DON’T FORGET TO
ADD THE CURRENT
RELEASE OF
TR-134
TO APPENDIX A!

KEITH PRODUCTS, L.P.

Air Conditioning System for Learjet 31/31A, 35/35A, and 36/36A

Section	Component
21-50-00	Air Conditioning System
21-50-01	Electrical
21-50-02	Plumbing
21-50-03	Compressor/Drive Motor Assembly
21-50-04	Condenser Assembly
21-50-05	Fwd Evaporator Assembly
21-50-06	Aft Evaporator Assembly

Maintenance Manual

With

Illustrated Parts Catalog

Document No. CR-31-10

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EFFECTIVITY

This Maintenance Manual/IPC is for the installation of a Keith Products Air Conditioning System on the Learjet Model 31/31A SN31-169 and on. For all installations prior to SN 31-169 and all 35/35a, 36/36a, refer to TR134 for servicing instructions. This manual was created to aid Learjet publication.

LIST OF REVISIONS

REV	DATE	DESCRIPTION	BY	APPROVED
Orig.	04/28/99		BAT	CSH
A	07/08/99	Added IPC. Revised manual to reflect addition of IPC.	PB	TD
B	03/02/00	Section 21-50-00, Page 601, Inspection Interval Table, Inspection Action for Compressor drive motor called out Page 202 NOW Page 201.	PB	HOA
C	05/15/01	Section 21-51-30, Page 4, I/N 18 WAS 35-1560-8, NOW 35-1560-12 Updated Record of Revisions, List of Revisions, List of Effective Page and Cover Page	ML	MAK
D	09/27/01	Revised effectivity, was This service manual is for the installation of a Keith Products Air Conditioning System on the Learjet Model 31/31A, 35/35A, and 36/36A SN31-169 and on. For all installation prior to SN31-169 refer to TR134 in the Appendix A. Added I/N 25 to figure 20 & P/L pages 1, 2, & 3 of I.P.C. Revised I/N 14 & 15, was 31-0800-2, 31-0800-2, now 31-1800-1, 31-1800-2, Revised I/N 22 qty, was 5, now 6, Deleted duplicated 31-0850-1 I/N 16, Added I/N 24 to sheet 1 & 2 figure 20, Added 2 plcs. To sheet 1 & 2 figure 20, Revised I/N 21 call out, was 2 plcs., now 3 plcs.	BCS	MAK
E	1/25/02	Added service bulletins to List Of Service Bulletins Revised I/N 5 on 21-51-30 sht 4, was 31-0550-4, now 31-0550-5 Reason: New Service Bulletins, Per ER1817	BCS	MAK
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G	12/18/03	Corrected page numbers 21-50-03 pg. 201, 202; 21-50-04 pg. 201; Added List of Revision pg.2, Reason: Drafting Error per ER2329	LAW	MAK
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F	3/24/03	3/24/03	RCG				
G	12/18/03	12/18/03	LAW				
H	6/8/06	6/8/06	CDW				

LIST OF SERVICE BULLETINS

SERVICE BULLETIN NO.	DATE	SUBJECT	REVISION NO.	DATE INCORPORATED
SB163	7/15/99	Load Shed	B	
SB165	8/11/99	Condenser Intake	NC	
SB166	8/11/99	Belt Guard	A	1/25/02
SB174	8/4/00	Belt Guard	NC	

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TR-134

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INTRODUCTION

1. PURPOSE

The purpose of this maintenance manual is to provide detailed instructions for troubleshooting, checking, and maintaining Keith Products, Inc., Air Conditioning System for the Learjet Model 30 Series aircraft.

2. SCOPE

The scope of this service and maintenance manual provides the maintenance technician with detailed information covering:

- Overall system level description and theory of operation.
- Component level description and theory of operation.
- Component checking and troubleshooting procedures.
- Maintenance practices to keep the environmental control system operating at its maximum efficiency.
- The identification of special equipment to accomplish the specific tasks.
- An illustrated parts catalog (IPC) covering the breakdown of each major component of the air conditioning system is included in this manual.

3. ARRANGEMENT

This maintenance manual is arranged in accordance with Air Transport Association (ATA) Specification 100 and includes an Illustrated parts catalog.

4. GLOSSARY

Nonstandard abbreviations and symbols used in the maintenance manual are described below.

Abbreviations

A/C	Air conditioning
A/R	As Required
Assy	Assembly
Comm Avail	Commercially Available
Evap	Evaporator
Fwd	Forward
Gnd	Ground
GPU	Ground Power Unit
IPC	Illustrated Parts Catalog
STC	Supplemental Type Certificate
Sw	Switch
VDC	Volts Direct Current
OAT	Outside Air Temperature

AIR CONDITIONING SYSTEM

SYSTEM DESCRIPTION

1. GENERAL

The air conditioning system for the Learjet Model 31/31A, 35/35A and 36/36A aircraft consists of a refrigerant R134a vapor cycle cooling system. This system allows the pilot to control cooling for a comfortable aircraft cabin on the ground and in flight. Figure 10 in the IPC, shows a general arrangement of the air conditioning system.

The co-pilot's switch panel contains the cooling system "COOL/OFF" switch, the crew fan speed switch/potentiometer, and the cabin fan speed switch/potentiometer.

2. REFRIGERATION SYSTEM

The refrigeration or air conditioning system, as designed and manufactured by Keith Products for the Learjet model 31/31A, 35/35A, and 36/36A aircraft, is a vapor cycle type cooling system using refrigerant R134a. The system is electrically operated using the aircraft 28 VDC electrical system and is operable in all normal flight modes. Air conditioning may be operated with ground external power or the aircraft electrical system with both generators providing 28 VDC.

The major components of the system are the compressor and condenser assembly with a common blower/motor, and two evaporator/blower units. Refrigerant plumbing and electrical systems connect the major components to provide a closed loop system.

The compressor and condenser assemblies are mounted in the tailcone. The compressor drive motor also has a fan that provides airflow for the condenser. The motor and compressor are mounted on a beam. The motor turns at approximately 7,500 RPM. The compressor is belt driven from the motor shaft. The compressor takes low pressure refrigerant gas and compresses it to higher pressure and temperature. Condenser cooling air (ambient air) is drawn in through a cutout in the left side of the fuselage of the aircraft. The air passes over the compressor and drive motor to provide cool air for those components prior to passing through the condenser coil to remove heat from the system. After passing through the condenser coil, the air is exhausted to the outside through an exhaust plenum with outlets located on the bottom left side of the aircraft.

An evaporator/blower unit is located above the cockpit headliner. It provides cooling airflow for the cockpit, as well as windshield defog. It is of a design wherein the cabin air is drawn into the evaporator coil and the fan then delivers the

conditioned air to individual gaspers and an “eyebrow” outlet duct. This recirculating system continues to dry and cool the air each time it passes through the evaporator. Moisture removed from the air by the cold coil (condensate) is collected within the evaporator housing and is forced overboard. The evaporator is equipped with a thermal expansion valve, which regulates the amount of refrigerant entering the coil to provide the optimum cooling effect. The evaporator blower can be operated in the “FAN” position to recirculate cabin air without cooling. The blower is operated from an independent variable fan speed control potentiometer mounted on the co-pilot’s switch panel.

The cabin evaporator/blower unit is installed in the aft section of the cabin ceiling. It contains an evaporator and two separate blowers. The first blower provides cooling airflow to the cabin gaspers and the second blower, if selected, provides flood duct cooling to the aft cabin. This blower is also used in the auxiliary heat mode. This recirculating system continues to dry and cool the air each time it passes through the evaporator. Moisture removed from the air by the cold coil (condensate) is collected within the evaporator housing and is forced overboard. The evaporator is equipped with a thermal expansion valve, which regulates the amount of refrigerant entering the coil to provide the optimum cooling effect. The evaporator blowers can be operated in the “FAN” position to recirculate cabin air without cooling. The blowers are operated from an independent variable fan speed control potentiometer mounted on the co-pilot’s switch panel.

The aft evaporator also contains an auxiliary heater system that is powered by an external power source for ground operation or through the generator control box for in flight operation. The system consists of two heater circuits with a three-position system switch, a thermal switch, an auxiliary cabin heater safety switch and a control circuit breaker common to both heater circuits.

The plumbing that connects the compressor, condenser and the evaporators consists of flexible hoses with a nylon barrier as well as hardlines for bulkhead penetration. The fittings are permanently swaged onto the hoses. All fittings are “o-ring” type connections with sealant on the fitting mating surfaces to prevent refrigerant leaks. Two R134a service valves are located near the compressor in the tailcone. They are sized differently to avoid incorrect connecting when servicing the system.

The air conditioning system is protected against overpressure conditions by two separate safety devices. The first device is a binary high/low pressure switch that activates in the event of an overpressure and is on the compressor discharge port. This switch will open at approximately 350 psig and will interrupt power to the compressor control circuit. This in turn will de-energize the compressor motor relay and remove power to the compressor motor. The refrigerant system pressures will then drop. The switch will also interrupt power to the compressor

control circuit under low-pressure conditions. The second overpressure safety device is a fuse plug that will vent the system refrigerant safely overboard in the event of a system pressure in excess of 425 psig. It is located on the receiver/drier bottle.

The electrical system allows operation of the air conditioning system from either aircraft power with one generator on-line or from an active GPU prior to engine start. System safety features include electrical interlocking and load shedding. In flight, the air conditioning system can be operated from the aircraft electrical system only with both generators on-line. Loss of either generator will automatically shed the air conditioning system electrical loads, except for the minimal loads of the evaporator fans. Also, the air conditioning system is inhibited when either “START-OFF-GEN” switch is selected to “START”.

TROUBLE SHOOTING

1. GENERAL

It needs to be understood that a vapor cycle refrigeration system is dynamic in nature. It is difficult to give exact temperature drops or suction pressure and discharge pressures for trouble shooting purposes with out knowing all the possible variables. It is recommended that you read and become familiar with this section before attempting to trouble shoot the air conditioning system. Below you will find a few examples of the dynamic nature of a refrigeration system that should help you in your trouble shooting process.

2. MEASURING TEMPERATURE DROP ACROSS THE EVAPORATOR:

Trying to associate a specific temperature drop across the evaporator is also dependent on many factors such as inlet air temperature, moisture content (relative humidity) and air flow. On a day with extreme humidity, up to 70% of the evaporator capacity will go towards dehumidification (latent Heat). That only leaves 30% available to actually lower the air temperature (sensible HEAT). A mechanic when encountering this scenario may assume that because he can only measure a 10°F drop in temperature that the system is not operating properly. This assumption is incorrect because he is not considering the amount of work it takes to condense moisture in the air and convert it to water that pours out of the condensate drain. To further complicate the issue if you eliminate the source of this humidity by closing the cabin door, your initial temperature readings will have a smaller temperature drop than measurements taken later. This is because you are drying out the air in the cabin and the evaporator is allowed to remove more sensible heat.

3. MEASURING SUCTION AND DISCHARGE PRESSURES:

The most accurate method to start diagnosing the system is to start with checking the pressures. However you must remember that these pressures are affected by many different conditions such as outside air temperature, cabin temperature, cabin humidity and charge level. It is impossible to give a accurate head pressure at a specific temperature with out knowing these other factors. These pressures can even vary during the trouble shooting process, as the system continues to run you are removing heat from the cabin and lower the cabin temperature. This lowered heat load will result in lower suction and discharge pressures.

4. CHARGING EQUIPMENT

There are many different manufactures of charging equipment available on the market. They range in price and capabilities. EPA regulations require you to recover the refrigerant completely and not allow any to be vented to the atmosphere. Some machines only recover, while others recover and recycle the refrigerant. It is recommended that only new or recycled refrigerant be used in the system. This will ensure that your system will not be contaminated with impure refrigerant.

During the refrigerant recovery process, some oil is removed from the system with the refrigerant. This oil will be separated from the refrigerant by the recovery machine and drained to a special container. The containers are graduated in ounces so you can view the amount of oil removed. Record the amount of oil because the same amount of new oil will need to be added back to the system prior to charging. It is critical that only polyalester oil (POE) is used. Mixing PAG (automotive) type oils will cause contamination and system failure. It is recommended that oil only be added to the discharge side of the system prior to charging*. Note: If oil is added to the suction side of the system it is possible that on start up oil can be sucked into the compressor and because it is non compressible it can damage the reed valves*.

It is best to add the oil after the system has been evacuated to 29.9 in hg. This will allow the vacuum to suck the oil in to the system then add the appropriate charge through the discharge service valve only. This will ensure oil is distributed through the system prior to start up. Most charging carts have the provisions to add oil without breaking into the system. *Note: ensure that there is a adequate amount of oil in the charging bottle and there no air bubbles in the stand pipe.*

If your cart does not have this feature you can add oil in the following manor. After recovering the refrigerant and prior to evacuation, remove the discharge fitting from the compressor and pour the required amount into the line. Reconnect the fitting to the compressor. Evacuate the system through the low side only to prevent oil from being sucked out by the vacuum pump. Add the appropriate charge through the discharge service valve only. This will ensure oil is distributed through the system prior to start up.

5. SYSTEM DIAGNOSIS

It is important to understand the basic principals of vapor cycle air-conditioning before attempting to troubleshoot the system. The following is a brief overview.

i Compressor:

The compressor only function is to raise the pressure of the refrigerant to a point where it can be condensed to a liquid at ambient temperature. Unfortunately as the laws of physics tell us, we create heat in the process of compression. We now have a superheated high pressure vapor.

ii. Condenser

The condenser function is to remove the heat from the super heated vapor. As the heat is removed, the vapor will begin to condense into a liquid. Condensing occurs in accordance to a temperature / pressure ratio. *i.e. the higher the condenser air inlet temperature is, the greater the pressure required to condense, while the lower the condenser air inlet temperature is, the lower the pressure is required for condensing.* This is why on a hot day you will have higher discharge pressures than on a cool day.

iii. Receiver dryer

The receiver dryer is a reservoir for liquid refrigerant. It also contains a filter screen and a desiccant material to remove particles and moisture from the refrigerant. It ensures that a filtered and dried column of liquid refrigerant is sent to the expansion valve.

iv. Expansion Valve

The expansion valve is a device that meters liquid refrigerant into the inlet of the evaporator where it will be evaporated. It has a orifice with a metering pin to vary the flow of refrigerant. This pin is attached to a diaphragm, that balances suction and spring pressure on one side and capillary sense bulb pressure on the other, which moves the pin in and out of the orifice.

The capillary sensing bulb contains a charge of refrigerant that is permanently sealed. This charge exerts pressure on the diaphragm to move the metering pin. Pressure is generated from the expansion or

contraction of the gas charge contained in the bulb as it is warmed or cooled.

This bulb attaches to the suction line where the refrigerant exits the evaporator. It measures the temperature of this line. If there is a insufficient refrigerant flowing through the evaporator the gas will be warmer than desired (superheated). This in turn will warm the sense bulb, therefore expanding the gas within and exerting pressure on the diaphragm. The diaphragm will then move the metering pin and increase the flow of refrigerant to the evaporator. With the increased flow of refrigerant, the gas temperature exiting the evaporator will be reduced, therefore cooling the sense bulb, which lowers the pressure within and reduces the pressure exerted on the diaphragm. The diaphragm will then move the metering pin to reduce the refrigerant flow. The valve will make adjustments until a balance has been reached. *One of the most common problems associated with expansion valves is a bad attachment of the sense bulb. It must make contact along its entire length and be securely attached to the metallic suction tube exiting the evaporator case. It must be thoroughly insulated with foam tape to ensure that out side air does not affect its reading.*

AIR CONDITIONING SYSTEM TROUBLESHOOTING

(This section will deal with trouble shooting the refrigeration circuit only, it will not cover the obvious, such as failed blowers or burned out drive motors.)

Lets assume that an aircraft is reported to have a malfunctioning system. The report from the pilots will usually say " poor cooling". From this you must decide where to start your investigation. *(If the OAT is below 70°F it is much more difficult to troubleshoot because of lack of heat load)*

Step one

Install gage set to the service ports. Turn on the system and allow to stabilize for ten minutes. Observe suction and discharge pressures and temperatures across evaporator(s). If one or both evaporators do not have a adequate temperature drop or you suspect a loss of refrigerant charge, stop the system and evacuate and recharge to the prescribed weight of refrigerant R134a. With the system charged to the required weight you have now eliminated the possibility of an overcharged or undercharged system as being the cause of the problem.

Step Two

Turn the system on and allow it to stabilize for ten minutes. Check the suction and discharge pressures. A normal pressure reading for the suction side should be between 25 and 40 PSIG (remember this is dependent on OAT and evaporator heat load). The discharge pressure should be between 150 and 300 PSI (also dependent on OAT and evaporator heat load).

Let us assume that our condenser blower and evaporator blowers are functioning properly. This leaves only those components that are involved in compressing and metering the refrigerant to be suspect of. The suction and discharge pressures will indicate the nature of the problem.

As stated above the expansion valve is the brain of the system. It controls how much liquid refrigerant is released into the evaporator coil. When this component fails it is important to understand the different ways it can fail and the associated symptoms.

The valve is stuck in mid range: This is usually associated with a contaminated system. The evaporator will have a poor temperature drop at extreme operating parameters therefore there is inadequate refrigerant flow at high heat loads and excessive refrigerant flow at low heat loads (coil flooding)

The valve is stuck wide open: This will cause excessive refrigerant to flow into the evaporator coil. The coil will become “Flooded “ with liquid refrigerant. The result will be poor temperature drop because the refrigerant is not evaporating in to a vapor. Because the expansion valve is wide open the suction pressure will be higher than normal and the return line will be very cold because the liquid refrigerant is evaporating in the line instead of the evaporator. The discharge pressure will be lower than normal because there is very little pressure drop across an open expansion valve. There may also be bubbles in the sight glass under this condition.

The valve is stuck closed: This will result in minimal refrigerant flow in to the evaporator. The coil is being starved for refrigerant. The result will be poor temperature drop because there is a lack of refrigerant available to evaporate. The suction line exiting the evaporator will be warmer than normal. The suction and discharge pressures in this scenario will not look much different from normal. The biggest clue will be a very warm suction line at the compressor.

(It is very important to understand that in a system with two evaporators, it is more difficult to determine which valve is malfunctioning. If one valve is stuck wide open, it can consume most of the refrigerant and give you the indication that the other valve is starving.)

AIR CONDITIONING SYSTEM

INSPECTION CHECK

1. GENERAL

Listed below are the recommended inspection intervals for maintenance critical items associated with the air conditioning system. Proper and timely inspections will keep the air conditioning system operating at its peak efficiency.

2. INSPECTION INTERVALS

Hours indicated are defined as air conditioning system hours.

ITEM	INSPECT FOR	INTERVAL	ACTION
Air conditioning system components	Dirt Damage	On condition or at 600 aircraft hour Inspection.	Clean or replace component as necessary.
Compressor belt	Tension Wear	Within 5 hours of installing new belt, then at 600 aircraft hour insp.	Tension or replace as necessary (see 21-50-03, page 201).
Sight glass	Proper refrigerant level	When problem is suspected.	Discharge/charge as necessary per TR-134, Appendix A.
Evaporator and condenser coils	Dirt	At 600 hr aircraft inspection.	Clean as necessary.
Refrigerant hoses	Chafing Wear	At 1200 hr aircraft inspection.	Repair as necessary per 21-50-02, page 201.
Compressor drive motor	Brush wear	Every 1200 motor operation hours.	Inspect/replace per 21-50-03, page 201.
	Overhaul	2,000 hrs, motor	
Fwd evaporator blower	Brush wear	On condition	Replace when failed.
Aft evaporator blowers		Every 2,000 hours.	Return to Keith for overhaul.

ELECTRICAL

DESCRIPTION AND OPERATION

1. GENERAL

The air conditioning system consists of one high-energy compressor drive/condenser fan motor, and two brushless DC centrifugal evaporator blowers in the aft cabin evaporator. One brushed DC centrifugal cockpit blower for the fwd evaporator. A mode switch with “COOL-OFF” positions operates the air conditioning system. Airflow for the evaporators is controlled by a variable potentiometer for fan speed. The system incorporates a binary pressure switch to sense an over-pressure or under-pressure condition in the system.

The air conditioning system is controlled by an interface control box, which monitors generator and GPU inputs to ensure operation of shedding of the system if a fault exists.

The system is protected by a 15 amp “Wemac Fan” breaker, a 15 amp “Cabin Fan” breaker, a 7-1/2 amp “Air Conditioner” breaker, and a 175 amp current limiter for the compressor drive/condenser fan motor.

This section of the maintenance manual describes the electrical system and presents electrical troubleshooting procedures. Refer to drawing 31-0700 for wiring information.

2. LOAD/SHED DESCRIPTION

The system incorporates a logic interface control box that enables the system to operate or be shed under various conditions. The table below shows operation under various conditions.

CONDITIONS	EVAP FANS	COMP DRIVE
Ground power cart/on	On	On
Ground power cart connected/off	On	Off
Battery only	On	Off
One generator on ground	On	On
Both generators on ground	On	On
Refrigerant over/under pressure	On	Off
One generator in fight	On	Off
Both generators in flight	On	On
Either “START-OFF-GEN” switch in "START” position	On	Off

Table 1. AC SYSTEM OPERATIVE CONFIGURATIONS

ELECTRICAL

TROUBLESHOOTING

1. GENERAL

The following procedures are used for troubleshooting the electrical system and the electrical interface with the other assemblies of the air conditioning system.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Service pressure gauge	Comm. Avail	1	None
Multi-meter	Comm. Avail	1	None
28 VDC source		A/R	None

3 ELECTRICAL TROUBLESHOOTING PROCEDURES (Ref. 31-0700 Electrical Installation Dwg.)

NOTE: Always attach a service gauge set to system prior to beginning troubleshooting to ensure proper refrigerant charge is present.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

A. Air condition selected, compressor drive/condenser fan motor does not turn.

1. Connect service pressure gauge to service ports located near compressor/drive motor assembly.

2. Connect and activate ground power to aircraft.

3. Select air conditioning system to “COOL”.

4. Check the 175A current limiter located in the existing E43 power distribution panel in the aft equipment bay, replace if necessary.

5. Check that load/shed start conditions in the “Description and Operation” paragraph are met .

6. Check for power at input and output of the compressor relay located on the compressor beam assembly. If power is present at input and output, proceed to step 8. If power is present only at input, proceed to step 7.

7. Check for power at the terminals of the pressure switch. If power is present at the input of the switch and not the output, disconnect leads to the switch and check continuity of pressure switch. If no continuity and gauge set reads adequate pressure, replace pressure switch. Switch can be removed without discharge of refrigeration. Back switch off in a counter-clockwise direction. Reinstall in reverse order. Lubricate o-ring in switch.

8. Check for power at motor. If power is present, proceed to step 9. If power is not present and load/shed conditions of step 4 are met, check power on the interface control box at connector pin 4. If power is present, system problem exists in load/shed system start unit. If power is not present, check 7.5 amp CB and mode switch.

9. Fault is isolated to compressor drive/condenser fan motor. Unit should be replaced.

10. Select air conditioning “OFF”, remove electrical power, and disconnect service gauge when troubleshooting is complete.

B. Fwd evaporator (crew) blower will not operate.

1. Check for power at terminal of the blower connector. If present, proceed to step 2. If power is not present, ensure that air conditioner circuit breaker (7-1/2 amp) is set. Check for power at the connector. If present, proceed to step 2. If power is not present, problems exist either with the air conditioner fan circuit breaker, or crew fan potentiometer.

2. Remove blower assembly from aircraft. Gain access to motor located in the overhead. Remove fan power connector and remove screws that attach the fan housing to the aircraft and remove motor. Install new motor in reverse order.

C. Aft evaporator flood blower (L/H blower) will not operate.

1. Turn the “COOL-OFF” switch to “OFF”. Disconnect electrical connectors from the blower. Turn the Flood Blower (L/H blower) switch on and set it to max speed. Check for power at pin A and pin

D. Both terminals should have a voltage reading between 26.0V and 28.0V. If present, check for ground continuity through pin B. If power is present, move on to Step 2. If power is not present, problems exist either with the cabin fan circuit breaker, fan buss contact circuit breaker, or 30A fuse FL30L located in the power distribution box (E43).

2. Remove blower assembly from aircraft by gaining access to motor located on the evaporator. Remove fan power connectors, remove screws that attach motor to fan housing, and carefully remove motor and blower wheel. Take note of blower wheel location on motor shaft before separating from motor, as the blower wheel needs to be mounted at the same location on the shaft of the new blower motor. Install new motor in reverse order.

D. Aft evaporator gasper distribution blower (R/H blower) will not operate.

1. Turn the “COOL-OFF” switch to “OFF”. Disconnect electrical connectors from the blower. Turn the Gasper Blower (L/H blower) switch on and set it to maximum speed. Check for power at pin A and pin D. Both terminals should have a voltage reading between 26.0V and 28.0V. If present, check for ground continuity through pin B. If power is present, move on to Step 2. If power is not present, problems exist either with the cabin fan circuit breaker, fan buss contact circuit breaker, or 30A fuse FL30L located in the power distribution box (E43).

2. Remove blower assembly from aircraft by gaining access to motor located on the evaporator. Remove fan power connectors, remove screws that attach motor to fan housing, and carefully remove motor and blower wheel. Take note of blower wheel location on motor shaft before separating from motor, as the blower wheel needs to be mounted at the same location on the shaft of the new blower motor. Install new motor in reverse order.

PLUMBING

DESCRIPTION AND OPERATION

1.0 GENERAL

The plumbing system consists of a flexible nylon lined refrigerant hose with permanent swaged on fittings. All connections are tube o-ring type with sealant on the fitting mating surfaces to ensure leak-free operation. Hose, o-ring material, and sealants are specially designed to work with refrigerant R134a and polyolester oils. Two service valves are located near the compressor/drive motor assembly. They are sized differently to avoid incorrect connection when servicing the system. A receiver/drier bottle is located downstream of the condenser and is installed on the condenser flange to remove moisture from the liquid refrigerant. A binary pressure switch monitors the refrigerant gas pressure. This switch will open at a compressor discharge over-pressure of 350 psi and under-pressure conditions of 30 psi. This will interrupt the power to the compressor drive motor control circuit and stop the compressor.

This section of the maintenance manual discusses checks and maintenance practices used for the plumbing portion of the air conditioning system. Refer to 21-51-20, Page 1 through 3, in the IPC section for parts list and schematics.

PLUMBING

MAINTENANCE PRACTICES

1.0 GENERAL

The following procedures are used to perform typical maintenance on the air conditioning system plumbing.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

2. PLUMBING MAINTENANCE PROCEDURES (Ref. 31-0800 Plumbing Installation Dwg.)

A. Connection to components, o-ring replacement:

1. Place the appropriate o-ring (reference 31-0800 drawing) over the tube “O” end of the fitting.
2. Lubricate o-ring with polyolester oil or ES49000-1sealant prior to assembly.
3. Apply sealant to all fitting-mating surfaces prior to assembly.
4. Torque requirements for all fittings are included in Appendix B.

B. Receiver/drier bottle replacement:

1. Replace receiver/drier bottle whenever the compressor is replaced or when the air conditioning system plumbing is left open to the atmosphere for a period of time greater than one (1) hour.

PLUMBING

INSPECTION/CHECK

1. GENERAL

The following procedures are used for checking and inspecting the air conditioning system plumbing.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Electronic R134a refrigerant leak detector	Comm. Avail	1	None

3. PLUMBING CHECK PROCEDURES (REFERENCE 31-0800 DRAWING)

NOTE: All o-rings should be lubricated with polyolester oil or ES49000-1 sealant applied to all fittings mating surfaces before assembly.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

A. Plumbing installation preventive maintenance check:

1. Check that all hoses are properly supported and do not chafe. Check that all clamps remain secure and that the hose and fitting are well supported at connections with fixed units such as evaporator, condenser, etc., to prevent fatigue cracking in tubing headers or fittings.

B. Plumbing system refrigerant leak check:

1. Connect service pressure gauge set to service ports, located near the compressor closeout box assembly.

2. Check that the gauges are reading the proper static pressure. Both gauges should read approximately 55 psig @ standard temperature (59^{o}F) with a properly charged system when the system is not operating.

3. Using leak detector, check entire plumbing system including hose fittings and coil assemblies for leaks. There shall be no leaks. Repair or replace leaking component per the appropriate maintenance manual section and its drawing.

COMPRESSOR/DRIVE MOTOR BEAM ASSEMBLY

DESCRIPTION AND OPERATION

1. GENERAL

The compressor and condenser assemblies are located in the tailcone. The compressor is mounted on a beam assembly that also includes the compressor drive motor. The drive motor via a multi “V” flat belt turns the compressor, which compresses the refrigerant gas for condensing at ambient temperatures. A binary pressure switch mounted on the compressor monitors the refrigerant gas pressure. This switch will open at a compressor discharge over-pressure of 350 psi and under-pressure conditions of 30 psi. This will interrupt the signal to the interface control box and stop the compressor drive motor.

This section of the maintenance manual discusses troubleshooting and maintenance practices used for the compressor assembly portion of the air conditioning system. Refer to 21-51-30, Pages 1 through 4, in the IPC section for parts list and schematics.

COMPRESSOR/DRIVE MOTOR ASSEMBLY

TROUBLESHOOTING

1. GENERAL

The following procedures are used for troubleshooting the compressor assembly.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Service pressure gauge	Comm Avail	1	None
28 VDC source		A/R	None

3. COMP/DRIVE MOTOR TROUBLESHOOTING PROCEDURES (Ref. 31-0500 Comp/Motor Beam Installation Dwg.)

With the air conditioning system operating, observe if any of the following conditions occur as described in table 1:

NOTE: Always attach a service gauge set to system prior to beginning troubleshooting to ensure proper refrigerant charge is present.

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Unusually high suction pressure with low discharge pressure.	a) Internal problem with compressor body. b) Faulty expansion valve.	a) Replace compressor. b) Replace expansion valve.
2. Unusually low suction and discharge pressure.	a) System or compressor leak. b) Faulty expansion valve.	a) Repair leak or replace compressor. b) Check bulb location and/or replace valve as necessary.
3. High compressor discharge pressure.	a) Condenser air exhaust restricted. b) Refrigerant overcharge. c) Excessive amount of compressor oil. d) Receiver/drier clogged. e) Condenser fan damaged.	a) Inspect exhaust flow path. b) Discharge refrigerant until only occasional bubbles are present in sight glass. c) Drain until correct d) Replace as necessary e) Replace as necessary
4. Rough running.	a) Damaged belt. b) Damaged fan. c) Loose beam on mounts. d) Internal compressor problem.	a) Replace as necessary b) Replace as necessary. c) Tighten bolts. d) Replace compressor.

Table 1. COMP/COND TROUBLESHOOTING

COMPRESSOR/DRIVE MOTOR BEAM ASSEMBLY

MAINTENANCE PRACTICES

1. GENERAL

The following procedures are used to perform typical maintenance on the compressor assembly.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Oil dipstick	Make from metal wire	1	See figure on Page 202
Coil cleaner	Comm Avail	A/R	Non-acid based
Polyolester oil	Comm Avail	A/R	Viscosity ISO 68

3. COMPRESSOR ASSEMBLY MAINTENANCE PROCEDURES

A. Compressor drive belt adjustment:

1. Adjust belt for moderate tension and then rotate large pulley through 2 revolutions.
2. Tension belt to deflect 0.16 inch with a 2 – 3 lb. force applied at midspan location.
3. Rotate belt 2 revolutions. Re-tension as required.

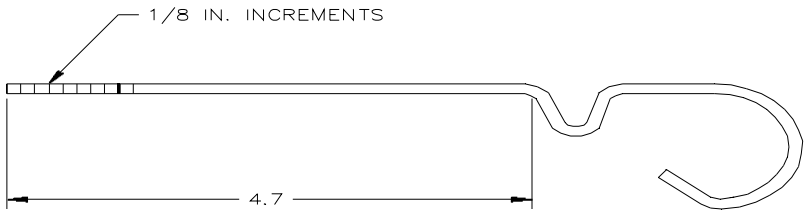
B. Compressor drive motor brush inspection:

1. Remove belt guard and motor from aircraft.
2. Remove cover from anti-drive end bell from motor.
3. Inspect brushes for wear. Measure brush length along the longest side of angled face.
4. Return motor to Keith Products for brush replacement if brush length is less than 1.00 inch.

C. Compressor oil level check:

NOTE: It is not necessary to check the compressor oil level during routine maintenance. It only needs to be checked when a system component is replaced or when incorrect oil level is suspected. Use only polyolester oil viscosity grade ISO 68.

1. Operate air conditioning system for 10 minutes. This will collect as much oil as possible in the compressor.
2. Evacuate air conditioning system of refrigerant and remove compressor from aircraft.
3. Place compressor on table such that the oil fill plug is up.
4. Remove oil fill plug.
5. Insert dipstick into oil fill port. It may be necessary to insert the dipstick into the compressor at a slight angle. Ensure that the dipstick is not inserted into the compressor more than 4.7 inches as shown below.
6. Check that the oil level is 8 fluid ounces (at the 8th increment). Add or subtract oil in one-fluid-ounce increments until 8 fluid ounces is obtained.
7. Clean oil fill port area and install oil fill plug. Torque plug to 6 – 9 ft lbs.



FABRICATED DIPSTICK

CONDENSER ASSEMBLY

DESCRIPTION AND OPERATION

1. GENERAL

The condenser assembly is located in the tailcone and is attached to the condenser exhaust plenum. It consists of a condenser coil unit, shroud, and receiver/drier bottle. The condenser condenses the refrigerant gas to a liquid. The receiver/drier bottle where moisture is removed collects this liquid. The compressor drive motor includes a fan, which draws in cool (ambient) air from an air inlet on the left-hand side of the aircraft and supplies air to the condenser coil where the refrigerant gas can be condensed to a liquid. The air is then exhausted overboard through the exhaust plenum and exits the left-hand bottom of the aircraft.

This section of the maintenance manual discusses troubleshooting and maintenance practices used for the condenser assembly portion of the air conditioning system.

CONDENSER ASSEMBLY

TROUBLESHOOTING

1. GENERAL

The following procedures are used for troubleshooting the condenser assembly portion of the air conditioning system.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Service pressure gauge	Comm Avail	1	None
28 VDC source		A/R	None

3. CONDENSER TROUBLESHOOTING PROCEDURES (REF IPL, FIGURE 1)

NOTE: Always attach a service gauge set to system prior to troubleshooting to ensure proper refrigerant charge is present.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

TROUBLE	PROBABLE CAUSE	CORRECTION
Low air flow across condenser coil.	Dirty condenser coil.	Clean condenser coil.

Table 1. CONDENSER TROUBLESHOOTING

CONDENSER ASSEMBLY

MAINTENANCE PRACTICES

1. GENERAL

The following procedures are used to perform typical maintenance on the condenser assembly.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Polyolester Oil	Comm Avail	A/R	Viscosity ISO 68
Vacuum Cleaner	Comm Avail	1	None
Coil Cleaner	Comm Avail	A/R	Non-acid based

3. CONDENSER ASSEMBLY MAINTENANCE PROCEDURES
4.

A. Condenser coil cleaning procedure:

1. Remove coil and use vacuum cleaner to remove large debris from upstream and downstream coil faces.
2. Spray coil cleaner on both coil faces. Wash off with water.
3. Allow coil to dry thoroughly prior to additional maintenance.

FORWARD EVAPORATOR ASSSEMBLY

DESCRIPTON AND OPERATION

1. GENERAL

The fwd evaporator assembly for the Learjet 31/31A is located above the cockpit headliner panels and provides cooling airflow to the flight crew through an overhead gasper and “eyebrow” defogger duct. The evaporator assembly includes an evaporator coil, blower with a DC motor, expansion valve and air outlet ducting.
Refer to 21-51-50, Pages 1 and 2, in the IPC section for parts list and schematics.

FORWARD EVAPORATOR ASSEMBLY

TROUBLESHOOTING

1. GENERAL

The following procedures are used for troubleshooting the fwd evaporator assembly portion of the air conditioning system.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Service pressure gauge	Comm Avail	1	None
28 VDC source		A/R	None

3. EVAPORATOR TROUBLESHOOTING PROCEDURES (Ref. 31-0200 Fwd. Evaporator Installation)

NOTE: Always attach a service gauge set to system prior to troubleshooting to ensure proper refrigerant charge is present.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

A. Water is being blown from air outlets.

1. Operate GPU and apply 28 VDC electrical power.
2. Select air conditioning system to ON.
3. Check evaporator drain for condensate runoff.
4. If no runoff, clear drain of blockage or verify that routing is in a downhill orientation.
5. Select air conditioning “OFF”, remove electrical power.

B. No cooling at evaporator.

1. Connect service pressure gauge to service ports located near compressor closeout assembly.
2. Operate GPU and apply 28 VDC electrical power.
3. Select air conditioning system to “ON”.
4. Check evaporator for proper cooling. If cooling is not sufficient, check refrigerant level to ensure that system is correctly charged. A clear sight glass (no bubbles) on top of the receiver/drier bottle

can confirm this. If bubbles are present, add refrigerant until sight glass clears.

5. If system is correctly charged and there is still insufficient cooling, replace expansion valve per forward evaporator, maintenance practices procedure.

FORWARD EVAPORATOR ASSEMBLY

MAINTENANCE PRACTICES

1. GENERAL

The following procedures are used to perform typical maintenance on the evaporator assembly.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Sealant	ES49000-3	A/R	None
Polyolester oil	Comm Avail	A/R	Viscosity ISO 68
Vacuum cleaner	Comm Avail	1	None
Coil cleaner	Comm Avail	A/R	Non-acid based

3. EVAPORATOR MAINTENANCE PROCEDURES (Ref. 31-0200 Fwd. Evaporator Installation Dwg.)

A. Expansion valve replacement:

1. Discharge system in accordance with recovery equipment's instructions.
2. Disconnect liquid line from inlet of expansion valve, and cap. Remove the thermal sense bulb from its clamp located on the suction tube of the evaporator and carefully remove insulation covering bulb.
3. Disconnect the fitting that connects the valve to the coil and plug coil fitting.
4. Install new expansion valve and o-ring in the reverse order.
5. Lubricate o-ring or flare surfaces with polyolester oil or apply sealant to fitting mating surfaces prior to assembly.
6. Install the thermal sense bulb in the 3 or 9 o'clock position such that it makes contact with the suction tube along its entire length. Insulate the bulb thoroughly with insulation.

B. Evaporator coil cleaning procedure:

1. Gain access to the forward evaporator installation.

2. Remove interconnecting “Y” duct to have a better view of the evaporator assembly.
3. Use vacuum cleaner to remove large debris from the coil face.

AFT EVAPORATOR ASSEMBLY

DESCRIPTION AND OPERATION

1.0 GENERAL

The aft evaporator assembly for the Learjet 31/31A is located in the aft section of the cabin ceiling. It contains an evaporator and two separate blowers. The first blower provides cooling airflow to the cabin gaspers and the second blower, if selected, provides flood duct cooling to the aft cabin. The evaporator assembly includes an evaporator coil, two blowers with brushless DC motors, expansion valve, flood duct opening, air outlet interface ducting, and the two heating elements that provide auxiliary heating.

This section of the maintenance manual discusses troubleshooting and maintenance practices used for the aft evaporator assembly portion of the air conditioning system. Additional troubleshooting and testing procedures for the evaporator blowers is contained in 21-50-01, page 101. Please refer 21-51-60, Pages 1 to 14, in the IPC section for parts list and schematics.

AFT EVAPORATOR ASSEMBLY

TROUBLESHOOTING

1. GENERAL

The following procedures are used for troubleshooting the aft evaporator assembly portion of the air conditioning system.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Service pressure gauge	Comm Avail	1	None
28 VDC source		A/R	None

3. EVAPORATOR TROUBLESHOOTING PROCEDURES (Ref. 31-0260 Aft Evaporator Installation Dwg.)

NOTE: Always attach a service gauge set to system prior to troubleshooting to ensure proper refrigerant charge is present.

CAUTION: Do not operate air conditioning system with condenser air inlet or outlet blocked.

A. Water is being blown from air outlets.

1. Operate GPU and apply 28 VDC electrical power.
2. Select air conditioning system to “COOL”.
3. Check evaporator drain for condensate runoff.
4. If no runoff, clear drain of blockage or verify that routing is in a downhill orientation.
5. Select air conditioning “OFF”, remove electrical power.

B. No cooling at evaporator.

1. Connect service pressure gauge to service ports located near compressor closeout assembly.
2. Operate GPU and apply 28 VDC electrical power.
3. Select air conditioning system to “COOL”.
4. Check evaporator for proper cooling. If cooling is not sufficient, check refrigerant level to ensure that system is correctly charged. This can be confirmed by seeing if the sight glass on top of the

receiver/drier bottle is clear and free of bubbles. If bubbles are present, add refrigerant until sight glass clears.

5. If system still has insufficient cooling, replace expansion valve per aft evaporator maintenance practices procedure.

4. AUX HEATER OPERATION

The auxiliary heaters consist of two heater assemblies (31-0280-1) that are a part of the Heater/Transition assembly (31-0260-2 or 31-0260-3). When the heater switch is flipped “ON” the heaters heat up to 150° where the low side thermoswitches (ES53128-1) will open after approximately 70 seconds. This action triggers a relay in the E33 relay panel, which turns on the Flood blower for cabin heating. In the event of a over temperature condition due to a restriction in the airflow or a failed blower unit, the high side thermoswitches will open at 350°F and power to the heater elements will be disconnected.

AFT EVAPORATOR ASSEMBLY

MAINTENANCE PRACTICES

1. GENERAL

The following procedures are used to perform typical maintenance on the evaporator assembly.

2. TOOLS AND EQUIPMENT

DESIGNATION	REF. NO.	QTY.	REMARKS
Sealant	ES49000-3	A/R	None
Polyolester oil	Comm Avail	A/R	Viscosity IO=SO68
Vacuum cleaner	Comm Avail	1	None
Coil cleaner	Comm Avail	A/R	Non-acid based

3. EVAPORATOR MAINTENANCE PROCEDURES (Ref. 31-0260 Aft Evaporator Installation Dwg.)

A. Expansion valve replacement:

1. Discharge system in accordance with recovery equipment's instructions.
2. Disconnect liquid line from inlet of expansion valve, and cap. Remove the thermal sense bulb from its clamp located on the suction tube of the evaporator and carefully remove insulation covering bulb.
3. Disconnect the fitting that connects the valve to the coil and plug coil fitting.
4. Install new expansion valve and o-ring in the reverse order.
5. Lubricate o-ring with polyolester oil or apply sealant to fitting mating surfaces prior to assembly.
6. Install the thermal sense bulb such that it makes contact with the suction tube along its entire length. Insulate the bulb thoroughly with insulation.

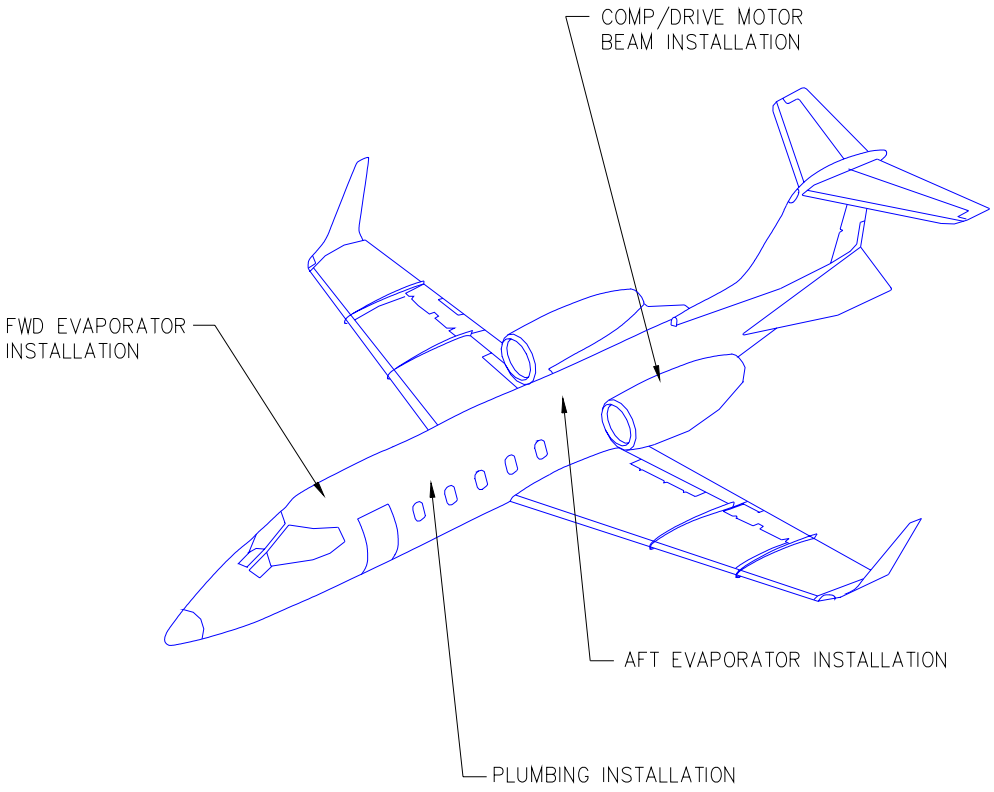
B. Evaporator coil cleaning procedure:

1. Use vacuum cleaner to remove large debris from the coil face.
2. Spray coil cleaner on coil face. Wash off with water.

4. AUXILIARY HEATER

A. REMOVAL/INSTALLATION (See IPC, 21-51-60, Pages x through x)

1. Remove equipment and upholstery as required to gain access to aft evaporator installation.
2. Disconnect all electrical connector(s) from evaporator and blower assemblies.
3. Remove screws securing heater to evaporator assembly.
4. Carefully lower heaters to where all components are visible and can be replaced if necessary.
   NOTE: KESTER SP-88 type flux should be used for soldering thermoswitch terminals.
5. Re-install in the reverse order of removal.



ILLUSTRATED PARTS CATALOG

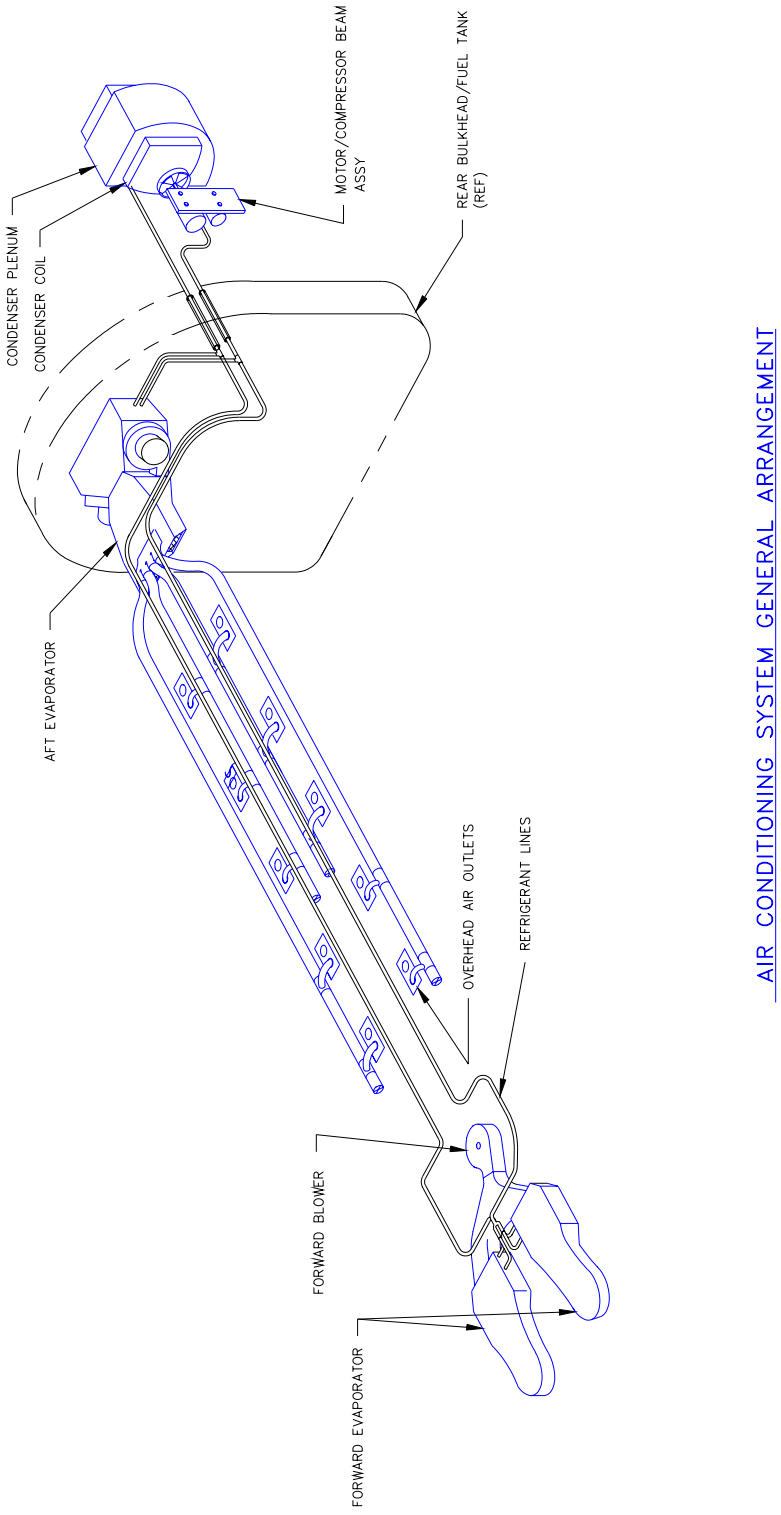


FIGURE 10
PLUMBING INSTALLATION
SHEET 1 OF 1

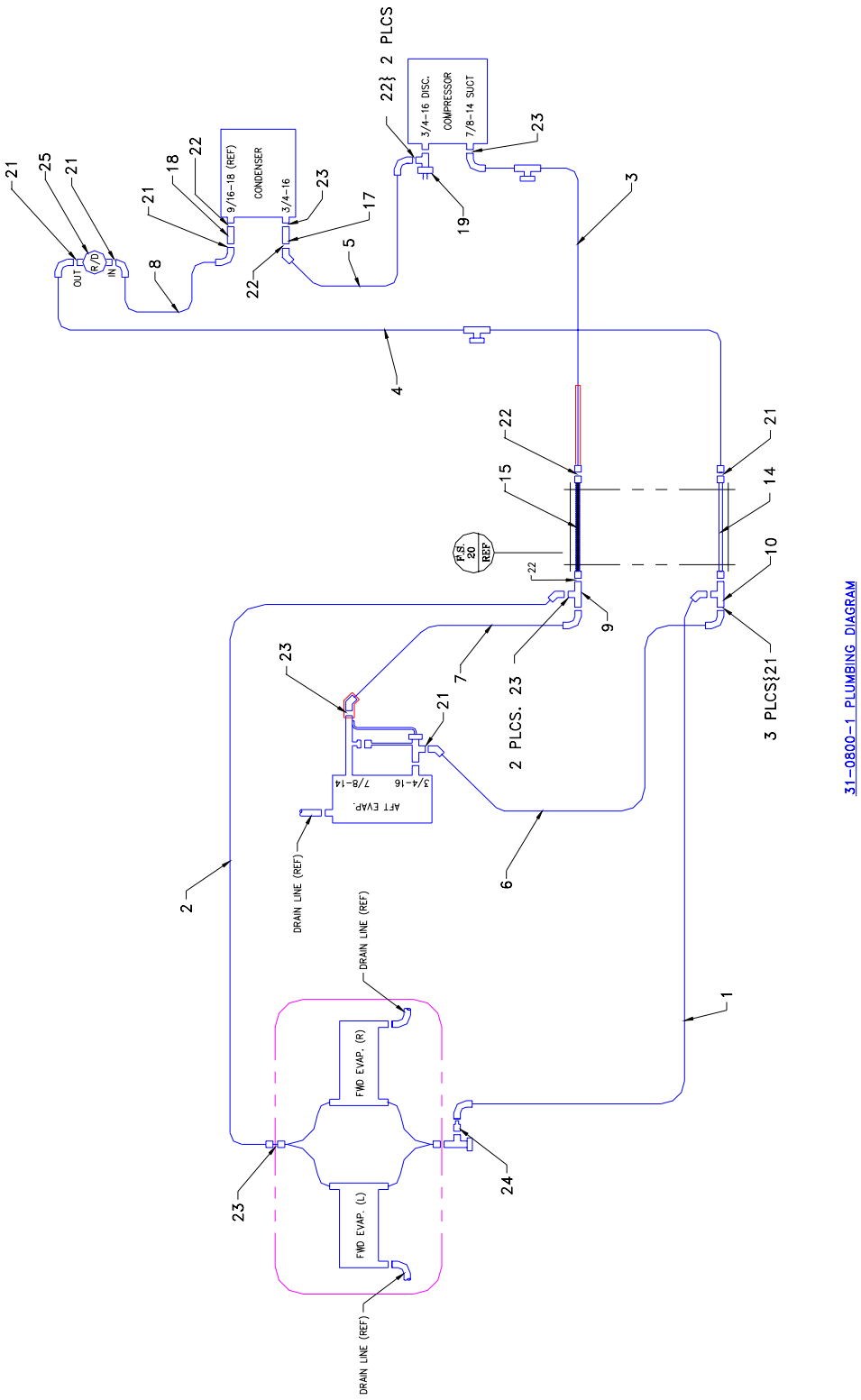


FIGURE 20
PLUMBING INSTALLATION
SHEET 1 OF 3

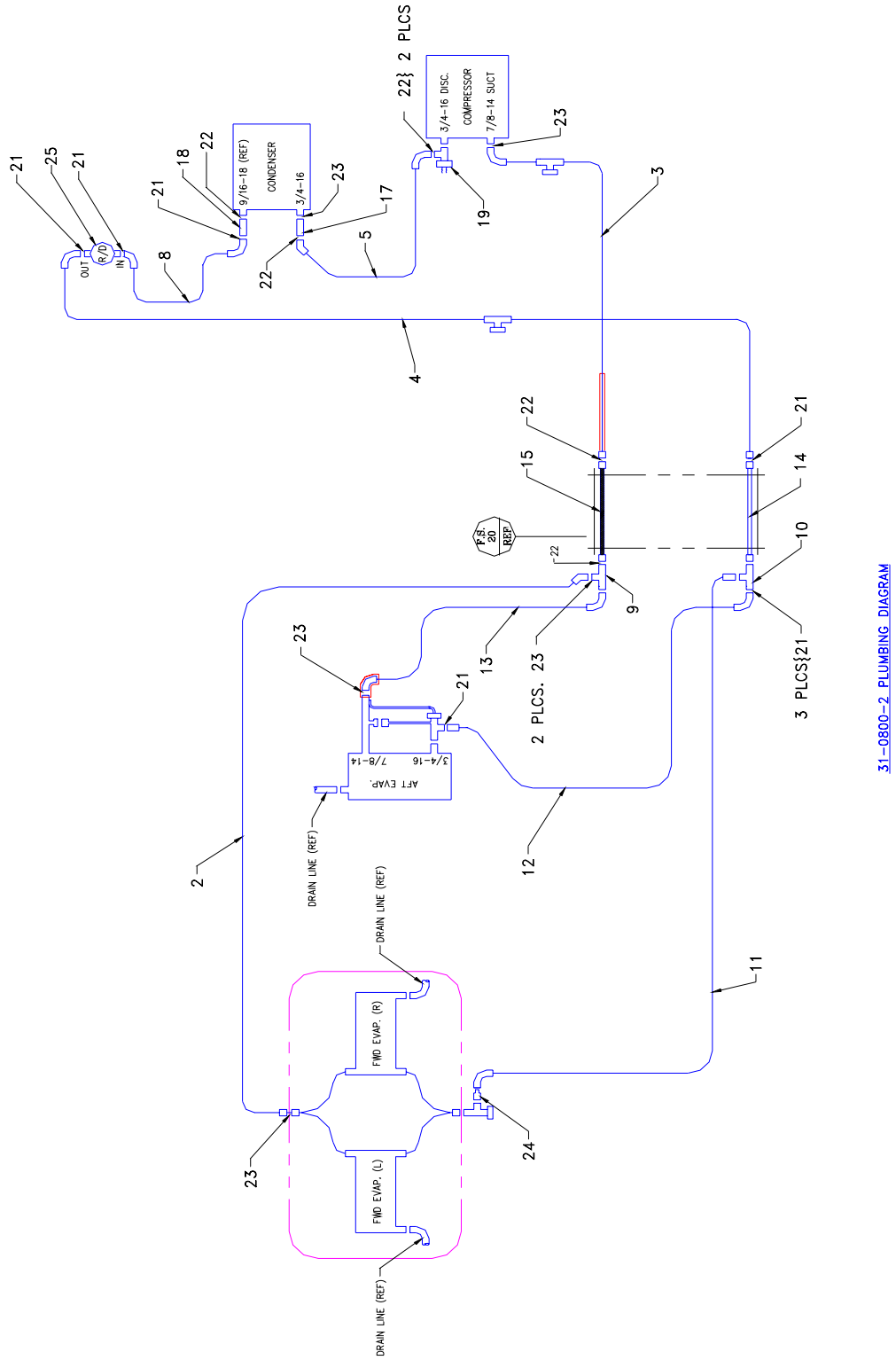


FIGURE 20
PLUMBING INSTALLATION
SHEET 2 OF 3

FIG	ITEM	PART NUMBER	NOMENCLATURE	EFF CODE	UNITS PER ASSEMBLY
	1	**31-0850-1**	Hose Assembly		1
	2	**31-0850-2**	Hose Assembly		1
	3	**31-0850-3**	Hose Assembly		1
	4	**31-0850-4**	Hose Assembly		1
	5	**31-0850-5**	Hose Assembly		1
	6	**31-0850-6**	Hose Assembly		1
	7	**31-0850-7**	Hose Assembly		1
	8	**31-0850-8**	Hose Assembly		1
	9	31-0850-10	Tee		1
	10	31-0850-11	Tee		1
	11	**31-0850-12**	Hose Assembly		1
	12	**31-0850-13**	Hose Assembly		1
	13	**31-0850-14**	Hose Assembly		1
	14	**31-1800-1**	Tube Assembly-Discharge		1
	15	**31-1800-2**	Tube Assembly-Suction		1
	16	Deleted	Hose Assembly		1
	17	JBS6009-4	Fitting, Adapter		1
	18	JBS6009-5	Fitting, Adapter		1
	19	JBS2020-5	Pressure Switch		1
	20	ES49000-1	Sealant		1
	21	ES49011-1	O-Ring		8
	22	ES49011-2	O-Ring		6
	23	ES49011-3	O-Ring		6
	24	ES45016-1	Reducer		1
	25	ES43030-2	Receiver/Drier Bottle		1

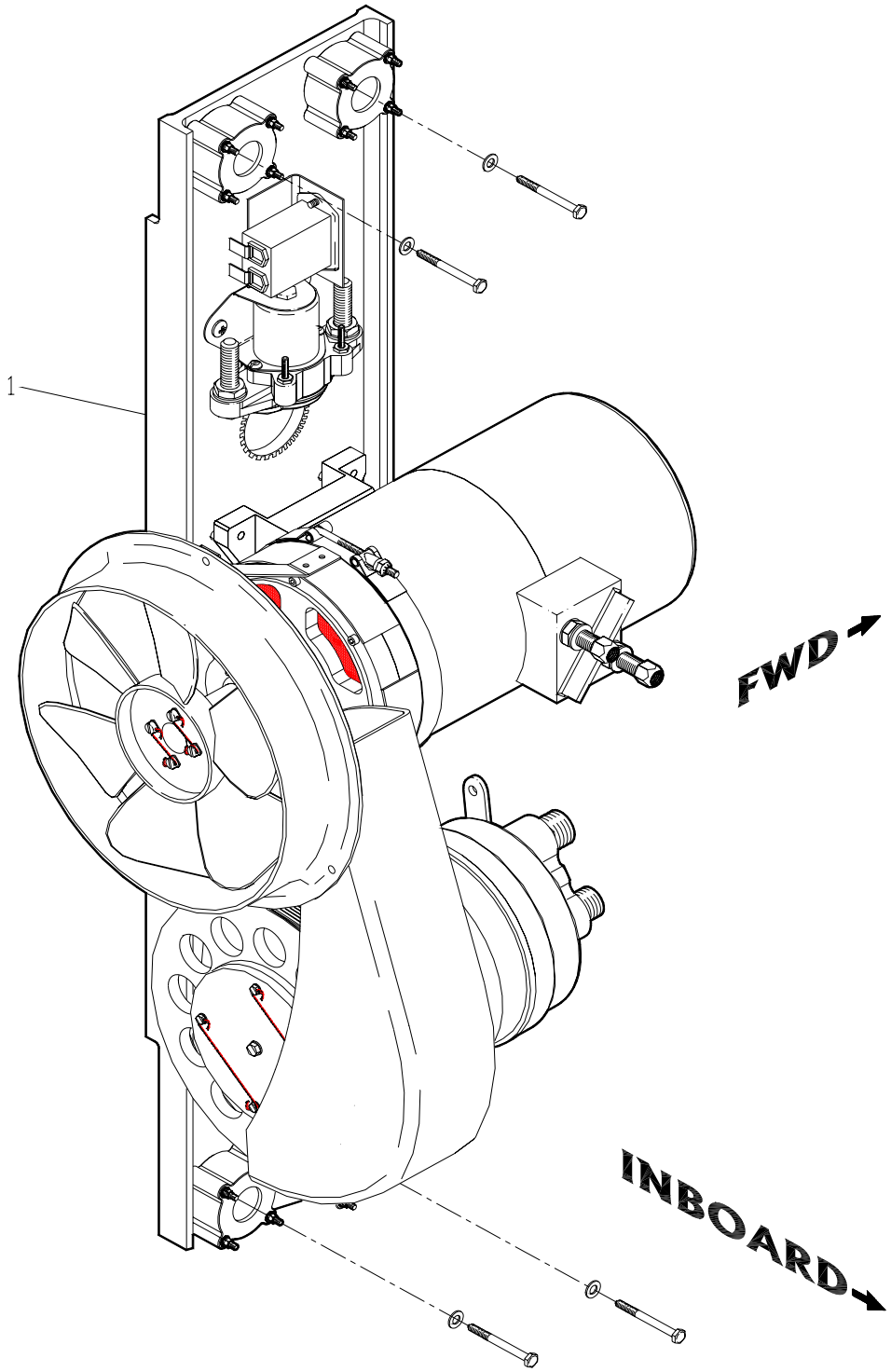


FIGURE 50
FORWARD EVAP/BLOWER INSTALLATION
SHEET 1 OF 4

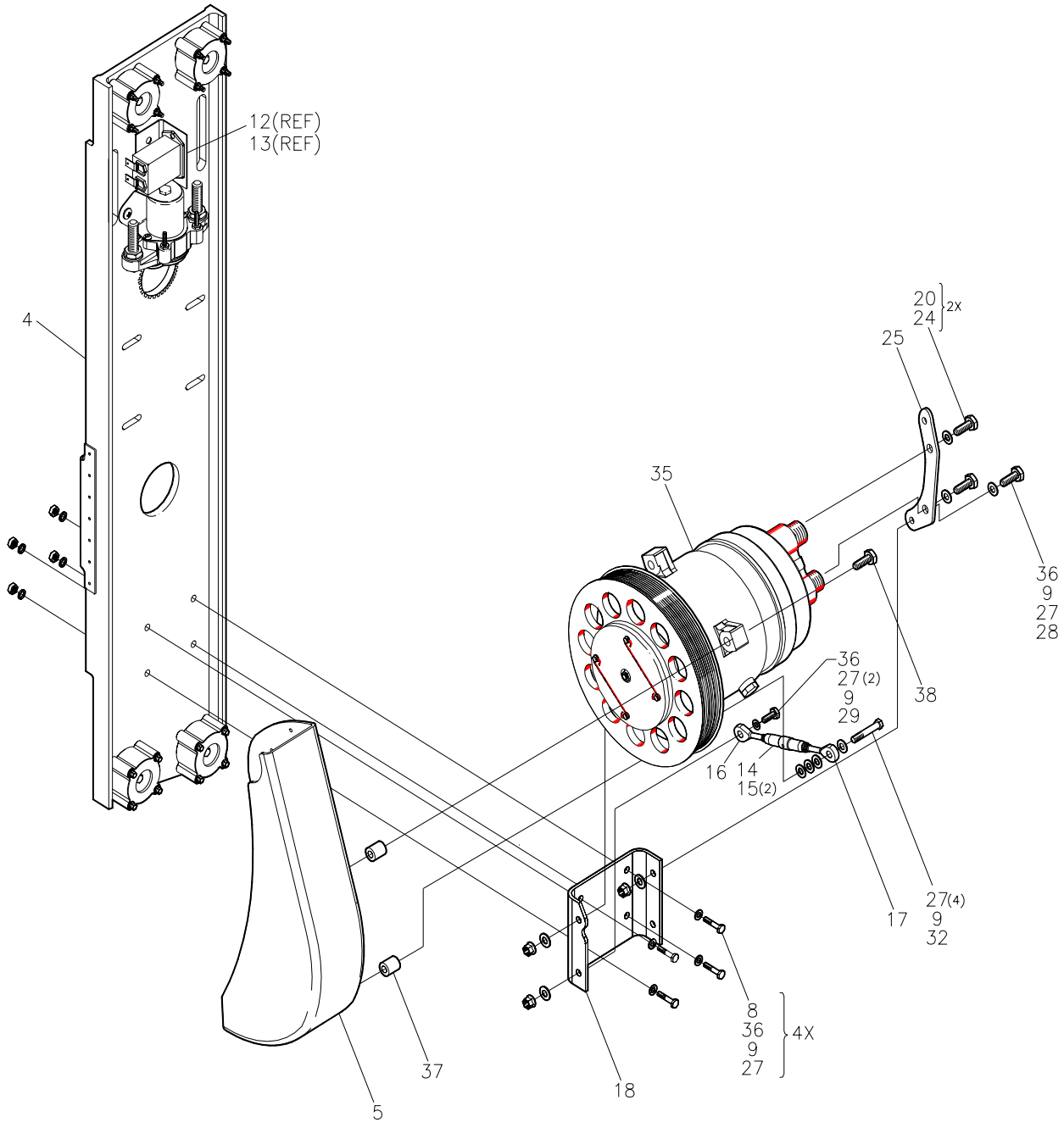


FIGURE 50
FORWARD EVAP/BLOWER INSTALLATION
SHEET 2 OF 4

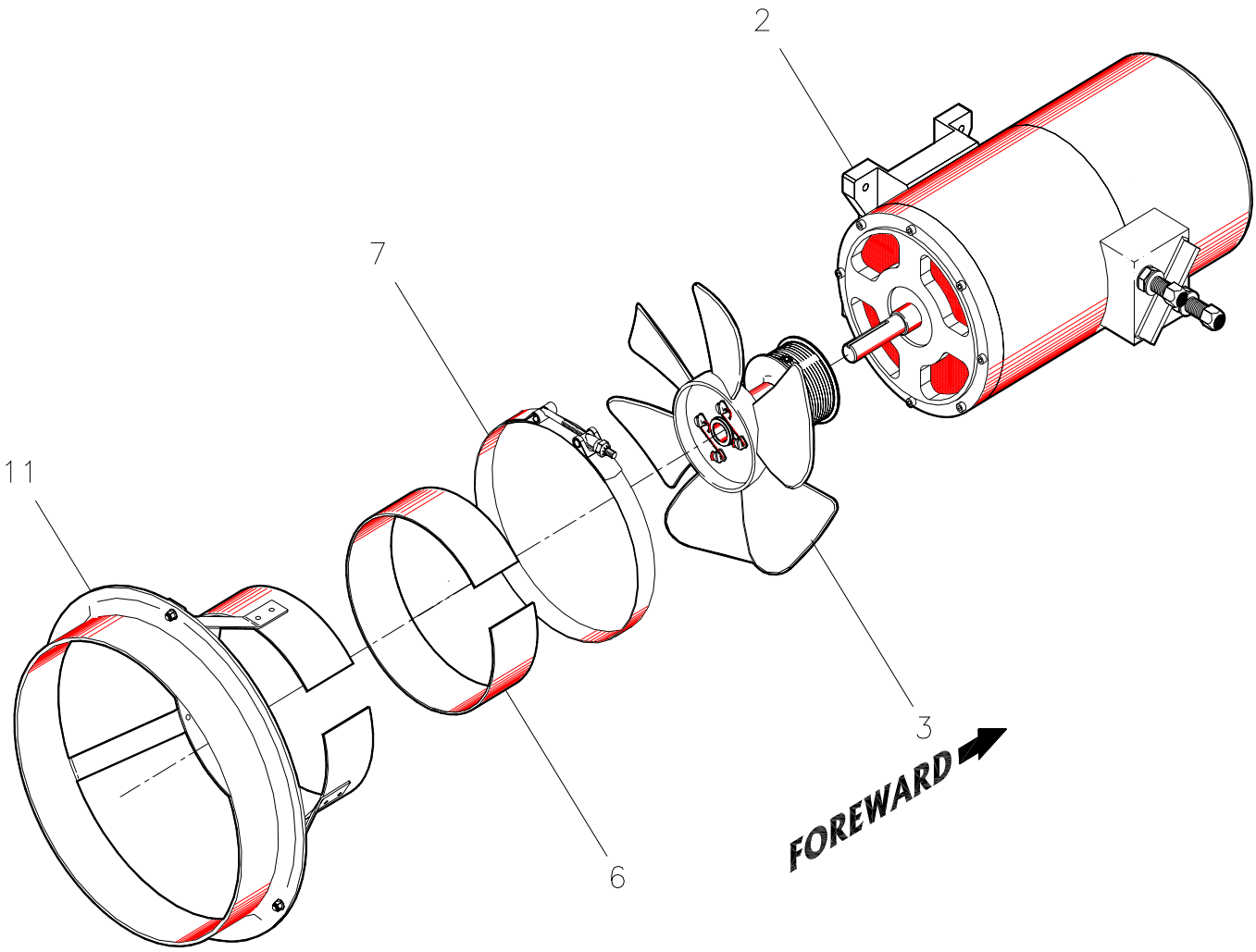


FIGURE 50
FORWARD EVAP/BLOWER INSTALLATION
SHEET 3 OF 4

FIG	ITEM	PART NUMBER	NOMENCLATURE	EFF CODE	UNITS PER ASSEMBLY
	1	**31-0550-1**	Comp/Motor Beam Assembly		1
	2	ES61134-3	Motor-Comp Drive		1
	3	JBS13015-2	Fan Blade Assembly		1
	4	31-0550-3	Beam Assy		1
	5	31-0550-5	Belt Guard Assy		1
	6	35-1560-4	Rubber Gasket		1
	7	MS21920-47	Clamp		1
	8	AN4-6A	Bolt		8
	9	AN960-416	Washer		15
	10	ES20040-6	Belt (35 IN.)		1
	11	35-0560-3	Fan Shroud Assembly		1
	12	ES59128-1	Hour Meter		1
	13	31-0550-5	Bracket		1
	14	MS21251A5S	Turnbuckle		1
	15	MS21256-1	Lock Clip		2
	16	MS21254-5RS	Eye End-Right Thd.		1
	17	MS21254-5LS	Eye End-Left Thd.		1
	18	35-1560-12	Support		1
	19	ES38128-5	Washer-Metric 10mm		1
	20	ES38128-4	Washer 8mm		1
	21	ES38113-1	Seal-Washer Disch.		1
	22	ES38112-1	Seal-Washer Suct.		1
	23	ES49024-1	Manifold		1
	24	ES39112-4	Bolt-Metric		2
	25	35-1560-9	Bracket		1
	26	AN4-16A	Bolt		1
	27	AN960-416L	Washer		8
	28	AN4-5A	Bolt		1
	29	AN4-7A	Bolt		1
	30	AN4-13A	Bolt		1
	31	JBS80-1	Key		1
	32	AN4-21A	Bolt		1
	33	ES39112-5	Bolt Metric		1
	34	JBS421-7	Relay		1
	35	JBS222-1	Compressor Assembly		1
	36	MS21042-4	Nut		7
	37	NAS42DD8-32	Spacer		2

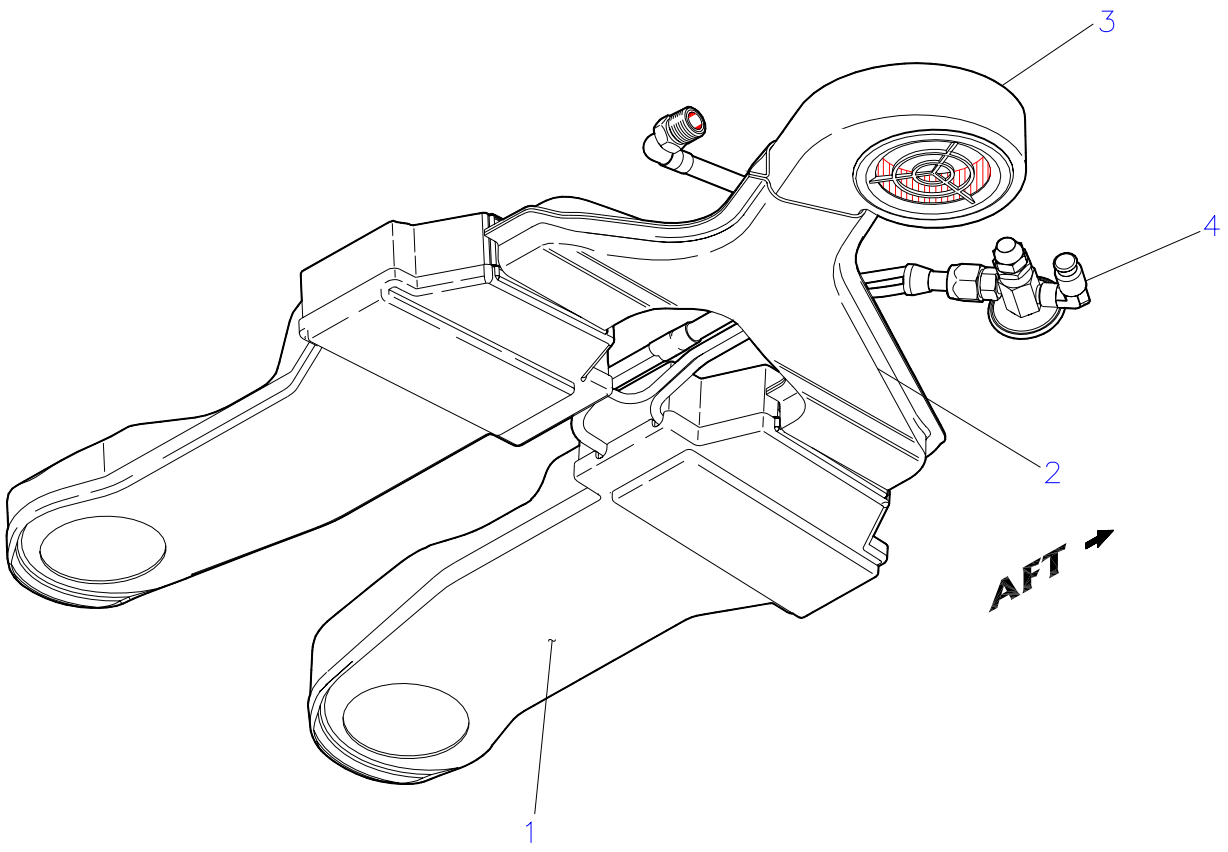


FIGURE 50
FORWARD EVAP/BLOWER INSTALLATION
SHEET 1 OF 2

FIG	ITEM	PART NUMBER	NOMENCLATURE	EFF CODE	UNITS PER ASSEMBLY
	1	**31-0250-1**	Forward Evaporator Assembly		1
	2	**31-0252-1**	Transition Duct Assembly		1
	3	**31-0251-1**	Forward Blower Assembly		1
	4	ES26107-1	Expansion Valve		1

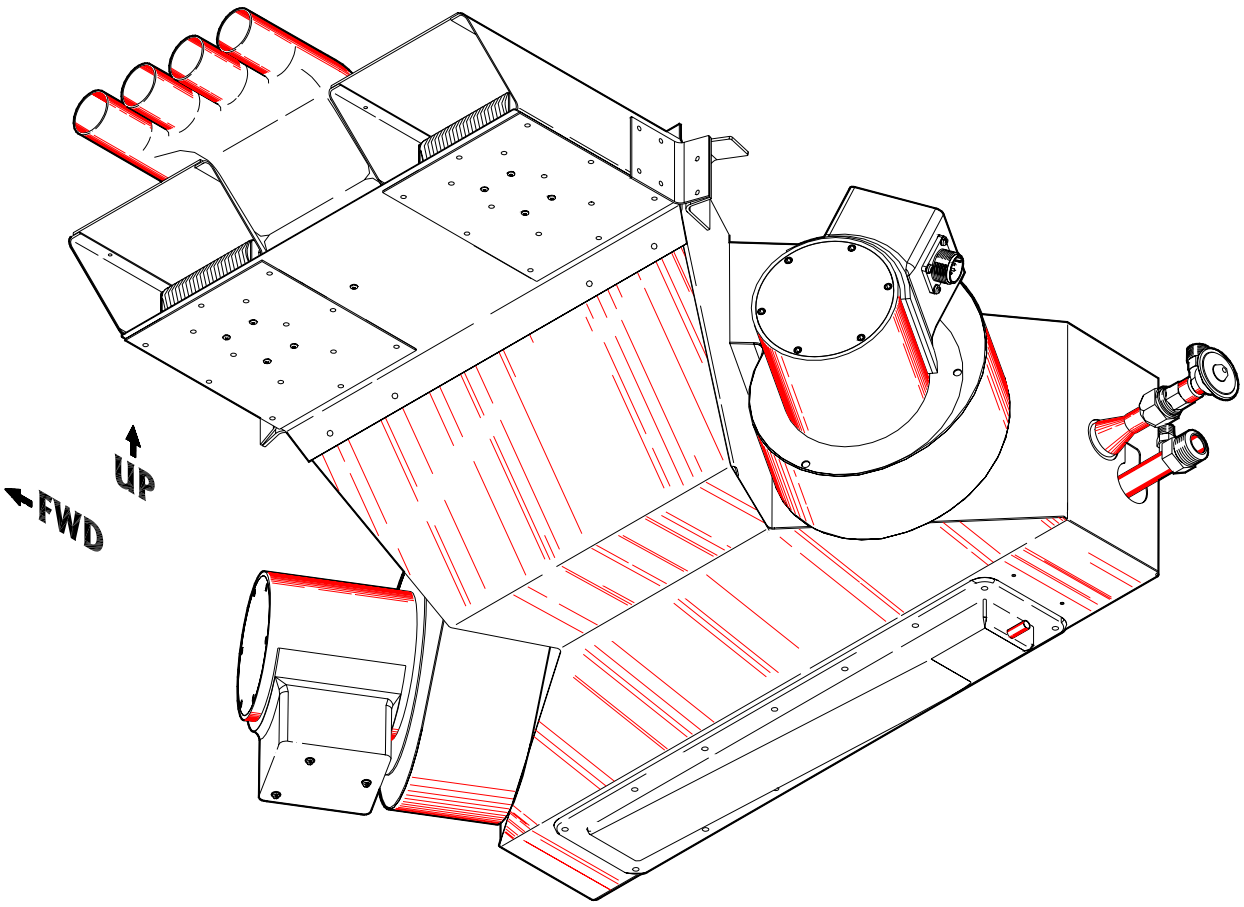


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 1 OF 10

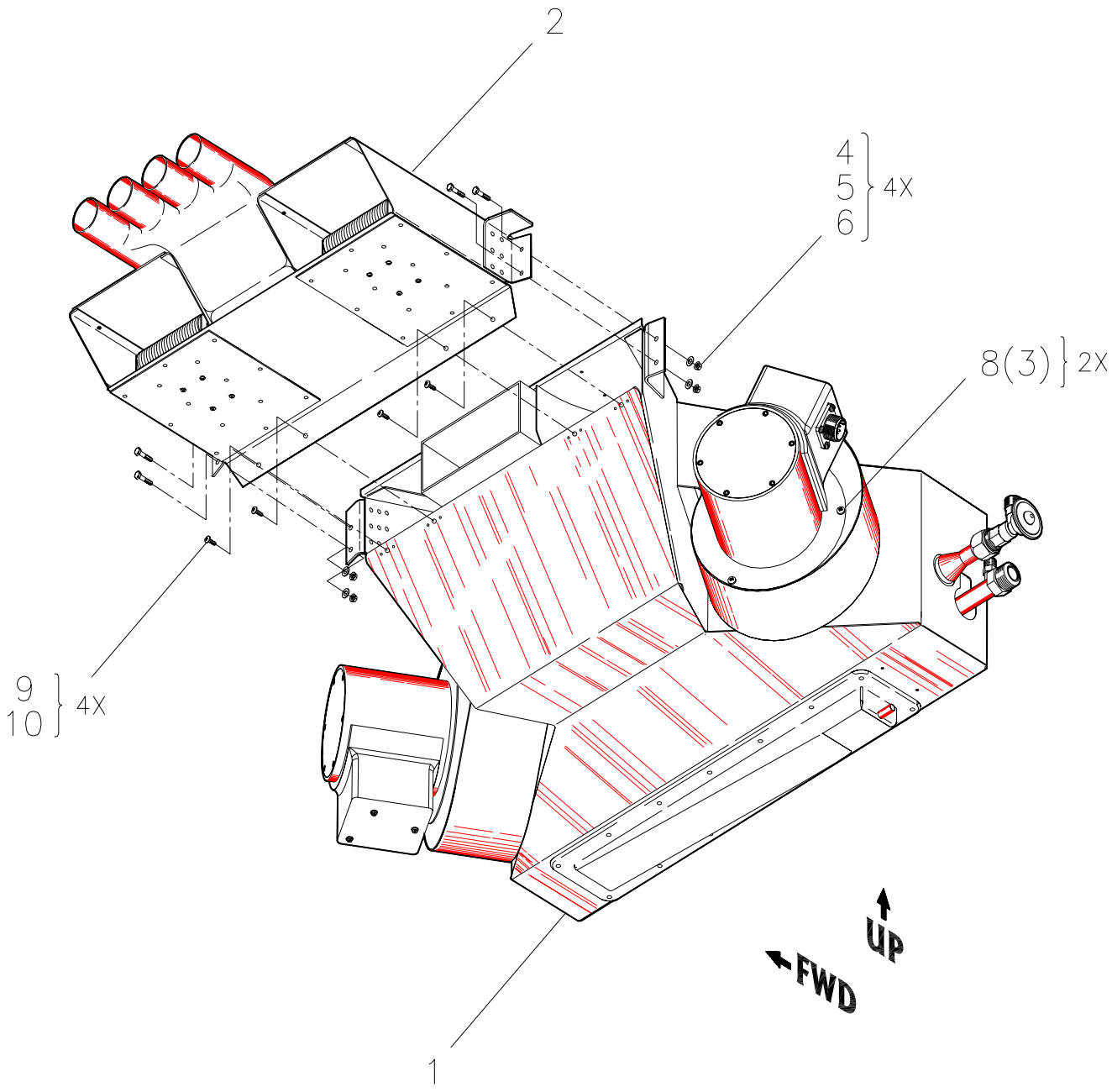


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 2 OF 10

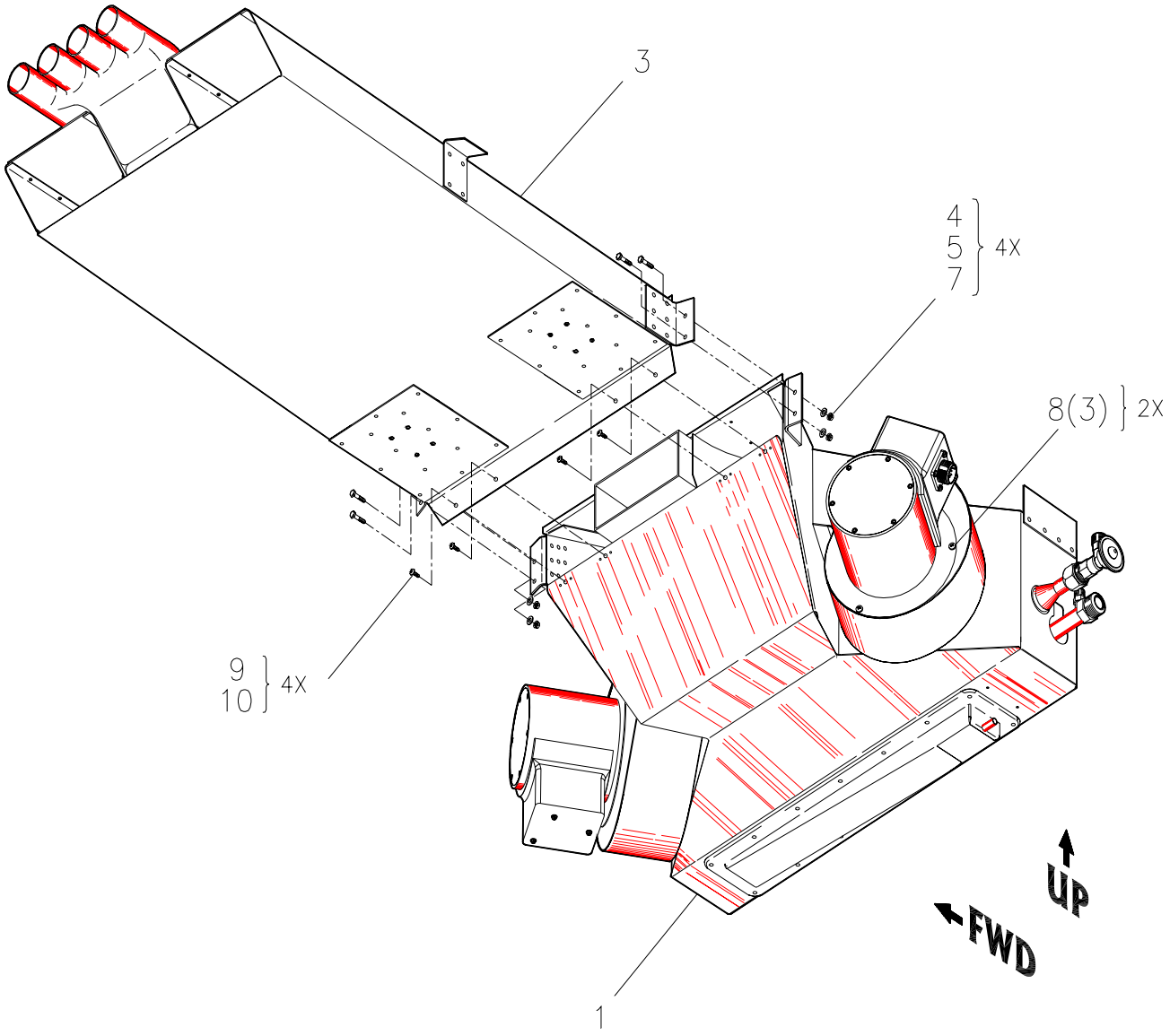


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 3 OF 10

FIG	ITEM	PART NUMBER	NOMENCLATURE	EFF CODE	UNITS PER ASSEMBLY
	1	**31-0260-1**	Aft Evaporator Assembly		1
	2	**31-0260-2**	Heater/Transition Assembly		1
	3	**31-0260-3**	Heater/Transition Assembly		1
	4	AN3-3A	Bolt		4
	5	AN960-10	Washer		4
	6	MS21042-08	Nut		4
	7	MS21042-4	Nut		4
	8	AN525-10R6	Screw		6
	9	AN525-832R6	Screw		4
	10	AN970-3	Washer		4

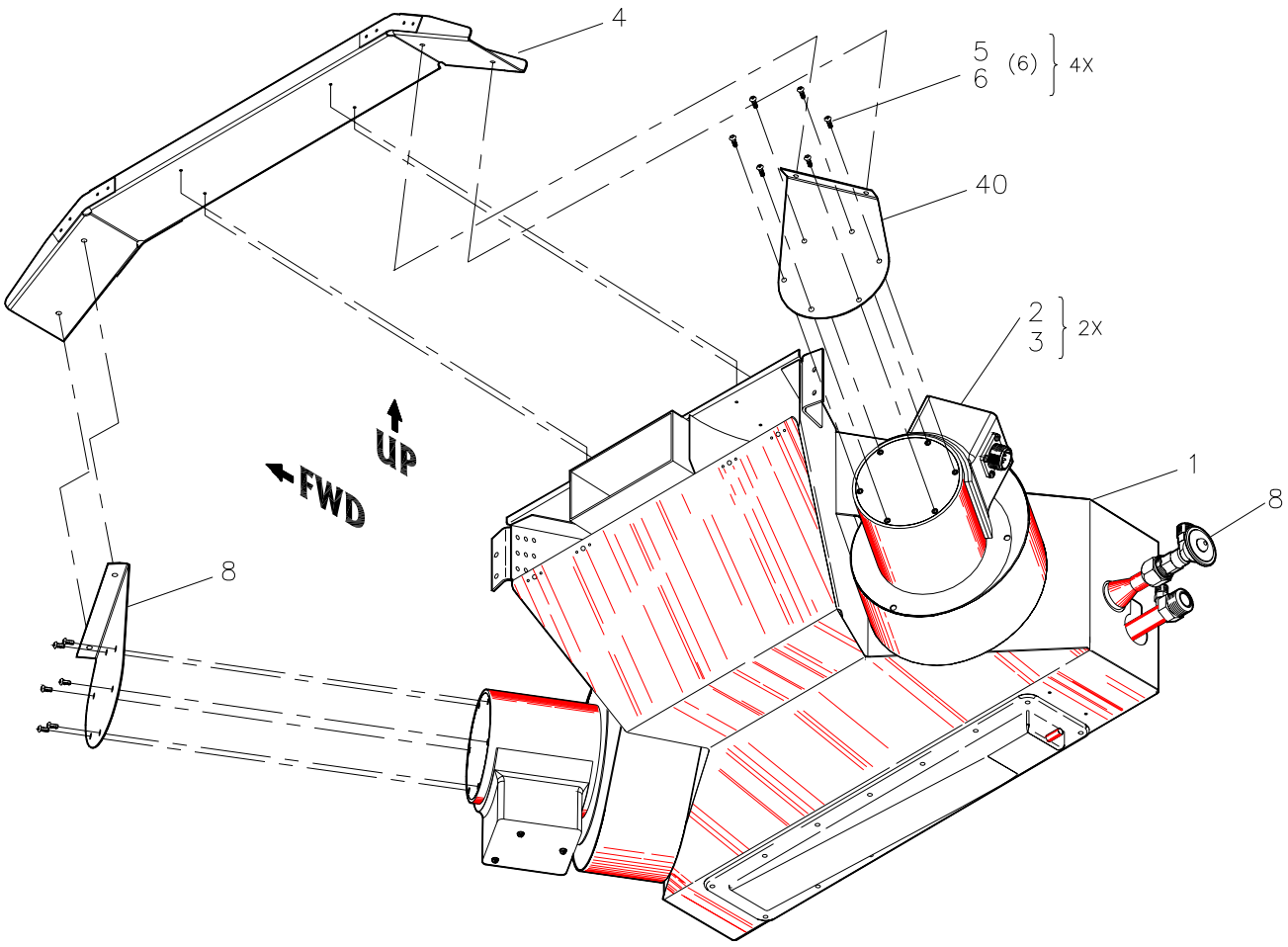


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 5 OF 10

FIG	ITEM	PART NUMBER	NOMENCLATURE	EFF CODE	UNITS PER ASSEMBLY
	1	**31-0260-1**	Aft Evaporator Assembly		1
	2	ES61136-1	Motor		2
	3	ES73100-7	Blower Wheel		2
	4	31-1210-4	Bracket		1
	5	NAS1352-C04-20	Screw		12
	6	31-1210-7	Bracket		1
	7	31-1210-8	Bracket		1
	8	ES26105-1	Expansion Valve		1

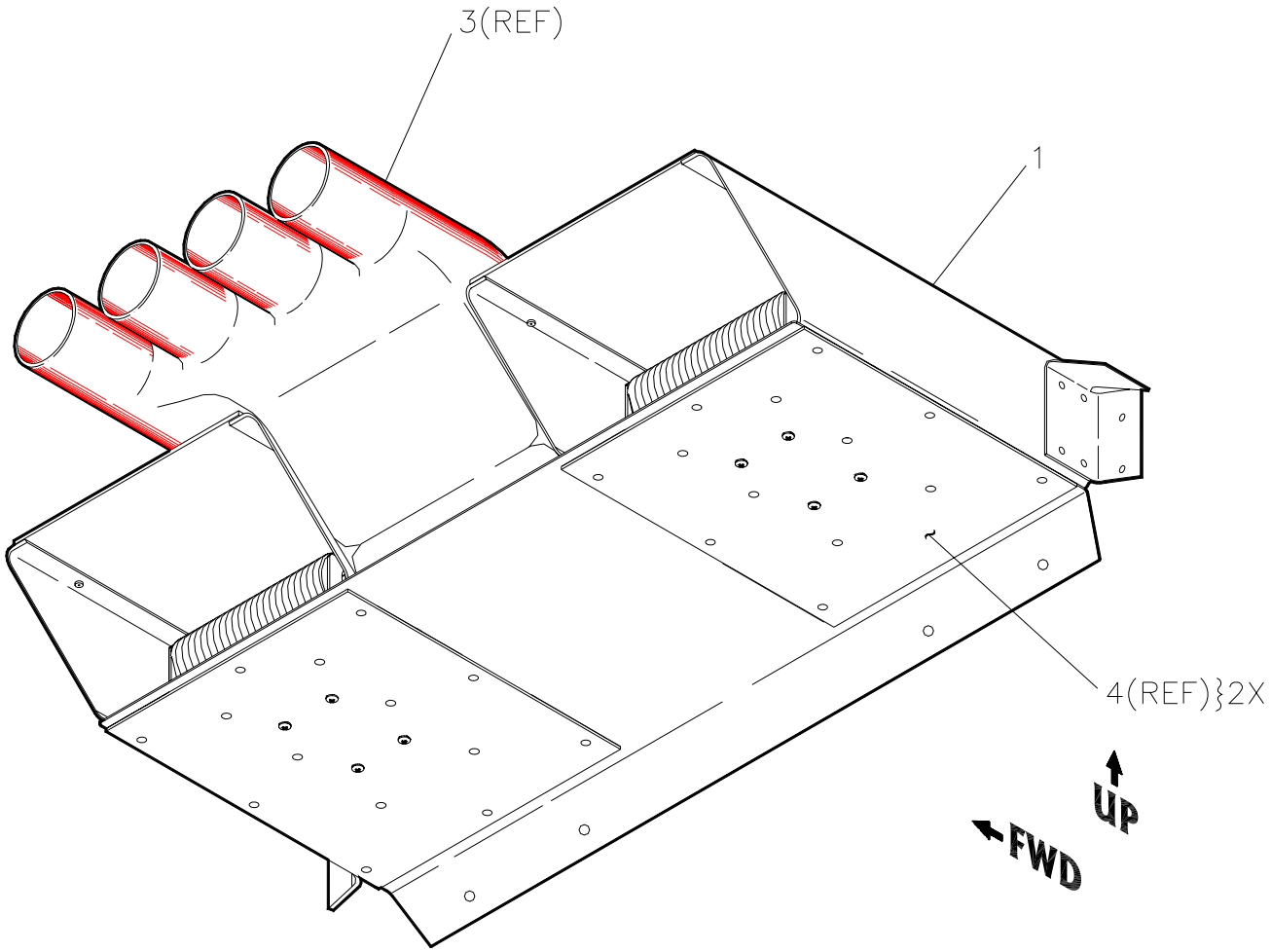


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 7 OF 10

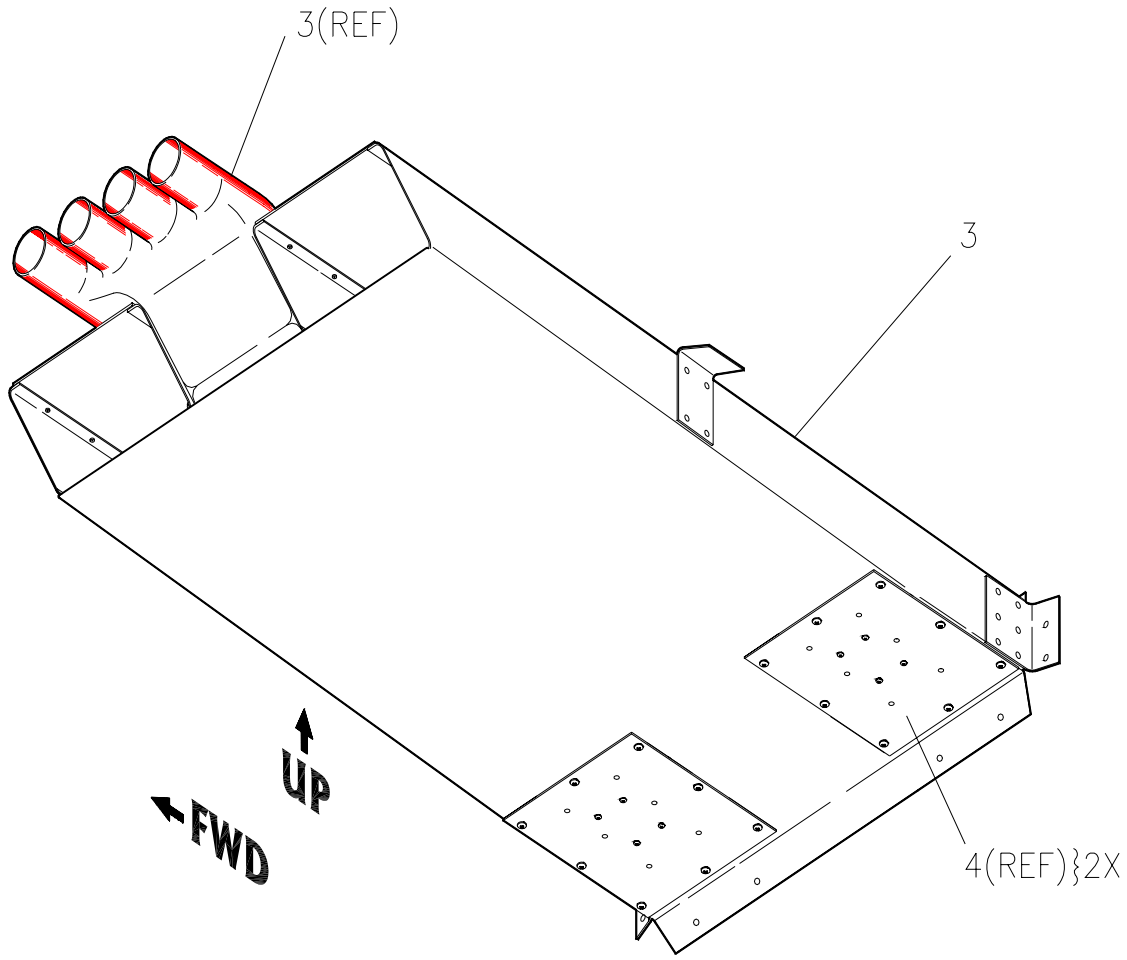


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 8 OF 10

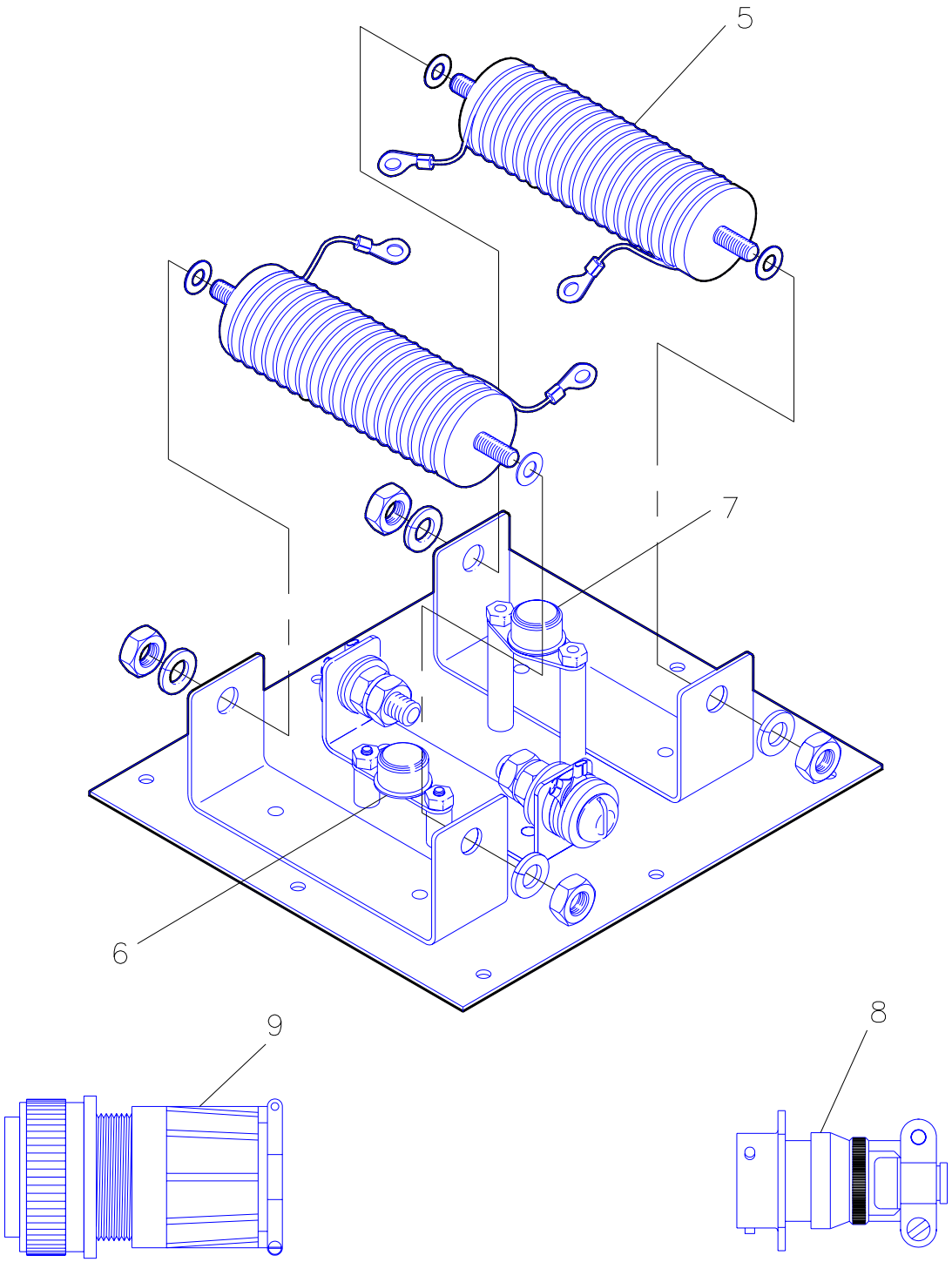


FIGURE 60
AFT EVAPORATOR INSTALLATION
SHEET 9 OF 10

FIG	ITEM	PART NUMBER	NOMENCLATURE	EFF CODE	UNITS PER ASSEMBLY
	1	**31-0260-2**	Heater/Transition Assembly		1
	2	**31-0260-3**	Heater/Transition Assembly		1
	3	31-1260-21	Duct		1
	4	**31-0280-1**	Heater Assembly		2
	5	ES52317-1	Heater Element		2
	6	ES53128-1	Thermostat		1
	7	ES53128-2	Thermostat		1
	8	MS3111F14-12P	Connector		1
	9	MS3106F22-22P	Connector		1

APPENDIX A

APPENDIX B

TO INSTALLER OF KEITH PRODUCTS AIR CONDITIONING SYSTEM

BEFORE YOU BEGIN YOUR INSTALLATION

Find the provided BILL OF MATERIAL (BOM) and check to ensure that all materials indicated, and the quantities indicated, are in the kit you just received.
Note that this BOM has the SERIAL NUMBER that KEITH PRODUCTS has assigned and the SYSTEM PART NUMBER of air-conditioning system on it.

Find the copies of the installation drawings and review them to get the full understanding of how the kit is to be installed. If questions should arise try to resolve them before proceeding with the installation.

If a SWAGE KIT or BUBBLE KIT has been provided as a loaner tool read the instructions enclosed in the kit to ensure that you know how to use the tool properly.

REQUIRED TOOLS

Crimper model 3700-H (Recommended brand ATCO)

DIE #3606-RB
For hose ES48149-1 & fittings ES40149 (-1 & -5) through ES40151 (-1 & -5)
*Recommended torque 11-13 ft/lbs
DIE #3608-RB
For hose ES48149-2 & fittings ES40149 (-2 & -6), ES40150 (-2 & -6) & ES40151 (-2, -6 & -8)
*Recommended torque 15-20 ft/lbs
DIE #3610-RB
For hose ES48149-3 & fittings ES40149 (-3 &-7) through ES40151 (-3 & -7)
*Recommended torque 21-27 ft/lbs
DIE #3612-RB
For hose ES48149-4 & fittings ES40149 (-4 & -10), ES40150 (-4), ES40151 (-4 & -9)
*Recommended torque 28-33 ft/lbs

Sealant (Ref #ES4900) is to be applied to all fittings and mating surface.
Note…. The part number of sealant is included in BOM, but not necessarily found on the plumbing schematic.

If a disconnection of the fitting is to occur, ensure that sealant is applied before reconnecting.

DURING THE INSTALLATION

If errors are found in the copies of the installation drawings and are confirmed by KEITH, please mark the areas of concern with the necessary corrections for future reference.

WHEN YOU FINISH YOUR INSTALLATION

When making the appropriate entries in the aircraft logbook please note the Serial Number and Part Number in the entry.

Save all contents of the Data Pack that was provided with the kit. The paperwork should include the General Service Manual for Vapor Cycle air-conditioning, the copies of installation drawings, BOM, STC, FMS, Weight and Balance Sheet. It is imperative that this Data Pack be given to the Owner/Operator for future referencing purposes.

APPENDIX B
Torque Requirements