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INSTRUCTIONS FOR CONTINUED AIRWORTHINESS AGUSTA A119 & AGUSTA WESTLAND AW119 MKII AIR CONDITIONING SYSTEM

THIS HANDBOOK INCLUDES THE MAINTENANCE INFORMATION REQUIRED TO BE AVAILABLE BY FAR PART 27

Revision 15 **April 11, 2018**

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RECORD OF REVISIONS

Rev	Date	Description of Change	Approval
0	6-30-2005	Original Issue	N/A
1	8-29-2005	Compressor belt part number & views	N/A
2	5-5-2006	High output condenser scoop and blower	N/A
3	12-15-2006	Installation of fwd evaporator S-6118EC-1	N/A
4	7-2-2007	Addition of AW119 MKII & periodic Insp.	N/A
5	1-17-2008	Changed ES57008-2 to ES57178-1	N/A
6	7-14-2008	Changed condenser blower & views	N/A
7	6-4-2009	Added High Output Configuration	N/A
8	10-12-2009	Added periodic inspection information	N/A
9	Not Published	Updated electrical air box feature	N/A
10	7-22-2013	Updated format, removed electric air box information from revision 9, updated location illustrations, edited removal instructions, added specific installation instructions (rather than “installation is opposite of removal”) corrected pressure switch specs, updated charging placard, provided IDS and G1000 info, updated schematic, added new revision block with sign off (all previous version do not have an approval / acceptance signature). No FAA Signature required – meets minor change agreement MR-100-134.	Prepared By: Karen G. Blecha (KGB) 7/22/2013 Date ACC Approval: MJK 7/22/2013 Signature Date FAA Acceptance (Major Change): N/A – Meets Minor Change Agreement MR-100-134 7/22/2013 Signature Date
11	11-18-2014	Pg 9,10,18,29: added alternate blower S-6501EC-1. Pgs 41,42: updated elec schematics to show relay box variances due to condenser blower options. Pg 12: updated p/n’s in views. Pg 19,20: added pressure relief valve for new kits.	Prepared By: J Byrnes 11/18/2014 Date ACC Approval: MJK 11/20/2014 Signature Date FAA Acceptance (Major Change): J. Cox Jan 5, 2015 Signature Date

12	2-11-2015	Corrected p/n S-6501EC-3 throughout, was S-6501EC-1, Pg 10,12,18,29,41,42	Prepared By: J Byrnes 2/11/2015 Date ACC Approval: K Pharris 9/17/2015 Signature Date FAA Acceptance (Major Change): N/A – Meets Minor Change Agreement MR-100-134 7/22/2013 Signature Date
13	1-26-2017	Updated Chapter 6 Section 3 to identify that the full oil charge for A119-504 is added at the factory.	Prepared By: C Posvic 1/26/2017 Date ACC Approval: L Bokas 2/3/17 Signature Date FAA Acceptance (Major Change): N/A – Meets Minor Change Agreement MR-100-134 7/22/2013 Signature Date
14	8-17-2018	Title page and Page 3: updated to current address. Page 18: added 'S/S by SK-A119-120315' to existing 2X A119-7008-1 and (-2 2X S-6501EC-3) was (S-6051EC-3 alt). Page 29: added 'is superseded by SK-A119-120315 now' to existing A119-7008-1. Ref ECO 18-524.	Prepared By: R Longcrier 8/17/2018 Date ACC Approval: M. Krauss 9/11/18 Signature Date FAA Acceptance (Major Change): N/A – Meets Minor Change Agreement MR-100-134 7/22/2013 Signature Date

15	4-11-2019	Retitled schematic figure 8-1 to indicate it only pertains to -810 installations. Added note 3 to figure 8-1. Retitled schematic figure 8-2 to indicate it only pertains to -810 installations. Added note 3 to figure 8-2. Added figure 8-3 schematic for -812 installations. Added figure 8-4 relay panel schematic. Added figure 8-5 relay panel schematic. Ref ECO 19-162.	Prepared By: R. Dodrill 4/11/2019 Date ACC Approval: 4-16-19 Signature Date FAA Acceptance (Major Change): N/A – Meets Minor Change Agreement MR-100-134 7/22/2013 Signature Date

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CHAPTER 1
INTRODUCTION

1. Scope
The scope of this manual encompasses scheduled and unscheduled maintenance procedures for continued airworthiness of Air Comm Corporation air conditioning system installed in the Agusta A119 and Agusta Westland AW119 MKII series helicopter.

2. Purpose
The purpose of this manual is to provide aircraft field mechanic necessary information to maintain the air conditioning system.

3. Arrangement
This manual is arranged by chapters which are broken down into paragraphs and sub-paragraphs. All chapters and paragraphs are listed in the front of this manual in the Table of Contents, and are further identified by their individual page number.

4. Applicability
This manual is applicable to Agusta Helicopter models A119 & Agusta Westland AW119 MKII which are equipped with the Air Comm Corporation kit number A119-206 & A119-208 & A119-210 & A119-212 & A119-214 air conditioner systems. The kit Serial Number is engraved on the compressor mount assembly. Mandatory Service Bulletin SB A119-306 requires that all Agusta A119s equipped with ACC air conditioners require the use of this ICA.

5. Definitions
The following terms are provided to give a ready reference to the meaning of some words contained within this manual. These definitions may differ from those given by a standard dictionary.

a. **Ambient air temperature:** Temperature of the air surrounding a person or object.
b. **Charging station:** An air conditioning system service unit which is capable of evacuating and charging an air conditioner.
c. **Cold:** The absence of heat.
d. **Condensation:** The process of changing a vapor into a liquid.
e. **Desiccant:** Material used in a receiver/drier bottle, designed to absorb moisture from refrigerant.
f. **Evaporate:** To change from a liquid into a vapor.
g. **Heat load:** The amount of heat which the air conditioner is required to remove from the aircraft cabin.
h. **Inches of mercury:** A measurement of pressure, normally used for pressures below atmospheric, one inch of mercury is equal to approximately one half pound per square inch.
i. **Pressure, ambient:** The pressure of the air surrounding a body, normally measured in pounds per square inch, or PSIG.
j. **Refrigerant:** A fluid which is used in an air conditioning system to absorb heat from the cabin and carry it outside the helicopter where it can be transferred to the outside air.
k. **Relative humidity:** The ratio of the amount of water vapor in the air to the

amount of water vapor required to saturate the air at the existing temperature.

l. **Thermostat:** An air conditioning control which senses the temperature of the evaporator coil and causes the system to cycle or by-pass to maintain the proper temperature of cooling air.

m. **Vacuum:** A negative pressure, or pressure below atmospheric; it is usually expressed in inches of mercury.

n. **Vapor:** The gaseous state of a material.

6. Abbreviations

gm: Gram
kg: Kilograms
inHg: Inches of Mercury
In-lbs: Inch pounds
Kg/cm: Kilograms Per Centimeter
lbs: Pounds
ml: Milliliters
mm: Millimeters
Nm: Newton-meters
oz: Ounces
Psig: Pounds Per Square Inch (gauge)

7. Precautions

The following precautions are found throughout this manual, and will vary depending on the seriousness of the Hazard or Condition:

WARNING: May be a maintenance procedure, practice, condition, etc., which could result in personal injury or loss of life.
CAUTION: May be a maintenance procedure, practice, condition, etc., which could result in damage or destruction of equipment.
NOTE: May be a maintenance procedure, practice, condition, etc., or a statement which needs to be highlighted.

8. Units of Measure

All measurements contained within this manual are given in United States standard measurement, followed by metric conversion in parentheses.

9. Information Essential to Continued Airworthiness

This manual provides information which is required for operation and maintenance of the Air Comm air conditioning system installed in Agusta model A119 & Agusta Westland AW119 MKII series helicopter. After completion of the air conditioner installation this document must be placed with the appropriate existing aircraft documents.

10. Reference Documents

The approval basis of the system covered by this ICA is Supplemental Type Certificate **SR00463DE**.

11. Distribution

This document is to be placed with the aircraft maintenance records at the time of system installation.

Changes will be made to this document in response to safety-of-flight or non-safety-of-flight issues. Any changes will result in a revision to this document. Revisions shall be noted in the Record of Revisions and on the List of Revisions of this manual.

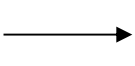
In addition to the revision of the manual, those changes categorized as safety-of-flight shall have a Service Bulletin issued to the operator providing the necessary information to comply with or to correct the safety-of-flight issue.

Replacement or revised copies of this manual can be obtained by contacting:

Air Comm Corporation Service Department
1575 W. 124th Ave, Suite 210
Westminster, CO 80234
Phone No. 303-440-4075 Fax No. 303-440-6355
Email: Service@aircommcorp.com

12. Changes to Instructions for Continued Airworthiness

Changes made to a line or paragraph of this document will be indicated by a vertical bar in the right hand margin. A complete page change will be indicated by a vertical bar next to the page number.

(Example: Any change will appear with a vertical bar next to that change). 

13. Air Conditioner Features

The vapor cycle air conditioner features one forward mounted evaporator assembly (cockpit), one aft mounted evaporator assembly (above main cabin), one condenser assembly, and a compressor driven by the fan drive shaft just aft of the aft main transmission, aircraft left. These components and associated plumbing combine to provide conditioned air through the existing air distribution system when the engines are operating during both ground and flight operations.

This system can be operated in either the air condition (A/C), or blower mode. In the A/C mode, conditioned air is provided by the forward and aft evaporator assemblies to the cockpit and main cabin areas respectively. In blower mode, the evaporator blowers are used to circulate and mix cabin air and fresh air, while the compressor clutch remains disengaged. When using the cabin heater it is acceptable to operate the air conditioner if desired, to defog the cabin windows.

The air conditioning system is connected electrically to the aircraft's DC Power Panel 28 VDC Bus. The control panel for the air conditioner system is located on the existing overhead switch panel between the pilot's and copilot's seats. The control panel consists of an A/C & Blower switch, two switches for the control of cockpit and cabin evaporator blower speed, and a temperature control rheostat. Temperature control is achieved by means of a refrigerant bypass valve, thus eliminating compressor cycling. The blower motors feature dual fan speed. This feature can be used in both the A/C or fan modes.
A "COMP ON" light, located on the upper main instrument panel, provides a visual status of compressor operation. For aircraft equipped with an Interactive Display System (IDS), compressor engagement is displayed on the IDS as a green "ECS ON" annunciation. For aircraft equipped with a Garmin G1000, the indication will show on the screen.

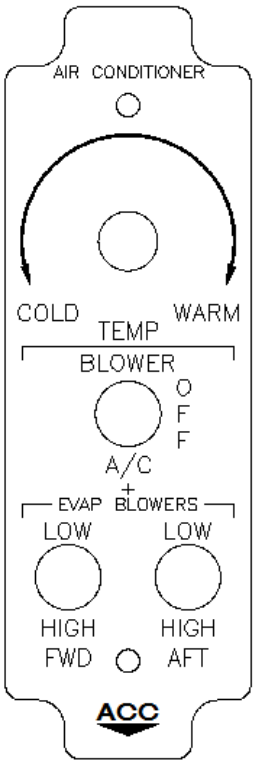


Figure 1-1 – Air Conditioning System Control Panel

The compressor is mounted on the surface of the transmission drain pan, in the aft aircraft center portion of the transmission compartment and is driven by a Poly V-Belt and a pulley which is mounted to the oil cooler blower drive shaft. Access to the compressor is provided by the transmission compartment access doors.

The condenser assembly is mounted below the baggage floor and features a blower assembly and a separate heat exchanger to reject system heat overboard. Airflow through the condenser heat exchanger is provided by two 28 volt DC high performance blowers.

The forward evaporator is mounted on the left side of the instrument panel console. Conditioned air is delivered to the crew by means of air ducts, mounted to the sides of the instrument panel console. An optional RH mounted blower may be installed.

The aft evaporator assembly is mounted above the cabin top and is enclosed by the transmission cowling. Cabin return air is ducted to the evaporator through a cutout in the cockpit closeout panel at fuselage station 2050. Conditioned air is pumped to the existing headliner ducting through the existing fresh air inlet in the cabin top.

The aft evaporator assembly is equipped with a freeze switch. The freeze switch probe is located in the core of the evaporator heat exchanger. This unit prevents coil freeze-up by limiting the minimum coil temperature to 32º F (0º C).

The system is also equipped with a Binary switch. This switch is designed to protect the system against over-pressure situations, or under-pressure in the event of refrigerant loss from the system. The switch also prevents the system from operating in low ambient temperatures below 50º F (10º C).

The switch operating pressures are:

Low Pressure Function:
Cut-out at 28 +/- 2.8 psig (1.97 +/- .2 kg/cm^2)
Cut-in at 29 +/- 4.3 psig (2.04 +/- .3 kg/cm^2)

High Pressure Function:
Cut-out at 384 +/- 30 psig (27.0 +/- 2.1 kg/cm^2)
Cut-in at 298 +/- 43 psig (20.95 +/- 3 kg/cm^2)

14. Description of Vapor Cycle Air Conditioner and Installation

This section contains a general overview of a vapor-cycle air conditioning system and how it functions. This type of system operates in a closed loop, in which the refrigerant absorbs heat from the cabin and rejects it into the outside air. The refrigerant then returns to the cabin to repeat the cycle. The operation of the system is described below (See Figure 1-2).

Liquid refrigerant is contained in the receiver-drier under pressure from the compressor. The receiver-drier also filters the refrigerant through a material know as desiccant. The desiccant insures that the liquid refrigerant leaving this component is free of any water or other contaminants.

The low pressure (suction) line from the compressor is attached to the evaporator lines, and causes the refrigerant to be pulled out of the receiver-drier and through the expansion valves. The expansion valves serve as a controlled spray orifice, to spray the correct amount of refrigerant into the evaporator. This regulation of refrigerant allows the liquid to absorb the heat from the cabin air, and transform it to a vapor state just prior to its exiting the evaporator assembly.

The low pressure vapor is then drawn into the compressor where its pressure is raised to approximately 200 psig (14.06 kg/cm) and its temperature to around 200º F (93.3º C). This high pressure/high temperature vapor then travels to the condenser (a heat exchanger cooled by a flow of outside air). Heat is extracted from the refrigerant, and as it cools it condenses back into a liquid and flows into the receiver-dryer, ready to repeat the cycle.

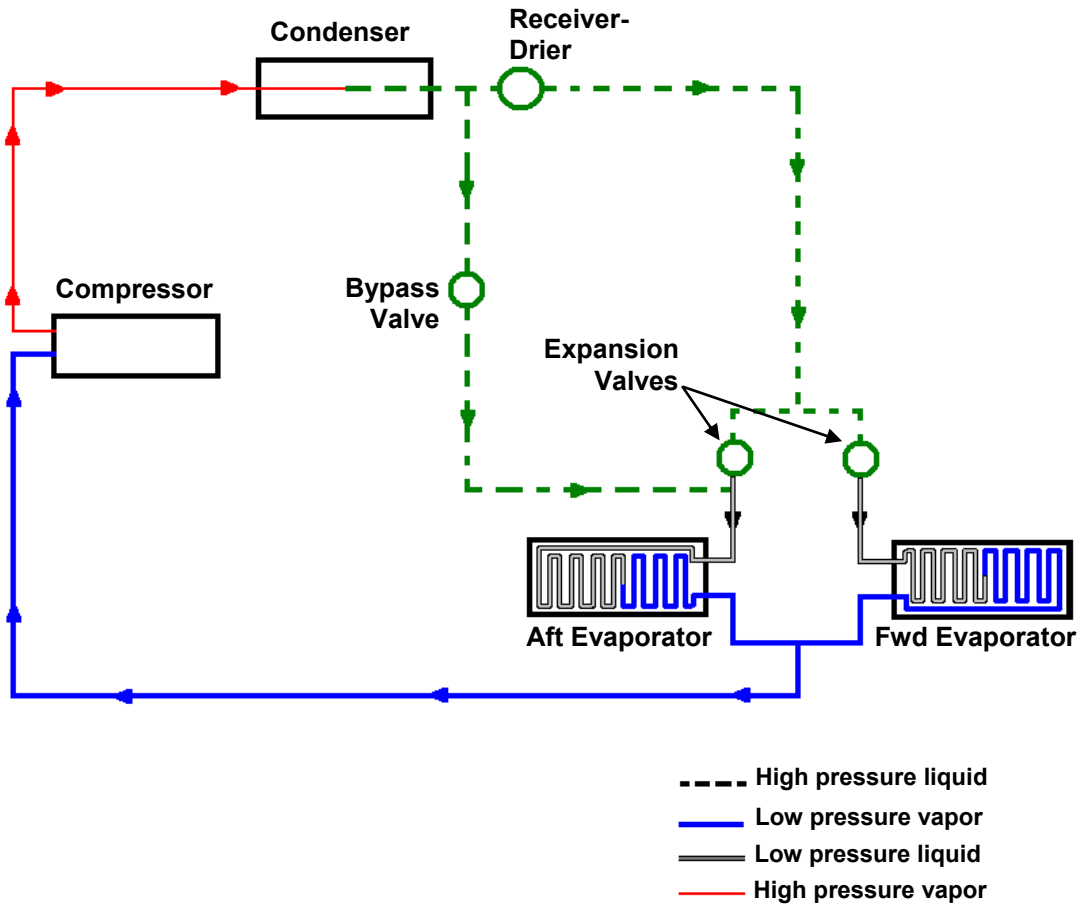


Figure 1-2 – Refrigeration Cycle Illustration
(NOTE: This illustration is provided as a reference only and may not match actual installation)

CHAPTER 2
AIRWORTHINESS LIMITATION SECTION

1. Airworthiness Limitations

The Airworthiness limitations section is FAA approved and specifies inspections and other maintenance required under Sections 43.16 and 91.403 of Federal Aviation Regulations unless an alternative program has been FAA approved.

“No airworthiness limitations associated with this type design change.”

FAA approval:

ACO Representative Date

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CHAPTER 3
INSPECTIONS AND OVERHAUL

1. Inspection Requirements

PERIODIC INSPECTIONS
(Hours are aircraft time)

Item	Annual	Every 100 Hours of Operation	Every 400 Hours of Operation	Special Inspection Information
Evaporator Blower Hi/Lo Operation	X		X	Check for operation
Condenser Blowers	X		X	Check for operation
Forward Evap Blower Motor ES61064-1	X		X	Check for operation in Hi and Lo settings
FASCO Aft Evap Blower Motor ES61142-1	X		X	Check for operation in Hi and Lo settings
Compressor Drive Belt	X	X	X	Check belt tension, and for signs of excessive wear (example: Glazing, Cracks, and exposed fibers)
Air Conditioner Placards & Markings (see chapter 5)	X		X	Check for security and legibility
Air Conditioner Compressor Assembly	X	X	X	Check for operation, security of attaching hardware, and signs of oil or refrigerant leaks.
Air Conditioner Compressor Mount	X	X	X	Check for cracks on compressor lugs, support doubler, WL1156.6 engine deck area, and rivet condition and cracks on lower surface of WL1156.3 engine deck. No cracks allowed. Check for condition and security of pivot and belt tension arm bolts.
Plumbing and Fittings	X		X	Check for security and signs of oil or refrigerant leaks
Air Conditioner Compressor drive pulley (mounted to oil cooler shaft)	X		X	Check for security of attaching hardware.
Compressor Isolator Mounts	X	X	X	Check for security, and condition
Aft Evaporator mounting brackets & upper deck area	X			Check for security and condition of attaching hardware & mounting brackets. No chaffing is allowed between aft evaporator brackets and upper deck of aircraft.
Forward Evaporator mounting brackets & isolators	X		X	Check for security, and condition

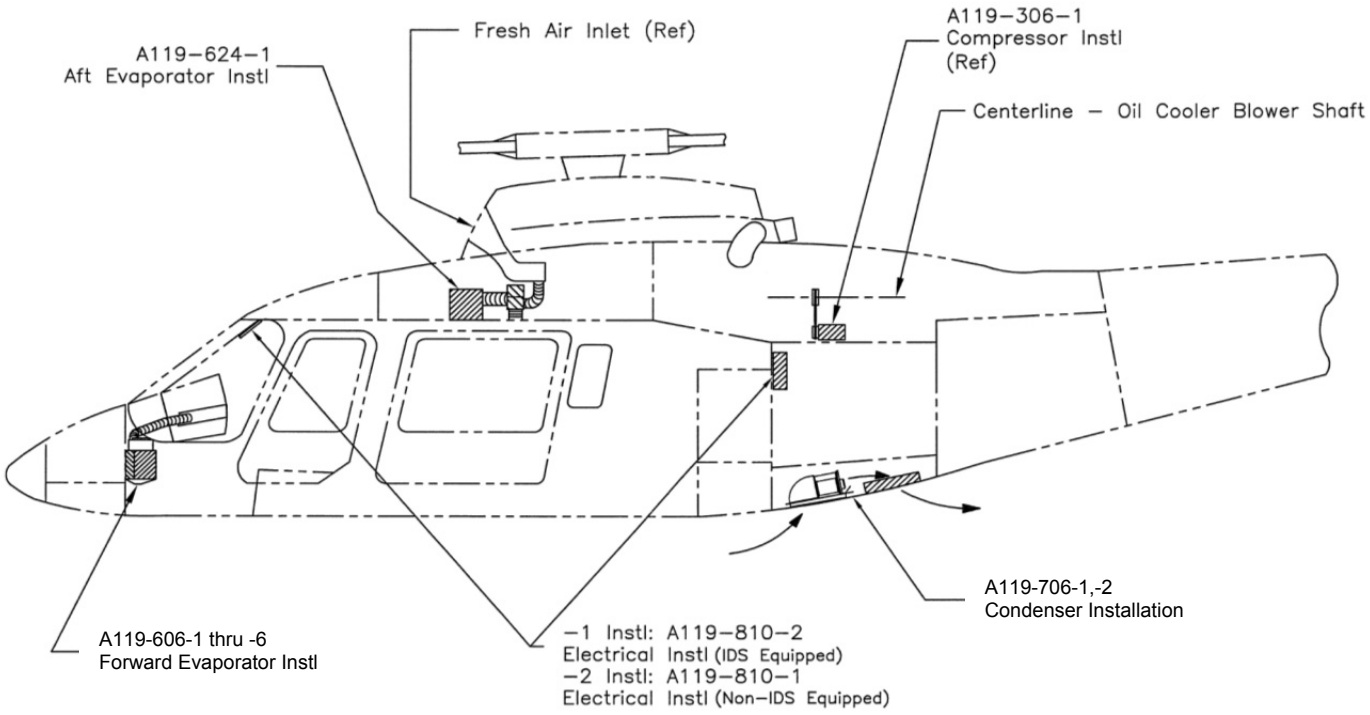
2. Component Overhaul / Replacement Schedule

Description	Part Number	Overhaul / Replacement Hours
Condenser Blower (deployable scoop intake) & Forward / Aft Evaporator Blower Motor	ES73190-1(Condenser Blower) ES73192-1 (Condenser Blower) ES61064-1 (Fwd Evap Motor) ES61142-1 (FASCO Aft Evap Motor)	The blower manufacturer recommends TBO is 500 hrs. At the discretion of the operator it is acceptable to operate the blower until failure. A blower failure will result in a reduction in cooling, but no safety-of-flight issues are involved.
Compressor Isolator Mounts	ES36096-1 Isolator	The manufacturer requires replacement of the compressor isolators every two (2) years
Condenser Blower (High Output) (Fixed intake grille)	A119-7008-1 Blower S-6501EC-3 Blower (alt.)	The blower manufacture recommends a TBO of 1000 hrs. At the discretion of the operator it is acceptable to operate the blower until failure. A blower failure will result in a reduction in cooling, but no safety-of-flight issues are involved.

CHAPTER 4
LOCATION AND ACCESS

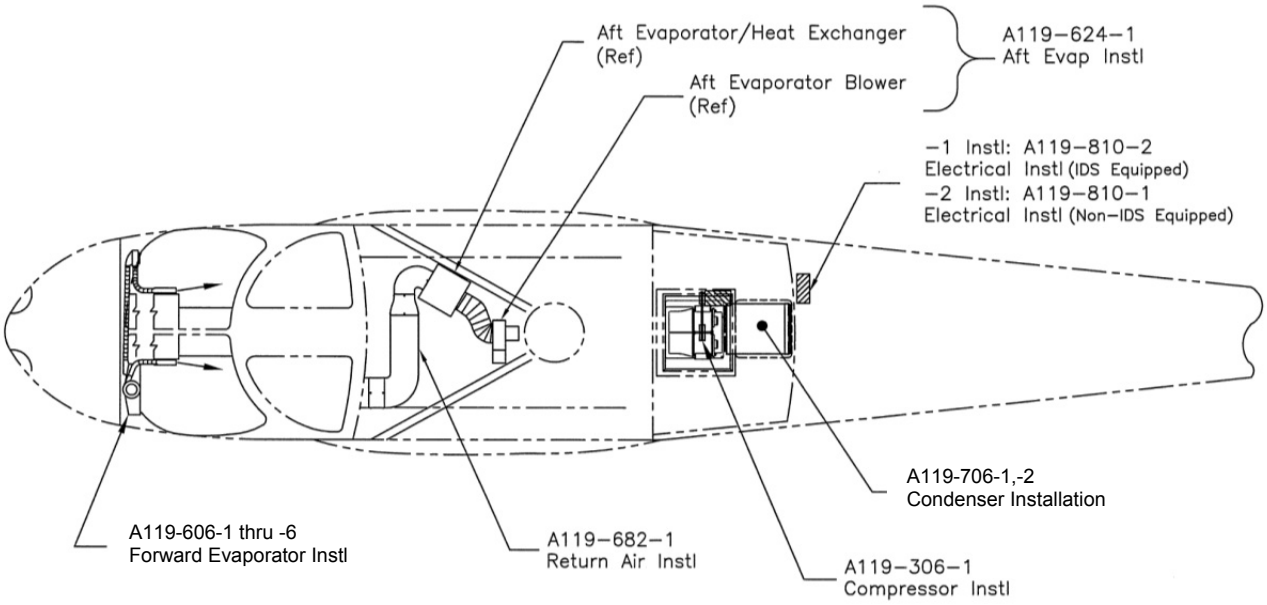
1. Location of Air Conditioner Components

Nomenclature	Description of Location
Air Conditioner Circuit Breaker & Relay Panel	Right side forward bulkhead of baggage compartment
Air Conditioner Control Panel	Existing overhead circuit breaker / switch panel
Forward (Cockpit) Evaporator and Blower	LH side center console below instrument panel in chin bubble area – blower is integral to forward evaporator
Forward Evaporator Blower Assembly	RH center console below instrument panel in chin bubble area
Aft (Main Cabin) Evaporator, Blower Assembly, and Air Box Assembly	Main cabin roof area just forward of main rotor transmission
Condenser Assembly and Blower Assembly	Aircraft belly below aft baggage compartment
Compressor	Aft center section of engine compartment drain pan
Refrigerant Plumbing	Routes from compressor, to area below baggage compartment, and forward to nose area (As refrigerant plumbing connects compressor, condenser, and evaporators, it may be necessary to access these components through several panels and cabin headliner
Hi & Lo Service Ports	Aft of compressor in engine compartment, RH side
Receiver Drier Bottle	Adjacent to condenser assembly in aircraft belly below aft baggage compartment
Bypass Valve	Aft of compressor in engine compartment, RH side
Binary Switch	Aft of compressor in engine compartment, RH side



SIDE VIEW

Figure 4-1 – Layout of A119 Air Conditioning System



TOP VIEW

Figure 4-2 – Layout of A119 Air Conditioning System

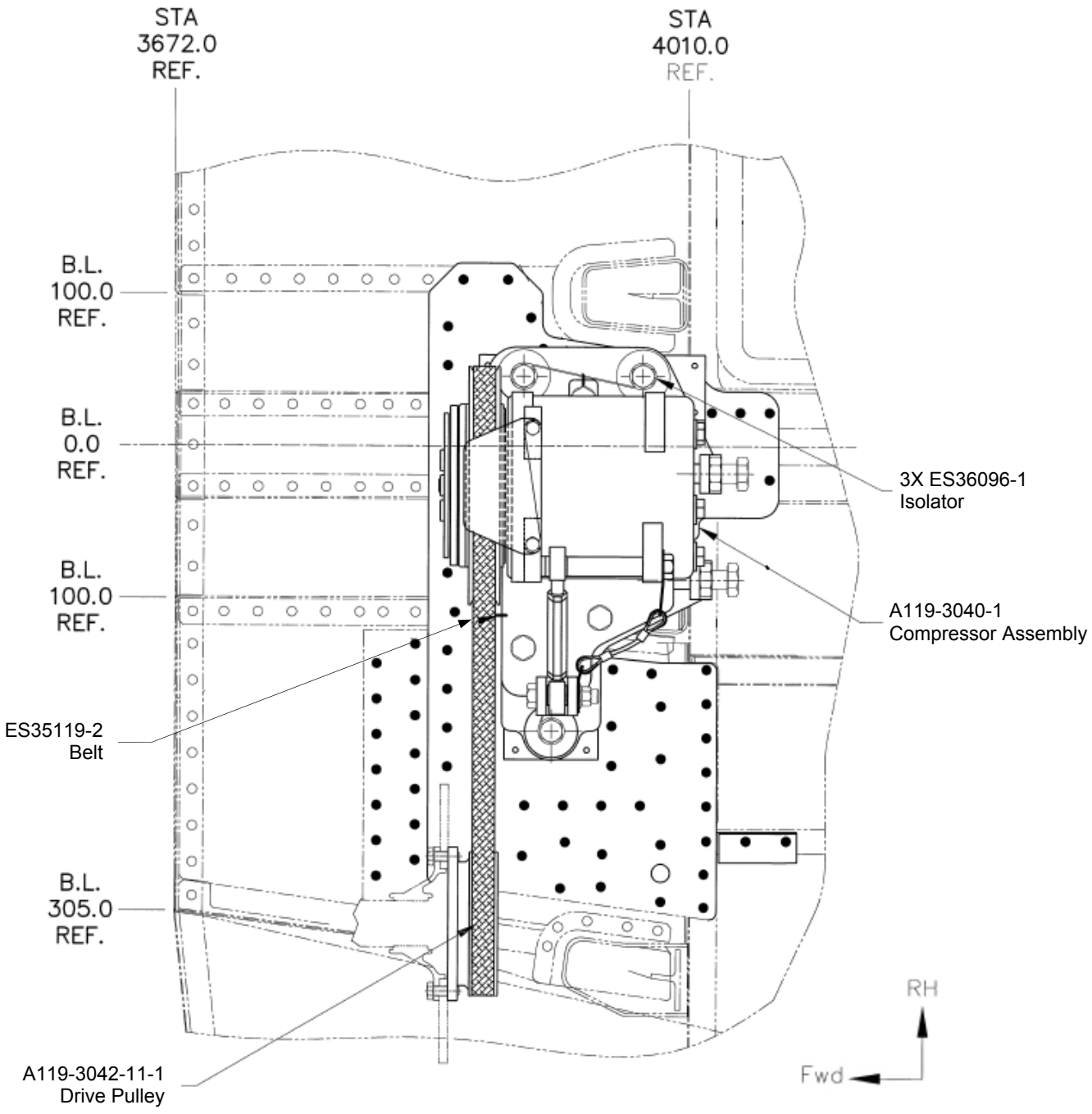


Figure 4-3 – Compressor Installation
(Engine Deck – View Looking Down)

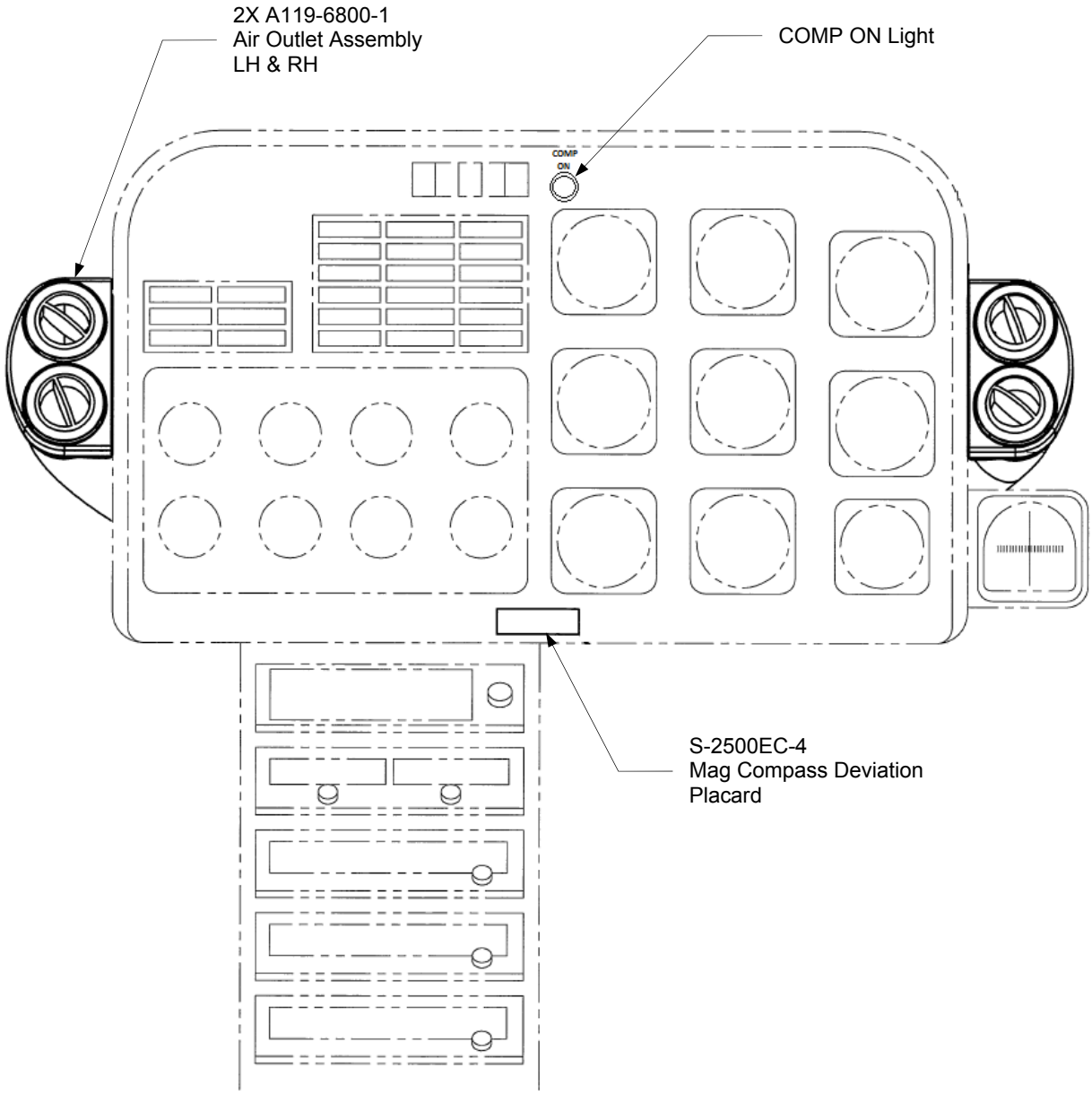


Figure 4-4 – Forward Evaporator Air Outlets
Non IDS Equipped Aircraft
(Instrument Panel – View Looking Fwd)

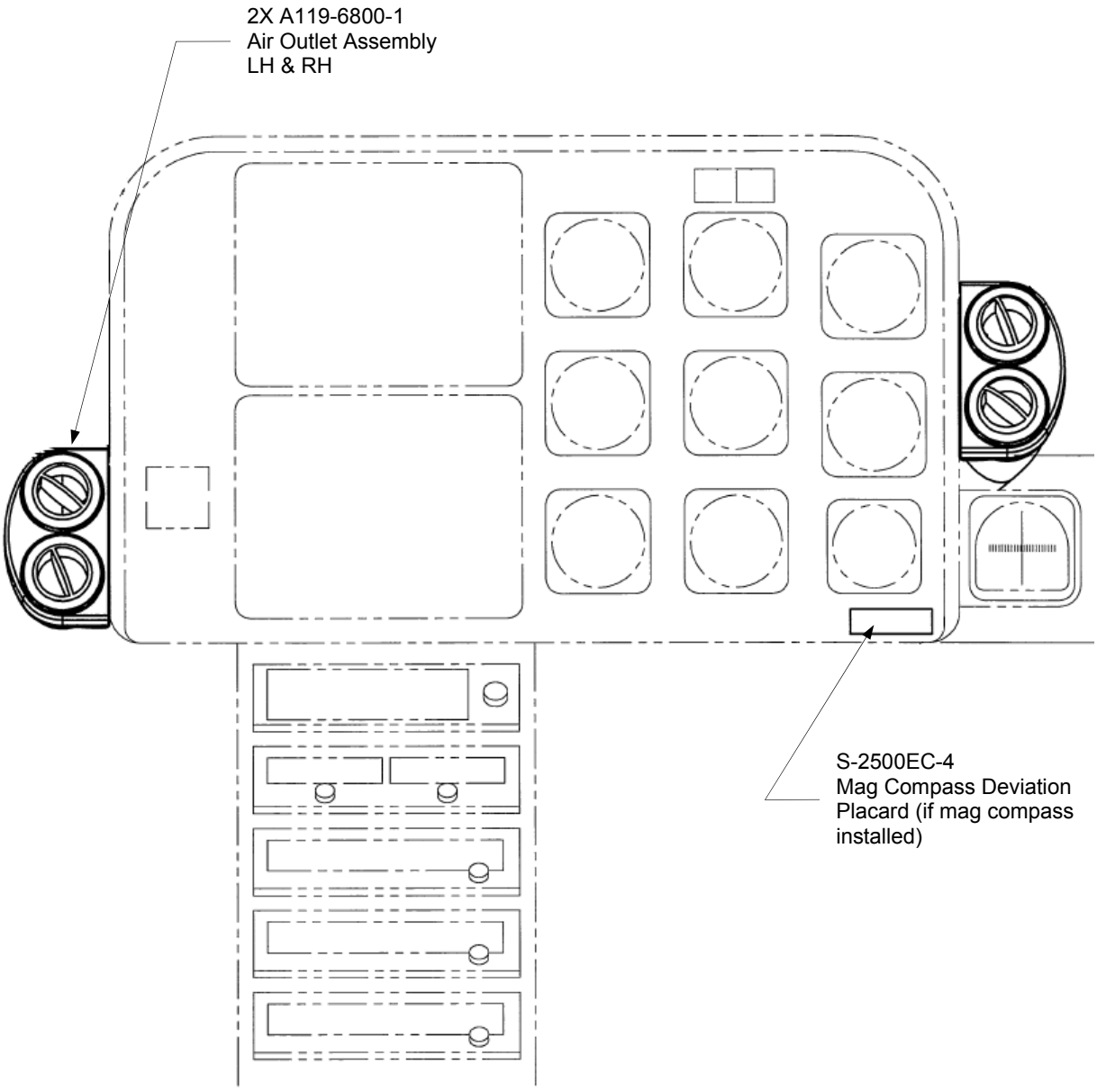


Figure 4-5 – Forward Evaporator Air Outlets
IDS Equipped Aircraft
(Instrument Panel – View Looking Fwd)

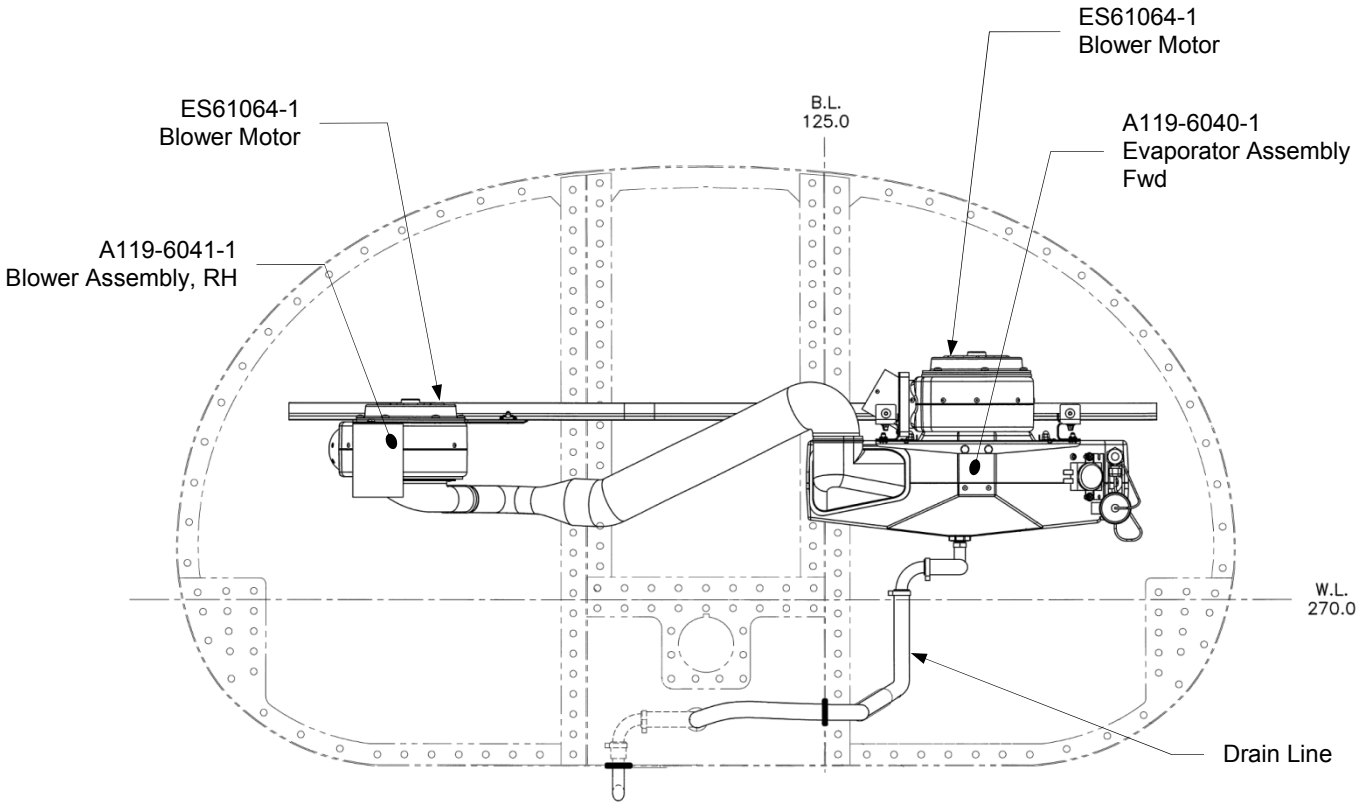


Figure 4-6 – Forward Evaporator Installation
(Cockpit – View Looking Aft)
Standard Configuration shown—other configurations similar

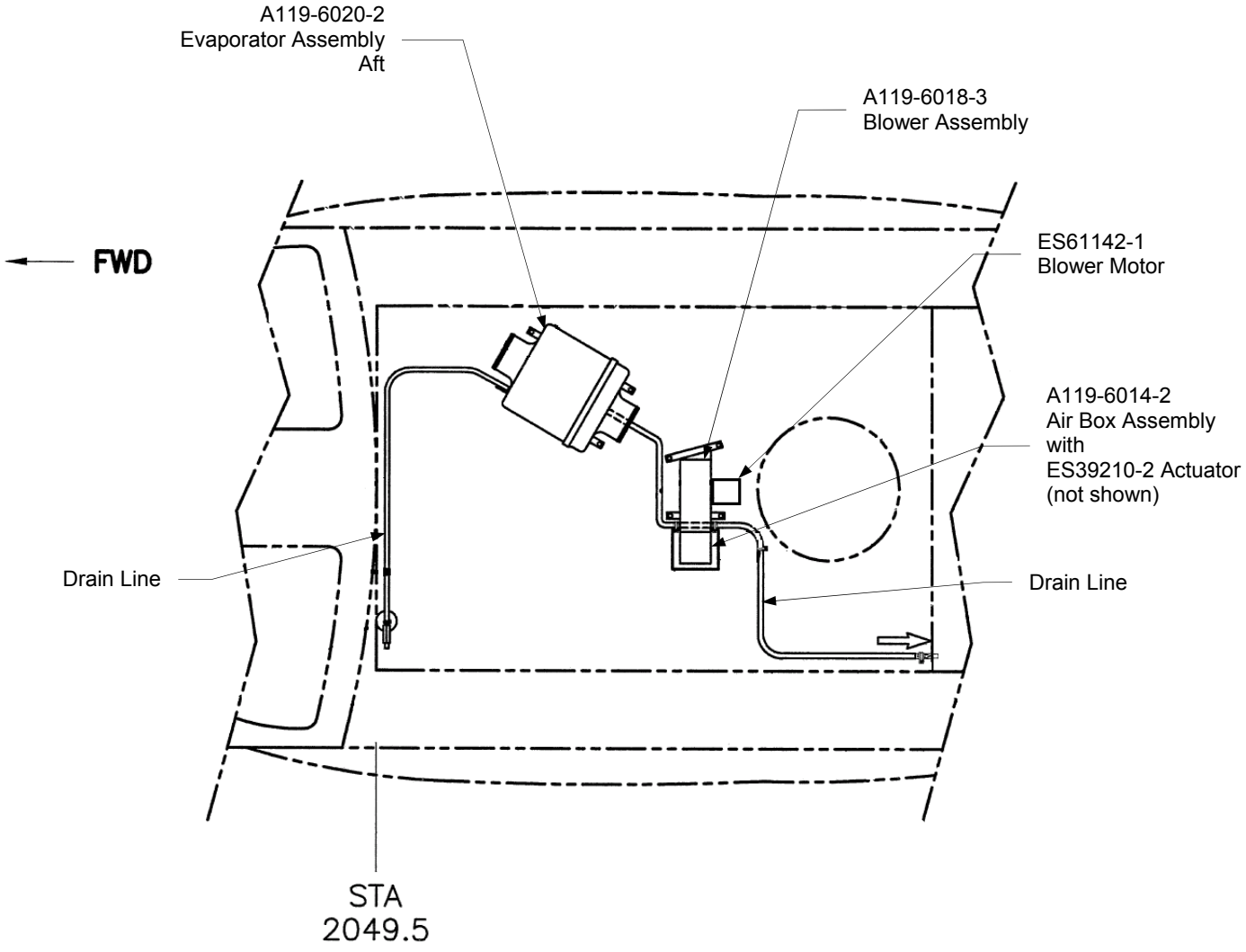
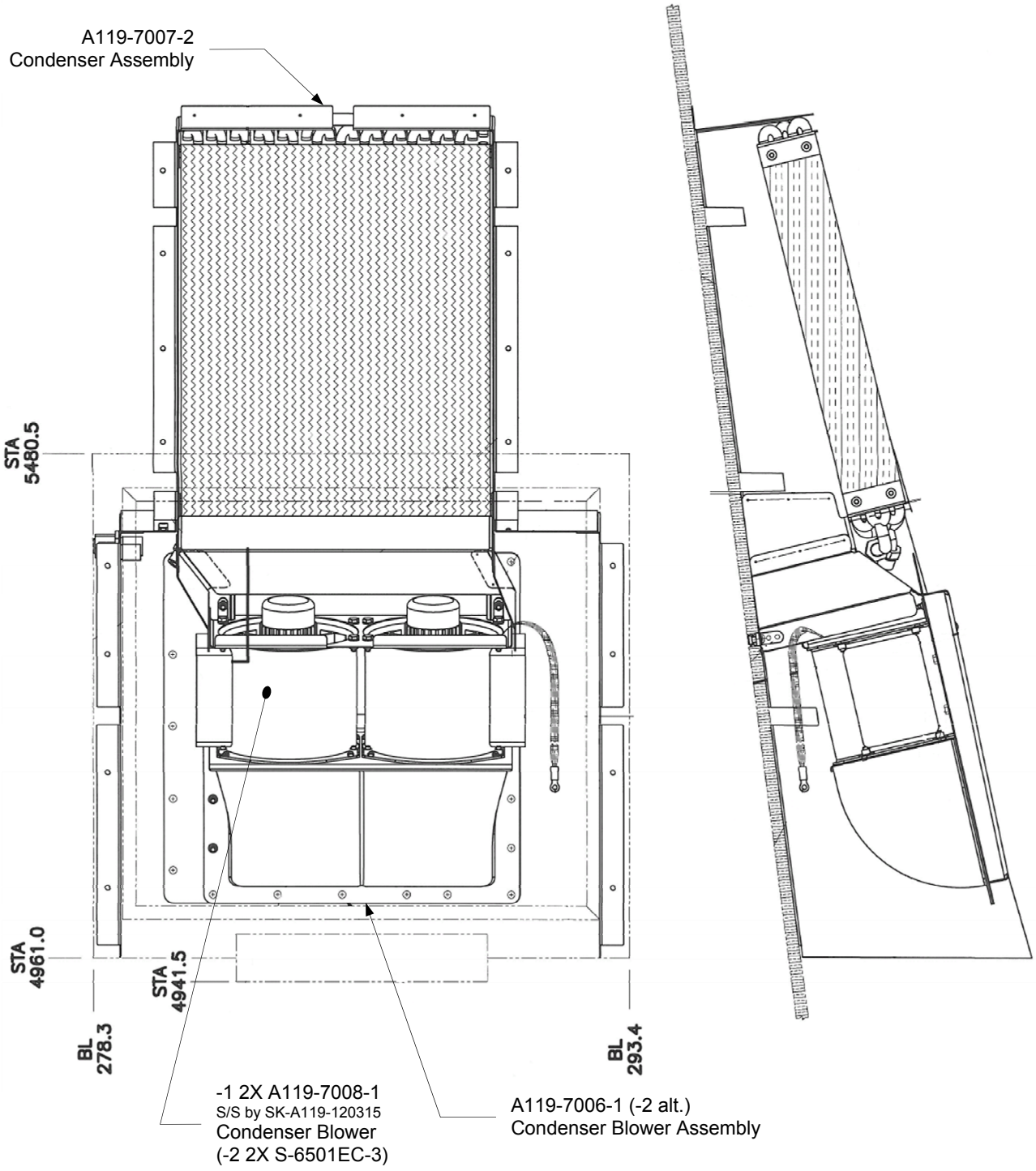


Figure 4-7 – Aft Evaporator Installation
(Cabin Top – View Looking Down)



(Baggage Floor – View Looking Down) **(View Looking Inboard)**

Figure 4-8 – Condenser Installation

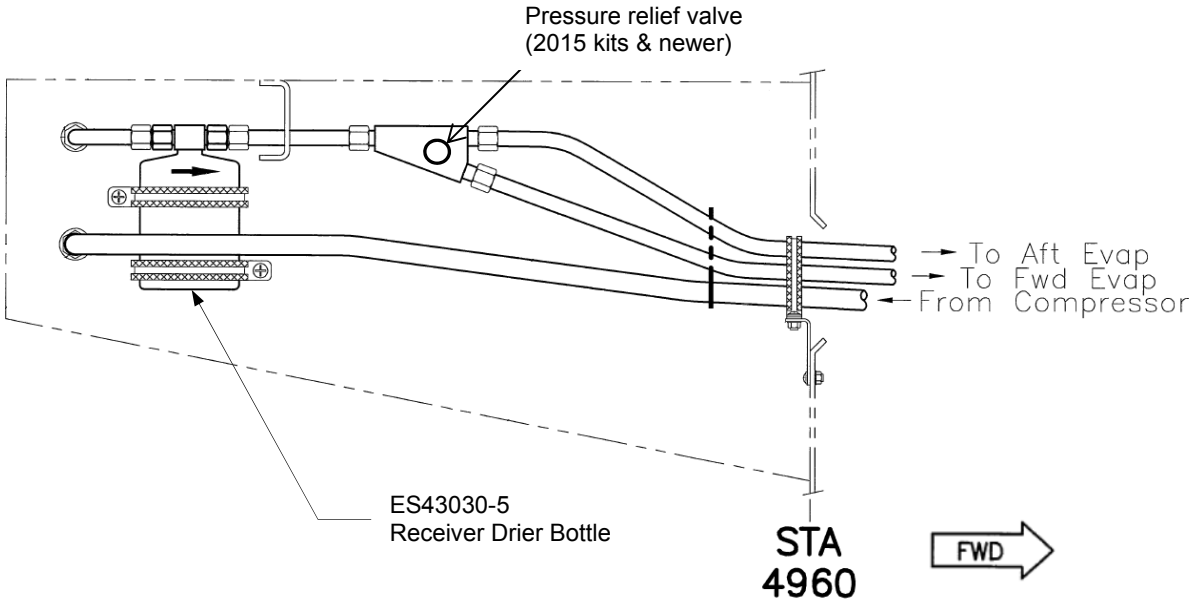


Figure 4-9 – Receiver Drier Bottle Installation
(Aircraft Belly – View Looking Inbd RH Side)

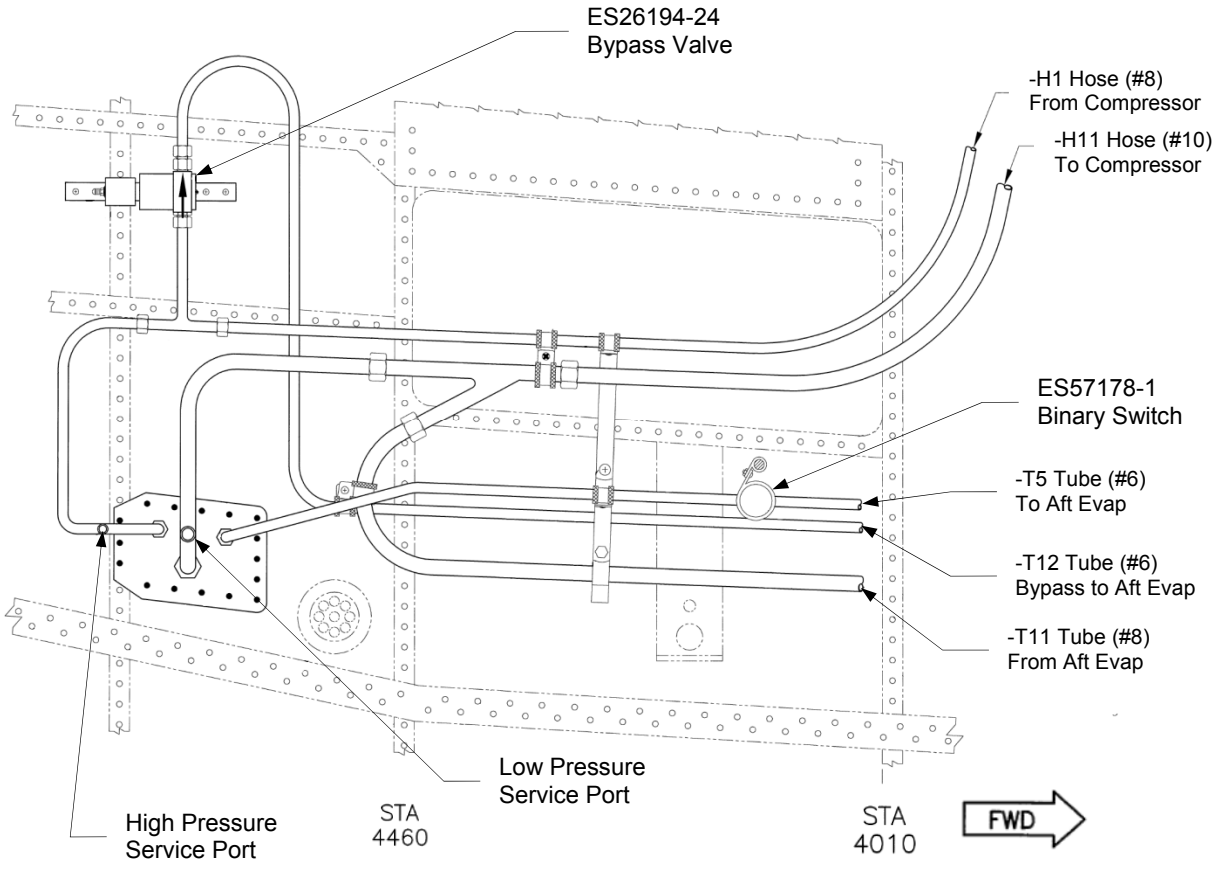


Figure 4-10 – Plumbing Components Location
(Engine Deck – View Looking Down RH Side)

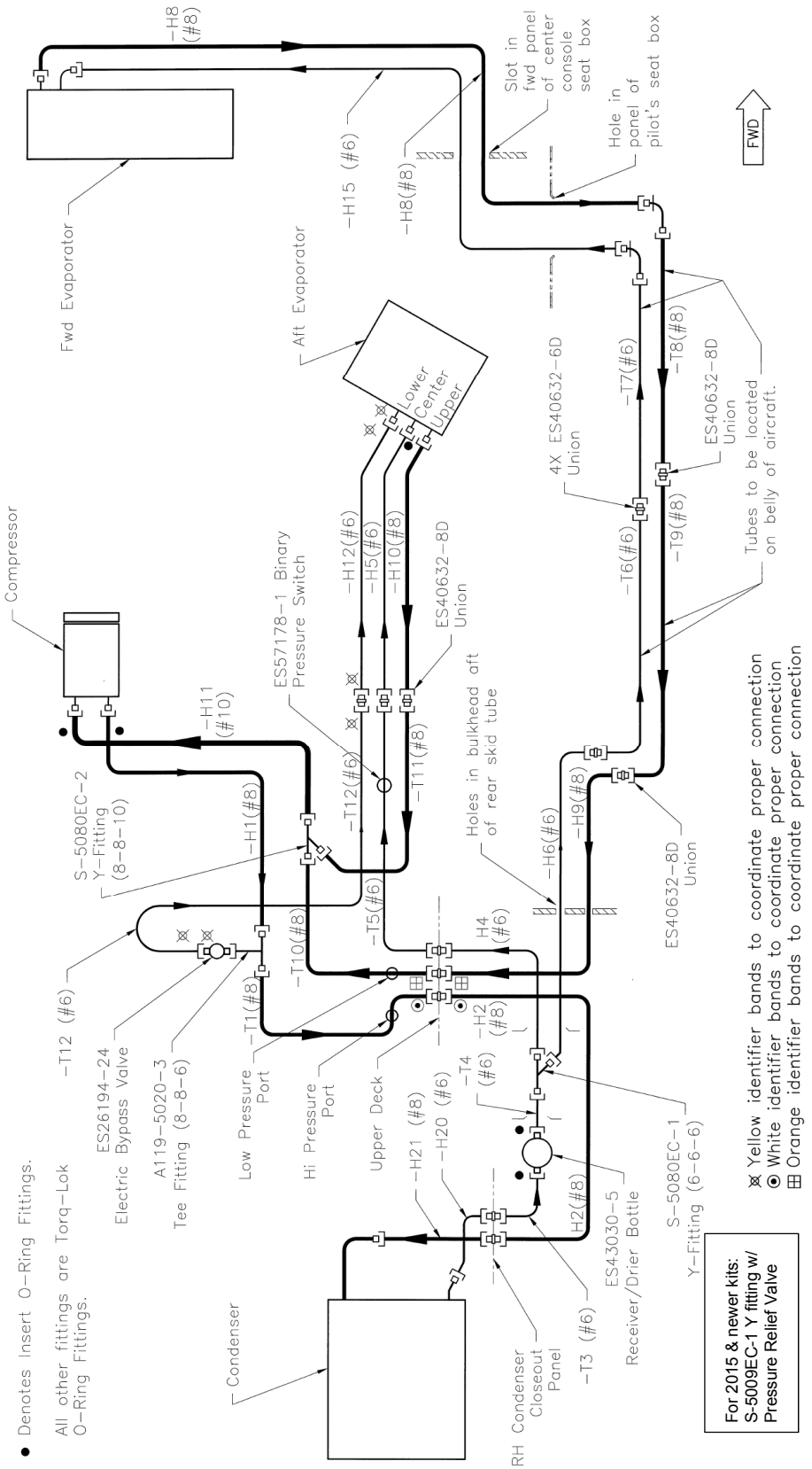


Figure 4-11 – Plumbing Schematic

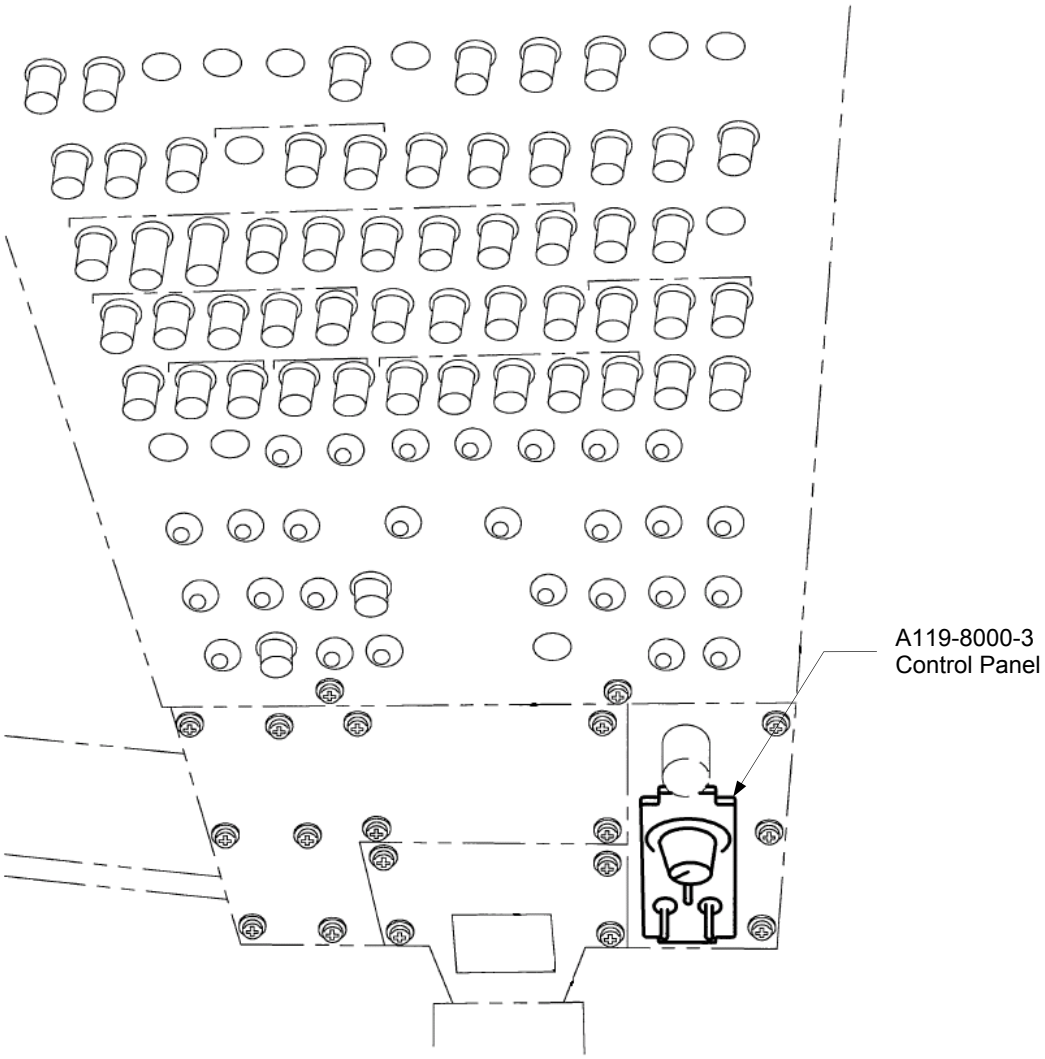


Figure 4-12 – A/C Control Panel Location
(Overhead Circuit Breaker Panel – View Looking Up)

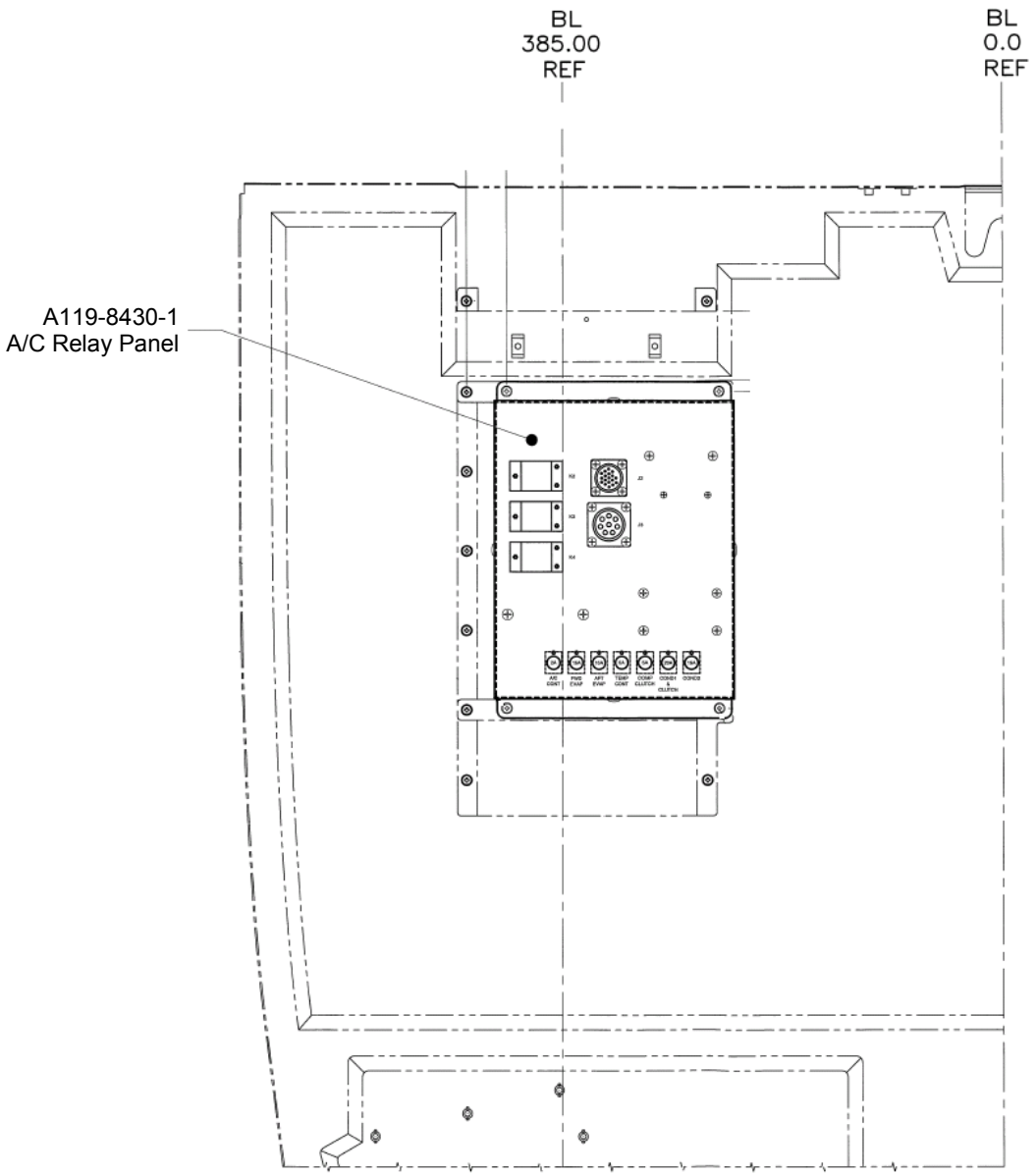
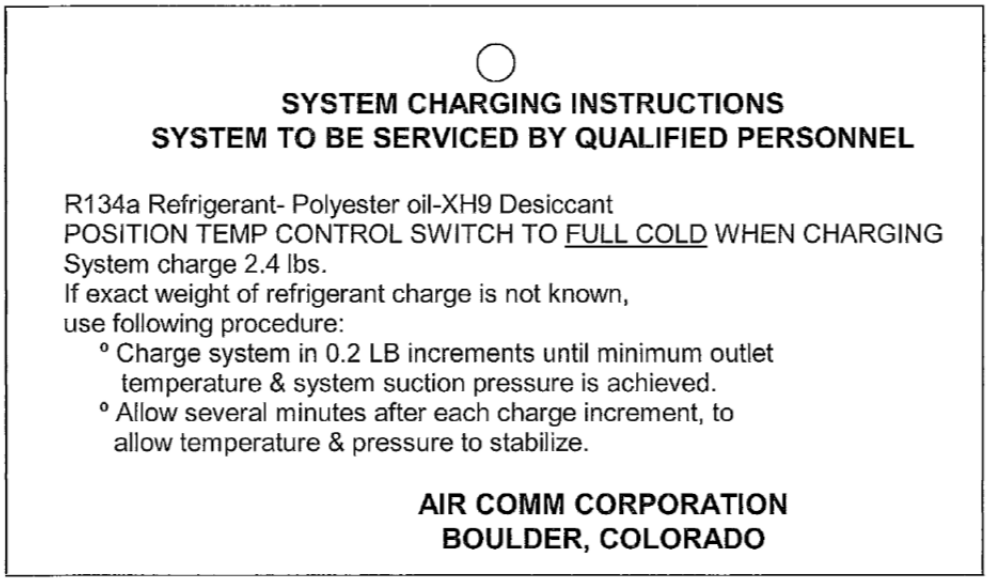


Figure 4-13 – A/C Relay Panel Location
(Baggage Compartment Forward Bulkhead – View Looking Fwd)

CHAPTER 5
PLACARDS AND MARKINGS

1. Placard and Marking Information

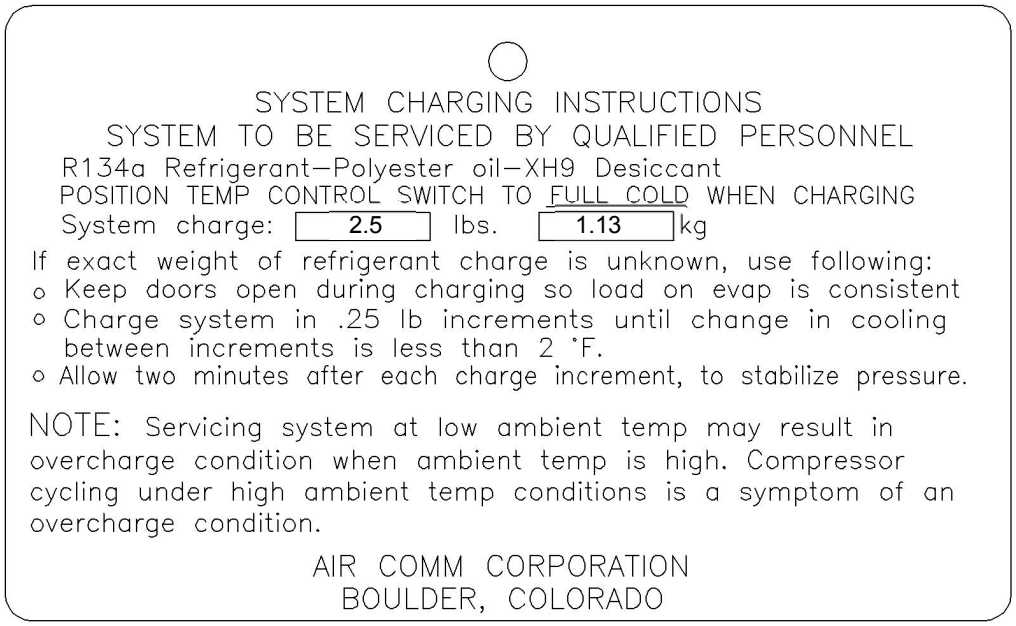


SYSTEM CHARGING INSTRUCTIONS
SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL

R134a Refrigerant- Polyester oil-XH9 Desiccant
POSITION TEMP CONTROL SWITCH TO FULL COLD WHEN CHARGING
System charge 2.4 lbs.
If exact weight of refrigerant charge is not known,
use following procedure:
- Charge system in 0.2 LB increments until minimum outlet temperature & system suction pressure is achieved.
- Allow several minutes after each charge increment, to allow temperature & pressure to stabilize.

AIR COMM CORPORATION
BOULDER, COLORADO

Placard Version up through July, 2013



SYSTEM CHARGING INSTRUCTIONS
SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL
R134a Refrigerant–Polyester oil–XH9 Desiccant
POSITION TEMP CONTROL SWITCH TO FULL COLD WHEN CHARGING
System charge: 2.5 lbs. 1.13 kg
If exact weight of refrigerant charge is unknown, use following:
- Keep doors open during charging so load on evap is consistent
- Charge system in .25 lb increments until change in cooling between increments is less than 2 °F.
- Allow two minutes after each charge increment, to stabilize pressure.

NOTE: Servicing system at low ambient temp may result in overcharge condition when ambient temp is high. Compressor cycling under high ambient temp conditions is a symptom of an overcharge condition.

AIR COMM CORPORATION
BOULDER, COLORADO

Placard version from July, 2013 onward

Charging Instructions Placard
(Upper Deck Adjacent to Charging Ports)

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CHAPTER 6
SERVICING

1. Safety Precautions

CAUTION

Refrigeration servicing should be performed by qualified personnel only.

The refrigerant used in the air conditioning system is the environmentally safe HFC R134a. This refrigerant is non-explosive, non-flammable, and non-corrosive, has practically no odor, and is heavier than air. Although R134a is classified as a safe refrigerant, certain precautions must be observed to protect the parts involved and the person working on the system.

Liquid R134a at normal atmospheric pressure and temperature evaporates quickly and tends to freeze anything that it contacts. Care must be taken to prevent any refrigerant from coming into contact with the skin and the eyes.

WARNING

Always wear safety goggles when servicing any part of the refrigerant system. Should any liquid refrigerant contact the skin or eyes, seek medical attention immediately even if the irritation ceases.

WARNING

Never weld, use a flame-type leak detector, blow torch, solder, steam clean, bake on aircraft finish, or use excess amounts of heat on, or in the immediate area of refrigerant supply tank.

2. Servicing Information

A list of suggested servicing equipment is provided later in this chapter.

Servicing Procedure

A. Connect the service manifold and vacuum pump to the service ports located in the upper deck aft of the compressor assembly.

B. Turn on the vacuum pump and open both valves to evacuate the system. When the pressure drops to 29.40 InHg (1.9 KgCm) moisture vaporizes and is drawn out of the system by the vacuum pump. Complete removal of moisture is important to prevent blockage of the expansion valves with ice. Leak check the system as described later in this chapter.

NOTE

Due to the drop in atmospheric pressure with an increase in altitude, the normal vacuum reading will drop approximately 1” InHg (1 KgCm) for each 1000 ft. (304.8 m) of altitude.

C. After the system has been evacuated, turn off both manifold valves and turn vacuum pump off. Allow a minimum of one hour to check for vacuum leaks (if the system will not

hold a vacuum, the system has a fitting leak). It may be necessary to charge the system with one or two lbs. (.45 to .86 Kg.) of refrigerant and conduct a leak check survey using an electronic leak detector.

CAUTION

It is mandatory that the system be leak free to insure trouble free operation. Continuous operation of the system with insufficient charge will result in reduced compressor life.

D. After the system is proven to be leak free, the system should be evacuated for a minimum of 1/2 hour before being charged with HFC R134a.

E. Charging the system with 2.5 lbs. (1.13 Kg.) of R134a refrigerant is the most accurate method of charging. This should be accomplished using the suggested servicing equipment called out in this chapter.

F. If a charging station is unavailable, the following procedure should be followed. Add an initial refrigerant charge of 2.0 lbs. (0.9 Kg.) then continue to add refrigerant until the evaporator outlet air temperature and system suction pressures reach a minimum. When adding the refrigerant after the initial charge, it should be done in increments of 0.2 lbs. (.09 Kg.) and two minutes allowed to elapse before adding each additional 0.2 lbs. (.09 Kg.) refrigerant charge. The optimum charge occurs when evaporator outlet temperatures are at their lowest. Any additional refrigerant will cause the outlet air temperature to increase and system performance to be degraded.

WARNING

If the system is to be charged by operating the compressor, it must be charged through the Lo (Blue fitting) pressure (suction) port only. Do not open the Hi (Red fitting) pressure (discharge) valve while the system is operating.

G. Test-run the system after charging, to confirm the system is working properly.

CAUTION

When reclaiming refrigerant, be sure to note any oil that is removed from the system, and replace the lost oil before or during re-servicing. Reduced compressor life will result if the total system oil charge is not maintained.

SYSTEM REFRIGERANT & OIL CHARGE

System Description	Refrigerant Charge		Oil Charge	
A119 Air Conditioner	2.5 lbs.	1.13 kg.	8.0 fl. oz.	236.6 ml.

3. Lubrication Information

The total system oil charge is 8.0 fl. oz. (236.6 ml.) of R134a Polyester Refrigerant Oil. The compressor is charged with a full system charge of 8.0 fl. oz. (236.6 ml.) of oil at the factory. No additional oil is to be added at the time of the system installation.

If oil is spilled during installation / maintenance, or is lost due to a leak in the system, it is necessary to approximate the amount of lost oil and add this amount to the system.

The oil charge is continuously circulated by the refrigerant during the operation of the system. A quantity of oil is trapped by the compressor.

NOTE

Maintaining the correct amount of refrigerant and refrigerant oil in the system is critical for ensuring the long life of the compressor.

The Service Ports for this system are located in the upper deck aft of the compressor assembly.

CAUTION

This system is serviced with Polyester Based Refrigerant Oil. The use of Polyalkylene glycol (PAG), or Mineral Oil in this system will cause damage to the air conditioner compressor and expansion valves.

4. System Leak Check

Identification and elimination of system fitting leaks is extremely important to insure a trouble-free operation of this system.

A system which contains a partial charge of refrigerant can be leak tested with the aid of an electronic leak detector, and be recharged without evacuating the system.

A new or empty system can be pressurized with nitrogen 70-80 psi (5.1-5.6 kg/cm) or R134a 50 psi (3.5 kg/cm) to conduct a leak survey.

CAUTION

Do not use compressed air. Compressed air will introduce moisture into the system, which will degrade the operation of the system.

The preferred method to conduct a leak survey is to use an electronic leak detector in conjunction with a small charge of R134a refrigerant. All checks done in this manner should be conducted with the air conditioner off. Since the refrigerant is heavier than air, leaks are most likely to be detected on the underside of hoses and fittings. Refrigerant will collect in low areas and provide erroneous leak detection. A stream of compressed air from a nozzle may be useful in clearing the area just prior to conducting a leak test.

If the nitrogen method is used, it will be necessary to mix together a water and mild soap solution. Each fitting or suspected leak area should be brushed with this soap solution and watched for evidence of bubbles formed by the escaping nitrogen.

If a leak is detected at an O-ring fitting, check to insure proper torque has been applied to the fitting. If the system continues to leak, reclaim the system of refrigerant, and install new O-rings.

NOTE

Ensure that the O-ring is lubricated with refrigerant oil prior to its installation.

A small amount of leakage (approximately one ounce per year) past the compressor shaft seal is normal. Most leak detectors are sensitive enough to show a leak of this magnitude.

5. Suggested Equipment for Servicing

Recovery / Recycling / Recharging Station
(Example: Snap-on Model ACT 3340, Robinair Model 34700, or equivalent)

Electronic Leak Detector (R134a compatible)
(Example: Micro-Tech III, Robinair, Snap-on, or equivalent)

Manifold and gauge set (R134a compatible)
(Example: Robinair, Snap-on, or equivalent)

6. Consumable Materials

Refrigerant: This system is to be charged with Dupont, or equivalent HFC R134a refrigerant only.

Lubricant: This system is to be serviced with R134a compatible Polyester Refrigerant Oil.

CAUTION

Do *not* use Polyalkylene glycol (PAG) or Mineral Oil in this system.

O-rings: As this system is charged with R134a refrigerant, it must be fitted with Highly Saturated Nitriles (HSN) O-rings. This system incorporates two different O-ring fittings, TORQ LOK® and Insert. The HSN O-rings for the TORQ LOK® fittings are BLACK in color and the HSN O-ring for the Insert fittings are GREEN in color.

7. Suggested Spares List

Item	Part Number	Effectivity
Blower Motor – Fwd. Evaporator	ES61064-1	
Blower Motor – Aft Evaporator	ES61142-1	
Blower Assembly – Condenser	A119-7008-1 is superseded by SK-A119-120315 now S-6501EC-3	Kit S/N 90 and subsequent
Compressor Assembly	A119-3040-1	
Compressor Drive Belt	ES35119-2	
Receiver / Drier Bottle	ES43030-5	
Binary Switch	ES57178-1	
By-pass Valve	ES26194-24	
Blower Assembly – Condenser (Standard)	ES73190-1	Kit S/N 28 thru 46
Blower Assembly – Condenser (High Output)	ES73192-1	Kit S/N 47 thru 89
HSN O-rings; Insert type (Green)		
Size		
#6 O-ring	ES44010-2	
#8 O-ring	ES44010-3	
#10 O-ring	ES44010-4	
HSN O-rings; TORQ LOK® Type (Black)		
Size		
#6 O-ring	ES44012-2	
#8 O-ring	ES44012-3	
#10 O-ring	ES44012-4	

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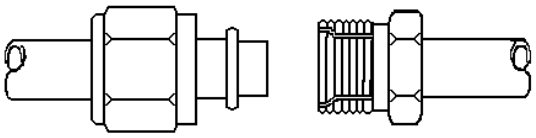
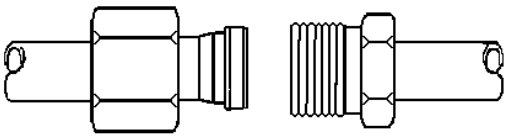
CHAPTER 7
STANDARD PRACTICES AND INFORMATION

1. Fitting Torque Procedures and Values

INSERT O-RING FITTINGS



TORQ LOK® FITTINGS



Apply a thin coating of refrigerant oil to O-ring and Female side of fitting.
Confirm there is no damage (nicks, dirt, etc.) on fittings.
Slide B-nut back away from the end of the tube so you can see the O-ring as you slide the fitting together.

Be careful not to pinch O-ring during assembly.

Engage the male end into the female fitting being careful to maintain alignment.

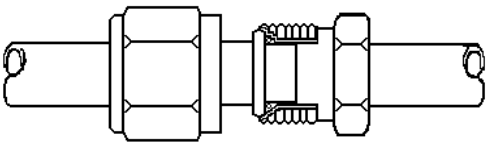
The male flange should seat fully against the female fitting without the O-ring being pinched.

It is important to hold the fitting together while sliding the B-nut forward and engaging the threads. Tighten the B-nut by hand and then torque as follows.

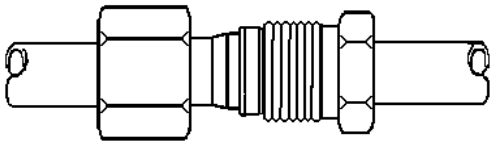
6 Fittings: 30 – 35 in-lbs (3.4-4.0 Nm)
8 Fittings: 40 – 45 in-lbs (4.6-5.1 Nm)
#10 Fittings: 50 – 55 in-lbs (5.7-6.3 Nm)

DO NOT OVER TORQUE
ALWAYS USE BACK UP WRENCH

INSERT O-RING FITTINGS



TORQ LOK® FITTINGS



Once the system is charged, check each fitting with an electronic leak detector.

(An electronic leak detector is the only reliable method of checking for refrigerant leaks)
Once the fittings have been checked and are found to be free of leaks, torque seal as appropriate.

2. Removal and Replacement of Forward Evaporator Assembly (Figure 4-6)

NOTE

It will be necessary to evacuate (discharge) refrigerant from the system to remove or replace forward evaporator assembly. Instructions for servicing are found in Chapter 6.

Removal

a. Disconnect refrigerant plumbing from evaporator fittings once refrigerant is evacuated. Always use a back-up wrench. Cap open lines to prevent contamination.
b. Remove flex duct coming from LH outlet and RH blower assembly by removing cable ties to evaporator.
c. Disconnect drain line from bottom of evaporator by removing cable tie.
d. Disconnect blower motor electrical connector.
e. Remove attaching hardware securing evaporator assembly to support brackets. Remove evaporator.

Replacement

a. Install evaporator and secure with attaching hardware to support brackets.
b. Connect blower motor electrical connector and secure as needed.
c. Connect drain line at bottom of evaporator and secure with cable tie.
d. Connect flex duct from LH outlet and RH blower assembly and secure with cable ties.
e. Replace all O-rings before connecting refrigerant plumbing to evaporator fittings using a back-up wrench. Torque refrigerant line connections to 30–35 inch-lbs (3.4-4.0 Nm) for the #6 fitting and 40–45 inch-lbs (4.6-5.1 Nm) for the #8 fitting.
f. Service air conditioning system with refrigerant.

3. Removal and Replacement of Forward Evaporator RH Blower Assembly (Figure 4-6)

Removal

a. Remove flex duct coming from RH outlet and evaporator assembly by removing cable ties at RH blower assembly.
b. Disconnect blower motor electrical connector.
c. Remove attaching hardware securing blower assembly to mounting bracket. Remove blower assembly.

Replacement

g. Install blower assembly and secure with attaching hardware to mounting bracket.
h. Connect blower motor electrical connector and secure as needed.
i. Connect flex duct from RH outlet and evaporator assembly and secure with cable ties.

4. Removal and Replacement of Aft Evaporator Assembly (Figure 4-7)

NOTE

It will be necessary to evacuate (discharge) refrigerant from the system to remove or replace aft evaporator assembly. Instructions for servicing are found in Chapter 6.

Removal

a. Disconnect refrigerant plumbing from evaporator fittings once refrigerant is evacuated. Always use a back-up wrench. Cap open lines to prevent contamination.
b. Remove attaching hardware and disconnect elbow duct from inlet of evaporator. Remove flex duct from outlet of evaporator by removing cable ties.
c. Disconnect drain line from bottom of evaporator by removing cable tie.
d. Disconnect wiring to temperature control module in the evaporator assembly by disconnecting electrical connector.
e. Remove attaching hardware securing evaporator assembly to cabin top. Remove evaporator.

Replacement

j. Install evaporator and secure with attaching hardware to cabin top.
k. Connect drain line at bottom of evaporator and secure with cable tie.
l. Connect elbow duct and flex duct to inlet and outlet of evaporator and secure with cable ties. Seal elbow duct joint to evaporator with black RTV.
m. Connect wiring to temperature control module in the evaporator assembly by connecting electrical connector.
n. Replace all O-rings before connecting refrigerant plumbing to evaporator fittings using a back-up wrench. Torque refrigerant line connections to 30–35 inch-lbs (3.4-4.0 Nm) for the #6 fitting and 40–45 inch-lbs (4.6-5.1 Nm) for the #8 fitting.
o. Service air conditioning system with refrigerant.

5. Removal and Replacement of Aft Evaporator Blower Assembly (Figure 4-7)

Removal

a. Remove flex duct coming from evaporator assembly by removing cable ties at blower assembly inlet.
b. Remove attaching hardware securing blower assembly outlet to air box assembly.
c. Disconnect blower motor electrical connector.
d. Remove attaching hardware securing blower assembly to angle mounting brackets. Remove blower assembly.

Replacement

p. Install blower assembly and secure with attaching hardware to angle mounting brackets.
q. Connect blower motor electrical connector and secure as needed.

r. Connect air box assembly to blower outlet with attaching hardware.
s. Connect flex duct from evaporator assembly and secure with cable ties.

6. Removal and Replacement of Air Box Assembly (Figure 4-7)

Removal

a. Remove fresh air flex duct coming from fresh air box by removing cable ties at air box assembly inlet.
b. Remove attaching hardware securing air box assembly inlet to aft evaporator blower assembly outlet.
c. Remove attaching hardware securing air box assembly to cabin top. Remove air box assembly.

Replacement

a. Install air box assembly and secure with attaching hardware to cabin top.
b. Secure air box assembly to blower outlet with attaching hardware.
c. Connect fresh air flex duct from fresh air box and secure with cable ties.

7. Removal and Replacement of Condenser Assembly (Figure 4-8)

NOTE

It will be necessary to evacuate (discharge) refrigerant from the system to remove or replace condenser assembly. Instructions for servicing are found in Chapter 6.

Removal

a. Remove screws that attach condenser blower assembly to the lower contour of the belly panel. This will allow the condenser blower assembly to pivot on the forward hinged support plate.
b. Remove lower aft fairing to gain access to condenser assembly.
c. Disconnect refrigerant plumbing from condenser fittings once refrigerant is evacuated. Always use a back-up wrench. Cap open lines to prevent contamination.
d. Remove attaching hardware securing condenser assembly to side panels. Remove condenser.

Replacement

a. Install condenser and secure with attaching hardware to side panels. Safety wire bolts. Reseal areas around condenser with ES06022-2 cork tape to prevent air leakage.
b. Replace all O-rings before connecting refrigerant plumbing to condenser fittings using a back-up wrench. Torque refrigerant line connections to 30–35 inch-lbs (3.4-4.0 Nm) for the #6 fitting and 40–45 inch-lbs (4.6-5.1 Nm) for the #8 fitting.
c. Install lower aft fairing and install screws that attach condenser blower assembly to the lower contour of the belly panel.
d. Service air conditioning system with refrigerant.

8. Removal and Replacement of Condenser Vane Axial Blower Assembly (Figure 4-8)

Removal

a. Remove screws that attach condenser blower assembly to the lower contour of the belly panel. This will allow the blower assembly to pivot on the forward hinged support plate.
b. Disconnect vane axial blower assembly Molex connector.
c. Remove inlet duct and attaching hardware.
d. Remove bolts on each side of blower mount plates and remove vane axial blower assembly.

Replacement

a. Install vane axial blower assembly and attaching hardware to blower mount plates.
b. Install inlet duct and attaching hardware. Seal inlet edge with RTV.
c. Connect Molex connector and secure as needed.
d. Swing condenser blower assembly up and install screws that attach assembly to lower contour of the belly panel.

9. Removal and Replacement of Compressor Drive Belt (Figure 4-3)

Removal

a. Cut safety wire on compressor belt tensioning link and belt tensioning link jam nuts, and loosen respective jam nut(s).
b. Loosen lower compressor pivot bolt on the compressor mount to allow freedom of movement of compressor.
c. Adjust belt tensioning link to loosen drive belt.
d. Remove bolts securing oil cooler shaft to rotor brake disk and flange to allow removal of drive belt from drive pulley. Remove drive belt.

Replacement

a. Install drive belt on compressor pulley and drive pulley.
b. Install bolts securing oil cooler shaft to rotor brake disk and flange. Torque to 75-95 in-lbs (8.47-10.73 Nm).
c. Adjust drive belt tension according to adjustment procedure below.
d. Tighten and torque lower compressor pivot bolt on the compressor mount to 110-130 in-lbs (12.43-14.69 Nm).

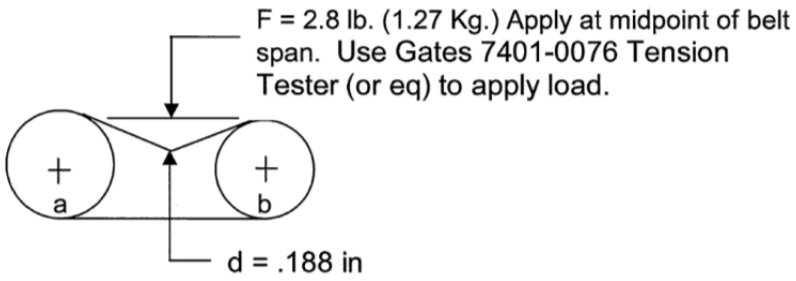
Adjustment

NOTE

Proper static belt tension is necessary to insure proper belt life and to avoid excessive side load on the oil cooler shaft. The belt tension should be reset after several hours of operation.

a. The proper belt tension is achieved by using the following procedure.

b. Apply 2.8 lbs (1.27 Kg) of force using a tension tester midpoint of belt span between the compressor pulley and the drive pulley.
c. Deviation should be .188 inch. Adjust belt tensioning link as required.
d. Safety wire compressor belt tensioning link and jam nuts.



10. Removal and Replacement of Compressor Assembly (Figure 4-3)

NOTE

It will be necessary to evacuate (discharge) refrigerant from the system to remove or replace compressor assembly. Instructions for servicing are found in Chapter 6.

Removal

a. Cut safety wire on compressor belt tensioning link and belt tensioning link jam nuts, and loosen respective jam nut(s).
b. Loosen lower compressor pivot bolt on the compressor mount to allow freedom of movement of compressor.
c. Adjust belt tensioning link to loosen drive belt. Remove belt from compressor pulley.
d. Remove nut and bolt from upper compressor mount for belt tensioning link assembly and safety strap.
e. Disconnect refrigerant plumbing from compressor fittings once refrigerant is evacuated. Always use a back-up wrench. Cap open lines to prevent contamination.
f. Remove pivot bolt, washer, and sleeve on lower compressor mount. Remove compressor.

Replacement

NOTE

Replacement compressors have been serviced with Polyester refrigerant (Ester) oil for use in R134a systems. There is no need to add additional oil for replacements.

a. Install compressor and secure pivot bolt, washer, and sleeve on lower compressor mount. Do not tighten pivot bolt.
b. Install belt on compressor pulley.

c. Replace all O-rings before connecting refrigerant plumbing to compressor fittings using a back-up wrench. Torque refrigerant line connections to 40–45 inch-lbs (4.6-5.1 Nm) for the #8 fitting and 50–55 in-lbs (5.7-6.3 Nm) for the #10 fitting.
d. Install nut and bolt from upper compressor mount for belt tensioning link assembly and safety strap. Torque bolt to 110-130 in-lbs.
e. Perform belt adjustment according to procedure in paragraph 9.
f. Tighten and torque lower compressor pivot bolt on the compressor mount to 110-130 in-lbs (12.43-14.69 Nm).
g. Service air conditioning system with refrigerant.

11. Removal and Replacement of Receiver Drier Bottle (Figure 4-9)

NOTE

It will be necessary to evacuate (discharge) refrigerant from the system to remove or replace receiver drier bottle. Instructions for servicing are found in Chapter 6.

Removal

a. Remove screws that attach condenser blower assembly to the lower contour of the belly panel. This will allow the condenser blower assembly to pivot on the forward hinged support plate.
b. Remove lower aft fairing to gain access to receiver drier bottle.
c. Disconnect refrigerant plumbing from receiver drier bottle fittings once refrigerant is evacuated. Always use a back-up wrench. Cap open lines to prevent contamination.
d. Remove attaching hardware to clamps securing receiver drier bottle. Remove receiver drier.

Replacement

CAUTION

Replacement receiver drier bottles are capped to prevent moisture contamination. Receiver drier bottles left uncapped and open for more than 10 minutes must be discarded and replaced.

a. Install receiver drier bottle and secure clamps with attaching hardware.
b. Replace all O-rings before connecting refrigerant plumbing to receiver drier bottle fittings using a back-up wrench. Torque refrigerant line connections to 30–35 inch-lbs (3.4-4.0 Nm) for the #6 fittings.
c. Install lower aft fairing and install screws that attach condenser blower assembly to the lower contour of the belly panel.
d. Service air conditioning system with refrigerant.

12. Removal and Replacement of Bypass Valve (Figure 4-10)

NOTE

It will be necessary to evacuate (discharge) refrigerant from the system to remove or replace bypass valve. Instructions for servicing are found in Chapter 6.

Removal

a. Disconnect refrigerant plumbing from bypass valve once refrigerant is evacuated. Always use a back-up wrench. Cap open lines to prevent contamination.
b. Disconnect electrical wiring from bypass valve solenoid.
c. Remove attaching hardware to mounting brackets securing bypass valve. Remove bypass valve.

Replacement

a. Install bypass valve and secure to mounting brackets with attaching hardware.
b. Replace all O-rings before connecting refrigerant plumbing to bypass valve fittings using a back-up wrench. Torque refrigerant line connections to 30–35 inch-lbs (3.4-4.0 Nm) for the #6 fittings.
c. Connect electrical wiring to bypass valve solenoid. Secure wiring as needed.
d. Service air conditioning system with refrigerant.

13. Removal and Replacement of Binary Switch (Figure 4-10)

Removal

a. Disconnect electrical wiring from binary switch.
b. Remove attaching hardware to clamp securing binary switch. Remove binary switch by unscrewing from Schrader valve on tube assembly.

Replacement

e. Install binary switch and secure clamp with attaching hardware.
f. Connect electrical wiring to binary switch.

CHAPTER 8
TROUBLESHOOTING

1. System Troubleshooting

Prior to troubleshooting a defective system, it is advisable to conduct a visual inspection for general condition and obvious signs of damage or failure.

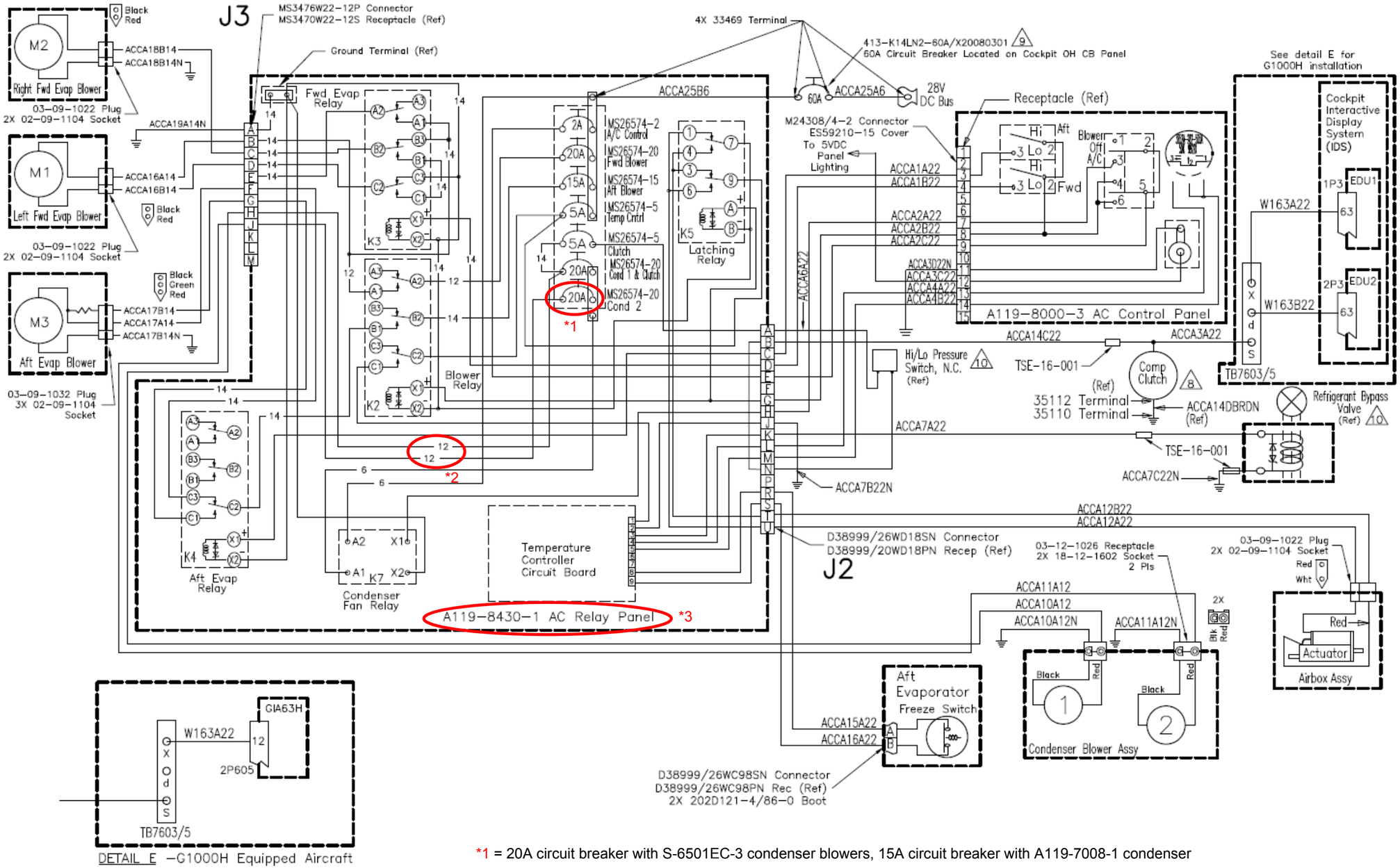
The following matrix lists the easiest checks and the most likely problems.

Problem	Probable Cause	Corrective Action
System not Cooling (Evaporator blowers still operating)	System is low or empty of refrigerant	Evacuate the system, determine the origin of the refrigerant leak if applicable, and re-charge the system
	Moisture or air in the system	Evacuate the system, replace the receiver drier, and place the system under a vacuum for a minimum of 45 minutes before recharging the system
	Compressor	If the compressor has failed, it must be replaced
	Compressor drive belt	If the compressor drive belt has failed it will need to be replaced
	By-pass valve	Check to insure the temperature control knob on the A/C control panel in the cockpit is in the full cold position, and the temperature control circuit breaker has not tripped. If the valve remains open (by-passing refrigerant) the valve will need replacement
	Condenser blower motor / fan assembly.	Check to insure the condenser blower motor/fan assembly are receiving power, and the circuit breakers have not tripped; if the blowers still do not function, they may have failed internally and must be replaced
System not cooling (Evaporator blowers not operating)	Air conditioner control circuit breaker tripped.	Reset circuit breaker; if breaker will not reset, check for short in circuit
	Forward or Aft evaporator blower circuit breaker tripped.	Reset circuit breaker; if breaker will not reset, check for short in circuit.

Problem	Probable Cause	Corrective Action
System not cooling (Evaporator blowers not operating)	Forward and aft evaporator blower motor(s)	Check for power to the motor(s), and for the free movement of the blower wheel; if the motor shaft does not turn smoothly the motor must be replaced
Loss of cooling limited to one evaporator	Expansion valve malfunction	If cooling is lost in only one of the evaporators, and the blowers continue to function, it is most likely a blockage at the expansion valve orifice, this is most often caused by dirt in the system forming a blockage as the refrigerant passes through the valve; evacuating the system and changing the receiver drier should cure this problem; if the above actions do not resolve the problem, the evaporator assembly must be replaced
External moisture (Condensate) in the area of forward / aft evaporator	Leak in evaporator, or evaporator drainage system	If water is noted in the area near the evaporators, this is normally caused by a loose, cracked, plugged, or disconnected drain line **NOTE** The drain line consists of a tube which extends from the lower surface of the evaporators through the outer contour of the helicopter

(Contact Air Comm Corporation Service Department for current pricing and availability of replacement components and parts)

Figure 8-1 – Electrical Schematic (IDS Equipped Aircraft) with A119-810 Installation

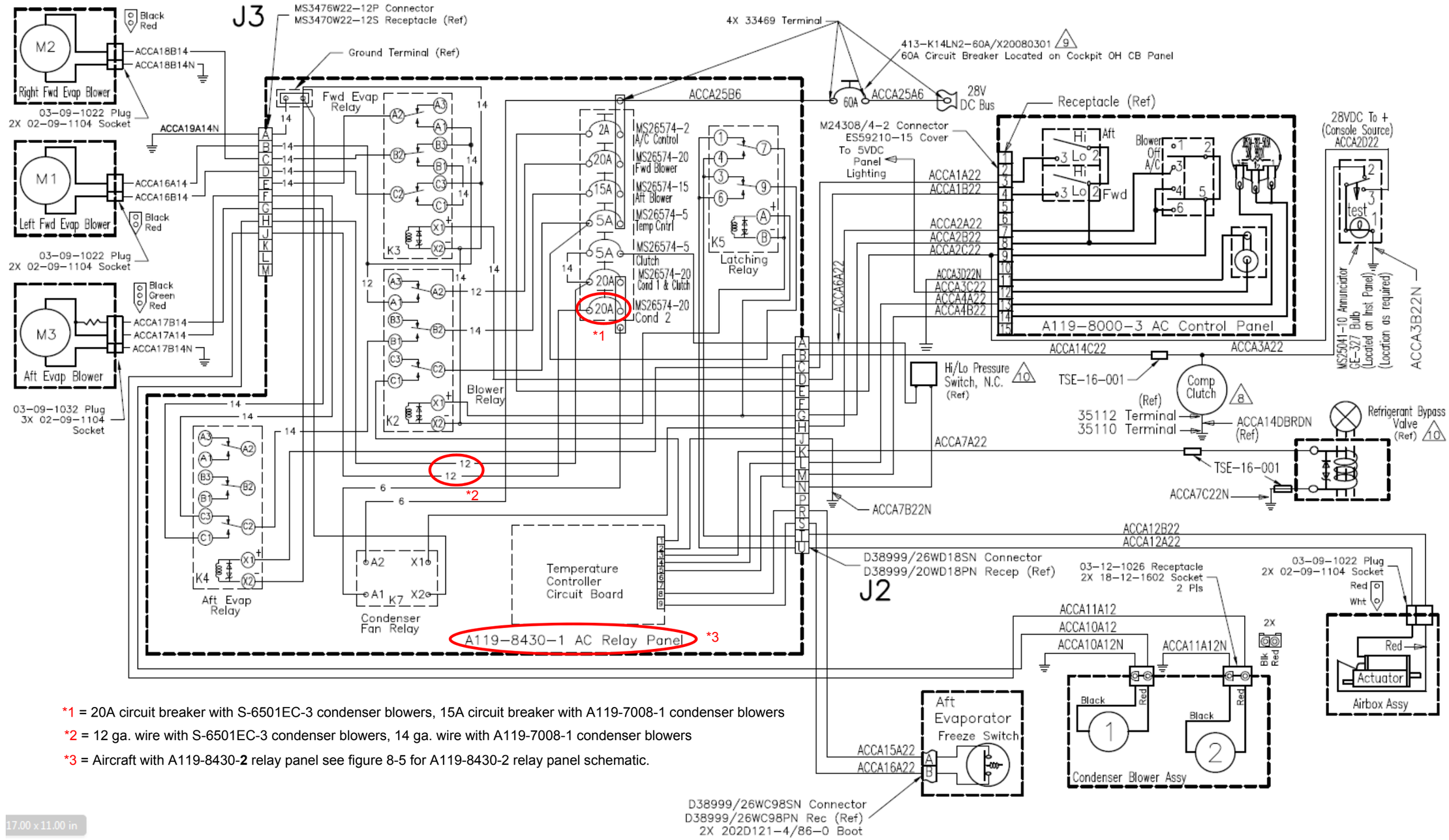


*1 = 20A circuit breaker with S-6501EC-3 condenser blowers, 15A circuit breaker with A119-7008-1 condenser

*2 = 12 ga. wire with S-6501EC-3 condenser blowers, 14 ga. wire with A119-7008-1 condenser blowers.

*3 = Aircraft with A119-8430-**2** relay panel see figure 8-5 for A119-8430-2 relay panel schematic.

Figure 8-2 – Electrical Schematic (Non IDS Equipped Aircraft) with A119-810 Installation



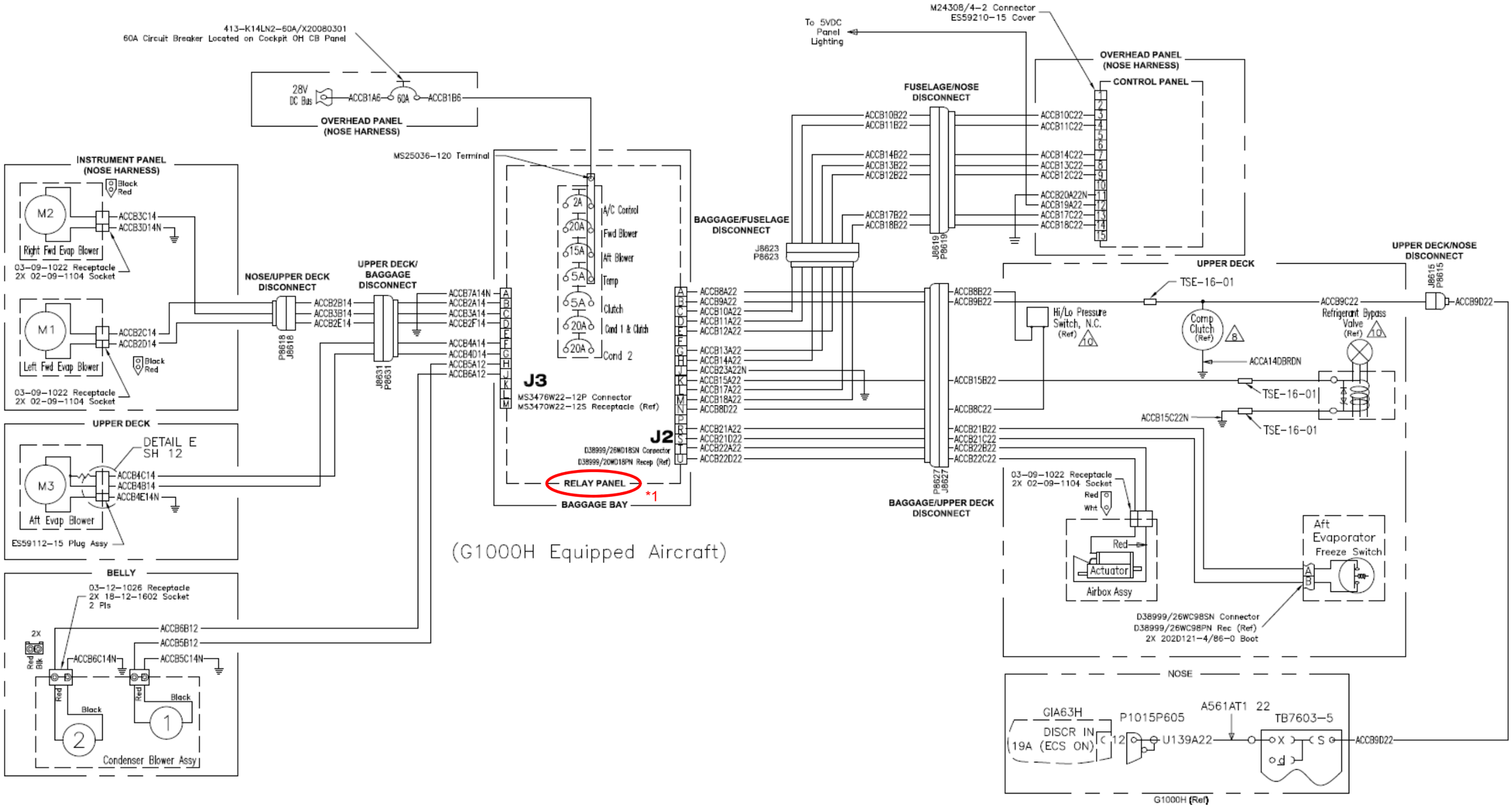
*1 = 20A circuit breaker with S-6501EC-3 condenser blowers, 15A circuit breaker with A119-7008-1 condenser blowers

*2 = 12 ga. wire with S-6501EC-3 condenser blowers, 14 ga. wire with A119-7008-1 condenser blowers

*3 = Aircraft with A119-8430-**2** relay panel see figure 8-5 for A119-8430-2 relay panel schematic.

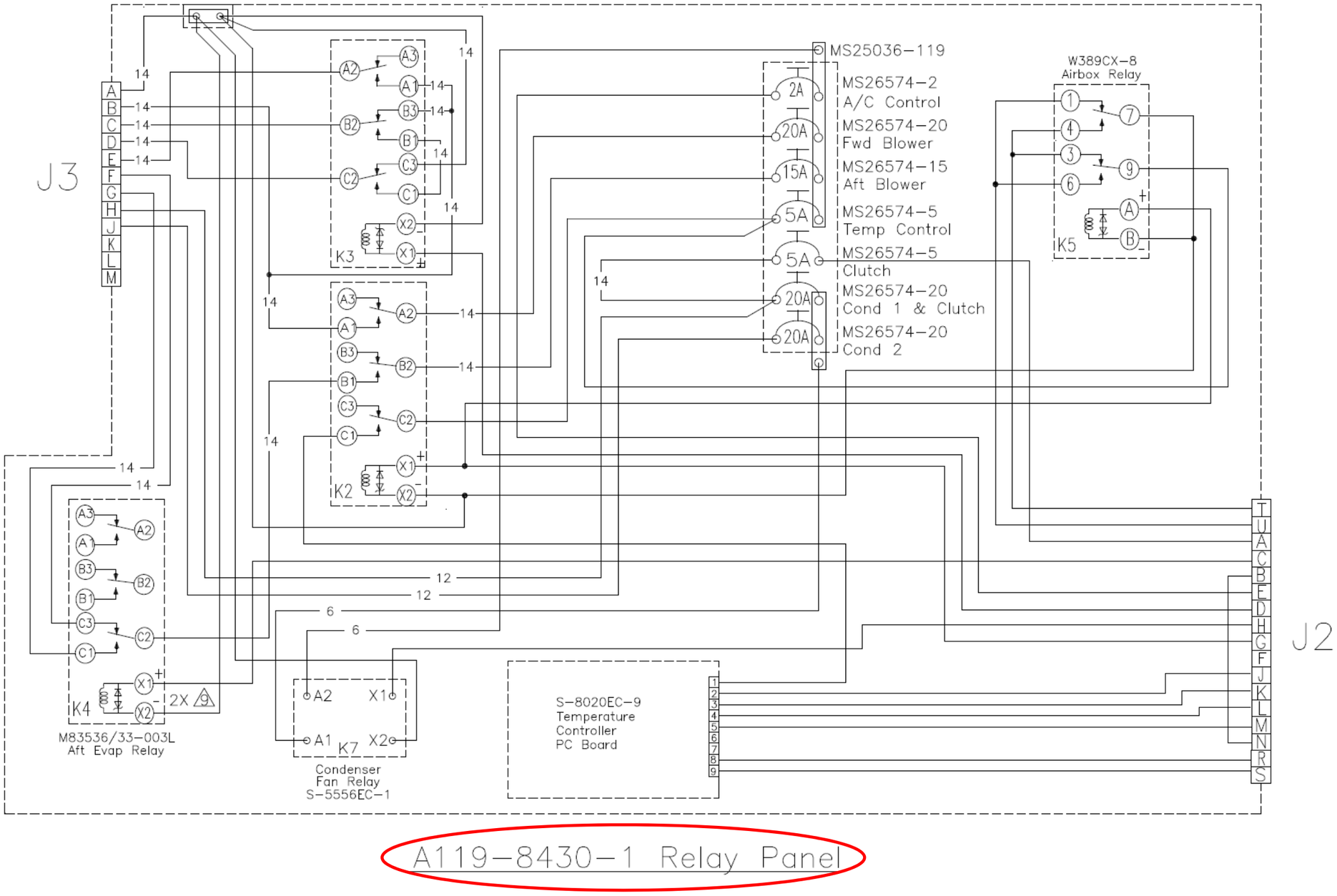
17.00 x 11.00 in

Figure 8-3 – Electrical Schematic (G1000H Equipped Aircraft) with A119-812 Installation



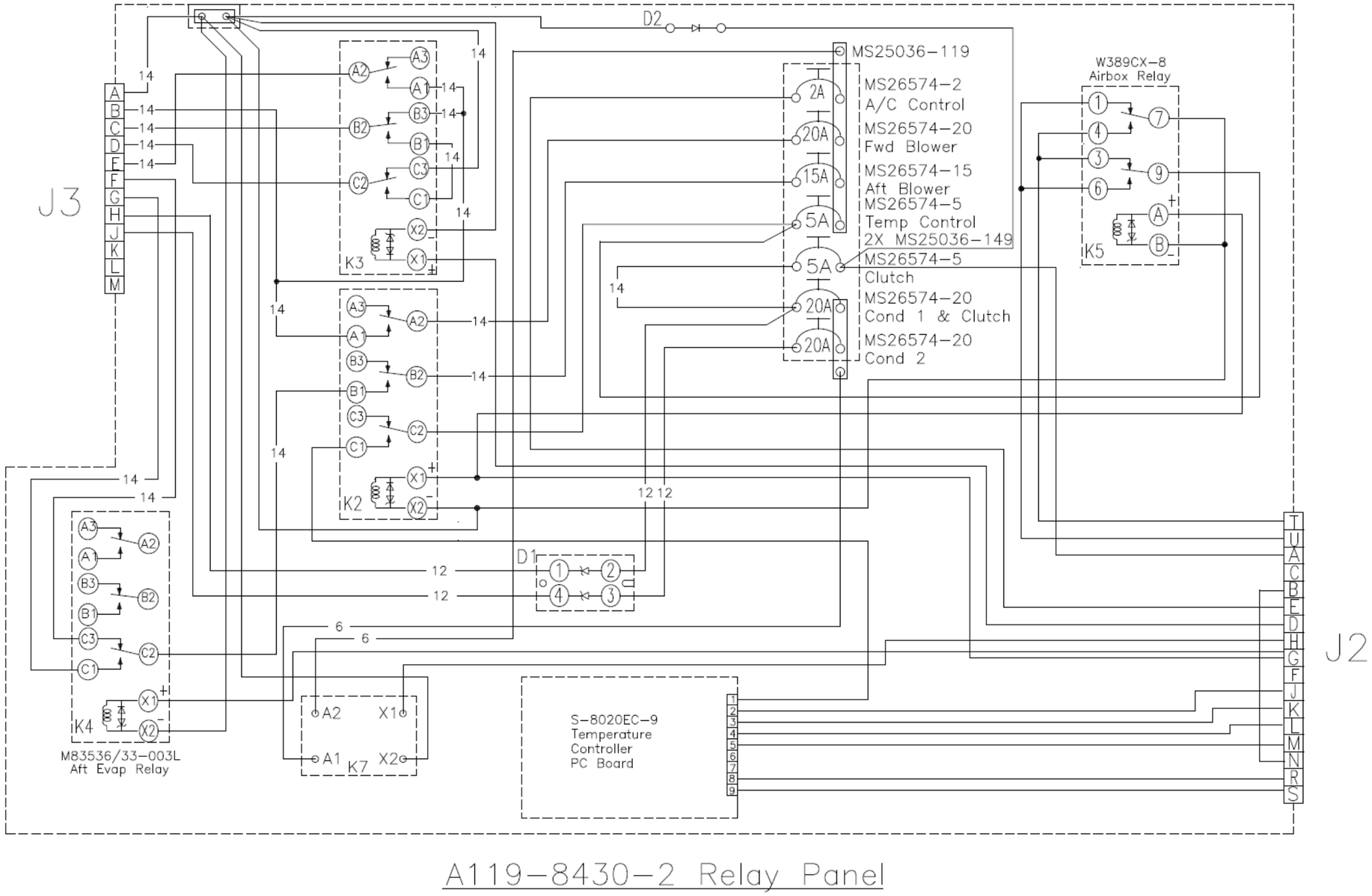
*1 = Relay panel A119-8430-1 schematic see Figure 8-4. Relay panel A119-8430-2 schematic see Figure 8-5.

Figure 8-4 – Electrical Schematic for A119-8430-1 Relay Panel



*1 = Aircraft with A119-810 installation may have slight panel variation see figures 8-1 and 8-2.

Figure 8-5 – Electrical Schematic for A119-8430-2 Relay Panel



APPENDIX A
WEIGHT AND BALANCE INFORMATION

Agusta A119 Air Conditioner System:
Ref. Dwg. A119-212

Weight Breakdown (Single Forward Evaporator Blower)

English Units					
Item	*Wt. (lbs)*	*X-Arm (in)*	*X-M (in-lb)*	*Y-Arm (in)*	*Y-M (in-lb)*
Total A119-212 Air conditioning System	*99.67*	*134.9*	*13,444.9*	*-1.88*	*-187.6*

Metric Units					
Item	**Wt. (kg)**	**X-Arm (mm)**	**X-M (kg-mm)**	**Y-Arm (mm)**	**Y-M (kg-mm)**
Total A119-212 Air conditioning System	45.30	3426	155227	-47.8	-2165

Weight Breakdown (Dual Forward Evaporator Blowers)

English Units					
Item	**Wt. (lbs)**	**X-Arm (in)**	**X-M (in-lb)**	**Y-Arm (in)**	**Y-M (in-lb)**
Total A119-212 Air conditioning System	105.8	129.2	13,669.4	-1.56	-165.5

Metric Units					
Item	**Wt. (kg)**	**X-Arm (mm)**	**X-M (kg-mm)**	**Y-Arm (mm)**	**Y-M (kg-mm)**
Total A119-212 Air conditioning System	50.0	3257.6	156,241.2	-50.4	-1,891.7