there is no debris or obstruction to coils.	
Attached to exterior of IECU (local) or inside of shelter (remote)	Remote box assembly	Check that control cable connector is mated to electrical box connector. Check to make sure that selector switch is in OFF position.	
Between IECU and shelter	Flexible duct	Check for secure attachment to IECU and shelter. Check for worn or torn spots.	
IECU	Condensate hoses	Check for proper installation. Check hoses are not pinched or blocked.	
IECU	Cable and wire connections	Inspect all cable and wire connections for tightness.	

OPERATING PROCEDURES

Power Up

WARNING

Be careful not to contact high voltage connections of 208 VAC input connections when installing or operating this equipment.

1. Make sure circuit breaker (CB1) is in OFF position and remote box selector switch is OFF.

2. Connect power cable (P1) to power source and connect ground wire.

3. Place CB1 to ON position.

4. Place selector switch (Figure 2, Item 2) on remote box assembly for necessary mode of operation, as follows:

   COOL Mode. Evaporator blower motor, condenser fan motor, and compressor are energized, and tubular heaters are de-energized when thermostat is set to COOLER position. Condenser fan motor, compressor, and tubular heaters are each de-energized when thermostat is set to WARMER position.

   HEAT Mode. Evaporator blower motor and tubular heaters are energized, and condenser fan motor and compressor are de-energized when thermostat is set to WARMER position. Condenser fan motor, compressor, and tubular heaters are each de-energized when thermostat is set to COOLER position.

   VENT Mode. Evaporator blower motor is energized and condenser fan motor, compressor, and heater are de-energized. Thermostat does not control evaporator blower motor.

   OFF Mode. All operating functions of IECU are de-energized.

5. Adjust temperature control on the remote box assembly (Figure 2, Item 1) by turning TEMPERATURE knob (Figure 2, Item 3) to COOLER or WARMER.

6. If unit fails to operate as specified during normal operating procedures, refer to troubleshooting index located in WP 0007.

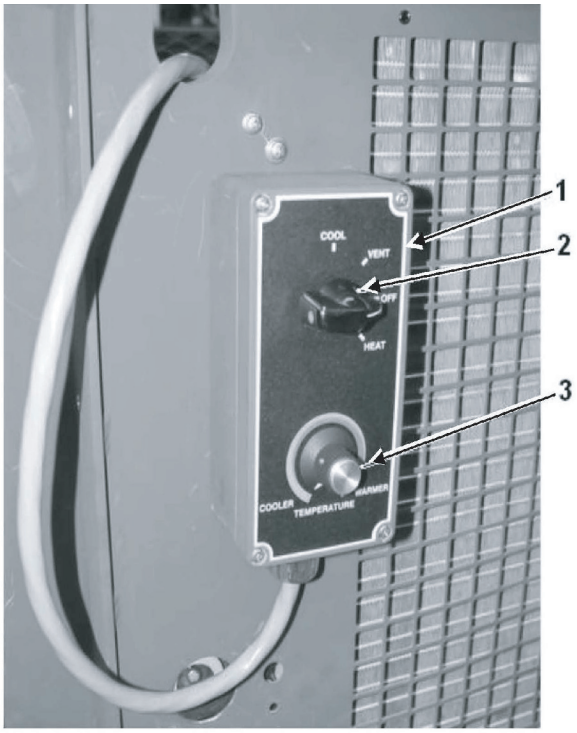


Figure 2. Remote Box Assembly

Shut Down

1. Place selector switch (Figure 2, Item 2) on remote box assembly (Figure2, Item 1) to OFF.
2. Place circuit breaker (CB1) to OFF position.
3. Disconnect power cable (P1) from power source.

Raise Top Cover

WARNING

The IECU top cover is heavy. Two person lift is required when raising the top cover. Be sure the cover retaining rod is in position and correctly secured. Injury can occur if cover drops.

1. Release two spring-loaded latch hinges (Figure 3, Item 1, and Item 2) that secure top cover to IECU.
2. Open top cover and secure in open position with retaining rod (Figure 3, Item 3) and cotter pin (Figure 3, Item 4).

Figure 3. Top Cover Assembly (Cover Open)

Lower Top Cover

WARNING

The IECU top cover is heavy. Two person lift is required. Carefully stow retaining rod. Injury can occur if cover drops.

1. Remove cotter pin (Figure 3, Item 4), release retaining rod (Figure 3, Item 3) and close top cover.

2. Close spring-loaded latch hinges (Figure 3, Item 1 and Item 2) that secure top cover to IECU unit.

PREPARATION FOR MOVEMENT

The upper condenser section of the IECU has an open interior compartment that houses an electrical enclosure. This compartment (Figure 4) also houses the flexible ducts, power cable, remote box assembly/cable, condensate drain hose, TM 9-4120-431-14, and return air duct flange for shipment or storage.

Figure 4. Condenser Storage Compartment

1. Operate IECU in VENT mode per this WP for approximately one hour to ensure that any condensate is drained from unit and to dry out inside coils, filter, and ducts.

2. Locate and check main air filter. Clean if necessary (WP 0026).

WARNING

High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution.

3. Shut down IECU per this WP.

4. Disconnect power cable from power source.

5. Disconnect ground wire.

6. Remove two flexible air ducts from IECU and shelter.

7. Make sure ducts are dry, then collapse and secure ducts, and set aside for storage in IECU.

8. Disconnect NBC equipment, if installed.

9. Raise top cover per this WP.

10. If remotely located, remove the remote box assembly from shelter and route back to IECU. Seal any opening made in shelter. If mounted locally, remove remote box assembly from side of IECU (WP 0021). Coil cable and place remote box assembly in condenser storage compartment.

11. Coil power cable (P1) and place in condenser storage compartment.

12. Remove flange assembly from IECU (WP 0018). Place flange assembly in condenser storage compartment.

13. Remove one Y-shaped condensate hose from barbed fittings at front and rear base of equipment.

14. Make sure hoses are dry prior to storage.

15. Place condensate hose (three pieces) in condenser storage compartment.

16. Place flexible ducts in condenser storage compartment.

17. Lower top cover per this WP.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
60K BTU/HR IECU
OPERATION UNDER UNUSUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
None

Personnel Required
One

References
WP 0005

Equipment Condition
IECU is powered up (WP 0005)

UNUSUAL ENVIRONMENT/WEATHER

Operation in Extreme Heat

When operating, the IECU in temperatures of 120°F (49°C) or higher, extra care should be taken to minimize the cooling load. Some of the precautions that may be taken are:

- Check all openings in the shelter or enclosure, especially doors and windows, to make sure they are tightly closed.
- Limit in and out traffic, if possible.
- When possible, use shades or awning to shut out direct rays of the sun.
- Limit the use of electric lights and other heat producing equipment.
- If fresh outside air is not required, slip return air duct over perforations on unit return air duct flange.

Operation In Extreme Cold

When operating the IECU in temperatures of 20°F (-7°C) or lower, extra care should be taken to minimize the heating load. Some of the precautions that may be taken are:

- Open and close the shelter as little as possible.
- If fresh outside air is not required, slip return air duct over perforations on unit return air duct flange.
- Seal any openings in shelter.
- Do not try to maintain a shelter temperature any higher than is necessary.

Operation in Dusty Conditions

Operating the IECU in dusty and sandy conditions can seriously reduce efficiency by clogging the air filters, which will restrict the volume of airflow. Accumulation of dust or sand in the condenser coil and/or in the compressor compartment may cause overheating of the refrigeration system. Dust or sand may also clog the condensate water drain lines. When operating the IECU in these dusty and sandy conditions, perform the following steps:

1. Frequently clean filter, condenser coil, evaporator coil, and all other areas of dust and sand accumulation.

2. Limit the amount of outside air introduced through flange to allow proper ventilation in dusty or sandy conditions.

Nuclear, Biological, and Chemical (NBC) Conditions

Operate and maintain the NBC filter/blower assemblies per instructions supplied with them.

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

1. Shutdown IECU (WP 0005) and disconnect it from power source.
2. Loosen four clamps (Figure 1, Item 1) then remove two ducts (Figure 1, Item 2). Store ducts (Figure 1, Item 2) for re-use.
3. Turn flange assembly (Figure 1, Item 3) counterclockwise to unlock then pull it from unit.
4. Install NBC adapter (Figure 1, Item 4) into unit.
5. Align slots and turn clockwise to lock NBC adapter (Figure 1, Item 4) in place.
6. Install NBC supply air duct (Figure 1, Item 5) between IECU supply and shelter supply.

NOTE

Note airflow direction marked on duct and be sure duct is installed with arrow toward shelter.

7. Tighten two clamps (Figure 1, Item 6) to secure supply air duct (Figure 1, Item 5) to IECU and shelter.
8. Install NBC return air duct (Figure 1, Item 7) between NBC adapter (Figure 1, Item 4) and shelter return air duct connector. Do not attach at this time.

NOTE

- The NBC return air duct is designed with one duct inside another, sewn together at one end. This will create an air chamber between the ducts that, when pressurized, will prevent contaminants from entering the shelter.
- Note airflow direction marked on duct and be sure duct is installed with arrow toward IECU.

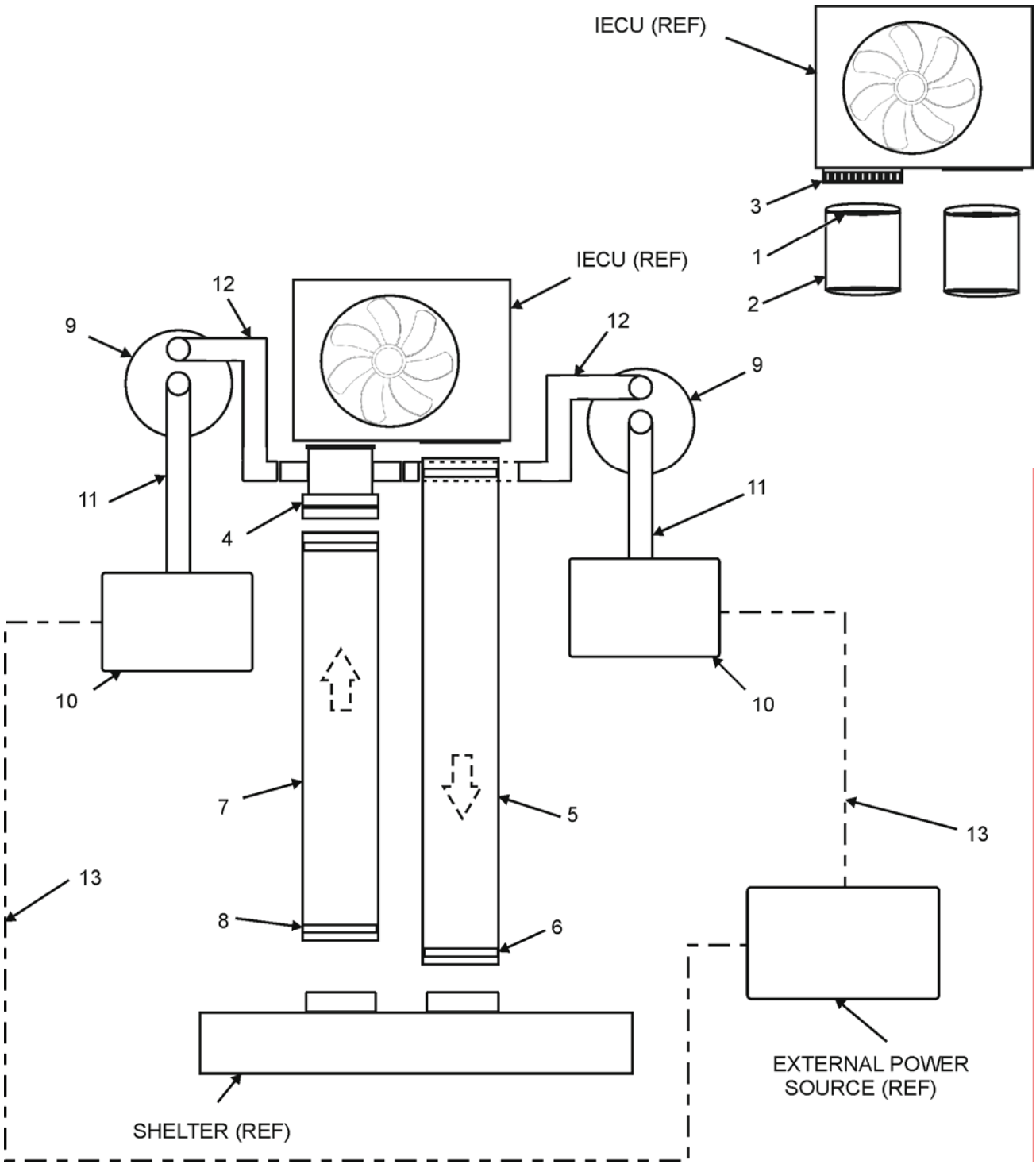


Figure 1. Nuclear, Biological, and Chemical (NBC) Install

9. Install return air inner duct (Figure 2, Item 1) inside return air duct (Figure 2, Item 2).

10. Tighten clamp (Figure 2, Item 3) to secure.

11. Install return air outer duct (Figure 2, Item 2) and tighten two clamps (Figure 1, Item 8) to secure return air outer duct (Figure 2, Item 2) to NBC adapter (Figure 1, Item 4) and shelter.

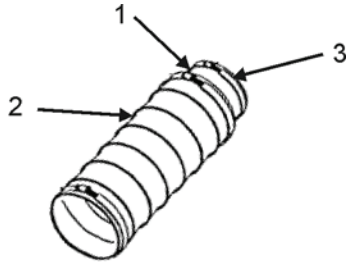


Figure 2. NBC Return Air Ducting

12. Place two NBC filter canisters (Figure 1, Item 9) within three feet of NBC adapter (Figure 1, Item 4).

13. Place two NBC motor blowers (Figure 1, Item 10) within three feet of respective NBC filter canister (Figure 1, Item 9).

14. Connect and secure one NBC air duct (Figure 1, Item 11) between each NBC motor blower (Figure 1, Item 10) and NBC filter canister (Figure 1, Item 9) center hole.

15. Connect and secure one NBC air duct (Figure 1, Item 12) between each NBC filter canister (Figure 1, Item 9) outside hole and NBC adapter (Figure 1, Item 4).

16. Secure two hose connections at NBC adapter (Figure 1, Item 4) using duct tape.

17. Connect each NBC motor blower (Figure 1, Item 10) power cord (Figure 1, Item 13) to appropriate external power source.

END OF WORK PACKAGE

CHAPTER 3

OPERATOR TROUBLESHOOTING PROCEDURES

OPERATOR TROUBLESHOOTING PROCEDURES
60K BTU/HR IECU
TROUBLESHOOTING INDEX

INTRODUCTION

This work package contains operator (field) troubleshooting information for locating and correcting most of the operating troubles that may develop in the 60K BTU/Hr IECU. Each symptom for a part, assembly, or subassembly is followed by a list of malfunctions, which will help you to determine corrective actions to take. You should perform the corrective actions in the order listed.

This manual cannot list all possible malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed (except when the malfunction or cause is obvious) or is not corrected by listed corrective actions, notify the next level of maintenance. IECU malfunctions are indexed below to provide a quick reference to corrective actions located in WP 0008.

MALFUNCTION/SYMPTOM INDEX

Table 1. Troubleshooting Index

END OF WORK PACKAGE

OPERATOR TROUBLESHOOTING PROCEDURES
60K BTU/HR IECU
IECU TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0011
Equipment Condition
IECU is powered up (WP 0005)

SYMPTOM

IECU fails to operate in any mode.

MALFUNCTION – MAL 1

Top cover is not closed.

CORRECTIVE ACTION

Step 1. Lower top cover (WP 0005).

Step 2. If the IECU does not operate, proceed to next malfunction.

MALFUNCTION – MAL 2

No input power to unit.

CORRECTIVE ACTION

Step 1. Verify power cable (P1) is connected to an external power source.

Step 2. If necessary, connect P1 to active power source.

Step 3. If the IECU does not operate, proceed to next malfunction.

MALFUNCTION – MAL 3

Input power circuit breaker (CB1) OFF or TRIPPED

CORRECTIVE ACTION

Step 1. Verify CB1 is in ON position.

Step 2. If necessary, reset or set CB1 to ON position.

Step 3. If CB1 is ON and IECU does not operate, proceed to next malfunction.

Step 4. If CB1 trips again, notify next level of maintenance.

MALFUNCTION – MAL 4

Remote box connector (P2) is not mated to electrical box connector (J2).

CORRECTIVE ACTION

Step 1. Raise top cover (WP 0005).

Step 2. Verify P2 is connected to J2.

Step 3. If necessary, notify next level of maintenance to connect P2 to J2.

Step 4. If connector is securely mated and IECU does not operate, remove power and notify next level of maintenance.

Step 5. Lower top cover (WP 0005).

SYMPTOM

IECU runs but will not cool or heat shelter as needed.

MALFUNCTION – MAL 5

Temperature control setting not properly adjusted.

CORRECTIVE ACTION

Step 1. If in HEAT mode, adjust remote control temperature control knob to WARMER (full clockwise) position.

a. If heating remains inadequate, notify next level of maintenance.

Step 2. If in COOL mode, adjust remote control temperature control knob to COOLER (full counterclockwise) position.

a. Allow unit to operate for several minutes.

b. If cooling remains inadequate, shut down unit.

c. Wait one minute.

d. Press High Pressure Cutout Switch S3 manual reset and listen for a metallic click to indicate reset.

d. Start unit in COOL mode.

(1) If cooling or heating is still inadequate, perform PMCS (WP 0011).

(a) If cooling remains inadequate after PMCS, notify next level of maintenance.

MALFUNCTION – MAL 6

Shelter is not well sealed.

CORRECTIVE ACTION

Step 1. Seal shelter as required. Notify next level of maintenance if necessary.

END OF WORK PACKAGE

CHAPTER 4

OPERATOR MAINTENANCE INSTRUCTIONS

OPERATOR MAINTENANCE INSTRUCTIONS
60K BTU/HR IECU
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
WP 0010
Equipment Condition
None

GENERAL

The table in WP 0010 has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

Always observe the WARNINGS and CAUTIONS appearing in your PMCS table. WARNINGS and CAUTIONS appear before applicable procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others or to prevent your equipment from being damaged.

PMCS PROCEDURES TABLE

Item Number Column. Numbers in this column are for reference. When completing DA Form 2404, Equipment Inspection and Maintenance Worksheet, include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

Interval Column. This column tells you when you must do the procedure in the Procedure column.

BEFORE (B) – Checks and services performed prior to the equipment leaving its containment area or performing its intended mission.

DURING (D) – Checks begin when the equipment is being used in its intended mission.

AFTER (A) – Checks and services begin when the equipment is taken out of its mission mode or returned to its containment area.

MONTHLY (M) – Checks and services to be performed on a monthly basis.

SEMIANNUALLY (S) – Checks and services to be performed on a semiannual basis.

Item To Be Checked Or Serviced Column. This column provides the item to be checked or serviced.

Procedure Column. This column gives the procedure you must do to check or service the item listed in the Item to be Checked or Serviced column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the Interval column.

Equipment Not Ready / Available If Column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

END OF WORK PACKAGE

OPERATOR MAINTENANCE INSTRUCTIONS
60K BTU/HR IECU
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
Two
References
WP 0005
Equipment Condition
IECU is shut down (WP 0005)

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

Item No.	Interval	Man-Hrs.	Item To Be Checked or Serviced	Procedure	Equipment Not Ready / Available If
1	B	0.1	IECU Housing	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on power cables. Improper operation could result in personal injury or death by electrocution.	
				A. Check exterior surfaces of IECU for cracks, dents, chips, corrosion, or other obvious damage to the unit. If damaged, notify next level of maintenance.	Cracks, dents, chips, or corrosion is found.
				B. Inspect frame weldment for cracks, dents, chips, broken welds, and corrosion. If damage is found, notify next level of maintenance.	Cracks, dents, chips, or corrosion is found.
				C. Inspect rear cover assembly for loose or missing fasteners, cracks, dents, chips, corrosion, or other damage. If damage is found, notify next level of maintenance.	Cracks, dents, chips, or corrosion is found. Missing fasteners.
				1. Check to make sure that wiring diagram plate and electrical schematic plate are securely attached to rear cover assembly and can be easily read. If not, notify next level of maintenance.	Plates not easy to read or loose.
				D. Inspect end panel assembly for loose or missing fasteners, cracks, dents, chips, corrosion, or other damage. If damage is found, notify next level of maintenance.	Loose or missing fasteners, cracks, dents, chips, corrosion, or other damage is found.

Item No.	Interval	Man-Hrs.	Item To Be Checked or Serviced	Procedure	Equipment Not Ready / Available If
				1. Check to make sure that refrigeration schematic plate is securely attached to end panel assembly and can be easily read. If not, notify next level of maintenance.	Plate not easy to read or loose.
				E. Inspect bottom-right side cover assembly for loose or missing fasteners, cracks, dents, chips, corrosion, or other damage. If damage is found, notify next level of maintenance.	Loose or missing fasteners, cracks, dents, chips, corrosion, or other damage is found.
				F. Inspect flange assembly for loose or missing rivets. If damage is found, notify next level of maintenance.	Missing or loose rivets.
				G. Check that identification plate is secure and easy to read. Notify the next level of maintenance if loose or hard to read.	Identification plate is loose or hard to read.
				H. Inspect flange grill and inlet flange for corrosion, cracks, or dents. If damage is found, notify next level of maintenance.	Corrosion, cracks, or dents are found.
2	B	0.1	Top Cover Assembly	**WARNING** High voltage and rotating parts are present when the IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death. The IECU top cover is heavy. Two person lift is required. Be sure the cover retaining rod is in position and correctly secured. Injury can occur if cover drops.	
				A. Open top cover assembly and secure in position with retaining rod and cotter pin.	
				B. Inspect top cover assembly for loose or missing fasteners. If damage is found, notify next level of maintenance.	Damaged or missing hardware is identified.
				C. Inspect top cover assembly hinges for loose, broken, or missing rivets. If damage is found, notify next level of maintenance.	Damage is identified.
				D. Inspect interior of IECU for water, leaves, dirt, insects, or other foreign matter. Remove debris as required. If damage is found, notify next level of maintenance.	Cleaning is required.

Item No.	Interval	Man-Hrs.	Item To Be Checked or Serviced	Procedure	Equipment Not Ready / Available If
3	B	0.1	Cabling	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on power cables. Improper operation could result in personal injury or death by electrocution. A. Inspect power cable for frayed or damaged insulation, or signs of burning. If damage is found, notify next level of maintenance. B. Inspect interconnecting control cable for frayed or damaged insulation, or signs of burning. If damage is found, notify next level of maintenance	Frayed or damaged insulation. Frayed or damaged insulation.
4	B	0.2	Condenser Assembly	A. Inspect condenser fan and motor for loose wiring, worn parts, loose or missing hardware, and proper fan blade clearance. If damage is found, notify next level of maintenance. B. Inspect for coil cleanliness, debris, or obstruction to coils. Remove obstructions or notify next level of maintenance for cleaning. **NOTE** If operating the IECU in extremely dusty conditions, it is likely that weekly cleaning of the condenser coil will need to take place.	Damage to wiring or missing hardware is identified. Obstructed or dirty to point of insufficient air flow over coil.
5	B	0.1	Electrical Box Assembly	A. Inspect electrical box assembly for damage to cables, wiring, and connections, and for loose or missing hardware securing cover, connector, and strain relief. If damage is found, notify next level of maintenance.	Damage to wiring or missing hardware is identified.
6	B	0.1	Remote Box Assembly	A. Check for damage to knob or selector switch. If damage is found, notify next level of maintenance. B. Inspect remote box assembly for cracks, dents, or corrosion. If found, notify next level of maintenance.	Knob or selector switch is damaged. Damage is found.

Item No.	Interval	Man-Hrs.	Item To Be Checked or Serviced	Procedure	Equipment Not Ready / Available If
				C. Check for loose or missing hardware. If found, notify next level of maintenance.	Loose or missing hardware is identified.
				D. Check that overlay is easy to read and is not damaged. If damage is found, notify next level of maintenance.	Overlay is not readable.
				E. Check cable and strain relief for damage or loose connection at both connections. If damage is found, notify next level of maintenance.	Damaged or loose connections.
				F. Remove cotter pin and release retaining rod securing top cover assembly and close top cover.	Top cover not closed.
7	B	0.1	Flexible Duct	A. Inspect duct attachment clamps for secure attachment to IECU and shelter. If loose, tighten clamps.	Ducts loose from IECU or shelter.
				B. Inspect for worn or torn spots. If duct shows signs of damage, notify the next level of maintenance.	Torn or worn ducts.
8	B	0.1	Condensate Drain Hoses	A. Inspect condensate drain hose connections to IECU in two locations and at tee fitting for secure attachment. If loose or disconnected, reconnect hose fittings.	Loose or disconnected hose.
				B. Inspect condensate drain hoses for cracks, cuts, kinks, or other blockages. If damage is found, notify next level of maintenance.	Damage to hoses is identified.
				C. Inspect length of condensate drain hose to make sure it extends 15 feet away from IECU and is sloped downhill from the unit. Reposition as required.	Drain hose not correctly positioned.
9	D	0.1	Sight Glass	A. Power up unit and allow unit to run for one minute (WP 0005).	
				B. Check sight glass for center indicator color and for constant bubbling or foaming while operating in cooling mode. If sight glass color is yellow or constant bubbling or foaming is seen, notify next level of maintenance.	Sight glass color is yellow or constant bubbling or foaming.

Item No.	Interval	Man-Hrs.	Item To Be Checked or Serviced	Procedure	Equipment Not Ready / Available If
10	A	1.0	IECU	A. Perform shut down procedures (WP 0005). B. Perform all Before (B) checks in this WP.	 All Before (B) checks not performed.
11	M	0.1	IECU Housing	A. Inspect for cracks, dents, or chips. If damage is found, notify next level of maintenance to repair or paint. B. Inspect for surface corrosion. If damage is found, notify next level of maintenance to repair or paint.	Cracks, dents, or chips found. Corrosion evident.
12	M	0.1	Cabling	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on power cables. Improper operation could result in personal injury or death by electrocution. A. Inspect power cable for frayed or damaged insulation, or signs of burning. If damage is found, notify next level of maintenance. B. Inspect interconnecting control cable for frayed or damaged insulation, or signs of burning. If damage is found, notify next level of maintenance	 Frayed or damaged insulation. Frayed or damaged insulation.

END OF WORK PACKAGE

CHAPTER 5
SERVICE TROUBLESHOOTING PROCEDURES

SERVICE TROUBLESHOOTING PROCEDURES
60K BTU/HR IECU
TROUBLESHOOTING INDEX

INTRODUCTION

This work package contains service troubleshooting information for locating and correcting most of the operating troubles that may develop in the 60K BTU/Hr IECU. Each symptom for a part, assembly, or subassembly is followed by a list of malfunctions, which will help you to determine corrective actions to take. You should perform the corrective actions in the order listed.

This manual cannot list all possible malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed (except when the malfunction or cause is obvious) or is not corrected by listed corrective actions, notify the next level of maintenance. IECU malfunctions are indexed below to provide a quick reference to corrective actions located in WP 0012.

SYMPTOM/MALFUNCTION INDEX

Table 1. Troubleshooting Index

END OF WORK PACKAGE

SERVICE TROUBLESHOOTING PROCEDURES
60K BTU/HR IECU
SERVICE TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Service Ordnance Refrigeration Toolkit (WP 0072, Item 3)
Materials/Parts
None
Personnel Required
Two
References
WP 0005
WP 0010
WP 0016
WP 0017
WP 0019
WP 0026
WP 0032
WP 0033
WP 0034
WP 0035
References (Continued)
WP 0036
WP 0039
WP 0040
WP 0042
WP 0043
WP 0044
WP 0045
WP 0046
WP 0047
WP 0048
WP 0049
WP 0050
WP 0051
WP 0055
WP 0057
WP 0058
WP 0063
Equipment Condition
IECU is powered up (WP 0005)

SYMPTOM

IECU fails to operate in any mode.

MALFUNCTION – MAL 1

Transformer (T1) is defective.

CORRECTIVE ACTION

WARNING

- High voltage and rotating parts are present when Improved Environmental Control Unit is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.
- Be careful not to contact high voltage connections of 208 VAC input connections when installing, setting up, and operating this equipment.

Step 1. Check input power to electrical plug connector (P1) for 208 VAC as follows:
- P1-A to P1-G
- P1-B to P1-G
- P1-C to P1-G

Step 2. Verify top cover assembly is closed.

Step 3. Verify circuit breaker (CB1) is in ON (up) position.

Step 4. Shut down IECU (WP 0005).

Step 5. Open top cover assembly (WP 0005).

Step 6. Remove electrical box assembly cover (WP 0040).

Step 7. Visually inspect T1 for obvious signs of damage or overheating (See Figure 1).

a. If T1 looks damaged or shows signs of overheating, replace T1 (WP 0040).

Step 8. Check for <0.5 ohms (coil resistance) at transformer secondary terminals T1-X1 to T1-X2.

a. If >0.5 ohms, replace T1 (WP 0040).

Step 9. If <0.5 ohms at T1-X1 to T1-X2, check for 11.0 to 14.0 ohms (coil resistance) at transformer primary terminals T1-H1 to T1-H2.

a. If <11.0 ohms or >14.0 ohms, replace T1 (WP 0040).

b. If T1-H1 to T1-H2 ohm reading is between 11.0 and 14.0 ohms, continue troubleshooting with MALFUNCTION – MAL 2.

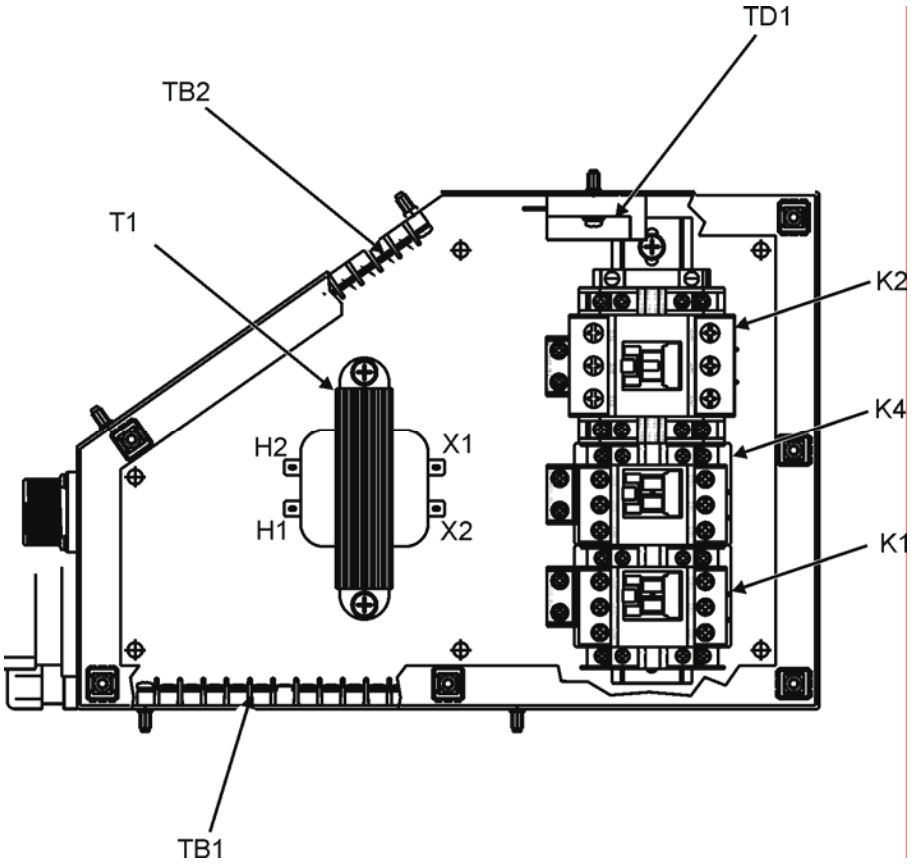


Figure 1. Electrical Box

MALFUNCTION – MAL 2

Circuit breaker (CB1) is defective.

NOTE

Troubleshooting continues below for SYMPTOM – IECU fails to operate in any mode. All equipment conditions remain as a result of the previous troubleshooting steps.

CORRECTIVE ACTION

Step 1. Make sure that facility power is disconnected and CB1 is in ON (up) position.

Step 2. Check for continuity at each location as follows:

- K2-L1 to P1-A
- K2-L2 to P1-B
- K2-L3 to P1-C

a. If ohm reading is >2.0 ohms at any check point location, replace (CB1) (WP 0043).

b. If ohm reading at each check point location indicates continuity, continue troubleshooting with MALFUNCTION – MAL 3.

MALFUNCTION – MAL 3

Rotary selector switch (S1) is defective.

NOTE

Troubleshooting continues below for SYMPTOM – IECU fails to operate in any mode. All equipment conditions remain as a result of the previous troubleshooting steps.

CORRECTIVE ACTION

Step 1. Make sure that facility power is disconnected and CB1 is in ON (up) position.

Step 2. Disconnect electrical connector (P2) from electrical box assembly.

Step 3. Place S1 to VENT position.

Step 4. Check for continuity from P2-A to P2-C.

a. If continuity does not exist, replace S1 (WP 0042).

b. If continuity exists, continue troubleshooting with MALFUNCTION – MAL 4.

Step 5. Place CB1 to OFF (down) position.

Step 6. Place S1 to OFF position.

Step 7. Reconnect P2 to electrical box assembly.

Table 1. Connector P2 Pin Out

WIRE REF. NO.	TERMINATION				WIRE ITEM NO.
	FROM	TERM. ITEM NO.	TO	TERM. ITEM NO.	
1	P2-A	1	S1-11	3	2 (BLK)
2	P2-B	1	S1-15	3	2 (RED)
3	P2-C	1	S1-26	3	2 (WHT)
4	P2-D	1	S1-18	3	2 (ORG)
5	P2-E	1	PT1-1	-	2 (BLU)
6	P2-F	1	PT1-2	-	2 (WHT/BLK)
7	P2-G	1	PT1-3	-	2 (RED/BLK)
8	P2-J	1	RB-GND	4	2 (GRN)

MALFUNCTION – MAL 4

Safety switch (S6) is defective.

NOTE

Troubleshooting continues below for SYMPTOM – IECU fails to operate in any mode. All equipment conditions remain as a result of the previous troubleshooting steps.

CORRECTIVE ACTION

Step 1. Make sure that facility power is disconnected and CB1 is in ON (up) position.

NOTE

The following troubleshooting steps are accomplished in order to determine the operational status of the S6. Using a digital multimeter, ohm checks will be made with the switch manually activated and with the switch deactivated. The switch is deactivated and should read no continuity with the top cover open.

Step 2. Make sure top cover assembly is open and secured (WP 0005).

Step 3. Check transformer terminal T1-X1 to terminal board TB1-1 (Figure 2) for no continuity, indicating S6 is open.

a. If ohm reading indicates continuity, replace S6 (WP 0019).

Step 4. With digital multimeter leads still on T1-X1 and TB1-1, manually activate S6 to closed and monitor reading on meter.

a. If ohm reading indicates no continuity, replace S6 (WP 0017).

b. If ohm reading indicates continuity, S6 is operational, indicating a problem with wiring.

Step 5. Troubleshoot and repair wiring using schematic and wiring diagram to determine location of faulty wiring.

Step 6. Install electrical box assembly cover (WP 0035).

Step 7. Close and secure top cover assembly (WP 0005).

Step 8. Place IECU back into normal operation (WP 0005).

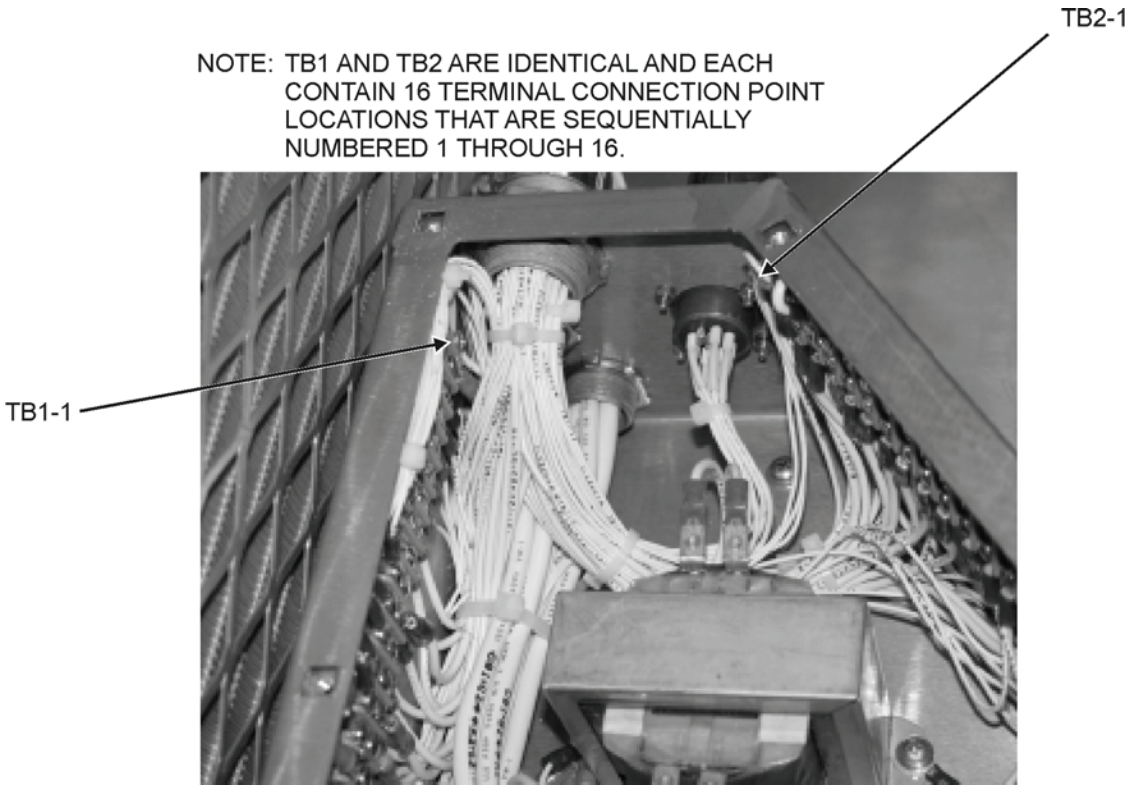


Figure 2. Terminal Boards TB1 and TB2 Pin Out Reference

SYMPTOM

IECU runs, but no heat in HEAT mode.

NOTE

If blower motor is not running, continue to MALFUNCTION – MAL 8.

MALFUNCTION – MAL 5

High temperature cutout switch (S5) is defective.

CORRECTIVE ACTION

NOTE

Performance of this troubleshooting procedure requires the IECU to be operating in the heat mode and return air (shelter) temperature to be less than 90°F.

Step 1. Start IECU and place S1 to HEAT position (WP 0005).

Step 2. Rotate potentiometer (PT1) TEMPERATURE knob full clockwise to full WARMER position.

Step 3. Check for no continuity between J5-11 and J5-1 (Figure 3), indicating electrical heater contactor (K4) is open.

a. If ohm reading indicates continuity, indicating K4 closed, replace S5 (WP 0046).

b. If ohm reading indicates no continuity, continue troubleshooting with next MALFUNCTION – MAL 6.

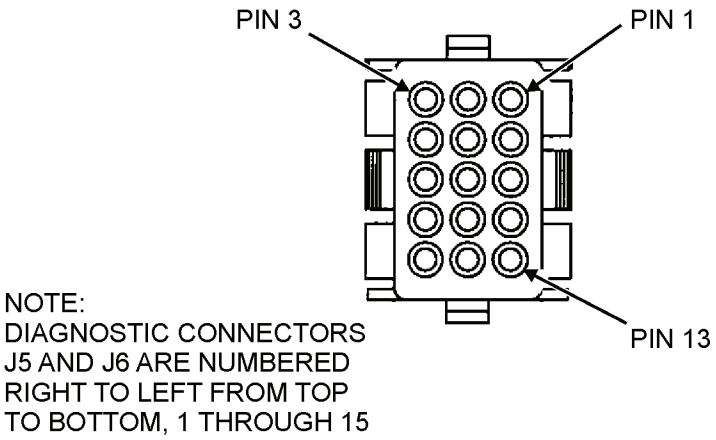


Figure 3. Diagnostic Connectors J5 and J6 Pin Out

MALFUNCTION – MAL 6

High temperature cutout switch (S10) is defective.

NOTE

Troubleshooting continues below for SYMPTOM – IECU runs but no heat. All equipment conditions remain as a result of the previous troubleshooting steps.

CORRECTIVE ACTION

WARNING

- High voltage and rotating parts are present when the IECU is in operation. Failure to use extreme care can cause injury or death to personnel.
- Be careful not to contact high voltage connections of 208 VAC input connections when installing, setting up, and operating this equipment.

NOTE

During the voltage check for Step 1, S10 status is checked. The multimeter reading will indicate either 0.0 VAC (S10 closed) or 24 VAC (S10 open).

Step 1. Check for AC voltage between J6-5 and J6-6 (Figure 3).

a. If meter reading indicates 24 VAC, continue to Step 2.

b. If meter reading indicates 0.0 VAC, continue to Step 3.

Step 2. Place S1 to VENT position and operate in VENT mode for 5 minutes.

Step 3. Make sure S1 is in HEAT position and PT1 TEMPERATURE is in full WARMER position.

Step 4. Check again for 0.0 VAC between J6-5 and J6-6 (Figure 3).

a. If meter reading indicates 24 VAC, indicating S10 open, replace S10 (WP 0048).

b. If meter reading indicates 0.0 VAC, continue to Step 5.

Step 5. Check for 24 VAC output from temperature controller between J6-6 and J6-3 (Figure 3).

a. If meter reading indicates 24 VAC, replace K4 (WP 0040).

b. If meter reading indicates 0.0 VAC, continue to Step 6.

Step 6. Shut down IECU (WP 0005).

Step 7. Place CB1 to OFF (down) position.

Step 8. Disconnect electrical power receptacle from IECU.

Step 9. Raise and secure top cover assembly (WP 0005).

Step 10. Disconnect P2 from electrical box assembly.

Step 11. Place S1 to HEAT position.

Step 12. Check for continuity between P2-A and P2-D.

a. If continuity does not exist, replace S1 (WP 0042).

b. If continuity exists, continue to Step 13.

Step 13. Reconnect P2 to electrical box assembly, and then troubleshoot temperature control function in MALFUNCTION – MAL 7.

MALFUNCTION – MAL 7

Potentiometer (PT1), evaporator coil air inlet thermistor (TS7), or temperature controller (TC) is defective.

CORRECTIVE ACTION

Step 1. Shut down IECU (WP 0005).

Step 2. Make sure that facility power is disconnected and CB1 is in OFF (down) position.

Step 3. Remove shielded enclosure assembly (WP 0039).

Step 4. Make sure connector FL6B is securely mated to shielded enclosure receptacle FL6A.

Step 5. If fault still exists, disconnect connector FL6B from shielded enclosure receptacle FL6A.

Step 6. Check for 2.1K to 2.5K ohms between FL6B-5 and FL6B-22.

a. If meter reading indicates <2.1K ohms or >2.5K ohms, replace PT1 (WP 0042).

b. If meter reading indicates 2.1K to 2.5K ohms, continue to Step 7.

Step 7. Check for 0.0 to 2.5K ohms between FL6B-5 and FL6B-6.

a. If meter reading indicates >2.5K ohms, replace PT1 (WP 0042).

Step 8. Slowly rotate PT1 knob from full counterclockwise to full clockwise position, then back to full counterclockwise position while monitoring meter reading.

a. If meter reading indicates >2.5K ohms or if meter reading breaks (no continuity) any time during PT1 rotation, replace PT1 (WP 0042).

Step 9. Check for 0.0 to 2.5K ohms between FL6B-6 and FL6B-22.

Step 10. Slowly rotate PT1 knob from full counterclockwise to full clockwise position, then back to full counterclockwise position while monitoring meter reading.

a. If meter reading indicates >2.5K ohms or if meter reading breaks (no continuity) any time during PT1 rotation, replace PT1 (WP 0042).

Step 11. Check for no continuity between FL6B-38 and FL6B-39.

a. If meter reading indication is no continuity between FL6B-38 and FL6B-39, replace TS7 (WP 0047).

Step 12. Check for no continuity between FL6B-38 and IECU frame, and between FL6B-39 and IECU frame.

a. If meter reading indicates continuity (TS7 shorted), replace TS7 (WP 0047).

b. If meter indicates no continuity on both readings, replace temperature controller (TC) (WP 0039).

Step 13. Reconnect connector FL6B to shielded enclosure receptacle FL6A.

Step 14. Install shielded enclosure assembly (WP 0039).

MALFUNCTION – MAL 8

Evaporator blower motor contactor (K1), rotary selector switch (S1), or blower motor (B1) is defective.

CORRECTIVE ACTION

Step 1. Start IECU and place rotary selector switch S1 to HEAT position (WP 0005).

Step 2. Rotate PT1 TEMPERATURE knob full clockwise to full WARMER position.

Step 3. Verify B1 is blowing (WP 0032).

a. If B1 is blowing (normal operation), omit step 4 and continue to step 5.

b. If B1 is not blowing, continue to Step 4.

Step 4. Check for continuity between J5-9 and J5-1 (Figure 3) to K1 status.

a. If continuity exists, continue to Step 9.

b. If no continuity exists, shut down IECU (WP 0005) and continue to Step 5.

Step 5. Shut down IECU and open top cover assembly (WP 0005).

Step 6. Remove electrical box assembly cover (WP 0040).

Step 7. Place S1 to HEAT and rotate S1 to warm.

Step 8. Check for continuity between TB1-1 and K1-A1.

a. If no continuity exists, replace S1 (WP 0042).

b. If continuity exists between TB1-1 and K1-A1, continue to Step 9.

Step 9. Check for continuity between TB1-14 and K1-A2.

a. If continuity exists, replace K1 (WP 0040).

b. If continuity does not exist, check and remove possible obstruction at B1, and continue to Step 10.

Step 10. Check for 2.5 to 5.0 ohms at the following locations:

NOTE

The resistance measurements below are measuring the resistance of the B1 windings and should range from 2.5 to 5.0 ohms and each be within +/- 0.3 ohms of each other. If each of the three measurements is not within 0.3 ohms of each other, the B1 should be replaced as there are internal winding failures.

- K1-T1 to K1-T2
- K1-T2 to K1-T3

- K1-T3 to K1-T1

a. If each measurement is 2.5 to 5.0 ohms and each is within 0.3 ohms of each other, check for and clear any obstructions to blower, and continue to Step 10.

b. If any measurement is >5.0 ohms or <2.5 ohms, or if any measurement is not within 0.3 ohms of each other, replace evaporator blower motor B1 (WP 0051).

Step 10. Install electrical box assembly cover (WP 0040).

Step 11. Close top cover assembly (WP 0005).

SYMPTOM

IECU running and heat will not turn off.

MALFUNCTION – MAL 9

Evaporator blower contactor (K1), electrical heaters contactor (K4), or rotary selector switch (S1) is defective.

CORRECTIVE ACTION

Step 1. Turn S1 to OFF position.

Step 2. Check to see if B1 has stopped operating (WP 0032).

a. If B1 is operating, open top cover (WP 0005).

(1) If B1 continues to operate with cover open, replace K1 (WP 0040).

(2) If B1 stops operating when cover is opened, replace S1 (WP 0042).

b. If B1 stopped, check for continuity between J5-11 and J5-1 (Figure 3) in order to determine status of K4.

(1) If continuity exists, replace K4 (WP 0040).

(2) If continuity does not exist (K4 open), continue troubleshooting with next SYMPTOM – IECU runs and cannot control heat.

SYMPTOM

IECU runs and cannot control heat.

MALFUNCTION – MAL 10

Rotary selector switch (S1) is defective.

CORRECTIVE ACTION

Step 1. Place S1 to OFF position.

Step 2. Check for 24 VAC between J6-5 and J6-3 (Figure 3).

a. If meter reading indicates 24 VAC, replace S1 (WP 0042).

b. If meter reading indicates 0 VAC, continue with Step 1 of MALFUNCTION – MAL 7 to troubleshoot defective PT1, TS7, or TC.

SYMPTOM

IECU runs, but no cooling in COOL mode.

MALFUNCTION – MAL 11

Evaporator blower motor (B1) will not start.

CORRECTIVE ACTION

Step 1. Start IECU and place S1 to COOL position (WP 0005).

Step 2. Rotate PT1 TEMPERATURE knob full counterclockwise to full COOLER position.

Step 3. Verify B1 is blowing (WP 0032).

a. If B1 is blowing, go to MALFUNCTION – MAL 12 to troubleshoot B2 will not start after one-minute delay.

b. If B1 is not blowing, continue with Step 4.

Step 4. Check for continuity between J5-9 and J5-1 (Figure 3) to check K1 status.

a. If meter reading indicates no continuity, shut down IECU (WP 0005).

(1) Open top cover assembly (WP 0005).

(2) Remove electrical box assembly cover (WP 0040).

(3) Place S1 to COOL position.

(4) Check for continuity between TB1-1 and K1-A1.

(a) If no continuity exists, replace S1 (WP 0042)

(b) If continuity exists, continue with Step 4.a.(5).

(5) Check for continuity between TB1-14 and K1-A2.

(a) If continuity exists, replace K1 (WP 0040).

(b) If no continuity exists, check for obstruction at B1.

b. If continuity exists between J5-9 and J5-1 (Figure 3), indicating K1 status is good, shut down IECU (WP 0005).

(1) Open top cover assembly (WP 0005).

(2) Remove electrical box assembly cover (WP 0040).

(3) Check for 2.5 to 5.0 ohms at the following locations:

NOTE

The resistance measurements below are measuring the resistance of the B1 windings and should range from 2.5 to 5.0 ohms and each be within +/- 0.3 ohms of each other. If each of the three measurements is not within 0.3 ohms of each other, the B1 should be replaced as there are internal winding failures.

- K1-T1 to K1-T2
- K1-T2 to K1-T3
- K1-T3 to K1-T1

(a) If each measurement is 2.5 to 5.0 ohms and each is within 0.3 ohms of each other, check for and clear any obstructions to B1.

1 Install electrical box assembly cover (WP0040).

2 Close top cover assembly (WP 0005).

3 Place IECU back into normal operation (WP 0005).

(b) If any measurement is >5.0 ohms or if any measurement is not within 0.3 ohms of each other, replace B1 (WP 0051).

1 Install electrical box assembly cover (WP0040).

2 Close top cover assembly (WP 0005).

3 Place IECU back into normal operation (WP 0005).

MALFUNCTION – MAL 12

Compressor (B2) will not start after one-minute delay.

NOTE

Normal operating sequence after turn on of the IECU will consist of B1 starting, followed by an approximate delay of one minute before B2 starts up. Within approximately 30 seconds of B2 starting, the condenser fan (B3) will start up and run.

CORRECTIVE ACTION

Step 1. Start IECU and place S1 to COOL position.

Step 2. Press high pressure cutout switch (S3) manual reset button and wait one minute for compressor B2 to start and for refrigerant to flow in sight glass.

a. If refrigerant is present and compressor is running, continue to MALFUNCTION – MAL 18 to troubleshoot condenser fan B3 will not operate.

b. If B2 does not start after one-minute delay, continue to Step 3.

WARNING

- High voltage and rotating parts are present when Improved Environmental Control Unit is in operation. Failure to use caution can cause injury or death to personnel.
- Be careful not to contact high voltage connections of 208 VAC input connections when installing or operating this equipment.

Step 3. Check for continuity between J5-14 and J5-1 (Figure 3) to check compressor contactor (K2) status.

a. If continuity does not exist, continue to Step 4.

b. If continuity does exist, continue to Step 17.

Step 4. Check for 24 VAC between J6-7 and J6-6 (Figure 3).

a. If meter indicates 24 VAC, replace K2 (WP 0040).

b. If meter indicates 0 VAC, continue to Step 5.

Step 5. Check for 24 VAC between J6-6 and J6-4 (Figure 3).

a. If meter indicates 24 VAC, replace time delay relay (TD1) (WP 0040).

b. If meter indicates 0 VAC, continue to Step 6.

Step 6. Check for 24 VAC between J6-2 and J6-6.

a. If meter indicates 24 VAC, continue to Step 7.

b. If meter indicates 0 VAC, continue to Step 9.

Step 7. Shut down IECU and attach a gauge set.

Step 8. Start IECU and check refrigeration low pressure side reading.

a. If pressure is >40 psi, replace low pressure switch (S2) (WP 0057).

b. If pressure <40 psi, inspect for refrigeration system leak (WP 0036).

Step 9. Check for 24 VAC between J6-1 and J6-6 (Figure 3).

a. If meter indicates 24 VAC, continue to Step 10.

b. If meter indicates 0 VAC, omit steps 10 and 11, and continue to Step 12.

Step 10. Press S3 manual reset button and recheck for 24 VAC between J6-2 and J6-6 (Figure 3).

a. If meter indicates 24 VAC, perform PMCS (WP 0010).

b. If meter indicates 0 VAC, continue to Step 11.

Step 11. Check for over pressure condition >700 psi on gauge.

a. If pressure is <700 psi, replace S3 (WP 0058).

b. If pressure is >700 psi, shut down IECU, wait to allow unit to cool, press S3 reset, and attempt restart. If IECU starts, perform PMCS (WP 0010).

Step 12. Shutdown IECU (WP 0005).

Step 13. Open top cover assembly (WP 0005).

Step 14. Disconnect P2 from electrical box assembly.

Step 15. Place S1 to COOL position.

Step 16. Check for continuity between P2-A and P2-B.

a. If continuity does not exist, replace S1 (WP 0042).

b. If continuity exists, perform MALFUNCTION – MAL 7 to troubleshoot PT1, TS7, or TC.

NOTE

The Variable Frequency Drive (VFD) output status can be checked by probing diagnostic connector J6 pins 9 and 10 (Figure 3) for no continuity, or continuity, meter reading status. When checking VFD status at J6, a no continuity reading on the meter indicates a no fault output by the VFD. A continuity reading on the meter indicates that the VFD has generated a fault code that is displayed on the VFD display.

Step 17. Check J6-9 to J6-10 (Figure 3) for continuity, indicating a VFD status (fault/no fault) output.

a. If no continuity is measured, continue to Step 18 (No fault in VFD).

b. If continuity is measured, continue to Step 33 (Fault in VFD).

Step 18. Check for 15 VDC using J6-12 as positive (+) and J6-15 as negative (-).

NOTE

A 0.0 VDC reading between J6-12 and J6-15 indicates that switch (S8) is open due to evaporator coil temperature <30°F. The VFD should read 0 Hz on the VFD display.

a. If meter reading indicates 0.0 VDC, omit steps 19 through 26 and continue to Step 27.

NOTE

A 15 VDC reading between J6-12 and J6-15 indicates that S8 is closed due to evaporator coil temperature >40°F. The VFD should read 60 Hz on the VFD display.

b. If meter reading indicates 15 VDC, continue to Step 19.

Step 19. Remove rear cover assembly (WP 0016) for access to VFD.

Step 20. Check for a display of 60.0 on VFD display.

a. If VFD display does not indicate exactly 60.0, continue to Step 21.

b. If VFD displays 60.0, omit steps 21 through 26 and continue to Step 27.

Step 21. Check VFD for any illuminated display.

a. If VFD is illuminated, replace VFD (WP 0039).

b. If VFD is not illuminated, continue to Step 22.

Step 22. Shut down IECU (WP 0005).

Step 23. Remove shielded enclosure assembly and cover for access, but leave wiring connected (WP 0039).

Step 24. Start IECU (WP 0005).

Step 25. Place S1 to COOL position and wait one minute.

Step 26. Check for 120 VAC as follows:

- VFD-L1 to Frame
- VFD-L2 to Frame
- VFD-L3 to Frame

a. If meter reading indicates 120 VAC at each reading, replace VFD (WP 0039).

b. If meter reading does not indicate 120 VAC at each reading, repair/replace faulty wiring (WP 0063).

Step 27. Power down IECU and let B2 cool for up to four hours (continued from Step 20b).

Step 28. Attempt to restart IECU after elapsed time indicated (continued from Step 18a).

a. If B2 starts, perform PMCS (WP 0010).

b. If B2 does not start, replace B2 (WP 0049).

Step 29. Measure resistance between J5-1 and J5-7 (Figure 3).

a. If evaporator coil temperature sensor (TS3) conversion indicates >35°F (30,020 ohms, see Table 2 at the end of this WP), replace precision bimetal thermostat S8 (WP 0044).

b. If TS3 conversion indicates <35°F (30,020 ohms, see Table 2), continue to Step 30.

Step 30. Make sure evaporator has adequate airflow and no filter obstructions.

Step 31. Disconnect supply air duct and check for ice buildup on evaporator coil.

a. If ice buildup is present on evaporator coil, replace S8 (WP 0044).

b. If no ice build is present, continue to Step 32.

Step 32. Operate IECU for 15 minutes in VENT mode, then return to COOL mode and check for normal operation.

a. If IECU still does not operate normally, troubleshoot wiring (WP 0063) and/or notify next higher level maintenance.

Step 33. Remove rear cover assembly (WP 0016) for access to VFD and read VFD displayed fault code.

NOTE

When a fault occurs within the VFD, a fault code is generated for display on the VFD display. Certain fault codes that are generated are a result of an internal failure to the VFD itself, and will result in replacement of the VFD as a corrective action. Other faults that can be generated by the VFD are a result of an external parameter that has caused the fault code to be generated.

Step 34. Perform corrective action suggested for displayed fault code as instructed in Table 2.

Table 2. VFD Fault Code Messages

Fault Code	Description and Possible Cause	Corrective Action
AF	High temperature fault caused by high ambient air temperature, and / or possible internal VFD fan failure.	Perform MALFUNCTION – MAL 13 for VFD Fault AF
CF	Control fault caused by possible blank electronic programmable memory (EPM), or EPM with corrupted data.	Replace VFD
cF	Incompatibility fault caused by EPM containing incompatible parameter version.	Replace VFD
dF	Dynamic braking fault; not used on IECU.	Replace VFD
EF	External fault; not used on IECU.	Replace VFD
GF	Data fault caused by corrupted user data and original equipment manufacturer (OEM) defaults.	Replace VFD
HF	High DC bus voltage fault caused by excessive line voltage, too rapid deceleration, or overhauling load.	Perform MALFUNCTION – MAL 14 for VFD Fault HF
JF	Remote keypad fault caused by loss of communication link between drive and optional remote keypad.	Replace VFD
LF	Low DC bus voltage fault caused by line voltage into unit being too low.	Perform MALFUNCTION – MAL 15 for VFD Fault LF
OF	Output transistor fault caused by possible phase-to-phase short circuit, phase-to-ground short circuit, boost settings too high, rapid acceleration rate, or failed output transistor.	Perform MALFUNCTION – MAL 16 for VFD Fault OF
PF	Current overload fault caused by mechanical problem with compressor.	Perform MALFUNCTION – MAL 17 for VFD Fault PF
F1	EPM fault caused by possible missing or damaged EPM.	Replace VFD
FC, F2-F9, F0	Internal faults sensed by internal control board.	Replace VFD

MALFUNCTION – MAL 13

VFD Fault AF, compressor (B2) will not start after one-minute delay.

CORRECTIVE ACTION

NOTE

Use Table 2 at the end of this WP to determine evaporator coil air inlet temperature sensor (TS2) temperature value.

Step 1. Check for resistance between J5-1 and J5-6 (Figure 3).

a. If TS2 conversion indicates >125°F (<3400 ohms), the system is operating outside of designed environment of -50°F to 125°F.

b. If TS2 conversion indicates <125°F (>3400 ohms), continue to Step 2.

Step 2. Remove rear cover assembly (WP 0016) for access to VFD.

Step 3. Check for debris buildup around VFD shielded enclosure assembly that may be blocking airflow.

a. If debris buildup is found around shielded enclosure assembly, remove debris.

b. If no debris buildup is found around shielded enclosure assembly, continue to Step 4.

Step 4. Remove VFD (WP 0039) to inspect fan intake.

a. If debris buildup is found around VFD fan intake, remove debris.

b. If no debris buildup is found around VFD fan intake, replace VFD (WP 0039).

MALFUNCTION – MAL 14

VFD Fault HF, compressor (B2) will not start after one-minute delay.

CORRECTIVE ACTION

WARNING

- High voltage and rotating parts are present when Improved Environmental Control Unit is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

- Be careful not to contact high voltage connections of 208 VAC input connections when installing or operating this equipment.

Step 1. Check facility power supply output is 208 VAC.

a. If not 208 VAC, connect proper facility power supply to IECU.

b. If facility power supply is 208 VAC, continue to Step 2.

Step 2. Shut down IECU (WP 0005) and wait one minute.

Step 3. Start IECU in COOL mode (WP 0005) and wait one minute for VFD to power up.

Step 4. Check VFD display.

a. If VFD displays 60.0, system is operating normally.

b. If fault HF is displayed, replace VFD (WP 0039).

MALFUNCTION – MAL 15

VFD Fault LF, compressor (B2) will not start after one-minute delay.

CORRECTIVE ACTION

WARNING

- High voltage and rotating parts are present when Improved Environmental Control Unit is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.

- Be careful not to contact high voltage connections of 208 VAC input connections when installing or operating this equipment.

Step 1. Check facility power supply output is 208 VAC.

a. If not 208 VAC, connect proper facility power supply to IECU.

b. If facility power supply is 208 VAC, continue to Step 2.

Step 2. Shut down IECU (WP 0005).

Step 3. Remove shielded enclosure assembly (WP 0039) without disconnecting wiring to enclosure.

Step 4. Start IECU (WP 0005) in COOL mode and wait one minute for B2 to start.

Step 5 Check for 120 VAC phase input at feed thru filters FL1, FL2, and FL3 as follows:

- FL1 (PH A) to Frame
- FL2 (PH B) to Frame
- FL3 (PH C) to Frame

a. If 120 VAC is present at each feed thru filter, continue to Step 6.

b. If 120 VAC is not present at each feed thru filter, continue to Step 8.

Step 6. Recheck each reading and leave meter leads attached for one minute while monitoring meter indication to see if voltage decreases.

Step 7. Inspect wiring inside shielded enclosure assembly for signs of damage or overheating (WP 0039).

a. If damaged wiring is found, repair wiring using schematics and wiring diagrams (WP 0063).

b. If damaged wiring is not found, replace VFD (WP 0039).

Step 8. Recheck each reading and leave meter leads attached for one minute while monitoring meter indication to see if voltage decreases.

a. If meter indicates voltage readings are same (phases balanced), notify facility maintenance to troubleshoot facility supply wiring.

b. If meter reading indicates voltages are different (phases unbalanced), continue to Step 9.

Step 9. Power down IECU (WP 0005).

Step 10. Open and secure top cover assembly (WP 0005).

Step 11. Remove electrical box assembly cover (WP 0040).

Step 12. Check K2 relay contacts as follows:

From	To	Expected Result
K2-L1	K2-T1	No Continuity
K2-L2	K2-T2	No Continuity
K2-L3	K2-T3	No Continuity

a. If any multimeter reading indicates any reading other than no continuity, replace K2 (WP 0040).

b. If each multimeter reading indicates no continuity, continue to Step 13.

Step 13. Manually activate relay, hold contacts closed, and recheck each contact for continuity.

a. If any multimeter reading indicates no continuity, replace K2 (WP 0040).

b. If each multimeter reading indicates continuity, continue to Step 14.

Step 14. Close CB1 if not already closed.

Step 15. Check for continuity between K2 and P1 as follows:

From	To
K2-L1	P1-A
K2-L2	P1-B
K2-L3	P1-C

a. If each multimeter reading indicates continuity, notify facility maintenance to troubleshoot facility supply wiring.

b. If any multimeter reading indicates no continuity, continue to step 16.

Step 16. Check for continuity across CB1 contacts as follows:

From	To
CB1-A1	CB1-A2
CB1-B1	CB1-B2
CB1-C1	CB1-C2

a. If each multimeter reading indicates continuity, troubleshoot and repair wiring between K2 and P1.

b. If any multimeter reading indicates no continuity, replace CB1 (WP 0043).

MALFUNCTION – MAL 16

VFD Fault OF, compressor (B2) will not start after one-minute delay.

CORRECTIVE ACTION

Step 1. Shut down IECU (WP 0005).

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

Step 2. Open compressor junction box.

Step 3. Tag and disconnect B2 wires terminating at T1, T2, and T3.

Step 4. Check continuity on B2 side at the following locations:

From	To	Expected Result
B2-T1	B2-T2	2 to 5 ohms, balanced with other two legs
B2-T2	B2-T3	2 to 5 ohms, balanced with other two legs
B2-T3	B2-T1	2 to 5 ohms, balanced with other two legs

a. If each meter value does not indicate expected result, replace B2 (WP 0049).

b. If each meter value does indicate expected result, continue to Step 5.

Step 5. Check for no continuity between B2-T1 and B2 case.

a. If meter indicates any reading other than no continuity, B2 is shorted to case. Replace B2 (WP 0049).

b. If meter reading indicates no continuity, continue to Step 6.

Step 6. Make the following checks to wires leading to B2 side as follows:

From Wire No.	To	Expected Result
VFD-W (white wire)	IECU frame	No Continuity
VFD-V (white/blue wire)	IECU frame	No Continuity
VFD-U (white/orange wire)	IECU frame	No Continuity

a. If meter reading for each wire indicates any value other than no continuity, troubleshoot and repair wiring using schematics and wiring diagrams.

b. If meter reading for each check indicates no continuity, replace VFD (WP 0039).

MALFUNCTION – MAL 17

VFD Fault PF, compressor (B2) will not start after one-minute delay.

CORRECTIVE ACTION

Step 1. Check B2 sight glass to make sure it is clear.

a. If sight glass is not clear, replace B2 (WP 0049).

b. If sight glass is clear, continue to Step 2.

Step 2. Check condenser coil for dirt and/or obstructions to air flow (WP 0010).

a. If dirt and debris are present, clean condenser coil.

b. If dirt, debris, or other obstructions are not present, replace B2 (WP 0049).

MALFUNCTION – MAL 18

Condenser fan (B3) will not operate.

CORRECTIVE ACTION

Step 1. Shut down IECU and raise top cover (WP 0005).

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

Step 2. Inspect fan and condenser coil for blockage.

Step 3. Close IECU top cover (WP 0005).

Step 4. Hook up gauge set to service valves V2 and V3 (WP 0036). Observe for pressure.

Step 5. When pressure falls below 450 psi, press S3 to reset.

NOTE

There are several checks that will need to be made within one minute of the S3 reset. Be prepared to accomplish the steps needed before the one minute window elapses. Read ahead a few steps to know what is to be accomplished within the allotted time frame. After resetting S3, steps (6) through (8) (b) need to be accomplished within one minute.

Step 6. Power up IECU (WP 0005). Set S1 to cool and rotate control switch to cool.

Step 7. Check that gauge reading is >370 psi, indicating condenser fan pressure switch (S4) is closed.

a. If pressure gauge reading is <370 psi, allow B2 to restart and reach 370 psi, then continue.

Step 8. Check for 24 VAC between J6-2 and J6-3 (Figure 3).

a. If meter reading indicates 24 VAC (S4 open), replace S4 (WP 0040).

b. If meter reading does not indicate 24 VAC, continue to Step 9.

Step 9. Check for continuity between J5-10 and J5-1 (Figure 3).

a. If continuity exists between J5-10 and J5-1 (Figure 3), replace B3 (WP 0046).

b. If meter reading indicates no continuity, continue to Step 10.

Step 10. Shut down IECU (WP 0005).

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

Step 11. Open top cover assembly (WP 0005).

Step 12. Spin B3 to check for binding, and that B3 can rotate freely.

a. If B3 does not move freely, perform PMCS (WP 0010).

b. If B3 moves freely, continue to Step 13.

Step 13. Remove condenser fan junction box cover (WP 0046).

Step 14. Check for resistance from B3-TK to B3-TK inside junction box.

a. If continuity exists, replace condenser fan contactor (K3) (WP 0034).

b. If no continuity exists, continue to Step 14.

Step 15. Allow unit to cool for 30 minutes and recheck resistance measurement between B3-TK to B3-TK.

a. If continuity exists, replace K3 (WP 0034).

b. If no continuity exists, replace B3 (WP 0050).

SYMPTOM

Cooling has stopped during extreme high temperature.

MALFUNCTION – MAL 19

Evaporator coil air inlet precision bimetal thermostat (S9) is defective.

NOTE

S9 is normally closed. S9 is designed to open when return air temperature exceeds 115°F. When S9 closes, frequency from the VFD drops from 60 Hz to 48 Hz in order to slow down the B2 speed and allow the B2 to continue to cool at a lower capacity. This is accomplished so that the B2 and VFD can stay away from trip points due to approaching extreme operating temperatures for the B2 and VFD.

CORRECTIVE ACTION

Step 1. Check for resistance between J5-6 and J5-1 (Figure 3) to determine TS2 value.

Step 2. Using temperature conversion chart in Table 2, convert resistance indicated on meter to temperature value.

a. If temperature <120°F (ohms >3742), perform MALFUNCTION – MAL 12 to troubleshoot B2 will not start after one-minute delay.

b. If temperature >120°F (ohms <3742), continue to Step 3.

Step 3. Check for <1.0 VDC between J6-13 and J6-15 (Figure 3).

NOTE

A reading <1.0 VDC between J6-13 and J6-15 indicates that S9 is open due to air temperature >115 °F. The VFD should read 48 Hz on the VFD display.

a. If meter reading indicates <1.0 VDC, perform PMCS (WP 0010).

NOTE

A reading >1.0 VDC between J6-13 and J6-15 indicates that S9 is closed due to air temperature <110°F. The VFD should read 60 Hz on the VFD display.

b. If meter reading indicates >1.0 VDC, replace S9 (WP 0045).

SYMPTOM

IECU runs, but cooling is inadequate.

MALFUNCTION – MAL 20

Thermostatic expansion valve (V1) is restricted or stuck open.

CORRECTIVE ACTION

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

- Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

Step 1. Shut down IECU (WP 0005).

Step 2. Inspect and clean air filter if required (WP 0026).

Step 3. Clean evaporator coils.

Step 3. Start IECU in COOL mode and recheck cooling efficiency (WP 0005).

Step 4. Hook up gauge set to suction and discharge service valves and check system operating pressure is normal (>155 psi and <608 psi) (WP 0036).

a. If system pressure is outside of normal operating range (<155 psi or >608 psi), service refrigeration system (WP 0036).

b. If system pressure is within normal operating range (>155 psi and <608 psi), continue to Step 5.

Step 5. Check resistance between J5-4 and J5-1 (Figure 3).

Step 6. Using temperature conversion chart in Table 2, convert resistance indicated on meter to determine temperature value at condenser refrigerant outlet temperature sensor (TS6). Record temperature value as T1 _____.

Step 7. Check resistance between J5-5 and J5-1 (Figure 3).

Step 8. Using temperature conversion chart in Table 2, convert resistance indicated on meter to determine temperature value at drier refrigerant outlet temperature sensor (TS1). Record temperature value as T2 _____.

Step 9. Calculate T1 - T2 = T3 _____.

a. If temperature value of T3 is >2.0° F, replace filter-drier (WP 0054).

b. If temperature value of T3 is <2.0° F, continue troubleshooting with Step 10.

Step 10. Check resistance between J5-8 and J5-1 (Figure 3).

Step 11. Using temperature conversion chart in Table 2, convert resistance indicated on meter to determine temperature value at evaporator refrigerant outlet temperature sensor TS4. Record temperature value as T4 _____.

Step 12. Check resistance between J5-7 and J5-1 (Figure 3).

Step 13. Using temperature conversion chart in Table 2, convert resistance indicated on meter to determine temperature value at TS3. Record temperature value as T5 _____.

Step 14. Calculate T5 – T4 = T6 _____.

a. If temperature value of T6 is approximately 9.0°F, perform PMCS (WP 0010).

b. If temperature value of T6 is <3.0°F or >15.0°F, continue to Step 15.

Step 15. Adjust V1 and retest valve (WP 0033).

a. If V1 retests good, perform PMCS (WP 0010).

b. If V1 retest fails, replace V1 (WP 0055).

Table 3. Temperature Conversion Chart (Ohms to Degrees C and Degrees F)

Temp (Deg. C)	Temp (Deg. F)	Res (ohms)
-46	-50.8	516300
-45	-49.0	481600
-44	-47.2	449300
-43	-45.4	419500
-42	-43.6	391800
-41	-41.8	366100
-40	-40.0	342300
-39	-38.2	320200
-38	-36.4	299600
-37	-34.6	280500
-36	-32.8	262700
-35	-31.0	246200
-34	-29.2	230800
-33	-27.4	216500
-32	-25.6	203200
-31	-23.8	190700
-30	-22.0	179100
-29	-20.2	168300
-28	-18.4	158150
-27	-16.6	148720
-26	-14.8	139910
-25	-13.0	131670
-24	-11.2	123980
-23	-9.4	116780
-22	-7.6	110040
-21	-5.8	103730
-20	-4.0	97820
-19	-2.2	92290
-18	-0.4	87100
-17	1.4	82240
-16	3.2	77680
-15	5.0	73390
-14	6.8	69380
-13	8.6	65600
-12	10.4	62050
-11	12.2	58720
-10	14.0	55590
-9	15.8	52640
-8	17.6	49860
-7	19.4	47250
-6	21.2	44790
-5	23.0	42340
-4	24.8	40170
-3	26.6	38130
-2	28.4	36200
-1	30.2	34380
0	32.0	32660
1	33.8	31040
2	35.6	29510
3	37.4	28080
4	39.2	26690
5	41.0	25400
6	42.8	24180
7	44.6	23020
8	46.4	21920
9	48.2	20890
10	50.0	19900
11	51.8	18970
12	53.6	18090
13	55.4	17260
14	57.2	16470
15	59.0	15710
16	60.8	15000
17	62.6	14320
18	64.4	13680
19	66.2	13070
20	68.0	12490
21	69.8	11940
22	71.6	11420
23	73.4	10920
24	75.2	10450
25	77.0	10000
26	78.8	9572
27	80.6	9165
28	82.4	8777
29	84.2	8408
30	86.0	8055
31	87.8	7721
32	89.6	7402
33	91.4	7098
34	93.2	6808
35	95.0	6531
36	96.8	6276
37	98.6	6015
38	100.4	5774
39	102.2	5545
40	104.0	5325
41	105.8	5116
42	107.6	4916
43	109.4	4725
44	111.2	4543
45	113.0	4368
46	114.8	4201
47	116.6	4041
48	118.4	3888
49	120.2	3724

Temp (Deg. C)	Temp (Deg. F)	Res (ohms)
50	122.0	3602
51	123.8	3488
52	125.6	3340
53	127.4	3217
54	129.2	3099
55	131.0	2987
56	132.8	2878
57	134.6	2775
58	136.4	2675

Temp (Deg. C)	Temp (Deg. F)	Res (ohms)
59	138.2	2580
60	140.0	2488
61	141.8	2401
62	143.6	2317
63	145.4	2236
64	147.2	2158
65	149.0	2084
66	150.8	2012
67	152.6	1944

Temp (Deg. C)	Temp (Deg. F)	Res (ohms)
68	154.4	1878
69	156.2	1814
70	158.0	1753
71	159.8	1698
72	161.6	1641
73	163.4	1587
74	165.2	1535
75	167.0	1485

END OF WORK PACKAGE

CHAPTER 6
SERVICE MAINTENANCE INSTRUCTIONS

SERVICE MAINTENANCE INSTRUCTIONS
60K BTU/HR IECU
PMCS INTRODUCTION

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
WP 0014
Equipment Condition
None

GENERAL

The PMCS table in WP 0014 has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

Always observe the WARNINGS and CAUTIONS appearing in your PMCS table. WARNINGS and CAUTIONS appear before applicable procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others or to prevent your equipment from being damaged.

PMCS PROCEDURES TABLE

Item Number column. Numbers in this column are for reference. When completing DA Form 2404, Equipment Inspection and Maintenance Worksheet, include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

Interval column. This column tells you when you must do the procedure in the Procedure column.

MONTHLY (M) – Checks and services to be performed on a monthly basis.

QUARTERLY (Q) – Checks and services to be performed on a quarterly basis.

SEMIANNUALLY (S) – Checks and services to be performed on a semiannual basis.

Item To Be Checked Or Serviced column. This column provides the item to be checked or serviced.

Procedure column. This column gives the procedure you must do to check or service the item listed in the Item to be Checked or Serviced column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the INTERVAL column.

Equipment Not Ready/Available If column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
60K BTU/HR IECU
PMCS

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0072, Item 1)
Materials/Parts
None
References
WP 0005
WP 0012
WP 0015
WP 0016
WP 0017
WP 0019
WP 0021
WP 0026
WP 0027
WP 0038

References (continued)
WP 0040
WP 0050
WP 0051
WP 0052
WP 0053
WP 0054
WP 0055
WP 0056
WP 0063
WP 0066
WP 0067
WP 0068
WP 0069
Personnel Required
One
Equipment Condition
IECU is shut down (WP 0005)

Table 1. Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If
1	M	Air Filter	A. Remove air filter from in front of evaporator coil to inspect (WP 0026). B. Clean or replace air filter as required (WP 0026).	Dirty enough to cause obstructed air flow.
2	M	Circuit Breaker	A. Check circuit breaker (CB1) function by cycling from ON to OFF. Power should be removed from IECU in OFF position.	If power does not cycle ON and OFF.
3	Q	Evaporator Compartment	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution. A. Check for cracks or other damage to compartment interior. If damage to frame is found, notify next level of maintenance.	Frame is damaged to point of unsafe operation.

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If
			B. Check for cleanliness of compartment. Clean inside compartment of evaporator as required to make sure adequate air flow is always possible.	Interior of evaporator compartment is obstructed by dirt or other materials.
			C. Check evaporator blower for cleanliness, loose or missing hardware, and any damage. Clean evaporator blower as required. Tighten or replace hardware as required. If evaporator blower is damaged, notify next level of maintenance (WP 0051).	Evaporator blower hardware is loose or missing. Evaporator blower is cracked or damaged.
			D. Check electrical wiring inside evaporator compartment for any evidence of overheating or arcing. If damaged wiring is found, notify next level of maintenance.	Any evidence of overheating or arcing wires is present.
			E. Check evaporator coil for cleanliness or blockage. Clean coil or remove blockage as required.	Obstructed by dirt or other debris.
4	Q	Condenser Fan	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution.	
			A. Clean condenser fan as necessary. **NOTE** The condenser fan is located in the upper condenser portion of the IECU and is secured to the top cover.	Fan is dirty enough to cause reduced air flow.
			B. Check fan for loose or missing hardware, cracks, or other damage. Tighten or replace hardware as required. If fan is damaged, notify next level of maintenance (WP 0050).	Fan is damaged.

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If
5	S	Electrical Components	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution. A. Raise IECU top cover (WP 0005). B. Open electrical box assembly and inspect components and wiring for damage or signs of overheating. Repair or replace if damaged (WP 0040, WP 0063). Transformer (T1) Evaporator Blower Contactor (K1) Compressor Contactor (K2) Heater Contactor (K4) C. Verify top cover safety Pushbutton Switch (S6) operates (WP 0019). D. Lower IECU top cover (WP 0005). E. Verify Remote Box Rotary Selector Switch (S1) operates (WP 0021).	 Electrical system component is damaged or shows signs of overheating. Test fails. IECU top cover is not closed. Test fails.
6	S	Wiring, Cables, Connections	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution. A. Raise IECU top cover (WP 0005). B. Remove end panel assembly (WP 0015). C. Remove rear cover assembly (WP 0016). D. Remove bottom-right side cover assembly (WP 0017). E. Check wires, cables, and harnesses in condenser section and compressor compartment for breaks, cuts, or frayed insulation. If damaged, notify next level of maintenance (WP 0063) to repair. F. Check wires, cables, and harnesses in evaporator section for breaks, cuts, or frayed insulation. If damaged, notify next level of maintenance (WP 0063) to repair. G. Check all electrical connections for tightness, missing hardware, or other damage. Tighten or repair if required.	 Any wire, cable, or harness is damaged. Any wire, cable, or harness is damaged. Any electrical connection is loose, missing, or damaged.

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If
7	S	Tubular heaters	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution. A. Remove bottom-right side cover assembly (WP 0017). B. Inspect each of the three installed U-shaped, tubular heaters for corrosion and cracks. Replace if required (WP 0029). C. Inspect tubular heaters for dirt, dust, or debris accumulation. Clean as required. D. Inspect tubular heaters for signs of arcing where heaters attach to power source. Replace if required (WP 0029). E. Inspect heaters for loose hardware and terminals. Tighten if required. F. Inspect over temperature switches S5 and S10 for loose hardware or terminals. Tighten hardware or resolder connections if required (WP 0063). G. If corrosion, cracks, or arcing are present where tubular heaters attach to power source, replace heaters (WP 0029). H. Install bottom-right side cover assembly (WP 0017)	Tubular heater shows signs of overheating or damage. Tubular heater shows signs of arcing. Hardware or terminals are loose.
8	S	Refrigeration System Components	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution.	

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If
			A. Check refrigeration components for evidence of damage or refrigerant leakage. • High Pressure Cutout Switch S3 (WP 0058) • Compressor (WP 0049) • Left Condenser Coil (WP 0066) • Right Condenser Coil (WP 0067) • Evaporator Coil Assembly (WP 0068) • Suction Metal Hose Assembly (Vibration Damper) (WP 0052) • Discharge Metal Hose Assembly (Vibration Damper) (WP 0053) • Filter-Drier (WP 0054) • Expansion Valve (WP 0055) • Sight Glass (WP 0056) • Suction and Discharge Service Valves (WP 0069) • Fusible Plug (WP 0059)	Any refrigeration system component is damaged or leaking.
			B. Check tubing and fittings for damage, kinks, pinches, and evidence of refrigerant leakage. Repair or replace as required (WP 0038).	Any tube or fitting is damaged or leaking.
			C. Install end panel assembly (WP 0015).	End panel assembly not installed.
			D. Install rear cover assembly (WP 0016).	Rear cover assembly not installed.
			E. Install bottom-right side cover assembly (WP 0017).	Bottom-right side cover assembly not installed.
9	S	Condenser Coils	**WARNING** High voltage and rotating parts are present when IECU is in operation. Make sure power cable is disconnected from power source before working on or inside IECU. Improper operation could result in personal injury or death by electrocution. **NOTE** The condenser coils are located in the upper condenser portion of the IECU. A. Raise IECU top cover (WP 0005).	

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If
			WARNING Coil fins are sharp. Wear gloves while handling a coil. Severe cuts can occur if hands are not protected. If low pressure air is used to clean condenser coils, wear approved safety glasses and hearing protection. Do not use low pressure air if other personnel are in the area.	Left or right condenser coil is damaged or leaking.
			CAUTION Be careful not to damage coils or other components. Do not use hard or sharp objects to clean coils.	
			B. Check left and right outside coils for any visible damage or evidence of refrigerant leakage. If damaged, notify next level of maintenance to replace (WP 0066, WP 0067).	
			C. Clean condenser coils of accumulation of dirt and other debris with low pressure air. Clean any accumulated dirt from coils. **NOTE** In extremely dusty or sandy conditions, weekly cleaning of the condenser coils may be required.	Either condenser coil is dirty enough to obstruct air flow.
			D. Lower IECU top cover (WP 0005).	IECU top cover is not lowered.

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
END PANEL ASSEMBLY
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic Toolkit (WP0072, Item1)
Materials/Parts
Lock Washer (WP 0075, Item 5)
Personnel Required
One
References
WP 0005
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove 29 screws (Figure 1, Item 1), lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) securing end panel (Figure 1, Item 4) assembly to IECU. Discard lock washers.
2. Remove end panel assembly (Figure 1, Item 4) from IECU.
3. Align new end panel assembly (Figure 1, Item 4) in position on left side of IECU.
4. Install 29 screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) to secure end panel assembly (Figure 1, Item 4) to IECU.
5. Tighten screws.
6. Place IECU back into normal operation (WP 0005).

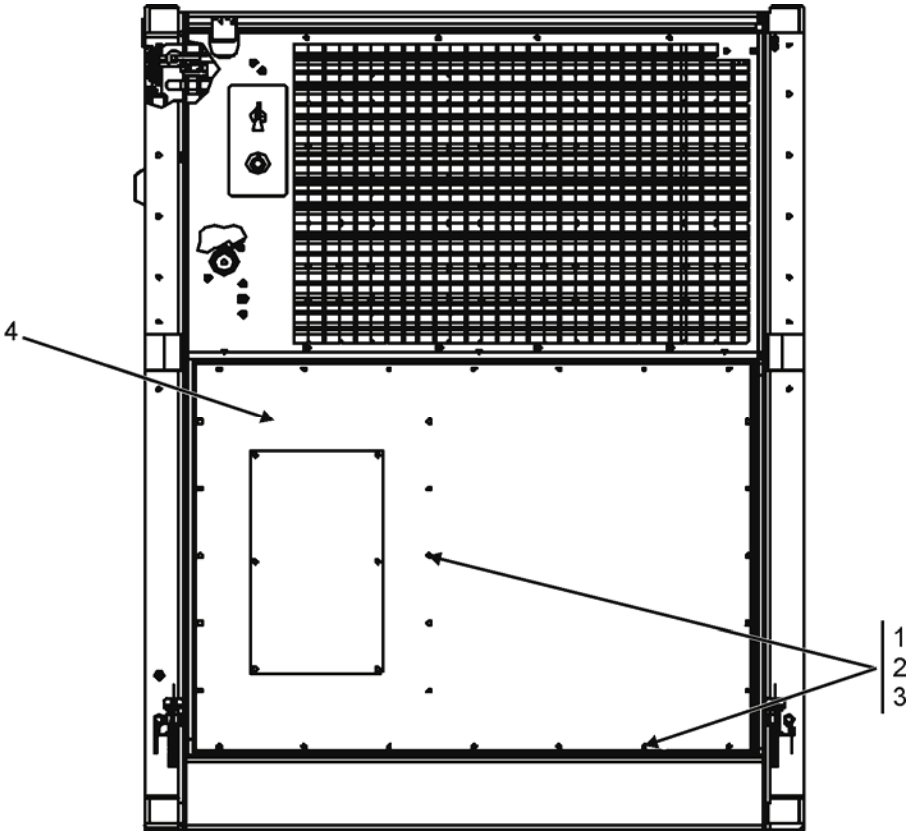


Figure 1. End Panel Assembly

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
REAR COVER ASSEMBLY
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanics Toolkit (WP 0072, Item 1)
Materials/Parts
Lock Washer (WP 0075, Item 5)
Personnel Required
One
References
WP 0005
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove 33 screws (Figure 1, Item 1), lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) securing rear cover assembly (Figure 1, Item 4) to IECU. Discard lock washers.
2. Remove rear cover assembly (Figure 1, Item 4) from IECU.
3. Align new rear cover assembly (Figure 1, Item 4) in position on IECU.
4. Install 33 screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) to secure rear cover assembly (Figure 1, Item 4) to IECU.
5. Tighten screws.
6. Place IECU back into normal operation (WP 0005).

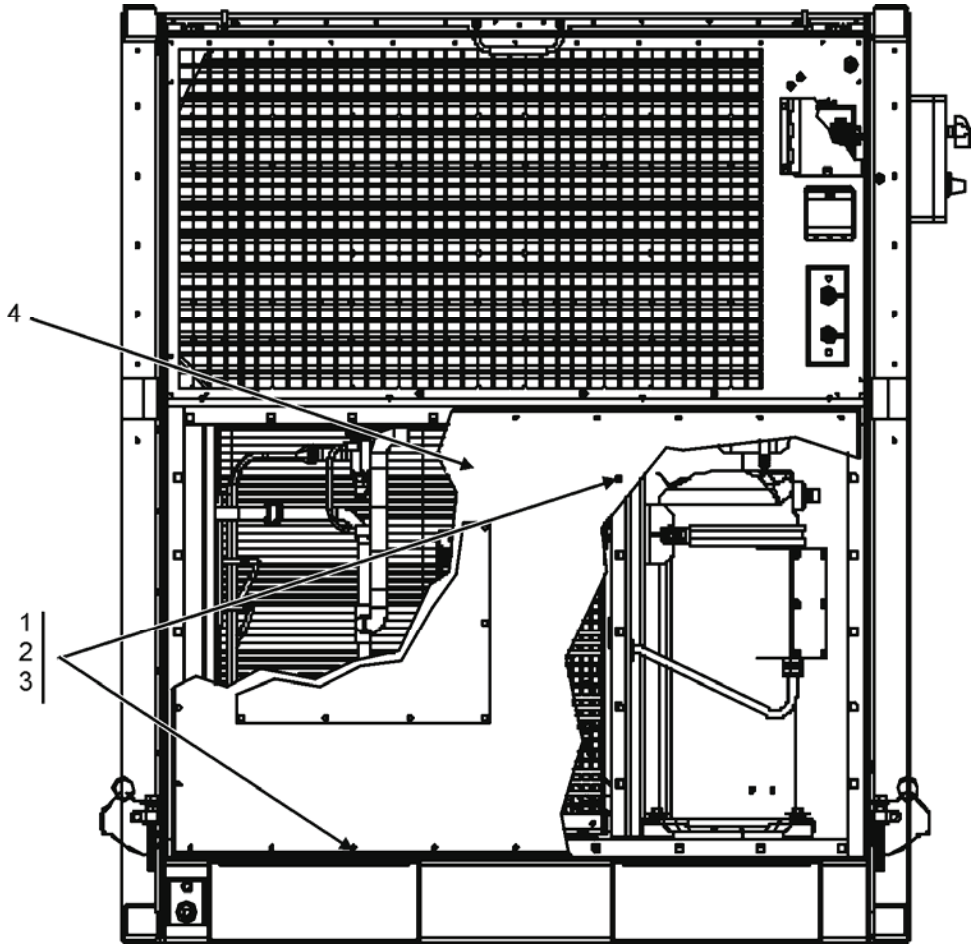


Figure 1. Rear Cover Assembly

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
BOTTOM-RIGHT SIDE COVER ASSEMBLY
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanics Toolkit (WP 0072, Item 1)
Materials/Parts
Lock Washer (WP 0075, Item 5)
Personnel Required
One
References
WP 0005
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove 24 screws (Figure 1, Item 1), lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) securing bottom-right side cover (Figure 1, Item 4) to IECU. Discard lock washers.
2. Remove one bolt (Figure 1, Item 5), lock washer (Figure 1, Item 6), and flat washer (Figure 1, Item 7) securing bottom-right side cover (Figure 1, Item 4) to IECU. Discard lock washer.
3. Remove bottom-right side cover (Figure 1, Item 4) from IECU.
4. Align new bottom-right side cover (Figure 1, Item 4) in position on IECU.
5. Install one bolt (Figure 1, Item 5), new lock washer (Figure 1, Item 6), and flat washer (Figure 1, Item 7) to secure bottom-right side cover (Figure 1, Item 4) to IECU.
6. Install 24 screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) to secure bottom-right side cover (Figure 1, Item 4) to IECU.
7. Tighten screws and bolt to secure bottom-right side cover (Figure 1, Item 4) to IECU.
8. Place IECU back into normal operation (WP 0005).

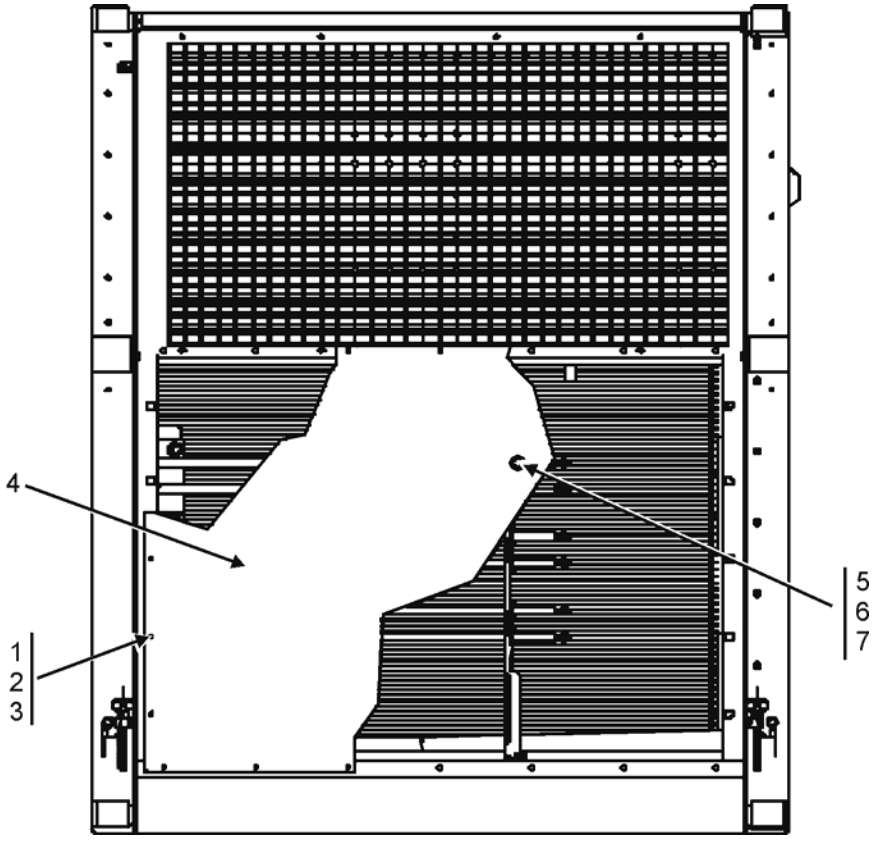


Figure 1. Bottom-Right Side Cover Assembly

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
FLANGE ASSEMBLY
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanics Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0005
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Loosen clamp (Figure 1, Item 1) securing flexible duct (Figure 1, Item 2) to flange assembly (Figure 1, Item 3).
2. Remove flexible duct (Figure 1, Item 2) from flange assembly (Figure 1, Item 3).
3. Rotate flange assembly (Figure 1, Item 3) counterclockwise to unlock.
4. Remove flange assembly (Figure 1, Item 3) from return opening.
5. Install new flange assembly (Figure 1, Item 3) by aligning then inserting locking tabs on flange assembly (Figure 1, Item 3) into return opening.
6. Turn flange assembly clockwise to engage locking tabs.
7. Install flexible duct (Figure 1, Item 2) onto flange assembly (Figure 1, Item 3) and tighten clamp (Figure 1, Item 1).

NOTE

The flexible duct can be installed at the FRESH AIR setting on the flange assembly if fresh air is required.

8. Power up IECU (WP 0005).
9. Check for air leaks around flange assembly (Figure 1, Item 3) and flexible duct (Figure 1, Item 2).
10. Place IECU back into normal operation (WP 0005).

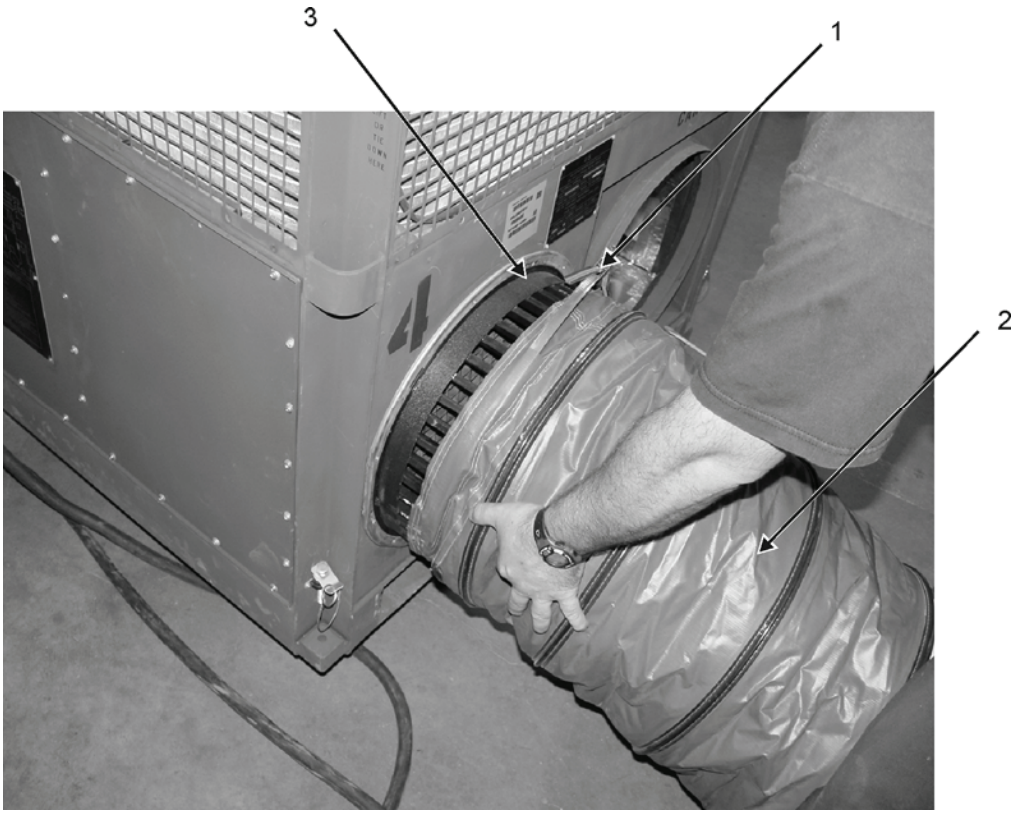


Figure 1. Flange Assembly

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
PUSHBUTTON SWITCH (S6)
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanics Toolkit (WP 0072, Item 1)
Materials/Parts
Lock washers (WP 0075, Item 5)
Personnel Required
Two
References
WP 0005
WP 0012
WP 0035
WP 0040
TM 9-4120-431-24P
Equipment Condition
IECU is powered up (WP 0005)
Top cover is lowered (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

NOTE

Pushbutton switch S6 is a safety device that interrupts power to the IECU and shuts it down if the top cover is opened while the unit is operating. Verification of proper switch operation can be made by physically opening the IECU top cover or by performing an electrical continuity check of the switch activation.

MANUAL TEST

1. Unlatch and slightly open top cover assembly.
   - IECU should shut down.
   - If IECU does not shut down, shut down IECU (WP 0005), and troubleshoot S6 (WP 0012).

2. Close and latch top cover assembly.
   - IECU should restart.
   - If IECU does not start, shut down IECU (WP 0005), and troubleshoot S6 (WP 0012).

3. Place IECU back into normal operation (WP 0005).

OHM TEST

1. Shut down IECU (WP 0005).

2. Place rotary selector switch S1 on remote box to OFF position.

3. Remove electrical box assembly cover (WP 0040).

4. Using a digital multimeter set to ohms-scale, check transformer terminal T1-X1 (WP 0012, Figure 1) to terminal board TB1-1 (WP 0012, Figure 2) for no continuity, indicating switch S6 is open. If meter indication is continuity, troubleshoot safety switch S6 (WP 0012).

5. With digital multimeter leads still on T1-X1 and TB1-1, manually activate safety switch S6 and check that meter reading indicates continuity, indicating safety switch S6 is closed. If meter indication is no continuity, troubleshoot safety switch S6 (WP 0012).

6. Install electrical box assembly cover (WP 0035).

7. Place IECU back into normal operation (WP 0005).

REPLACE

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power is disconnected. Injury or death can occur if connected to power source.

1. Remove two screws and lock washers securing corner flange (Figure 1, Item 1) to IECU frame (Figure 1, Item 2). Discard lock washers.

2. Remove corner flange (Figure 1, Item 1) from IECU frame (Figure 1, Item 2). Retain for reinstallation.

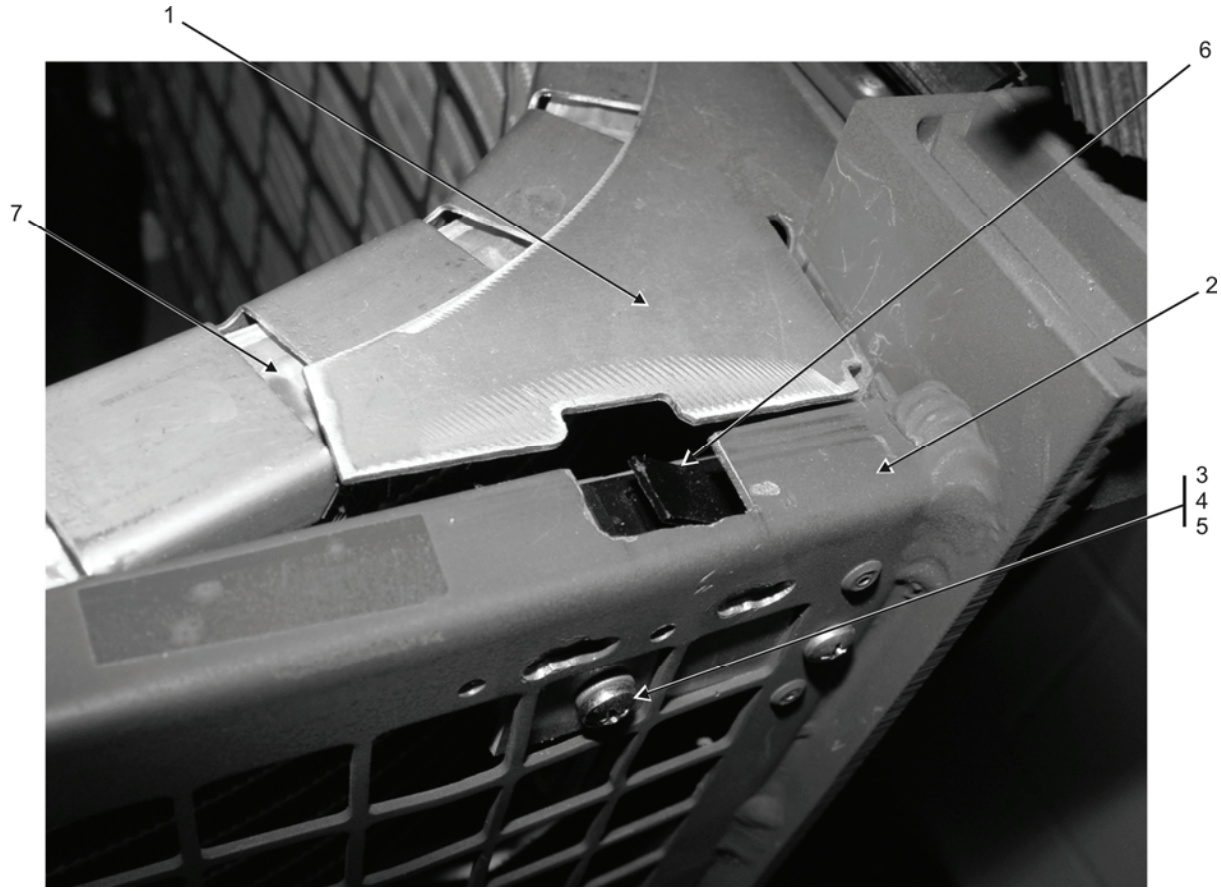


Figure 1. Pushbutton Switch (S6)

NOTE

Hold the switch while loosening the screws to keep it from falling between the condenser and frame of the IECU.

3. Remove two screws (Figure 1, Item 3), lock washers (Figure 1, Item 4), and flat washers (Figure 1, Item 5) securing switch (Figure 1, Item 6) to frame (Figure 1, Item 2). Discard lock washers.
4. Remove switch (Figure 1, Item 6) through opening between frame (Figure 1, Item 2) and condenser coil (Figure 1, Item 7).
5. Tag and disconnect two wires from pushbutton switch (Figure 1, Item 6).

NOTE

Do not allow wires to drop between condenser coil and frame.

6. Discard switch (Figure 1, Item 6).
7. Reconnect two wires to new switch (Figure 1, Item 6) as tagged.
8. Remove wire tags.
9. Install new switch (Figure 1, Item 6) to IECU frame and secure using two screws (Figure 1, Item 3), new lock washers (Figure 1, Item 4), and flat washers (Figure 1, Item 5).
10. Tighten screws.
11. Reinstall corner flange (Figure 1, Item 1) to IECU frame (Figure 1, Item 2) and secure using two screws, new lock washers, and flat washers.
12. Close top cover (WP 0005).
13. Test pushbutton switch (Figure 1, Item 6) per this WP.
14. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
CONDENSER FAN PRESSURE SWITCH (S4)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Service Refrigeration Ordnance Toolkit (WP 0072, Item 3)

Materials/Parts
None

Personnel Required
Two

References
WP 0005
WP 0012
WP 0036
WP 0041

Equipment Condition
IECU is powered up (WP 0005)

NOTE

Condenser fan pressure switch (S4) settings are factory set and cannot be changed. When refrigerant pressure at condenser drops to 280 psig ±10 psig, switch S4 opens and the condenser fan stops, which increases refrigerant pressure. When refrigerant pressure rises to 370 psig ±15 psig, switch S4 closes and condenser fan starts, which decreases refrigerant pressure.

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. On remote box assembly (Figure 1, Item 1), place rotary selector switch S1 (Figure 1, Item 2) to COOL position.
2. Rotate TEMPERATURE knob (Figure 1, Item 3) to COOLER position.
3. Visually check that condenser fan is operating and evaporator blower is operating.
4. Check that compressor motor is operating by observing sight glass for refrigerant flow.
5. Loosen three captive screws (Figure 2, Item 1) to open hinged panel (Figure 2, Item 2) on outside of IECU to access diagnostic connectors (J5) (Figure 2, Item 4) and (J6) (Figure 2, Item 4).
6. Set digital multimeter to read volts AC.
7. Insert multimeter positive (+) and negative (-) probes between pins 3 and 2 of J6 connector (Figure 2, Item 4), then monitor multimeter display. If conditions below are not met, troubleshoot S4 (WP 0012).
   - 24 VAC indicates S4 is open and condenser fan will be off.
   - <1.0 VAC indicates S4 is closed and condenser fan will be on.
8. Allow system to operate long enough for S4 to cycle on and off.

- x If S4 cycles on and off as normal, omit step 9 and continue to step 10 of this procedure.

9. Connect gauge set to suction service valve (V2) and discharge service valve (V3) (Figure 2, Item 5) and monitor compressor discharge pressure (WP 0036).
   - x When pressure is >370 psig (+/- 15 psig), condenser fan pressure switch S4 should close and turn on condenser fan. If not, replace S4 (WP 0041).
   - x When pressure is <280 psig (+/- 10 psig), condenser fan pressure switch S4 should close and turn off condenser fan. If not, replace S4 (WP 0041).

10. Close hinged panel (Figure 2, Item 2) and secure using three screws (Figure 2, Item 1).

11. Disconnect gauge set (WP 0036).

12. Shut down IECU (WP 0005).

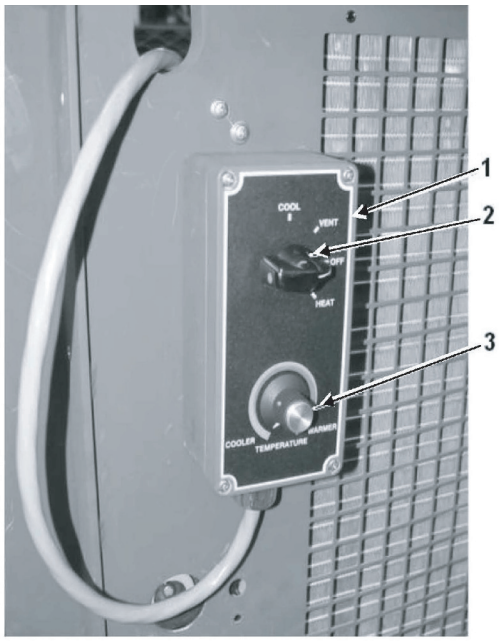
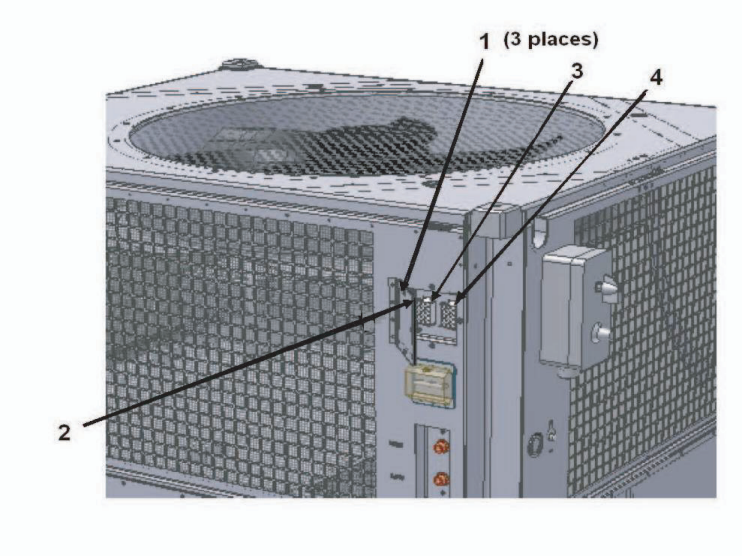
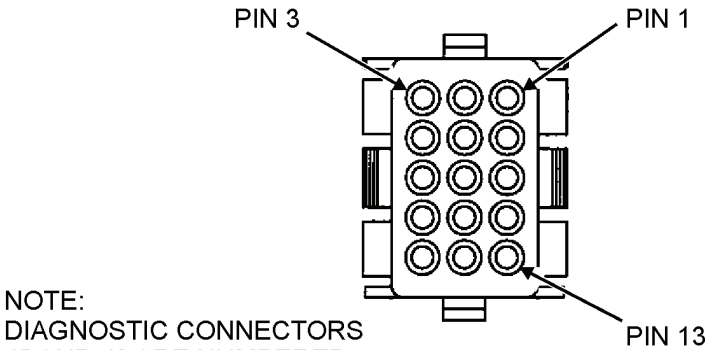


Figure 1. Remote Box Assembly





NOTE:
DIAGNOSTIC CONNECTORS J5 AND J6 ARE NUMBERED RIGHT TO LEFT FROM TOP TO BOTTOM, 1 THROUGH 15

Figure 2. Diagnostic Connectors J5 and J6 Pin Out

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
REMOTE BOX ASSEMBLY
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0012
Equipment Condition
IECU is powered up (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

TEST

NOTE

The temperature inside the shelter, or area being cooled or heated, needs to be between 60° F and 90° F when performing the remote box assembly test procedure.

1. Place rotary selector switch (Figure 1, Item 1) to VENT position.
2. Make sure evaporator blower motor operates. Check for noise and vibration.
3. Make sure condenser fan motor, compressor, and heaters are not operating.
4. Rotate TEMPERATURE knob (Figure 1, Item 2) to COOLER position.
5. Place rotary selector switch (Figure 1, Item 1) to COOL position.
6. Make sure evaporator blower motor operates and that, after approximately one-minute, compressor motor operates with refrigerant flow to expansion valve by visually inspecting refrigerant sight glass for liquid flow, and that condenser fan motor operates.

NOTE

Normally the compressor can be heard when it starts operating. If operating the IECU in a noisy environment, compressor startup may not be heard but can be verified by visually checking to see that refrigerant flow is present in sight glass.

7. Rotate TEMPERATURE knob (Figure 1, Item 2) to WARMER position.
8. Make sure evaporator blower motor operates and compressor motor, condenser fan motor, and heaters are not operating.
9. Place rotary selector switch (Figure 1, Item 1) to HEAT position.

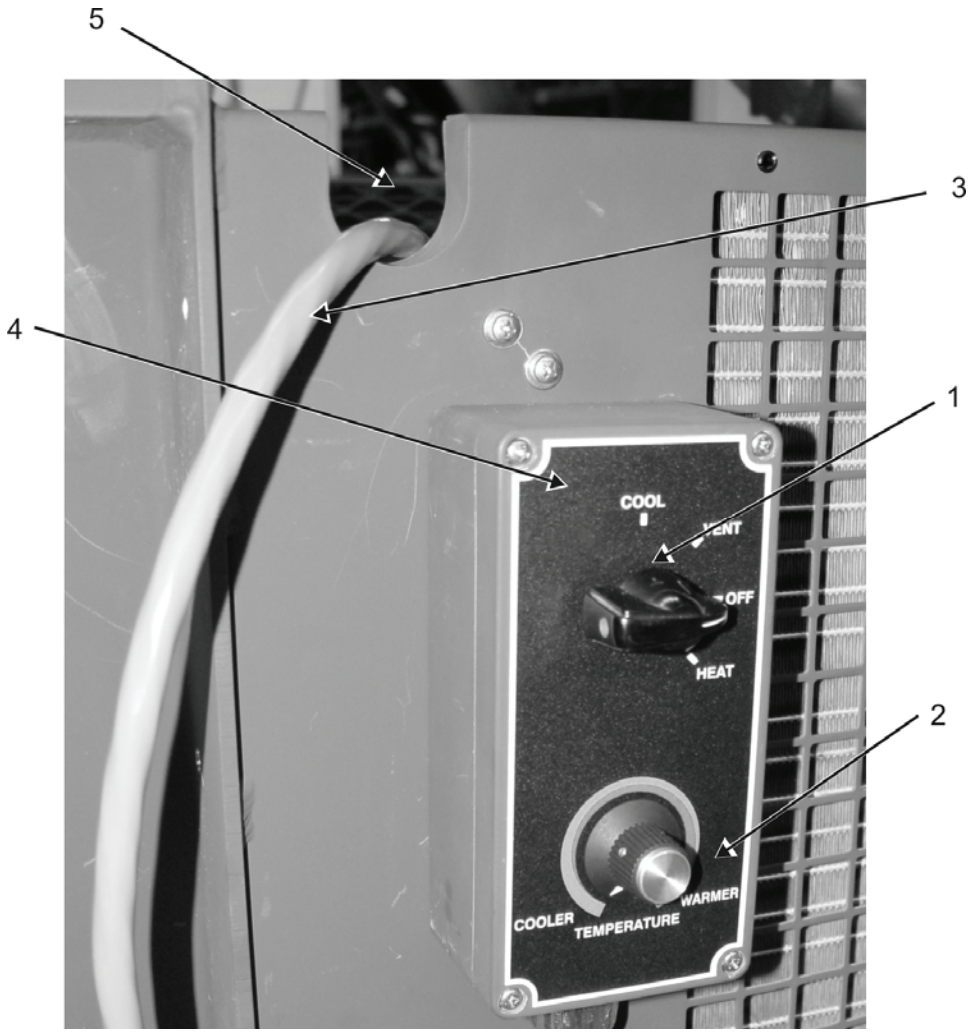


Figure 1. Remote Box Assembly

NOTE

TEMPERATURE knob should still be in the WARMER position.

10. Make sure that evaporator blower motor and heaters operate.
11. Make sure compressor and condenser fan motors are not operating.
12. Rotate TEMPERATURE knob to COOLER position.
13. With return air temperature above 70° F, make sure heaters are not operating and evaporator blower motor is operating.
14. If IECU fails above tests, troubleshoot remote box assembly (WP 0012).

REPLACE

1. Shut down IECU (WP 0005).
2. Raise and secure top cover (WP 0005).
3. Disconnect remote box assembly cable connector (P2) (Figure 2, Item 1) from electrical box assembly receptacle (J2) (Figure 2, Item 2).

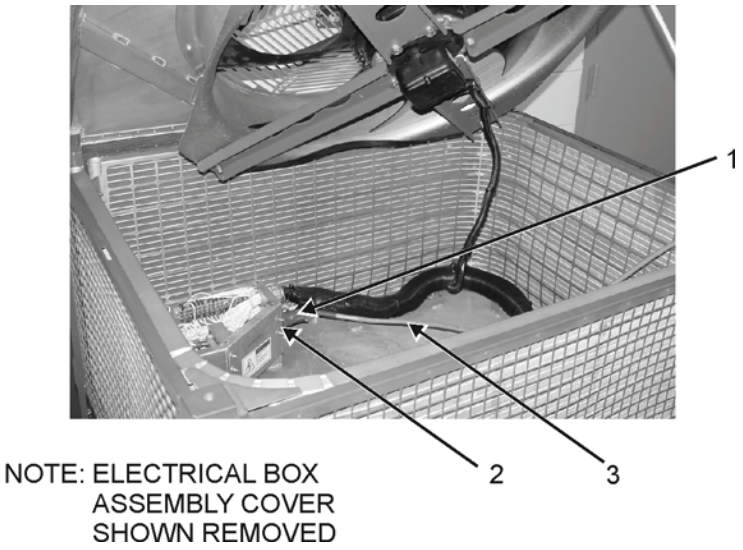


Figure 2. Electrical Box Assembly

4. Loosen two captive fasteners (Figure 3, Item 1) on inside of unit attaching remote box assembly to unit.
5. Remove cable assembly (Figure 2, Item 3) and remote box assembly (Figure 1, Item 2).
6. Connect new remote box assembly cable connector (P2) (Figure 2, Item 1) to electrical box assembly receptacle (J2) (Figure 2, Item 2).
7. Route cable (Figure 1, Item 1) and remote box assembly outside of IECU through deployment opening on frame (Figure 1, Item 3).
8. Mount new remote box assembly (Figure 1, Item 2) to IECU exterior surface using two captive fasteners (Figure 3, Item 1).
9. Lower top cover (WP 0005).
10. Test remote box assembly per this WP.
11. Place IECU back into normal operation (WP 0005).

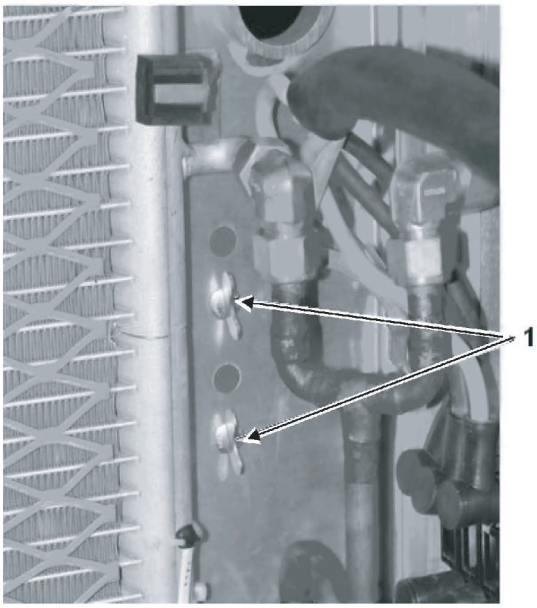


Figure 3. Captive Fasteners

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
PRECISION BIMETAL THERMOSTAT (S8)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0044
Equipment Condition
IECU is powered up (WP 0005)

NOTE

Precision bimetal thermostat S8 monitors temperature of the outlet side of evaporator coils and opens when coil temperature drops below 30° F. The Variable Frequency Drive (VFD) will stop compressor to allow evaporator coil to warm up. This will raise evaporator coil temperature and keep ice off evaporator coils. The thermostat will close at 40° F. Settings for the bimetal thermostat are factory set and nonadjustable.

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. On remote box assembly (Figure 1, Item 1), place rotary selector switch (Figure 1, Item 2) to COOL position.
2. Rotate TEMPERATURE knob (Figure 1, Item 3) to COOLER position.
3. Make sure evaporator blower motor operates and that, after approximately one-minute, compressor motor operates with refrigerant flow to expansion valve by visually inspecting refrigerant sight glass for liquid flow, and that condenser fan motor operates.

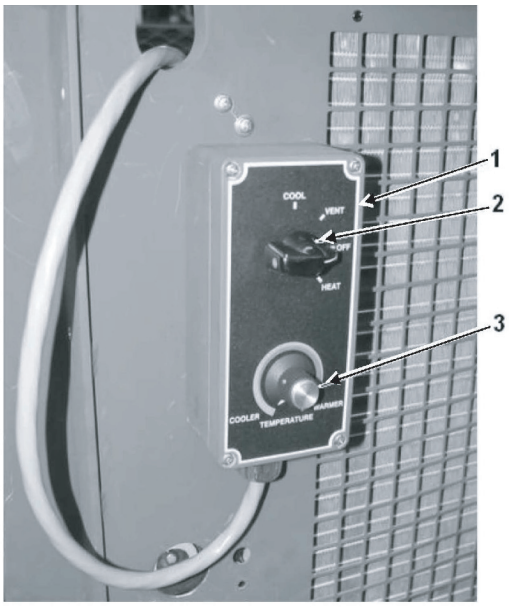


Figure 1. Remote Box Assembly

4. Loosen three screws (Figure 2, Item 1) to open hinged panel (Figure 2, Item 2) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 2, Items 3 and 4).

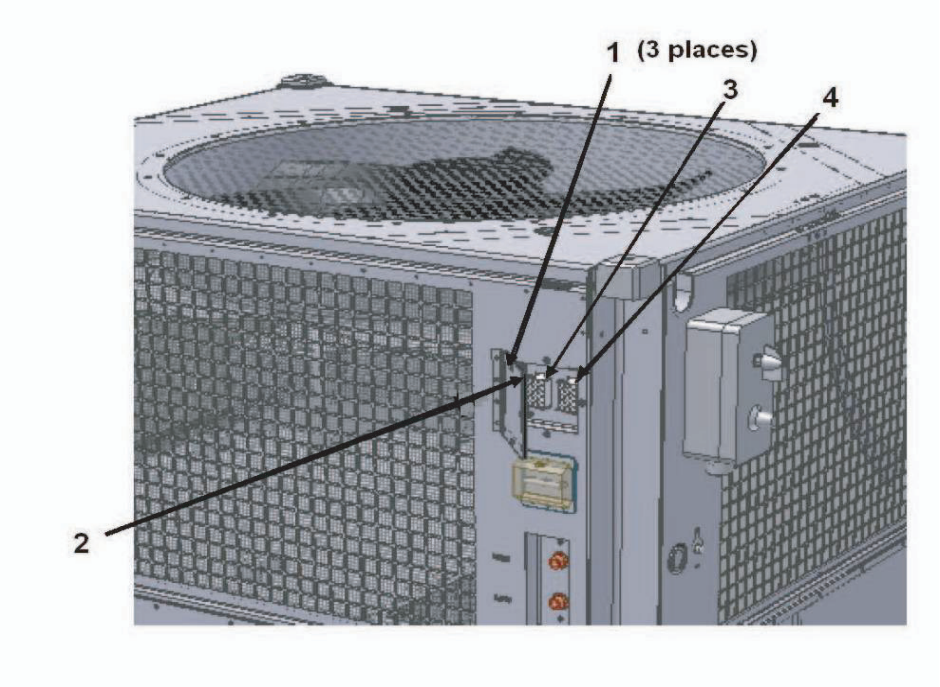


Figure 2. Diagnostic Connectors (J5 and J6)

5. Set digital multimeter to read volts DC.

6. Block off return air inlet (Figure 3, Item 1).

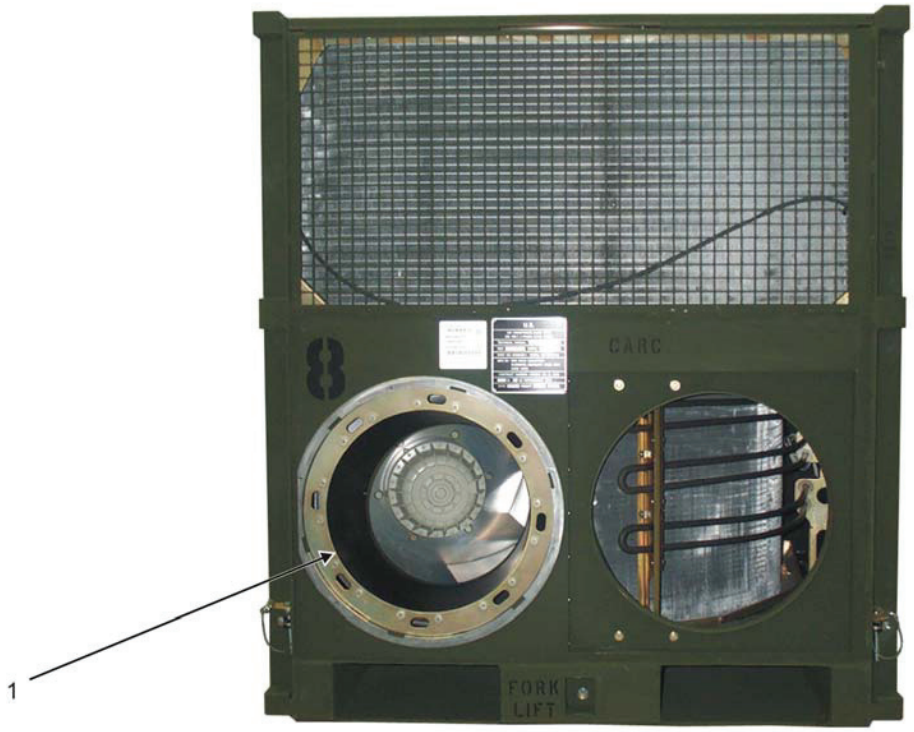


Figure 3. Return Air Inlet

7. Insert multimeter positive (+) and negative (-) probes between pins 15 and 12 (Figure 4) of J6 connector (Figure 2, Item 4), then monitor multimeter display.
   - 15 VDC indicates S8 is closed and compressor runs at normal speed.
   - <1.0 VDC indicates S8 is open and compressor stops.

8. Allow system to run until S8 opens and the compressor stops. This may require several minutes.

9. If condenser and compressor do not shut down after several minutes, notify next level of maintenance to replace S8 switch (WP 0044).

10. Remove multimeter probes from J6 connector (Figure 2, Item 4).

11. Close hinged panel (Figure 2, Item 2) and secure using three screws (Figure 2, Item 1).

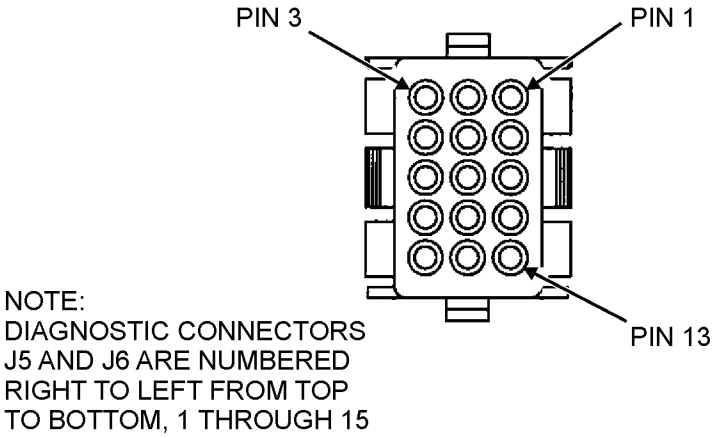


Figure 4. Diagnostic Connectors J5 and J6 Pin Out

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
PRECISION BIMETAL THERMOSTAT (S9)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
None
Equipment Condition
IECU is powered up (WP 0005)

NOTE

Bimetal thermostat switch (S9) monitors temperature of air flow to evaporator coil and actuates (opens) when air temperature exceeds 115° F. The Variable Frequency Drive (VFD) will decrease compressor speed to a low level of 48 Hz so the compressor does not overload when it operates at a high air temperature. The thermostat will close below 109° F. Settings for the bimetal thermostat are factory set and nonadjustable.

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. On remote box assembly (Figure 1, Item 1), place rotary selector switch (Figure 1, Item 2) to COOL position.
2. Rotate TEMPERATURE knob (Figure 1, Item 3) to COOLER position.
3. Make sure evaporator blower motor operates and that, after approximately one-minute, compressor motor operates with refrigerant flow to expansion valve by visually inspecting refrigerant sight glass for liquid flow, and that condenser fan motor operates.

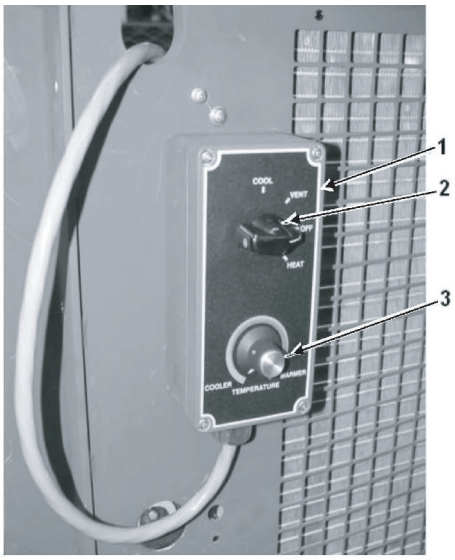


Figure 1. Remote Box Assembly

4. Loosen three screws (Figure 2, Item 1) to open hinged panel (Figure 2, Item 2) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 2, Items 3 and 4).

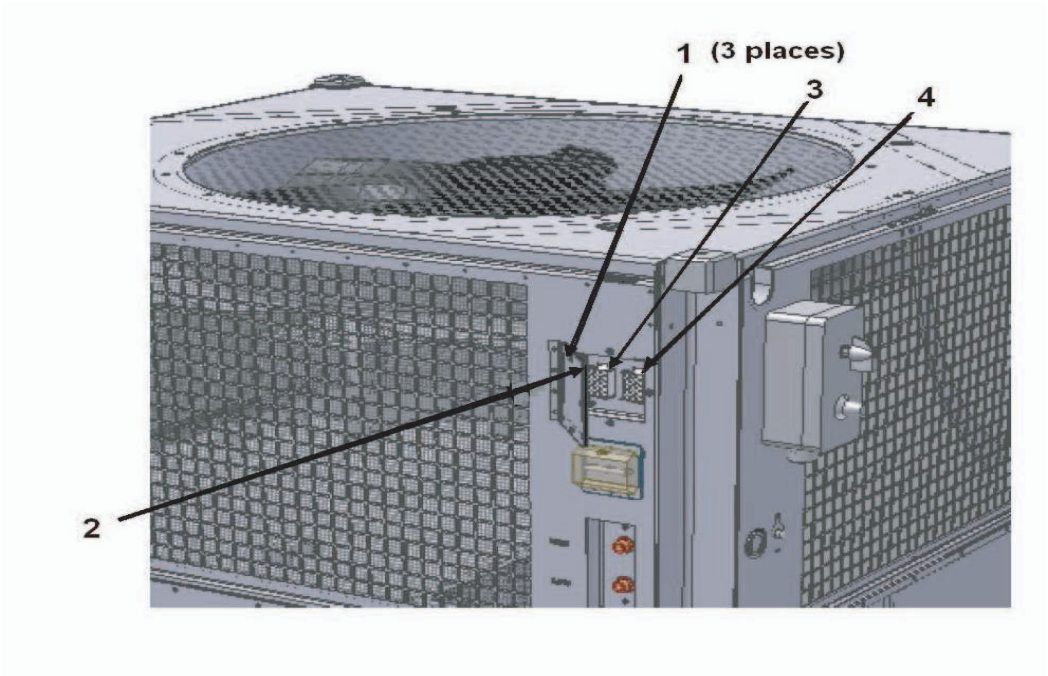


Figure 2. Diagnostic Connectors (J5 and J6)

5. Set digital multimeter to read volts DC.

NOTE

When checking evaporator coil air inlet temperature switch S9 status, the measured parameter is DC volts. The voltage check can be measured between diagnostic connector pins J6-13 and J6-15 (reference Figure 3). If the switch is open, the reading will be less than 1 VDC. If the switch is closed, the reading will be approximately 15 VDC.

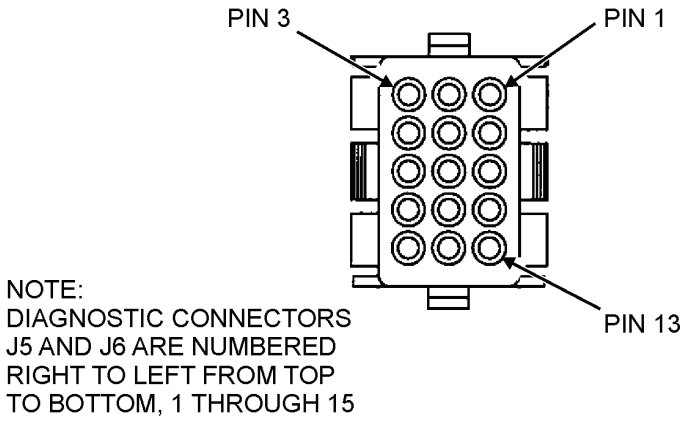


Figure 3. Diagnostic Connectors J5 and J6 Pin Out

6. Insert multimeter positive (+) and negative (-) probes between pins J6-13 and J6-15 (Figure 3) of J6 connector (Figure 2, Item 4), then monitor multimeter display.
   - 15 VDC indicates S9 is closed and compressor runs at normal speed.
   - <1 VDC indicates S9 is open and compressor runs at low speed

NOTE

S9 is closed at normal room temperature. It switches from closed to open when the temperature goes above 115º F.

7. Verify status (open or closed) of S9 is correct based on indoor temperature (return air temperature). If S9 status is not correct, troubleshoot S9 (WP 0012).

NOTE

A defective S9 switch may not be apparent under most operating conditions. Frequent VFD or compressor overload conditions at extremely high ambient temperature may be an indication of a defective S9 switch.

8. Remove multimeter probes from J6 connector (Figure 2, Item 4).

9. Close hinged panel (Figure 2, Item 2) and secure using three captive screws (Figure 2, Item 1).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
THERMOSTATIC SWITCH (S5)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0046
Equipment Condition
IECU is shut down (WP 0005)

NOTE

High temperature cutout thermostatic switch S5 is a normally closed switch designed to open and interrupt power to the three IECU heaters if temperatures inside the evaporator compartment exceed 190° F. The switch will remain open until evaporator compartment returns to safe operating temperatures of <120° F. The only way to test the switch outside of inducing an overheat condition in the evaporator compartment is to remove the switch, and desolder the leads from it in order to ohm out the switch internal elements.

TEST

1. Start IECU and place rotary selector switch S1 (Figure 1, Item 2) to HEAT position (WP 0005).

2. On remote box assembly (Figure 1, Item 1), rotate potentiometer (PT1) TEMPERATURE knob full clockwise to full WARMER position.

3. Check for no continuity between J5-11 and J5-1 (Figure 2), indicating electrical heater contactor (K4) is open.
   - If ohm reading indicates continuity, indicating K4 closed, replace S5 (WP 0046).

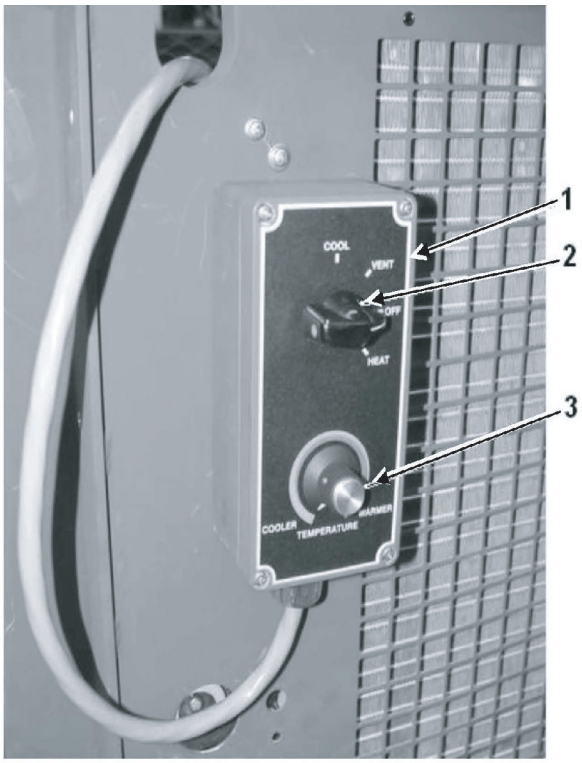


Figure 1. Remote Box Assembly

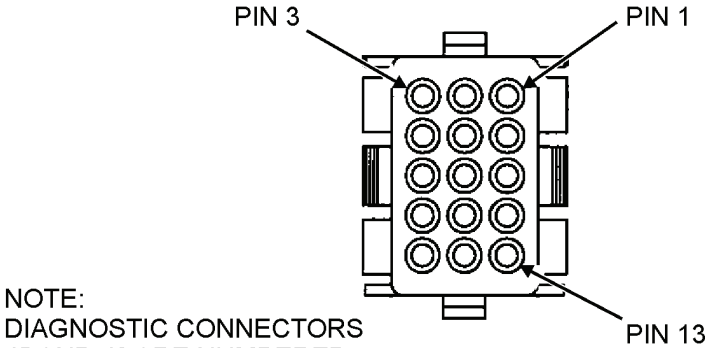


Figure 2. Diagnostic Connectors J5 and J6 Pin Out

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
THERMOSTATIC SWITCH (S10)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0048
Equipment Condition
IECU is powered up (WP 0005)

NOTE

- High temperature cutout thermostatic switch S10 is a normally closed switch designed to open and interrupt power to the coil of the IECU heater contactor K4 if temperatures inside the evaporator compartment exceed 150° F. The switch will remain open until evaporator compartment returns to safe operating temperatures of <120° F.
- The only way to test the switch outside of inducing an overheat condition in the evaporator compartment is to remove the switch, and disconnect the leads from it in order to ohm out switch internal elements.

TEST

1. On remote box assembly, place rotary switch S1 (Figure 1, Item 2) to HEAT position (WP 0005).
2. Rotate TEMPERATURE knob (Figure 1, Item 3) to WARMER (full clockwise) position.
3. Loosen three captive screws (Figure 2, Item 1) to open hinged panel (Figure 2, Item 2) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 2, Items 3, 4).
4. Visually check that evaporator blower is operating.
5. Set digital multimeter to read volts AC.
6. Insert multimeter positive (+) and negative (-) probes between pins 5 and 6 of J6 connector (Figure 2, Item 4), then monitor multimeter display.
   - 24 VAC indicates S10 is open and tubular heaters will be off.
   - <1.0 VAC indicates S10 is closed and tubular heaters will be on if air needs to be heated.
7. If above test fails, replace S10 switch (WP 0048).
8. Close hinged panel (Figure 2, Item 2) and secure using three screws (Figure 2, Item 1).

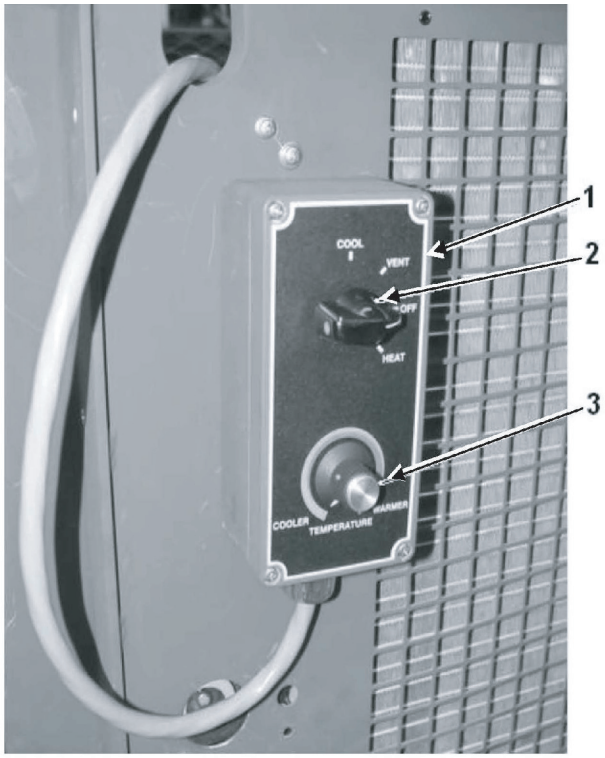
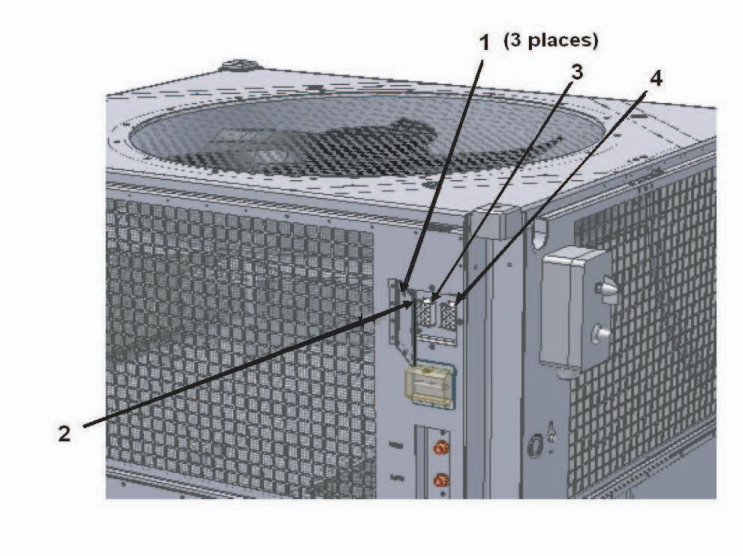


Figure 1. Remote Box Assembly



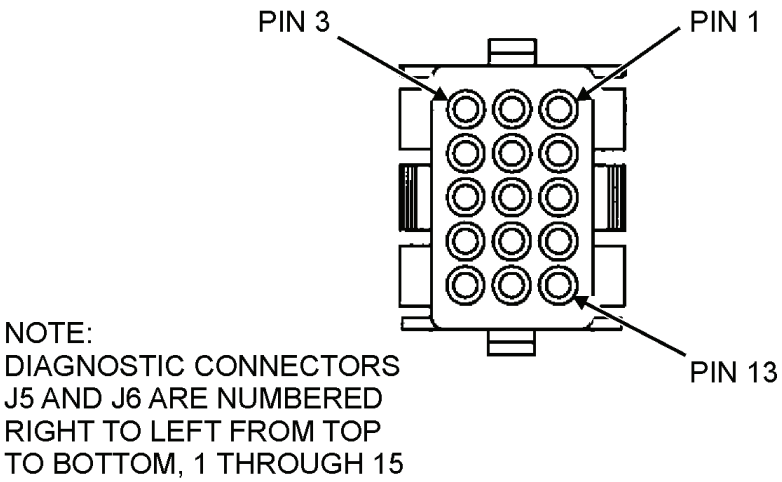


Figure 2. Diagnostic Connectors J5 and J6 Pin Out

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
AIR FILTER
SERVICE, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanics Tool Kit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0016
WP 0039
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

SERVICE

1. Remove rear cover assembly (WP 0016).
2. Remove shielded enclosure assembly (WP 0039).
3. Remove dirty air filter (Figure 1, Item 1) by lifting spring loaded clamp (Figure 2, Item 1) and sliding filter out of unit.

NOTE

The location and positioning of the filter inside of the IECU is somewhat awkward to maneuver. After freeing the filter from the spring loaded clamp, it will have to be maneuvered out from behind piping and or wiring. Remove carefully so as not to damage any wiring.

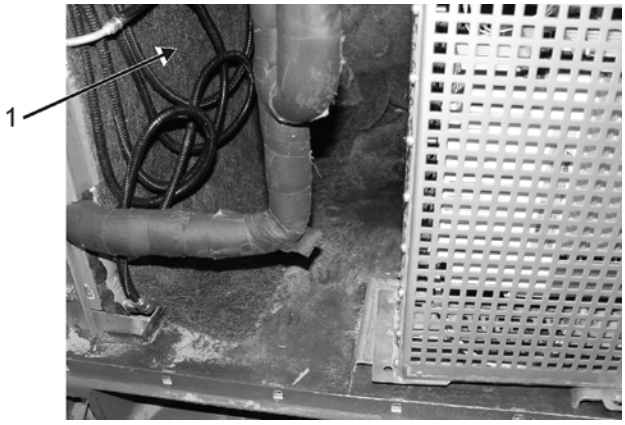


Figure 1. Air Filter Location

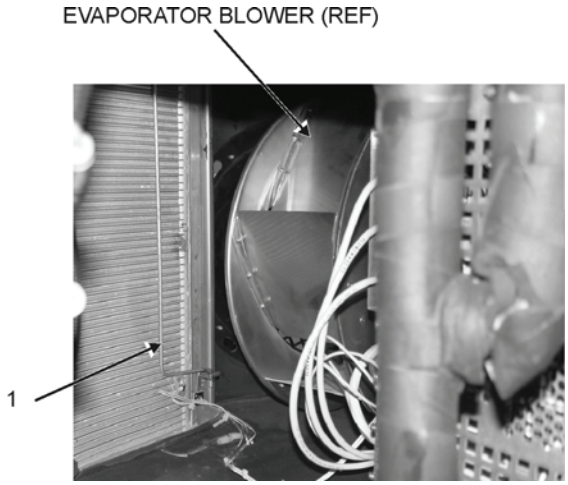


Figure 2. Air Filter Removed

CAUTION

Excessive dust can cause damage to IECU equipment. Make sure there is a good distance between personnel and IECU when shaking air filter

4. Shake air filter downward to remove dust and debris.
5. Rinse air filter in clean water to remove remaining dust.
6. Remove excess water from filter.
7. Install filter (Figure 1, Item 1) in front of evaporator coil using spring loaded clamp (Figure 2, Item 1).
8. Install shielded enclosure assembly (WP 0039).
9. Install rear cover assembly (WP 0016).
10. Place IECU back into normal operation (WP 0005).

REPLACE

1. Remove rear cover assembly (WP 0016).
2. Remove shielded enclosure assembly (WP 0039).
3. Remove dirty air filter (Figure 1, Item 1) by lifting spring loaded clamp (Figure 2, Item 1).
4. Install new air filter in front of evaporator coil using spring loaded clamp (Figure 2, Item 1).
5. Install shielded enclosure assembly (WP 0039).
6. Install rear cover assembly (WP 0016).
7. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
FLEXIBLE DUCT
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0005
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Loosen duct clamp (Figure 1, Item 1) securing flexible duct (Figure 1, Item 2) to IECU.
2. Remove flexible duct (Figure 1, Item 2) from flange assembly (Figure 1, Item 3) on IECU.

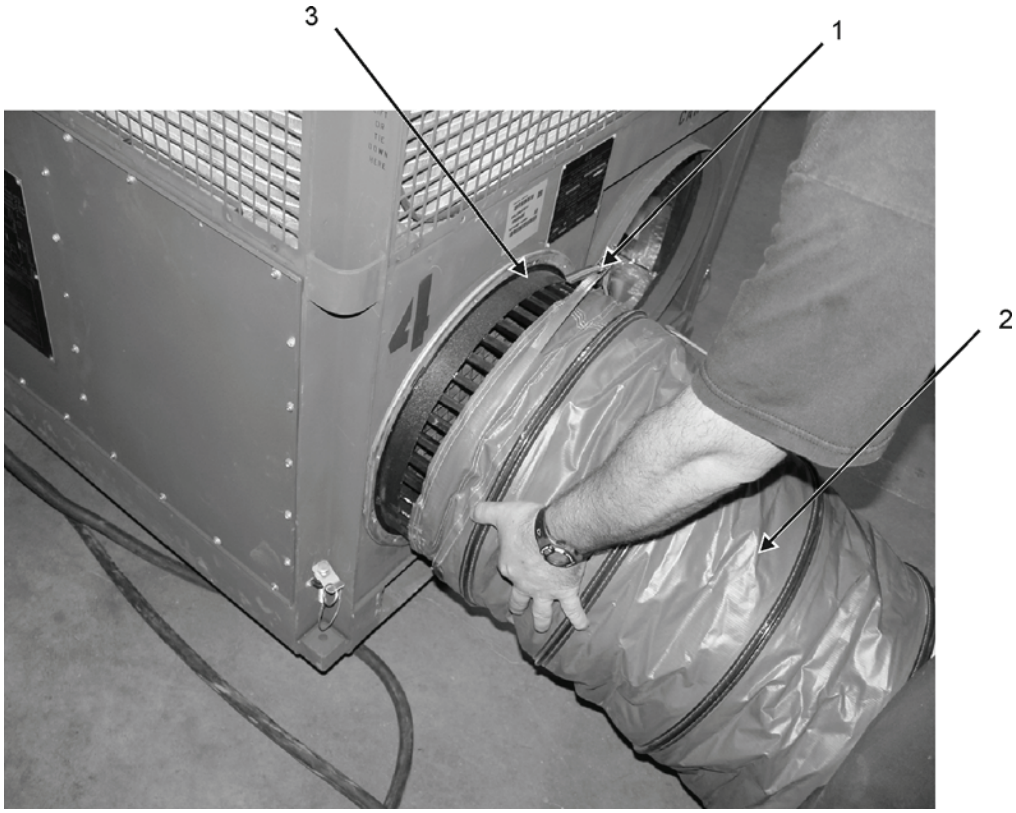


Figure 1. Flange Assembly

3. Loosen duct clamp securing flexible duct to shelter.
4. Remove flexible duct from shelter.
5. Install new flexible duct (Figure 1, Item 2) to shelter.
6. Tighten duct clamp to shelter.
7. Install new flexible duct to (Figure 1, Item 2) IECU flange assembly (Figure 1, Item 3).

NOTE

Flexible duct should be installed or adjusted to FRESH AIR setting (Figure 1, Item 1) if replacing duct with flange assembly.

8. Tighten duct clamp (Figure 1, Item 1).
9. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
CONDENSATE DRAIN TUBING
REPLACE

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
TM 9-4120-431-24P
Equipment Condition
None

REPLACE

1. Disconnect condensate drain tubing (Figure 1, Item 1) from two condensate drain fittings (Figure 1, Item 2) at base of IECU.
2. Disconnect drain tube (Figure 1, Item 3) at tee fitting.
3. Connect new condensate drain tubing (Figure 1, Item 1) to condensate drain fittings (Figure 1, Item 2).
4. Connect drain tubing (Figure 1, Item 3) to tee fitting.

NOTE

For best drainage, make sure tubing slopes down and away from unit and shelter.

5. Roll out 15 feet of tubing away from IECU.

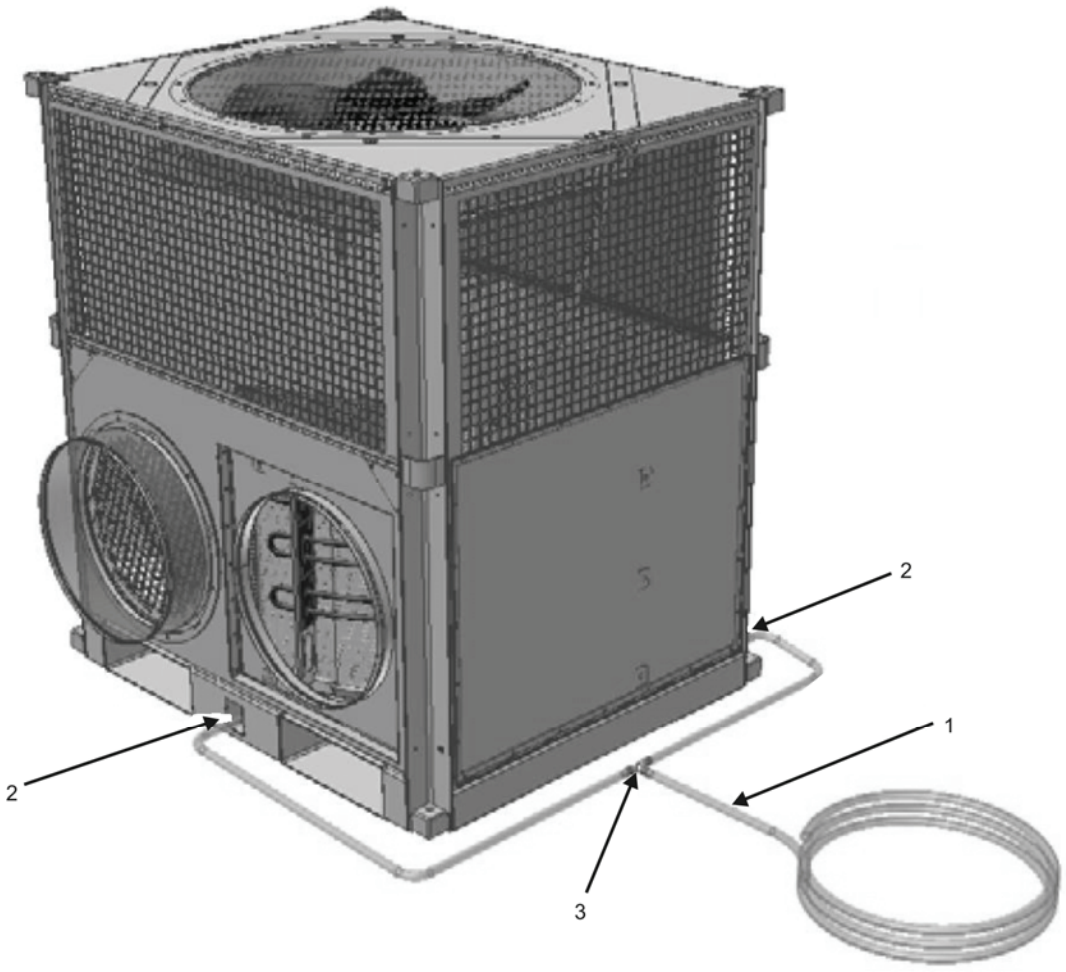


Figure 1. Condensate Drain Tube

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
TUBULAR HEATERS (HR1, HR2, HR3)
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanics Toolkit (WP 0072, Item 1)
Materials/Parts
Lock washers (WP 0075, Item 5)
Personnel Required
One
References
WP 0005
WP 0017
WP 0046
WP 0048
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)
Bottom-right side cover is removed (WP 0017)

TEST

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power is disconnected. Injury or death can occur if connected to power source.
- The heaters are electrically operated and generate heat great enough to cause severe burns. Make sure adequate time is taken after shutting unit down before performing heater maintenance.

1. Pull back two insulation sleeves (Figure 1, Item 1) on each heater tube (Figure 1, Item 2).
2. Set multimeter to ohms-scale to read heater element resistance.

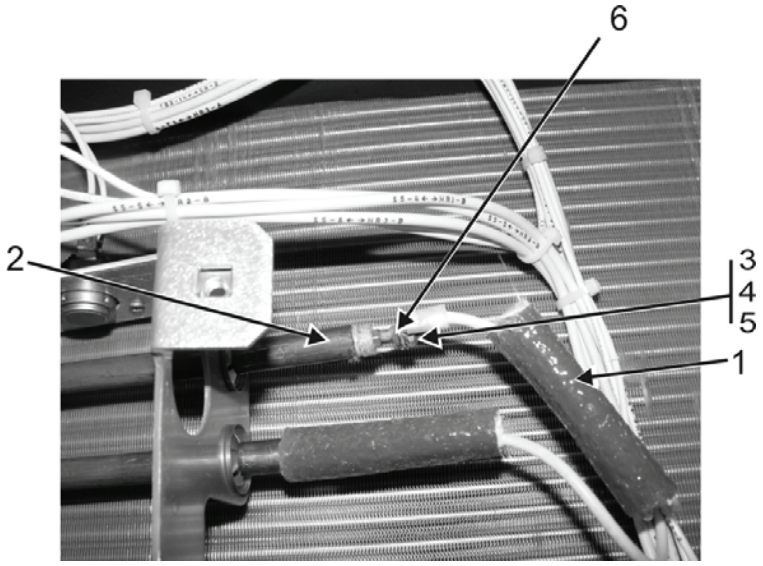


Figure 1. Tubular Heater Wiring

3. Place multimeter probes on both sides of each tubular heater (Figure 1, Item 2) at terminal lugs to read resistance.
    - Each tubular heater element should read resistance of 4.8 ±1 ohms on each.

4. If any tubular heater does not read correct resistance, replace per this WP.

5. Cover terminals with insulation sleeve (Figure 1, Item 1).

6. Install bottom-right side cover to IECU (WP 0017).

7. If repairs were made, operate IECU in HEAT mode to verify heater operation (WP 0005).

8. Place IECU back into normal operation (WP 0005).

REPLACE

WARNING

- Tubular heaters (elements) are hot and can cause serious personal injury. Make sure tubular heaters are cooled to ambient temperature before performing maintenance.

- Evaporator fins are very sharp and can injure personnel. Use extreme care when removing heating elements.

CAUTION

Bending evaporator fins will reduce unit operating efficiency. Use care when removing heating elements so as not to damage evaporator coils fins.

1. Remove S5 (Figure 2, Item 1) from mounting bracket (Figure 2, Item 12) (See WP 0046).

2. Remove S10 (Figure 2, Item 2) from mounting bracket (Figure 2, Item 12) (See WP 0048).

3. Slide insulation sleeves (Figure 1, Item 1) back to expose six electrical terminals of three heater elements.

4. Tag and remove six hex nuts (Figure 1, Item 4) and 12 washers (Figure 1, Item 5) from six heater element electrical terminals (Figure 1, Item 6) and disconnect six ring lugs (Figure 1, Items 3, 4, 5).

5. Remove six hex head bolts (Figure 2, Item 4), lock washers (Figure 2, Item 5), and flat washers (Figure 2, Item 6) securing heater plate (Figure 2, Item 7) to mount bracket (Figure 2, Item 8) at U-shaped end of heater tubes. Discard lock washers.

6. Remove two hex head bolts (Figure 2, Item 9), lock washers (Figure 2, Item 10), and flat washers (Figure 2, Item 11) securing mount bracket (Figure 2, Item 12) to base of IECU at terminal end of heater elements. Discard lock washers.

7. Remove tubular heater elements (Figure 2, Item 13) and mount bracket (Figure 2, Item 12) from IECU as an assembly and put on flat surface.

8. Break six speed nuts (Figure 2, Item 14) securing faulty element to mount bracket (Figure 2, Item 12).

9. Remove each tubular heater element (Figure 2, Item 13) from mount bracket (Figure 2, Item 12).

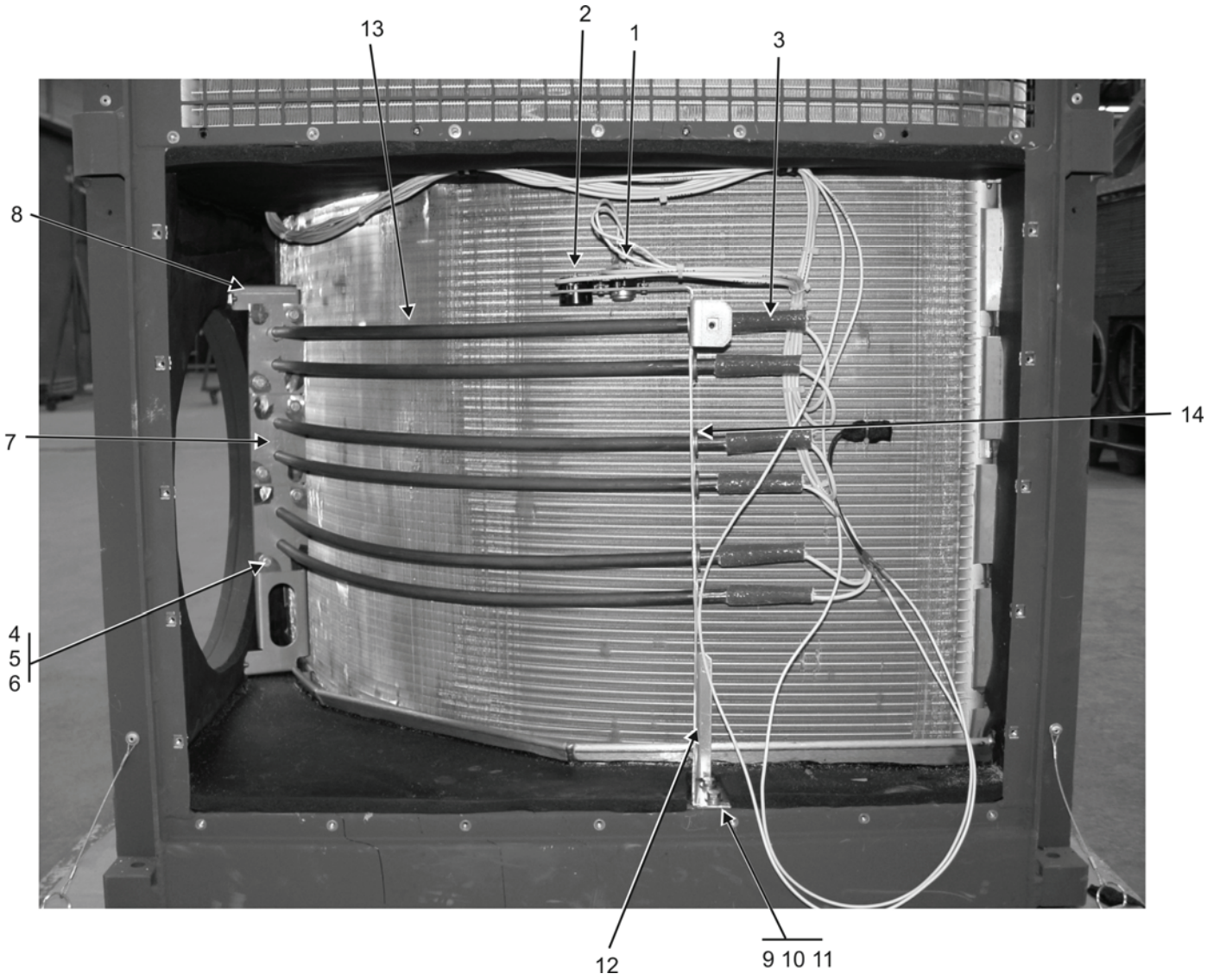


Figure 2. Tubular Heaters on Mount Brackets

10. Insert new tubular heater elements (Figure 2, Item 13) through holes in mount bracket (Figure 2, Item 12) and attach with new speed nuts (Figure 2, Item 14).

11. Install tubular heater elements (Figure 2, Item 13) assembly and mount bracket (Figure 2, Item 12) into IECU with U-shaped ends of element through holes in mount bracket (Figure 2, Item 8).

12. Attach three heater plates (Figure 2, Item 7) to mount bracket (Figure 2, Item 8) with six hex head bolts (Figure 2, Item 4), new lock washers (Figure 2, Item 5), and flat washers (Figure 2, Item 6) at U-shaped end of elements (Figure 2, Item 13). Tighten bolts.

13. Attach terminal end mount bracket (Figure 2, Item 12) to base of IECU with two hex head bolts (Figure 2, Item 9), new lock washers (Figure 2, Item 10), and flat washers (Figure 2, Item 11). Tighten bolts (Figure 2, Item 9).

14. Install S5 (Figure 2, Item 2) to mounting bracket (Figure 2, Item 12) (See WP 0046).

15. Install S10 (Figure 2, Item 3) to mounting bracket (Figure 2, Item 12) (WP 0048).

16. Reconnect six wires (Figure 1, Item 3) to six heater element electrical terminals and secure in position with six hex nuts (Figure 1, Item 4) and 12 washers (Figure 1, Item 5).

17. Cover six electrical terminals with six insulation sleeves (Figure 1, Item 1).

18. Install bottom-right side cover to IECU (WP 0017).

19. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
COMPRESSOR MOUNTING KIT
INSPECT, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0015
WP 0016
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)
End panel is removed (WP 0015)
Rear cover assembly is removed (WP 0016)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

INSPECT

NOTE

There are four rubber grommets and four spacers in compressor mounting kit. When replacing the rubber grommet, always replace all four.

1. Use wiping rag to clean oil residue off four compressor mounts and surrounding area.
2. Check rubber grommets (Figure 1, Item 9) for cracks, hardness, and wear. Replace per this WP if worn or damaged.
3. Check bolts (Figure 1, Item 1) for tightness. Tighten as necessary.
4. Install end panel assembly (WP 0015).
5. Install rear cover assembly (WP 0016).
6. Place IECU back into normal operation (WP 0005).

REPLACE

1. Remove bolt (Figure 1, Item 1), lock washer (Figure 1, Item 2), and flat washer (Figure 1, Item 3) from both sides of bracket clamp (Figure 1, Item 4). Discard lock washer.
2. Remove four mount bolts (Figure 1, Item 6), then tilt compressor slightly to remove lock washers (Figure 1, Item 7), and large washers (Figure 1, Item 8) securing compressor (Figure 1, Item 5) to channel (Figure 1, Item 10). Discard lock washers.

NOTE

Four grommets and four spacers make up the compressor mounting kit, one for each mount. Replace each mount completely before moving to the next mount.

3. Carefully remove spacer from center of grommet (Figure 1, Item 9), and remove grommet. Discard spacer and grommet.
4. Slide new grommet (Figure 1, Item 9) in place and push tapered top through hole in base of compressor (Figure 1, Item 5).
5. Insert new spacer in hole in top of grommet (Figure 1, Item 9).
6. Repeat steps 3 through 5 until all grommets and spacers have been replaced.
7. Align with holes in channel and secure compressor (Figure 1, Item 5) with large flat washer (Figure 1, Item 8), new lock washer (Figure 1, Item 7), and bolt (Figure 1, Item 6).
8. Tighten four bolts (Figure 1, Item 6).
9. Install bracket clamp (Figure 1, Item 4) with flat washers (Figure 1, Item 3), new lock washers (Figure 1, Item 2), and bolts (Figure 1, Item 1).
10. Install rear cover assembly (WP 0016).
11. Install end panel assembly (WP 0015).
12. Place IECU back into normal operation (WP 0005).

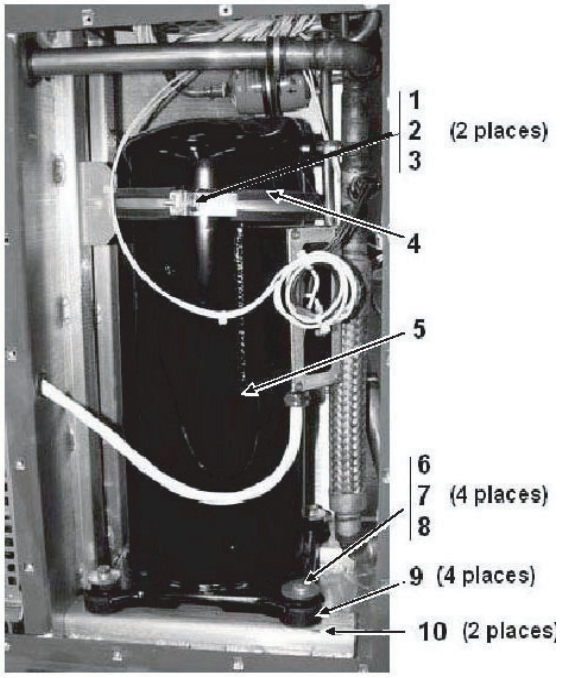


Figure 1. Compressor Mounting Kit

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
CONDENSER FAN (B3)
TEST

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
WP 0005
Equipment Condition
IECU is powered up (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

TEST

1. On remote box assembly (Figure 1, Item 1), place selector switch (Figure 1, Item 2) to COOL position.

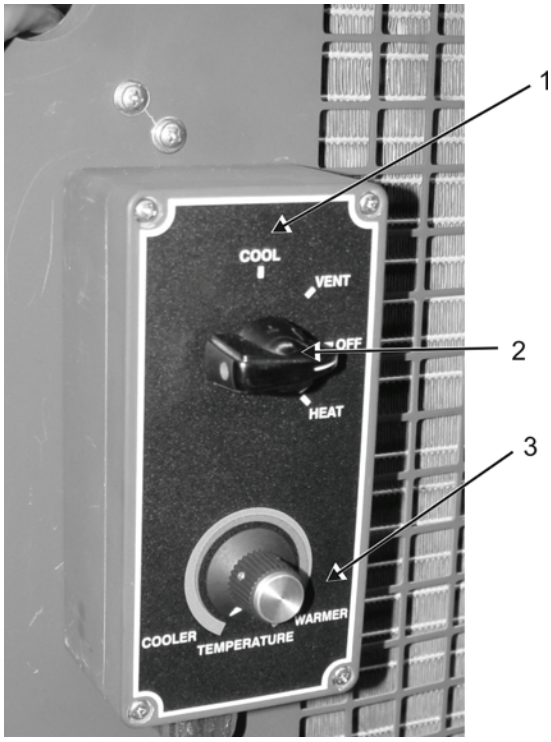


Figure 1. Remote Box Assembly

2. Rotate TEMPERATURE knob (Figure 1, Item 3) to COOLER position.

NOTE

Fan operation can be confirmed visually and audibly. There may be a delay of several minutes before the condenser fan starts, especially if the ambient temperature is low.

3. Make sure condenser fan is operating.
4. Listen for noises that are unrelated to normal operation of IECU.
5. Feel IECU for vibration unrelated to normal operation of IECU.
6. Check air flow for correct flow direction per Figure 2.

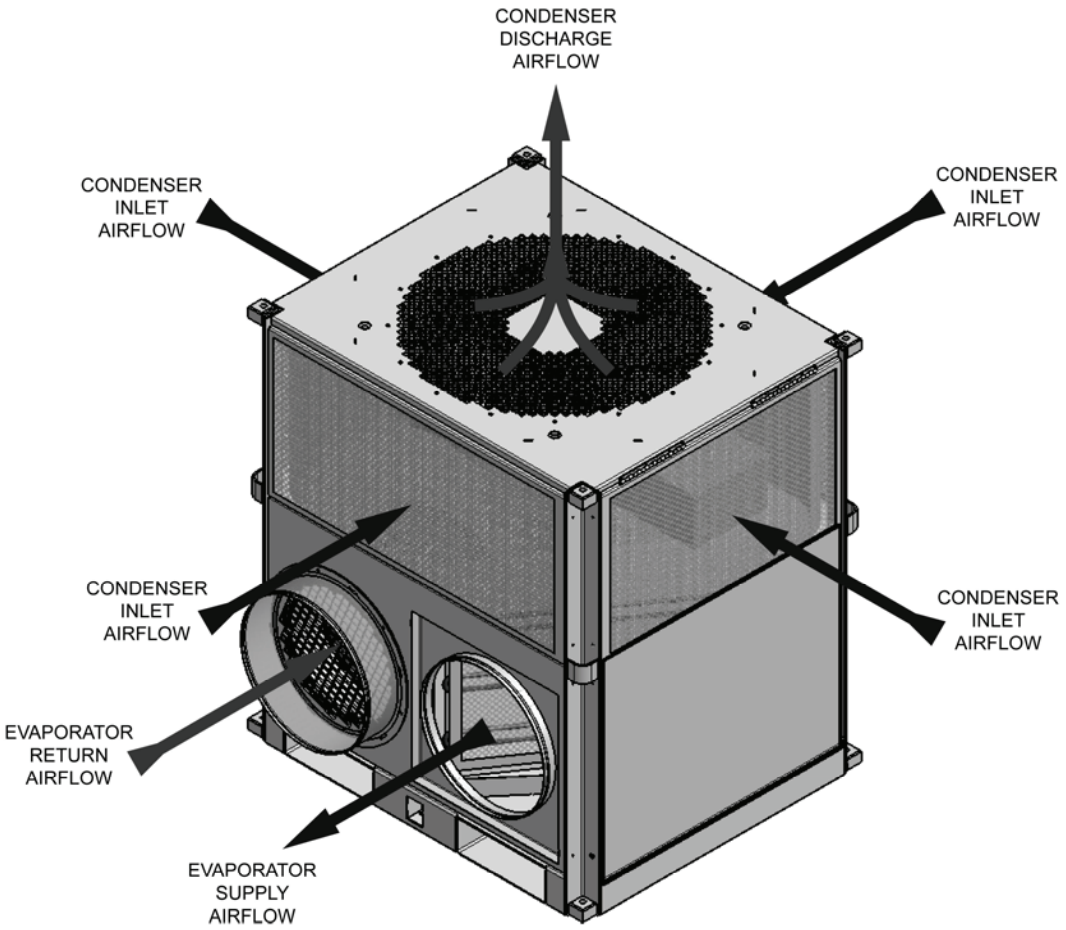


Figure 2. IECU Air Flow

7. If abnormalities are found, shut down IECU (WP 0005) and notify next level of maintenance to replace condenser fan.

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
EVAPORATOR BLOWER (B1)
TEST

INITIAL SETUP:

Tools and Special Tools
None
Materials/Parts
None
Personnel Required
One
References
None
Equipment Condition
IECU is powered up (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

TEST

1. On remote box assembly (Figure 1, Item 1), place mode selector switch (Figure 1, Item 2) to VENT position.

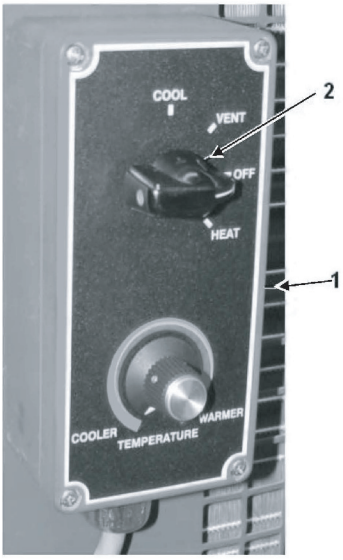


Figure 1. Remote Box Assembly

2. Make sure evaporator blower is on by listening for operation.
3. Listen for noises that are unrelated to normal operation of IECU.
4. Feel IECU for vibration unrelated to normal operation of IECU.
5. Check for adequate airflow (Figure 2) through flexible ducts.

NOTE

An incorrect rotation direction for the blower can cause a significantly less amount of airflow.

6. If damage or abnormalities from above are found, notify next level of maintenance to replace evaporator blower.

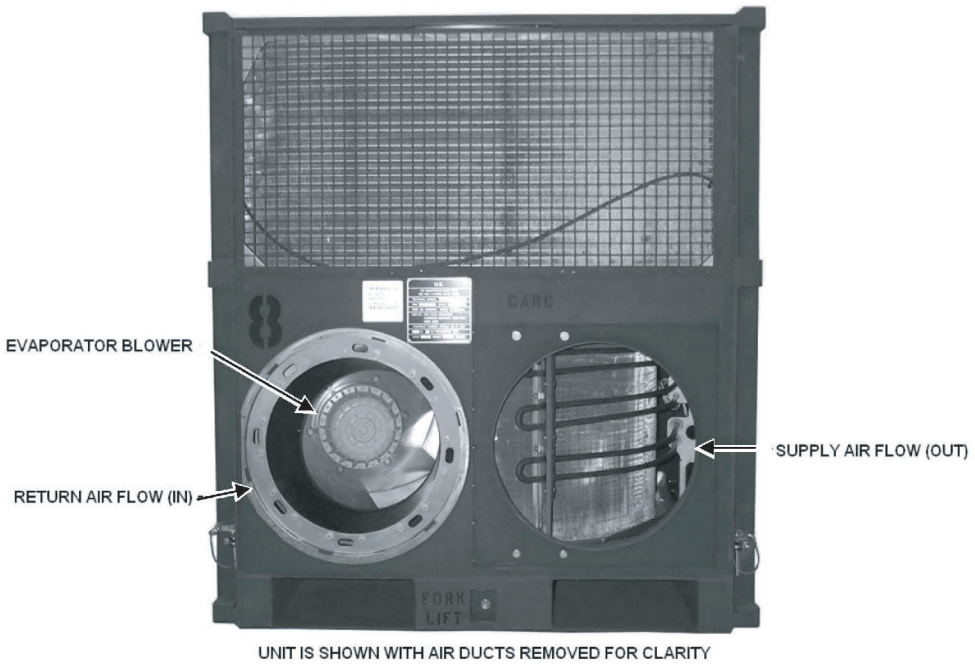


Figure 2. Air Flow Direction

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
EXPANSION VALVE
INSPECT, TEST, ADJUST

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Materials/Parts
Foam Insulation (WP 0075, Item 10)
Press Tight Insulation (WP 0075, Item 8)
Insulating Tape (WP 0075, Item 7)
Thermomastic Heat Transfer Compound (WP 0075, Item 9)
Personnel Required
One
References
WP 0005
WP 0012
WP 0016
WP 0036
WP 0037
WP 0055
Equipment Condition
IECU is shut down (WP 0005)

NOTE

Certain portions of the tasks contained within this work package will require the removal of insulation for access. Remove and replace insulation as required in order to accomplish the work package tasks. Use care when removing and handling insulation so that it is reusable if possible.

INSPECT

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

CAUTION

Expansion valve is very delicate. Make sure all gaskets remain in position and valve cage assembly is correctly aligned. Handle valve gently or damage could occur.

1. Remove rear cover assembly (WP 0016).
2. Carefully remove insulating material (Figure 1, Item 1) and retain for reinstallation.
3. Inspect expansion valve sensing bulb (Item not illustrated) underneath insulation for foreign matter between sensing bulb and tubing (Figure 1, Item 2). Clean if necessary.
4. Inspect expansion valve (Figure 1, Item 3) for cracks or other damage.
5. If cracks or damage are found on expansion valve (Figure 1, Item 3), notify next level maintenance to replace valve (WP 0055).
6. Inspect expansion valve for frost or ice at valve port (Figure 1, Item 4).
7. Re-apply insulating material (Figure 1, Item 1).

8. Install rear cover assembly (WP 0016).

9. Place IECU back into normal operation (WP 0005).

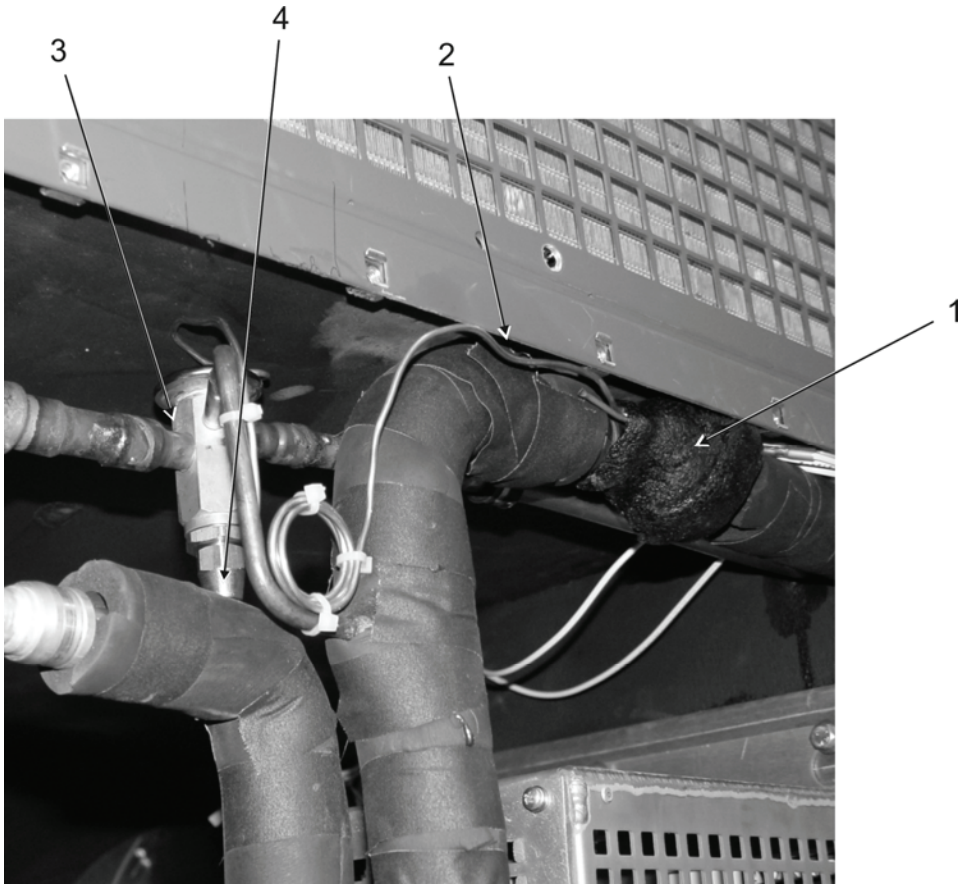


Figure 1. Expansion Valve (Rear Panel Removed)

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. Connect IECU to main power source and power up IECU (WP 0005).

2. On remote box assembly (Figure 2, Item 1), turn selector switch (Figure 2, Item 2) to COOL mode.

3. Turn TEMPERATURE control knob (Figure 2, Item 3) on remote box assembly to COOLER position.

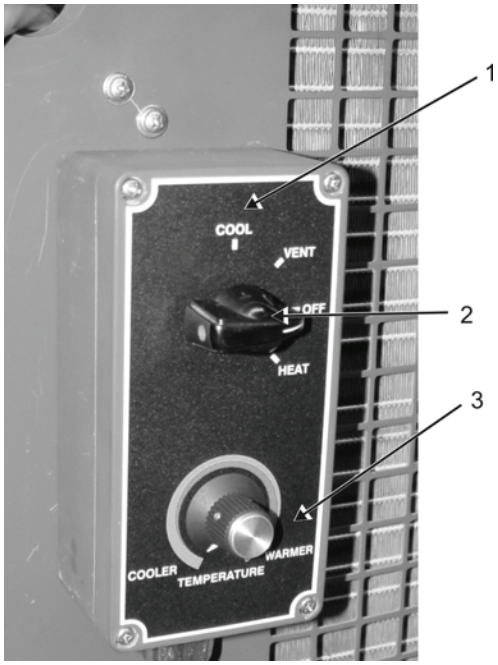


Figure 2. Remote Box Assembly

4. Operate IECU for approximately 30 minutes.

5. Connect refrigerant pressure gauge set (WP 0036).

6. Verify suction and discharge pressures are adequate for ambient operating temperature (WP 0037).

7. Using a multimeter, measure resistance between J5 pins 1 and 8 to determine evaporator outlet temperature. Record result.

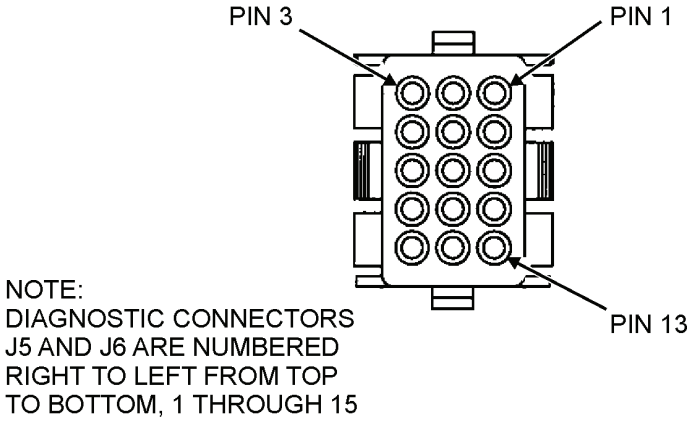


Figure 3. Diagnostic Connectors J5 and J6 Pin Out

8. Use temperature conversion chart (Table 3, WP 0012) to determine evaporator outlet temperature. Record result as T1_____.

9. Using a multimeter, measure resistance using J5 pins 1 and 7 to determine evaporator coil temperature. Record result.

10. Use temperature conversion chart (Table 3, WP 0012) to determine evaporator coil temperature. Record result as T2 _____.

11. If calculated temperature difference, or superheat, between value T1 and T2 is more than 15° F or less than 3° F, and check refrigerant charge (WP 0037).

NOTE

It is possible for the temperature difference to exceed the tolerances listed if refrigerant charge is low or high. Before adjusting the expansion valve, verify a good refrigerant charge per WP 0036.

12. If refrigerant charge is good, shutdown IECU and adjust valve per this WP.

13. If after adjusting the expansion valve, temperature difference is still more than 15° F or less than 3° F, refrigerant is fully charged, notify next level maintenance to replace valve (WP 0055).

ADJUST

1. Make sure refrigeration system is fully charged (WP 0037).

2. Remove rear cover assembly (WP 0016).

3. Remove end cap (Figure 1, Item 4) on expansion valve (Figure 1, Item 3) to access adjusting stem.

4. Mark original location of adjusting stem for reference.

NOTE

- The steps that follow will adjust superheat by repositioning the adjustment stem on the expansion valve. Do not exceed 1/4 total turn from center when adjusting superheat by turning the stem. If superheat cannot be properly adjusted within a 1/4 turn, notify the next level of maintenance to replace valve.

- When adjusting superheat using the adjusting stem, start off adjustment using very small incremental turns such as 1/64th or 1/32nd turn. Increase adjustment in small increments following 30-minute stabilization after each adjustment until a maximum of 1/4 turn has been made.

5. Turn adjusting stem counterclockwise up to, but no more than 1/4 maximum turn from center, as viewed from bottom of expansion valve (Figure 1, Item 3), to decrease superheat and increase flow of liquid refrigerant through expansion valve.

6. Allow system to cycle for 30 minutes and observe temperature change.
   - If adjustment is changing temperature in wrong direction, go to step 7.
   - If temperature difference is still >15°F or <3°F, repeat steps 5 and 6.
   - If temperature difference is not between 15°F and <3°F after full 1/4 turn adjustment, replace expansion valve (WP 0055).
   - If adjustment is complete, go to step 11.

7. Turn adjusting stem clockwise back to original center position.

8. Allow system to cycle for 30 minutes.

NOTE

- The steps that follow will adjust superheat by repositioning the adjustment stem on the expansion valve. Do not exceed 1/4 total turn from center when adjusting superheat by turning the stem. If superheat cannot be properly adjusted within a 1/4 turn, notify the next level of maintenance to replace valve.

- When adjusting superheat using the adjusting stem, start off adjustment using very small incremental turns such as 1/64th or 1/32nd turn. Increase adjustment in small increments following 30-minute stabilization after each adjustment until a maximum of 1/4 turn has been made.

9. Turn adjusting stem clockwise up to, but no more than 1/4 maximum turn from center, as viewed from bottom of expansion valve (Figure 1, Item 3), to increase superheat and decrease flow of liquid refrigerant through expansion valve.

10. Allow system to cycle for 30 minutes and observe temperature change.
    - If adjustment is changing temperature in wrong direction, turn adjusting stem counterclockwise back to original center position, allow system to cycle for 30 minutes, and go to step 5.
    - If temperature difference is still >15°F or <3°F, repeat steps 9 and 10.
    - If temperature difference is not between 15°F and <3°F after full 1/4 turn adjustment, replace expansion valve (WP 0055).
    - If adjustment is complete, go to step 11.

11. Replace end cap (Figure 1, Item 4) on expansion valve (Figure 1, Item 3).

12. Install rear cover assembly (WP 0016).

13. Retest expansion valve per this WP.

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
THERMISTORS (TS1, TS3, TS4, TS5, TS6)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanics Toolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0012
WP 0061
Equipment Condition
IECU is powered up (WP 0005)

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. On remote box assembly (Figure 1, Item 1), place mode selector switch (Figure 1, Item 2) to COOL position.
2. Rotate TEMPERATURE knob (Figure 1, Item 3) to COOLER position.

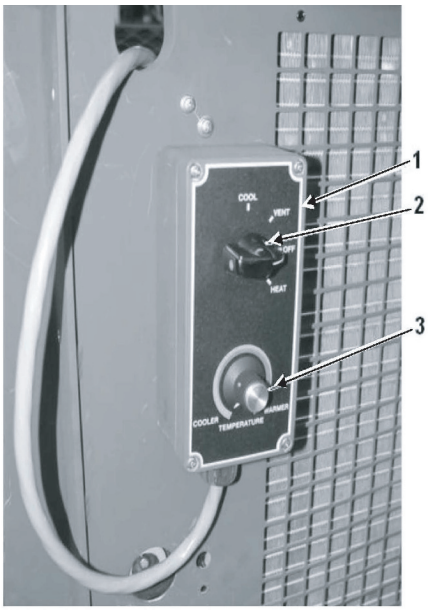
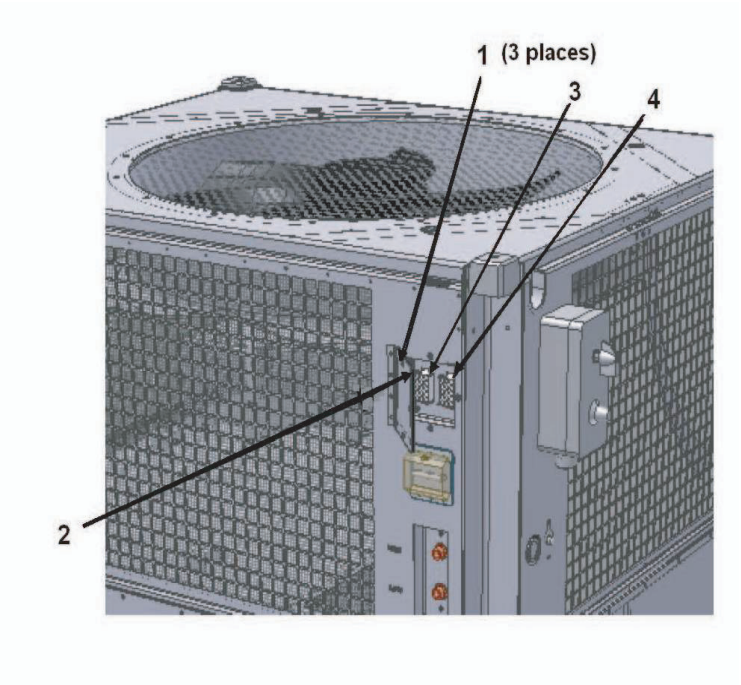


Figure 1. Remote Box Assembly

3. Make sure condenser fan motor, evaporator blower motor, and compressor motor operate.
4. Allow IECU to operate for at least 10 minutes.

5. Loosen three screws (Figure 2, Item 1) to open hinged panel (Figure 2, Item 2) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 2, Items 3, 4).



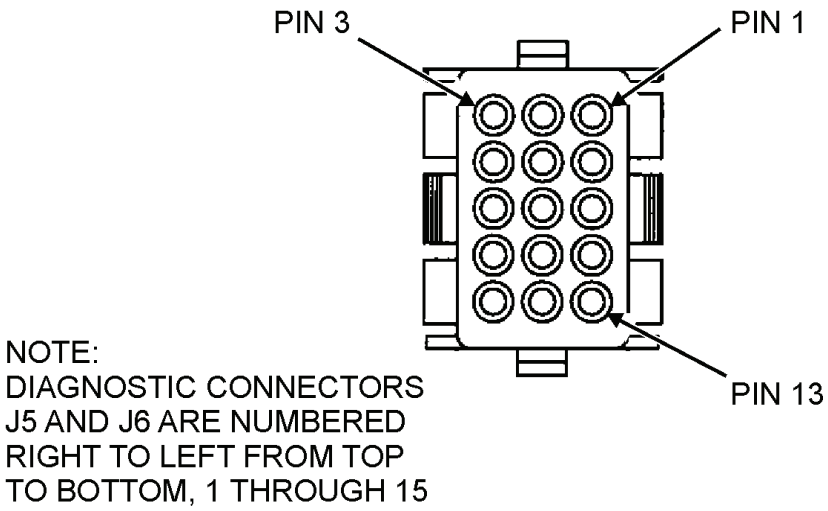


Figure 2. Diagnostic Connectors J5 and J6 Pin Out

6. Using a digital multimeter set to ohms-scale, perform resistance measurements as follows to determine thermistor status.

Thermistor	From	To	Expected Result
TS1	J5-1	J5-5	1.8K ohms to 22K ohms
TS3	J5-1	J5-7	18.2K ohms to 45K ohms
TS4	J5-1	J5-8	6.6K ohms to 33K ohms
TS5	J5-1	J5-3	1.5K ohms to 13K ohms
TS6	J5-1	J5-4	2.5K ohms to 20K ohms

7. If any thermistor resistance measurement is outside of expected result, replace applicable thermistor (WP 0061).

8. Close hinged panel (Figure 2, Item 2) and secure using three screws (Figure 2, Item 1).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
AIR THERMISTOR (TS2)
TEST

INITIAL SETUP:

Tools and Special Tools
General Mechanic• s Tolkit (WP 0072, Item 1)
Materials/Parts
None
Personnel Required
One
References
WP 0062
Equipment Condition
IECU is powered up (WP 0005)

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. On remote box assembly (Figure 1, Item 1), place mode selector switch (Figure 1, Item 2) to COOL position.
2. Rotate TEMPERATURE knob (Figure 1, Item 3) to COOLER position.

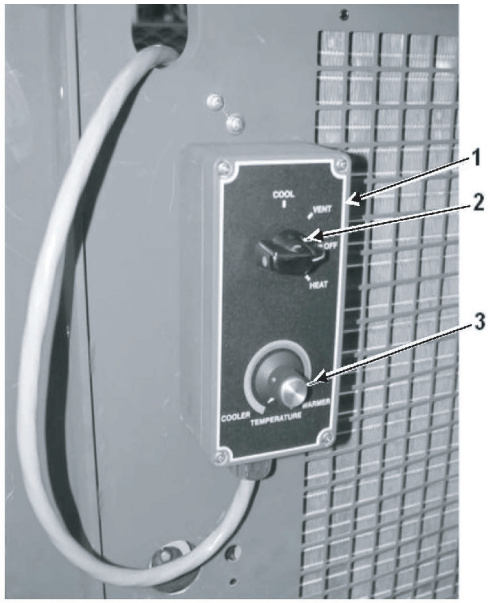


Figure 1. Remote Box Assembly

3. Loosen three screws (Figure 2, Item 1) to open hinged panel (Figure 2, Item 2) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 2, Items 3, 4).

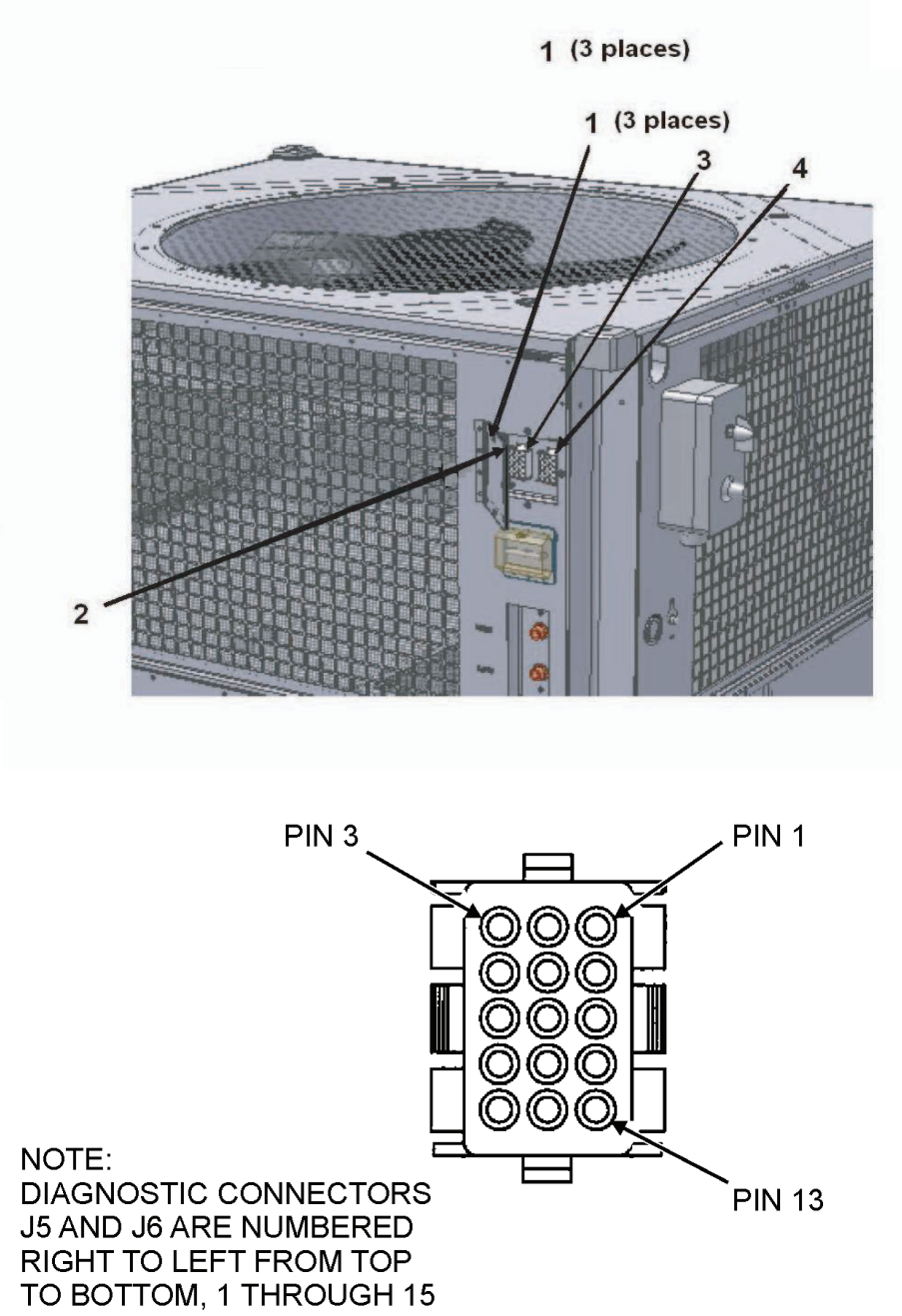


Figure 2. Diagnostic Connectors J5 and J6 Pin Out

4. Using a digital multimeter set to ohms-scale, check resistance between J5-1 and J5-6 (Figure 2, Item 3).
5. If thermistor resistance measurement indicates <3.0K ohms or >550K ohms, replace thermistor TS2 (WP 0062).
6. Close hinged panel (Figure 2, Item 2) and secure using three screws (Figure 2, Item 1).

END OF WORK PACKAGE

CHAPTER 7
FIELD MAINTENANCE INSTRUCTIONS

FIELD MAINTENANCE INSTRUCTIONS
60,000 BTU/HR IECU
REFRIGERANT RECOVERY

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
Gauge Set, Charging and Testing, Refrigerant, with Hose Set (WP 0072, Item 7)
Refrigerant Reclaimer (WP 0072, Item 4)
Cylinder, Compressed Gas, Refrigerant Gas Mixture,
DOT 400 (WP 0072, Item 8)
Nitrogen Regulator (WP 0072, Item 13)

Materials/Parts
Refrigerant, R410A (WP 0075, Item 11)

Personnel Required
Two

References
WP 0005
TM 9-4940-435-14&P

Equipment Condition
IECU shut down (WP 0005)

SERVICE

WARNING

- Sudden and irreversible tissue damage can result from freezing. Wear gloves and face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.
- Compressor lubricating oil used in this equipment is caustic. Wear gloves and face protector or safety glasses in any situation where skin or eye contact is possible. If oil does contact skin, wash with soap and water.
- Dangerous chemical refrigerant under pressure is used in this equipment. Use great care to avoid contact with liquid refrigerant. Work in well ventilated area.
- Heat may cause refrigerant to decompose and release irritating, toxic, and corrosive gas. Prevent contact of refrigerant with flame or hot surfaces.

NOTE

- Refrigeration system repairs must be performed by technician certified to perform such duties in accordance with EPA restrictions. Performing repairs without proper certification may be a violation of public law and subject to severe penalties.
- The system refrigerant must be totally removed and recovered before any maintenance is performed on system components. Leak testing and filter-drier replacements are required after any system component has been removed and replaced. After repair, the system must be properly evacuated and charged to function correctly.

GAUGE SET INSTALLATION

Installation

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

WARNING

- Sudden and irreversible tissue damage can result from freezing. Wear gloves and face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.
- Compressor lubricating oil used in this equipment is caustic. Wear gloves and face protector or safety glasses in any situation where skin or eye contact is possible. If oil does contact skin, wash with soap and water.
- Dangerous chemical refrigerant under pressure is used in this equipment. Use great care to avoid contact with liquid refrigerant. Work in well ventilated area.
- Heat may cause the refrigerant to decompose and release irritating, toxic, and corrosive gases. Prevent contact of refrigerant with flame or hot surfaces.

1. On IECU, remove two captive protective caps (Figure 1, Item 1) from discharge and suction service valves.

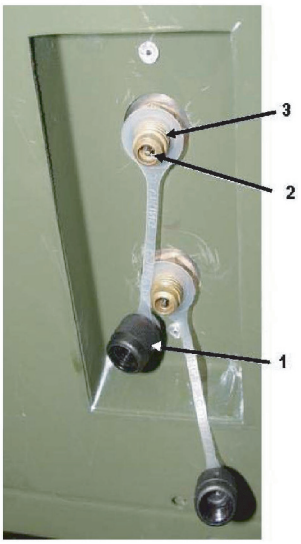


Figure 1. Suction and Discharge Service Valves

2. On gauge set, make sure all valves are closed.
3. Connect discharge hose to gauge set.
4. Connect suction hose to gauge set.
5. Position gauge set outside unit.

NOTE

Breaking the connection for three to five seconds will remove impurities from the system.

6. Connect suction hose to suction service valve.
7. Connect discharge hose to discharge service valve.
8. Bleed both hoses at gauge set for three to five seconds to bleed air from system.

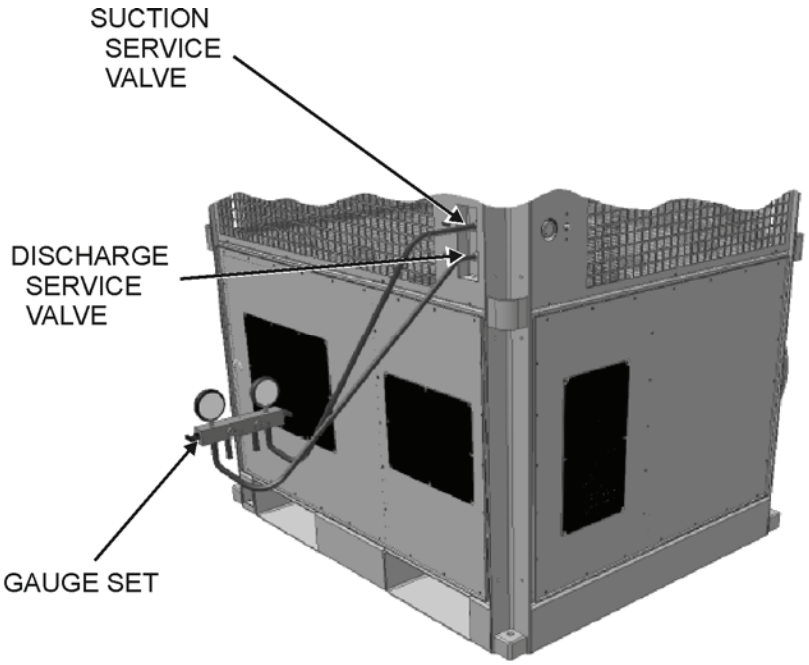


Figure 2. Gauge Set Hook Up

REMOVAL AND RECOVERY OF SYSTEM REFRIGERANT

1. Install gauge set per this WP.

WARNING

Compressor lubricating oil is caustic. Wear gloves and a face protector or safety glasses in any situation where skin or eye contact is possible. If oil does contact skin, wash with soap and water.

CAUTION

- Follow instructions for specific refrigerant recovery unit being used to avoid compressor oil loss. Loss of oil could result in compressor damage.
- It is recommended that refrigeration system be opened up for 15 minutes or less, to avoid excess moisture in lubricating oil. Excess moisture in oil can cause problems when pumping down refrigeration system before recharging.
- Make sure all open tubes, ports, etc. are closed off with plugs or tape before opening refrigeration system. Failure to close off openings can cause problems when pumping down refrigeration system before recharging.

2. Connect discharge hose to gauge set.
3. Connect discharge hose to recovery unit.
4. Connect recovery unit to recovery tank per manufacturer's instructions.
5. Fully open gauge set valves.

NOTE

Recovery unit may also have an open and close valve that will need to be opened.

6. Fully open recovery tank valve.
7. Operate recovery unit until all refrigerant has been removed from system.

NOTE

Refrigerant removed is indicated by low pressure gauge reading of 0 or less.

8. Close gauge set valves.
9. Shut down refrigerant recovery unit.
10. Close recovery tank valves.
11. Bleed service hose at recovery unit.

NOTE

- Ensure all valves are closed and vacuum is maintained for at least three to five minutes. If pressure rises, moisture or refrigerant may still be in the system.
- If pressure rose, repeat evacuation and recheck.
- If pressure rise occurs again at the same speed, a leak is in the system and must be found per this work package.

- If pressure rise was slower the second time, moisture remains in the system and the evacuation process must be repeated until there is no rise.

12. Remove gauge set per this WP.

Gauge Set Removal

1. Make sure all gauge set valves are closed.
2. Disconnect discharge hose from discharge service valve.
3. Disconnect suction hose from suction service valve.
4. Reinstall two protective caps (Figure 1, Item 1) on unit discharge and suction service valves.

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
REFRIGERANT SYSTEM
PURGING AND CHARGING

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
Gauge Set, Charging and Testing, Refrigerant, with Hose Set (WP 0072, Item 7)
Refrigerant Reclaimer (WP 0072, Item 4)
Cylinder, Compressed Gas, Refrigerant Gas Mixture,
Cylinder, Nitrogen
DOT 400 (WP 0072, Item 8)
Nitrogen Regulator (WP 0072, Item 13)

Materials/Parts
Refrigerant, R410A (WP 0075, Item 11)

Personnel Required
Two

References
WP 0005
WP 0036
WP 0054
TM 9-4940-435-14&P
MIL-B-7883

Equipment Condition
IECU is shut down (WP 0005)

PURGING REFRIGERANT SYSTEM

CAUTION

- The refrigeration system must be purged with dry nitrogen before brazing is performed on any component. A flow of dry nitrogen should be continued during all brazing operations to minimize internal oxidation and scaling.
- Make sure that approximately 25 cfm nitrogen is flowing during purging operations.

WARNING

- Never pressurize refrigerant lines with oxygen; mixture with oil could cause an explosion.
- The pressure in a nitrogen cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times to avoid personal injury.
- Nitrogen is an inert gas that can cause suffocation and must be discharged in well ventilated area.

1. Install gauge set (WP 0036).
2. Remove and recover system refrigerant (WP 0036).
3. Make sure gauge set valves are closed.
4. Connect service hose to nitrogen tank.
5. Fully open discharge valve on gauge set.

6. Disconnect suction hose from gauge set and place in a suitable container.
7. Open nitrogen tank valve and adjust regulator so that approximately 25 cfm of nitrogen flows through system.
8. Check suction hose to make sure nitrogen is flowing and no oil is being forced out of system.

NOTE

If oil discharge is present, reduce nitrogen flow.

9. Perform any brazing/debrazing operations necessary.
10. When brazing/debrazing is completed, close nitrogen tank valve.
11. Close discharge valves and remove hose from nitrogen tank.
12. Reconnect suction hose to gauge set.

EVACUATING THE REFRIGERANT SYSTEM

Evacuate the refrigerant system as follows:

WARNING

The extremely low temperature resulting from the rapid expansion of liquid Refrigerant R-410A, or Refrigerant R-410A gas released under pressure, can cause sudden and irreversible tissue damage through freezing. As a minimum, all personnel must wear thermal protective gloves and a face shield or goggles when working in any situation where Refrigerant R-410A contact with the skin or eyes is possible.

CAUTION

The refrigeration system must be evacuated to remove all moisture and noncondensables before it is charged.

1. Remove and recover system refrigerant (WP 0036).
2. Make sure a new filter-drier was installed. If not, install one (WP 0054).
3. Connect service hose to vacuum pump.
4. Set up and start vacuum pump per manufacturer’s instruction manual.
5. Fully open all gauge set valves.
6. Run vacuum pump until at least 29 inches Hg vacuum is measured on suction pressure gauge.
7. Continue running vacuum pump for one more hour and continue to observe suction pressure gauge.

NOTE

Inability to reach and hold 29 inches Hg vacuum may indicate a leak, moisture in oil, or a problem with the vacuum pump.

8. Close gauge set valve and stop vacuum pump.
   - If pressure rises, moisture may still be in the system or a leak exists.
   - If pressure rose, repeat evacuation and re-check.
   - If pressure rise occurs again at the same speed, a leak is in the system and must be found per this WP.
   - If pressure rise was slower the second time, moisture remains in the system and the evacuation process must be repeated until there is no rise.

9. Disconnect service hose from vacuum pump.

10. Charge refrigeration system per this WP.

CHARGING THE REFRIGERANT SYSTEM

Full Charge

WARNING

- Dangerous chemical refrigerant under pressure is used in the operation of this equipment. Use great care to avoid contact with liquid refrigerant.
- Sudden and irreversible tissue damage can result from freezing. Wear gloves and face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.
- Heat may cause refrigerant to decompose and release irritating, toxic, and corrosive gases. Prevent contact of refrigerant with flame or hot surfaces.
- Never introduce high discharge pressure into a refrigerant cylinder. This can cause the cylinder to rupture and injure personnel.

CAUTION

The system must be evacuated before charging. Moisture in the system will prevent refrigeration unit from operating properly.

1. Install gauge set (WP 0036).

2. Evacuate refrigerant system per this WP.

3. Connect service hose to R410A refrigerant tank.

4. Prepare refrigerant tank to deliver liquid refrigerant per instructions on tank.

5. Make sure all gauge set valves are closed.

6. Open refrigerant tank valve.

7. Bleed service hose and connect to gauge set..
8. Place refrigerant tank on calibrated scale to measure and record weight.
9. Open gauge set service valve.
10. Open gauge set discharge valve.
11. Close discharge valve after proper charge of 5.3 pounds liquid is obtained.
12. Close service valve on gauge set.
13. Close refrigerant tank and gauge set valves.

NOTE

A calibrated scale must be used to measure the weight of the refrigerant storage tank. If 5.3 pounds of refrigerant is not obtained, omit steps 14 and 15 and continue to step 16.

14. Shut system down.
15. Close refrigerant tank and gauge set valves.

NOTE

If 5.3 pounds (full charge) was obtained, omit steps 16 through 20.

16. Power up IECU and operate (WP 0005).
17. Set refrigerant tank to deliver liquid only.
18. Make sure all gauge set valves are closed.

WARNING

Never introduce high discharge pressure into refrigerant tank. This can cause tank to rupture and injure personnel.

19. Open refrigerant tank and low pressure valve.
20. Monitor weight of refrigerant tank until total 5.3 pounds (2.41 kg) charge is obtained. When system is fully charged, immediately close refrigerant tank and gauge set valves.
21. Run IECU for 15 minutes and observe sight glass on side of IECU.
    - Green to chartreuse means refrigerant moisture content is acceptable.
    - Yellow means there is too much moisture in system. Remove and recover system refrigerant, replace filter-drier, leak check, evacuate per this work package, and charge again.
    - Milky white or bubbly liquid means system has low charge. Continue to add charge until sight glass clears.
    - Clean bubble free liquid around center means the system is fully charged.

22. Make sure all gauge set valves are closed.

23. On remote box (Figure 1, Item 1), place selector switch (Figure 1, Item 2) to OFF position.

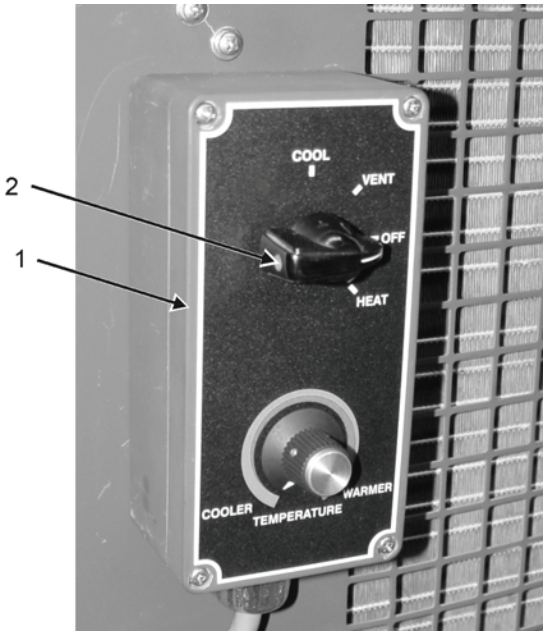


Figure 1. Remote Box

REFRIGERANT SYSTEM PRESSURE CHECK

Check the pressure in refrigerant system as follows:

1. Install gauge set (WP 0036).

2. Make sure all gauge set valves are closed.

NOTE

Gauge set gauges should indicate the same pressure.

3. Check gauge set reading against appropriate column in Table 1.
   - If system is even partially charged, pressure should be approximately equal to that shown in table for appropriate ambient temperature.
   - If pressure is considerably less than shown in the table, system does not contain enough refrigerant to continue pressure check. Perform leak check (WP 0038).

4. Power up IECU (WP 0005).

5. With IECU operating, allow gauge set gauges to stabilize. Compare readings with those listed in Table 2.
   - If discharge and suction pressure are at or near the same value, compressor (B2) failure is indicated.
   - If discharge pressure is low and suction pressure is low, a low refrigerant charge is indicated. Milky white or bubbly liquid in the sight glass will verify low charge.
   - If discharge pressure is high and suction pressure is slightly higher than normal, refrigerant overcharge is indicated.

6. When pressure tests are complete, shut down IECU (WP 0005).

7. Remove gauge set (WP 0036).

Table 1. Pressure/Temperature Relationship of Saturated Refrigerant R-410A

Temperature		Pressure	
Deg F	Deg C	psig	kg/cm²
-40	-40	10.8	0.8
-38	-39	12.1	0.9
-36	-38	13.4	0.9
-34	-37	14.8	1.0
-32	-36	16.3	1.1
-30	-34	17.8	1.3
-28	-33	19.4	1.4
-26	-32	21.0	1.5
-24	-31	22.7	1.6
-22	-30	24.5	1.7
-20	-29	26.3	1.8
-18	-28	28.2	2.0
-16	-27	30.2	2.1
-14	-26	32.2	2.3
-12	-24	34.3	2.4
-10	-23	36.5	2.6
-8	-22	38.7	2.7
-6	-21	41.0	2.9
-4	-20	43.4	3.1
-2	-19	45.9	3.2
0	-18	48.4	3.4
2	-17	51.1	3.6
4	-16	53.8	3.8
6	-14	56.6	4.0
8	-13	59.5	4.2
10	-12	62.4	4.4
12	-11	65.5	4.6
14	-10	68.6	4.8
16	-9	71.9	5.1
18	-8	75.2	5.3
20	-7	78.7	5.5
22	-6	82.2	5.8
24	-4	85.8	6.0
26	-3	89.6	6.3
28	-2	93.4	6.6
30	-1	97.4	6.8
32	0	101.4	7.1
34	1	105.6	7.4
36	2	109.9	7.7
38	3	114.3	8.0
40	4	118.8	8.4
42	6	123.4	8.7
44	7	128.2	9.0
46	8	133.0	9.4
48	9	138.0	9.7
50	10	143.2	10.1
52	11	148.4	10.4
54	12	153.8	10.8
56	13	159.3	11.2
58	14	164.9	11.6
60	16	170.7	12.0
62	17	176.6	12.4
64	18	182.7	12.8
66	19	188.9	13.3
68	20	195.3	13.7
70	21	201.8	14.2
72	22	208.4	14.7
74	23	215.2	15.1
76	24	222.2	15.6
78	26	229.3	16.1

Temperature		Pressure	
Deg F	Deg C	psig	kg/cm²
80	27	236.5	16.6
82	28	244.0	17.2
84	29	251.6	17.7
86	30	259.3	18.2
88	31	267.3	18.8
90	32	275.4	19.4
92	33	283.6	20.1
94	34	292.1	20.5
96	36	300.7	21.1
98	37	309.5	21.8
100	38	318.5	22.4
102	39	327.7	23.0
104	40	337.1	23.7
106	41	346.7	24.4
108	42	356.5	25.1
110	43	366.4	25.8
112	44	376.6	26.5
114	46	387.0	27.2
116	47	397.6	28.0
118	48	408.4	28.7
120	49	419.4	29.5
122	50	430.7	30.3
124	51	442.1	31.1
126	52	453.8	32.0
128	53	465.8	32.7
130	54	477.9	33.6
132	56	490.3	34.5
134	57	503.0	35.4
136	58	515.9	36.3
138	59	529.1	37.2
140	60	542.5	38.1
142	61	556.2	39.1
144	62	570.2	40.1
146	63	584.5	41.1
148	64	599.0	42.1
150	66	613.9	43.2

Table 2. Nominal Operating Pressure at Suction and Discharge Service Valves

COOLING MODE			
Coil Entering Air Temperature		Pressure at Service Valve	
Indoor	Ambient	Suction	Discharge
90° F (32° C) (dry bulb)	125° F (52° C)	165 psig (1138 kPa)	600 psig (4137 kPa)
75° F (24° C) (wet bulb)			

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
TUBING AND FITTINGS
TEST, REPAIR, AND REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
Gauge Set, Charging and Testing, Refrigerant, with Hose Set (WP 0072, Item 7)
Refrigerant Reclaimer (WP 0072, Item 4)
Cylinder, Compressed Gas, Refrigerant Gas Mixture, DOT 400 (WP 0072, Item 8)
Nitrogen Regulator (WP 0072, Item 13)

Personnel Required
Two

References
WP 0005
WP 0036
WP 0037
WP 0054
TM 9-4940-435-14&P, Leak Detector, Refrigerant Gas
MIL-B-7883

Materials/Parts
Refrigerant, R410A (WP 0075, Item 11)
Alloy, Brazing, Grade IV or VI (50% silver) (WP 0075, Item 13)
Flux, Type B (WP 0075, Item 12)
Alloy, Brazing, Grade III (15% silver) (WP 0075, Item 14)

Equipment Condition
IECU is shut down (WP 0005)

LEAK TESTING REFRIGERANT SYSTEM

Test refrigerant system for leaks as follows:

WARNING

- Never pressurize refrigerant lines with oxygen; mixture with oil could cause an explosion.
- The pressure in a nitrogen cylinder can exceed 2,000 psi. A nitrogen pressure regulator should be used at all times to avoid personal injury.
- Nitrogen is an inert gas that can cause suffocation and must be discharged in a well ventilated area.

TEST

Check all tubing and fittings for leaks as follows:

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

1. Shut down IECU if operating (WP 0005).

WARNING

The IECU top cover is heavy an is a two person lift. Be sure cover retaining rod is in place and properly secured. Injury can occur if cover drops.

1. Raise and secure top cover to access tubing and fittings inside unit.

2. Remove panels as necessary to access tubing and fittings.

3. Remove insulation as necessary.

4. Leak test the tubing and fittings per this WP.
   - If leak is found, omit steps (6) through (8) and repair or replace tubing or fitting as necessary.

5. Install insulation if removed and secure with insulation tape as necessary.

6. Install any panels removed to access tubing and fittings.

7. Close and secure top cover.

REPAIR

WARNING

Brazing alloys and flux contain materials that are hazardous to health. Avoid breathing vapors or fumes from brazing operations. Perform operations only in well ventilated areas. Wash hands with soap and water after handling brazing alloys and flux. Wear gloves and protective goggles or face shield to protect against burns.

Debraze

1. Remove and recover system refrigerant (WP 0036).

2. Purge refrigerant system (WP 0037).

3. Protect wiring harnesses and other components with appropriate heat shields.

NOTE

It may be easier to access a component by cutting or debrazing copper lines in accessible areas and removing part of interconnecting tubing.

4. If debrazing a joint on a valve, disassemble valve to extent possible and wrap all but joint with wet rag to act as heat sink.

WARNING

Never use a heating torch on any part that contains refrigerant. Heat may cause refrigerant to decompose and release irritating, toxic, and corrosive gases. All refrigerant must be removed and recovered from system and entire system must be purged with dry nitrogen before beginning any brazing operation.

CAUTION

If heat is applied slowly, or only on one side, entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted.

5. Check that system is being purged per WP 0037 and apply sufficient heat uniformly around joint to quickly melt filler alloy. Remove heat as soon as joint is separated.

Clean

NOTE

All filler alloy must be cleaned from debrazed joints before reassembly.

1. Heat each piece of joint until filler has melted, then wipe it away with a wire brush.
2. Make sure no filler alloy or other debris remains inside any tubing, fitting, or component.
3. Use abrasive cloth as necessary to clean joints.
4. Apply flux to joints immediately after cleaning to avoid oxidation.

Braze

1. Protect wiring harnesses and other components with appropriate heat shields.

NOTE

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. Grade IV or VI brazing alloy (50% silver) and Type-B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III (15% silver) brazing alloy may be substituted for Grade IV or VI for copper to copper joints; flux is not required for copper to copper joints.

2. If brazing a joint on a valve, disassemble valve to extent possible and wrap all but joint with wet rag to act as heat sink.

NOTE

If interconnecting tubing was removed with a component, braze tubing to new components before installation. Ensure orientation of tubing is correct.

3. Position component or assembly into place.

WARNING

Never use a heating torch on any part that contains refrigerant. Heat may cause refrigerant to decompose and release irritating, toxic, and corrosive gases. All refrigerant must be removed and recovered from system and there must be adequate ventilation before beginning any brazing operation.

CAUTION

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. Brazing a joint without adequate ventilation could cause deposits to form on inside of tube and may cause obstructions in refrigeration system or equipment damage.

4. Make sure system is being purged (WP 0037) and apply sufficient heat uniformly around joint to quickly melt filler alloy.

5. Remove heat and stop purging as soon as brazing is completed.

6. Complete purging (WP 0037).

NOTE

- To perform leak test, it is necessary that system be pressurized with a proportion of refrigerant gas.
- The electronic gas tester is highly sensitive to the presence of a minute quantity of gas in the air, and is quite effective in the detection of small leaks. However, due to rapid dispersion of refrigerant gas into surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in well ventilated but draft free area. Use procedures contained in TM 9-4940-435-14&P, "Leak Detector, Refrigerant Gas".

1. Install gauge set (WP 0036).

2. Check suction pressure on gauge set.
   - If pressure is over 100 psi go to perform leak test.
   - If pressure is over 40 psi, go to step 6 of refrigerant charge is less than 40 psi.
   - If pressure is below 40 psi, continue with step 1 of refrigerant charge is less than 40 psi.

Refrigerant charge is less than 40 psi.

1. Connect service hose to R410A refrigerant tank.

2. Prepare refrigerant tank to deliver liquid refrigerant per instructions on tank.

3. Make sure all gauge set valves are closed.

4. Open refrigerant tank valve.

5. Open gauge set discharge valve and pressurize system to at least 40 psi.

6. Close discharge valve.

7. Connect service hose to nitrogen tank.

8. Make sure gauge set service valve is closed.

9. Open nitrogen tank valve.

10. Open gauge set discharge valve and pressurize system to at least 350 psi.

11. Close gauge set discharge valve and nitrogen tank valve.

12. Disconnect service hose from nitrogen tank.

Perform Leak Test

1. Test for leaks at all of possible leakage using a refrigerant gas leak detector.
    - If a leak is found, take necessary steps to replace damaged components or repair leak.
    - If no leak is found and refrigerant only was used to pressurize the system, refer to charging in WP 0037 to determine proper charge
    - If no leak was found and nitrogen was used to pressurize the system, remove and recover system refrigerant (WP 0036), evacuate system (WP 0037), and charge refrigeration system (WP 0037).

REPLACE

Removal

Remove tubing and fittings as follows:

1. Remove and recover system refrigerant (WP 0036).

2. Remove insulation as necessary.

3. Purge refrigerant system (WP 0037) and debraze any fitting or tubing that was leaking.

Installation

Install tubing or fittings as follows:

1. Purge refrigerant system (WP 0037).

2. Install tubing or fittings and braze in place per this WP.

3. Replace filter-drier (WP 0054).

4. Evacuate and charge refrigerant system (WP 0037).

5. Leak test refrigerant system per this WP.

6. Install insulation if removed and secure with insulation tape as necessary.

7. Install any panels removed to access tubing and fittings.

8. Close and secure top cover.

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
SHIELDED ENCLOSURE ASSEMBLY
REMOVE (FOR ACCESS), INSPECT, INSTALL, REPAIR

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0070, Item 2)
Electronic Equipment Tool Kit (WP 0072, Item 11)

Materials/Parts
Lock washer (WP 0075, Item 5)
Insulation Sleeving (WP 0075, Item 15)

Personnel Required
One

References
WP 0005
WP 0012
WP 0016
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Rear cover assembly removed (WP 0017)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

NOTE

The shielded enclosure can be partially removed from the IECU without disconnecting any wiring. It will need to be removed from the IECU to access internal components for inspection.

REMOVE (FOR ACCESS)

1. Remove four bolts (Figure 1, Item 1), lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) securing shielded enclosure assembly (Figure 1, Item 4), to two mount brackets (Figure 1, Item 5) on floor of IECU. Discard lock washers.

1. Loosen, but do not remove, three bolts (Figure 1, Item 6) attaching shielded enclosure to mounting channel (Figure 1, Item 7).

2. Disconnect electrical connector FL6B (Figure 2, Item 1) from shielded enclosure assembly (Figure 2, Item 2).

NOTE

If the shielded enclosure assembly was removed in order to facilitate troubleshooting the IECU for a particular malfunction, it will be necessary to reconnect FL6B to the shielded enclosure assembly after it has been removed from the unit to successfully accomplish the troubleshooting.

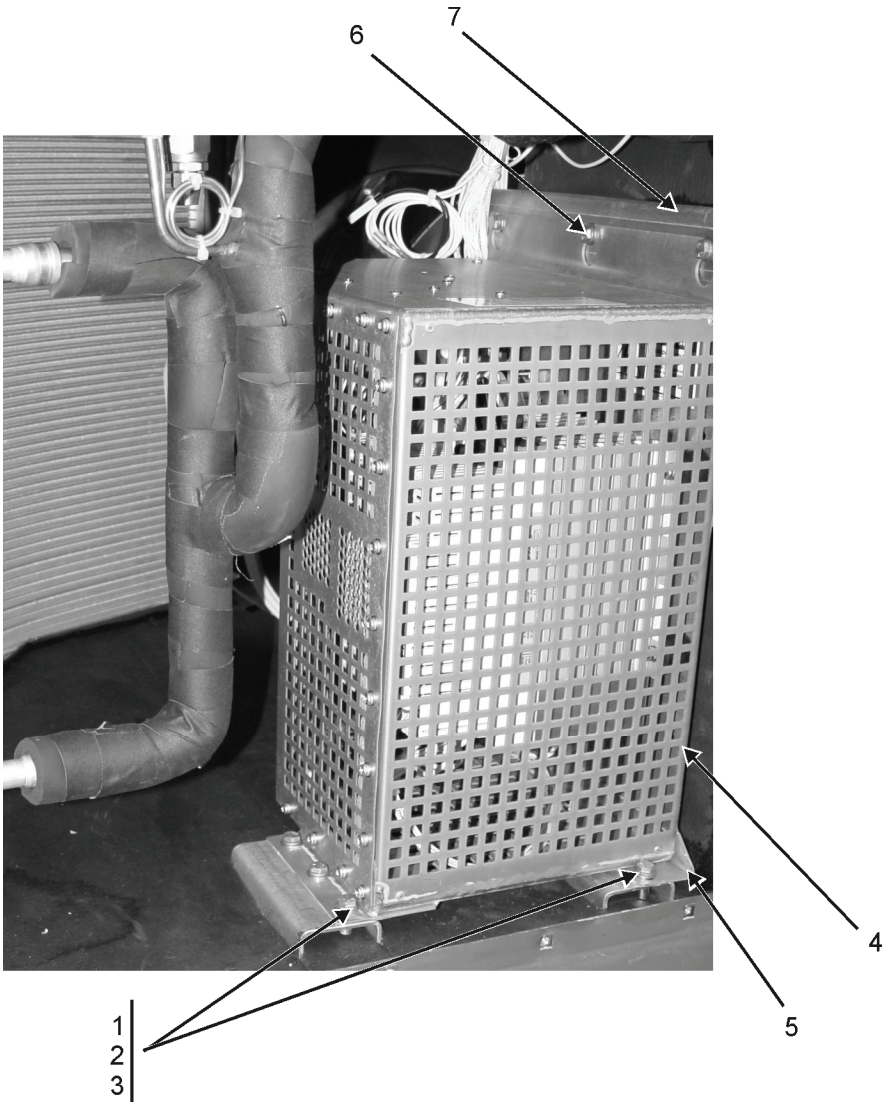
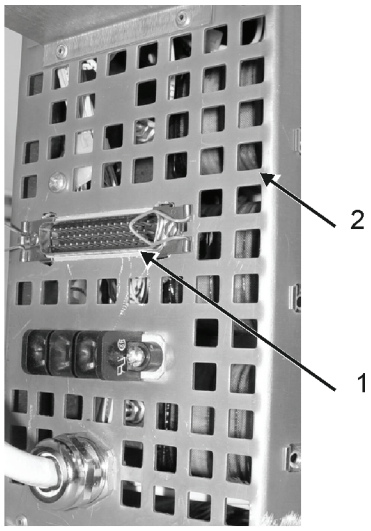


Figure 1. Shielded Enclosure Assembly (View 1)

3. Carefully lift shielded enclosure assembly (Figure 1, Item 4) up and away from mounting channel (Figure 1, Item 7) and set outside IECU on solid surface.



NOTE: SHOWN WITH CONNECTOR DISCONNECTED

Figure 2. FL6B Disconnect Location

INSPECT

1. Inspect shielded enclosure assembly cables and connectors for damage or loose connections. Tighten as required or notify next level of maintenance for repair.

2. Inspect wiring for signs of fraying or burning. If found, notify next level of maintenance for repair.

NOTE

The shielded enclosure assembly cover is perforated for ease of viewing internal components. It is not necessary to remove the cover of the shielded enclosure assembly when performing internal inspection.

3. Visually inspect shielded enclosure assembly (Figure 1, Item 4) internally for damage to components, loose connections, and signs of overheating. If damage is found, replace component per this WP.

INSTALL

1. Reconnect electrical connector FL6B (Figure 2, Item 1) to shielded enclosure assembly (Figure 2, Item 2).

2. Install shielded enclosure assembly (Figure 1, Item 4) into IECU on three bolts (Figure 1, Item 6) of mounting channel (Figure 1, Item 7). Do not tighten bolts (Figure 1, Item 6).

3. Attach shielded enclosure assembly (Figure 1, Item 4) to two mount brackets (Figure 1, Item 5) on IECU floor using four bolts (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3).

4. Tighten all hardware.

5. Replace rear cover assembly (WP 0016).

REPAIR

NOTE

The shielded enclosure assembly must be detached from the IECU and positioned outside the unit before maintenance can be performed. This will provide easy access to internal components.

General

WARNING

- Electrical voltage and current cannot be seen and when contacted can result in death, render you unconscious, or severely burn you. Use extreme care when working around or with energized equipment. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning.
- High voltage and rotating parts are present when Improved Environmental Control Unit is in operation. Make sure unit is completely shut down and free of any power source before attempting any repair or maintenance on the unit. Failure to comply can cause injury or death to personnel.
- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power is disconnected. Injury or death can occur if connected to power source.
- Capacitors can store electrical power for extended periods of time after being disconnected from power supply. A bleed resistor is connected across the capacitor terminals to discharge this power more quickly. Do not touch capacitor terminals for the first five minutes after the power has been disconnected.

1. Move shielded enclosure assembly outside the evaporator compartment of IECU. See Remove (For Access) per this WP.

2. Remove 30 screws (Figure 3, Item 1), lock washers (Figure 3, Item 2), and flat washers (Figure 3, Item 3) from cover (Figure 3, Item 4). Discard lock washers.

3. Carefully remove cover (Figure 3, Item 4) as to not damage cover gaskets.

NOTE

Gaskets are attached to the shielded enclosure cover by RTV sealant.

4. Perform component test and replacement per this WP.

5. Inspect cover gaskets for tears or other damage. Replace gaskets if necessary.

6. Install cover (Figure 3, Item 4) on shielded enclosure using 30 screws (Figure 3, Item 1), new lock washers (Figure 3, Item 2), and flat washers (Figure 3, Item 3).

7. Reinstall shielded enclosure assembly into IECU per Install of this WP.

8. Reinstall rear cover assembly (WP 0016).

9. Power up IECU (WP 0005).

10. Place IECU back into normal operation (WP 0005).

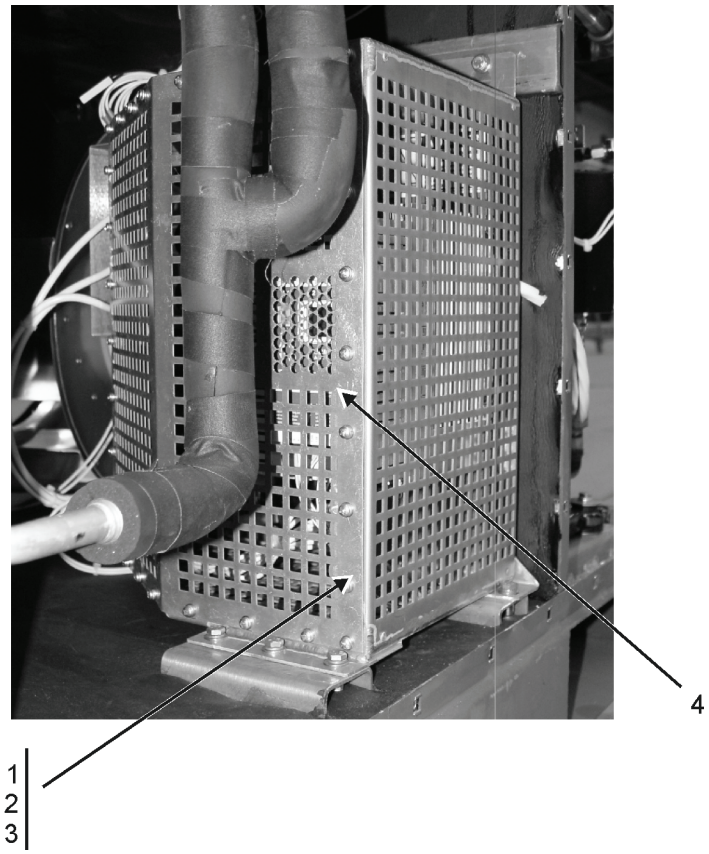


Figure 3. Shielded Enclosure Assembly (View 2)

Test Variable Frequency Drive (VFD)

1. Power up IECU (WP 0005).

NOTE

The Variable Frequency Drive (VFD) fault status can be checked by probing diagnostic connector J6 pins 9 and 10 for a no continuity or continuity meter reading status. When checking VFD status at J6, a no continuity reading on the meter indicates there is no VFD fault. A continuity reading on the meter indicates that there is a VFD fault.

2. Loosen three screws (Figure 4, Item 1) to open hinged panel (Figure 4, Item 2) on outside of IECU to access diagnostic connector J5 (Figure 4, Item 3) and J6 (Figure 4, Item 4).

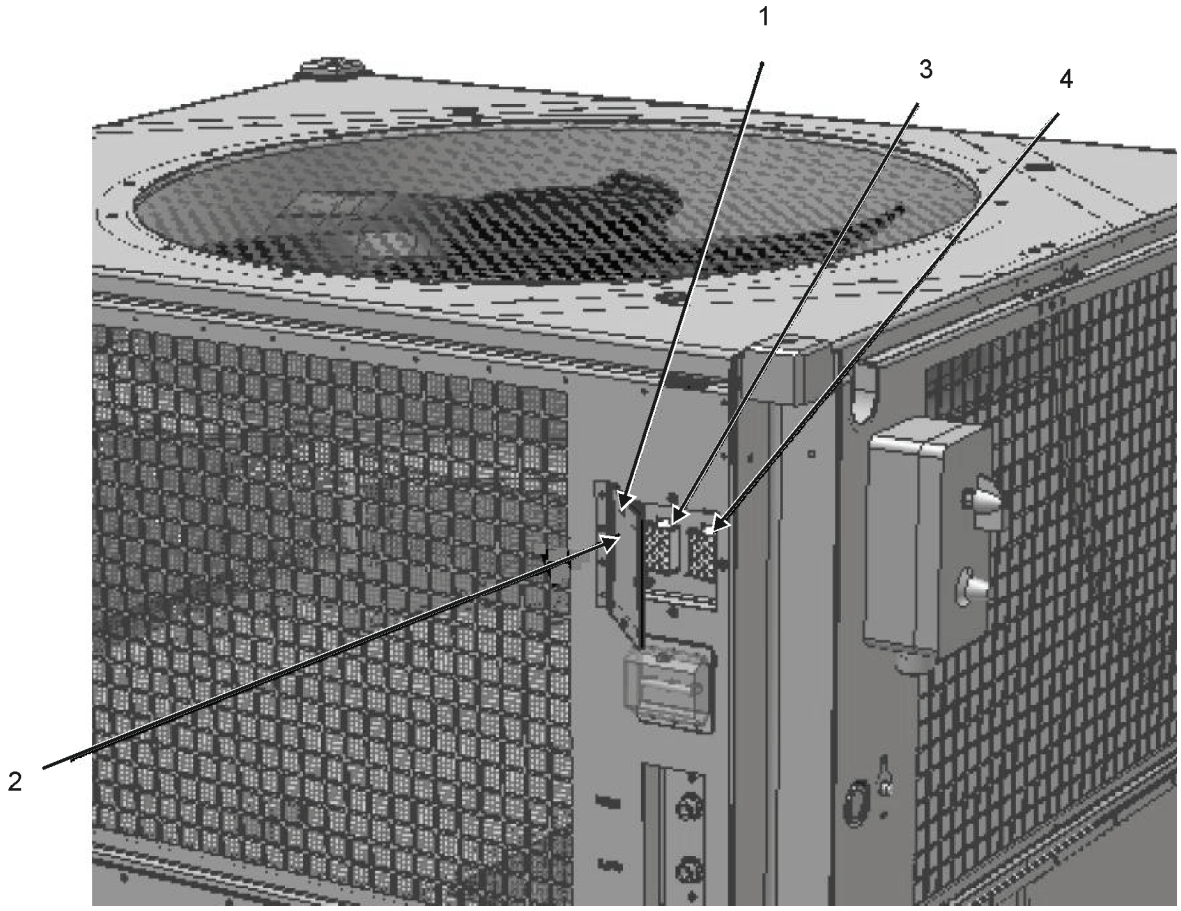


Figure 4. Diagnostic Connectors (J5 and J6)

3. Using a digital multimeter set to ohms-scale, check between J6-9 and J6-10 (Figure 5) for a reading of no continuity to indicate a no fault condition exists with VFD.
    - If any reading other than no continuity is indicated on meter, troubleshoot VFD (WP 0012).

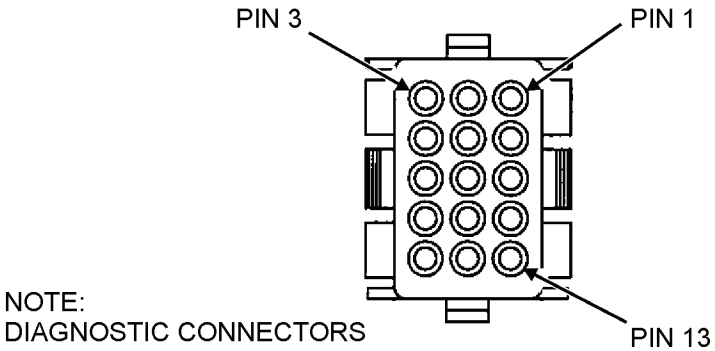


Figure 5. Diagnostic Connectors J5 and J6 Pin Out

Replace Variable Frequency Drive (VFD)

1. Remove 30 screws (Figure 3, Item 1), lock washers (Figure 3, Item 2), and flat washers (Figure 3, Item 3) from cover (Figure 3, Item 4). Discard lock washers.

2. Remove cover (Figure 3, Item 4) from shielded enclosure assembly using care not to damage cover gaskets.

NOTE

Gaskets are attached to the shielded enclosure assembly cover by RTV sealant.

3. Tag and disconnect VFD wiring (Figure 6, Item 1, and Item 9).

4. Remove four screws (Figure 6, Item 2), lock washers (Figure 6, Item 3), and washers (Figure 6, Item 4) securing VFD and anti-vibration mounts (Figure 6, Item 5) to back of shielded enclosure assembly. Discard lock washers.

5. Remove VFD, with anti-vibration mounts attached, from shielded enclosure assembly.

6. Remove four nuts (Figure 6, Item 6), lock washers (Figure 6, Item 7), and washers (Figure 6, Item 8) securing anti-vibration mounts (Figure 6, Item 5) to VFD. Discard lock washers and anti-vibration mounts.

7. Install new anti-vibration mounts (Figure 6, Item 6) onto new VFD and secure using four nuts (Figure 6, Item 6), lock washers (Figure 6, Item 7), and washers (Figure 6, Item 8).

NOTE

During VFD installation, install two mounts onto the right mounting flange of the VFD and tighten. Then install the remaining two mounts on the left mounting flange, but do not tighten.

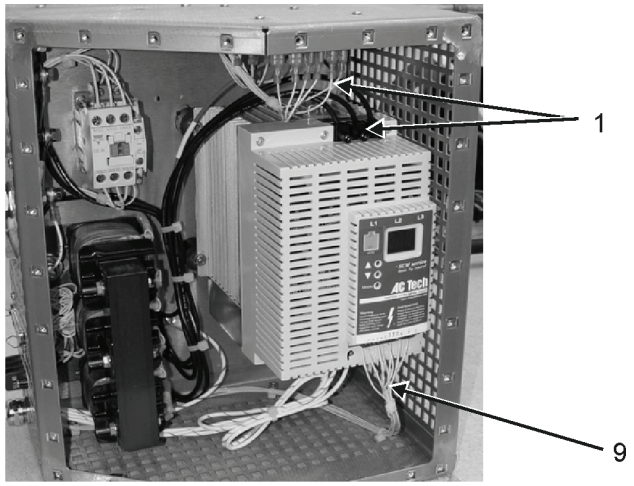
8. Install new VFD with anti-vibration mounts attached into shielded enclosure assembly and secure using four screws (Figure 6, Item 2), new lock washers (Figure 6, Item 3), and washers (Figure 6, Item 4).

NOTE

During installation, it will be necessary to install two screws into the mounting on the right side using new lock washers and washers. Then line up the mounts on the left side of the VFD as needed. You can then install and tighten hardware in the shielded enclosure.

9. Tighten two nuts on the left side mounting flange.

10. Connect wiring as tagged. Remove tags.



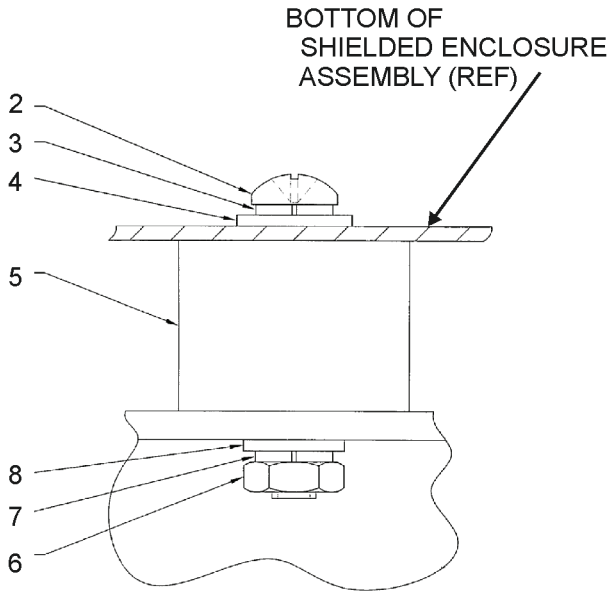


Figure 6. Variable Frequency Drive (VFD)

Replace Harmonic Filter (FL5)

1. Tag and disconnect three wires to harmonic filter from VFD (Figure 6, Item 1).

2. Remove two nuts (Figure 7, Item 1), lock washers (Figure 7, Item 2), and flat washers (Figure 7, Item 3) from two hex head bolts (Figure 7, Item 4) securing right side of harmonic filter (Figure 7, Item 6) to rear wall of enclosure. Discard lock washers.

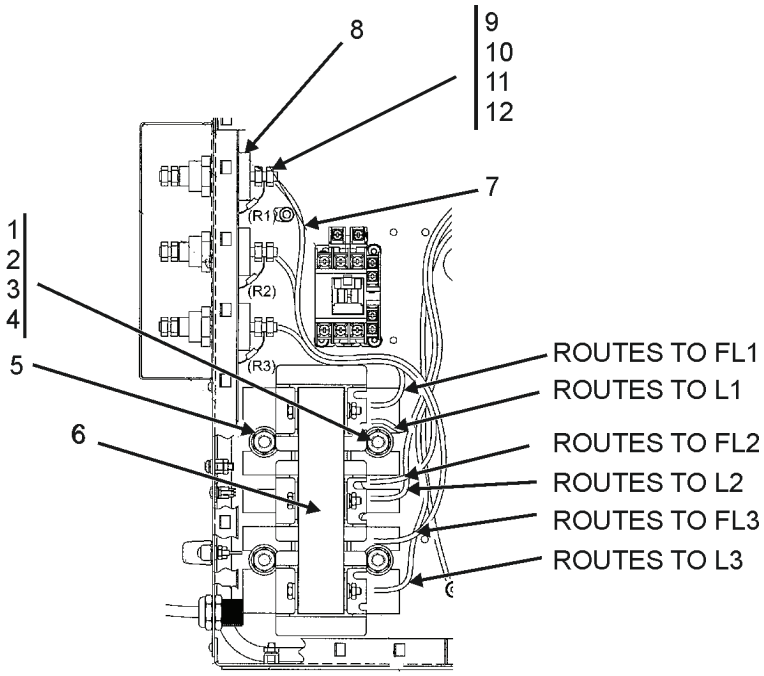


Figure 7. Harmonic Filter Wiring

3. Loosen two nuts (Figure 7, Item 5) on left side of harmonic filter (Figure 7, Item 6).

4. Tag wiring (Figure 7, Item 7) to three feed thru capacitors (Figure 7, Item 8).

5. Remove nut (Figure 7, Item 9), lock washer (Figure 7, Item 10), and washer (Figure 7, Item 11) from terminal stud (Figure 7, Item 12) on both ends of feed thru capacitor (Figure 7, Item 8). Discard lock washer.

6. Remove wiring (Figure 7, Item 7) from each feed thru capacitor (Figure 7, Item 8) terminal stud (Figure 7, Item 12).

NOTE

Leave all other wiring connected to harmonic filter and VFD.

7. Slide harmonic filter (Figure 7, Item 6) from fasteners and remove harmonic filter from shielded enclosure assembly.

8. Install new harmonic filter (Figure 7, Item 6) to the two left mounting fasteners first by sliding slotted harmonic filter mounting bracket between flat washers (Figure 7, Item 3) and the rear wall of the enclosure.

9. Align right harmonic filter mounting bracket slots with holes in the rear wall of the enclosure.

10. Insert from the rear, two hex head bolts (Figure 7, Item 1) through the holes in the rear wall from and through the slots in the harmonic filter mounting bracket.

11. Install two flat washers (Figure 7, Item 3), new lock washers (Figure 7, Item 2), and nuts (Figure 7, Item 4) on hex head bolt (Figure 7, Item 1) and firmly tighten.

12. Connect wiring as tagged. Remove tags.

Test Temperature Controller (TC)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. Power up IECU (WP 0005).

2. On remote box assembly, place mode selector switch to HEAT position.

3. Rotate TEMPERATURE knob to WARMER position.

4. Make sure that room air temperature becomes warmer.
   - If room air temperature does not increase, troubleshoot IECU for SYMPTOM – IECU runs but no heat (WP 0012).

5. Rotate TEMPERATURE knob to COOLER position.
   - If room air temperature does not decrease, troubleshoot IECU for SYMPTOM – IECU runs but will not cool (WP 0012).

6. Return IECU to normal operation (WP 0005).

Replace Temperature Controller (TC)

NOTE

The temperature controller is located on the top inner surface of the shielded enclosure assembly.

1. Shut down IECU (WP 0005).

2. Tag wiring and disconnect female spade lugs (Figure 8, Item 1) from male spade mounts (Figure 8, Item 2) on temperature controller (Figure 8, Item 3).

3. Remove five screws (Figure 8, Item 4), nuts (Figure 8, Item 5), lock washers (Figure 8, Item 6), and washers (Figure 8, Item 7) securing temperature controller (Figure 8, Item 3) to shielded enclosure assembly ceiling (Figure 8, Item 8). Discard lock washers.

CAUTION

Do not over tighten screws; damage or cracking of temperature controller board may result.

4. Attach new temperature controller to ceiling of shielded enclosure assembly with five screws (Figure 8, Item 4), nuts (Figure 8, Item 5), new lock washers (Figure 8, Item 6), and washers (Figure 8, Item 7).

5. Connect wiring with female spade lugs (Figure 8, Item 1) to male spade mounts (Figure 8, Item 2) on temperature controller (Figure 8, Item 3).

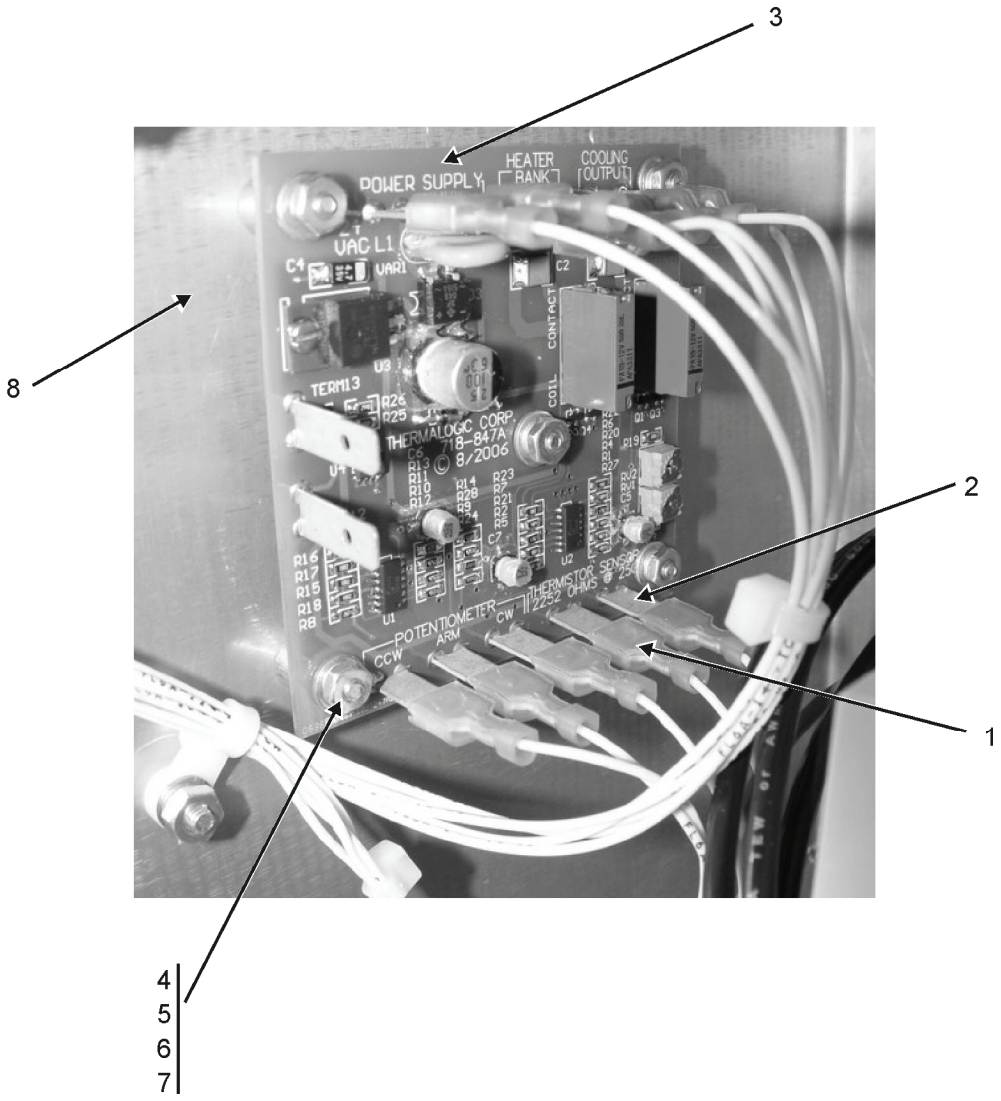


Figure 8. Temperature Controller

6. Remove tags.

7. Test temperature controller per this WP.

Replace EMI Filter Terminal Block (FL4)

1. Remove harmonic filter per this WP to gain access to EMI filter terminal block.

2. Tag and disconnect external wiring (Figure 9, Item 1) attached to EMI filter terminal block (Figure 9, Item 2).

3. Remove two screws (Figure 9, Item 3), lock washers (Figure 9, Item 4), flat washers (Figure 9, Item 5), and nuts (Figure 9, Item 6), securing EMI filter terminal block (Figure 9, Item 2) to shielded enclosure assembly. Discard lock washers.

4. Cut wire ties as required to remove terminal block from mounting hole and position outside of shielded enclosure assembly.

5. Tag three wires (Figure 9, Item 7) soldered to terminal block posts (Figure 9, Item 8).

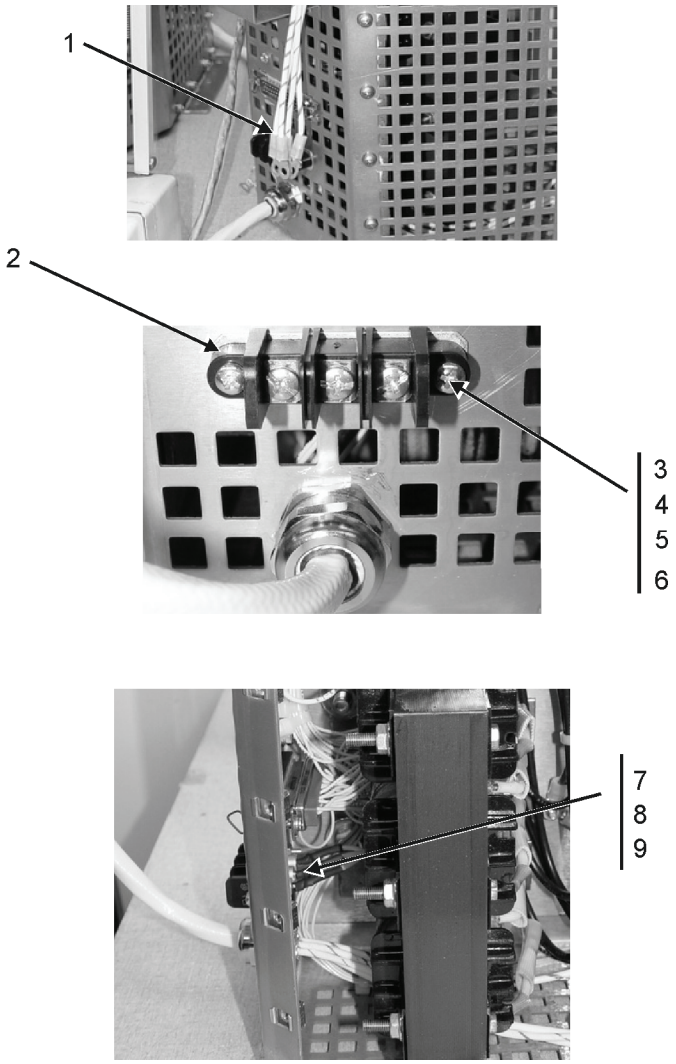


Figure 9. EMI Filter Block

6. Cut off insulating sleeves (Figure 9, Item 9) and desolder wires (Figure 9, Item 7).

7. Slide new insulating sleeves (Figure 9, Item 9) over wires and solder wires to posts on new EMI filter terminal block (Figure 9, Item 2) as tagged.

8. Heat shrink insulating sleeves on wires.

9. Install EMI filter terminal block (Figure 9, Item 2) into mounting hole and secure with two screws (Figure 9, Item 3), lock washers (Figure 9, Item 4), flat washers (Figure 9, Item 5), and nuts (Figure 9, Item 6).

10. Remove tags on internal wiring and secure wiring with wire ties as needed.

11. Install harmonic filter per this WP.

12. Connect external wiring (Figure 9, Item 1) to EMI filter terminal block (Figure 9, Item 2) pas tagged.

13. Remove tags.

Replace Feedthru Capacitor (FL1, FL2, FL3)

NOTE

There are three feedthru capacitors, (FL1, FL2, and FL3), housed in the shielded enclosure assembly. This procedure is applicable to all three capacitors.

1. Tag wiring (Figure 10, Item 1) to applicable feedthru capacitor (Figure 10, Item 2).

2. Remove nut (Figure 10, Item 3), lock washer (Figure 10, Item 4), and washer (Figure 10, Item 5) from terminal stud (Figure 10, Item 6) on both ends of feedthru capacitor (Figure 10, Item 2). Discard lock washer.

3. Remove wiring (Figure 10, Item 1) from feedthru capacitor (Figure 10, Item 2) terminal studs (Figure 10, Item 6).

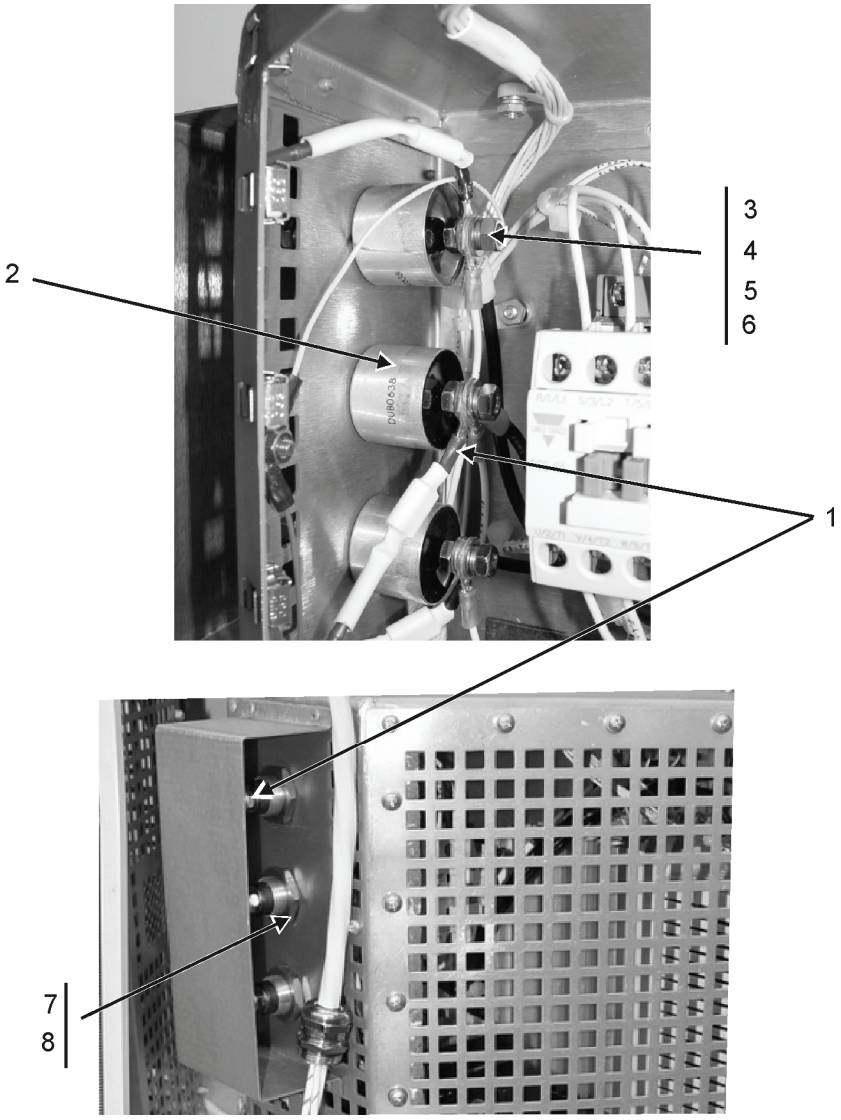


Figure 10. Feed thru Capacitors

4. Remove mounting nut (Figure 10, Item 7) and spring washer (Figure 10, Item 8) securing feedthru capacitor (Figure 10, Item 2) to shielded enclosure. Retain nut and spring.

5. Remove feedthru capacitor (Figure 10, Item 2).

6. Install new feedthru capacitor (Figure 10, Item 2) through mounting hole and secure with nut (Figure 10, Item 7) and spring washer (Figure 10, Item 8).

7. Connect wiring (Figure 10, Item 1) to feedthru capacitor (Figure 10, Item 2) terminal studs (Figure 10, Item 6) as tagged.

8. Remove tags.

Test Bleeder Resistor (R1, R2, R3)

NOTE

There are three bleeder resistors assemblies (R1, R2, and R3) housed in the shielded enclosure assembly. This procedure is applicable to all three resistor assemblies.

1. Remove applicable bleeder resistor (Figure 11, Item 1) per this WP.

2. Set digital multi-meter to ohms scale.

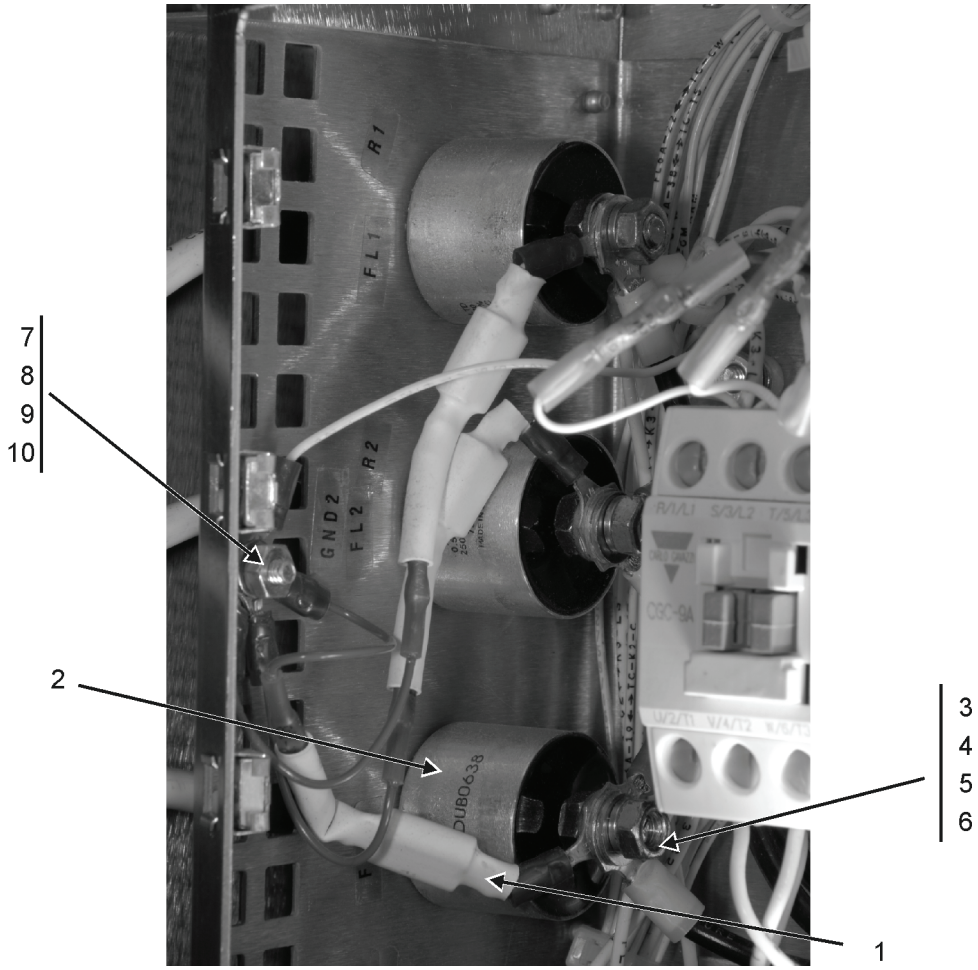


Figure 11. Bleeder Resistors

3. Test resistance of resistor.
   - If resistance value is not between 121 ohms and 148 ohms, replace bleeder resistor.

Replace Bleeder Resistor (R1, R2, R3)

NOTE

There are three bleeder resistors (Figure 11, Item 1) (R1, R2, and R3) housed in the shielded enclosure assembly. R1 is attached to feedthru capacitor FL1; R2 is attached to FL2; and R3 is attached to FL3. This procedure is applicable to all three bleeder resistors.

1. Tag all wiring to applicable feedthru capacitor (Figure 11, Item 2).
2. Remove nut (Figure 11, Item 3), lock washer (Figure 11, Item 4), and washer (Figure 11, Item 5) from terminal stud (Figure 11, Item 6) on feedthru capacitor (Figure 11, Item 2). Discard lock washer.
3. Remove one side of bleeder resistor (Figure 11, Item 1) from feedthru capacitor (Figure 11, Item 2) stud.
4. Remove one screw (Figure 11, Item 7), washer (Figure 11, Item 8), lock washer (Figure 11, Item 9), and nut (Figure 11, Item 10) securing opposite end of bleeder resistor (Figure 11, Item 1) to shielded enclosure assembly frame.
5. Remove bleeder resistor (Figure 11, Item 1).
6. Install new bleeder resistor (Figure 11, Item 1) to shielded enclosure assembly frame and secure using one screw (Figure 11, Item 7), washer (Figure 11, Item 8), lock washer (Figure 11, Item 9), and nut (Figure 11, Item 10).
7. Install other end of bleeder resistor (Figure 11, Item 1) on applicable feedthru capacitor (Figure 11, Item 2).
8. Install all other tagged wires on feedthru capacitor (Figure 11, Item 2) terminal stud (Figure 11, Item 6) and secure using nut (Figure 11, Item 3), lock washer (Figure 11, Item 4), and washer (Figure 11 Item 5).
9. Remove tags.

Replace Contactor (K3)

1. Tag and disconnect wiring from terminals on contactor (K3) (Figure 12, Item 1).
2. Remove four nuts (Figure 12, Item 2), lock washers (Figure 12, Item 3), and washers (Figure 12, Item 4) from screws (Figure 12, Item 5), securing (K3) contactor (Figure 12, Item 1) to the rear wall of shielded enclosure assembly.
3. Install new contactor (K3) (Figure 12, Item 1) on rear wall of shielded enclosure assembly and secure using four nuts (Figure 12, Item 2), lock washers (Figure 12, Item 3), and washers (Figure 12, Item 4) from screws (Figure 12, Item 5).
4. Reconnect wiring as tagged.
5. Remove tags.

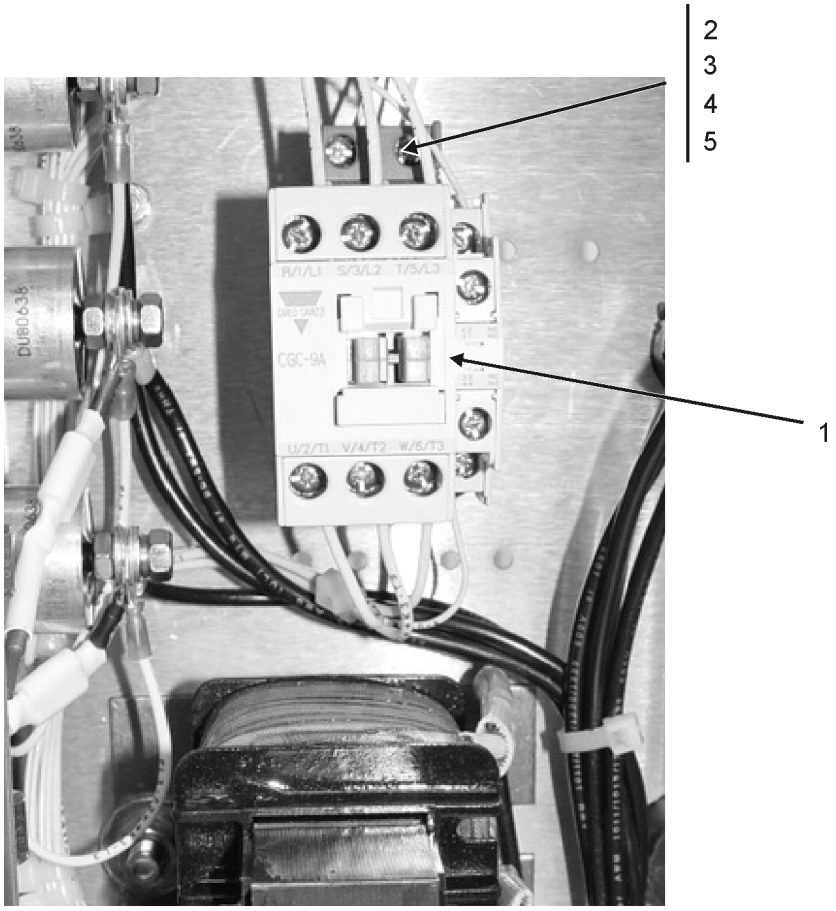


Figure 12. K3 Contactor

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
ELECTRICAL BOX ASSEMBLY
INSPECT, REPAIR

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Materials/Parts
None

Personnel Required
One
References
WP 0005
WP 0012
TM 9-4120-431-24P

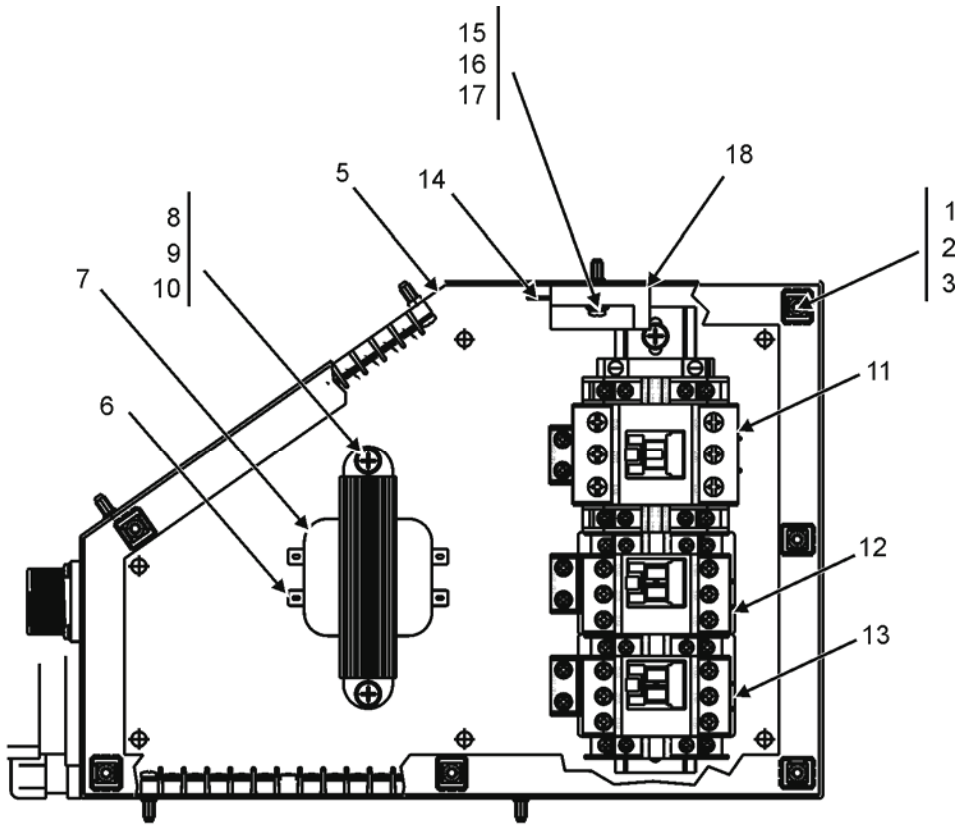
Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

INSPECT

1. Remove seven screws (Figure 1, Item 1), lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) securing cover (Figure 1 Item 4, not illustrated) to electrical box (Figure 1, Item 5). Discard lock washers.
2. Remove cover (not illustrated) and place out of way.
3. Inspect electrical box assembly wiring for frays, cuts, and signs of overheating.
4. Inspect contactors K2 (Figure 1, Item 11), K4 (Figure 1, Item 12), and K1 (Figure 1, Item 13) for loose wiring.
5. Inspect transformer (Figure 1, Item 7) for signs of overheating, obvious damage, or loose connections. Tighten as required or repair per this WP.
6. Inspect strain relief locknuts (not illustrated) on two input electrical harnesses for tightness. Tighten as required.
7. If any inspected electrical box assembly component is damaged, replace component per this WP.
8. Install cover (Figure 1, Item 4, not illustrated) on electrical box (Figure 1, Item 5) and secure using seven screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3). Tighten screws (Figure 1, Item 1).
9. Close top cover assembly (WP 0005).
10. Place IECU back into normal operation (WP 0005).



NOTE: SHOWN WITH COVER (4) REMOVED.

Figure 1. Electrical Box Assembly (Cover Removed)

REPAIR

General

WARNING

- Electrical voltage and current cannot be seen, and when contacted can result in death, render you unconscious, or severely burn you. Use extreme care when working around or with energized equipment. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning.
- Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, they must warn them about dangerous areas.
- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power is disconnected. Injury or death can occur if connected to power source.

1. Remove seven screws (Figure 1, Item 1), lock washers (Figure 1, Item 2), flat washers (Figure 1, Item 3) securing cover (Figure 1, Item 4, not illustrated) to electrical box (Figure 1, Item 5). Discard lock washers.

2. Remove cover (Figure 1, Item 4,not illustrated) and place out of way.

3. Perform component test and replacement per this WP.

4. Install electrical box cover assembly (Figure 1, Item 4, not illustrated) using seven screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3). Tighten screws.

5. Lower IECU top cover (WP 0005).

6. Place IECU back into normal operation (WP 0005).

Test Control Transformer (T1) (Refer to Figure 2)

1. Shut down IECU (WP 0005).

WARNING

- Electrical voltage and current cannot be seen, and when contacted can result in death, render you unconscious, or severely burn you. Use extreme care when working around or with energized equipment. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning.

- Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, they must warn them about dangerous areas.

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power is disconnected. Injury or death can occur if connected to power source.

2. Remove electrical box cover (Figure 1, Item 4, not illustrated) per this WP.

3. Tag and disconnect transformer (Figure 1, Item 7) leads. Refer to transformer schematic, Figure 2.

4. Using a digital multimeter set to ohms-scale, check for <0.5 ohms between terminals T1-X1 and T1-X2.
   - If >0.5 ohms, replace transformer (T1) per this WP.

5. Using a digital multimeter set to ohms-scale, check for 11.0 to 14.0 ohms between terminals T1-H1 and T1-H2.
   - If <11.0 ohms or >14.0 ohms, replace T1 per this WP.

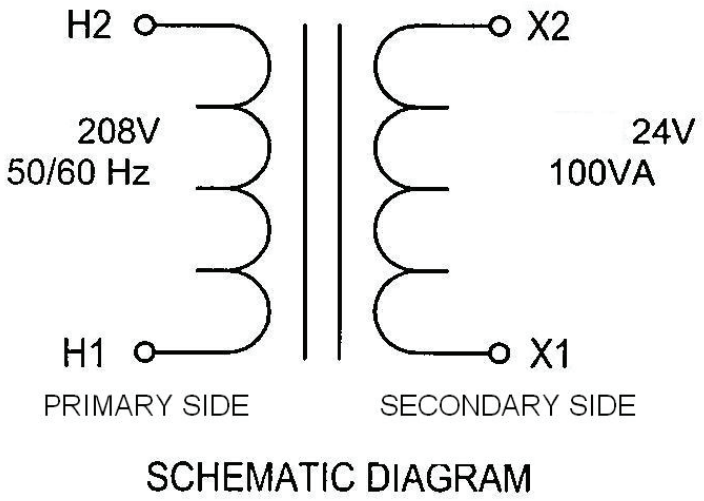


Figure 2. Transformer (T1) Schematic

6. Install electrical box cover assembly (Figure 1, Item 4, not illustrated) using seven screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3). Tighten screws.
7. Lower IECU top cover (WP 0005).
8. Place IECU back into normal operation (WP 0005).

Replace Control Transformer (T1)

1. Tag and disconnect four leads (Figure 1, Item 6) from control transformer (Figure 1, Item 7) terminals.
2. Tag ground leads attached to transformer mounting screws (Figure 1, Item 8).
3. Remove two screws (Figure 1, Item 8), lock washers (Figure 1, Item 9), and flat washers (Figure 1, Item 10) securing transformer (Figure 1, Item 7) to electrical box (Figure 1, Item 5). Discard lock washers.
4. Position new control transformer in electrical box with X1 and X2 terminals facing away from contactors.
5. Secure tagged ground leads and transformer using two screws (Figure 1, Item 8), new lock washers (Figure 1, Item 9), and flat washers (Figure 1, Item 10).

CAUTION

Use care when installing the transformer leads to make sure that 208 VAC leads are connected to terminals H1 and H2 on primary side of transformer. Damage to equipment will result if high voltage lines are connected to secondary terminals.

6. Reconnect four tagged leads to transformer terminals.
7. Install electrical box cover assembly (Figure 1, Item 4, not illustrated) using seven screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3). Tighten screws.

8. Lower IECU top cover (WP 0005).

9. Place IECU back into normal operation (WP 0005).

Test Contactor (K1)

10. Power up IECU (WP 0005).

11. Place rotary selector switch to COOL position.
    - If evaporator blower motor does not start, shut down IECU and troubleshoot for IECU runs, but no cooling in COOL mode (WP 0012).

12. After evaporator blower motor starts, shut down IECU (WP 0005).

Test Contactor (K2)

1. Power up IECU (WP 0005).

2. Place rotary selector switch to COOL position.
    - If compressor does not start after one minute, shut down IECU and troubleshoot for IECU runs, but no cooling in COOL mode (WP 0012).

3. After compressor starts, shut down IECU (WP 0005).

Test Contactor (K4)

1. Power up IECU (WP 0005).

2. Place rotary selector switch to HEAT position.
    - If no heat is provided, shut down IECU and troubleshoot for IECU runs, but no heat in HEAT mode (WP 0012).

3. After heat is observed, shut down IECU (WP 0005).

Replace Contactor (K1, K2, or K4)

NOTE

There are three contactors K2 (Figure 1, Item 11), K4 (Figure 1, Item 12), and K1 (Figure 1, Item 13) housed in the electrical box. This procedure is applicable to all three contactors.

1. Tag and disconnect leads from contactor (Figure 1, Item 11, 12, or 13).

2. Pry tab, in-between contactor (Figure 1, Item 11, 12, or 13) and edge of electrical control box (Figure 1, Item 5) on bottom of contactor (Figure 1, Items 11, 12, or 13), with #2 screwdriver toward edge of electrical control box (Figure 1, Item 5) pushing toward control transformer (Figure 1, Item 7) to disengage contactor (Figure 1, Items 11, 12, or 13) from DIN rail and lift up and away from DIN rail.

3. Install new contactor (Figure 1, Items 11, 12, or 13) onto DIN rail.

4. Reconnect electrical wiring to contactor (Figure 1, Items 11, 12, or 13) as tagged.

5. Remove tags from wiring.

6. Install electrical box cover assembly (Figure 1, Item 4, not illustrated) using seven screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3). Tighten screws.

7. Lower IECU top cover (WP 0005).

8. Place IECU back into normal operation (WP 0005).

Test Time Delay Relay Assembly (TD1)

NOTE

Normal operating sequence, after selecting mode and temperature settings, of the IECU will consist of the evaporator blower motor starting, followed by a delay of approximately one minute controlled by the time delay relay (TD1) before the compressor starts up. After compressor starts, the condenser fan will start up and run when the discharge pressure is above approximately 370 psig. If the compressor does not start within one minute of placing the rotary selector switch to COOL position, troubleshoot time delay relay per WP 0012.

1. Power up IECU (WP 0005).

2. Place rotary selector switch to COOL position.

3. Rotate TEMPERATURE knob to full COOLER (counterclockwise) position.
   - If compressor does not start after one minute, shut down IECU and troubleshoot for compressor no start (WP 0012).

4. After compressor starts, shut down IECU (WP 0005).

Replace Time Delay Relay Assembly (TD1)

5. Shut down IECU (WP 0005).

6. Tag and disconnect leads (Figure 1, Item 14) from time delay relay (Figure 1, Item 18).

7. Remove two screws (Figure 1, Item 15), lock washers (Figure 1, Item 16), and flat washers (Figure 1, Item 17) securing time delay relay (Figure 1, Item 18) to electrical box (Figure 1, Item 5). Discard lock washers.

8. Position new time delay relay (Figure 1, Item 18) in electrical box (Figure 1, Item 5).

9. Secure time delay relay (Figure 1, Item 18) using two screws (Figure 1, Item 15), new lock washers (Figure 1, Item 16), and flat washers (Figure 1, Item 17).

10. Reconnect electrical wiring (Figure 1, Item 14) to time delay relay (Figure 1, Item 18) as tagged.

11. Remove tags from wiring.

12. Install electrical box cover assembly (Figure 1, Item 4, not illustrated) using seven screws (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3). Tighten screws.

13. Lower IECU top cover (WP 0005).

14. Place IECU back into normal operation (WP 0005).

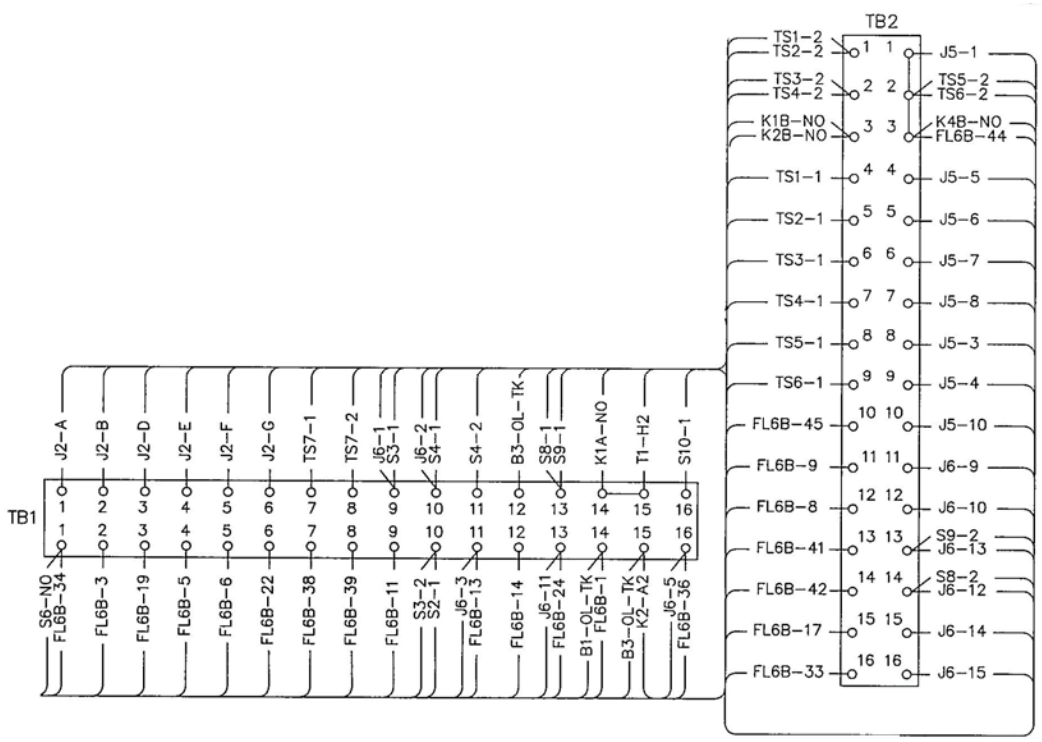


Figure 3. Terminal Boards TB1 and TB2 Wire Connections

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
CONDENSER FAN PRESSURE SWITCH (S4)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electronic Equipment Toolkit (WP 0072, Item 11)
Materials/Parts
Splice (WP 0075, Item 2)
Tie Wraps (WP 0075, Item 3)
Personnel Required
One
References
WP 0005
WP 0015
WP 0020
WP 0063
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)
End panel removed (WP 0015)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

15. Cut and remove tie wraps as needed to access fan pressure switch (S4) (Figure 1, Item 1) wiring. Discard tie wraps.

NOTE

Pressure switch wiring is connected to IECU wiring using splices. The splices will have to be cut out to remove switch. The wires do not need to be tagged, as polarity of the wiring for the switch is irrelevant.

16. Cut two wires (Figure 1, Item 4) as close to splices as possible.

WARNING

Use care when working with R-410A refrigerant. Avoid contact with skin and eyes at all times. Always wear protective gloves and face shield when possibility of exposure is possible.

17. Loosen flared nut (Figure 1, Item 2) on fan pressure switch (Figure 1, Item 1) and remove switch from self-sealing fitting (Figure 1, Item 3).

NOTE

The pressure switch is connected to a self-sealing fitting. A little refrigerant will escape when disconnected from this type fitting.

18. Install new fan pressure switch (Figure 1, Item 1) and tighten flared nut (Figure 1, Item 2) to self-sealing fitting (Figure 1, Item 3).

19. Connect two wires (Figure 1, Item 4) from pressure switch to IECU wiring (WP 0063).

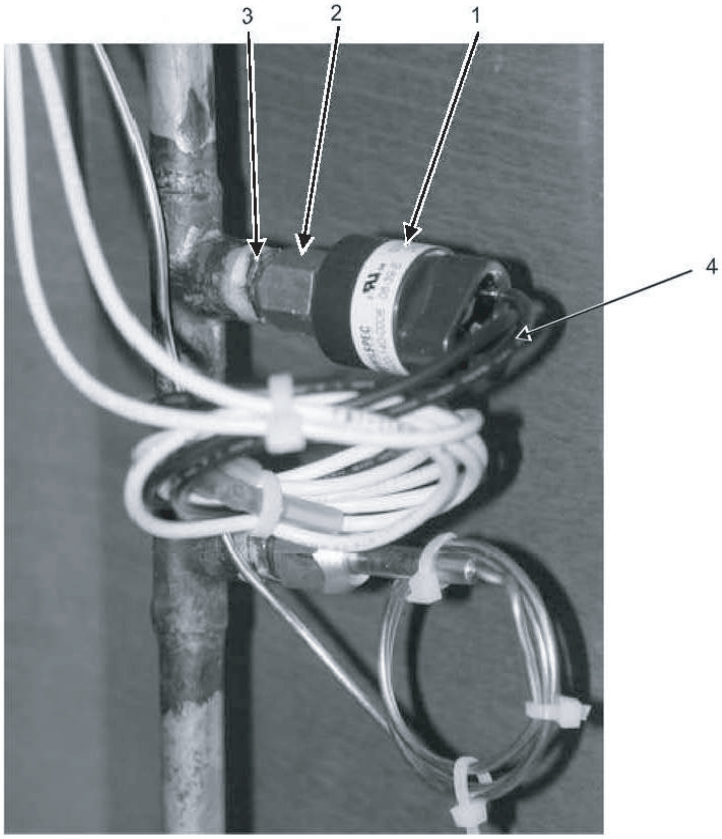


Figure 1. Fan Pressure Switch (S4)

20. Secure wiring inside IECU with tie wraps as required.

21. Test fan pressure switch (WP 0020).

22. Install end panel (WP 0015).

23. Power up IECU (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
REMOTE BOX ASSEMBLY
REPAIR

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electronics Equipment Tool Kit (WP 0072, Item 11)

Materials/Parts
None

Personnel Required
One

References
WP 0005
WP 0021
TM 9-4120-431-24P

EquipmentCondition
IECU is shut down (WP 0005)
Remote box assembly removed from IECU (WP 0021)

REPAIR

Remove Remote Box Assembly Cover

1. Route cable and remote box assembly outside of IECU through deployment opening on frame.
2. Remove four screws (Figure 1, Item 5) securing remote box assembly cover (Figure 1, Item 6) to remote box assembly (Figure 1, Item 7).

CAUTION

The cover and remote box assembly are connected internally by wiring. The cover cannot be completely removed. Use care when opening cover. Do not damage wiring or components.

3. Carefully open remote box cover (Figure 1, Item 6).

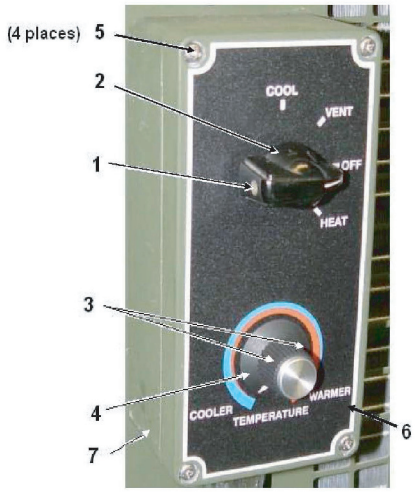


Figure 1. Remote Box Assembly

Replace Potentiometer (PT1)

1. Tag three wires attached to potentiometer (PT1) (Figure 2, Item 1).
2. Remove two setscrews (Figure 1, Item 3) from potentiometer PT1 knob (Figure 1, Item 4).
3. Remove knob from potentiometer shaft.
4. Remove insulation over potentiometer (PT1) (Figure 2, Item 2) terminals.
5. Desolder and remove the three wires from potentiometer (Figure 2, Item 1).
6. Loosen and remove nut (Figure 3, Item 1) and washer (Figure 3, Item 2) securing potentiometer to cover.
7. Remove key (Figure 3, Item 3).
8. Install key (Figure 3, Item 3) on new potentiometer (Figure 3, Item 4) and align with holes on cover. Install on cover.

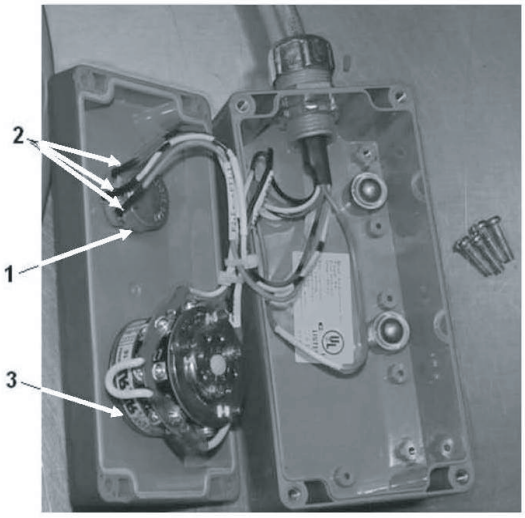


Figure 2. Remote Box Assembly (Cover Removed)

NOTE

Put potentiometer in position on cover so knob pointer will point to correct positions.

9. Install nut (Figure 3, Item 1) and washer (Figure 3, Item 2) to secure potentiometer (Figure 3, Item 4) to cover (Figure 1, Item 7). Tighten nut.
10. Solder wiring to potentiometer as tagged.
11. Remove tags.
12. Install cover per this WP.

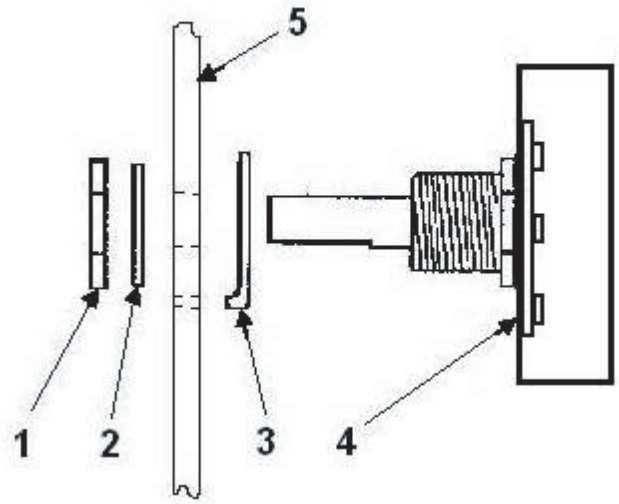


Figure 3. Potentiometer

Replace Rotary Switch (S1)

1. Tag and disconnect wiring from rotary switch (Figure 2, Item 3) terminals.
2. Remove setscrew (Figure 1, Item 1) from rotary switch selector switch S1 knob (Figure 1, Item 2).
3. Remove knob (Figure 1, Item 2) from switch shaft.
4. Loosen and remove nut (Figure 4, Item 1) and washer (Figure 4, Item 2) securing rotary switch to cover (Figure 4, Item 5).
5. Remove rotary switch (Figure 4, Item 4) and key (Figure 4, Item 3).
6. Install key (Figure 4, Item 3) on new switch (Figure 4, Item 4) and install switch on cover (Figure 4, Item 5).

NOTE

Put switch in position on cover so knob pointer will point to correct positions.

7. Install nut (Figure 4, Item 1) and washer (Figure 4, Item 2) to secure switch (Figure 4, Item 4) to cover (Figure 4, Item 5). Tighten nut.
8. Reconnect wiring to rotary switch (Figure 2, Item 3) as tagged.
9. Remove tags.
10. Install cover per this WP.

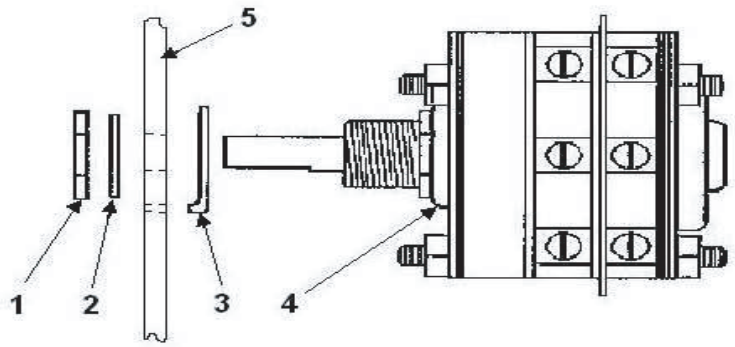


Figure 4. Rotary Switch

Install Cover

CAUTION

Use care when positioning cover onto remote box so that wires do not get pinched.

1. Install remote box assembly cover (Figure 1, Item 6) on remote box assembly (Figure 1, Item 7) using four screws (Figure 1, Item 5). Tighten screws.
2. Install rotary selector switch knob (Figure 1, Item 2) on rotary switch shaft.

NOTE

Make sure pointer points in the correct position.

3. Secure knob (Figure 1, Item 2) to rotary switch shaft using one set screw (Figure 1, Item 1).
4. Tighten set screw (Figure 1, Item 1).
5. Install potentiometer knob (Figure 1, Item 4) on potentiometer shaft.

NOTE

Make sure pointer points in the correct position.

6. Secure knob (Figure 1, Item 4) to potentiometer shaft using two set screws (Figure 1, Item 3).
7. Tighten set screws.
8. Install remote box assembly and cable in IECU (WP 0021).
9. Lower top cover (WP 0005).

10. Test remote box assembly by operating IECU (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
CIRCUIT BREAKER (CB1)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Materials/Parts
None
Personnel Required
One
References
WP 0005
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Pull boots away from circuit breaker terminals.
2. Tag and disconnect all wires (Figure 1, Item 1) from rear of circuit breaker.

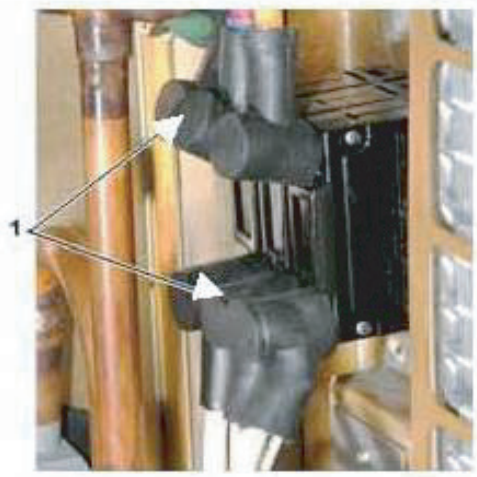


Figure 1. Circuit Breaker Wiring Inside IECU Frame

3. Hold circuit breaker and remove six screws (Figure 2, Item 1) and six o-rings (Figure 2, Item 2) from faceplate (Figure 2, Item 3). Retain screws and o-rings for installation.

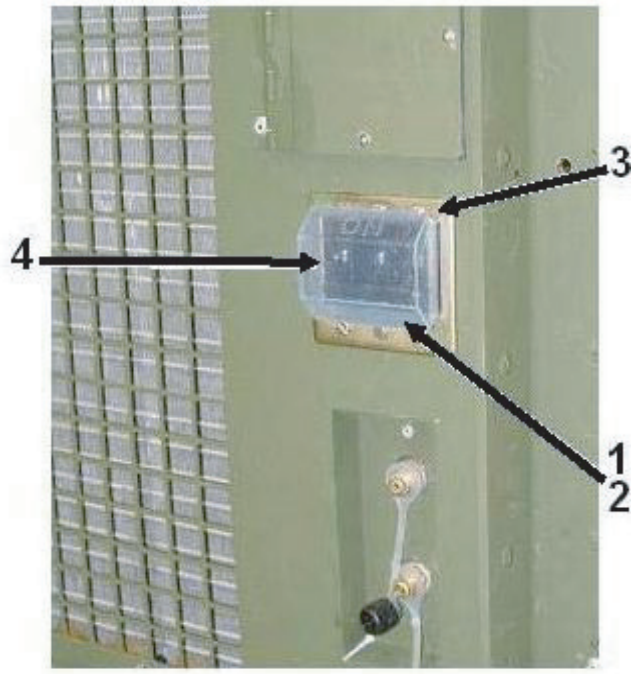


Figure 2. Circuit Breaker Outside of Frame

4. Insert and hold new circuit breaker in opening and align mounting holes. Orient circuit breaker, so that ON is up.

5. Align boot (Figure 2, Item 4) and frame (Figure 2, Item 3) with mounting holes. Be sure ON indicator on transparent boot is facing up.

6. Secure frame with six screws (Figure 2, Item 1) and six o-rings (Figure 2, Item 2).

7. Connect wires (Figure 1, Item 1) as tagged and in accordance with Table 1 and Figure 3.

Table 1. CB1 Pin Out Connections

CB Termination		Wire Number
A1	P1-A	
A2	K2-L1	
B1	P1-B	
B2	K2-L2	T1-H1
C1	P1-C	
C2	K2-L3	T1-H2

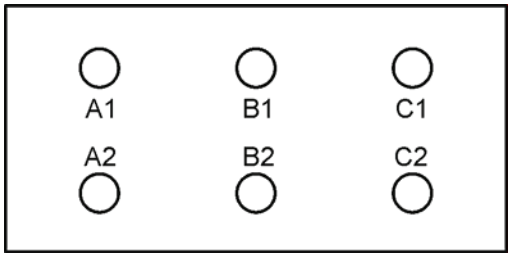


Figure 3. CB1 Pin Out

8. Position boots over terminals.
9. Remove tags.
10. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
PRECISION BIMETAL THERMOSTAT (S8)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electronics Equipment Tool Kit (WP 0072, Item 11)
Materials/Parts
Splice (WP 0075, Item 2)
Tie Wrap (WP 0075, Item 3)
Personnel Required
One
References
WP 0017
WP 0022
WP 0063
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)
Bottom-right side cover removed (WP 0017)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

CAUTION

Evaporator coils are easily damaged. Use care when removing tie wraps.

1. Cut tie wrap (Figure 1, Item 1) securing thermostat S8 (Figure 1, Item 2) to evaporator coil. Discard wire tie.
2. Remove thermostat (Figure 1, Item 2) from evaporator coil. Mark thermostat's location on the evaporator coil.
3. Remove insulation (Figure 1, Item 3) surrounding thermostat (Figure 1, Item 2).
4. Tag two wires on IECU side of butt slices.
5. Cut wires to each splice as close to splices as possible.
6. Connect new thermostat wiring to IECU wiring as tagged using wire splices (WP 0063).
7. Remove tags.
8. Apply insulation material (Figure 1, Item 3) to thermostat (Figure 1, Item 2).

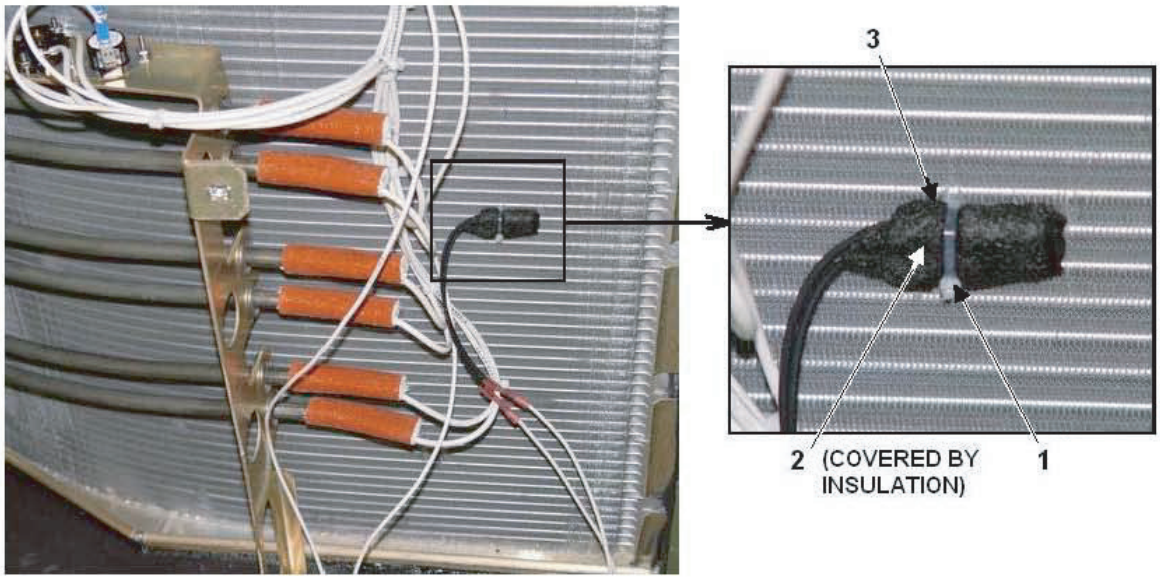


Figure 1. Thermostat (S8)

CAUTION

Evaporator coils are easily damaged. Use care when installing wire tie.

9. Attach thermostat (Figure 1, Item 2) to evaporator coil using wire tie (Figure 1, Item 1), in the same location as the original thermostat.

10. Install bottom-right side cover (WP 0017).

11. Test thermostat (WP 0022).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
PRECISION BIMETAL THERMOSTAT (S9)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electronic Equipment Toolkit (WP 0072, Item 11)

Materials/Parts
Splice (WP 0075, Item 2)
Wire Tie (WP 0075, Item 3)

Personnel Required
One

References
WP 0015
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
End panel removed (WP 0015)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

NOTE

S9 thermistor is mounted next to the TS2 and TS7 thermistors. Identify these parts by examining wire markings.

1. Cut tie wrap securing thermostat (S9) (Figure 1, Item 1) to wire bundle. Discard tie wrap.
2. Uncoil and remove S9 from wire bundle.
3. Tag two wires on IECU side of butt slices.
4. Cut wires on both sides of each splice as close to splices as possible.
5. Connect new thermostat wiring to IECU wiring as tagged using butt splices (WP 0063).
6. Remove tags.
7. Attach S9 (Figure 1, Item 1) to wire bundle using tie wrap.
8. Install end panel (WP 0015).

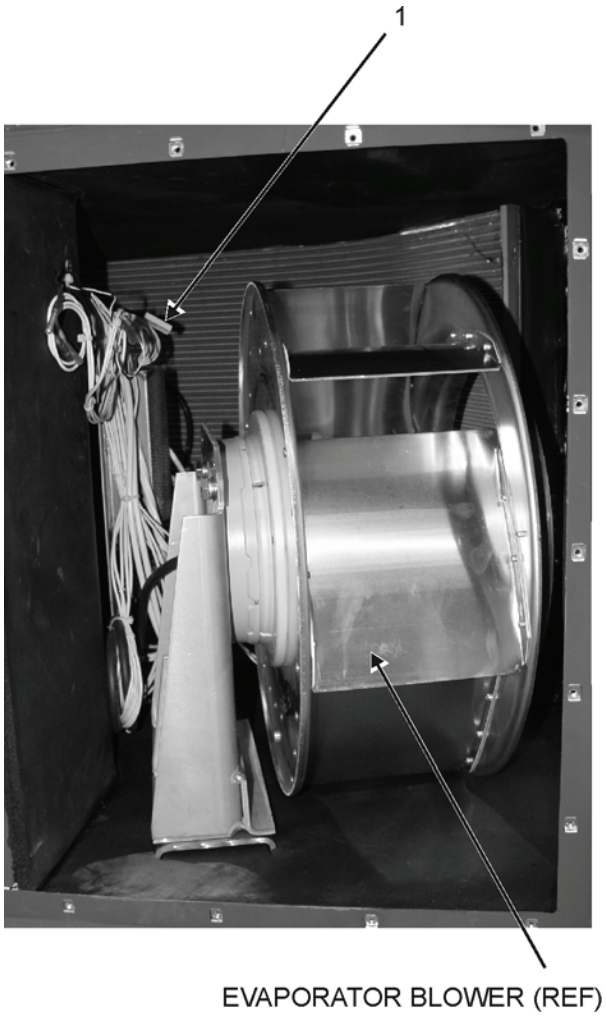


Figure 1. Bimetal Thermostat (S9)

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
THERMOSTATIC SWITCH (S5)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electronics Equipment Tool Kit (WP 0072, Item 11)

Materials/Parts
None

Personnel Required
One

References
WP 0005
WP 0017
WP 0024
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Bottom-right side cover removed (WP 0017)

REPLACE

1. Tag three wires connected to thermostatic switch (S5) (Figure 1, Item 1).

WARNING

Solder and flux contain materials which are hazardous to health. Avoid breathing vapors or fumes from soldering operations. Perform operations only in well ventilated areas. Wash hands with soap and water after handling solder and flux. Wear thermal gloves and protective goggles or face shield to protect against burns.

2. Desolder wires from S5.
3. Remove two screws (Figure 1, Item 2), washers (Figure 1, Item 3), lock washers (Figure 1, Item 4), and nuts (Figure 1, Item 5) securing thermostatic switch (Figure 1, Item 1) to tubular heater mount bracket (Figure 1, Item 6). Discard lock washers.
4. Remove thermostatic switch (Figure 1, Item 1) from tubular heater mount bracket (Figure 1, Item 6).
5. Install new thermostatic switch (Figure 1, Item 1) on tubular heater mount bracket (Figure 1, Item 6) and secure using two screws (Figure 1, Item 2), washers (Figure 1, Item 3), new lock washers (Figure 1, Item 4), and nuts (Figure 1, Item 5).
6. Prepare wires for solder.
7. Solder three wires to new thermostatic switch (Figure 1, Item 1) as tagged (WP 0063). Do not apply excessive heat or flux to the switch.
8. Remove tags.
9. Install bottom-right side cover (WP 0017).
10. Test thermostatic switch (WP 0024).
11. Place IECU back into normal operation (WP 0005).

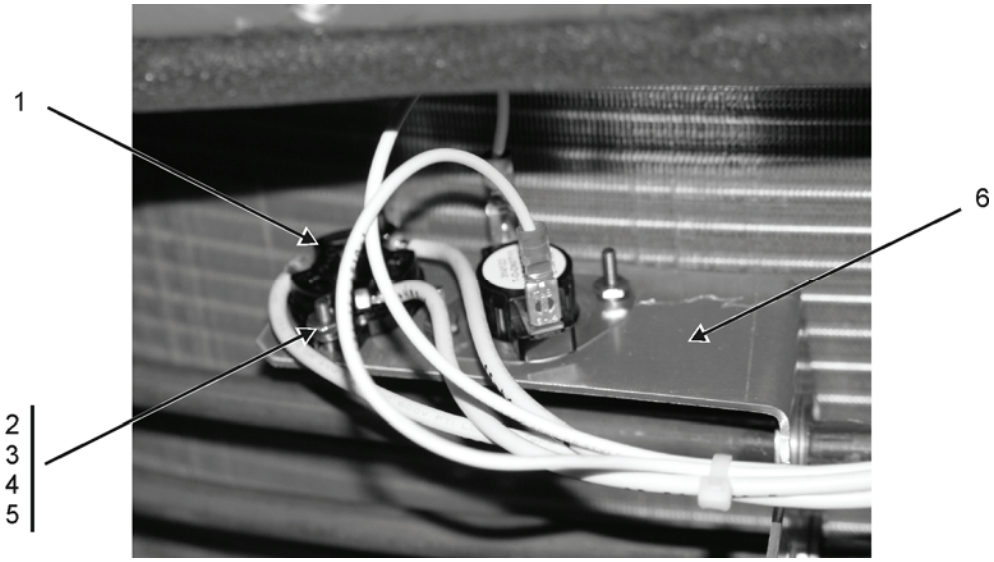


Figure 1. Thermostatic Switch (S5)

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
THERMISTOR (TS7)
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
Electrical Connector Maintenance Kit (WP 0072, Item 10)

Materials/Parts
Tie Wrap (WP 0075, Item 3)

Personnel Required
One

References
WP 0014
WP 0039
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU shut down (WP 0005)
Top cover assembly raised and secure (WP 0005)
End panel is removed from IECU (WP 0015)

NOTE

Evaporator Coil Air Inlet Thermistor TS7 contains a 2252 ohm thermal element. The effective tolerance of the element is +/- 1% at 77º F (25º C). A resistance measurement outside of the element tolerance indicates the thermistor is defective and requires replacement.

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

1. Unbolt shielded enclosure assembly (WP 0039) from IECU.
2. Disconnect connector FL6B from shielded enclosure receptacle FL6A.
3. Using a digital multimeter set to ohms-scale, check for 2229-2275 ohms (2252 +/- 1% at 77º F) between FL6B-38 and FL6B-39 (Figure 1).
   - If resistance value is <2229 ohms or >2275 ohms, replace thermistor TS7 per this WP.

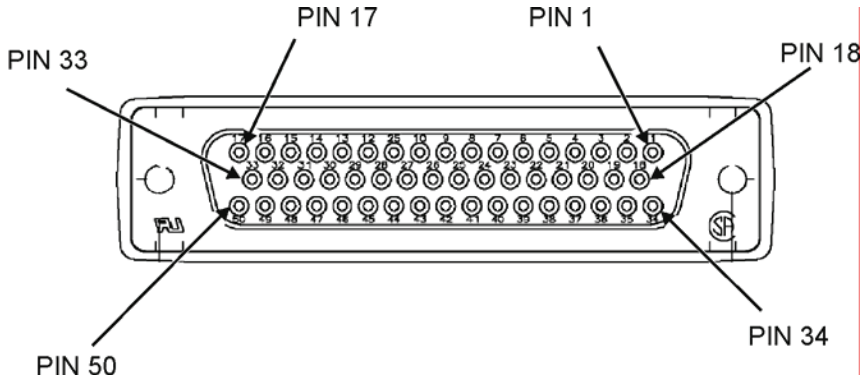


Figure 1. Connector FL6 Pin Out

REPLACE

1. Shut down IECU (WP 0005).
2. Cut tie wrap and remove thermistor (Figure 2, Item 1) from wire bundle. Discard tie wrap.
3. Tag two wires on IECU side of butt slices.
4. Cut wires on both sides of each splice as close to splices as possible.
5. Connect new thermistor wiring to IECU wiring as tagged using butt splices (WP 0063).
6. Remove tags.
7. Attach thermistor (Figure 2, Item 1) to wire bundle using tie wrap.
8. Install end panel (WP 0014).
9. Test thermistor per this WP.

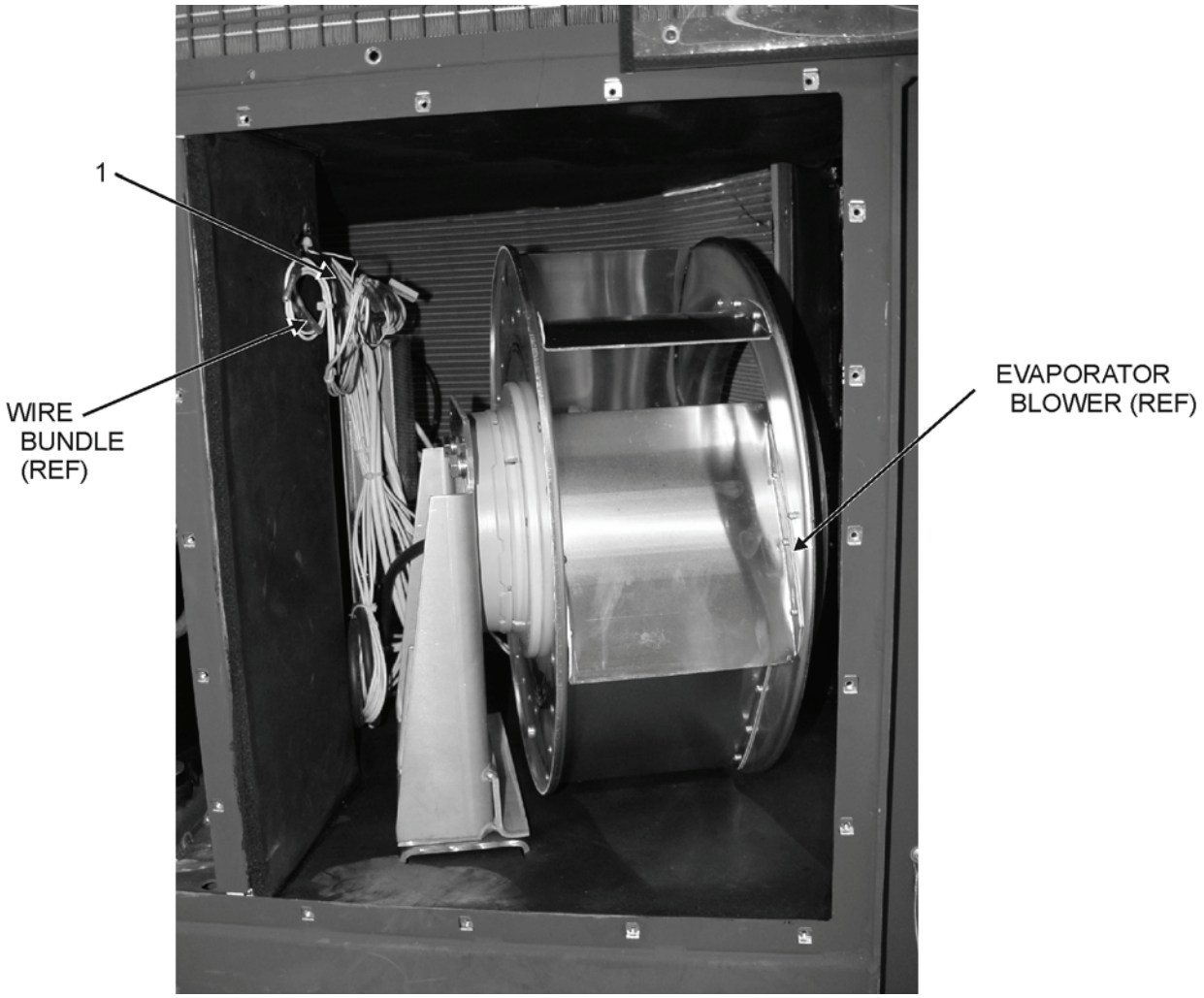


Figure 2. Thermistor (TS7)

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
THERMOSTATIC SWITCH (S10)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electronics Equipment Tool Kit (WP 0072, Item 11)

Materials/Parts
Lock Washer (WP 0075, Item 5)

Personnel Required
One

References
WP 0005
WP 0017
WP 0025
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Bottom right side cover removed (WP 0017)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Tag and disconnect two wires (Figure 1, Item 1) connected to thermostatic switch S10 (Figure 1, Item 2).
2. Remove two screws (Figure 1, Item 3), washers (Figure 1, Item 4), lock washers (Figure 1, Item 5), and nuts (Figure 1, Item 6) securing thermostatic switch (Figure 1, Item 1) to tubular heater mount bracket (Figure 1, Item 7). Discard lock washers.
3. Remove thermostatic switch (Figure 1, Item 1) from tubular heater mount bracket (Figure 1, Item 7).
4. Install new thermostatic switch (Figure 1, Item 1) onto tubular heater mount bracket (Figure 1, Item 7) and secure using two screws (Figure 1, Item 3), washers (Figure 1, Item 4), new lock washers (Figure 1, Item 5), and nuts (Figure 1, Item 6).
5. Connect two wires (Figure 1, Item 2) to thermostatic switch (Figure 1, Item 1) as tagged (WP 0063).
6. Remove tags.
7. Install bottom-right side cover (WP 0017).
8. Test thermostatic switch (WP 0025).
9. Place IECU back into normal operation (WP 0005).

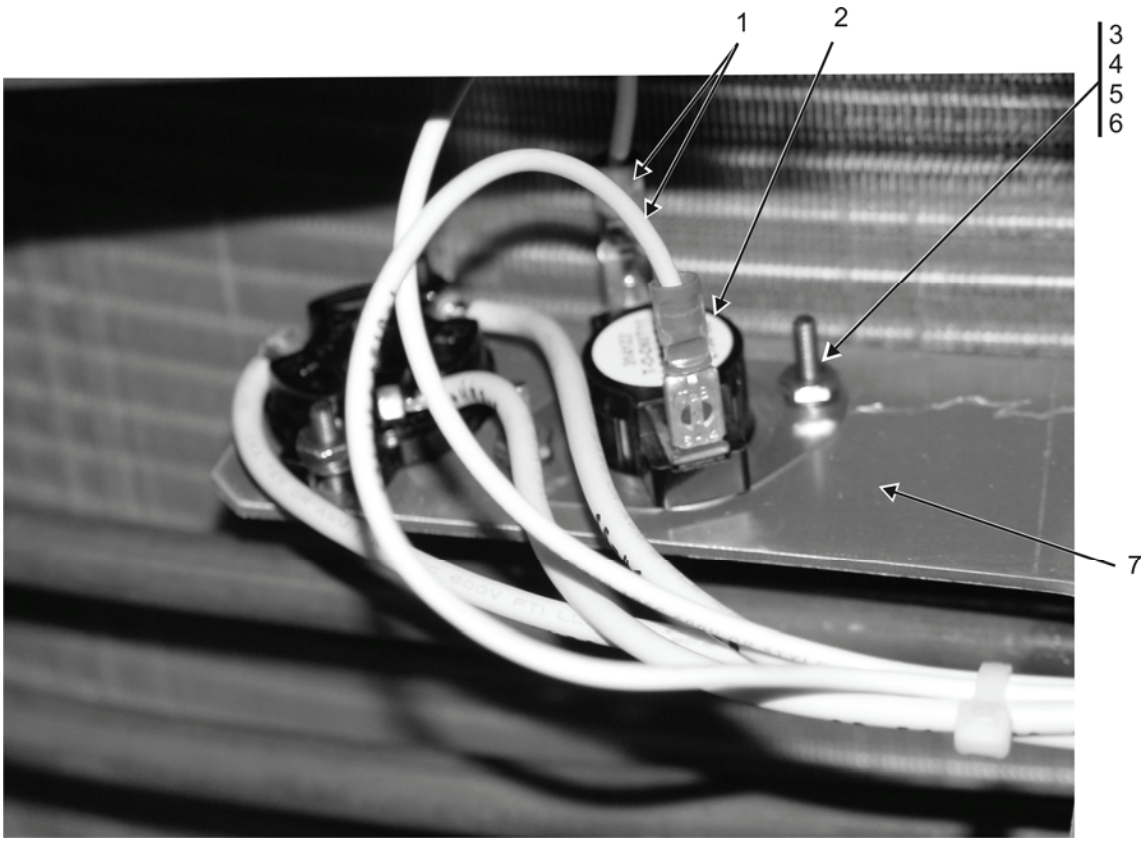


Figure 1. Thermostatic Switch (S10)

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
COMPRESSOR
SERVICE, TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
General Mechanic's Toolkit
Hoist (WP 0072, Item 5)

Materials/Parts
None

Personnel Required
Two

References
WP 0005
WP 0015
WP 0016
WP 0030
WP 0036
WP 0054
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
End panel assembly removed (WP 0015)
Rear cover assembly removed (WP 0016).

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

SERVICE

This task consists of charging system to proper refrigerant level as follows:

1. Charge refrigerant system (WP 0036).

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

2. Remove one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3) securing compressor cover (Figure 1, Item 4). Discard lock washer.

3. Remove compressor cover (Figure 1, Item 4).

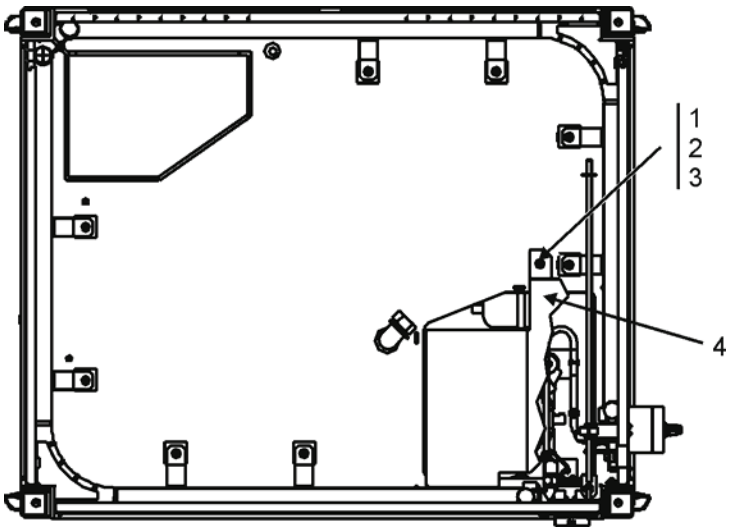


Figure 1. Compressor Cover

4. Remove six screws (Figure 2, Item 6), lock washers (Figure 2, Item 7), and washers (Figure 2, Item 8) from compressor junction box cover (Figure 2, Item 9). Discard lock washers.

5. Remove compressor junction box cover (Figure 2, Item 9).

6. Tag and disconnect B2 wires terminating at T1, T2, and T3.

7. Check continuity on B2 side at the following locations:

From	To	Expected Result
B2-T1	B2-T2	2 to 5 ohms, balanced with other two legs
B2-T2	B2-T3	2 to 5 ohms, balanced with other two legs
B2-T3	B2-T1	2 to 5 ohms, balanced with other two legs

- If each meter value does not indicate expected result, replace B2 (WP 0049).
- If each meter value does indicate expected result, continue to Step 8.

8. Check for no continuity between B2-T1 and B2 case.
   - If meter indicates any reading other than no continuity, B2 is shorted to case. Replace B2 (WP 0049).
   - If meter reading indicates no continuity, continue to Step 9.

9. Make the following checks to wires leading to B2 side as follows:

From Wire No.	To	Expected Result
VFD-W (white wire)	IECU frame	No Continuity
VFD-V (white/blue wire)	IECU frame	No Continuity
VFD-U (white/orange wire)	IECU frame	No Continuity

- If meter reading for each wire indicates any value other than no continuity, troubleshoot and repair wiring using schematics and wiring diagrams.
- If meter reading for each check indicates no continuity, replace VFD (WP 0039).

10. Install compressor junction box cover (Figure 2, Item 9) and secure using six screws (Figure 2, Item 6), new lock washers (Figure 2, Item 7), and washers (Figure 2, Item 8).

11. Install compressor cover (Figure 1, Item 4) and secure using one screw (Figure 1, Item 1), new lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3).

12. Install rear cover assembly (WP 0016).

13. Install end panel assembly (WP 0015).

14. Close top cover (WP 0005).

15. Place IECU back into normal operation (WP 0005).

REPLACE

1. Remove and recover system refrigerant (WP 0036).

2. Purge refrigerant system (WP 0036).

3. Remove one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3) securing compressor cover (Figure 1, Item 4). Discard lock washer.

4. Remove compressor cover (Figure 1, Item 4).

5. Remove two bolts (Figure 2, Item 1), lock washers (Figure 2, Item 2), and flat washers (Figure 2, Item 3) securing both halves of bracket clamp (Figure 2, Item 4) to compressor (Figure 2, Item 5). Discard lock washers.

6. Remove front half of bracket clamp (Figure 2, Item 4).

7. Remove all insulation (not illustrated) from work area as necessary.

8. Remove one screw (Figure 5, Item 5), lock washer (Figure 5, Item 6), and nut (Figure 5, Item 7) securing two clamps (Figure 5, Item 8) to two pipes. Discard lock washers.

CAUTION

Provide heat shield to area as required to prevent damage to surrounding area components during braze/debraze operations.

9. Remove filter-drier (Figure 3, Item 4) (WP 0054).

10. Debraze 7/8-inch input pipe from compressor (Figure 3, Item 1) at compressor flange (WP 0036).

11. Debraze 1/2-inch output pipe from compressor (Figure 3, Item 3) at compressor flange (WP 0036).

WARNING

The compressor and surrounding components will be extremely hot following the Debraze operations. Allow sufficient time for area to cool before performing further maintenance. Failure to allow sufficient time may result in serious burns.

12. Remove four mount bolts (Figure 2, Item 10), lock washers (Figure 2, Item 11), and flat washers (Figure 2, Item 12) securing compressor (Figure 2, Item 5) to channel (Figure 2, Item 14). Discard lock washers.

NOTE

Do not attempt to remove the compressor at this time.

13. Rotate compressor enough to gain access to all junction box screws for removal.

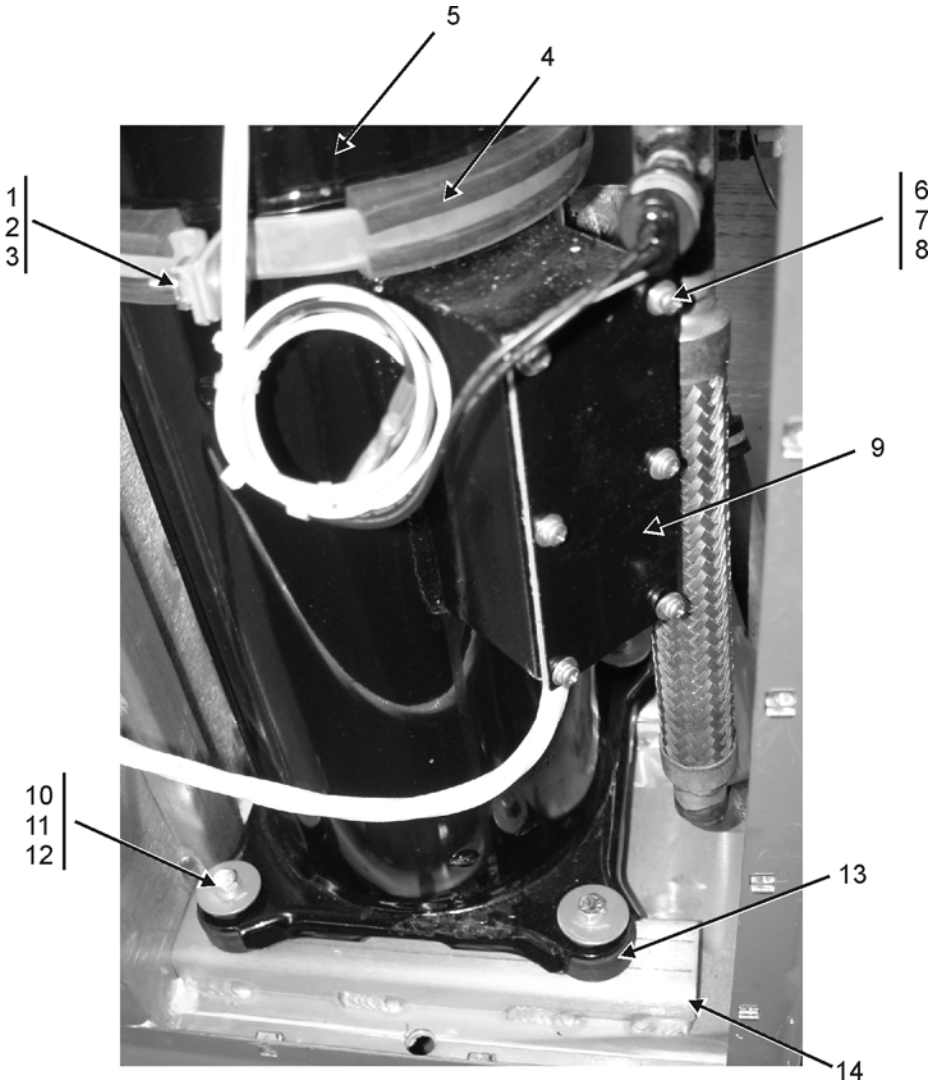


Figure 2. Compressor Mounting

14. Remove back half of bracket clamp (Figure 2, Item 4).

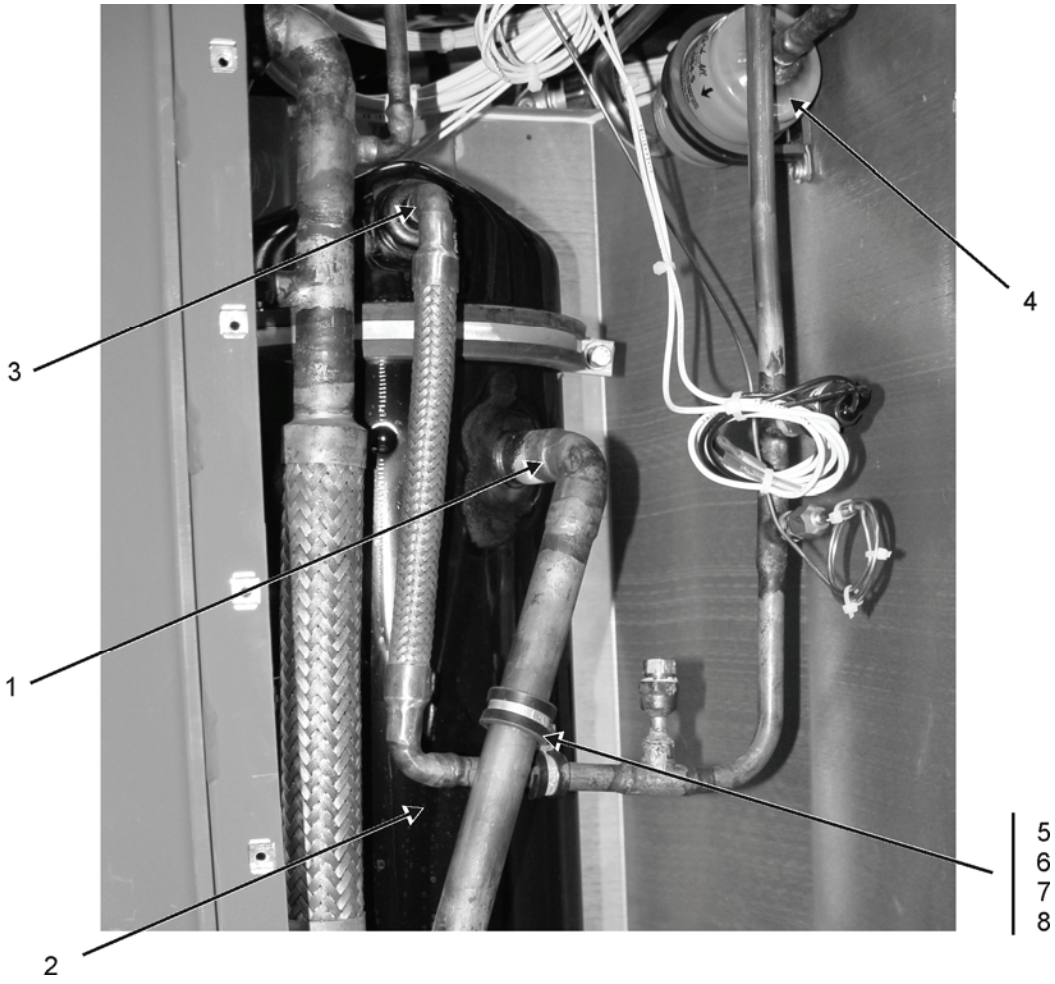


Figure 3. Compressor Brazing Points

15. Remove four bolts (Figure 4, Item 1), lock washers (Figure 4, Item 2), and washers (Figure 4, Item 3) securing mount bracket (Figure 4, Item 4) to IECU frame. Discard lock washers.

16. Remove mount bracket (Figure 4, Item 4).

17. Remove six screws (Figure 2, Item 6), lock washers (Figure 2, Item 7), and washers (Figure 2, Item 8) from compressor junction box cover (Figure 2, Item 9). Discard lock washers.

18. Remove compressor junction box cover (Figure 2, Item 9).

19. Loosen compressor cable strain relief (Figure 5, Item 1) and slide back along cable (Figure 5, Item 2).

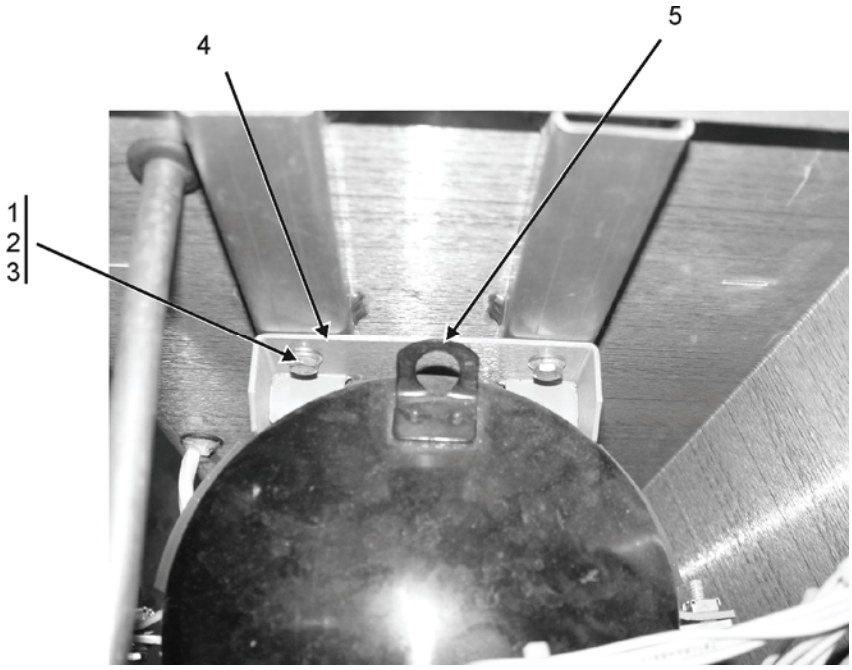


Figure 4. Mounting Bracket

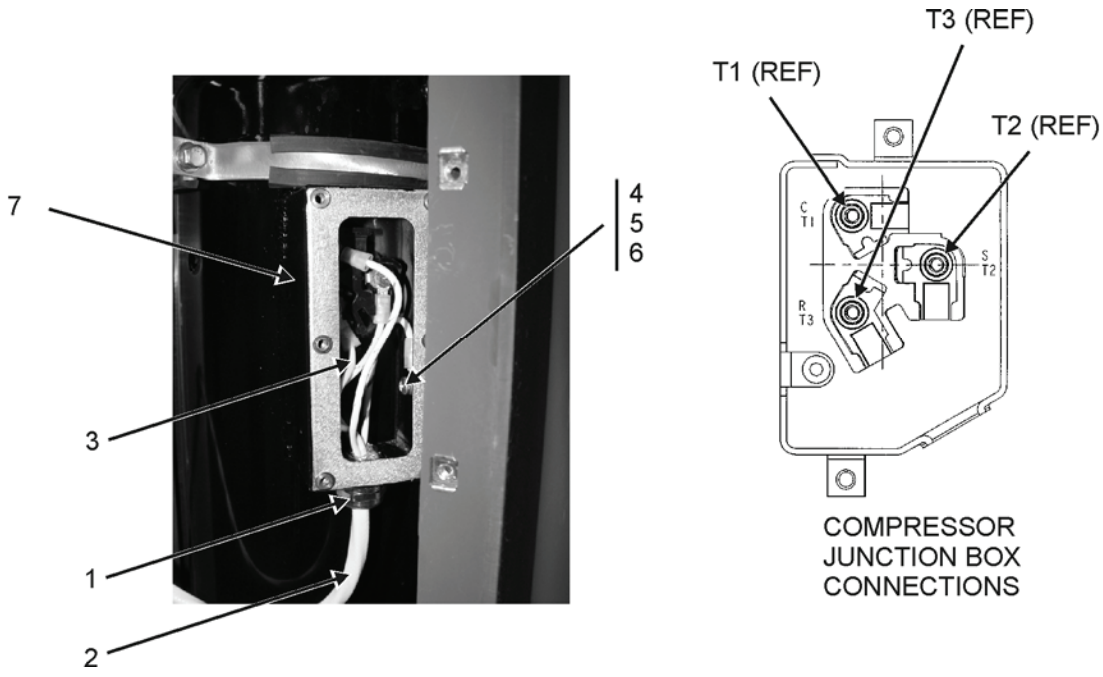


Figure 5. Compressor Junction Box

20. Tag and disconnect four wires (Figure 5, Item 3) from compressor junction box (Figure 5, Item 7) by removing four screws (Figure 5, Item 4), lock washers (Figure 5, Item 5), and washers (Figure 5, Item 6). Discard lock washers.

21. Carefully pull wiring (Figure 5, Item 3) out of junction box (Figure 5, Item 7).

CAUTION

- Take extra precautions when moving compressor as to not damage surrounding tubing or components.
- The compressor contains lubricating oil, do not tilt or invert.

22. Remove compressor (Figure 4, Item 5) through opening in side of IECU.
23. Remove compressor mounting kit (Figure 2, Item 13) from compressor (Figure 2, Item 5) (WP 0030).
24. Make sure new compressor has oil in it (WP 0030).

CAUTION

- Take extra precautions when moving compressor as to not damage surrounding tubing or components.
- The compressor contains lubricating oil, do not tilt or invert.

25. Install compressor (Figure 4, Item 5) through opening in side of IECU.
26. Install mount bracket (Figure 4, Item 4) to IECU frame and secure using four bolts (Figure 4, Item 1), new lock washers (Figure 4, Item 2), and washers (Figure 4, Item 3).
27. With compressor still loose in mount location, temporarily reposition compressor in order to route four wires (Figure 5, Item 3) into junction box (Figure 5, Item 7).
28. Secure cable assembly (Figure 5, Item 2) with strain relief (Figure 5, Item 1).
29. Connect four wires (Figure 5, Item 3) in compressor junction box (Figure 5, Item 7) as referenced below (WP 0063).

Wire Connector	Wire Color
B2-T1	White/Orange
B2-T2	White/Blue
B2-T3	White
B2-GND	White/Green

30. Remove tags.
31. Install junction box cover (Figure 2, Item 9) and secure using six screws (Figure 2, Item 6), new lock washers (Figure 2, Item 7), and washers (Figure 2, Item 8).
32. Align mounting hole on channel (Figure 2, Item 14), install compressor mounting kit (Figure 2, Item 13), and secure compressor (Figure 2, Item 5) to channel using four mount bolts (Figure 2, Item 10), new lock washers (Figure 2, Item 11), and flat washers (Figure 2, Item 12).
33. Braze 1/2-inch output pipe (Figure 3, Item 3) to compressor (Figure 3, Item 2) (WP 0036).
34. Braze 7/8-inch input pipe (Figure 3, Item 1) to compressor (Figure 3, Item 2) (WP 0036).
35. Install new filter-drier (Figure 3, Item 4) (WP 0054).

36. Install two clamps (Figure 5, Item 8) to two pipes and secure using one screw (Figure 5, Item 5), new lock washer (Figure 5, Item 6), and nut (Figure 5, Item 7).

NOTE

Allow time for pipe to cool before completing next step. Cooling can be expedited by using wet rags on the pipe as a heat sink.

37. Leak check connections (WP 0036).

38. Replace all insulation as required.

39. Attach both halves of bracket clamp (Figure 2, Item 4) and secure with two bolts (Figure 2, Item 1), new lock washers (Figure 2, Item 2), and washers (Figure 2, Item 3).

40. Evacuate and charge refrigerant system (WP 0036).

41. Install compressor cover (Figure 1, Item 4) and secure using one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3).

42. Install rear cover assembly (WP 0016).

43. Install end panel assembly (WP 0015).

44. Close top cover (WP 0005).

45. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
CONDENSER FAN (B3)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)

Materials/Parts
Tie Wraps, (WP 0075, Item 3)
Lock Washers (WP 0075, Item 5)

Personnel Required
Two

References
WP 0005
WP 0031
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove two screws (Figure 1, Item 1) securing fan motor cover (Figure 1, Item 2) to fan (Figure 1, Item 3).
2. Remove fan motor cover (Figure 1, Item 2).
3. Tag and disconnect wiring (Figure 1, Item 4) from inside fan motor cover (Figure 1, Item 3).
4. Cut two tie wraps (Figure 1, Item 5) securing wiring (Figure 1, Item 4) and conduit to support arm (Figure 1, Item 6). Discard tie wraps.
5. Loosen feed through connector (Figure 1, Item 7) and slide back along wiring (Figure 1, Item 4).
6. Separate conduit and carefully pull wiring (Figure 1, Item 4) out of fan motor (Figure 1, Item 3) through feed through (Figure 1, Item 7).

WARNING

Condenser fan assembly weighs more than 40 pounds and is awkward to handle. Removal will require at least two people.

7. Remove four nuts (Figure 1, Item 8), lock washers (Figure 1, Item 9), and flat washers (Figure 1, Item 10) securing four condenser fan support arms (Figure 1, Item 6) to top cover. Discard lock washers.
8. Remove fan (Figure 1, Item 3) with support arms (Figure 1, Item 6) attached from top cover.

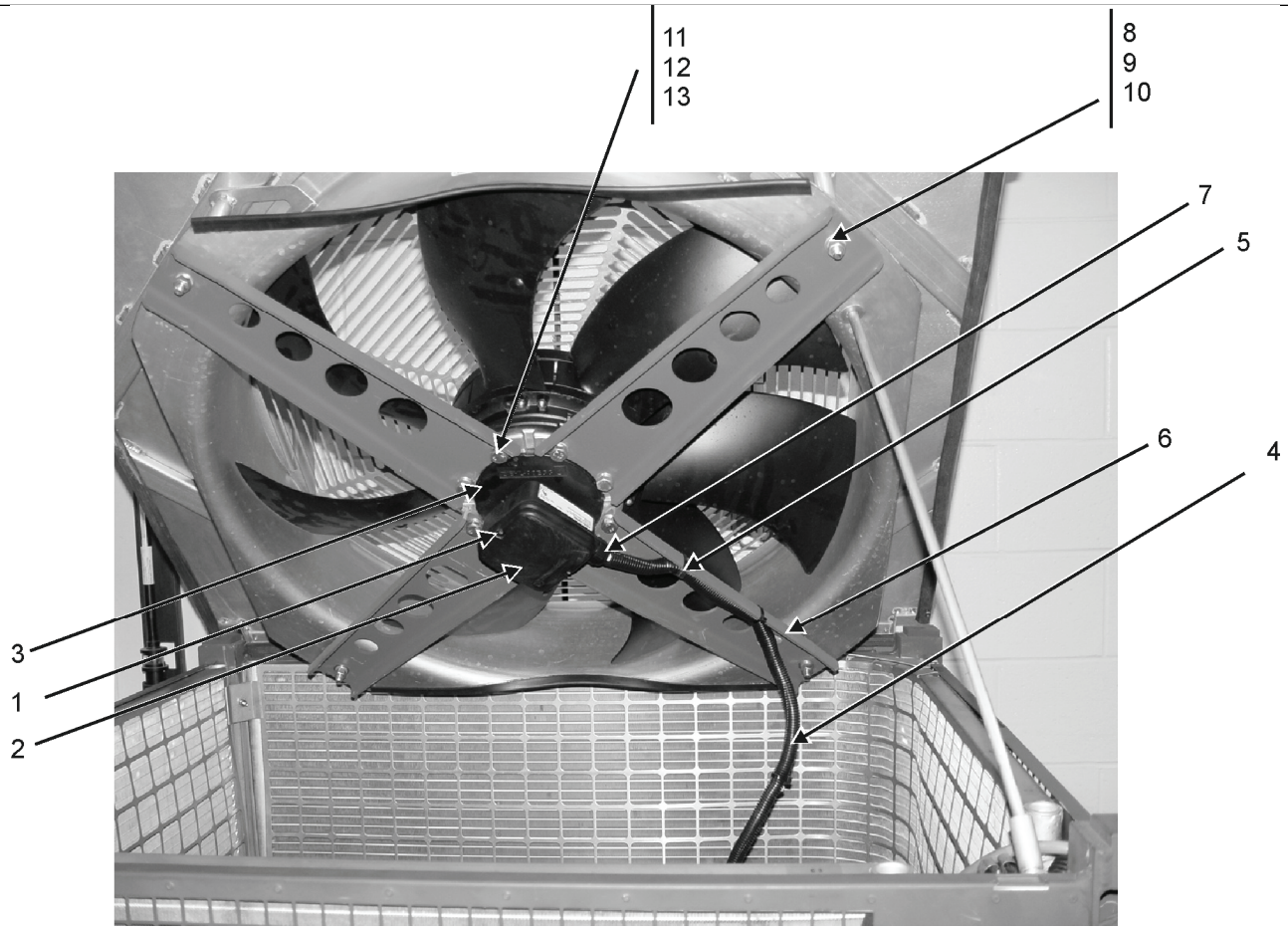


Figure 1. Condenser Fan

9. Place fan (Figure 1, Item 3) on solid work surface.

10. Remove two each hex head bolts (Figure 1, Item 11), lock washers (Figure 1, Item 12), and flat washers (Figure 1, Item 13) securing four support arms (Figure 1, Item 6) to fan assembly. Discard lock washers.

11. Remove four support arms (Figure 1, Item 6) from fan (Figure 1, Item 3).

12. Install four support arms (Figure 1, Item 6) onto new fan (Figure 1, Item 3) and secure using eight hex head bolts (Figure 1, Item 11), new lock washers (Figure 1, Item 12), and flat washers (Figure 1, Item 13).

WARNING

Condenser fan is heavy and awkward to handle. Installation will require at least two people.

13. Remove fan motor cover (Figure 1, Item 2).

NOTE

Be sure to note the orientation of the feedthru cable.

14. Install new fan (Figure 1, Item 3) with support arms (Figure 1, Item 6) attached onto top cover and secure with four nuts (Figure 1, Item 8), new lock washers (Figure 1, Item 9), and flat washers (Figure 1, Item 10).Tighten bolts (Figure 1, Item 11) in an alternating, cross-tightening manner.

15. Tighten nuts (Figure 1, Item 8) in an alternating, cross-tightening manner.

16. Feed wires (Figure 1, Item 4) into new fan motor junction box (Figure 1, Item 3).

17. Reconnect wiring (Figure 1, Item 4) to condenser fan (Figure 1, Item 3) as tagged.

18. Reconnect feedthru connector (Figure 1, Item 7).

19. Remove tags.

20. Secure wiring (Figure 1, Item 4) and conduit to support arm (Figure 1, Item 6) in two places with tie wraps (Figure 1, Item 5).

21. Install fan motor cover (Figure 1, Item 2).

22. Test condenser fan (WP 0031).

23. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
EVAPORATOR BLOWER (B1)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic• s Tolkit (WP 0072, Item 2)
Electrical Connector Maintenance Kit (WP 0070, Item 11)

Materials/Parts
Wire Splice(WP 0075, Item 16)

Personnel Required
Two

References
WP 0005
WP 0015
WP 0032
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
End panel removed (WP 0014)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Locate wiring (Figure 1, Item 10) and wiring splice points inside evaporator compartment.
2. Cut and remove tie wraps as needed for access.
3. Discard tie wraps.
4. Tag both sides of each wire splice.
5. Cut each wire as close to splice point as possible. Discard wire splices.

WARNING

Blower assembly weighs greater than 40 pounds and is awkward to handle. Removal will require at least two people.

6. Remove six hex head bolts (Figure 1, Item 1), lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) securing blower bracket weldment (Figure 1, Item 4) to motor angle channel (Figure 1, Item 5). Discard lock washers.
7. Slide evaporator blower (Figure 1, Item 6) with bracket weldment (Figure 1, Item 4) attached back approximately 3/8-inch until it is free from transition (Figure 2, Item 1).
8. Remove evaporator blower (Figure 1, Item 6) with bracket weldment (Figure 1, Item 4) attached from IECU and put on solid work surface.

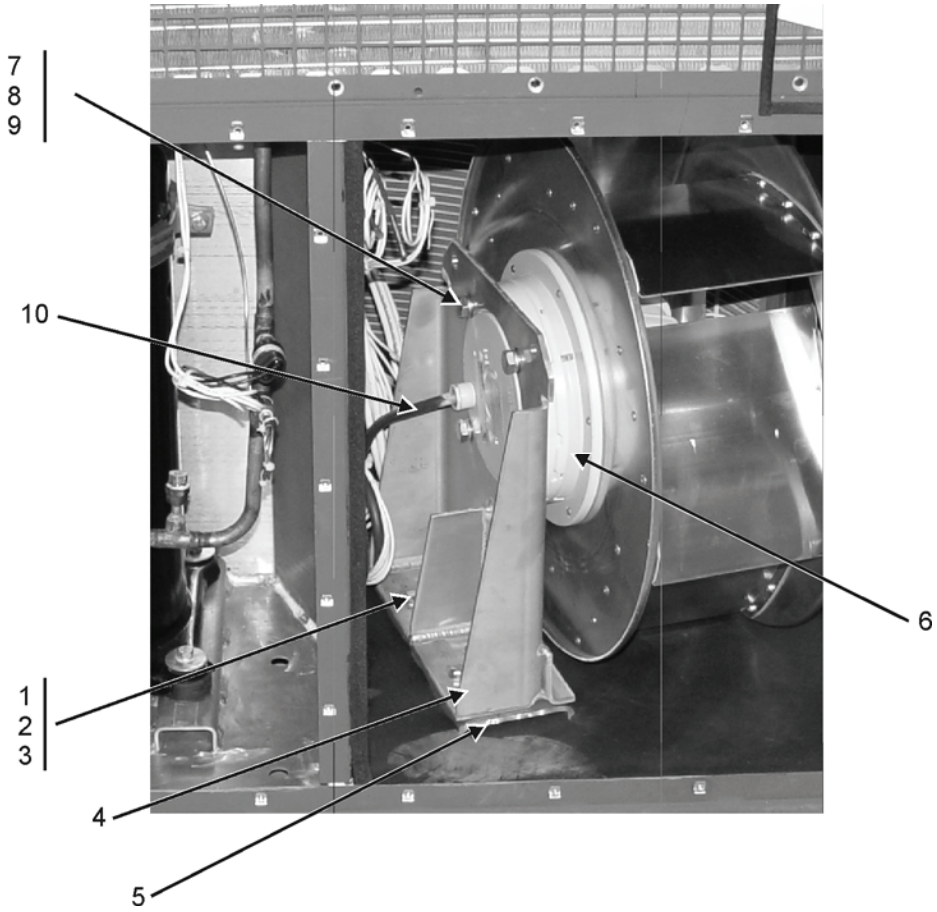


Figure 1. Evaporator Blower

9. Remove four hex head bolts (Figure 1, Item 7), lock washers (Figure 1, Item 8), and flat washers (Figure 1, Item 9) securing evaporator blower (Figure 1, Item 6) to fan bracket weldment (Figure 1, Item 4). Discard lock washers.

10. Attach new evaporator blower (Figure 1, Item 6) to bracket weldment (Figure 1, Item 4) and secure using four hex head bolts (Figure 1, Item 7), new lock washers (Figure 1, Item 8), and flat washers (Figure 1, Item 9).

11. Tighten fasteners.

WARNING

Blower assembly is heavy and awkward to handle. Installation will require at least two people.

12. Place evaporator blower (Figure 1, Item 6) with bracket weldment (Figure 1, Item 4) attached in position inside IECU.

13. Slide evaporator blower (Figure 1, Item 6) with bracket weldment (Figure 1, Item 4) attached forward approximately 3/8-inch to mate with transition (Figure 2, Item 1).

NOTE

The transition to the blower inlet should overlap approximately 3/16 inch.

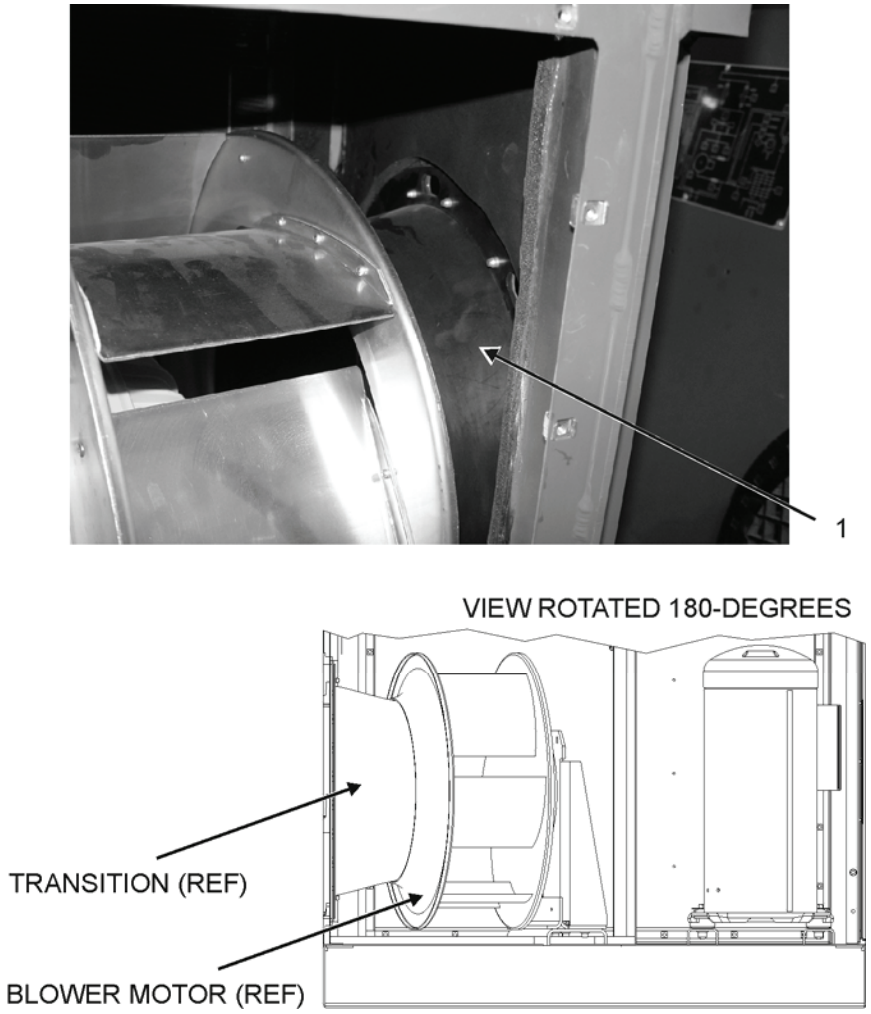


Figure 2. Evaporator Blower Transition

14. Install six hex head bolts (Figure 1, Item 1), new lock washers (Figure 1, Item 2), and flat washers (Figure 1, Item 3) to base of bracket weldment (Figure 1, Item 4) and tighten.

NOTE

Be sure the blower fan can turn freely and does not rub on the transition.

15. Prepare IECU wires and evaporator blower wires (Figure 1, Item 10) for splicing (WP 0063).
16. Connect IECU wires and evaporator blower wires (Figure 1, Item 10) using splices as tagged (WP 0063).
17. Remove wire tags.

18. Install tie wraps as needed to secure wiring.
19. Install end panel (WP 0015).
20. Power up IECU (WP 0005).
21. Test evaporator blower (WP 0032).
22. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
METAL HOSE ASSEMBLY (VIBRATION DAMPER) (SUCTION)
REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
Materials/Parts
Foam Insulation (WP 0075, Item 10)
Personnel Required
One
References
WP 0005
WP 0015
WP 0016
WP 0036
WP 0037
WP 0038
TM 9-4120-431-24P
Equipment Condition
IECU is shut down (WP 0005)
End panel assembly removed (WP 0015)
Rear cover assembly removed (WP 0016)

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.
- System refrigerant pressures can be very hazardous. Always make sure that system pressure has been removed before opening refrigerant lines and associated components. Take extra precautions while working inside or around IECU enclosure. Wear approved safety glasses.

REPLACE

1. Remove and recover system refrigerant (WP 0036).
2. Purge refrigerant system (WP 0036).

NOTE

When performing this procedure it is necessary to remove insulation as required. Protect low pressure cutout switch by wrapping switch with a wet towel or heat shield. New insulation must be installed when procedure is complete.

3. Remove insulation as required.
4. Debraze suction metal hose assembly (Vibration Damper) (Figure 1, Item 1) from 7/8-inch pipe in two places (Figure 1, Item 2) (WP 0038).
5. Remove metal hose assembly (Vibration Damper) (Figure 1, Item 1).
6. Install new suction metal hose assembly (Vibration Damper) (Figure 1, Item 1) and braze in one end of 7/8-inch pipe (Figure 1, Item 2) (WP 0038).

7. Discontinue nitrogen purge and braze other in end of 7/8-inch pipe (Figure 1, Item 2) (WP 0038).
8. Leak check connections (WP 0038).
9. Install new insulation where removed.
10. Evacuate and recharge refrigerant system (WP 0037).
11. Install rear cover assembly (WP 0016).
12. Install end panel assembly (WP 0015).
13. Place IECU back into normal operation (WP 0005).

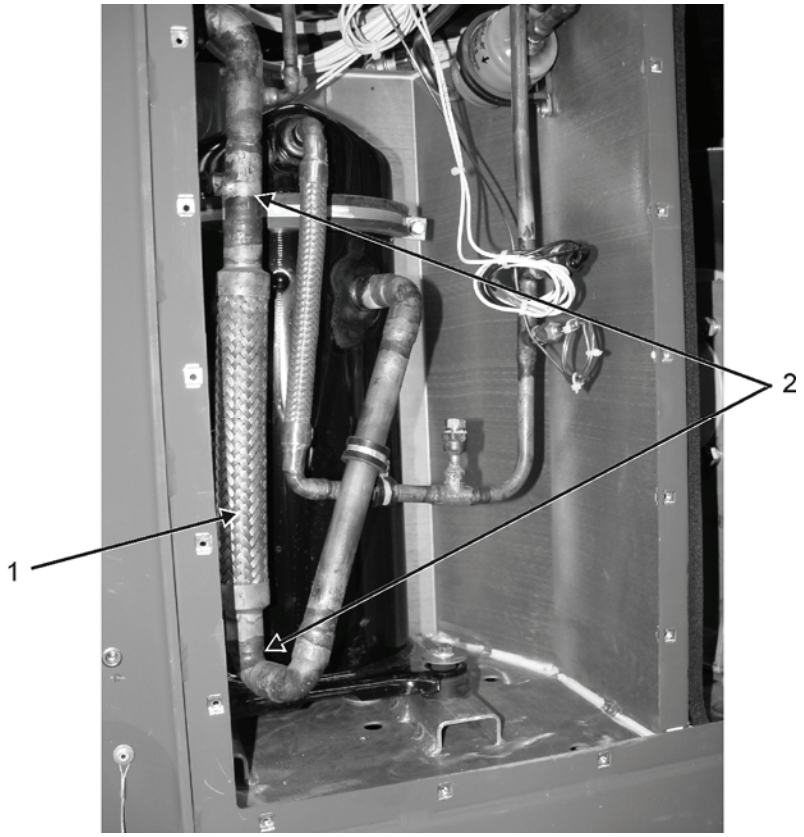


Figure 1. Metal Hose Assembly (Vibration Damper) (Suction) with Insulation Removed

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
METAL HOSE ASSEMBLY (VIBRATION DAMPER) (DISCHARGE)
REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)

Materials/Parts
Lock Washers (WP 0075, Item 5)

Personnel Required
One

References
WP 0005
WP 0015
WP 0016
WP 0036
WP 0037
WP 0038
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
End panel assembly removed (WP 0015)
Rear cover assembly removed (WP 0016)

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.
- System refrigerant pressures can be very hazardous. Always make sure that system pressure has been removed before opening refrigerant lines and associated components. Take extra precautions while working inside or around IECU enclosure. Wear approved safety glasses.

REPLACE

1. Remove and recover system refrigerant (WP 0036).
2. Purge refrigerant system (WP 0036).
3. Remove one screw (Figure 1, Item 3), washer (Figure 1, Item 4), lock washer (Figure 1, Item 5), and nut (Figure 1, Item 6) securing support clamp (Figure 1, Item 7) to pipe. Discard lock washer.
4. Remove clamp (Figure 1, Item 7).
5. Remove two bolts (Figure 1, Item 8), washers (Figure 1, Item 9), lock washers (Figure 1, Item 10), and nuts (Figure 1, Item 11) securing compressor bracket (Figure 1, Item 12) to compressor. Discard lock washer.
6. Remove forward side of two-piece compressor bracket (Figure 1, Item 12).

WARNING

Exposure of Refrigerant R-410A to an open flame or a very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly toxic and corrosive gas. In its natural state, Refrigerant R-410A is a colorless odorless vapor with no toxic characteristics. R-410A is lighter than air, and in a well-ventilated area, will disperse rapidly. Suffocation is possible in unventilated areas. A respirator must be worn when removing and installing metal hose assembly (Vibration Damper). Failure to observe safety precautions may result in personnel injury or DEATH.

7. Debraze discharge metal hose assembly (Vibration Damper) (Figure 1, Item 1) from 1/2-inch pipe in two places (Figure 1, Item 2) (WP 0038).

NOTE

When performing this procedure it is necessary to remove insulation as required. Protect low pressure cutout switch by wrapping switch with a wet towel or heat shield. New insulation must be installed when procedure is complete.

8. Remove metal hose assembly (Vibration Damper) (Figure 1, Item 1).

WARNING

Exposure of Refrigerant R-410A to an open flame or a very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly toxic and corrosive gas. In its natural state, Refrigerant R-410A is a colorless odorless vapor with no toxic characteristics. It is lighter than air, and in a well-ventilated area will disperse rapidly. Suffocation is possible in unventilated areas. A respirator must be worn when removing and installing metal hose assembly (Vibration Damper). Failure to observe safety precautions may result in personnel injury or DEATH.

9. Install new discharge metal hose assembly (Vibration Damper) (Figure 1, Item 1) and braze in one end of 1/2-inch pipe (Figure 1, Item 2) (WP 0038).

10. Discontinue nitrogen purge and braze other in end of 1/2-inch pipe (Figure 1, Item 2) (WP 0038).

11. Leak check connections (WP 0038).

12. Install forward side of compressor bracket (Figure 1, Item 11) and secure using two bolts (Figure 1, Item 8), washers (Figure 1, Item 9), new lock washers (Figure 1, Item 10), and nuts (Figure 1, Item 11).

13. Install support clamp (Figure 1, Item 7) to pipe and secure using one screw (Figure 1, Item 3), washer (Figure 1, Item 4), new lock washer (Figure 1, Item 5), and nut (Figure 1, Item 6).

14. Evacuate and recharge refrigerant system (WP 0037).

15. Install rear cover assembly (WP 0016).

16. Install end panel assembly (WP 0015).

17. Place IECU back into normal operation (WP 0005).

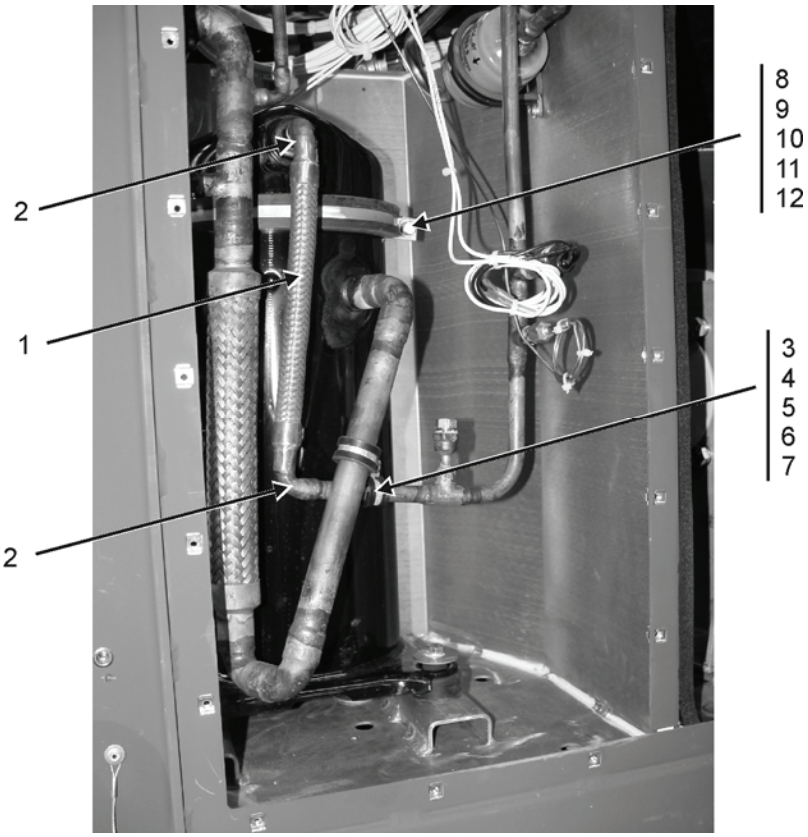


Figure 1. Metal Hose Assembly (Vibration Damper) (Discharge) with Insulation Removed

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
FILTER-DRIER
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Service Refrigerant Ordnance Toolkit (WP 0072, Item 3)

Materials/Parts
None

Personnel Required
Two

References
WP 0005
WP 0012
WP 0015
WP 0036
WP 0037
WP 0038
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is powered up (WP 0005)

TEST

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

1. Examine refrigerant sight glass (Figure 1, Item 1) moisture indicator color.
   - If sight glass color is yellow, go to step 2.
   - If sight glass is green, place IECU back into normal operation (WP 0005).

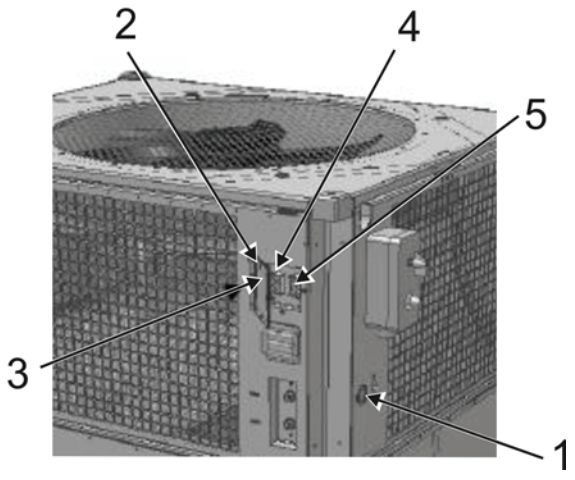


Figure 1. Diagnostic Connectors J5 and J6 Pin Out

2. On remote box assembly (Figure 2, Item 1), place rotary selector switch (Figure 2, Item 2) to COOL position.

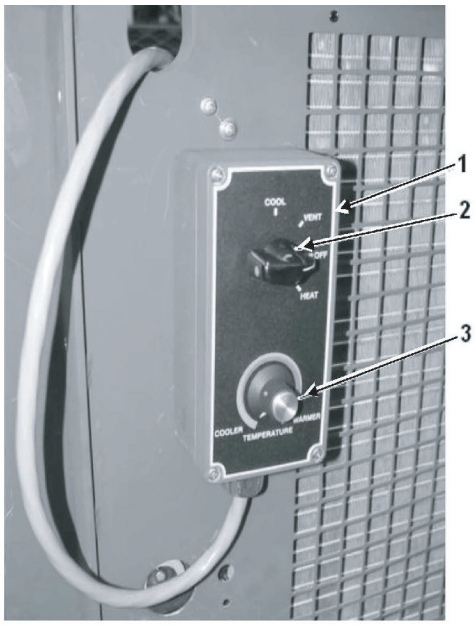


Figure 2. Remote Box Assembly

3. Rotate TEMPERATURE knob (Figure 2, Item 3) to COOLER position.

4. Make sure condenser fan motor, evaporator blower motor, and compressor motor operate. Allow IECU to operate at least ten minutes.

NOTE

Normal operating sequence after turn on for the IECU will consist of the evaporator blower motor starting, followed by an approximate delay of one minute before the compressor starts up. Within 30 seconds of the compressor starting, the condenser fan will start up and run. Compressor start up sometimes cannot be heard. Checking the sight glass for refrigerant flow will indicate when the compressor starts.

5. Loosen three screws (Figure 1, Item 3) to open hinged panel (Figure 1, Item 2) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 1, Items 4, 5).

6. Use a digital multimeter set to ohms-scale to check resistance between J5-4 and J5-1 (Figure 3).

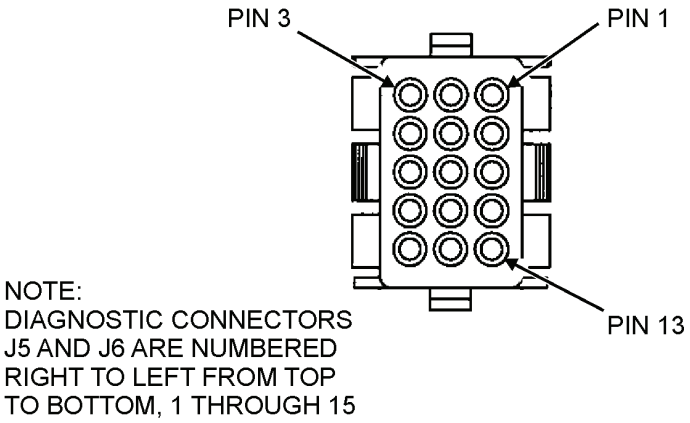


Figure 3. Diagnostic Connectors J5 and J6 Pin Out

7. Using temperature conversion chart in Table 2 of WP 0012, convert resistance indicated on meter to determine temperature value at condenser refrigerant outlet temperature sensor TS6.

8. Record temperature value as T1 _____.

9. Using a digital multimeter set to ohms-scale, check resistance between J5-5 and J5-1 (Figure 3).

10. Using temperature conversion chart in Table 2 of WP 0012, convert resistance indicated on meter to determine temperature value at drier refrigerant outlet temperature sensor TS1.

11. Record temperature value as T2 _____.

NOTE

Measuring error could easily exceed 2.0° F. Re-measure T1 - T2 after 15 minute cool down period to verify filter-drier needs replaced.

12. Calculate T1 - T2 = T3(A) _____.
    - If temperature value of T3(A) is > 2.0° F, shut down IECU. Allow to cool 15 minutes and re-measure T1 - T2 = T3(B). If T3(A) – T3(B) > 2.0° F, replace filter-drier per this WP.
    - If temperature value of T3(A) < 2.0° F continue to step 13.

13. Close hinged panel (Figure 1, Item 2) and secure using three screws (Figure 1, Item 3).

14. Place IECU back into normal operation (WP 0005).

REPLACE

1. Shut down IECU (WP 0005).

2. Raise top cover (WP 0005).

3. Remove end panel assembly (WP 0015).

4. Remove one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3) securing compressor cover (Figure 1, Item 4). Discard lock washer.

5. Remove compressor cover (Figure 1, Item 4).

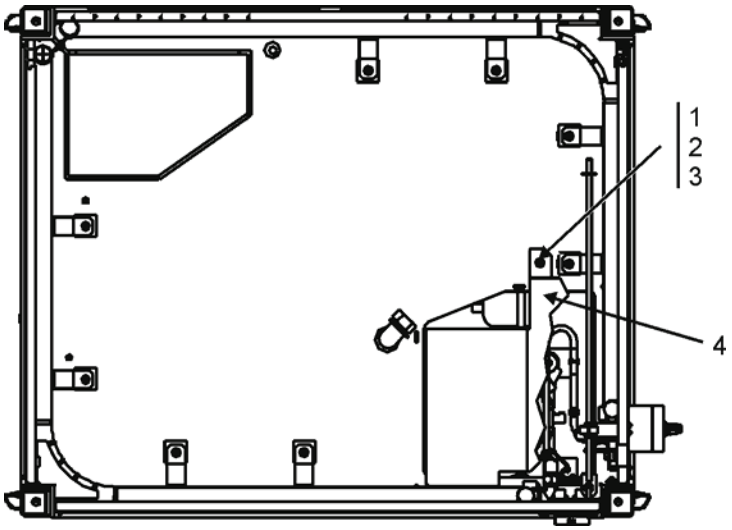


Figure 4. Compressor Cover

6. Remove and recover system refrigerant (WP 0036).

7. Remove one screw (Figure 5, Item 1), lock washer (Figure 5, Item 2), and flat washer (Figure 5, Item 3) securing filter-drier mount clamp (Figure 5, Item 4) to IECU. Discard lock washer.

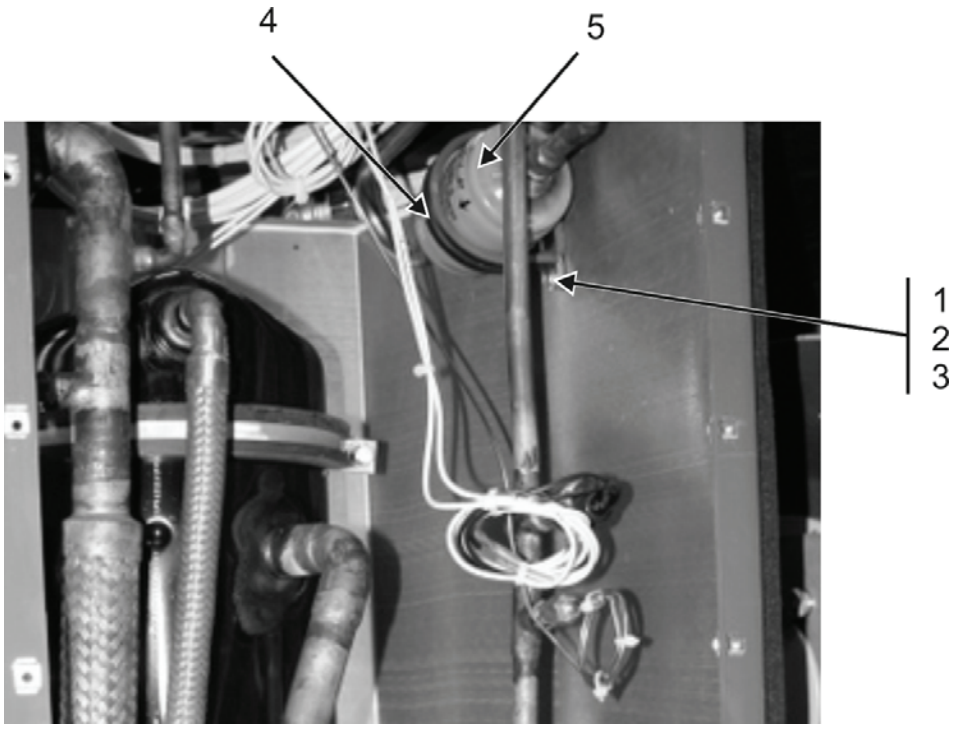


Figure 5. Filter-Drier

8. Remove mount clamp (Figure 5, Item 4) from filter-drier (Figure 5, Item 5).

9. Purge refrigerant system (WP 0037).

CAUTION

The filter-drier is direction sensitive and must be installed correctly to prevent damage to unit or improper operation. Prior to removal of filter-drier, note the direction of the arrow on the filter-drier and make sure new filter-drier is installed in same direction.

10. Debraze 1/2-inch pipe connections from each end of filter-drier (Figure 5, Item 5) (WP 0038).

NOTE

Protect wires, in the general area to be debrazed, as needed to make sure they are not damaged during debraze operation. If it is necessary to remove the wires to make sure they are protected, make sure wires are marked and that the general area of original location is noted in order to allow for proper reinstallation.

11. Remove filter-drier (Figure 5, Item 5) from IECU.

NOTE

New filter-drier fittings are protected with caps. Do not remove these caps until ready to install.

12. Remove protective caps from new filter-drier.

13. Install new filter-drier (Figure 5, Item 5) onto tubing ends.

CAUTION

The filter-drier is direction sensitive and must be installed correctly to prevent damage to unit or improper operation. Prior to removal of filter-drier, note the direction of the arrow on the filter-drier and make sure new filter-drier is installed in same direction.

14. Braze 1/2-inch pipe connection on one end of filter-drier (Figure 5, Item 5) (WP 0038).

15. Discontinue purge and braze last connection to filter-drier (Figure 5, Item 5) (WP 0038).

16. Leak check connections (WP 0038).

17. Evacuate and charge refrigerant system (WP 0036).

18. Replace any wiring that was removed to gain access (WP 0063)

19. Install filter-drier mount clamp (Figure 5, Item 4) and secure using one screw (Figure 5, Item 1), new lock washer (Figure 5, Item 2), and flat washer (Figure 5, Item 3).

20. Install compressor cover (Figure 4, Item 4) and secure using one screw (Figure 4, Item 1), new lock washer (Figure 4, Item 2), and washer (Figure 4, Item 3).

21. Install end panel assembly (WP 0015).

22. Lower IECU top cover assembly (WP 0005).

23. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
EXPANSION VALVE
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item1)
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)

Materials/Parts
Foam Insulation (WP 0075, Item 10)
Insulating Tape (WP 0075, Item 7)
Thermomastic Heat Transfer Compound (WP 0075, Item 9)
Tie Wraps (WP 0075, Item 3)

Personnel Required
One

References
WP 0005
WP 0016
WP 0033
WP 0036
WP 0037
WP 0038
WP 0054
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Rear cover assembly removed (WP 0016)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove and recover system refrigerant (WP 0036).

1. Purge refrigerant system (WP 0037).

2. Remove insulation (Figure 1, Item 1) from 7/8-inch evaporator coil pipe (Figure 1, Item 2) as necessary to gain access to bulb (not illustrated).

3. Cut tie wraps (Figure 1, Item 3) securing capillary tube (Figure 1, Item 4) to 1/4-inch sensing line (Figure 1, Item 5).

NOTE

Make note of the location that the sensing bulb is removed from so that it can be reinstalled in the same location when replaced.

4. Discard tie wraps.

5. Remove metal strap securing bulb (not illustrated) to 7/8-inch evaporator coil pipe (Figure 1, Item 2) by removing two screws and two nuts. Discard strap.

6. Carefully separate bulb (not illustrated) from 7/8-inch evaporator coil pipe (Figure 1, Item 2).

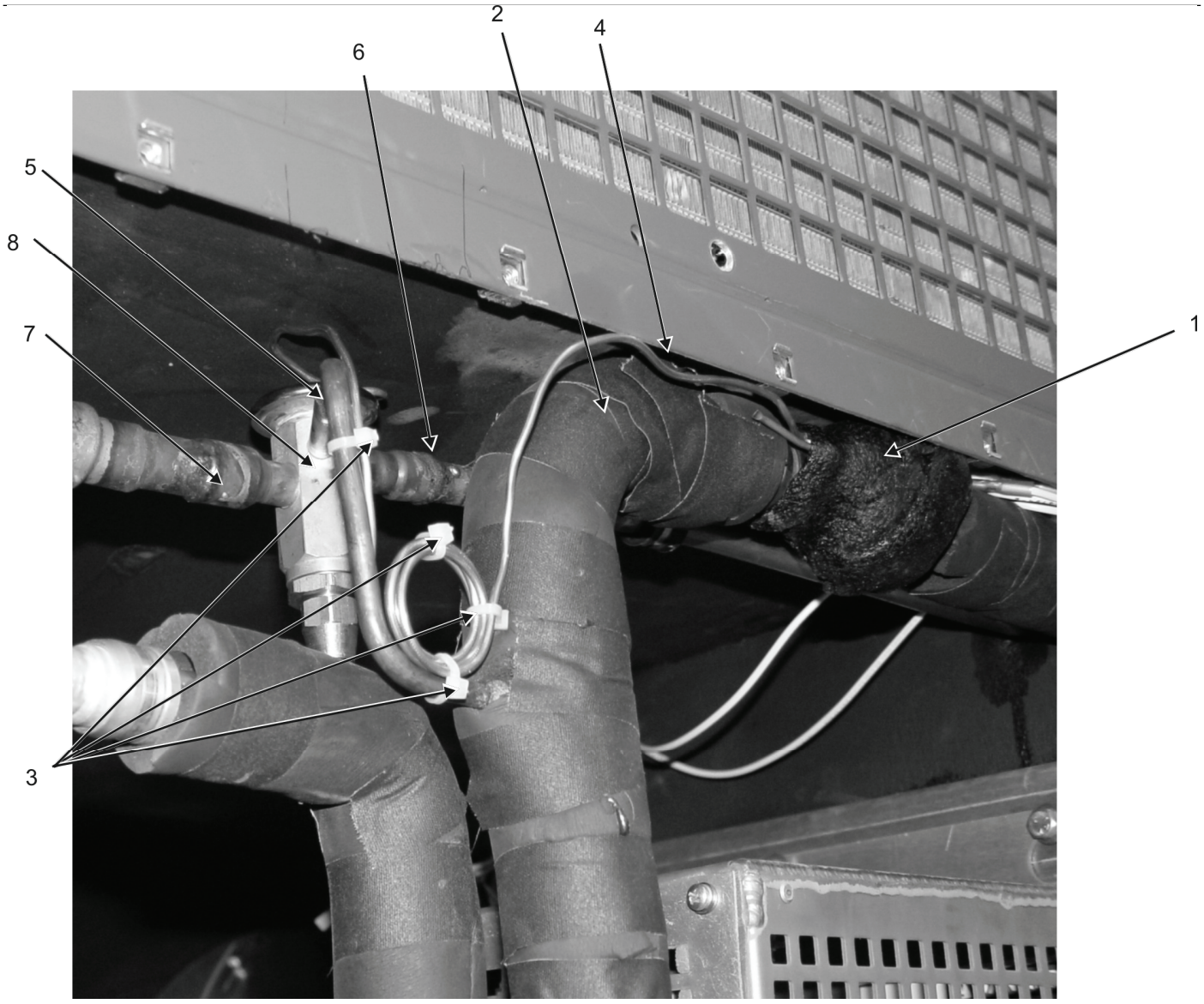


Figure 1. Expansion Valve

WARNING

Brazing alloys and flux contain materials that are hazardous to health. Avoid breathing vapors or fumes from brazing operations. Perform operations only in well ventilated areas. Wash hands with soap and water after handling brazing alloys and flux. Wear gloves and protective goggles or face shield to protect against burns.

CAUTION

Place heat shield above and below expansion valve to avoid burning the upper and lower cabinet insulation.

7. Debraze 1/4-inch sensing line (Figure 1, Item 5) connection from expansion valve (Figure 1, Item 8) (WP 0038).

8. Debraze 1/2-inch inlet pipe (Figure 1, Item 6) from expansion valve (Figure 1, Item 8) (WP 0038).

9. Debraze 5/8-inch outlet pipe (Figure 1, Item 7) from expansion valve (Figure 1, Item 8) (WP 0038).

10. Remove expansion valve (Figure 1, Item 8) with capillary tube (Figure 1, Item 4) and bulb (not illustrated).

CAUTION

The expansion valve can be damaged by high heat. Be sure to wrap new valve body with wet rags as instructed to avoid damage to internal components when brazing.

11. Install new expansion valve (Figure 1, Item 8) with capillary tube (Figure 1, Item 4) and bulb (not illustrated) onto existing pipes.

12. Braze 5/8-inch outlet pipe (Figure 1, Item 7) to expansion valve (Figure 1, Item 8) (WP 0038).

13. Braze 1/2-inch inlet pipe (Figure 1, Item 6) to expansion valve (Figure 1, Item 8) (WP 0038).

14. Discontinue purge and braze 1/4-inch sensing line (Figure 1, Item 5) to expansion valve (Figure 1, Item 8) (WP 0036).

15. Apply thermal Compound to bulb liberally and secure bulb (not illustrated) to 7/8-inch evaporator coil pipe (Figure 1, Item 2) using metal strap supplied with new expansion valve (Figure 1, Item 8) using two screws and two nuts. Tighten hardware.

16. Secure capillary tube (Figure 1, Item 5) to 1/4-inch sensing line (Figure 1, Item 5) using tie wraps (Figure 1, Item 3).

17. Replace filter-drier (WP 0054).

18. Leak check connections (WP 0038).

19. Replace insulation (Figure 1, Item 1) and secure with tape as necessary.

20. Evacuate and charge refrigerant system (WP 0037).

21. Test expansion valve (WP 0033).

22. Install rear cover assembly (WP 0016).

23. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
SIGHT GLASS
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072 Item 1)
Service Refrigerant Ordnance Tool Kit
(WP 0072, Item 3)

Materials/Parts
Lock Washer (WP 0075, Item 5)

Personnel Required
One

References
WP 0005
WP 0036
WP 0037
WP 0038
WP 0054
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove and recover system refrigerant (WP 0036).

1. Remove one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3) securing compressor cover (Figure 1, Item 4). Discard lock washer.

2. Remove compressor cover (Figure 1, Item 4).

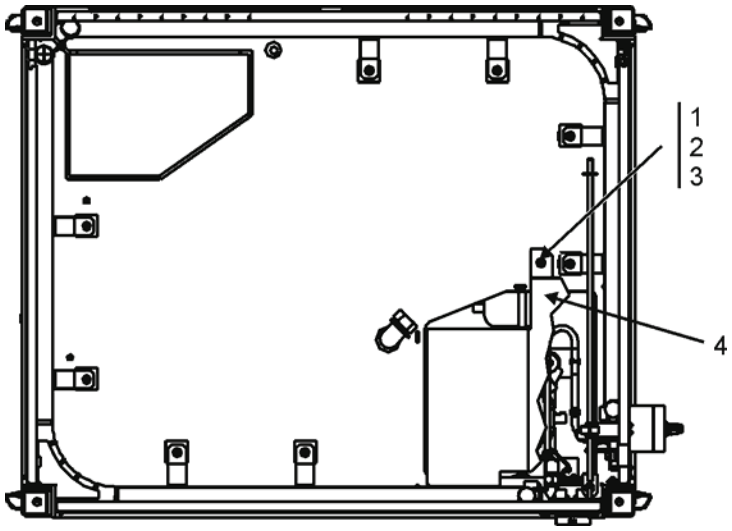


Figure 1. Compressor Cover

3. Remove two screws (Figure 2, Item 1), lock washers (Figure 2, Item 2), and washers (Figure 2, Item 3) securing sight glass (Figure 2, Item 4) and sight glass bracket (Figure 2, Item 5) to IECU frame (Figure 2, Item 6). Discard lock washers.

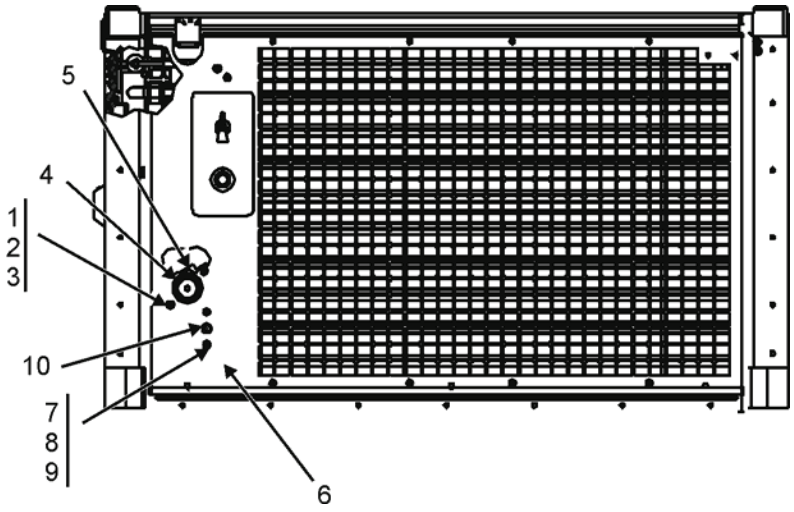


Figure 2. Sight Glass and S3 Reset

NOTE

In order to gain access required for debrazing the sight glass connections and not to damage wiring in the surrounding area, it will be necessary to dismount the high pressure cutout switch S3 manual reset from the IECU frame. Wire leads do not need to be disconnected.

4. Remove two screws (Figure 2, Item 7), lock washers (Figure 2, Item 8), and washers (Figure 2, Item 9) securing high pressure cutout switch manual reset (Figure 2, Item 10) to IECU frame (Figure 2, Item 5). Discard lock washers.

5. Carefully remove high pressure cutout switch S3 (Figure 2, Item 9) from IECU frame and position away from area to be debrazed.

6. Purge refrigerant system (WP 0037).

7. Remove one screw (Figure 3, Item 1), lock washer (Figure 3, Item 2), and flat washer (Figure 3, Item 3) securing filter-drier mount clamp (Figure 3, Item 4) to IECU. Discard lock washer.

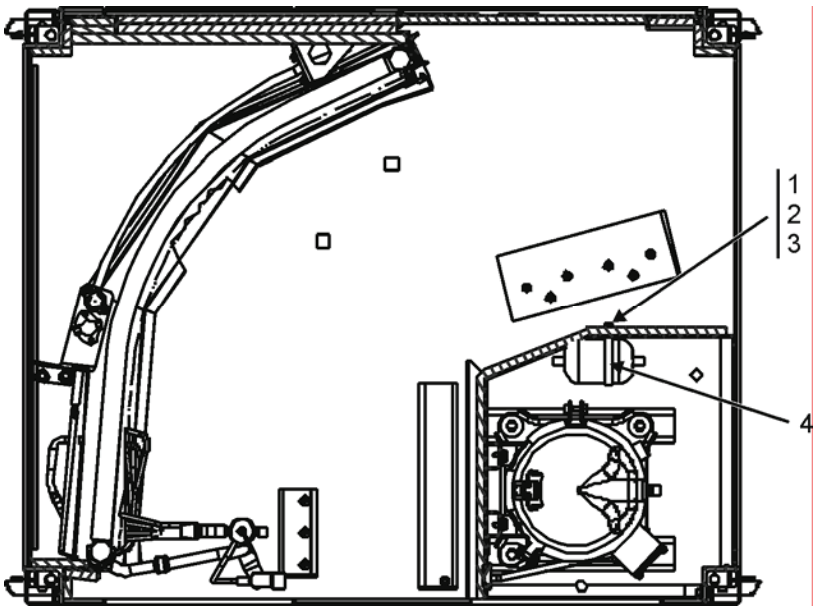


Figure 3. Filter-Drier Installation

CAUTION

The sight glass and other components in the area can be damaged by high heat. Be sure to wrap indicator body and surrounding components with wet rags as instructed to avoid damage when debrazing.

8. Debraze sight glass (Figure 4, Item 1) and filter-drier assembly (Figure 4, Item 2) at filter-drier exit (Figure 4, Item 3), and at second joint after sight glass (Figure 4, Item 4) (WP 0038).

NOTE

- Protect wires, in the general area to be debrazed, as needed to make sure they are not damaged during debraze operation. If it is necessary to remove the wires to make sure they are protected, make sure wires are marked and that the general area of original location is noted in order to allow for proper reinstallation.

- The filter-drier must be replaced any time the refrigeration system is opened, and will be replaced when the sight glass is replaced. To ease the maintenance and replacement of these two components, the filter-drier and sight glass will be debrazed and removed as a single assembly.

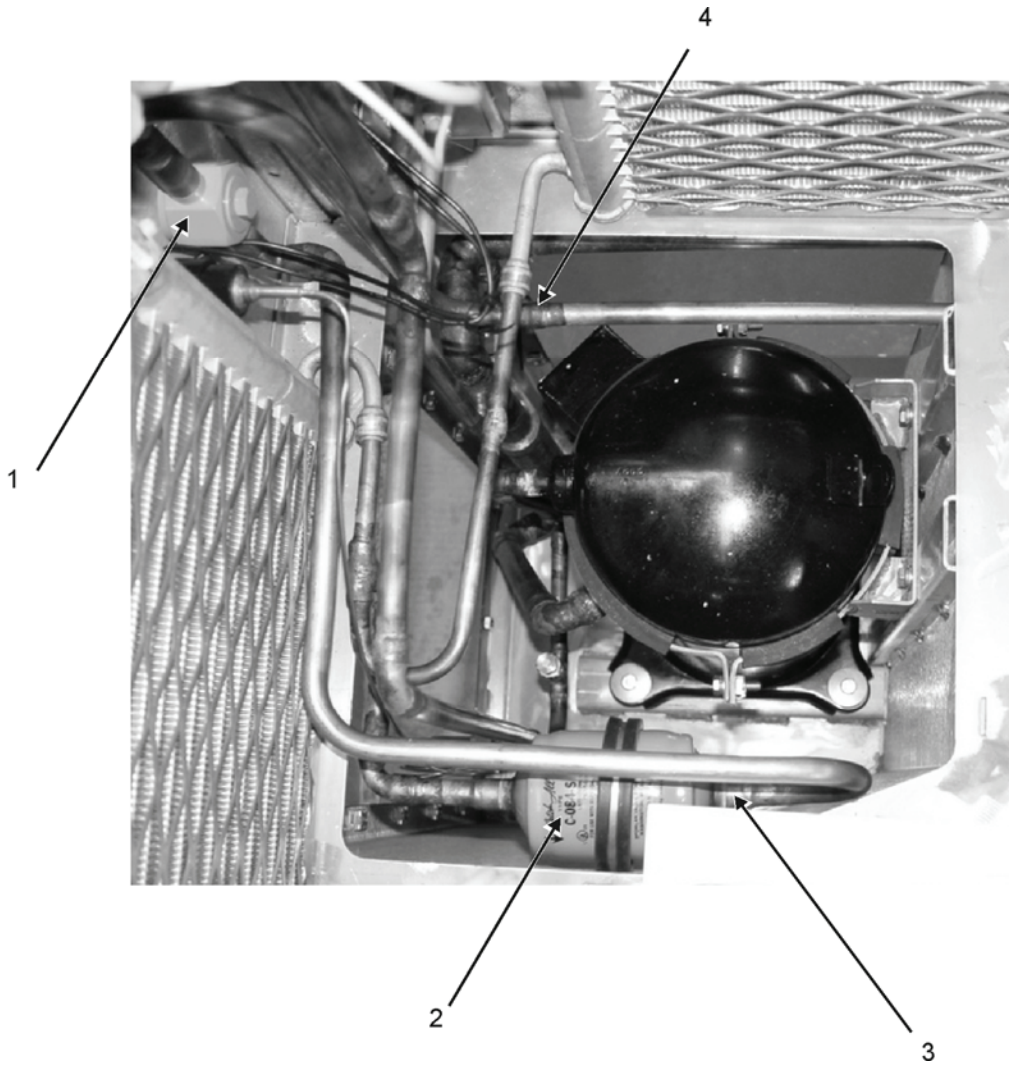


Figure 4. Site Glass Debraze Points

9. Remove sight glass (Figure 1, Item 1) and filter-drier assembly and place on suitable workbench.

10. Purge sight glass and filter-drier assembly on workbench (WP 0037).

NOTE

The sight glass and filter-drier assembly with associated tubing attached must be reinstalled back into the IECU exactly as it was removed. Before debrazing the tubing from the sight glass and the filter-drier, make sure to make note of how the tubing is oriented so that it is reassembled with the same orientation.

11. Debraze tubing from removed sight glass and filter-drier assembly (WP 0038). Retain tubing for installation onto new sight glass and filter-drier.

12. Remove moisture indicator by unscrewing from new sight glass before brazing onto tubing. Retain moisture indicator for reinstallation.

13. Remove protective caps from new sight glass and install new sight glass (Figure 3, Item 1) and filter-drier (Figure 3, Item 2) onto tubing.

NOTE

New sight glass fittings are protected with caps. Do not remove these caps until ready to install.

14. Purge sight glass and filter-drier assembly on workbench (WP 0037).

CAUTION

The sight glass can be damaged by high heat. Be sure to wrap sight glass body with wet rags as instructed to avoid damage when brazing.

15. Braze previously removed tubing to new sight glass and filter-drier while maintaining tubing orientation as noted during removal (WP 0038).

16. Reinstall moisture indicator into new sight glass by screwing into sight glass.

17. Purge refrigerant system (WP 0037).

NOTE

Nitrogen pressure can cause pinholes in hot soldered joints. Prior to brazing final joint, discontinue nitrogen purge.

18. Braze sight glass (Figure 3, Item 1) and filter-drier assembly (Figure 3, Item 2) at filter-drier exit (Figure 3, Item 3), and at second joint after sight glass (Figure 3, Item 4) (WP 0038).

19. Install filter-drier mount clamp (Figure 3, Item 4) and secure using one screw (Figure 3, Item 1), new lock washer (Figure 3, Item 2), and flat washer (Figure 3, Item 3).

20. Install sight glass (Figure 2, Item 4) into IECU frame and secure using two screws (Figure 2, Item 1), new lock washers (Figure 2, Item 2), and washers (Figure 2, Item 3).

21. Carefully reinstall high pressure cutout switch S3 (Figure 2, Item 10) into IECU frame (Figure 2, Item 5) and secure using two screws (Figure 2, Item 7), new lock washers (Figure 2, Item 8), and washers (Figure 2, Item 9).

22. Leak check connections (WP 0038).

23. Install compressor cover (Figure 1, Item 4) and secure using one screw (Figure 1, Item 1), new lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3).

24. Evacuate and charge refrigerant system (WP 0037).

25. Lower top cover (WP 0005).

26. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
LOW PRESSURE CUTOUT SWITCH (S2)
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
General Mechanic's Tool Kit (WP 0072, Item 2)
Electronic Equipment Tool Kit (WP 0072, Item 11)

Materials/Parts
Splice (WP 0075, Item 2)
Tie Wraps (WP 0075, Item 3)

Personnel Required
One

References
WP 0005
WP 0016
WP 0063
WP 0036
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

TEST

1. Attach gauge set to service valves V2 and V3 (Figure 1, Item 1, Item 2) (WP 0036).

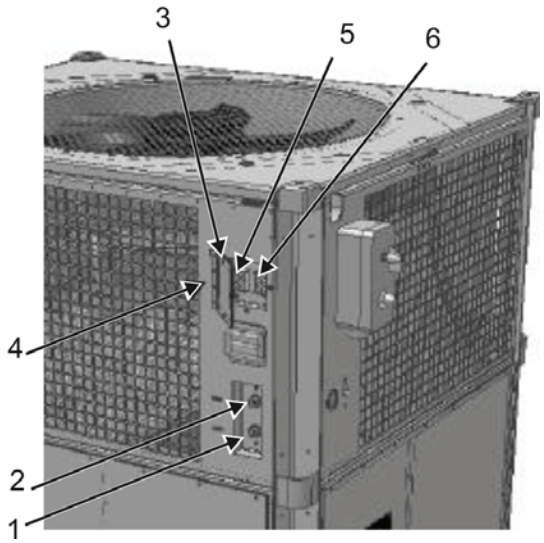


Figure 1. Diagnostic Connectors (J5 and J6)

2. Power up IECU (WP 0005).

3. On remote box assembly (Figure 2, Item 1), place mode selector switch (Figure 2, Item 2) to COOL position.

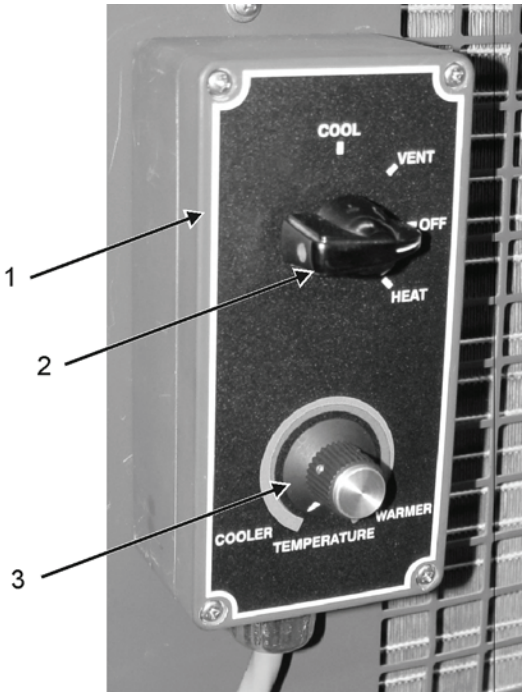


Figure 2. Remote Box Assembly

4. Rotate TEMPERATURE knob (Figure 2, Item 3) to COOLER position.

NOTE

Normal operating sequence after turn on for the IECU will consist of the evaporator blower motor starting, followed by an approximate delay of one minute before the compressor starts up. Within 30 seconds of the compressor starting, the condenser fan will start up and run.

5. Make sure condenser fan motor, evaporator blower motor, and compressor motor operate.

6. On gauge set, check refrigeration low pressure side.
   - If pressure is >40 psi, replace low pressure switch (S2) per this WP.
   - If pressure is <40 psi, continue to step 7.

7. Loosen three screws (Figure 1, Item 3) to open hinged panel (Figure 1, Item 4) on outside of IECU for access to diagnostic connectors (J5 and J6) (Figure 1, Item 5, Item 6).

8. Set up digital multimeter to read volts AC.

9. Insert multimeter positive (+) and negative (-) probes between pins 2 and 4 (Figure 3) of J6 connector (Figure 1, Item 6), then monitor multimeter display.
   - If meter indicates 24 VAC (S2 open), replace S2 per this WP.
   - 0 VAC indicates S2 is closed (normal). Continue to step ten.10

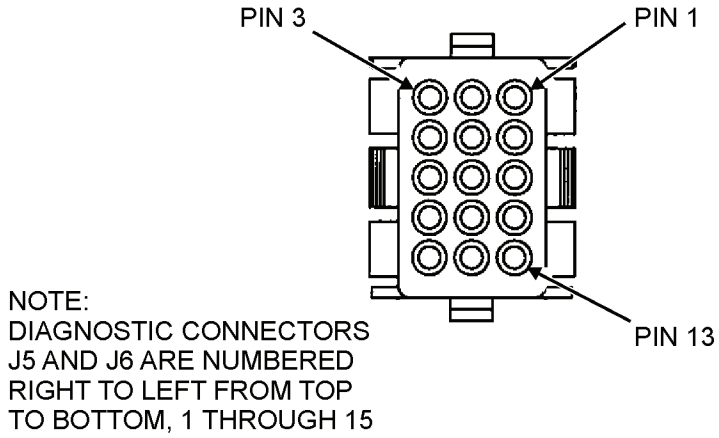


Figure 3. Diagnostic Connectors J5 and J6 Pin Out

10. On remote box assembly (Figure 2, Item 1), place rotary selector switch (Figure 2, Item 2) to OFF position.

11. Remove rear access panel (WP 0016).

NOTE

The pressure cutout switch is connected to a self-sealing fitting. A little refrigerant will escape when disconnected from this type fitting.

12. Loosen low pressure cutout switch (S2) (Figure 4, Item 1) and remove from self-sealing fitting (Figure 4, Item 2) in 7/8-inch compressor inlet pipe (Figure 4, Item 3).

13. Set multimeter to read ohms.

14. With multimeter leads still connected to J6 (Figure 1, Item 6) pins 2 and 4 (Figure 3) check for continuity (S2 open).
    - If continuity is found, replace low pressure switch (S2) per this WP.
    - If no continuity is found, continue to step 15.

15. Shut down IECU (WP 0005).

16. Disconnect gauge set from V2 and V3 (Figure 1, Item 1, Item 2) (WP 0036).

17. Close hinged panel (Figure 1, Item 4) and secure using three screws (Figure 1, Item 3).

18. Install low pressure cutout switch (Figure 4, Item 1) in self-sealing fitting (Figure 4, Item 2) on 7/8-inch compressor inlet pipe (Figure 4, Item 3).

19. Install rear access panel (WP 0016).

20. Place IECU back into normal operation (WP 0005).

Figure 4. Low Pressure Cutout Switch

REPLACE

1. Cut tie wraps (Figure 4, Item 4) securing wires (Figure 4, Item 5). Discard tie wraps.

2. Tag and disconnect two low pressure cutout switch wire leads (Figure 4, Item 6) at butt splices (Figure 4, Item 7) as close to splice as possible.

WARNING

Use care when working with R-410A refrigerant. Avoid contact with skin and eyes at all times. Always wear protective gloves and face shield when possibility of exposure is possible.

3. Loosen low pressure cutout switch (S2) (Figure 4, Item 1) and remove from self-sealing fitting (Figure 4, Item 2) in 7/8-inch compressor inlet pipe (Figure 4, Item 3).

NOTE

The pressure cutout switch is connected to a self-sealing fitting. A little refrigerant will escape when disconnected from this type fitting.

4. Install new low pressure cutout switch (S2) (Figure 4, Item 1) into self-sealing fitting (Figure 4, Item 2) on 7/8-inch compressor inlet pipe (Figure 4, Item 3) and tighten.
5. Connect two wire leads (Figure 4, Item 6) from low pressure cutout switch (Figure 4, Item 1) to IECU wiring (Figure 4, Item 5) as tagged using splices (WP 0063).
6. Remove tags.
7. Re-bundle wires (Figure 4, Item 5) using tie wraps (Figure 4, Item 4).
8. Install rear cover assembly (WP 0016).
9. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
HIGH PRESSURE CUTOUT SWITCH (S3)
TEST, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0072, Item 2)
Electronic Equipment Tool Kit (WP 0077, Item 11)

Materials/Parts
Lock Washer (WP 0075, Item 5)

Personnel Required
One

References
WP 0005
WP 0012
WP 0015
WP 0036
WP 0038
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)

TEST

1. Attach gauge set to service valves V2 and V3 (Figure 1, Item 1, Item 2) (WP 0036).

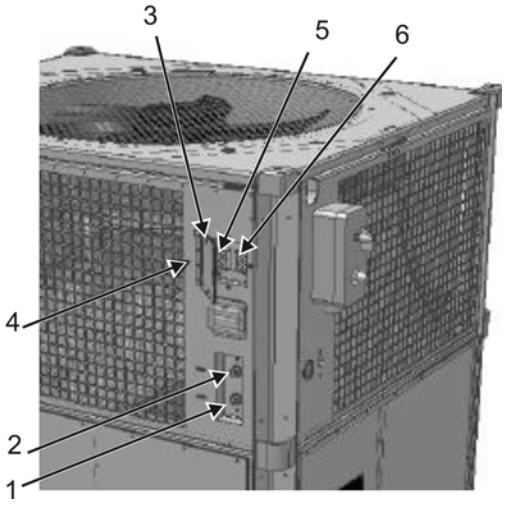


Figure 1. Diagnostic Connectors (J5 and J6)

2. On remote box assembly (Figure 2, Item 1), place rotary selector switch (Figure 2, Item 2) to COOL position.

3. Rotate TEMPERATURE knob (Figure 2, Item 3) to COOLER position.

NOTE

Normal operating sequence after turn on for the IECU will consist of the evaporator blower motor starting, followed by an approximate delay of one minute before the compressor starts up. Within 30 seconds of the compressor starting, the condenser fan will start up and run.

4. Make sure condenser fan motor, evaporator blower motor, and compressor motor operate.

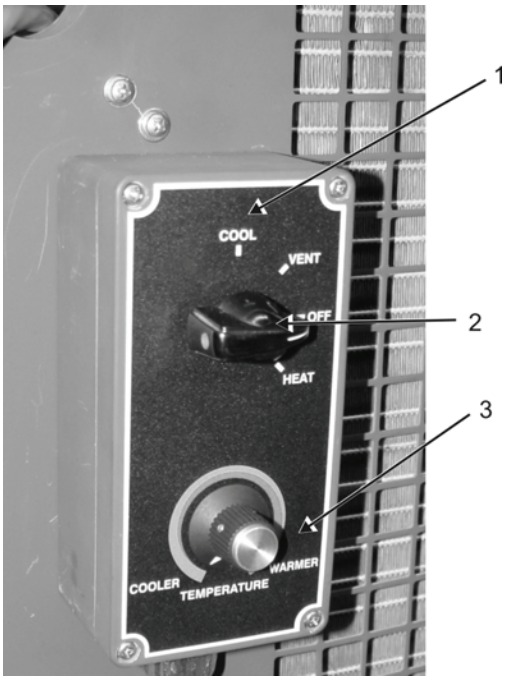


Figure 2. Remote Box Assembly

5. Check that refrigeration high pressure side is <700 psi.
   - If pressure is <700 psi continue to step 5.
   - If high pressure side rises to >700 psi after compressor start up and compressor continues to operate, shut down IECU (WP 0005). Replace high pressure cutout switch per this WP.

6. Remove three screws (Figure 1, Item 3) to open hinged panel (Figure 1, Item 4) on outside of IECU to access diagnostic connectors (J5 and J6) (Figure 1, Items 5, Item 6).

7. Set digital multimeter to read volts AC.

8. Insert multimeter positive (+) and negative (-) probes between pins 1 and 2 (Figure 3) of J6 connector (Figure 1, Item 6), then monitor multimeter display.
   - 0.0 VAC indicates S3 is closed (normal operation).
   - If meter indicates 24 VAC (S3 open), troubleshoot S3 for SYMPTOM – Compressor B2 will not start after one minute delay (WP 0012).

9. Block condenser return air flow by blocking return air duct.

NOTE

Blocking the return air flow will cause the high side pressure to increase. Monitor the multimeter display as pressure increases. When the high side pressure reaches 700 psi, the compressor will shut down.

10. After compressor shuts down, read multimeter display.
    - If meter indicates 24 VAC (S3 open), switch is correctly open due to a high pressure condition.

- If meter indicates 0.0 VAC (S3 closed), troubleshoot S3 for SYMPTOM – Compressor B2 will not start after one minute delay (WP 0012).

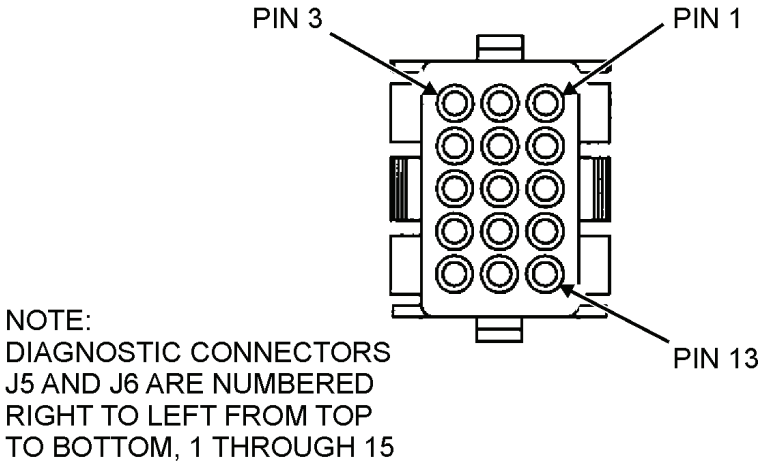


Figure 3. Diagnostic Connectors J5 and J6 Pin Out

11. Shut down IECU (WP 0005).
12. Remove gauge set connected to service valves V2 and V3 (Figure 1, Item 1, Item 2) (WP 0036).
13. Close hinged panel (Figure 1, Item 4) and secure using three screws (Figure 1, Item 3).
14. Place IECU back into normal operation (WP 0005).

REPLACE

1. Remove end panel (WP 0015).
2. Raise top cover (WP 0005).
3. Remove one screw (Figure 4, Item 1), lock washer (Figure 4, Item 2), and washer (Figure 4, Item 3) securing compressor cover (Figure 4, Item 4). Discard lock washer.
4. Remove compressor cover (Figure 4, Item 4).

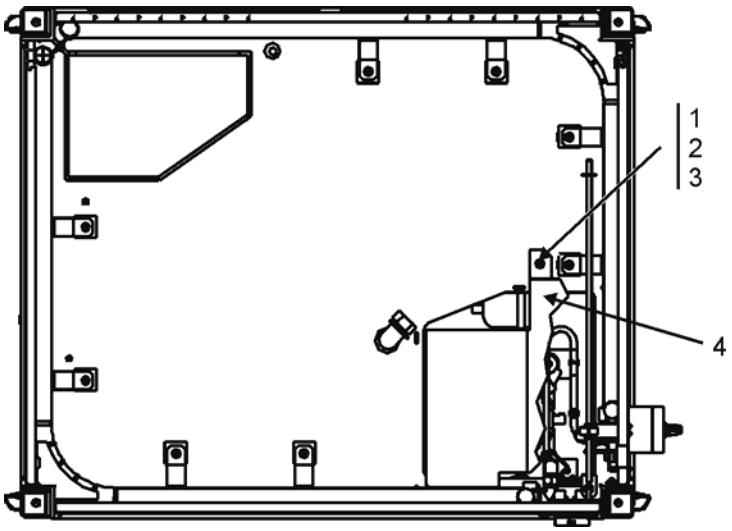


Figure 4. Compressor Cover

5. Tag and disconnect two high pressure cutout switch wire leads (Figure 5, Item 1) in condenser section at butt splices (Figure 5, Item 2) as close to splice as possible.

6. Remove two screws (Figure 6, Item 1), lock washers (Figure 6, Item 2), and washers (Figure 6, Item 3) securing high pressure cutout switch manual reset button (Figure 6, Item 4) to panel (Figure 6, Item 5). Discard lock washers.

WARNING

Use care when working with R-410A refrigerant. Avoid contact with skin and eyes at all times. Always wear protective gloves and face shield when possibility of exposure is possible.

7. Remove flared nut (Figure 7, Item 1) from fitting (Figure 7, Item 2) in 1/2-inch pipe (Figure 7, Item 3).

NOTE

The high pressure cutout switch is connected to a self-sealing fitting. A little refrigerant will escape when disconnected from this type fitting.

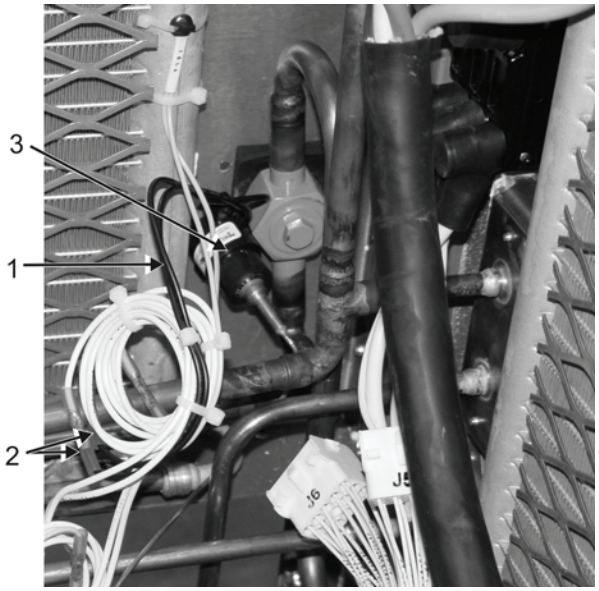


Figure 5. High Pressure Cutout Switch

8. Remove high pressure cutout switch (Figure 5, Item 3) with tubing (Figure 7, Item 4) and flared nut (Figure 7, Item 1) attached.

9. Install new high pressure cutout switch (Figure 5, Item 3) into opening in panel (Figure 6, Item 5) and secure using two screws (Figure 6, Item 1), new lock washers (Figure 6, Item 2), and washers (Figure 6, Item 3).

10. Reconnect two high pressure cutout switch wire leads (Figure 5, Item 1) using two butt splices (Figure 5, Item 2) (WP 0063).

11. Remove tags.

CAUTION

Use extreme care when bending the thin copper tubing as to not pinch or cause kinks.

12. Coil excess tubing (Figure 7, Item 4) and secure with tie wraps (Figure 7, Item 5).

NOTE

The high pressure cutout switch is connected to a self-sealing fitting. A little refrigerant will escape when connecting to this type fitting.

13. Install flared nut (Figure 7, Item 1) onto fitting (Figure 7, Item 2) on 1/2-inch pipe (Figure 7, Item 3).

14. Leak test connections (WP 0038).

15. Install end panel assembly (WP 0015).

16. Install compressor cover (Figure 4, Item 4) and secure using one screw (Figure 4, Item 1), lock washer (Figure 4, Item 2), and washer (Figure 4, Item 3).

17. Lower top cover (WP 0005).

18. Place IECU back into normal operation (WP 0005).

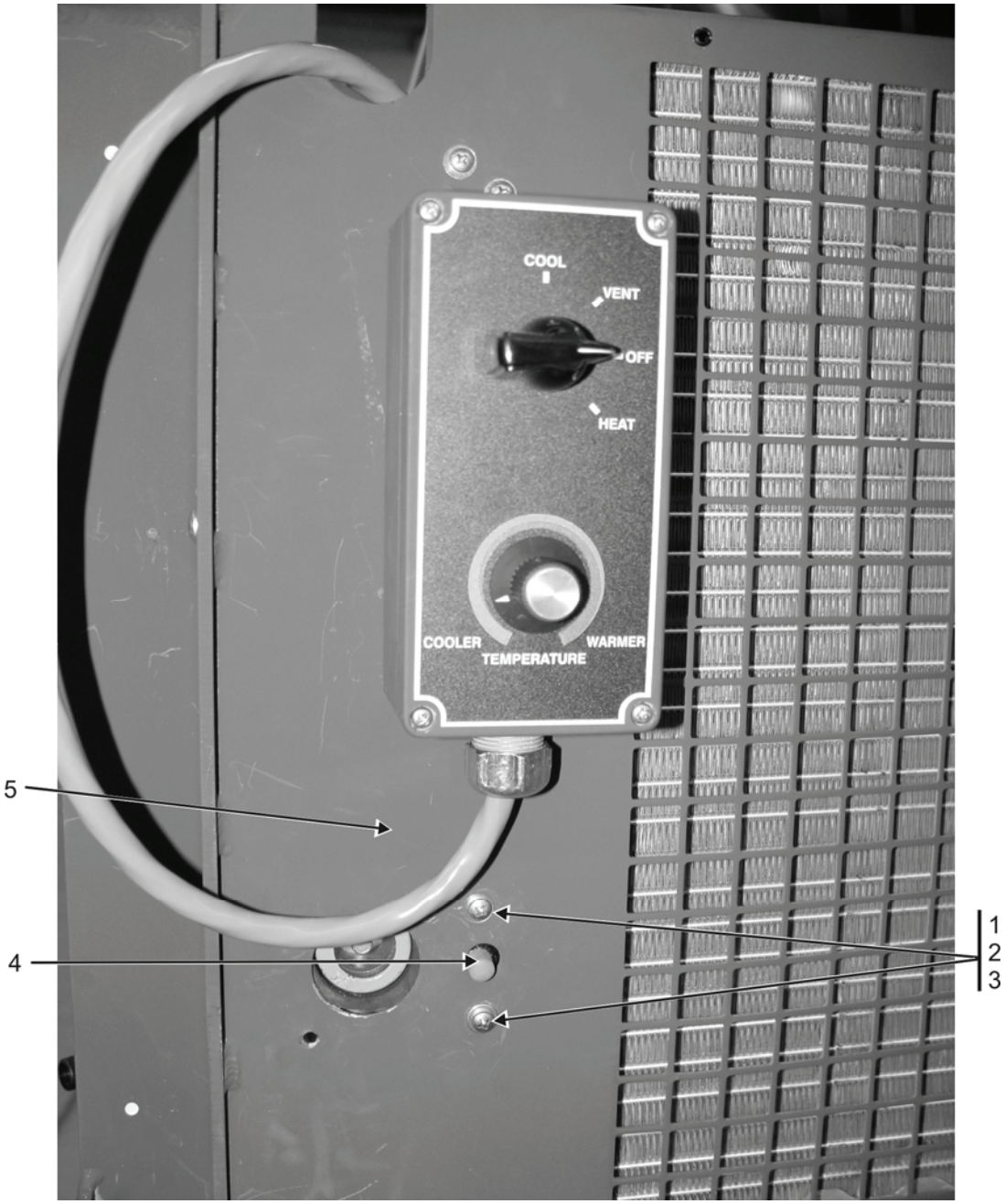


Figure 6. Manual Pushbutton Switch

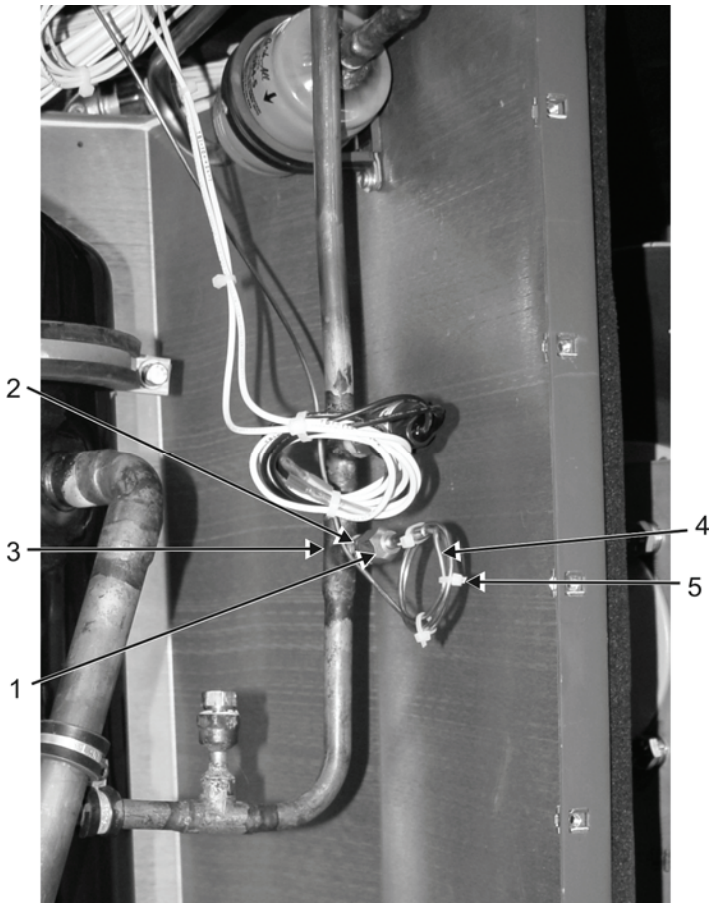


Figure 7. S3 Tubing

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
FUSIBLE PLUG
REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)
General Mechanic's Tool Kit (WP 0070, Item 2)

Materials/Parts
Adhesive (WP 0075, Item 4)

Personnel Required
One

References
WP 0005
WP 0015
WP 0036
WP 0037
WP 0038
WP 0054
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
End panel assembly removed (WP 0015)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

1. Remove and recover system refrigerant (WP 0036).
2. Loosen fusible plug (Figure 1, Item 1) and remove from tee (Figure 1, Item 2).

CAUTION

After removing the fusible plug, protect the refrigeration system to stop dirt and debris from entering. Do not clean tee with a small wire brush.

3. Clean threads in tee (Figure 1, Item 2) by hand.
4. Apply sealing compound to threads of new fusible plug (Figure 1, Item 2).
5. Install fusible plug (Figure 1, Item 1) into tee (Figure 1, Item 2) and tighten hand tight.

CAUTION

Do not over tighten fusible plug as damage to system may result.

6. Tighten fusible plug (Figure 1, Item 1) an additional two and a half turns.

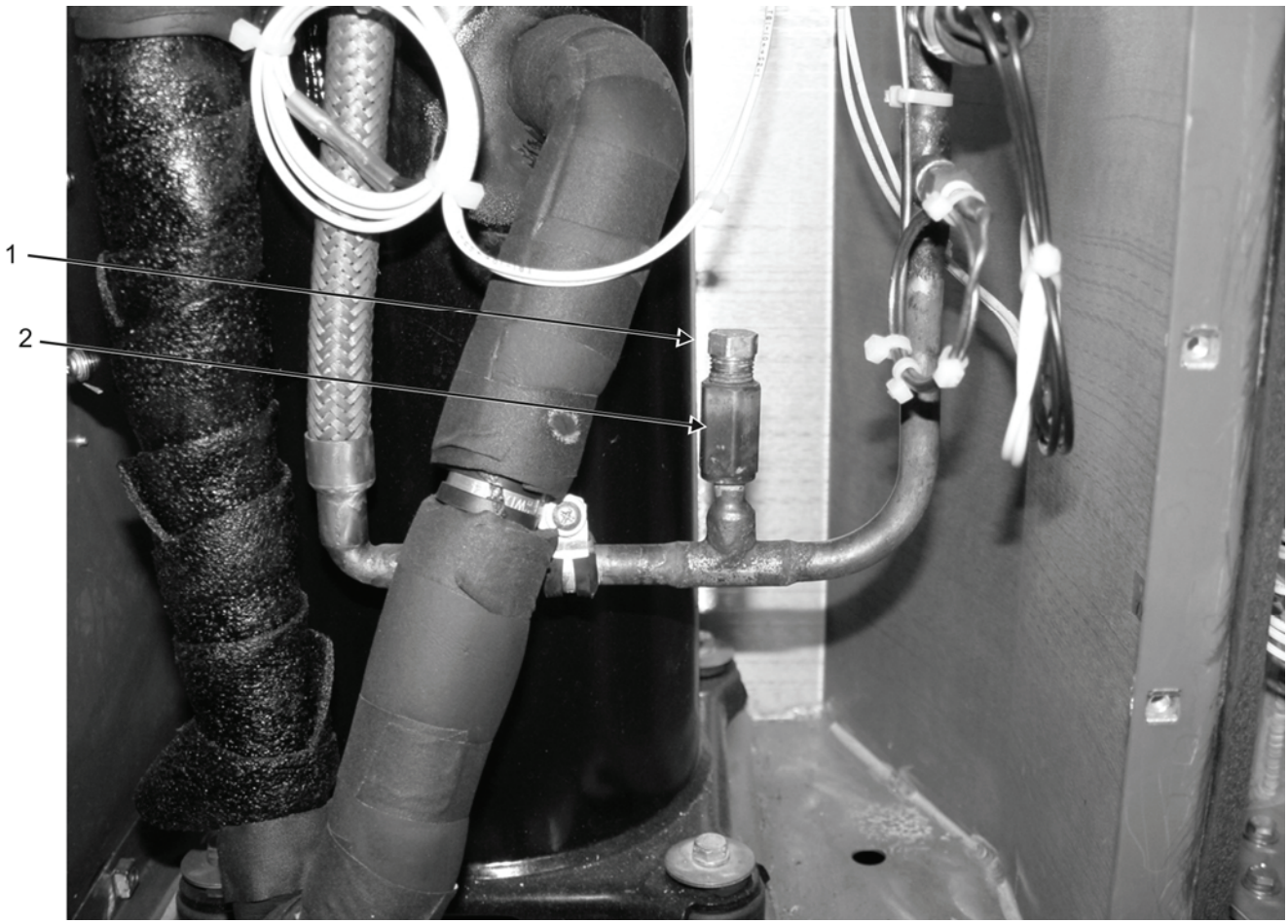


Figure 1. Fusible Plug

7. Leak check connections (WP 0038).
8. Evacuate and charge refrigerant system (WP 0037).
9. Install end panel assembly (WP 0015).
10. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
DIAGNOSTIC CONNECTORS (J5, J6)
INSPECT, REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electrical Connector Maintenance Kit
(WP 0072, Item 10)

Materials/Parts
None

Personnel Required
One

References
WP 0005
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

INSPECT

1. Inspect rear of J5 (Figure 1, Item 1) and J6 (Figure 1, Item 2) diagnostic connectors for loose wires (Figure 1, Item 3).

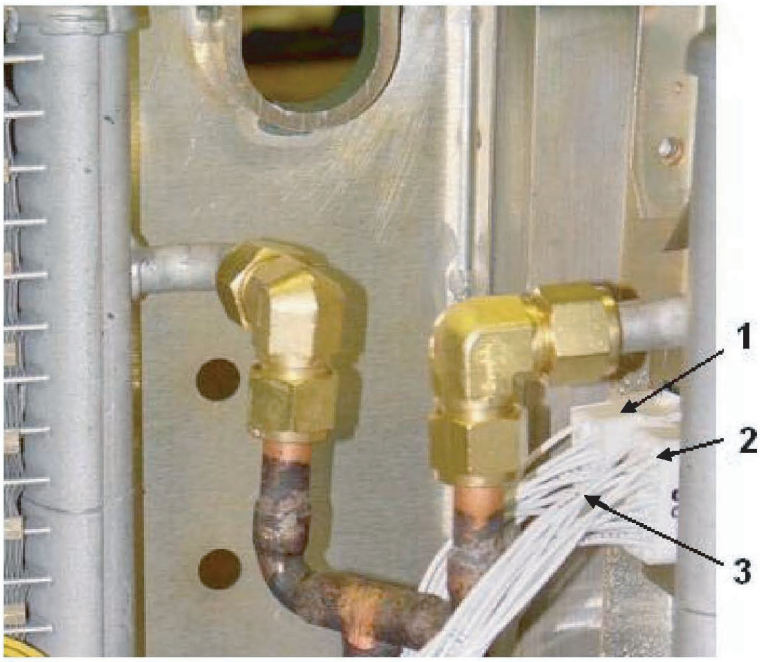


Figure 1. J5 and J6 Diagnostic Connectors (Rear View)

2. Check wiring and connectors (Figure 1, Items 1, 2, 3) for signs of arcing or overheating.
3. Check external connector housing for cracks or damage.
4. Loosen three screws (Figure 2, Item 1) to open hinged panel on outside of IECU to access front of connectors (Figure 2, Items 3, 4).
5. Check external connector (Figure 2, Items 3, 4) housings for cracks or damage.
6. Inspect face of J5 and J6 (Figure 2, Items 3, 4) connector holes for signs of corrosion.
7. If damage is found, replace applicable connector (Figure 2, Items 3, 4) per this WP.
8. Close hinged panel and secure using three screws (Figure 2, Item 1).
9. Close top cover (WP 0005).

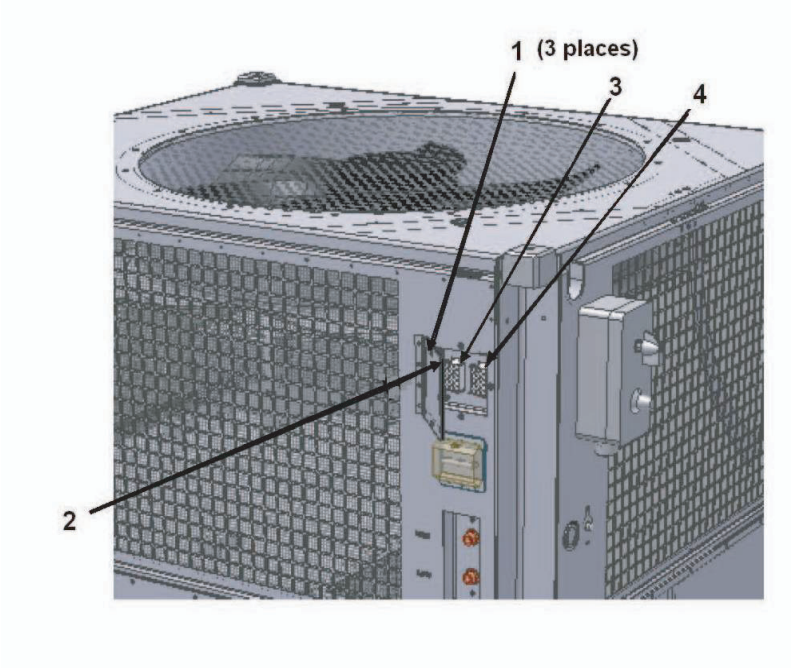


Figure 2. Diagnostic Connectors J5, J6 (Front View)

REPLACE

NOTE

Replacement procedures are applicable to either the J5 or the J6 connector.

1. Release connector (Figure 1, Items 1, 2) from panel by carefully using a screwdriver tip to press in on retaining tabs while pushing inward on connector.

2. Tag all wires (Figure 1, Item 3) to applicable connector (Figure 1, Items 1, 2).

3. Use a contact extraction tool to remove wires from connector (Figure 1, Items 1, 2).

NOTE

If any crimp contacts (not illustrated) are damaged, cut damaged contact off and replace with new crimp contact.

4. Insert wires (Figure 1, Item 3) into new connector as tagged.

NOTE

Wire should snap in place when inserted securely into connector. Tug slightly on each wire to make sure it is secured in connector.

5. Install connector through hole in rear cover assembly and snap into position on IECU frame.

6. Close hinged panel (Figure 2, Item 2) and secure using three screws (Figure 2, Item 1).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
THERMISTORS (TS1, TS3, TS4, TS5, TS6)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electrical Connector Maintenance Kit
(WP 0072, Item 10)

Materials/Parts
Tie Wrap (WP 0075, Item 3)

Personnel Required
One

References
WP 0005
WP 0015
WP 0016
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Access panels and covers removed per Table 1

REPLACE

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

1. Replace applicable temperature sensor using Table 1 and applicable figure to locate appropriate thermistor.

Table 1. Location of Temperature Sensing Thermistors

Ref Des	Nomenclature	Access Panels and Covers	Thermistor Location
TS1	Drier Refrigerant Outlet Temperature	Top cover assembly End panel assembly (WP 0015)	On tubing downstream of filter-drier (Figure 1, Item 1)
TS3	Evaporator Coil Temperature	Rear cover assembly (WP 0016) End panel assembly (WP 0015)	Mounted on blower side of evaporator coil (Figure 2, Item 1)
TS4	Evaporator Refrigerant Outlet Temperature	Rear cover assembly (WP 0016)	On tubing downstream of evaporator coil outlet (Figure 3, Item 1)
TS5	Condenser Coil Temperature	Top cover assembly	On condenser coil header near sight glass (Figure 4, Item 1)
TS6	Condenser Refrigerant Outlet Temperature	Top cover assembly End panel assembly (WP 0015)	On inlet side of filter-DRIER tubing (Figure 1, Item 2)

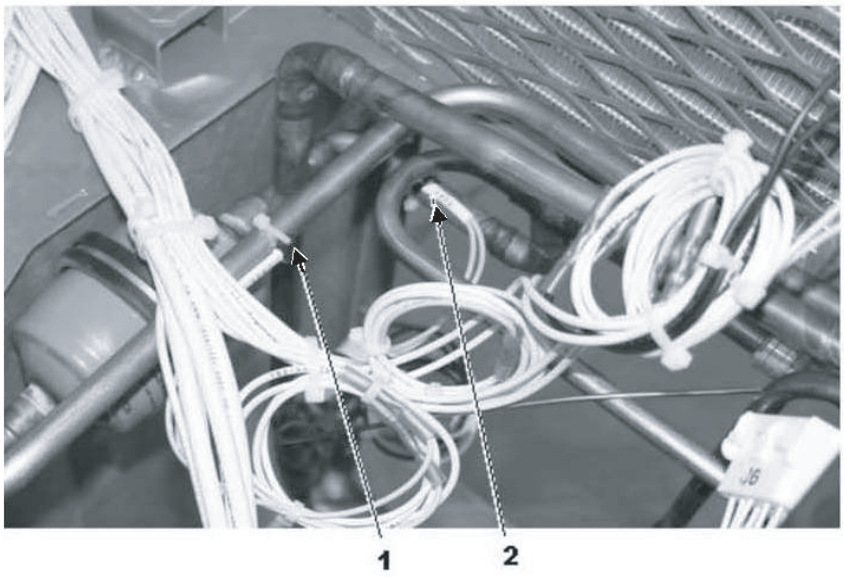


Figure 1. Location of TS1 and TS6 Thermistors

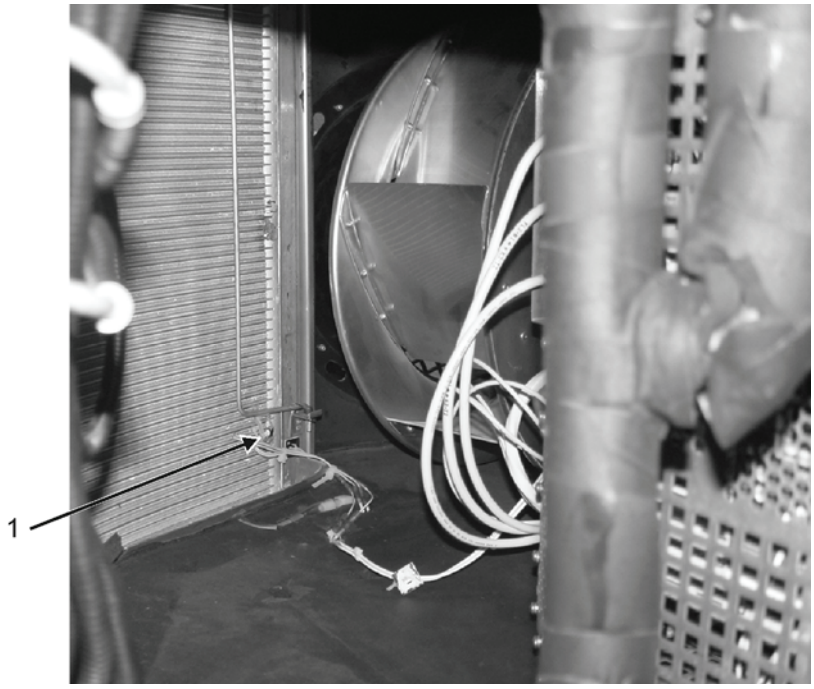


Figure 2. Location of TS3 Thermistor

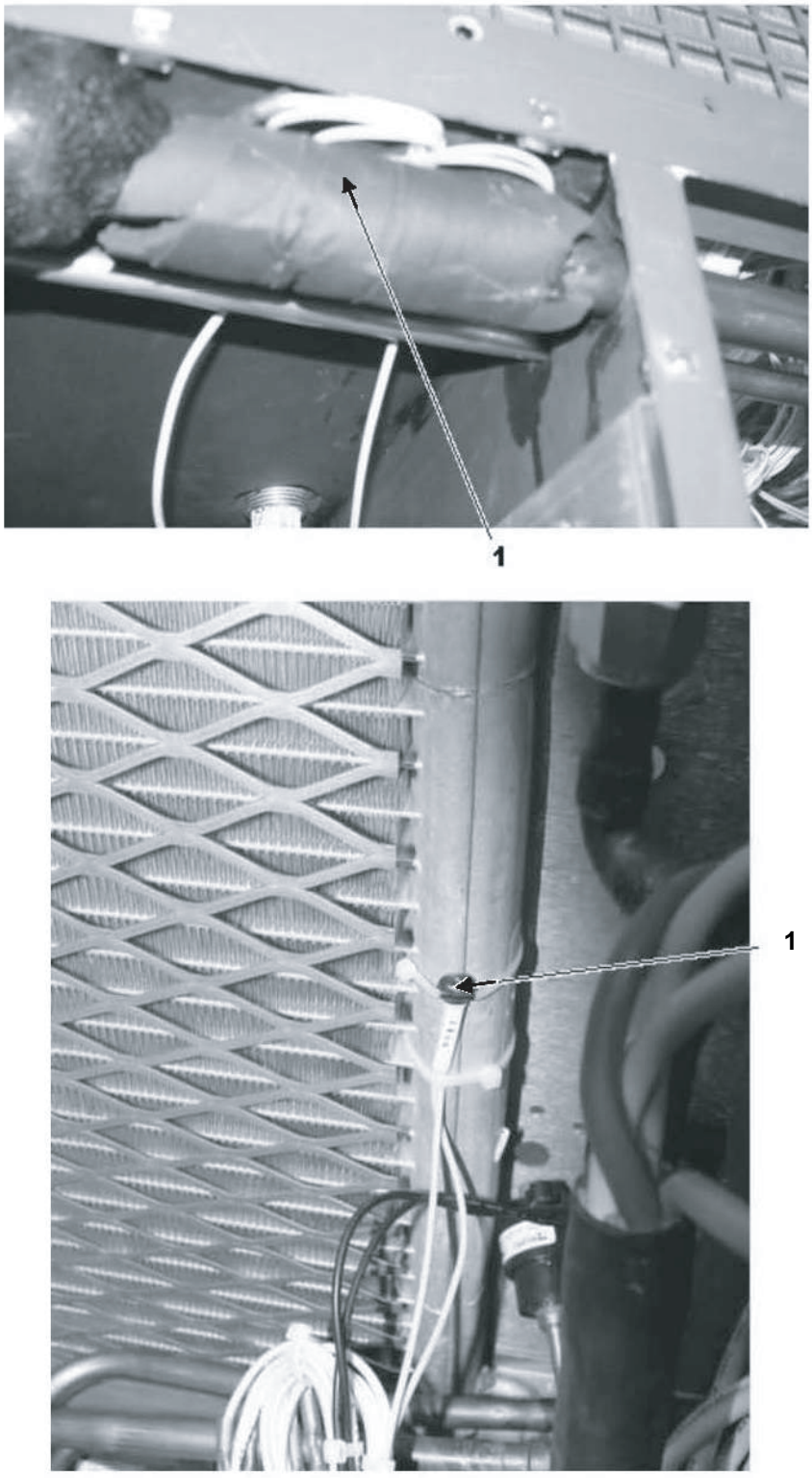


Figure 4. Location of TS5 Thermistor

2. Remove insulation as necessary to gain access to thermistor.
3. Tag wiring on both sides of two butt splices.
4. Cut each wire as close to splice as possible on each side.
5. Cut tie wrap securing thermistor to mounting location. Discard thermistor and tie wrap.
6. Connect wiring to new thermistor as tagged (WP 0063).
7. Remove tags.
8. Secure thermistor using tie wraps as needed at location indicated in Table 1.
9. Install insulation if removed and secure with insulation tape as needed.
10. Lower top cover and/or install side panels at location indicated in Table 1.
11. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
AIR THERMISTOR (TS2)
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 2)
Electrical Connector Maintenance Kit
(WP 0072, Item 10)

Materials/Parts
Wire Tie (WP 0075, Item 3)

Personnel Required
One

References
WP 0015
WP 0061
WP 0063
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
End panel removed (WP 0015)

REPLACE

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

1. Locate thermistor (TS2) (Figure 1, Item 1) on partition wall behind evaporator blower (Figure 1, Item 2).

NOTE

TS2 is mounted next to the TS7 thermistor (Figure 1, Item 3). Identify these parts by examining wire markings. Additionally, TS2 is a dual prong sensor.

2. Tag wiring on both sides of two butt splices (Figure 1, Item 4).
3. Cut each wire as close to splice as possible on each side.
4. Remove wire tie (Figure 1, Item 5) securing thermistor (Figure 1, Item 1) to mounting location. Discard wire tie wrap.
5. Remove screw, (Figure 1, Item 6) lock washer, (Figure 1, Item 7) and flat washer (Figure 1, Item 8). Discard lock washer.
6. Connect wiring to new thermistor as tagged using butt splices (WP 0063).
7. Remove tags.
8. Secure thermistor (Figure 1, Item 1) in position using new wire tie (Figure 1, Item 5).
9. Install screw (Figure 1, Item 6), new lock washer (Figure 1, Item 7), and flat washer (Figure 1, Item 8) and secure to partition.
10. Install end panel assembly (WP 0015).

11. Place IECU back into normal operation (WP 0005).

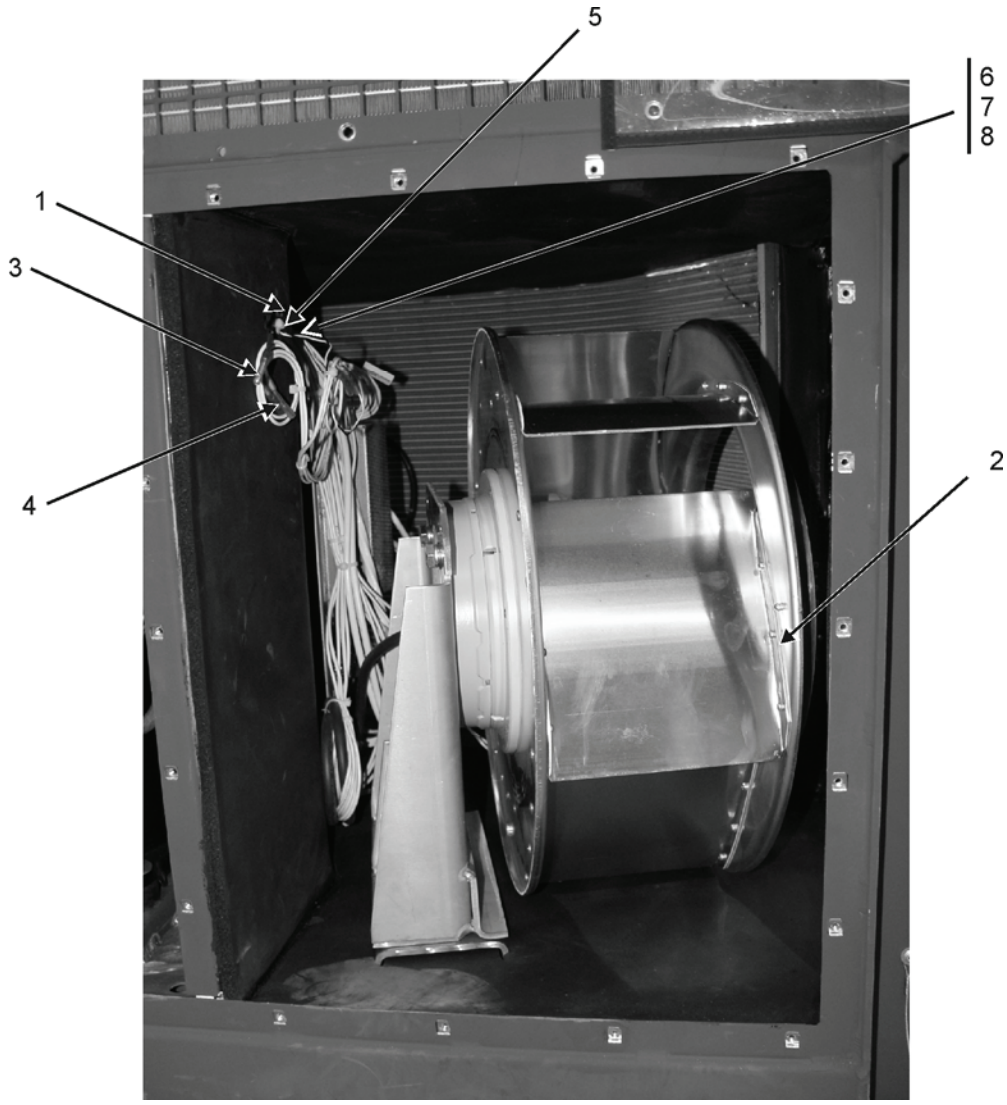


Figure 1. Thermistor (TS2)

END OF WORK PACKAGE

FIELD MAINTENANCE INSTRUCTIONS
60K BTU/HR IECU
WIRING DIAGRAMS

INITIAL SETUP:

Tools and Special Tools
Electronic Equipment Toolkit (WP 0072, Item 11)
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0036
WP 0037
WP 0038
FP Diagrams 1and 2
Equipment Condition
None

INTRODUCTION

Wiring diagrams are provided for general repair methods consisting of replacing wire leads, cables, harnesses, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other make shift procedures. Make shift repair procedures may be appropriate for emergency field repairs, but should be properly repaired as soon as possible.

Refrigeration servicing and repairs can be found in WP 0036, WP 0037, and in WP 0038

General Wiring Repair

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

1. Shut down IECU (WP 0005).
2. Open or remove covers and panels as necessary to access repair area.

CAUTION

Extreme cold can cause electrical wire leads and insulation to become brittle. Do not disturb electrical wiring that has been exposed to extremely low temperatures. Damage to electrical wire leads or insulation can result if disturbed under these conditions.

3. If access to a repair requires removal of a component, refer to the Repair or Replace task for that component for removal instructions.
4. Cut and discard tie straps as necessary to make the repair.
5. Tag the wire lead, cable, or harness ends as necessary.
6. Disconnect wire lead, cable, or harness ends.

7. Cut off and discard splices or crimp nuts.

8. Disconnect connectors and cut off pins with housing as necessary.

9. Cut leads at solder connections then remove and discard insulation sleeving pieces from wire lead ends and component.

10. Disconnect wire leads from component.

11. Loosen strain relief fittings as necessary then note routing and remove wire lead, cable, or harness.

12. **Insulating Joints**. The preferred method of insulating bare electrical joints is by using insulation sleeving. To apply, slide a piece of insulation sleeving over the wire lead before making the joint. Make the joint then slide the insulation sleeving over the joint and shrink in place with heat gun.

13. **Crimping Terminals**. If the terminal is not insulated, refer to (8) above. To install the terminal, strip 1/4-1/2 inch (0.6-1.3 cm) of insulation from the end of the wire lead, insert bare wire lead end into the shank of the terminal. Crimp the shank securely onto the wire lead

WARNING

Solder and flux contain materials which are hazardous to health. Avoid breathing vapors or fumes from soldering operations. Perform operations only in well ventilated areas. Wash hands with soap and water after handling solder and flux. Wear thermal gloves and protective goggles or face shield to protect against bums.

14. **Soldering Connections**. Wire connections must be made mechanically sound before they are soldered; solder alone does not provide sufficient strength to prevent breakage. Joining surfaces of connections to be soldered must be clean and bright. Flux should be brushed onto the joint before soldering. Wires should always be heated with a soldering iron to the point at which the solder will melt completely when touched to joint and flow into all parts of the joint. Excessive build up of solder on the joint should be avoided or removed.

15. **Splicing Wire**. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced by using a crimped splice installed per (9) above or by wrapping the stripped wire lead ends onto themselves then soldering and insulating per (8) and (10) above.

16. Select appropriate wire lead, cable, or harness then route as noted during removal being sure to pass it through any grommets or strain relief fittings as necessary.

17. Tighten any strain relief fittings that were loosened for removal.

18. Connect wire lead, cable, or harness ends per tags and wiring diagram F0-1 in Figure 1 at the end of the manual. Remove tags.

19. Connect wire leads to components.

20. Solder and insulate leads to components per (8) and (10) above.

21. Install connector pins per (9) above and tab housings then connect cable or harness.

22. Install splice or crimp as appropriate per (9) above.

23. Secure wires, cables, or harnesses with tie straps as necessary. Cut to remove excess tie strap material.

24. Install any components that were removed for access.

25. Install any covers and panels that were removed for access.

26. Connect IECU to power source and operate (WP 0005).

WIRING DIAGRAMS, ELECTRICAL SCHEMATICS, AND REFRIGERATION SCHEMATICS

A pictorial representation of the wiring diagram (Figure 1), electrical schematic (Figure 2), and refrigeration schematic (Figure 3) are provided at the end of this work package. Full size diagrams for the wiring diagram (FO-1), electrical schematic (FO-2), and refrigeration schematic (FO-3) are provided at the end of the manual as foldout diagrams. Table 1 provides a list of component legends used in the diagrams and schematics.

Table 1. Wiring Diagram Legend

B1	Motor, Evaporator Blower
B2	Motor, Compressor
B3	Motor, Condenser Fan
C1	Coil, Evaporator
C2, C3	Coil, Condenser
CB1	Circuit Breaker (Main)
CF1	Fan, Condenser
EB1	Blower, Evaporator
F1	Filter-Drier
F2	Filter, Return Air
FL1-3	Filter, Feedthru
FL4	Terminal Block, Filtered
FL5	Harmonic Filter
FL6A	Connector, Filtered
FL6B	Connector, Filtered
HR1-3	Heater, Electric
J2	Connector, Receptacle, Electrical
J5	Receptacle, Electrical (Diagnostic)
J6	Receptacle, Electrical (Diagnostic)
K1	Contactor (Evaporator Blower)
K2	Contactor (Compressor)
K3	Contactor (Condenser Fan)
K4	Contactor (Electric Heaters)
P1	Connector, Plug, Electrical
P2	Connector, Plug, Electrical
PP1	Pipe Plug, Fusible
PT1	Potentiometer
R1-3	Resistor
S1	Rotary (Selector)
S2	Switch, Pressure (LPCO)
S3	Switch, Pressure (HPCO)
S4	Switch, Pressure (Condenser Fan)
S5	Switch, Temperature (HTCO)
S6	Pushbutton (Door)
S8	Switch, Temp. (Evaporator Coil)
S9	Switch, Temp. (Evaporator Coil Air Inlet)
S10	Switch, Thermostatic (HTCO)
SA1-3	Transient Voltage Suppressor
SG1	Sight Glass
T1	Transformer, Control
TB1, 2	Terminal Board
TC	Controller, Temperature
TD1	Time Delay Relay Assembly
TS1	Sensor, Temp. (Drier Refrigerant Outlet)
TS2	Sensor, Temp. (Evaporator Coil Air Inlet)
TS3	Sensor, Temp. (Evaporator Coil)
TS4	Sensor, Temp. (Evaporator Refrigerant Outlet)
TS5	Sensor, Temp. (Condenser Coil)
T56	Sensor, Temp. (Condenser Refrigerant Outlet)
TS7	Thermistor (Evaporator Coil Air Inlet)
V1	Valve, Thermal Expansion
V2, V3	Valve, Service
VFD	Variable Frequency Drive

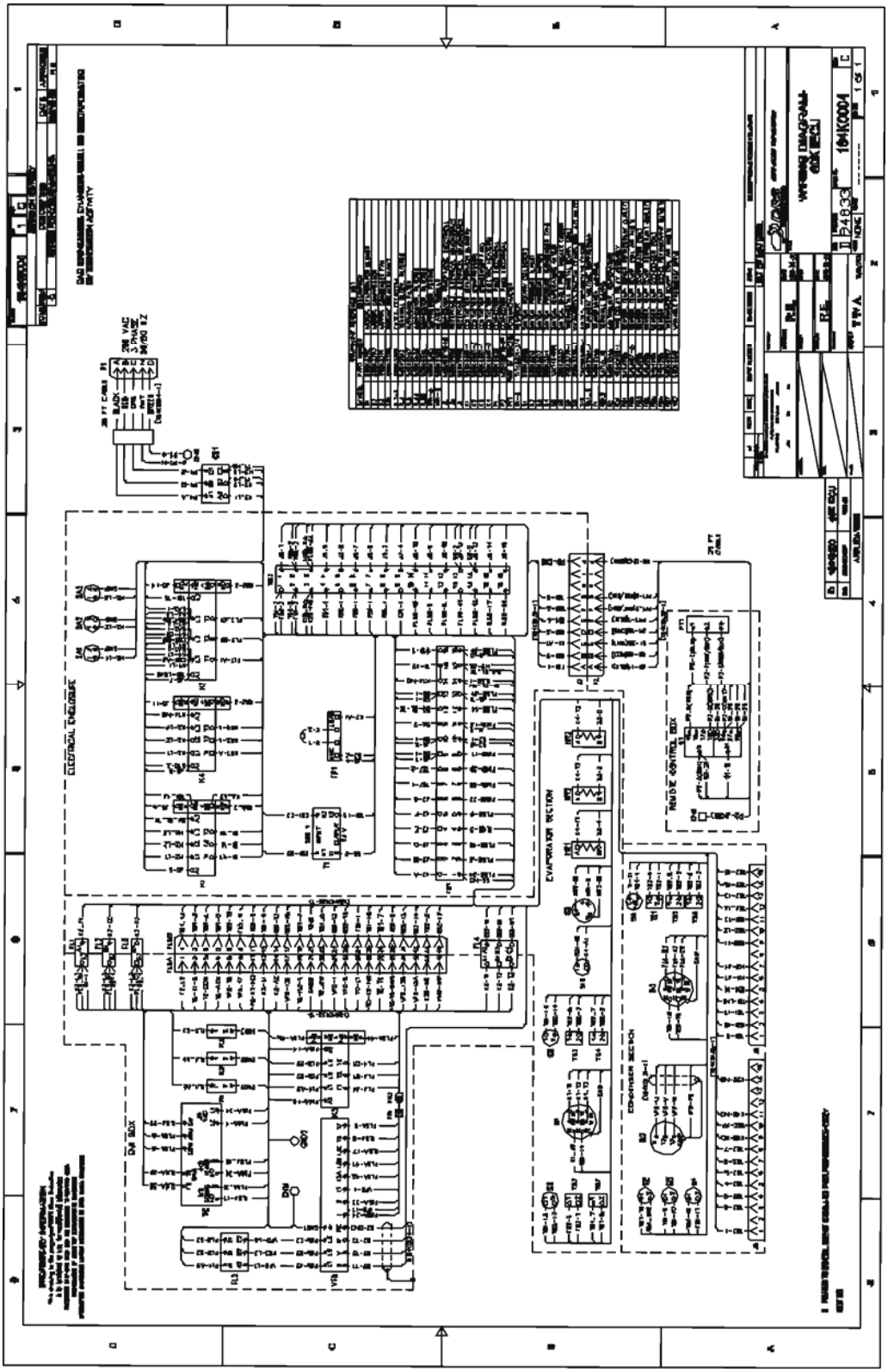


Figure 1. 60K BTU/Hr IECU Wiring Diagram
*** (Refer to FO-2)**

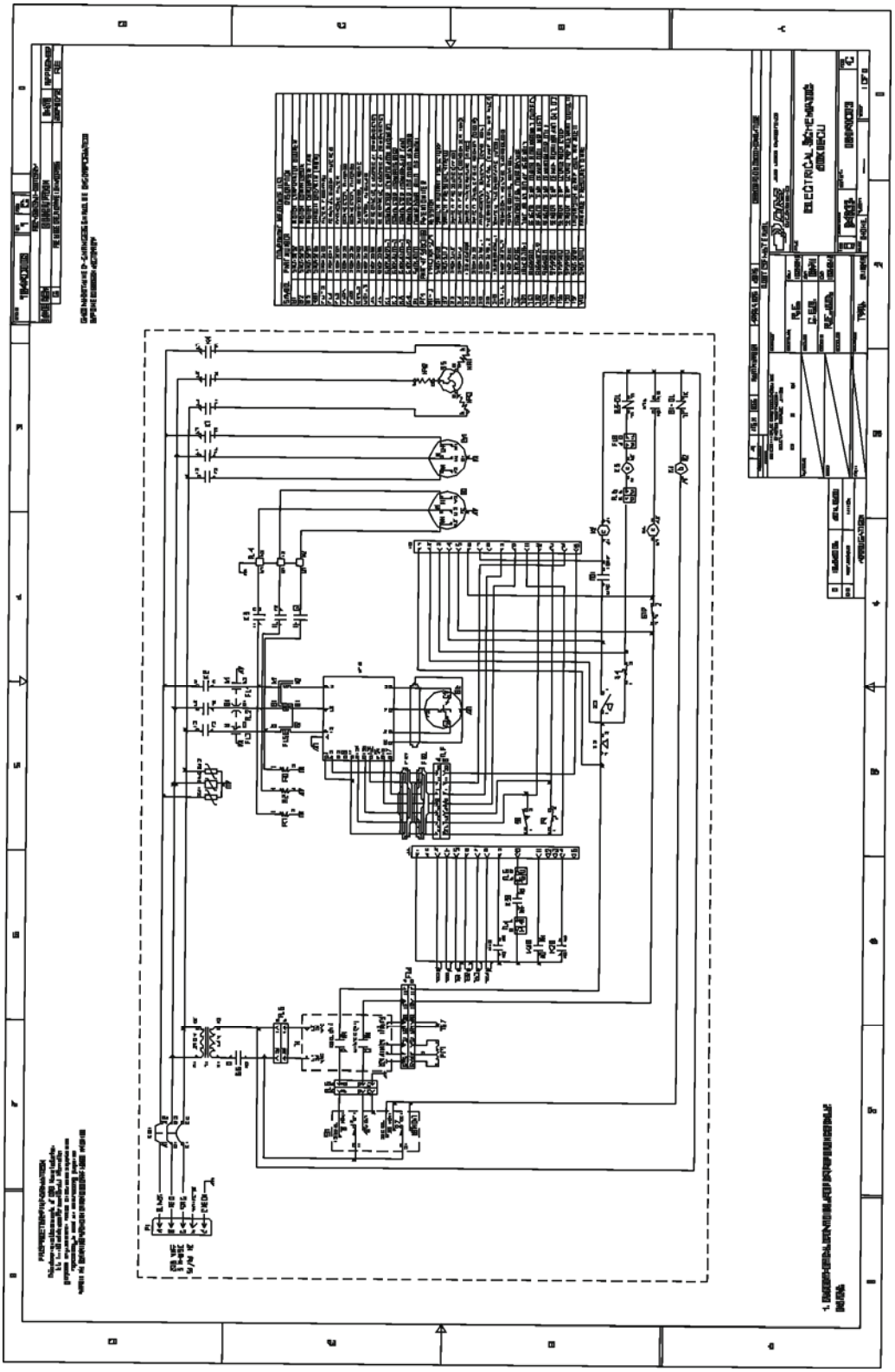


Figure 2. 60K BTU/Hr IECU Electrical Schematic Diagram
*** (Refer to FO-1)**

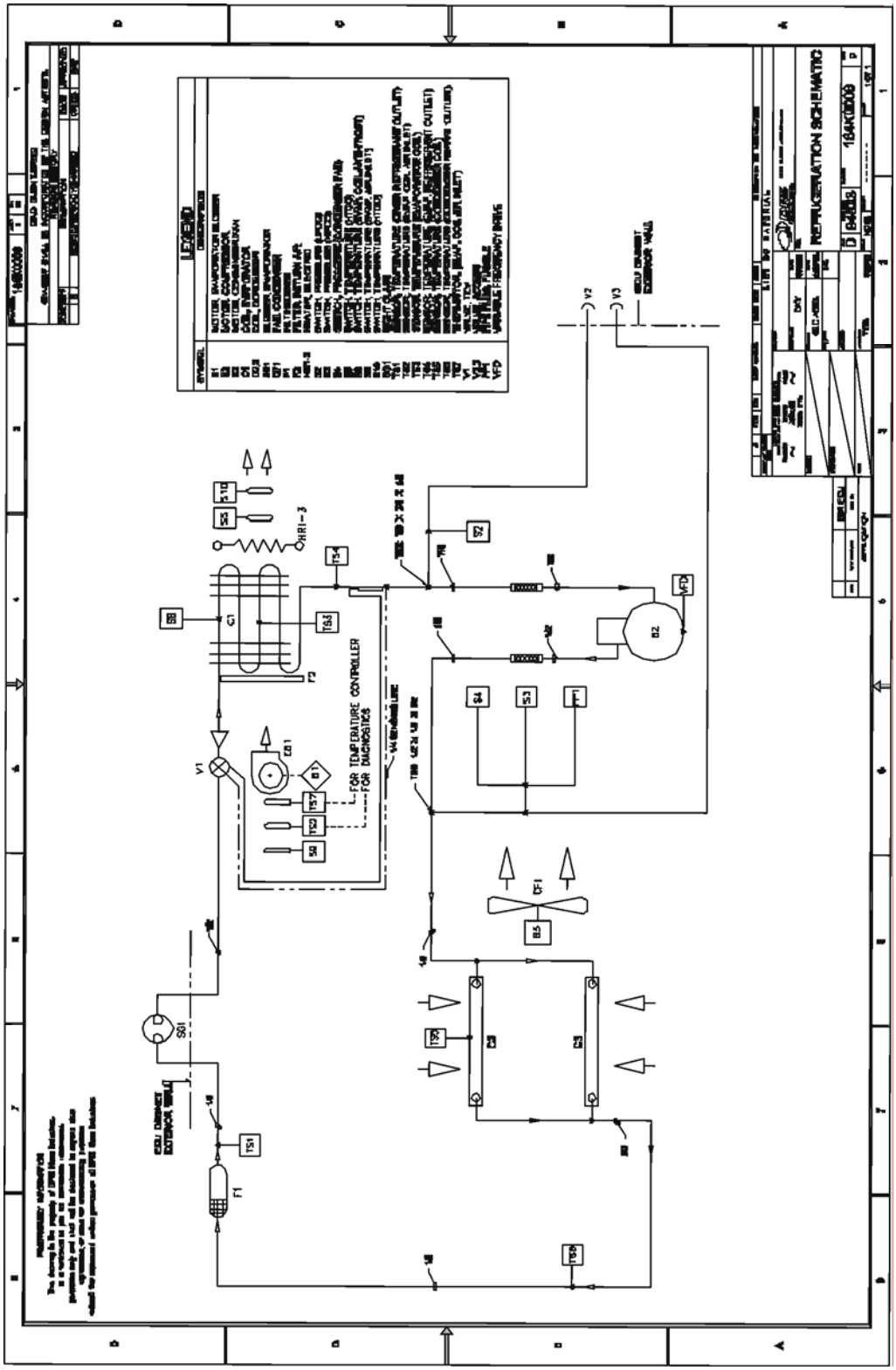


Figure 3. 60K BTU/Hr IECU Refrigeration Schematic Diagram
***(Refer to FO-3)**

CHAPTER 8

SUSTAINMENT MAINTENANCE INSTRUCTIONS

SUSTAINMENT MAINTENANCE INSTRUCTIONS
TOP COVER ASSEMBLY
REPLACE, REPAIR

INITIAL SETUP:

Tools and Special Tools
General Mechanic• s Tol Kit (WP 0072, Item 2)
Hand Blind Riveter (WP 0072, Item 9)
Materials/Parts
Rivet (WP 0075, Item 1)

Equipment Condition
IECU is shutdown (WP 0005)

Personnel Required
Two
References
WP 0005
WP 0050
MIL-B-7883
TM 43-0139
TM 9-4120-431-24P

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

REPLACE

WARNING

Rivets can shatter during removal or installation and cause serious personal injury or permanent eye damage. Always wear approved safety glasses when removing or installing rivets.

1. Remove condenser fan (B3) (WP 0050).
2. Remove 18 blind rivets (Figure 1, Item 1) securing two continuous hinges (Figure 1, Item 3) to IECU frame using rivet removal tool.
3. Lift top cover assembly (Figure 1, Item 2) off of IECU frame.
4. Clean area where hinge was removed.
5. Remove handle per this WP.
6. Install handle on new top cover per this WP.
7. Position new top cover assembly (Figure 1, Item 2) in place on IECU frame.

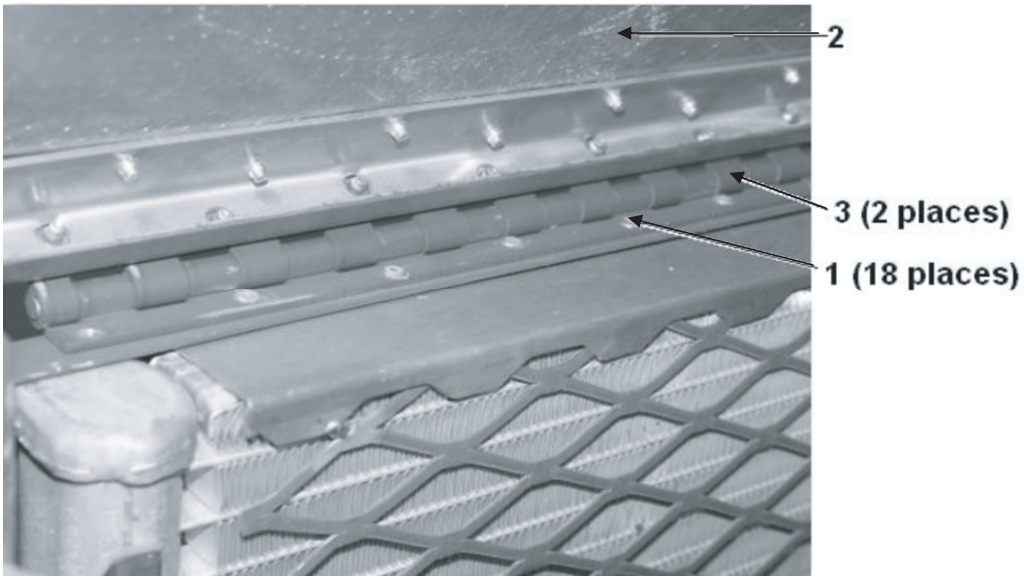


Figure 1. Top Cover Assembly

8. Align holes and attach two continuous hinges (Figure 1, Item 3) to IECU frame using rivet gun and 18 rivets (Figure 1, Item 1).
9. Install condenser fan (B3) (WP 0050).
10. Lower top cover (WP 0005).
11. Place IECU back into normal operation (WP 0005).

REPAIR

1. Repair any minor sheet metal dents and bent edges by straightening using common sheet metal repair procedures.
2. Weld any cracks or broken welds per MIL-B-7883.
3. Touch-up any painted surfaces per TM 43-0139.
4. Place IECU back into normal operation (WP 0005).

Replace Continuous Hinge

NOTE

There are two continuous hinges that connect the IECU top cover assembly to the IECU frame. This procedure is applicable to replacing either of the two continuous hinges.

1. Lift top cover (WP 0005) and secure open.

WARNING

Rivets can shatter during removal or installation and cause serious personal injury or permanent eye damage. Always wear approved safety glasses when removing or installing rivets.

2. Remove 18 blind rivets (Figure 1, Item 1) securing top cover assembly (Figure 1, Item 2) to two continuous hinges (Figure 1, Item 3) using rivet removal tool.
3. Lift top cover assembly (Figure 1, Item 2) off of IECU and put in safe location.
4. Clean area where hinge was removed.

WARNING

Rivets can shatter during removal or installation and cause serious personal injury or permanent eye damage. Always wear approved safety glasses when removing or installing rivets.

5. Remove nine blind rivets (Figure 1, Item 1) securing damaged continuous hinge (Figure 1, Item 3) to IECU frame.
6. Remove damaged continuous hinge.
7. Place new continuous hinge in place on IECU.
8. Using rivet gun and nine rivets (Figure 1, Item 1) attach new continuous hinge (Figure 1, Item 3) to IECU frame.
9. Put top cover assembly in place on IECU.
10. Align holes of top cover and two continuous hinges.
11. Attach top cover assembly (Figure 1, Item 2) to two continuous hinges (Figure 1, Item 3) using rivet gun and 18 rivets (Figure 1, Item 1).
12. Lower top cover (WP 0005).
13. Place IECU back into normal operation (WP 0005).

Replace Latch Hinge

NOTE

There are two latch hinges that secure the IECU top cover assembly closed. This procedure is applicable to replacing either of the two latch hinges.

1. Raise top cover assembly (WP 0005).

WARNING

Rivets can shatter during removal or installation and cause serious personal injury or permanent eye damage. Always wear approved safety glasses when removing or installing rivets.

2. Remove three rivets (Figure 2, Item 1) securing latch hinge (Figure 2, Item 2) to top cover (Figure 2, Item 3).

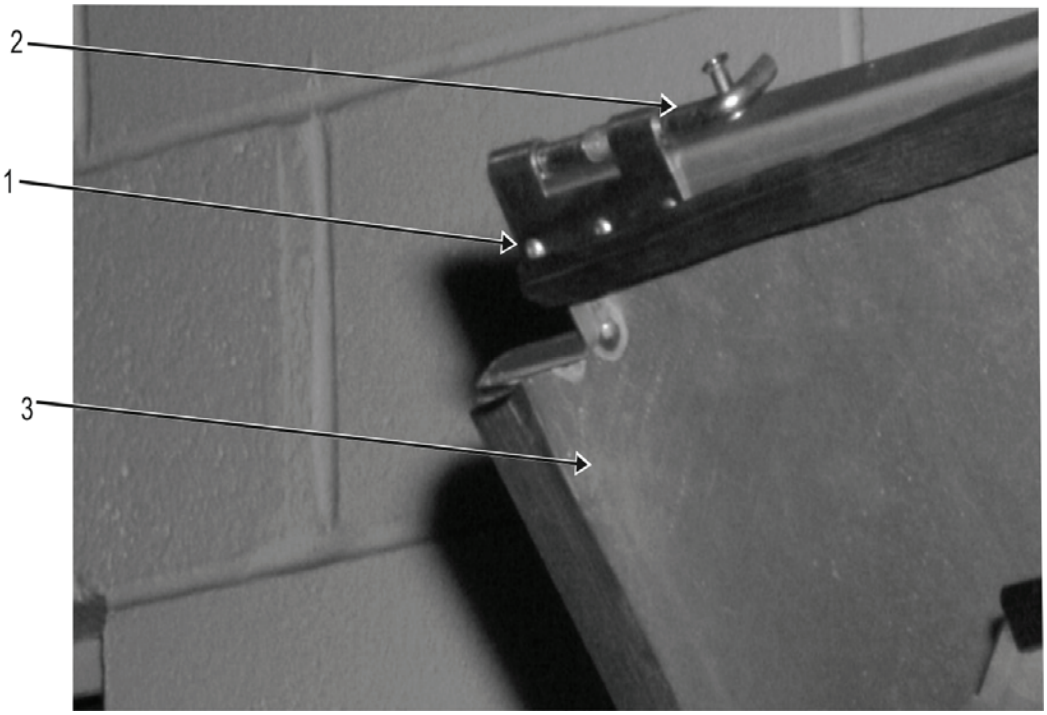


Figure 2. Latch Hinge

3. Remove latch hinge (Figure 2, Item 2).
4. Clean area where latch hinge was removed.
5. Install latch hinge (Figure 2, Item 2) and secure using three rivets (Figure 2, Item 1).
6. Lower top cover assembly (WP 0005).
7. Place IECU back into normal operation (WP 0005).

Replace Handle

1. Raise top cover assembly (WP 0005).
2. Remove two nuts (Figure 3 Item 1), washers (Figure 3, Item 2), and lock washers (Figure 3, Item 3) securing handle (Figure 3, Item 4) to top cover assembly. Discard lock washers.
3. Remove handle (Figure 3, Item 4) from top cover assembly.
4. Install new handle to top cover and secure using two nuts (Figure 3, Item 1), washers (Figure 3, Item 2), and new lock washers (Figure 3, Item 3).
5. Place IECU into normal operation (WP 0005).

Figure 3. Top Cover Handle

Replace Support Arm Assembly

NOTE

There are four support arm assemblies that secure the condenser fan to the top cover. Use this procedure to replace a single support arm.

1. Raise top cover assembly (WP 0005).
2. Remove one nut (Figure 4, Item 1), washer (Figure 4, Item 2), and lock washer (Figure 4, Item 3) securing the outer end of the support arm assembly (Figure 4, Item 4) to top cover assembly.
3. Remove two bolts (Figure 4, Item 5), lock washers (Figure 4, Item 6), and washers (Figure 4, Item 7) securing the inner end of the support arm assembly (Figure 4, Item 4) to condenser fan motor (Figure 4, Item 8). Discard lock washers.
4. Remove support arm assembly (Figure 4, Item 4) from condenser fan motor (Figure 4, Item 8).
5. Install inner end of new support arm assembly (Figure 4, Item 4) to condenser fan motor (Figure 4, Item 8) and secure using two bolts (Figure 4, Item 5), new lock washers (Figure 4, Item 6), and washers (Figure 4, Item 7).
6. Install outer end of the support arm assembly (Figure 4, Item 4) to top cover assembly and secure using one nut (Figure 4, Item 1), washer (Figure 4, Item 2), and new lock washer (Figure 4, Item 3).
7. Verify that fan turns freely.
8. Lower top cover assembly (WP 0005)
9. Place IECU back into normal operation (WP 0005).

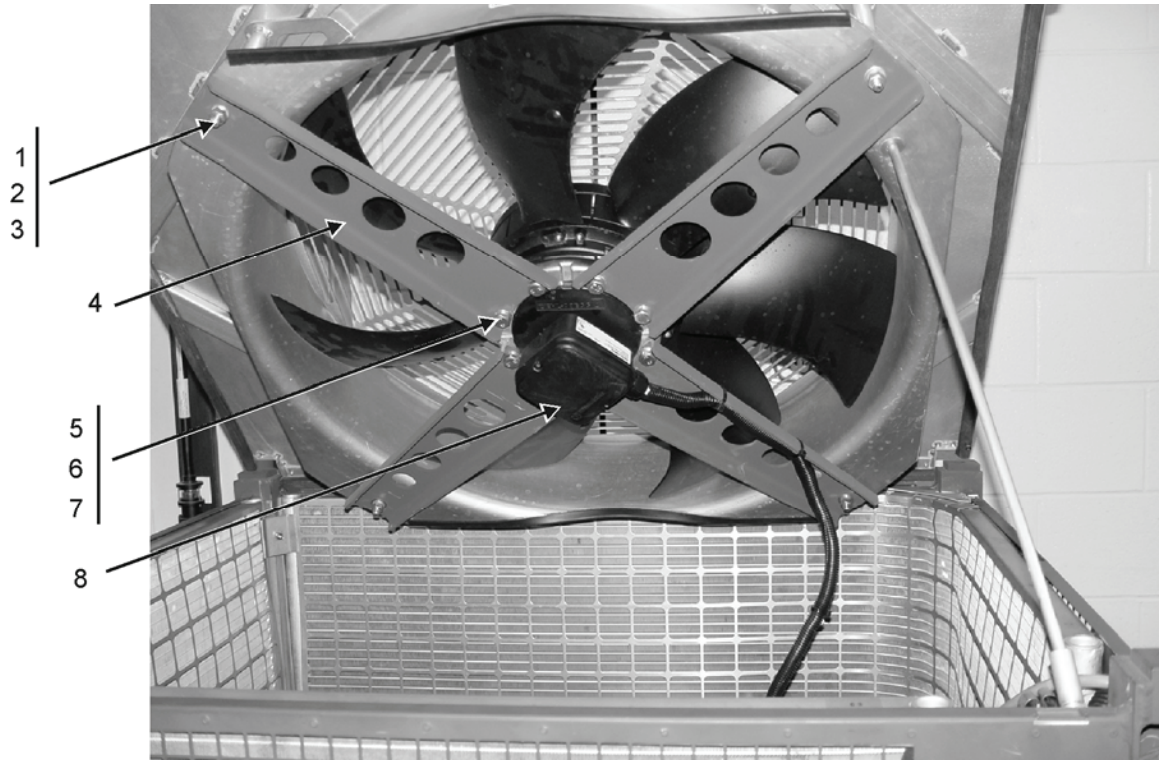


Figure 4. Top Cover Arm Assembly

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE INSTRUCTIONS
FRAME WELDMENT
REPAIR

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Tool Kit (WP 0072, Item 2)
Materials/Parts
None
Personnel Required
One
References
WP 0005
WP 0014
MIL-B-7883
TM 43-0139
Equipment Condition
IECU is shut down (WP 0005)

WARNING

Rotating parts and lethal voltage levels are used in operating the IECU. Use care when power is connected and the unit is operating. Injury or death can occur when connected to power source.

REPAIR

1. Disassemble IECU as necessary to access repair area.
2. Repair frame as indicated below.
3. Repair any minor sheet metal dents and bent edges by straightening using common sheet metal repair procedures.
4. Weld any cracks or breaks in frame members or welds per MIL-B-7883.
5. Touch-up any painted surfaces per TM 43-0139.
6. Assemble IECU after making necessary repairs.
7. Test IECU operation (WP 0005).
8. Place IECU back into normal operation following frame repair (WP 0005).

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE INSTRUCTIONS
LEFT CONDENSER COIL
REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit, (WP 0072, Item 3)

Personnel Required
Two

Materials/Parts
Lock Washers (WP 0075, Item 5)
Foam Insulation (WP 0075, Item 10)

References
WP 0005
WP 0036
WP 0061
WP 0064
WP 0054
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)

REPLACE

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.
- Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

1. Remove and recover system refrigerant (WP 0036).
2. Remove top cover assembly (WP 0064).
3. Remove one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3) securing compressor cover (Figure 1, Item 4). Discard lock washer.
4. Remove compressor cover (Figure 1, Item 4).

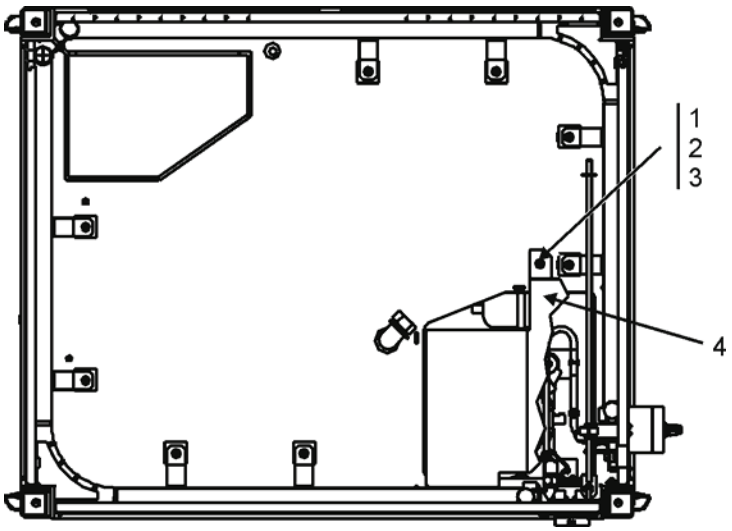


Figure 1. Compressor Cover

5. Remove bolt (Figure 2, Item 1), washer (Figure 2, Item 2), and lock washer (Figure 2, Item 3) securing condenser coil corner bracket (Figure 2, Item 4) to IECU frame. Discard lock washer.

6. Remove condenser coil corner bracket (Figure 2, Item 4).

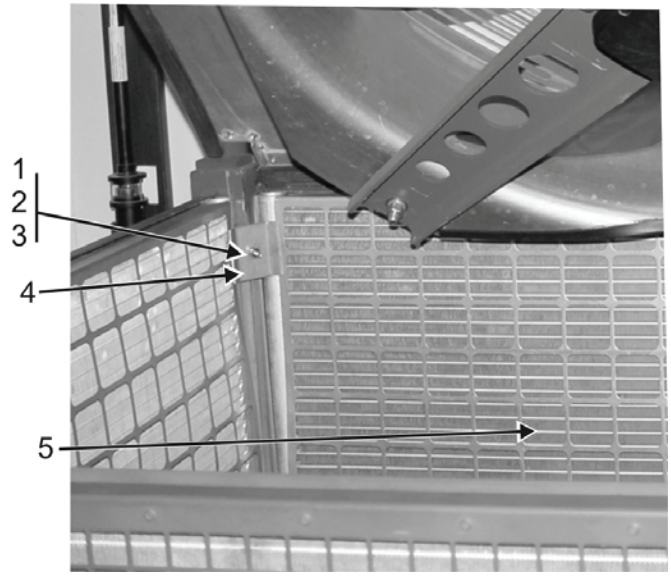


Figure 2. Left Condenser Coil (Looking at Interior Front Wall of Condenser Compartment)

7. Remove four screws (Figure 3, Item 1), lock washers (Figure 3, Item 2), and flat washers (Figure 3, Item 3) securing four condenser coil bottom supports (Figure 3, Item 4) to IECU frame bottom. Discard lock washers.

8. Remove four supports (Figure 3, Item 4).

9. Purge refrigerant system (WP 0036).

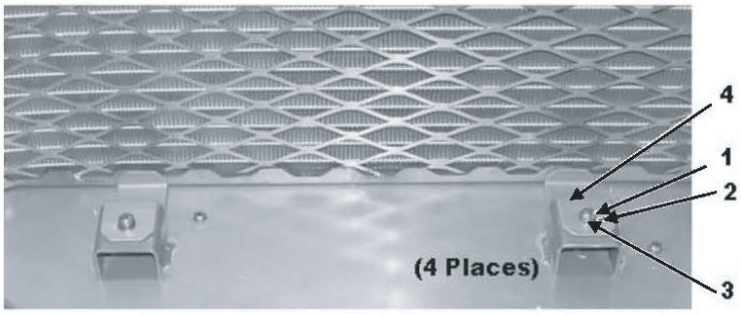


Figure 3. Condenser Coil Bottom Supports

10. Remove two screws (Figure 4, Item 1), lock washers (Figure 4, Item 2), and washers (Figure 4, Item 3) securing condenser coil header bracket (Figure 4, Item 4) to IECU frame. Rivet nuts will stay attached to header bracket. Discard lock washers.

11. Remove condenser coil header bracket (Figure 4, Item 4) from IECU frame.

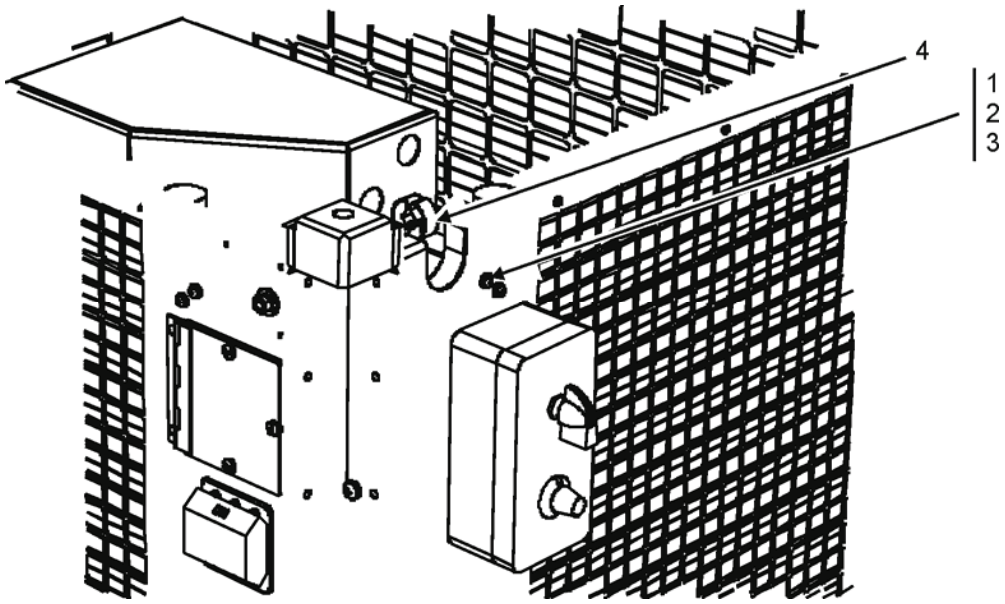


Figure 4. Condenser Coil Header Bracket

12. Purge refrigerant system (WP 0036).

13. Disconnect fitting (Figure 5, Item 1) from condenser coil (Figure 5, Item 2) on condenser coil side.

NOTE

- The condenser coil assembly includes the compression fitting.
- Remember the location of the two sensors to be removed during condenser coil removal. One of the sensors attaches to the condenser header as illustrated in Figure 5, and one of the sensors attaches to the 3/8-inch pipe as illustrated in Figure 7. The two sensors use the same wire bundle for routing.

14. Remove tie wrap securing temperature sensor TS5 (Figure 5, Item 3) to coil header and position sensor out of way.

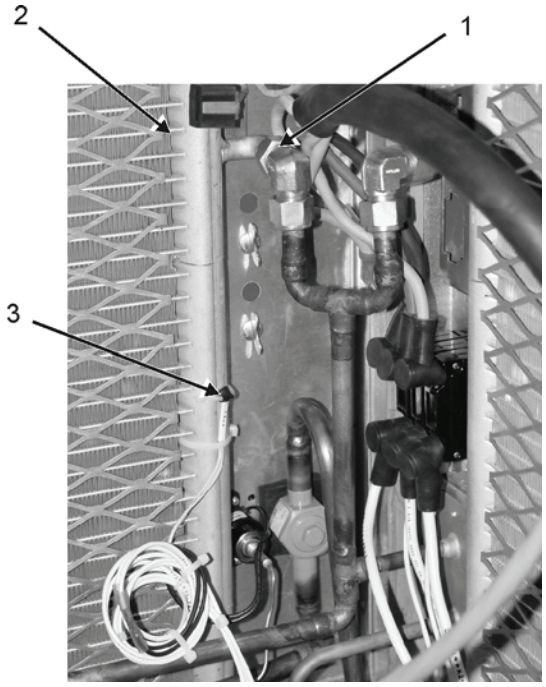


Figure 5. Condenser Coil Fitting Disconnect

15. Remove filter-drier (WP 0054).

16. Remove two screws, lock washers, and washers (not illustrated) securing corner flange (Figure 6, Item 1) to IECU frame. Discard lock washers.

17. Remove corner flange.

Figure 6. Corner Flange

18. Remove insulation as required for access to braze area. Retain for reinstallation.
19. Remove tie wrap securing temperature sensor TS1 (Figure 7, Item 1) to 3/8-inch pipe and position sensor out of way.
20. Use a heat shield between point to be debrazed and condenser to shield condenser coils from excessive heat.
21. Reposition wiring, in immediate area, to protect from heat during debraze.
22. Debraze 3/8-inch copper pipe connection away from lock ring (Figure 7, Item 2) at bottom of left condenser coil (WP 0038).

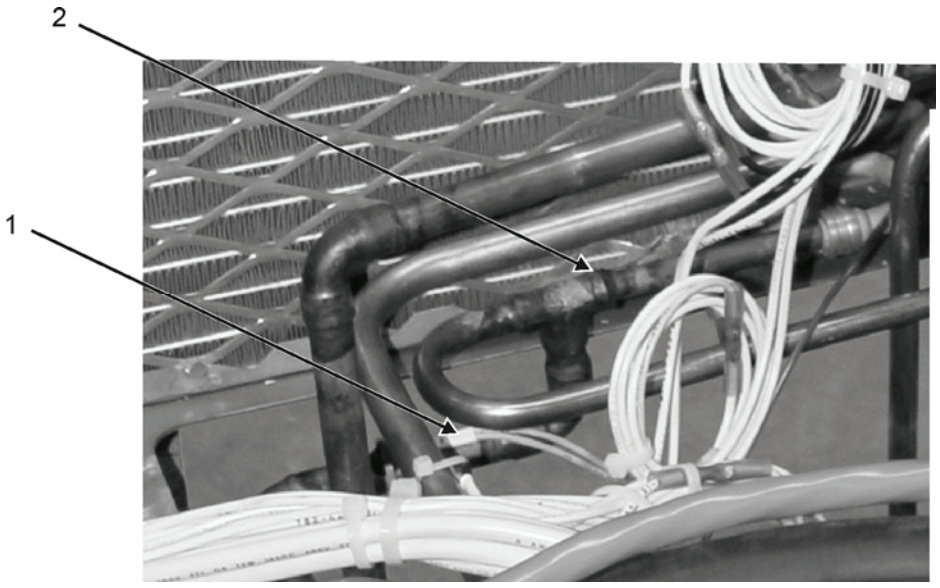


Figure 7. Condenser Coil Debraze

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

23. Using two people, carefully lift left condenser coil (Figure 2, Item 5) out of IECU.

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

24. Using two people, carefully lower new left condenser coil (Figure 2, Item 5) into IECU.
25. Purge refrigerant system (WP 0036).
26. Wrap aluminum and copper joint of new condenser with wet towel to provide heat sink during braze operation.
27. Use a heat shield between point to be brazed and condenser to shield condenser coils from excessive heat.
28. Braze 3/8-inch pipe (Figure 7, Item 1) connection to left condenser coil (WP 0036).
29. Tighten new 1/2-inch nut and compression ring to secure fitting (Figure 5, Item 1) to condenser coil (Figure 5, Item 2).
30. Secure condenser coil (Figure 2, Item 5) to frame bottom by installing four condenser coil bottom supports (Figure 3, Item 4) and secure using flat washers (Figure 3, Item 3), new lock washers (Figure 3, Item 2), and screws (Figure 3, Item 1).
31. Install condenser coil header bracket (Figure 4, Item 4) and secure using two screws (Figure 4, Item 1), lock washers (Figure 4, Item 2), and washers (Figure 4, Item 3).
32. Install corner condenser coil corner bracket (Figure 2, Item 4) at condenser coil (Figure 2, Item 5) and secure using bolt (Figure 2, Item 1), washer (Figure 2, Item 2), and new lock washer (Figure 2, Item 3).
33. Install corner flange (Figure 6, Item 1) using two screws, new lock washers, and washers (not illustrated). Tighten screws.
34. Replace temperature sensor TS1 and TS5 (WP 0061).
35. Install new filter-drier (WP 0054).
36. Leak check connections (WP 0036).
37. Evacuate and charge refrigerant system (WP 0036).
38. Install compressor cover (Figure 1, Item 4) and secure using one screw (Figure 1, Item 1), new lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3).
39. Install top cover assembly (WP 0064).
40. Verify operational functionality of IECU by operating unit in COOL mode (WP 0005).
41. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE INSTRUCTIONS
RIGHT CONDENSER COIL
REPLACE

INITIAL SETUP:

Tools and Special Tools
Service Refrigerant Ordnance Tool Kit, (WP 0072, Item 3)

Materials/Parts
Lock Washers (WP 0075, Item 5)

Personnel Required
Two

References
WP 0005
WP 0036
WP 0054
WP 0064
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

REPLACE

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.
- Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

1. Remove and recover system refrigerant (WP 0036).
2. Remove top cover assembly (WP 0064).
3. Remove one screw (Figure 1, Item 1), lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3) securing compressor cover (Figure 1, Item 4). Discard lock washer.
4. Remove compressor cover (Figure 1, Item 4).

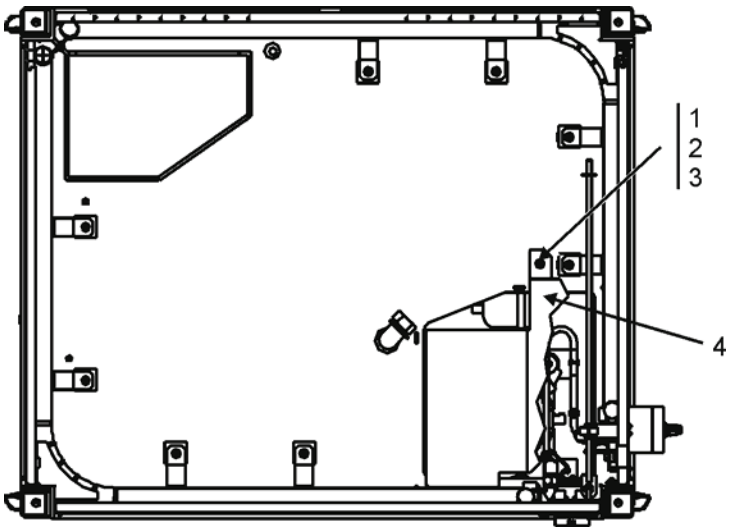


Figure 1. Compressor Cover

5. Remove bolt (Figure 2, Item 1), washer (Figure 2, Item 2), and lock washer (Figure 2, Item 3) securing condenser coil corner bracket (Figure 2, Item 4) to IECU frame. Discard lock washers.

6. Remove condenser coil corner bracket (Figure 3, Item 4).

7. Remove four screws (Figure 3, Item 1), lock washers (Figure 3, Item 2), and flat washers (Figure 3, Item 3) securing four condenser coil bottom supports (Figure 3, Item 4) to IECU frame bottom. Discard lock washers.

8. Remove four supports (Figure 3, Item 4).

9. Remove two screws, lock washers, and flat washers (not illustrated), securing header bracket (Figure 4, Item 1) to IECU frame. Rivet nuts will stay attached to header bracket. Discard lock washers.

10. Remove header bracket (Figure 4, Item 1).

11. Purge refrigerant system (WP 0036).

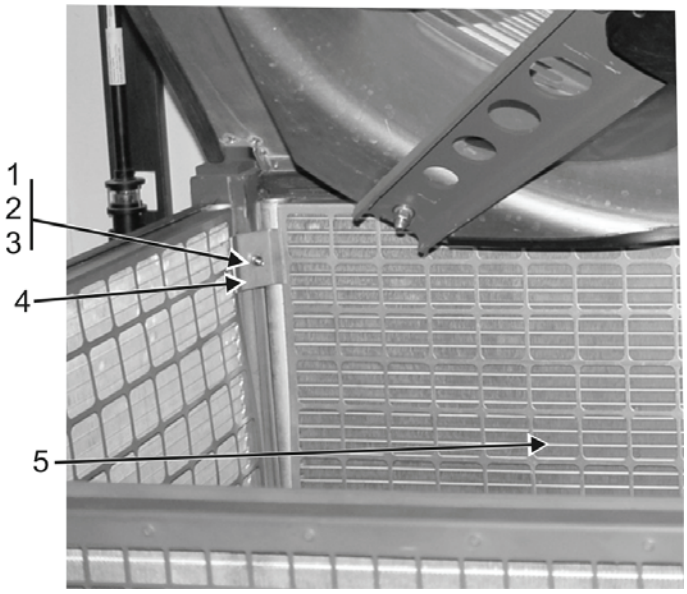


Figure 2. Right Condenser Coil (Looking at Interior Front Wall of Condenser Compartment)

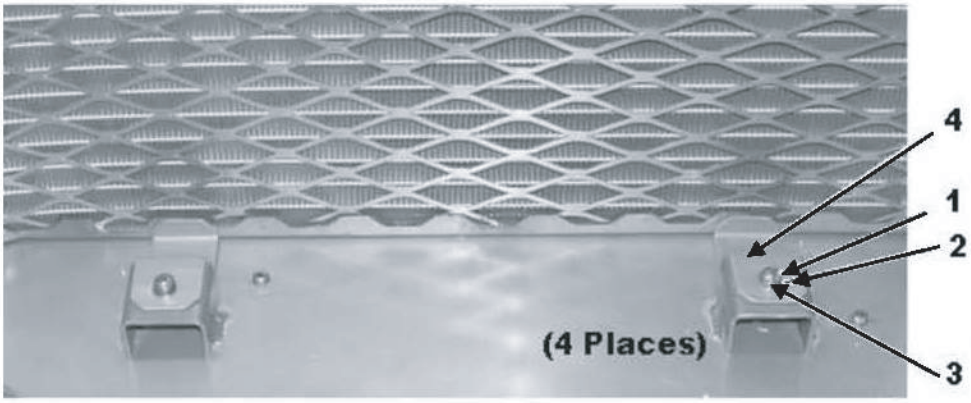


Figure 3. Condenser Coil Bottom Supports

12. Disconnect fitting (Figure 4, Item 2) from condenser coil (Figure 4, Item 3).

NOTE

The condenser coil assembly includes the compression fitting.

13. Remove filter-drier (WP 0054).

14. Remove two screws, lock washers, and washers (not illustrated) securing corner flange (Figure 5, Item 1) to IECU frame. Discard lock washers.

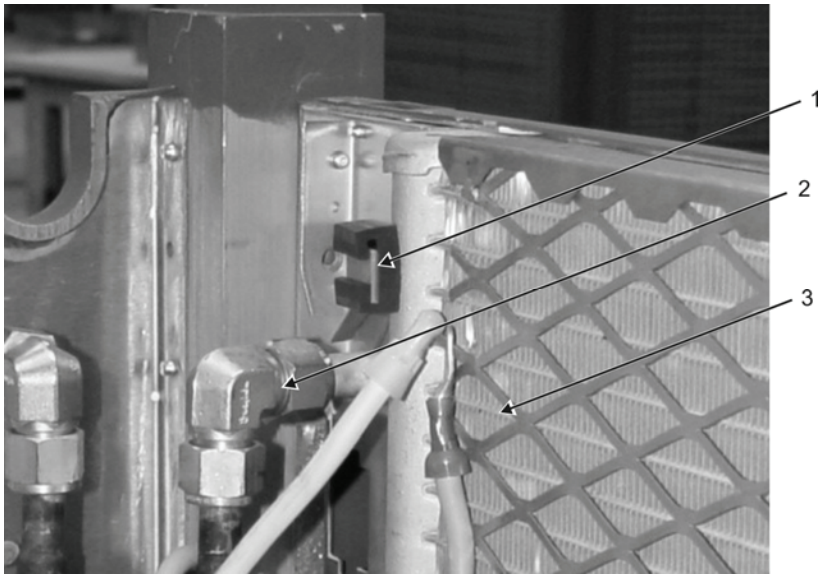


Figure 4. Condenser Coil Header Bracket

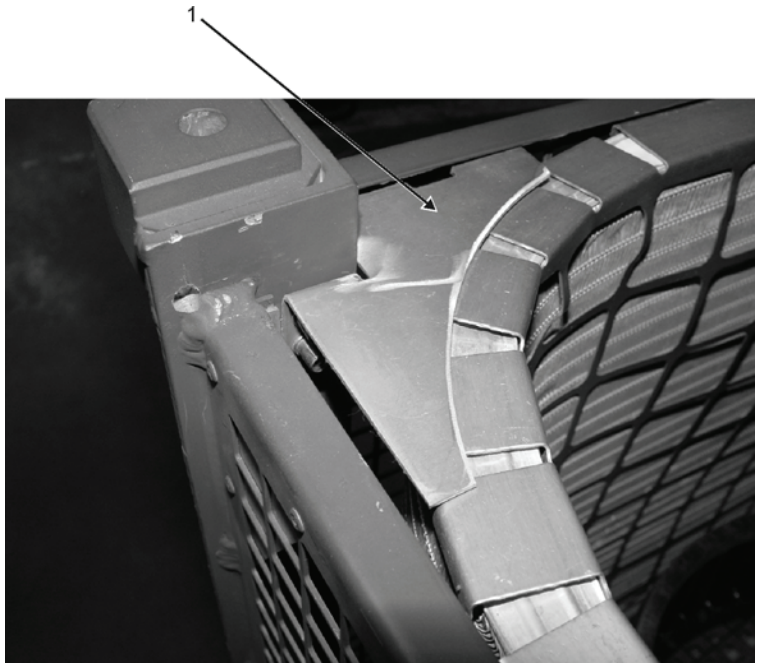


Figure 5. Corner Flange

15. Debraze 3/8-inch copper pipe connection (Figure 6, Item 1) away from lock ring connection at bottom of right condenser coil (WP 0038).

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

16. Using two people, carefully lift right condenser coil (Figure 2, Item 5) out of IECU.

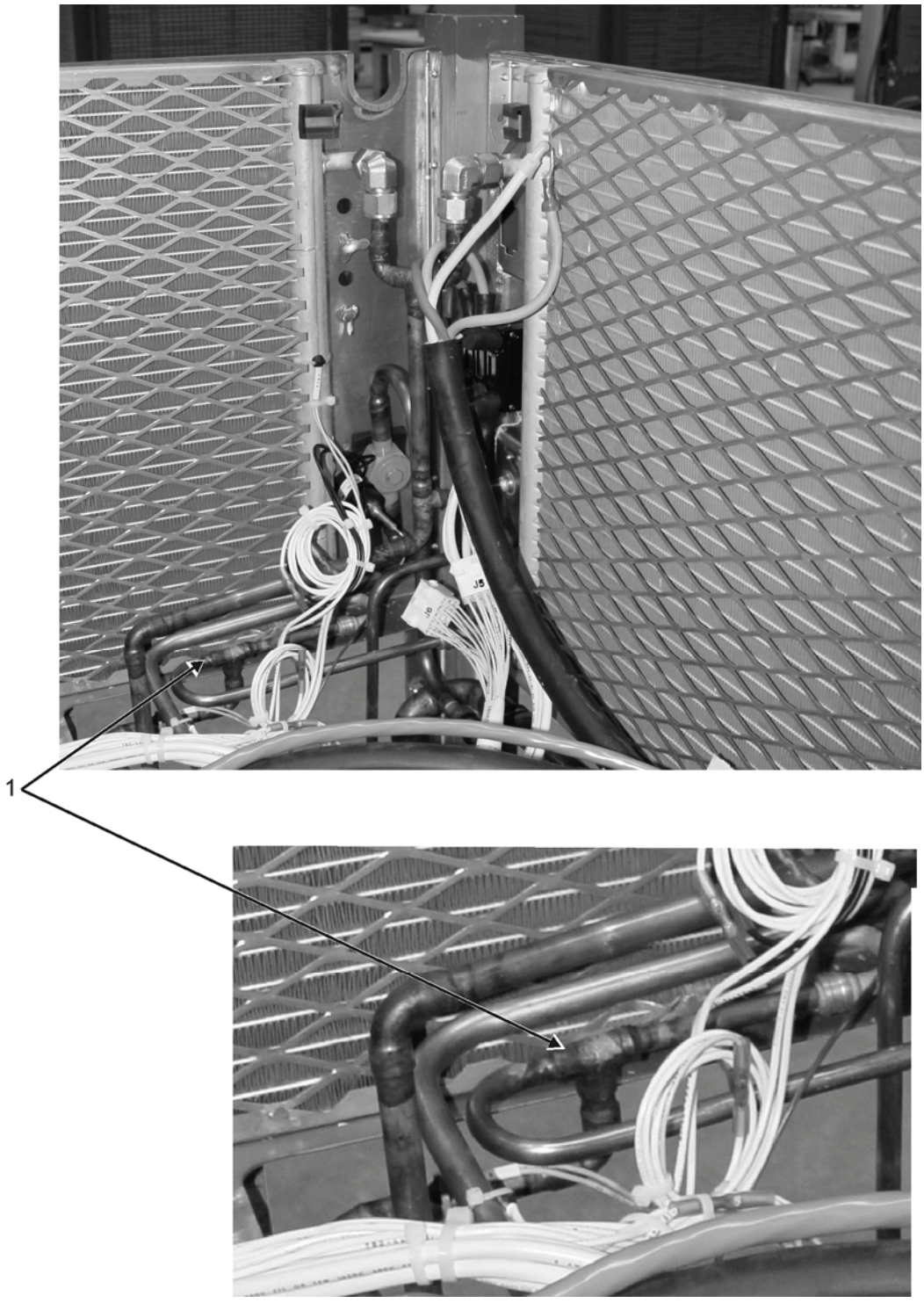


Figure 6. Condenser Coil

17. Using two people, carefully lower new right condenser coil (Figure 2, Item 5) into IECU.

18. Purge refrigerant system (WP 0036).

19. Braze 3/8-inch pipe (Figure 6, Item 1) connection to right condenser coil (WP 0038).

20. Tighten new 1/2-inch nut and compression ring to secure fitting (Figure 4, Item 2) to condenser coil (Figure 4, Item 3) flange.

21. Secure condenser coil (Figure 2, Item 5) to frame bottom by installing four condenser coil bottom supports (Figure 3, Item 4) using flat washers (Figure 3, Item 3), new lock washers (Figure 3, Item 2), and screws (Figure 3, Item 1).

22. Install condenser coil header bracket (Figure 4, Item 1) and secure using two flat washers, new lock washers, and screws (not illustrated).

23. Install condenser coil corner bracket (Figure 2, Item 4) and secure using bolt (Figure 2, Item 1), washer (Figure 2, Item 2), and new washer (Figure 2, Item 3).

24. Install corner flange (Figure 5, Item 1) using two screws, new lock washers, and washers (not illustrated). Tighten screws.

25. Install new filter-drier (WP 0054).

26. Leak check connections (WP 0036).

27. Evacuate and charge refrigerant system (WP 0036).

28. Install compressor cover (Figure 1, Item 4) and secure using one screw (Figure 1, Item 1), new lock washer (Figure 1, Item 2), and washer (Figure 1, Item 3).

29. Install top cover assembly (WP 0064).

30. Verify operational functionality of IECU by operating unit in COOL mode (WP 0005).

31. Place IECU back into normal operation (WP 0005).

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE INSTRUCTIONS
EVAPORATOR COIL ASSEMBLY
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP0070, Item 2)
Service Refrigerant Ordnance Tool Kit (WP 0072, Item 3)

Materials/Parts
Press Tight Insulation (WP 0075, Item 8)
Lock Washers (WP 0075, Item 5)
Adhesive (WP 0075, Item 4)
Rivets (WP 0075, Item 1)

Personnel Required
Two

References
WP 0005
WP 0015
WP 0016
WP 0017
WP 0029
WP 0036
WP 0037
WP 0038
WP 0039
WP 0044
WP 0054
WP 0061
TM 9-4120-431-24P

Equipment Condition
IECU is shut down (WP 0005)
Bottom-right side cover assembly removed (WP 0017)
Rear cover assembly removed (WP 0016)
End panel assembly removed (WP 0015)

REPLACE

WARNING

- Rotating parts and lethal voltage levels are used in operating the IECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.
- Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.
- System refrigerant pressures can be very hazardous. Always make sure that system pressure has been removed before opening refrigerant lines and associated components. Take extra precautions while working inside or around IECU enclosure. Wear approved safety glasses.

1. Remove and recover system refrigerant (WP 0036).
2. Purge refrigerant system (WP 0037).
3. If installed, remove supply air duct (WP 0005).
4. Remove shielded enclosure (WP 0039).
5. Remove tubular heaters (Figure 1, Item 1) (WP 0029).

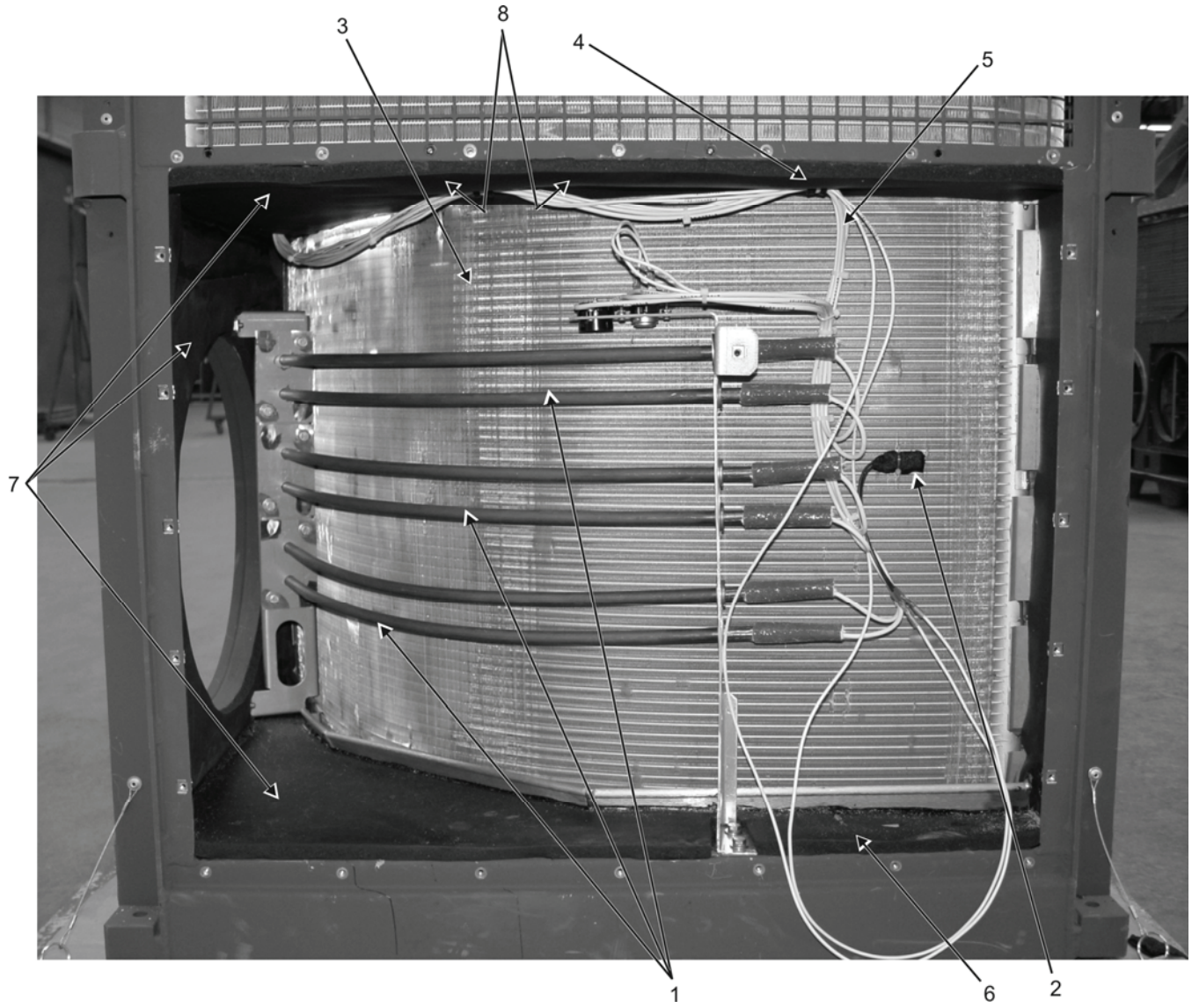


Figure 1. Evaporator Compartment (Heater Side)

6. Remove bimetal thermostat (S8) (Figure 1, Item 2) from evaporator coil (Figure 1, Item 3) (WP 0044).

7. Remove wire clamps (Figure 1, Item 4), as necessary, and carefully route wiring (Figure 1, Item 5) to a safe location.

8. Remove drain pan hoses (Figure 1, Item 6).

9. Remove insulation material and adhesive, as necessary, from top, bottom, and sides of compartment partition (Figure 1, Item 7).

10. Remove six screws (Figure 2, Item 1), lock washers (Figure 2, Item 2), and washers (Figure 2, Item 3) securing evaporator coil bracket (Figure 2, Item 4) to frame (Figure 2, Item 5). Discard lock washers.

11. Remove five screws (Figure 2, Item 6), lock washers (Figure 2, Item 7), and washers (Figure 2, Item 8). Discard lock washers securing bracket (Figure 2, Item 4) to evaporator.

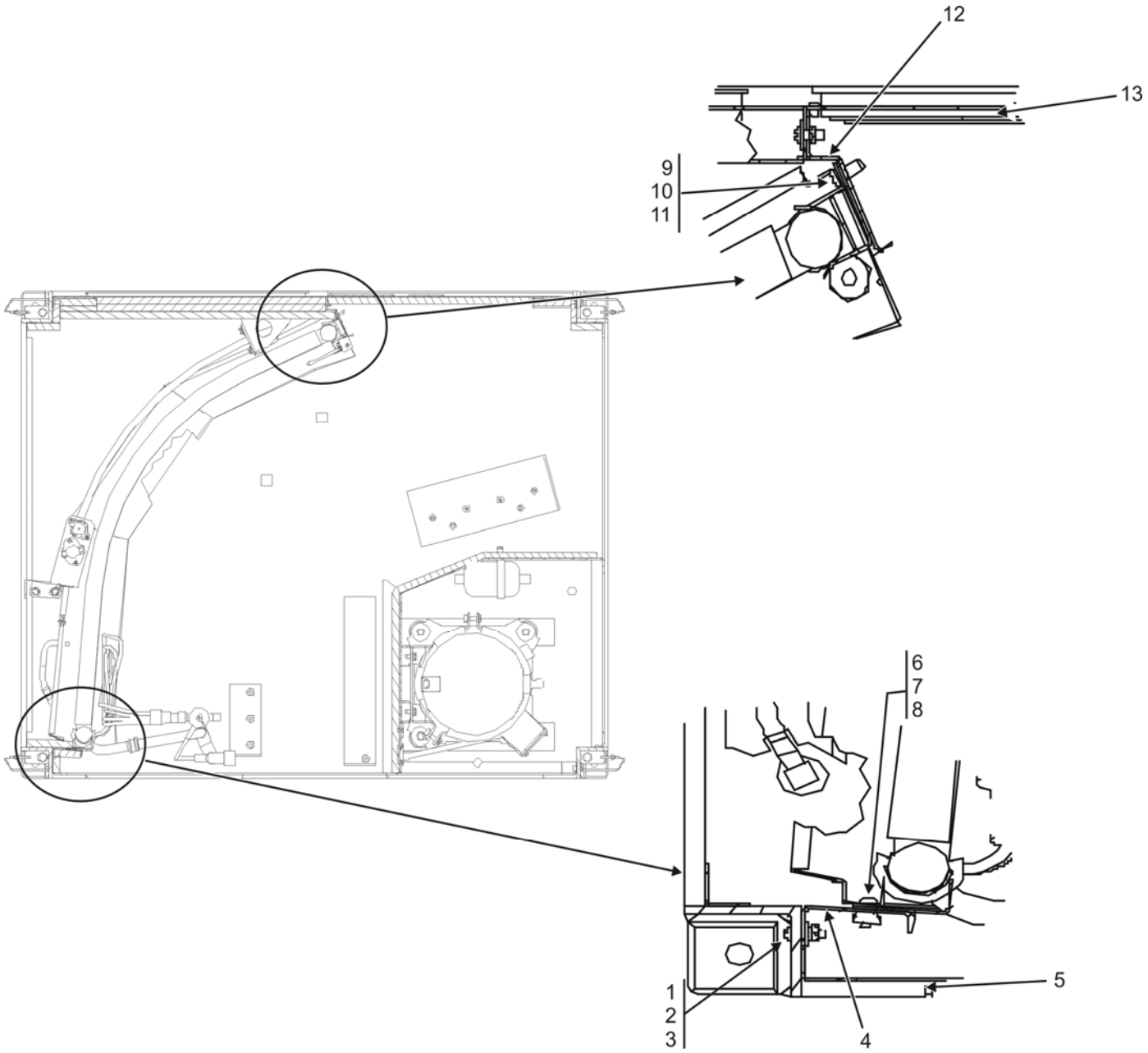


Figure 2. Evaporator Coil Mounting Bracket

12. Remove bracket (Figure 2, Item 4).

13. Remove seven screws (Figure 2, Item 9), lock washers (Figure 2, Item 10), and washers (Figure 2, Item 11) securing evaporator coil bracket (Figure 2, Item 12) to frame (Figure 2, Item 13). Discard lock washers.

14. Remove thermistor (TS3) from evaporator coil (WP 0061).

15. Remove insulation material (Figure 3, Item 1) to access 7/8-inch elbow connection (Figure 3, Item 2).

16. Debraze 7/8-inch elbow connection (Figure 3, Item 2) from evaporator coil (WP 0038).

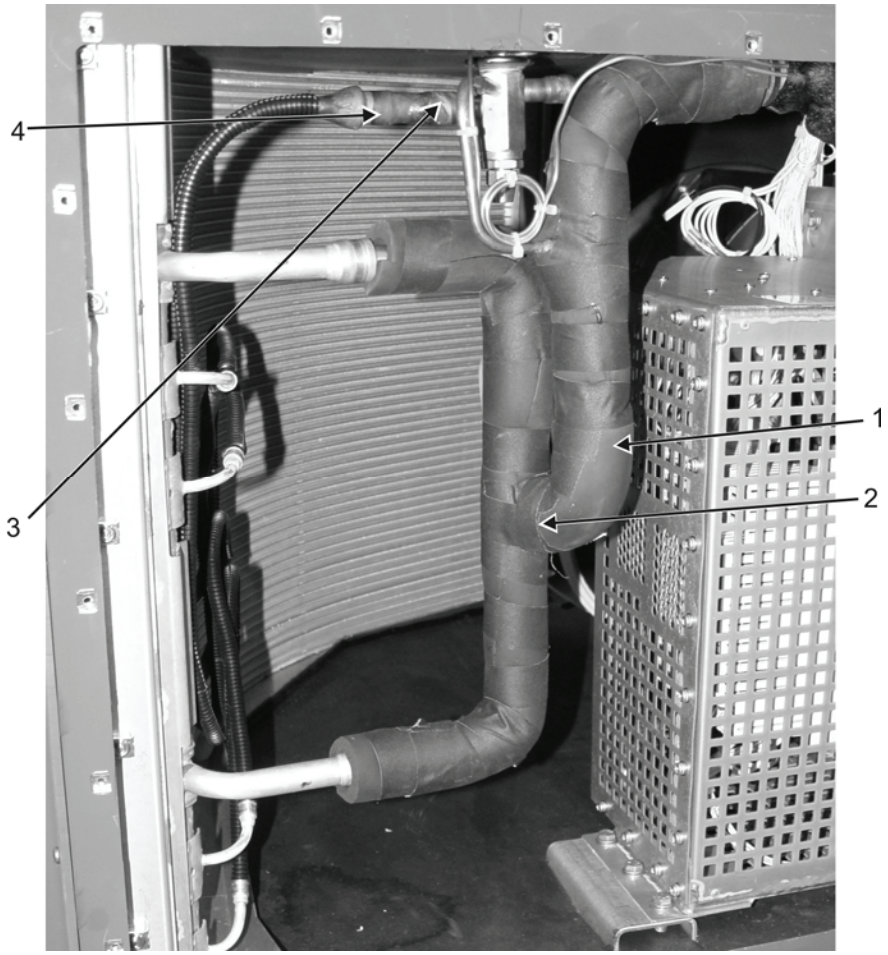


Figure 3. Evaporator Coil Brazing Points

17. Remove insulation material (Figure 3, Item 3) to gain access to 5/8-inch pipe connection (Figure 3, Item 4).

18. Debraze 5/8-inch pipe connection (Figure 3, Item 4) from evaporator coil (WP 0038).

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

NOTE

- The evaporator coil assembly must be removed and installed through the bottom right side opening as shown in Figure 1.
- It may be necessary to remove rivets (Figure 1, Item 8) from IECU frame in order to remove the evaporator coil.

19. Using two people, carefully slide evaporator coil and drain pan out of IECU.

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

20. Using two people, carefully slide new evaporator coil and drain pan into IECU.
21. Align mounting tabs on evaporator coil with bracket (Figure 2, Item 12) on frame (Figure 2, Item 13) and secure with seven screws (Figure 2, Item 9), new lock washers (Figure 2, Item 10), and washers (Figure 2, Item 11).
22. Install bracket (Figure 2, Item 4) to frame (Figure 2, Item 5) using six screws (Figure 2, Item 1), new lock washers (Figure 2, Item 2), and washers (Figure 2, Item 3).
23. Line up evaporator coil with bracket (Figure 2, Item 4) on frame (Figure 2, Item 5) and secure with five screws (Figure 2, Item 6), new lock washers (Figure 2, Item 7), and washers (Figure 2, Item 8).
24. Purge refrigerant system (WP 0037).
25. Braze 5/8-inch pipe connection to evaporator coil (Figure 3, Item 4) (WP 0038).
26. Braze 7/8-inch pipe connection to evaporator coil (Figure 3, Item 1) (WP 0038).
27. Replace filter-drier (WP 0054).
28. Leak check connections (WP 0038).

NOTE

Allow copper pipe connections and pipes to cool to ambient temperature prior to installing insulation back onto lines. Placing wet rags directly on copper lines can expedite the cooling process.

29. Install previously removed tubing insulation (Figure 3, Item 1, 3) and secure with insulation tape as necessary.
30. Install thermistor (TS3) on evaporator coil (WP 0061).
31. Install bimetal thermostat (S8) (Figure 1, Item 2) on evaporator coil (Figure 1, Item 3) (WP 0044).
32. Route wiring and install previously removed wire clamps (Figure 1, Item 4) to secure wiring (Figure 1, Item 5).
33. Install tubular heaters (Figure 1, Item 1) (WP 0029).
34. Evacuate and charge refrigerant system (WP 0037).
35. Install drain pan hoses (Figure 1, Item 6).
36. Replace insulation material on top, bottom, and sides (Figure 1, Item 7) of compartment partition using adhesive.
37. Apply adhesive to joint between drain pan and floor insulation material.
38. Install shielded enclosure (WP 0039).
39. Install end panel assembly (WP 0015).

40. Install rear cover assembly (WP 0016).

41. Install bottom-right side cover assembly (WP 0017).

42. Place IECU back into normal operation mode (WP 0005).

END OF WORK PACKAGE

SERVICE MAINTENANCE INSTRUCTIONS
SERVICE VALVE
REPLACE

INITIAL SETUP:

Tools and Special Tools
General Mechanic's Toolkit (WP 0072, Item 1)
Common Number 1 Toolkit
Service Refrigeration Ordnance Toolkit

Materials/Parts
Rivets (WP 0075, Item 1)
Lock Washer (WP 0075, Item 5)

Personnel Required
One

References
WP 0005
WP 0017
WP 0036
WP 0037
WP 0054

Equipment Condition
IECU is shut down (WP 0005)
Top cover is raised (WP 0005)

NOTE

This procedure is applicable to both suction and discharge service valves.

REPLACE

1. Completely remove caps on service valves (Figure 1, Item 1).

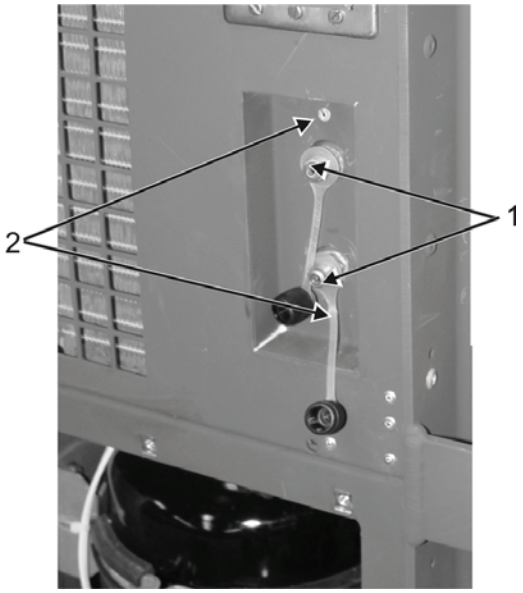


Figure 1. Service Valves

2. Recover system refrigerant (WP 0036).

3. Remove rubber boots covering wires (Figure 2, Item 1) on CB1 (Figure 2, Item 2).

4. Remove nuts, lock washers and washers from bottom three CB1 wires (Figure 2, Item 1).

5. Tag and disconnect wires (Figure 2, Item 1) from CB1 (Figure 2, Item 2).

Figure 2. Valves

6. Remove two screws (Figure 3, Item 1), lock washers (Figure 3, Item 2), and washers (Figure 3, Item 3) securing high pressure cutout switch manual reset (Figure 3, Item 4) to IECU frame (Figure 3, Item 5). Discard lock washers.

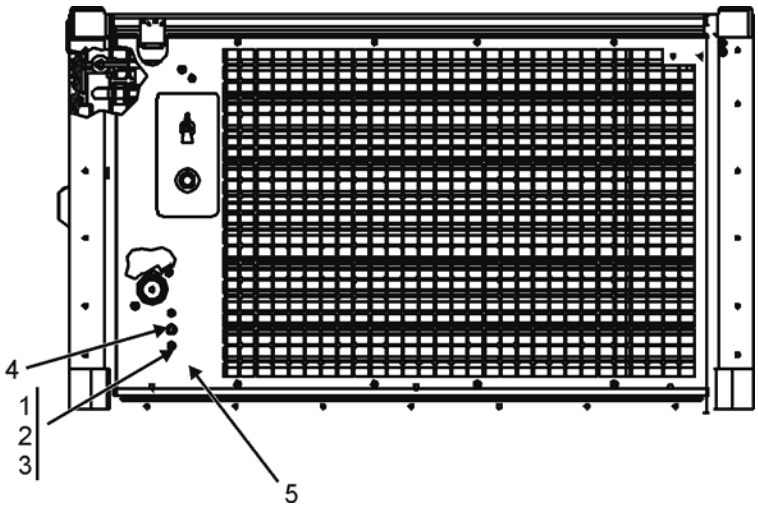


Figure 3. High Pressure Cutout Switch S3 Mounting

7. Carefully remove high pressure cutout switch S3 (Figure 3, Item 4) from IECU frame and position away from area to be debrazed.

8. Remove one screw (Figure 4, Item 1), lock washer (Figure 4, Item 2), and washer (Figure 4, Item 3) securing compressor cover (Figure 4, Item 4). Discard lock washer.

9. Remove compressor cover (Figure 4, Item 4).

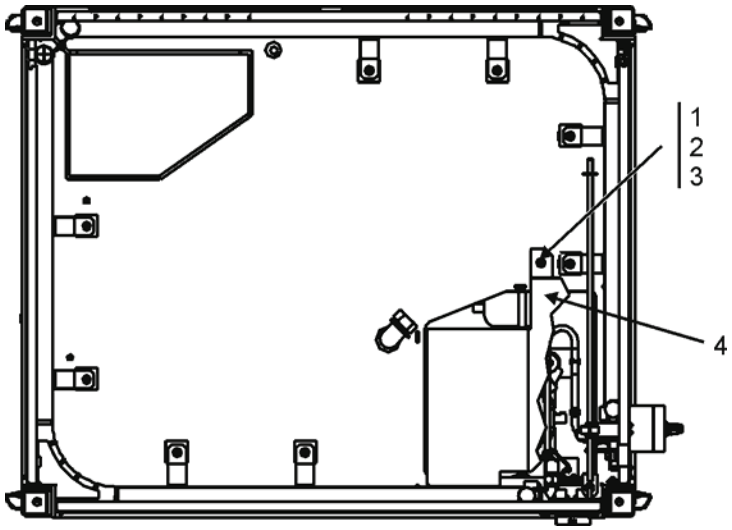


Figure 4. Compressor Cover

10. Disconnect left and right condenser coils upper fittings (Figure 5, Item 1).

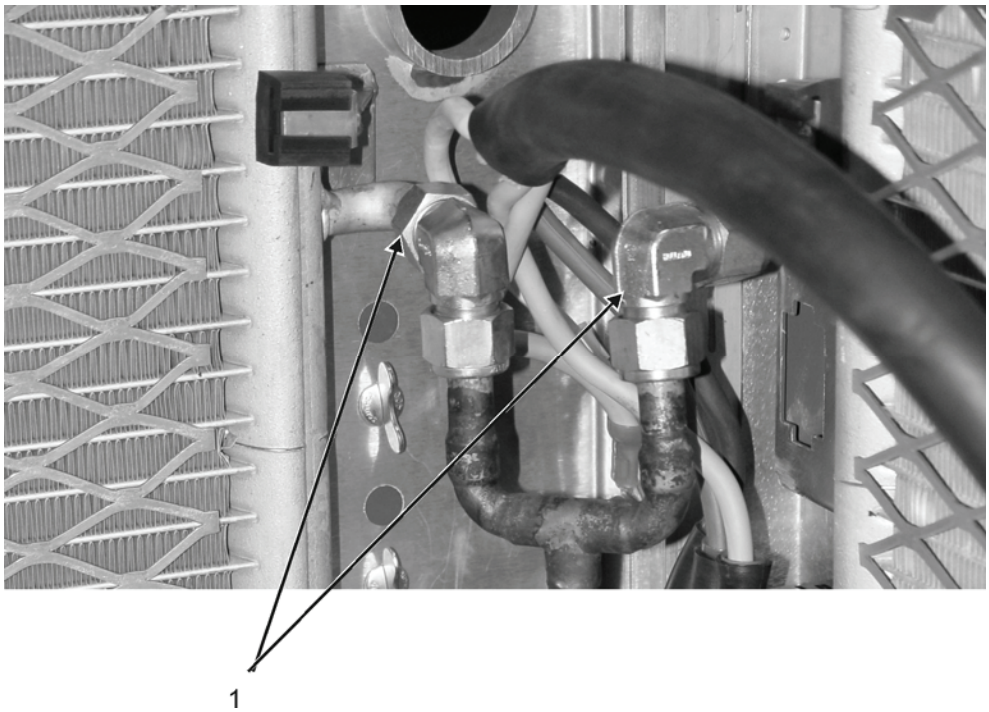


Figure 5. Left and Right Condenser Upper Fittings

11. Remove two bolts (Figure 6, Item 1), lock washers (Figure 6, Item 2), and flat washers (Figure 6, Item 3) securing both halves of bracket clamp (Figure 6, Item 4) to compressor (Figure 6, Item 5). Discard lock washers.

12. Remove both halves of compressor clamp (Figure 6, Item 6).

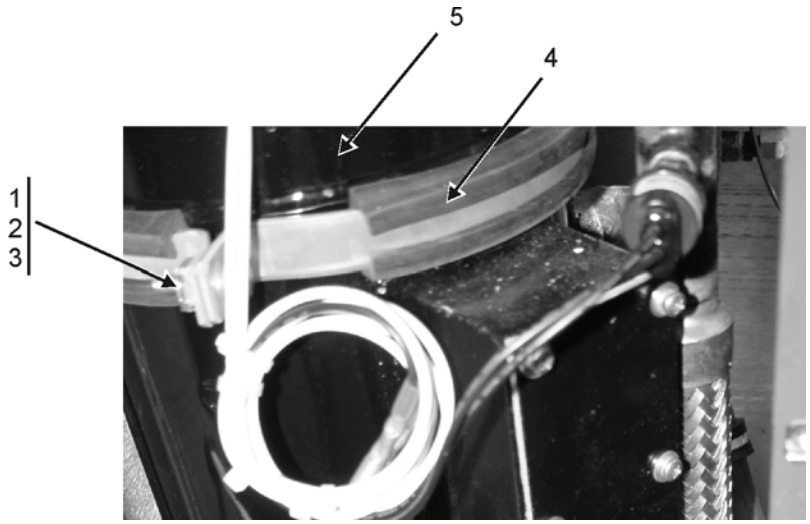


Figure 6. Compressor Mounting Clamp

NOTE

Protect wires, in the general area to be debrazed, as needed to make sure they are not damaged during debraze operation. If it is necessary to remove the wires to make sure they are protected, make sure wires are marked and that the general area of original location is noted in order to allow for proper reinstallation.

WARNING

Use care when working with R-410A refrigerant. Avoid contact with skin and eyes at all times. Always wear protective gloves and face shield when possibility of exposure is possible.

13. Remove insulation from suction line.

14. Debraze copper line to suction service valve from tee coupling (Figure 2, Item 3).

15. Debraze copper line to discharge service valve at elbow (Figure 7, Item 1).

16. Drill and remove two rivets (Figure 1, Item 2) attaching plate (Figure 2, Item 4) to IECU.

17. Remove two valves (Figure 1, Item 1), plate (Figure 2, Item 4), and attached copper lines (Figure 7, Item 1), (Figure 2, Item 3) from IECU. Place on flat surface.

18. Debraze plate (Figure 2, Item 4) from both copper lines (Figure 2, Item 5) and move plate out of way.

19. Debraze and discard two valves (Figure 1, Item 1) from two copper lines.

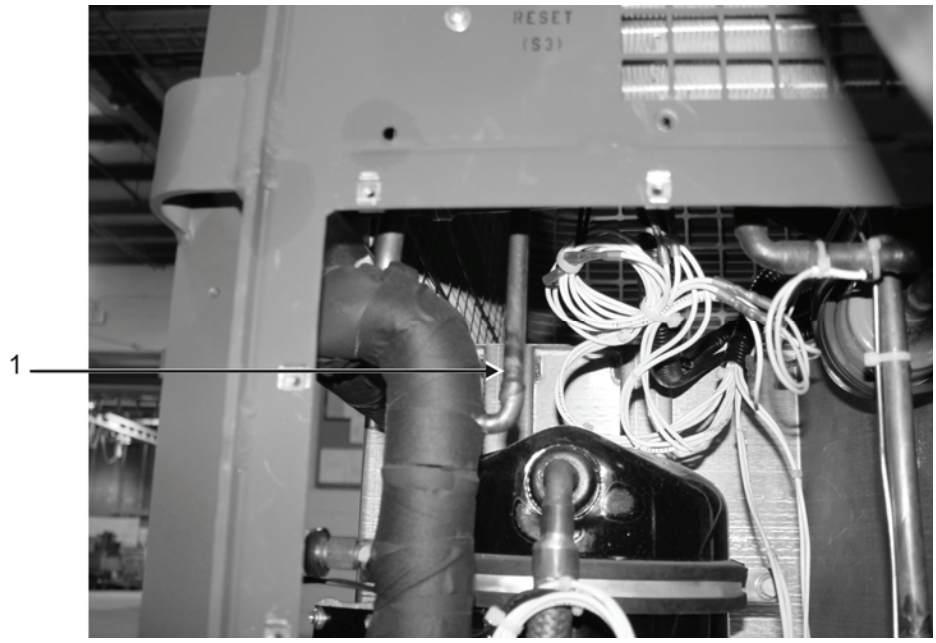


Figure 7. Low Pressure Valve

20. Braze two new valves to two copper lines.
21. Braze plate (Figure 2, Item 4) into position on both copper lines.
22. Insert two valves (Figure 1, Item 1), plate (Figure 2, Item 4), and copper lines (Figure 7, Item 1), (Figure 2, Item 3), into place inside IECU.
23. Reconnect left and right condenser coils upper fittings (Figure 5, Item 1).
24. Braze copper line to suction service valve at tee coupling (Figure 2, Item 3).
25. Braze copper line to discharge service valve at elbow (Figure 7, Item 1).
26. Install high pressure cutout switch manual reset (Figure 3, Item 4) to IECU frame (Figure 3, Item 5) and secure using two screws (Figure 3, Item 1), new lock washers (Figure 3, Item 2), and washers (Figure 3, Item 3).
27. Install two new rivets (Figure 1, Item 2) securing plate (Figure 2, Item 4) to IECU.
28. Replace filter-drier (WP 0054).
29. Reconnect wires (Figure 2, Item 1) to CB1 (Figure 2, Item 2) as tagged and secure using nuts, new lock washers, and washers.
30. Remove tags.
31. Cover CB1 (Figure 2, Item 2) wire terminals with protective boots.
32. Install compressor cover (Figure 4, Item 4) and secure using one screw (Figure 4, Item 1), new lock washer (Figure 4, Item 2), and washer (Figure 4, Item 3).

33. Install both halves of compressor clamp (Figure 6, Item 4) and secure using two bolts (Figure 6, Item 1), new lock washers (Figure 6, Item 2), and flat washers (Figure 6, Item 3).

34. Purge and charge system refrigerant (WP 0037).

35. Perform leak test (WP 0036).

36. Close top cover (WP0005).

37. Place unit into normal operation (WP 0005).

END OF WORK PACKAGE

CHAPTER 9
SUPPORTING INFORMATION

SUPPORTING INFORMATION
60K BTU/HR IECU
REFERENCES

SCOPE

This work package lists all forms, pamphlets, field manuals, technical manuals, bulletins, army regulations, military specifications, and military standards referenced in this manual.

DA PAMPHLETS

DA PAM 750	Functional Users Manual for the Army Maintenance Management System

FORMS

SF 361	Discrepancy in Shipment Report
DA Form 5988E	Equipment Inspection and Maintenance Worksheet
SF 368	Product Quality Deficiency Report
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
SF 364	Supply Discrepancy Report

MILITARY SPECIFICATIONS

MIL-B-783	Brazing of Steels, Copper, Copper Alloys, Nickel Alloys, Aluminum and Aluminum Alloys

TECHNICAL MANUALS

TM-43-0139	Painting Instructions for Army Materiel
TM 9-4120-431-24P	Repair Parts and Special Tools List for 60kW IECU
TM 750-244-7	Procedures for Destruction of Equipment in Federal Supply classification
TM 9-4940-435-14&P	Leak Detector, Refrigerant Gas

END OF WORK PACKAGE

PACKAGESUPPORTING INFORMATION
60K BTU/HR IECU
INTRODUCTION FOR STANDARD MAINTENANCE ALLOCATION CHART (MAC)

THE ARMY MAINTENANCE SYSTEM MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

This MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. 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 three subcolumns, Crew maintenance (C), Service maintenance (O), and Field maintenance (F).

Sustainment – includes two subcolumns, Below Depot (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 are 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). This includes scheduled inspection and gauging and evaluation of cannon tubes.

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, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.

3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:
   Unpack. To remove from packing box for service or when required for the performance of maintenance operations.
   Repack. To return item to packing box after service and other maintenance operations.
   Clean. To rid the item of contamination.
   Touch up. To spot paint scratched or blistered surfaces.
   Mark. To restore obliterated identification.

4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper 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 and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. 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 the proper functioning of an equipment or system.

8. Paint (ammunition only). To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.

9. 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.

10. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures and maintenance actions to identify troubles and 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:
- Services. Inspect, test, service, adjust, align, calibrate, and/or replace.
- Fault location/troubleshooting. The process of investigating and detecting the case 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.

11. Overhaul. That 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 des not normally return an item to like new condition.

12. 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) considered in classifying Army equipment/components.

EXPLANATION OF COLUMNS IN THE MAC

Column (1) Group Number. Column (1) lists Functional Group Code (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 manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to 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 - Service Maintenance

F - Field Maintenance

Sustainment:

H – Below Depot 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 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 alphabetical order, which is keyed to the remarks table entries.

EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIREMENTS

Column (1) Tool or Test Equipment Reference Code. The tool or test equipment reference 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.

END OF WORK PACKAGE

SUPPORTING INFORMATION
60K BTU/HR IECU
MAINTENANCE ALLOCATION CHART (MAC)

Table 1. MAC for 60K IECU

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
GROUP NUMBER	COMPONENT/ASSEMBLY	MAINTENANCE FUNCTION	CREW C	SERVICE O	FIELD F	BELOW DEPOT H	DEPOT D	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
00	**AIR CONDITIONER ASSY, 60,000 BTU/HR**	INSPECT	0.5					NONE	A
		INSPECT		2.0				1	B
		SERVICE			2.0			3, 4, 7, 8	F
		REPAIR					24	2, 3, 4, 5, 6, 7, 8	E
01	**HOUSING GROUP**								
0101	COVER, TOP, ASSEMBLY	REPLACE				2.0		3, 9	
		REPAIR				4.0		3, 9, 12	
0102	WELDMENT, FRAME	INSPECT			0.5			3	
		REPAIR				8.0		3, 4, 7, 8, 12	
0103	PANEL ASSEMBLY, LEFT	REPLACE		0.2				1	
0104	COVER ASSEMBLY, REAR	REPLACE		0.2				1	
0105	COVER ASSEMBLY, BOTTOM-RIGHT SIDE	REPLACE		0.2				1	
0106	FLANGE ASSEMBLY	REPLACE		0.1				1	
02	**POWER DISTRIBUTION AND CONDITIONING GROUP**								
0202	SHIELDED ENCLOSURE ASSEMBLY	REMOVE			0.2			2	
		INSPECT		0.1				NONE	B
		INSPECT			0.5			2	
		INSTALL			0.2			2	
		REPAIR			2.0			2	
0203	SWITCH, PUSHBUTTON (S6)	TEST		0.1				1	
		REPLACE		0.1				1	

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
GROUP NUMBER	COMPONENT/ASSEMBLY	MAINTENANCE FUNCTION	CREW C	SERVICE O	FIELD F	BELOW DEPOT H	DEPOT D	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
03	**POWER CONTROLS GROUP**								
0301	ELECTRICAL BOX ASSEMBLY	INSPECT		0.1				NONE	B
		INSPECT			0.2			2	
		REPAIR			1.5			2	
0302	SWITCH, PRESSURE, FAN (S4)	TEST		0.1				1	
		REPLACE			1.0			1	
0303	REMOTE BOX ASSEMBLY	INSPECT	0.1					1	A
		TEST		0.3				NONE	C
		REPLACE		0.2				1	
		REPAIR			0.5			2, 11	
0304	BREAKER, CIRCUIT (CB1)	REPLACE			0.5			2	
		INSPECT	0.1						
04	**THERMOSTATIC CONTROLS GROUP**								
0401	THERMOSTAT, BIMETAL, PRECISION (S8)	TEST		0.3				1	
		REPLACE			0.5			2	
0402	THERMOSTAT, BIMETAL, PRECISION (S9)	TEST		0.3				1	
		REPLACE			0.5			2	
0403	SWITCH, THERMOSTATIC (S5)	TEST		0.3				1	
		REPLACE			0.5			2	
0404	THERMISTOR (TS7)	TEST			0.3			3	
		REPLACE			0.5			3	
0405	SWITCH, THERMOSTATIC (S10)	TEST		0.2				1	
		REPLACE			0.5			2	
05	**AIR FILTERS GROUP**								
0501	FILTER, MAIN	INSPECT		0.1				1	B, G
		SERVICE		0.2				1	G
		REPLACE		0.2				1	G

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
GROUP NUMBER	COMPONENT/ASSEMBLY	MAINTENANCE FUNCTION	CREW C	SERVICE O	FIELD F	BELOW DEPOT H	DEPOT D	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
06	**AIR CYCLING GROUP**								
0601	DUCT, FLEXIBLE (2)	INSPECT	0.1					NONE	A
		REPLACE		0.2				1	
07	**WATER CONNECTIONS GROUP**								
0701	TUBING, CONDENSATE DRAIN	INSPECT	0.05					NONE	A
		REPLACE		0.1				NONE	
08	**HEATING UNITS GROUP**								
0801	HEATER, TUBULAR (HR1, HR2, HR3)	INSPECT		0.2				1	B
		SERVICE		0.2				1	B
		TEST		0.5				1	
		REPLACE		1.0				1	
09	**GAS COMPRESSOR ASSEMBLY GROUP**								
0901	COMPRESSOR, REFRIGERANT (B2)	SERVICE			2.0			3, 4, 7, 8	F
		TEST			1.0			3	C
		REPLACE			6.0			3, 4, 5, 7, 8	
0902	MOUNTING KIT, COMPRESSOR	INSPECT		0.1				NONE	
		REPLACE		1.5				1	
10	**CONDENSER GROUP**								
1001	CONDENSER FAN (B3)	INSPECT	0.05					1	B
		SERVICE	0.05					1	B
		TEST		0.05				1	
		REPLACE			2.0			2	
1002	CONDENSER COIL, FORMED, LEFT	INSPECT	0.1					NONE	A
		SERVICE		0.05				1	B
		REPLACE				3.0		3, 4, 7, 8	
1003	CONDENSER COIL, FORMED, RIGHT	INSPECT	0.1					NONE	A
		SERVICE		0.05				1	B
		REPLACE				3.0		3, 4, 7, 8	

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
GROUP NUMBER	COMPONENT/ASSEMBLY	MAINTENANCE FUNCTION	CREW C	SERVICE O	FIELD F	BELOW DEPOT H	DEPOT D	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
11	**EVAPORATOR GROUP**								
1101	EVAPORATOR BLOWER (B1)	INSPECT		0.2				1	B
		SERVICE		0.1				1	B
		TEST		0.05				1	
		REPLACE			1.5			2	
1102	EVAPORATOR COIL ASSEMBLY	INSPECT		0.2				1	B
		SERVICE		0.1				1	B
		REPLACE				8.0		3, 4, 7, 8	
12	**REFRIGERANT PIPING GROUP**								
1201	HOSE ASSEMBLY, METAL (SUCTION)	INSPECT		0.05				1	B
		REPLACE			1.5			3, 4, 7, 8	
1202	HOSE ASSEMBLY, METAL (DISCHARGE)	INSPECT		0.05				1	B
		REPLACE			1.5			3, 4, 7, 8	
1203	FILTER-DRIER, REFRIGERANT	TEST			0.5			1	
		REPLACE			3.0			3, 4, 7, 8	
1204	VALVE, EXPANSION	INSPECT		0.1				NONE	
		ADJUST		0.2				1	
		TEST		0.5				NONE	
		REPLACE			3.0			3, 4, 7, 8	
1205	INDICATOR, SIGHT, LIQUID	INSPECT	0.05					NONE	A
		REPLACE			3.0			3, 4, 7, 8	
1206	VALVE, SERVICE (2)	REPLACE				3.0		3, 4, 7, 8	
13	**SUCTION AND DISCHARGE COMPONENTS GROUP**								
1301	SWITCH, PRESSURE, LOW (S2)	TEST			1.0			2	
		REPLACE			2.0			3, 4, 7, 8	

(1)	(2)	(3)	(4) MAINTENANCE LEVEL					(5)	(6)
			FIELD			SUSTAINMENT			
GROUP NUMBER	COMPONENT/ASSEMBLY	MAINTENANCE FUNCTION	CREW C	SERVICE O	FIELD F	BELOW DEPOT H	DEPOT D	TOOLS AND EQUIPMENT REF CODE	REMARKS CODE
1302	SWITCH, PRESSURE, HIGH (S3)	TEST			1.0			2	
		REPLACE			2.0			3, 4, 7, 8	
1303	PLUG, FUSIBLE	REPLACE			3.0			3, 4, 7, 8	
14	**DIAGNOSTICS GROUP**								
1401	CONNECTOR (J5, J6)	INSPECT			0.05			2, 10	
		REPLACE			0.5			2, 10	
1402	THERMISTOR (TS1, TS3, TS4, TS5, TS6)	TEST		0.2				1	
		REPLACE			0.5			2	
1403	THERMISTOR, AIR (TS2)	TEST		0.1				1	
		REPLACE			0.5			2	

Table 2. Tools and Test Equipment Requirements

(1) TOOL OR TEST EQUIPMENT REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER (NSN)	(5) TOOL NUMBER
1	O	General Mechanic's Tool Kit PUB #: 5180-95-B47-HR, LIN: T28688	5180-01-483-0249	12B470000-1
2	F	Tool Kit, General Mechanic's (Formerly Master Mechanic's Tool Kit) PUB #: 5180-95-N05-HR, LIN: W45060	5180-00-699-5273	SC5180-90-CL-N05
3	F	Service Refrigeration Ordnance Tool Kit PUB #: 5180-95-N18-HR, LIN: W51362	5180-00-596-1474	SC 5180-90-CL-N18
4	H	Reclaimer, Refrigerant	NONE	95760
5	H	Hoist, Chain	3950-00-965-0098	2502 1/2TON
6	O	Forklift (local material handling equipment capable of lifting and moving 525 pound pallet)	AS AVAILABLE	
7	H	Gauge Set, Charging and Testing, Refrigerant (with hose set)	NONE	47725
8	H	Cylinder, Compressed Gas, Refrigerant Gas Mixture, DOT 400	NONE	95002
9	H	Hand Blind Riveter	5120-00-508-1588	
10	F	Maintenance Kit, Electrical Connector PUB #: 5935-92-101 LIN: M03339	5935-01-350-8391	SC9999-01-SKO
11	F	Tool Kit, Electronic Equipment PUB #: 5180-91-R13 LIN: W37483	5180-00-064-5178	TK-101/G
12	H	Weld Shop, Trailer Mounted	3431-01-090-1231	SC-3431-95-CL-A04
13	F	Nitrogen Regulator	6680-00-503-1327	
14	F	Nitrogen Tank	6830-01-121-9834	
15	O	Common NO. 1 Toolkit PUB # 4910-95-A74 LIN: W32593	4910-00-754-0654	5120-01-042-0982

Table 3. Remarks

(1) REMARKS CODE	(2) REMARKS
A	This consists of the field crew/operator level PMCS.
B	This consists of the field service level PMCS.
C	This consists of the verification of the functionality of IECU.
D	This consists of the replacement and set-up of functional IECU.
E	This task is for all those repairs beyond the capability of the lower levels of maintenance, such as frame straightening.
F	This consists of charging the IECU to the proper level of refrigerant.
G	The placement of the air filter can be installed in one of two places. (1) If the air filter is placed at the inlet of the return air duct the operator can inspect and replace the air filter with no tools. (2) In front of the evaporator coil inside of the unit, which require tools for the access of the air filter location.

END OF WORK PACKAGE

SUPPORTING INFORMATION
60K BTU/HR IECU
COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

INTRODUCTION

SCOPE

This work package lists COEI and BII for the IECU 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 list is for information purposes only and is not authority to requisition replacements. These items are part of the IECU. 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 IECU in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the IECU 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/MTOE. Illustrations are furnished to help you find and identify the items.

EXPLANATION OF COLUMNS IN THE COEI LIST AND BII LIST

Column (1) Item Number. Gives you the reference number of the item listed.

Column (2) National Stock Number (NSN) and Illustration. Identifies the stock number of the item to be used for requisitioning purposes and provides an illustration of the item.

Column (3) Description, Part Number/(CAGEC). 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 part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

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.

Column (5) U/I. 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.

Table 1. COEI for 60K BTU/Hr IECU

(1) Item Number	(2) National Stock Number (NSN) and Illustration	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
1		Duct, Flexible (94833) 500K3421-1		EA	2
2		Assembly, Power Cable (94833) 184K0014-1		EA	1
3		Assembly, Control Cable (94833) 184K0133-1		EA	1
4		Flange Assembly (Duct)		EA	1
5		Filter, Intake (98750) 9454132		EA	1
6		Condensate Drain Hose (94833) 184K0195		EA	1
7		Assembly, Filter Frame (94833) 184K0163		EA	1

Table 2. BII for 60K BTU/Hr IECU

(1) Item Number	(2) National Stock Number (NSN) and Illustration	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
1		ARMY TECHNICAL MANUAL Operator, Field, And Sustainment Maintenance Manual for 60K BTU/Hr Improved Environmental Control Unit (IECU) Model 60K IECU NSN 4120-01-543-0741 (EIC XXX) TM 9-4120-431-14		EA	1
2		ARMY TECHNICAL MANUAL Sustainment Maintenance Manual for 60K BTU/Hr Improved Environmental Control Unit (IECU) including Repair Parts and Special Tools List (RPSTL) Model 60K IECU NSN4120-01-543-0741 (EIC XXX) TM 9-4120-431-24P		EA	1

END OF WORK PACKAGE

SUPPORTING INFORMATION
60K BTU/HR IECU
ADDITIONAL AUTHORIZATION LIST (AAL)

INTRODUCTION

SCOPE

This work package lists additional items you are authorized for the support of the IECU.

GENERAL

This list identifies items that do not have to accompany the IECU and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

EXPLANATION OF COLUMNS IN THE AAL

Column (1) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (3) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (4) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) Qty Recm. Indicates the quantity recommended.

Table 1. AAL for 60K BTU/Hr IECU

(1) National Stock Number (NSN)	(2) Description, Part Number/(CAGEC)	(3) Usable On Code	(4) U/I	(5) Qty Recm
NOTE The following items are required for NBC configuration.				
4240-01-178-9936	Filter Canister		EA	2
4130-01-434-7665	NBC Adapter Kit		EA	1
4720-01-434-2327	Return Air Duct		EA	1
4720-01-434-2331	Supply Air Duct		EA	1
4240-01-200-4330	Support Kit		EA	2

END OF WORK PACKAGE

SUPPORTING INFORMATION
60K BTU/HR IECU
EXPENDABLE AND DURABLE ITEMS LISTS

INTRODUCTION

Scope

This work package lists expendable and durable items that you will need to operate and maintain the 60K IECU. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use brake fluid (WP 0098, Item 5)).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed.

Column (3) National Stock Number (NSN). This is the NSN assigned to the item, which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

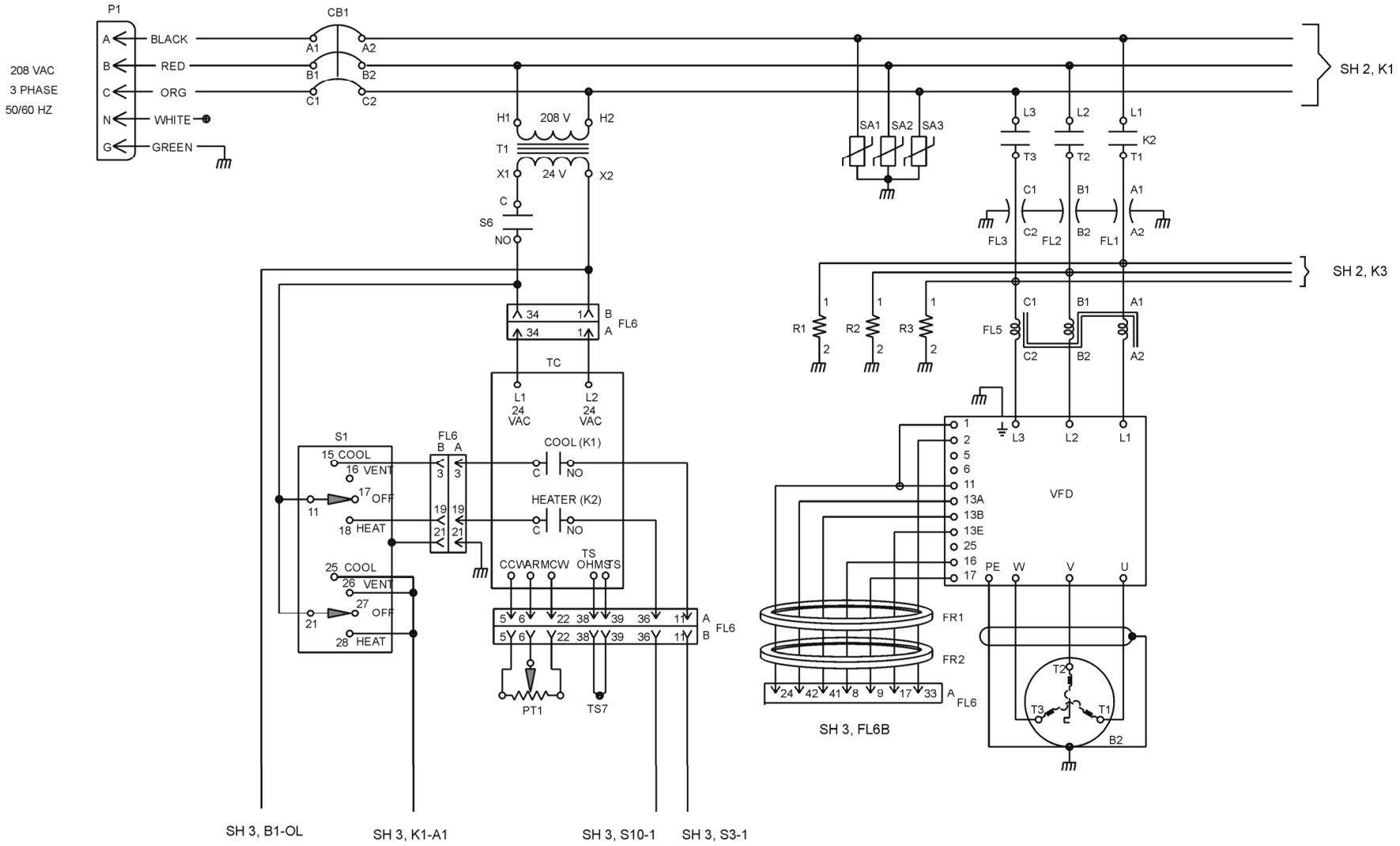
Table 1. Expendable and Durable Items List for 60K BTU Improved Environmental Control Unit

(1) Item No.	(2) Level	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(5) U/I
1	O		Rivet, 13214E3789-2, -3	EA
2	O		Splice, 9454296-2	EA
3	O		Tie Wrap, 13208E8536	EA
4	O		Adhesive	EA
5	O		Lock washers	EA
6	O		Rags	EA
7	O		Insulating Tape	Roll
8	O		Press Tight Insulation	Roll
9	O		Thermomastic Heat Transfer Compound	Gal
10	O		Foam Insulation	Roll
11	F		Refrigerant, R410A	Tank
12	F		Flux, Type B	Can

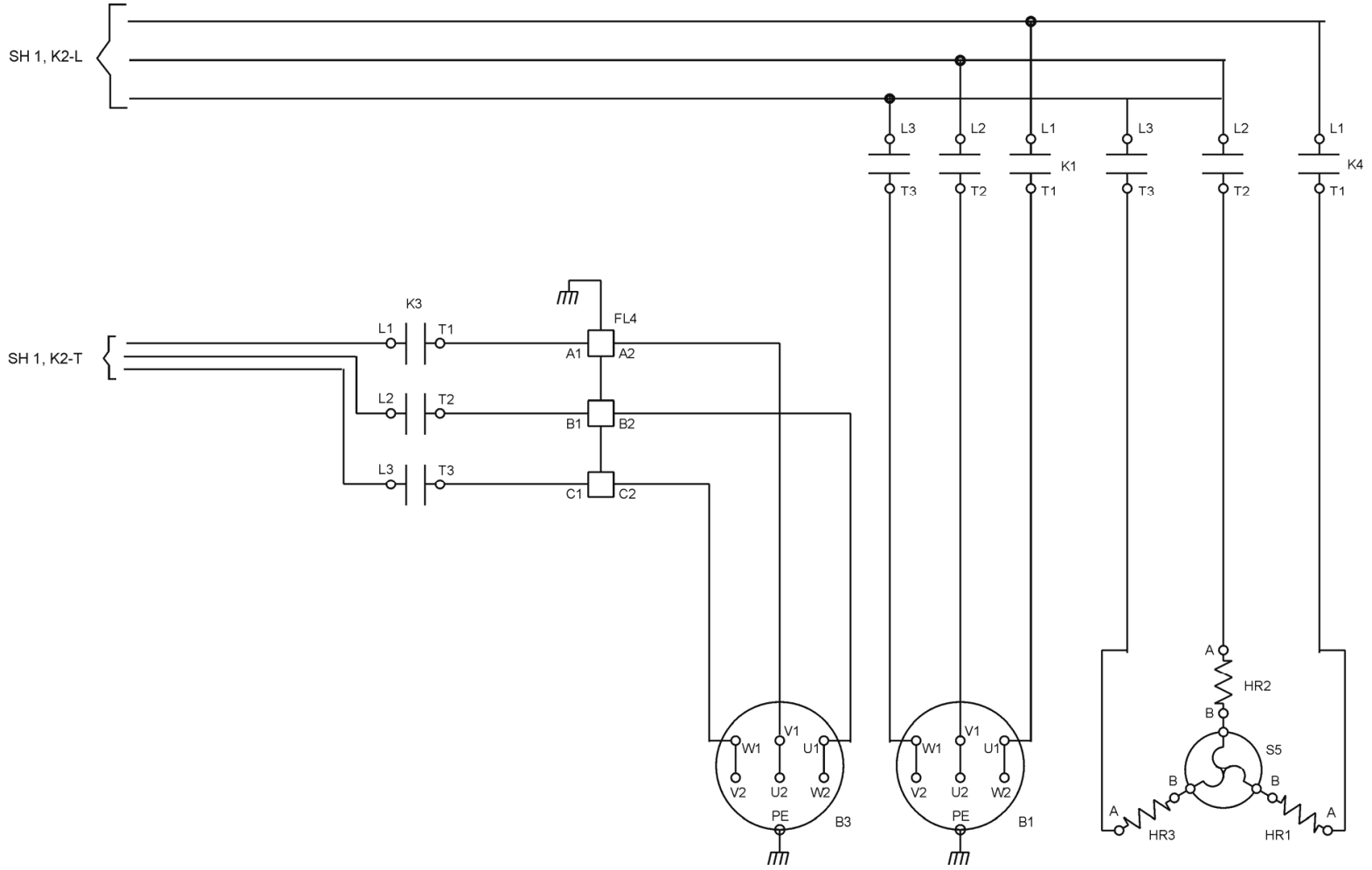
(1) Item No.	(2) Level	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(5) U/I
13	F		Alloy, Brazing, Grade IV or VI (50% Silver)	EA
14	F		Alloy, Brazing, Grade III (15% Silver)	EA
15	F		Sleeving, Insulation	EA
16	F		Splice, Wire, 9454296-2	EA

END OF WORK PACKAGE

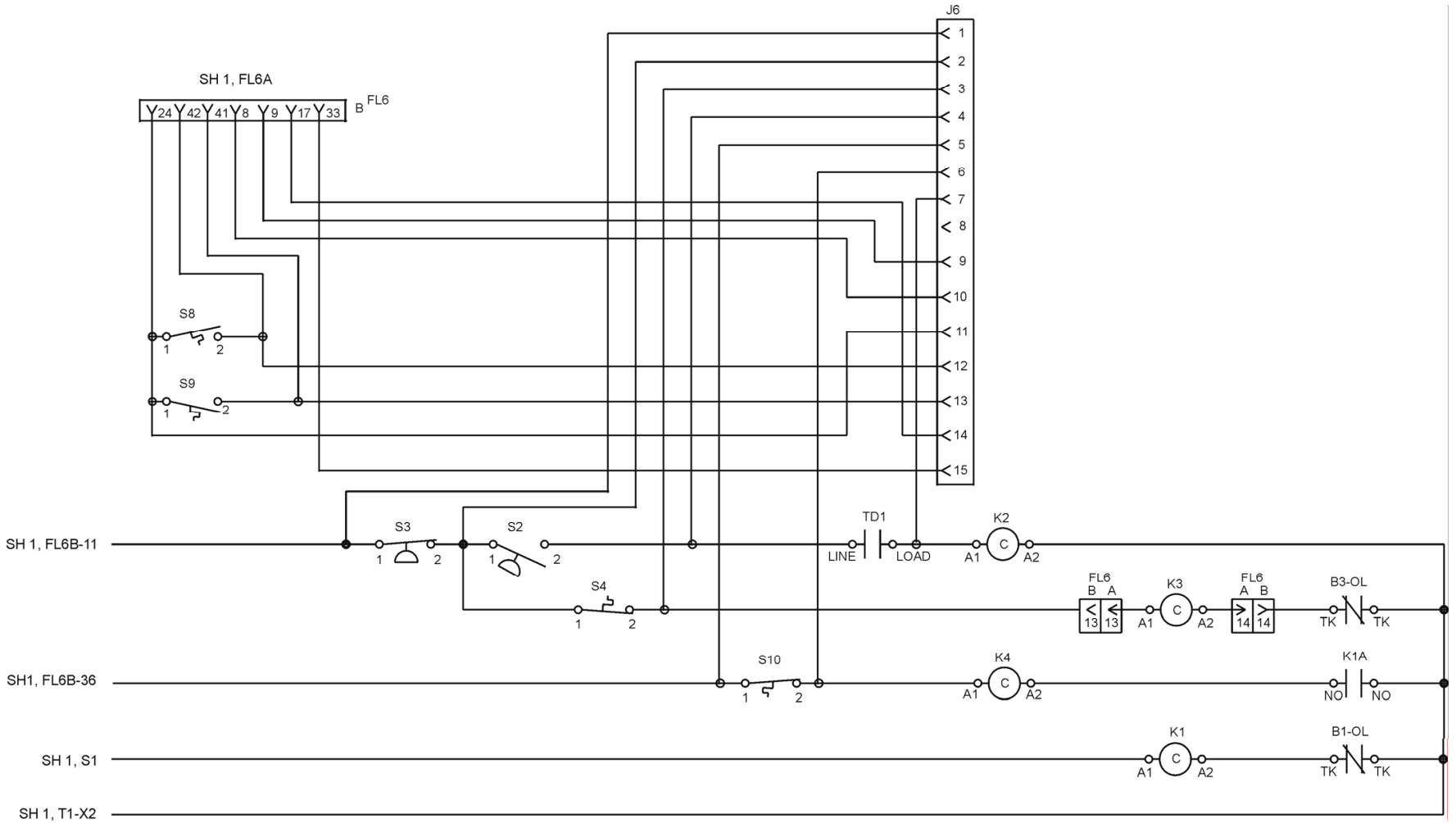
CHAPTER 10
REAR MATTER



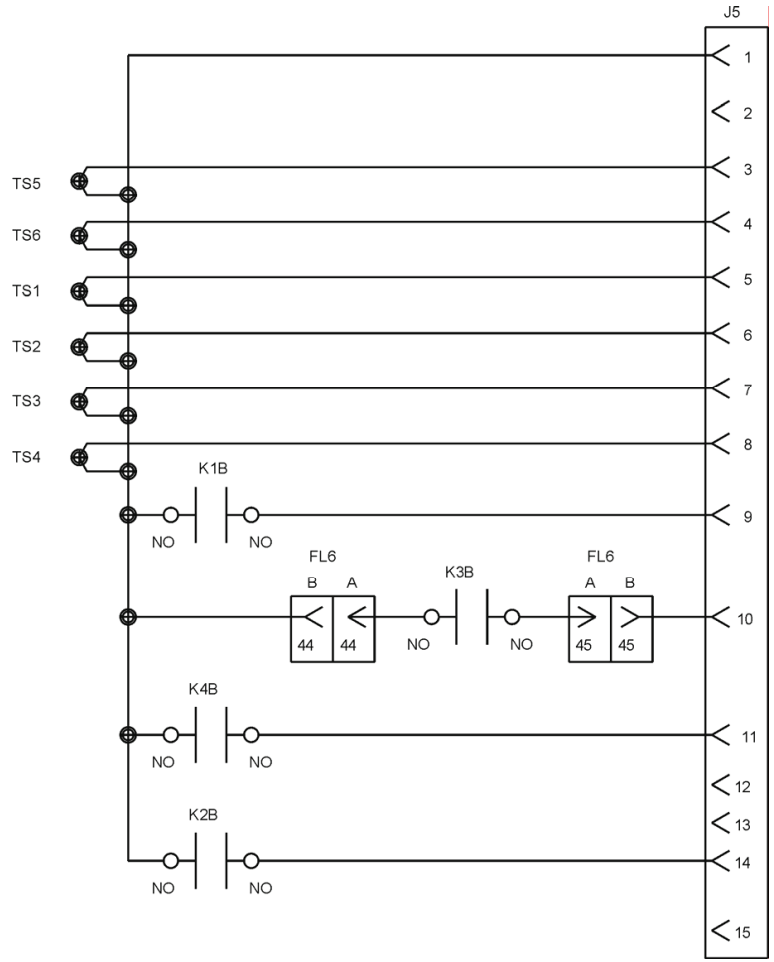
FO-1. 60K BTU/Hr IECU Electrical Schematic (Sheet 1 of 4)



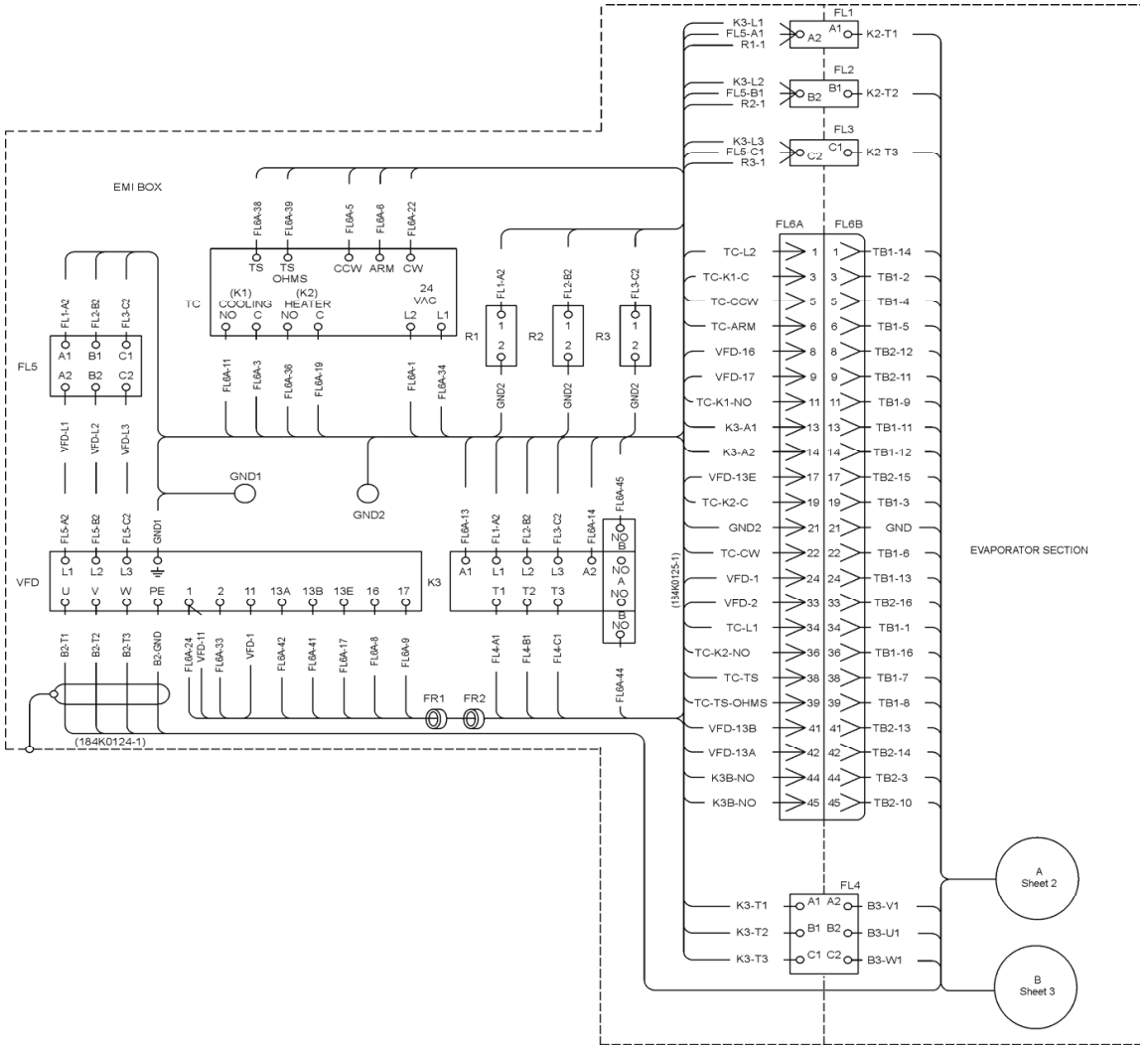
FO-1. 60K BTU/Hr IECU Electrical Schematic (Sheet 2of 4)



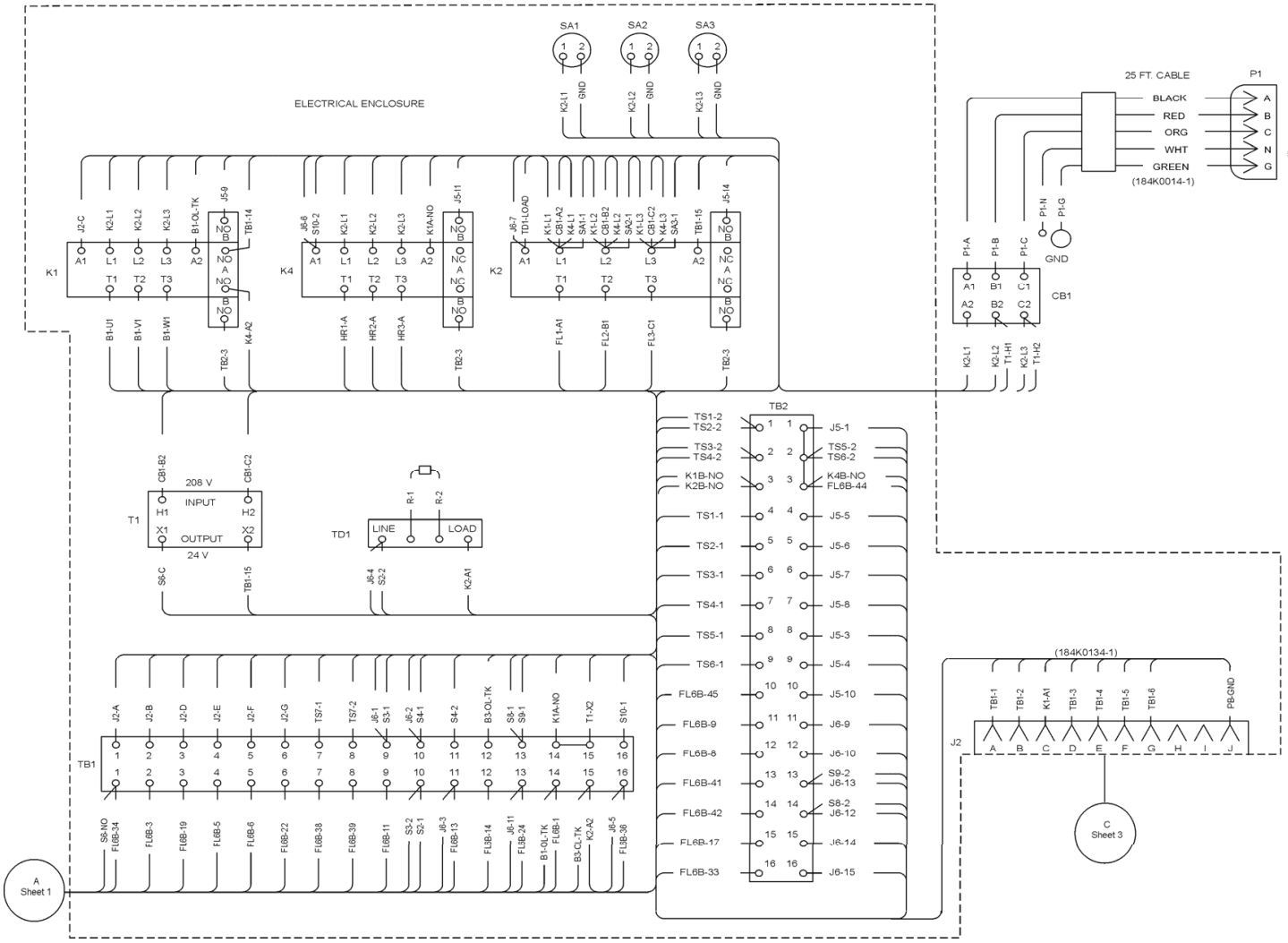
FO-1. 60K BTU/Hr IECU Electrical Schematic (Sheet 3 of 4)



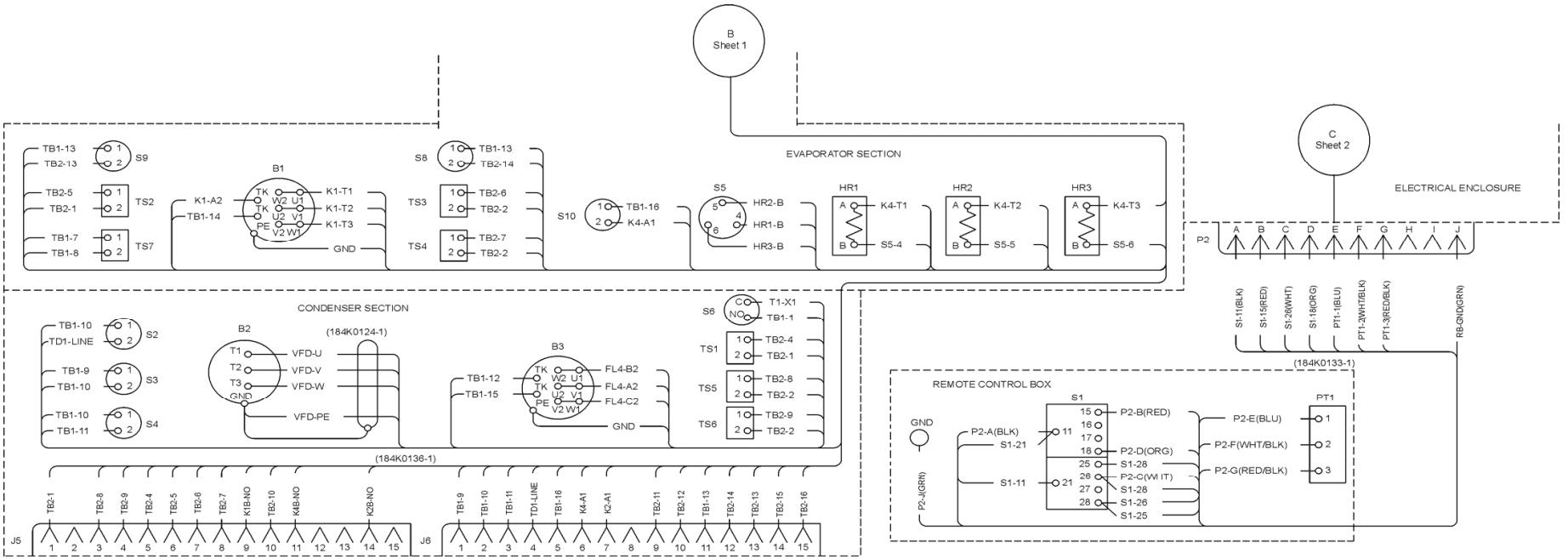
F0-1. 60K BTU/Hr IECU Electrical Schematic (Sheet 4of 4)



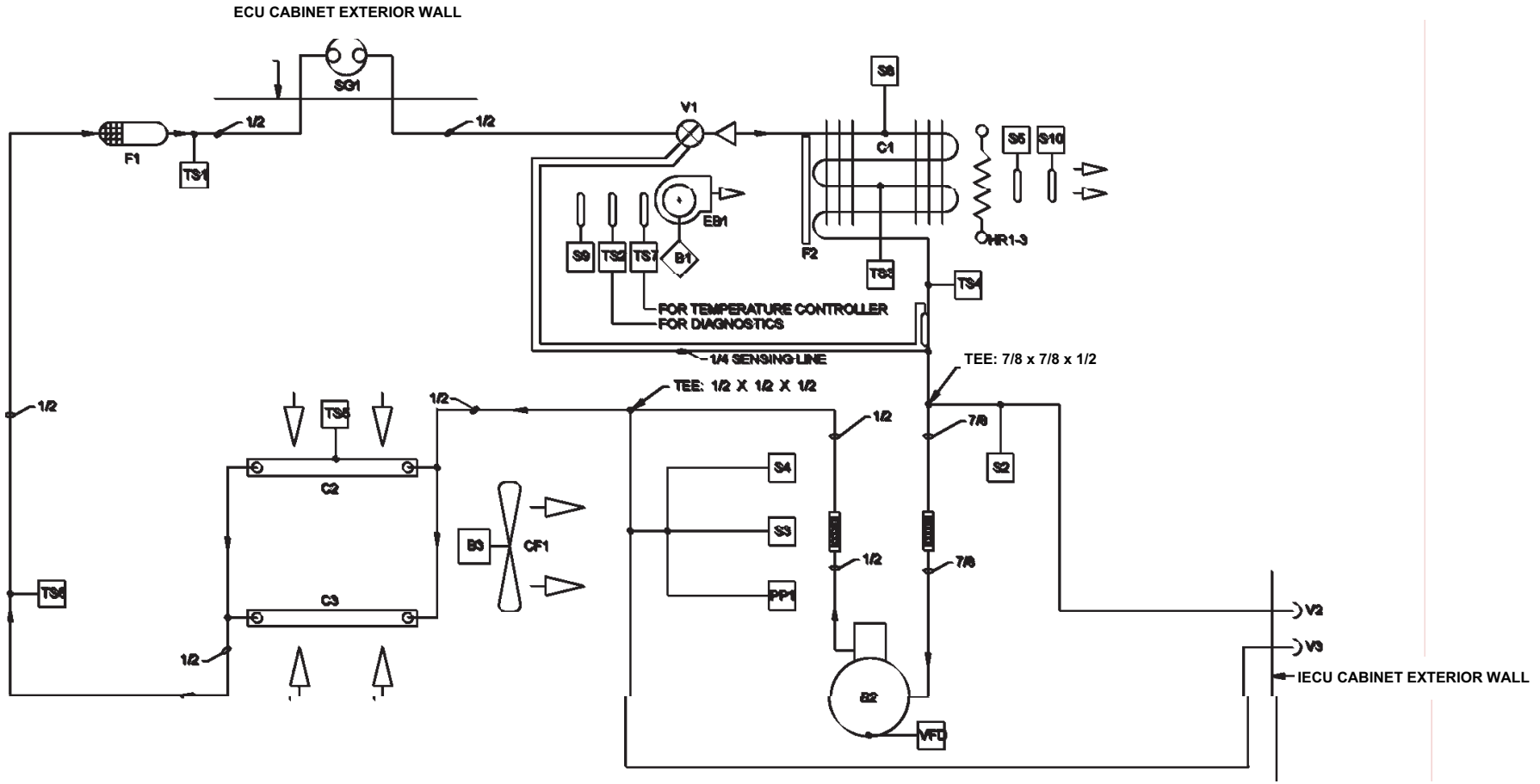
FO 2. 60K BTU/Hr IECU Wiring Diagram (Sheet 1 of 3)



FO-2. 60K BTU/Hr IECU Wiring Diagram (Sheet 2of 3)



FO-2. 60K BTU/Hr IECU Wiring Diagram (Sheet 3of 3)



FO-3. 60Kw BTU/Hr ECU Refrigeration Schematic

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 30 August 2002
TO: *(Forward to proponent of publication or form) (Include ZIP Code)* Commander, US Army C-E LCMC ATTN: AMSEL-LC-LEO-E-ED Fort Monmouth, NJ 07703-5006	**FROM:** *(Activity and location) (Include ZIP Code)* Jane Q. Doe, SFC 1234 Any Street Anytown, AL 34565	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-1234-567-14	16 Sep 2001	Operator, Field and Sustainment Support Maintenance Manual for Radio, AN/ABC-123

ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
1	WP0005 PG 3		2			Test or Correctiive Action column should identify a different WP number.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Jane Q. Doe, SFC	123-4567	

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	**DATE**

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	**DATE**

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

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TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	**DATE**

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

By Order of the Secretary of the Army:

Official:

JOYCE E. MORROW
Administrative Assistant to the Secretary of the Army
0815004

GEORGE W. CASEY, JR
General, United States Army
Chief of Staff

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