

FAA – DER APPROVED

Service Bulletin

Service Bulletin: SB412-204; Bell 412 Air Conditioner System
Subject: Installation of Compressor Anti Cycle Module
Date: 3 April, 2001
Applicability: Bell Helicopter Model 412 EP equipped with the Air Comm Corporation Air Conditioner System.

Reference:

1. F.A.A./S.T.C. #SR00066DE, Bell Helicopter 412 Air Conditioning System.
2. Plumbing Installation Drawing # : 412AC-508
3. Electrical Installation Drawing #: 412AC-807
4. Instructions for Continued Airworthiness # 412AC-208

Compliance: Shall be at the discretion of the operator.

I. Discussion:

In environments that combine extremely high temperatures & humidity along with significant amounts of dust and sand, and coupled with the failure of one or both of the Condenser Blower Assemblies. A condition may exist that would greatly reduced the ability of the Binary (Hi/Lo) Pressure Switch to effectively protect the Compressor Clutch Assembly from cycling at high discharge pressures.

In an effort to reduce the chance of Compressor Clutch cycling under these conditions, and incorporate modifications to the system to enhance serviceability, the following changes are recommended to insure the continued operation of the air conditioning system.

1. Install a Compressor "ON" time delay so that the compressor cannot cycle from the OFF to ON during high discharge pressure situations. A 30 second time delay would allow the discharge pressure to decay, thus avoiding a clutch / belt load spike. This delay would not occur during initial system start up. (See V. Installation of the Compressor "ON" Time Delay Module, and Compressor Clutch Electrical Disconnect. Page 3 of 11)

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2. Specify inspection and cleaning procedures of the Condenser Heat Exchanger to insure proper system operation. (See VI. Cleaning and Inspection for the Condenser Heat Exchanger Assembly. Page 6 of 11)
3. Suggested overhaul schedule of the Condenser Blower overhaul life for operation in extreme environmental conditions. (See VII. Suggested Overhaul Schedule for the Condenser Blower Motor Assembly, for Operation in Extreme Environmental Conditions. Page 9 of 11)
4. Evacuate, and re-charge the system, add oil as necessary, and leak check system. (See VIII. Refrigerant Charging Procedure, and Leak Check System. Page 9 of 11)
5. Visually Inspect refrigerant lines to insure necessary support and clamping requirements per Dwg. 412AC-508 have been complied with. (See IX. Visually Inspect Refrigerant Lines to insure necessary support and clamping requirements have been complied with. Page 10 of 11)
6. Provide special inspection instructions to check for the proper function of the Evaporator Blower Assemblies. (See X. Special Inspection Instructions for the Forward Evaporator Blower Assemblies. Page 10 of 11)

II. Approval:

The Technical aspects of this Service Bulletin have been FAA / DER approved.

III. Purpose:

To eliminate the occurrence of the Air Conditioner Compressor Clutch Assembly from cycling under high pressure situations.

IV. Bill of Materials:

Qty.	Part Number	Nomenclature
1	412AC-8410-1	Time Delay Module
1	412AC-8410-10	Bracket
12'	MIL-W-22759/41-20	20 Gauge Wire
3	320559	Splice
2	36152	Terminal Lug
1	MS35489-1	Grommet

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NOTE

Disconnect battery and external power before starting work.

Discharge refrigerant from the air conditioner system.

NOTE

This system should be serviced by qualified personnel only!

CAUTION

Always use a back-up wrench when connecting or disconnecting refrigerant lines.

NOTE

Cap all refrigerant lines to reduce the possibility of system contamination, and refrigerant oil loss.

V. Installation of the Compressor "ON" Time Delay Module, and Compressor Clutch Electrical Disconnect.

This section provides instructions for the installation of a Compressor Clutch Time Delay Module.

The purpose of the time delay module is to help prevent cycling of the compressor clutch at high discharge pressures.

The module provides a thirty (30) second delay in clutch power when the air conditioner pressure switch cuts power to the clutch coil, or the air conditioner is switched from ON to OFF to ON. There is no delay to the system during initial start-up.

During the thirty (30) second delay, the compressor clutch is disengaged, allowing the discharge pressure to decay, thus resulting in reduced pressures and start-up torque.

The Time Delay Module is clamped to the R/H forward leg of the Condenser Support Frame, and is installed electrically between the Hi/Lo Pressure Switch and the Compressor Clutch.

Installation details are provided as follows:

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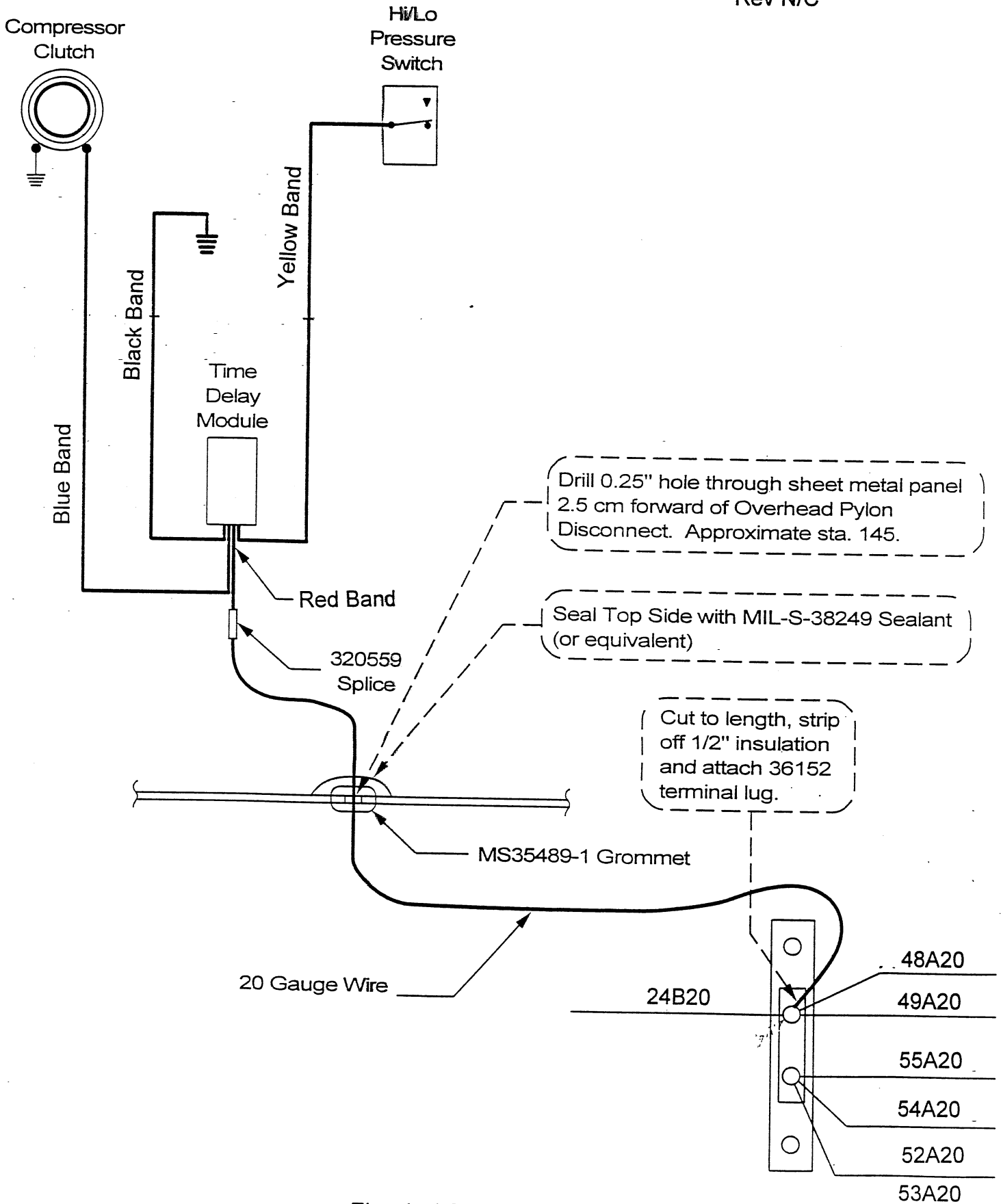
It is necessary to remove the forward transmission cowling, and the cabin headliner for access to complete this service bulletin.

1. Cut wire AC-36A20 between the Hi/Lo Pressure Switch and the compressor clutch. Strip ends of wires approximately ½ inch to accommodate the 320559 Splice.
2. Cut the Blue banded wire coming from the time delay module to length as required. Strip the end of the wire approximately ½ inch to accommodate the 320559 Splice, and connect it to the Compressor Clutch Wire as indicated in step 1.
3. Cut the Yellow banded wire coming from the time delay module to length as required. Strip the end of the wire approximately ½ inch to accommodate the 320559 Splice, and connect it to the Hi/Lo Pressure Switch Wire as indicated in step 1.
4. Using the nearest chassis ground to the Time Delay Module (Aft Evaporator Motor Ground suggested). Cut the Black wire coming from the time delay module to length as required. Strip the end of the wire approximately ½ inch to accommodate the 36152 Terminal Lug. Remove screw from existing ground wire, and add time delay module ground to this connection, and reinstall screw.
5. The Red banded wire coming from the time delay module must be connected to the Terminal Bus Bar at wire AC-24B20 on the 412AC-2502-1 Air Conditioner Relay Panel Assembly. To install this wire it will be necessary to drill a 0.25" hole through the sheet metal panel 2.5 cm forward of the Overhead Pylon disconnect. (Approximate sta. 145.0). Install MS35489-1 Grommet in hole and route the wire as necessary to attach to the Terminal Bus Bar. Cut Red banded wire coming from the time delay module to length as required. Strip the end of the wire approximately ½ inch to accommodate the 320559 Splice, and connect to the +28 VDC power supply wire from the junction of the AC-24B20 wire and the Terminal Bus Bar on the Air Conditioner Relay Panel Assembly. Seal Top Side of MS35489-1 Grommet with MIL-S-38249 Sealant, or Equivalent.
6. Perform a Maintenance Operational Check (MOC) by placing the air conditioner switch in the on position, and insure the engagement of the Compressor Clutch Assembly.

See Electrical Schematic Fig. V-1 on Page 5 of 11

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Electrical Schematic Fig. V-1.

VI. Cleaning Procedure and Inspection for the Condenser Heat Exchanger Assembly.

Cleaning:

1. Remove Access Panel 412AC-7047-15 on the back of the 412AC-7007-4 Condenser Assembly. (Fig. IV-1)
2. Remove the AN525-10R6 Screws & AN960-10L Washers from the 412AC-7074-3 Frame / Screen Assembly, and remove the frame from the front of the condenser assembly. (Fig. IV-2)
3. Cover Inlet section of 412AC-7058-15 Vane Axial (V/A) Blowers with plastic sheeting and secure in place with masking tape or equivalent. (Fig. IV-1)
4. Spray a mild solution of aircraft soap and water on to both sides of the heat exchanger fins, working from the top down.

CAUTION

Do not use solvents or chlorine base cleaners, as these may remove the protective coating from the heat exchanger fins.

CAUTION

Do not spray water or soap solution at the heat exchanger fins at a pressure greater than 100 psi.

5. Thoroughly rinse the heat exchanger with clean water to remove all traces of soap and dirt.

NOTE

It maybe necessary to use a sponge to remove any residual water & dirt from the inside of the Condenser Housing Assembly

6. On completion of the cleaning process, remove the plastic from the Inlet section of the 412AC-7058-15 V/A Blower Assemblies, and reinstall the 412AC-7074-3 Frame / Screen Assembly on the front of the Condenser Assembly.

Inspection:

1. Visually inspect both sides of the heat exchanger fins to insure there is no blockage caused by dirt, debris, bent or dented fins.

NOTE

Repeat Cleaning Steps 1 – 6 as necessary to remove any dirt or debris found during Inspection of the heat exchanger assembly.

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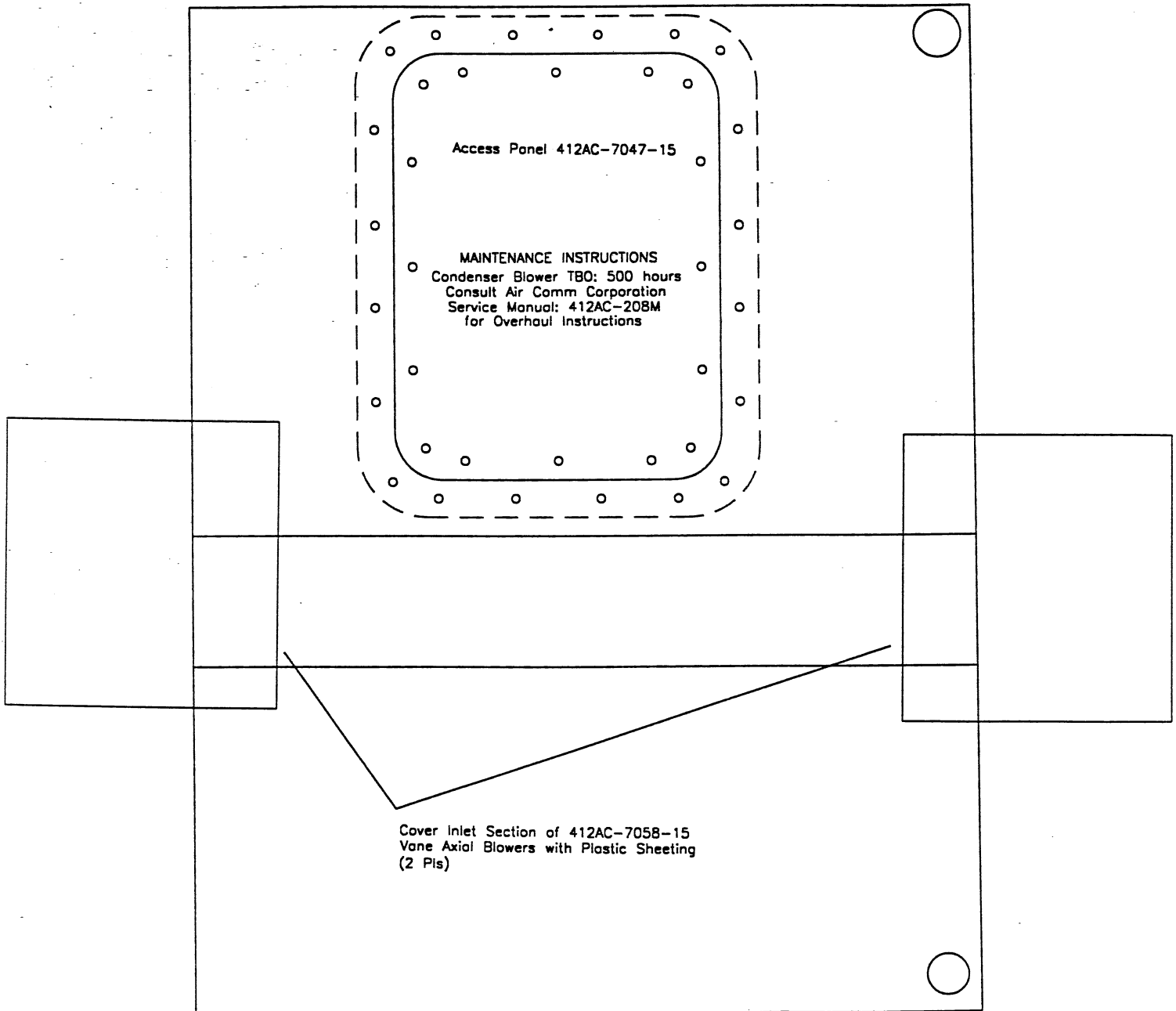
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A "fin comb" or plastic pick can be used to aid in dislodging / removing dirt, debris, or to straighten bent or dented fins.

2. Visually inspect condenser housing for damage, cracking, and corrosion.
3. Reinstall Access Panel 412AC-7047-15 on the back of the 412AC-7007-4 Condenser Assembly & 412AC-7074-3 Frame.

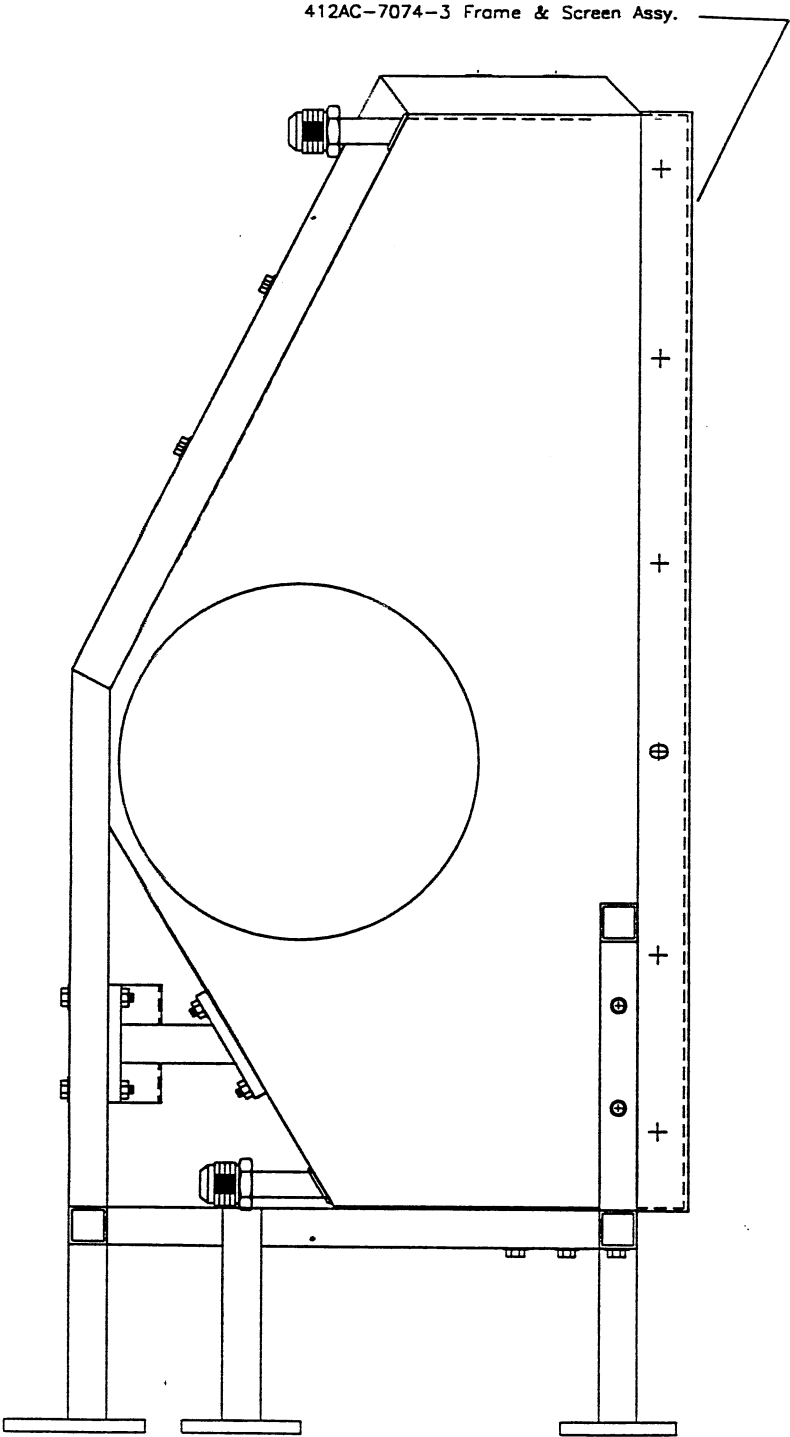


View Looking Forward
Fig. IV-1Condenser Assy. 412AC-7007-4
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Looking Inbd from RH side.

Fig. IV-2 Condenser Assy. 412AC-7007-4

VII. Suggested Overhaul Schedule for the Condenser Blower Motor Assembly, for Operation in Extreme Environmental Conditions.

The suggested overhaul schedule for the 412AC-7058-15 Vane Axial (V/A) Blower Fan & Motor Assembly (ES73131-1) has been revised to 300 hours for operation in extreme environmental conditions.

Extreme environmental conditions are defined as, temperatures at or above 100° F (38° C), combined with high humidity for more than 30 calendar days.

Or

Environments where significant amounts of dust, dirt, or salt air maybe ingested into the V/A Blower Fan & Motor Assemblies during normal operations.

As stated in the 412AC-208 Air Conditioner Service Manual, " The blower manufacturer recommended 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.

VIII. Refrigerant Charging Procedure, and Leak Check System.

CAUTION

Refrigerant servicing should be preformed by qualified personnel only!

Charging Procedure:

1. Connect a servicing manifold, and reclaiming / charging station to the service ports located on the right hand side of the cabin roof adjacent to the aft evaporator assembly.
2. Evacuate all refrigerant into the reclaiming / charging station.

NOTE

It is acceptable to remove, and or replace any of the air conditioner refrigerant lines or components once the evacuation of the system has been completed.

3. Turn on the vacuum pump (cycle) and open the suction valve on the manifold to place a vacuum on the system. When the pressure drops to 29.40 InHg (1.9 KgCm) any moisture vaporizes and is drawn out of the system by the vacuum pump. Continue operation of the vacuum pump for a minimum of 45 minutes.

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NOTE

The complete removal of moisture is important to prevent blockage of the expansion valves.

4. On completion of the vacuuming of the system, close the manifold valves and observe the suction gauge. Allow system to hold the vacuum for a minimum of 30 minutes. (This is known as a vacuum leak test). If after 30 minutes there is no noticeable loss of system vacuum, the system is more than likely free of leaks.
5. After completion of the vacuum leak test, proceed to charging the system with 6.25 lbs of R134a Refrigerant.
6. On completion of system charging, conduct a leak check of the entire system utilizing an electronic leak detection device. Repair any leaks found, do not over torque the fittings, excessive torque will damage the fittings.

IX. Visually Inspect refrigerant lines to insure necessary support and clamping requirements have been complied with.

1. Perform a visual inspection of the refrigerant plumbing system I/AW ACC Dwg. 412AC-508 to insure the proper support and clamping requirements have been complied with.
2. Visually inspect refrigerant lines for leaks, chaffing, and corrosion.
3. Install Clamps as necessary to provide support and clearance of aircraft structure and components.

X. Special Inspection Instructions for the Forward Blower Assemblies.

1. Remove cat ducting from Inlet section of Right and Left hand forward blower assemblies.
2. Manually turn the blower wheel to insure that it is not rubbing against the venture ring, or the blower housing.

CAUTION

Do not rotate the blower wheel with fingers, as there are multiple sharp surfaces on the blower wheel.

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Special Inspection Instructions for the Forward Blower Assemblies (Continued)

3. Place the switch on the air conditioner control panel to "Blower" and observe the direction of the blower wheel rotation. (The vanes on the blower wheel should turn in the direction of the blower housing outlet).

NOTE

If the blower wheel is found to be turning in the wrong direction, the blower motor electrical leads have been connected incorrectly. This is easily corrected by reversing the blower motor connections, thus switching the direction of the blower wheel rotation.

4. Reinstall the cat ducting to the Right and Left hand forward blower assemblies and secure in place.

XI. Weight and Balance.

There is a negligible change to the weight due to the addition of the Compressor Anti Cycle Module, and should not impact the weight and balance of the aircraft.

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