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**PR-505AC-903M**

**Rev. B**

**March 20, 2020**

**505AC-103-1 Installation Instructions**

**For**

**Optional Right-Hand Evaporator Kit**

**On**

**Bell Model 505 Series Helicopters**

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## REVISION HISTORY

<b>Revision</b>	<b>Date</b>	<b>Detail of Changes</b>	<b>By</b>
N/C	03/19/2019	Original	L.S.
A	06/14/2019	Update installation to include new shroud	L.S.
B	03/20/2020	Updated Table 2. Torque Values for 1/2" and 5/8" tubes.	ZA

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## LIST OF EFFECTIVE PAGES

PAGE NO.	REVISION	DATE	PAGE NO.	REVISION	DATE
Cover	B	03/20/2020	-----	-----	-----
i	<b>B</b>	03/20/2020	-----	-----	-----
ii	B	03/20/2020	-----	-----	-----
iii	NC	03/19/2019	-----	-----	-----
1	NC	03/19/2019	-----	-----	-----
2	NC	03/19/2019	-----	-----	-----
3	NC	03/19/2019	-----	-----	-----
4	<b>A</b>	06/14/2019	-----	-----	-----
5	NC	03/19/2019			
6	NC	03/19/2019			
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## 1 INTRODUCTION

This document is to be used as a guide for installation of the optional right-hand evaporator to the existing 505AC-101-1/-3 Air Conditioning system installations in Bell 505 series helicopters. These instructions are intended to supplement and aid interpretation of the information contained on the installation drawings. Additional information required for operation and maintenance of the aircraft air conditioning system are included in the PR-505AC-900M Installation Instructions and PR-505AC-120M Instructions for Continued Airworthiness.

### 1.1 SYSTEM DESCRIPTION

The major components along with general plumbing routing of a typical basic air conditioning system are described in PR-505AC-900M Installation Instructions. The only change made in this document is the number of evaporators from two to three.

### 1.2 PRECAUTIONARY INFORMATION

HFC-134a refrigerant molecular structure is very small causing it to be more difficult to seal. Therefore, it is very important to follow the precautionary steps listed below in order to minimize the potential for leaks.

- A. Care must be taken to prevent contamination from entering the system tubing and components through all steps of the installation process.
- B. All lines and components should remain sealed until final assembly to minimize any contamination.
- C. Inspect all plumbing parts prior to installation. This step can be omitted from all major components (compressor, condenser, evaporators) since they are pre-cleaned at the factory.
- D. AS, AN, and SAE flared fittings are used throughout the system. Over tightening of these fittings may strip the threads or crack the flare resulting in system leaks. See table 3 for fitting torque specifications.
- E. The evaporators are preset at the factory for optimal performance. Therefore, adjustment should not be necessary. If it is determined, through system performance analysis, that adjustment is needed, contact Paravion Technology Inc. for further assistance.

### 1.3 SAFETY PRECAUTIONS

The refrigerant used in the air conditioner system is HFC-134a; other refrigerants must not be introduced into the system. HFC-134a has been shown to be nonflammable at ambient temperature and atmospheric pressure. However, tests have indicated that at pressures above atmospheric and with air concentrations greater than 60% by volume, combustible mixtures can be formed. Under no circumstance should any bulk storage cylinder, filling equipment, charging or refrigerant reclaim or recovery system be pressure tested with AIR/HFC-134a mixtures. NEVER charge a discharged air conditioning system which has not



been evacuated first. All lines should be evacuated on a discharged system so that they will fill with refrigerant only before adding a charge. NEVER use compressed air to flush the refrigerant from an air conditioning system.

**NOTE:** Servicing of HFC systems should be performed by licensed, qualified personnel only.

The work area should be well ventilated. Route relief and purge vent piping outdoors, away from air intakes. Be certain that the work area is clear of vapors prior to beginning work.

**WARNING:** INTENTIONAL INHALATION MAY CAUSE DEATH WITHOUT WARNING.

Always wear protective clothing when there is a risk of exposure to liquid refrigerant. Wear eye protection and a face shield when servicing any part of the refrigerant system. Liquid refrigerant at atmospheric pressure evaporates quickly and rapidly cools anything that it contacts.

**WARNING:** TO AVOID FROSTBITE, CARE MUST BE TAKEN TO PREVENT LIQUID REFRIGERANT CONTACT WITH SKIN OR EYES. IF CONTACT DOES OCCUR, SEEK MEDICAL ATTENTION AS SOON AS POSSIBLE.

Avoid operations with high temperatures, such as welding or baking of finishes in the immediate area of any part of the air conditioning system or refrigerant supply tank.

**WARNING:** AVOID AREAS WHERE OPEN FLAME OR CHEMICAL VAPORS ARE PRESENT WHEN USING REFRIGERANT.

### 1.3.1 PROTECTIVE CLOTHING

Always wear protective clothing when there is a risk of exposure to hazardous items. Wear eye protection and a face shield when servicing if need dictates. If contact does occur, seek medical attention immediately.

### 1.3.2 TOOLS, EQUIPMENT AND CONSUMABLES

Servicing of an air conditioning system requires the use of certain special tools.

#### 1.3.2.1 TOOLS AND EQUIPMENT

- A. Recommended equipment vendor for servicing, recovery, recycling, and recharging; The Robinair Corp. or equivalent.
- B. Electronic leak detector for HFC-134a.
- C. Vacuum pump if not included with recovery/recharging equipment.
- D. Heat exchanger cooling fin comb.
- E. Gates P/N 91107 "Krikit" drive belt tension gage or equivalent.
- F. Probe-type thermometers (minimum of 2 each)

#### 1.3.2.2 CONSUMABLES:

- A. HFC-134a, bulk cylinder.
- B. Refrigerant oil type; PAG oil with a viscosity index of 80 to 100.
- C. MIL-S-8802F Class B2 sealant per drawing or equivalent.
- D. MIL-S-38249 sealant per drawing or equivalent.
- E. MIL-S-81733 Type II, Class 1 sealant or equivalent.
- F. MIL-PRF-83483 anti-seize.
- G. MIL-PRF-16173 compound Grades 1 and 2 per drawing.
- H. Hysol EA9309 adhesive, or equivalent.
- I. Contact cement, 3M Scotch 1300L, or equivalent.
- J. 0.032" stainless lock wire (Ref.; MS20995C32).
- K. Robinair Corp. Power-Flush cleaning solvent, (for system flushing), or equivalent.
- L. Gaseous dry nitrogen, regulated source (0-500 psig).
- M. Leak check fluid, (soap solution).
- N. Thread Sealant, P/N 55431 (Loctite Corp.)
- O. Robinair Corp. Universal A/C Dye

#### 1.4 AREAS OF ACCESS

Most efficient installation of the optional right-hand evaporator system is achieved by first accomplishing the following tasks:

- A. Disconnect the battery and external power sources.
- B. Remove refrigerant charge.
- C. Remove cowling and gain access to circuit breaker box area, remove box cover for modification.
- D. Remove nose cowling and cabin heater ducts, tube assemblies as required.
- E. Remove map light, instrument panel shroud, PFD, MFD, and existing installed forward evaporator outlet ducting, per manufacturer's maintenance manuals and Paravion Technology Inc. drawings 505AC-523, 505AC-524.
- F. Remove and disconnect air conditioning system control panel in center console for modification if required, reference Paravion Technology Inc. 505AC-603 drawing.
- G. Reference Paravion Technology Inc. drawing 505AC-443 to determine if center evaporator modification is required. If required, reference Paravion Technology Inc. drawings 505AC-440, 505AC-524, 505AC-540, and 505AC-601 to disconnect existing forward evaporator electrical connections at evaporator and plumbing connections aft of the canted bulkhead, remove evaporator assembly.

## 2 COMPONENT INSTALLATION

### 2.1 EVAPORATOR INSTALLATION, REFERENCE DRAWING 505AC-443

#### 2.1.1 RIGHT HAND FORWARD EVAPORATOR INSTALLATION

- A. Using 505AC-4403-13 support as a pattern, match mark additional fastener locations on center evaporator mount and support angle per drawing if applicable.

**NOTE: Modification if necessary will require removal of the center evaporator assembly (Ref. 505AC-101 installation drawings as applicable). See plumbing and outlet duct installation instructions in this document for further modifications information before completing installation.**

- B. Modify center evaporator mount and support angle per drawing if necessary.
- C. Install center evaporator outlet reducer and, seal per drawing.

**NOTE: It may be necessary to remove excess adhesive from inside diameter of evaporator outlet to achieve best fit of reducer.**

- D. Re-install center evaporator per applicable drawing 505AC-440 and PR-505AC-900M installation instructions.
- E. Complete 505AC-4403-13 support installation per drawing.
- F. Mark indicated fastener locations on canted bulkhead per drawing.
- G. Supporting right-hand evaporator, temporarily install to 505AC-4403-13 console support, 505AC-4403-8 shroud Assembly, 505AC-4403-6 bulkhead support, 505AC-4403-7 bulkhead bracket, and 505AC-4403-12 inside bulkhead support to verify alignment with canted bulkhead fastener locations. Minor adjustment of evaporator on mounting studs and brackets within existing fastener hole clearances is allowable.
- H. After verifying bulkhead fastener locations, remove temporarily installed evaporator, shroud assembly, and brackets. Install 505AC-4403-7 bulkhead bracket and 505AC-4403-12 inside bulkhead support to canted bulkhead per drawing.
- I. Install evaporator on mount brackets minus 505AC-4403-14 shroud and complete evaporator electrical, plumbing, drainage, and air outlet installations. Complete applicable tests per installation instructions and drawings.
- J. After electrical operation and plumbing leak test, install -14 shroud and prepare for ground run.
- K. Install PFD, MFD and auxiliary compass per Model 505 Maintenance Instructions after completion of right-hand evaporator installation.

## 2.2 PLENUM AND DUCT INSTALLATION, REFERENCE DRAWING 505AC-523

### 2.2.1 OUTLET PLENUM AND DUCT INSTALLATION

- A. Remove existing outlet ducts and tee fitting per drawing.
- B. Complete outlet duct routing from forward evaporator to left hand plenum inlet location. Locate best fit for tie mount installation.
- C. Install instrument panel shroud per manufacturer's instructions. After completion of right-hand evaporator installation, complete ducting and tie mount installation. Secure ducting per drawing.

## 2.3 PLUMBING INSTALLATION, GENERAL

### 2.3.1 PRECAUTIONARY INFORMATION

Care must be taken to avoid contamination of the plumbing system components during installation. End plugs and caps, found in components must not be removed before final assembly of plumbing lines. If system becomes contaminated, follow cleaning/flushing procedures recommended by solvent manufacturer.

The plumbing is primarily aluminum tubing, SECO7 seals are included with the installation hardware to provide a lower yield gasket material between the SAE 37° tube flare and fittings.

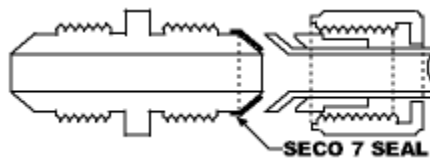


FIGURE 1: TYPICAL SECO SEAL INSTALLATION

The installation procedure is as follows:

- A. Referring to the installation drawing, select the correct size seal for the flared fitting.
- B. Clean all surfaces thoroughly, coat mating surfaces sparingly with SP-20 PAG or equivalent oil compatible with HFC-134a.
- C. Referencing Figure 2, install SECO7 seal onto male portion of flared fitting.
- D. Thread nut onto male fitting several turns by hand until connection is snug. If nut cannot be tightened snugly by hand, disassemble and correct problem to prevent assembly damage to seal and/or fitting.
- E. Tighten nut to torque value specified in Table 3.
- F. Allow 15 seconds elapsed time for compression of seal to occur.
- G. Retighten nut to torque value specified in Table 3 in order to compensate for the compression yielding of the SECO7 seal.

**NOTE: Do not attempt to correct leakage or misalignment of a joint by over**

**torqueing. Disassemble and check for nicks, burrs, dirt, etc. Reassemble using new parts if necessary. SECO7 seals must be replaced if the joint is disassembled.**

Complete electrical installation after plumbing installation is complete.

### 2.3.2 PLUMBING INSTALLATION, RIGHT-HAND EVAPORATOR REFERENCE DRAWING 505AC-543

**NOTE: To prevent possible contamination of the system, keep component plumbing connections and tube assemblies sealed when not installed.**

- A. Complete right-hand evaporator and supports installation as detailed above.
- B. Remove center evaporator canted bulkhead fittings as indicated and temporarily install tee fittings per drawing.
- C. Using tube assemblies installed on tee fittings, verify equipment clearances and holes locations for right-hand evaporator canted bulkhead penetrations.
- D. Remove right hand evaporator tubes from tee fittings, locate and drill canted bulkhead holes per drawing.
- E. Install bulkhead fittings, route and secure all affected pressure and return lines per drawing.
- F. Complete drain line installation and modification per drawing.
- G. Reinstall and complete lines and fittings installations removed for access, reference 505AC-101-1/-3 installation drawings.
- H. Complete electrical connections and test operation before final system servicing.
- I. Follow system servicing instructions as detailed in this manual, PR-505AC-900M Installation Instructions, and in servicing equipment manufacturer's instructions.

### 2.4 ELECTRICAL INSTALLATION, REFERENCE DRAWING 505AC-603

To avoid unnecessary disassembly, work on the electrical installation should precede completion of component installation. In addition to pre-marked wires, this kit includes crimp-on terminal lugs and connectors for use in completing electrical wire routing. The wires are marked in accordance with the drawing notation.

**NOTE:** Follow existing wire routing where possible.

#### 2.4.1 ELECTRICAL COMPONENTS INSTALLATION

- A. Install replacement circuit breakers, electrical contacts and wiring in box per drawing.
- B. Install new circuit breaker labeling.
- C. Reassemble circuit breaker box per applicable Model 505 Maintenance Manual.
- D. Determine proper installation routing per drawing and route wires to each component.
- E. Modify switch panel assembly per drawing if required and install per drawing.
- F. Install connectors, splices, terminal lugs and lacing cord to complete wiring per drawing.

### 3 SYSTEM SERVICING

Refer to PR505AC-900M Installation Instructions for system servicing instructions including;

1. Precautionary procedures, before recovering or charging any refrigeration system read the safety precautions.
2. Refrigerant recovery and evacuation.
3. System lubrication
4. Leak check methods
5. System charging

**NOTE:** Only trained and qualified personnel should service this system.

#### 3.1 SYSTEM CHECK

Refer to PR-505AC-900M Installation Instructions for troubleshooting, it is good practice to thoroughly inspect all fasteners, fittings, connections, plumbing, and electrical routing before proceeding to charge the system.

Perform an electrical system function check of system components as detailed in PR-505AC-900M Section 3.

#### 3.2 SYSTEM LUBRICATION

Refer to PR-505AC-900M for System lubrication. An additional 0.5oz. of PAG refrigerant oil with a viscosity index of 80 to 100 should be added bringing the system total to 7.0oz. ± 0.5oz.

#### 3.3 SYSTEM CHARGING

- A. Refer to PR-505AC-900M Section 3 for system charging information and procedures, charge and operate the system according to procedures contained in this section. Recover any refrigerant in the system before beginning modification work and charge per recovery/charging unit manufacturer's instructions with 2.2\* lb. of refrigerant at completion. Final system charge should be accomplished in an area where the helicopter can be run for performance evaluation.

\*Estimated overall charge

### 4 TROUBLESHOOTING INFORMATION

Refer to PR-505AC-900M Section 4 for system troubleshooting information of system and components performance.

## 5 WEIGHT AND BALANCE

TABLE 1: INSTALLATION WEIGHT AND BALANCE DATA

INSTALLATION	WEIGHT. (LB.)	F.S. (IN.)	B.L. (IN.)
505AC-443 - Evaporator Installation	8.8	56.7	9.2
505AC-523 - Outlet Ducting Installation	**1.0	66.5	4.5
505AC-543 - Plumbing Installation	1.1	57.3	2.7
505AC-603 - Electrical Installation	.6	123.2	-2.2
Additional Refrigerant Charge	0.2*	155.7	-11.3
505AC-103-1 System Total	11.5	61.2	7.7
505AC-101-1/-3 System Installation	70.3	165.5	-7.1
505AC-101& 505AC-103 Combined Systems Total	**80.9	150.6	-5

\*\* Net weight gain of 0.1 lbs. from removal of 505AC-520 ducting parts.

**NOTE:** This data is generally applicable. Due to normal variation of actual component weights and locations, when equipment is installed, actual aircraft weight and center-of-gravity must be verified by weighing after system installation. Refer to the appropriate aircraft manufacturer's information/maintenance manual as applicable.

## 6 TORQUE VALUES

TABLE 2: TORQUE CHART, FLARED FITTING NUTS

TUBE SIZE (IN.)	FITTING TORQUE (IN.-LB.) WITH SECO7 SEAL
1/4	40-65
3/8	75-125
1/2	275-300
5/8	275-350

NOTE: For flared nuts installed with conical seal washers (SECO seal), apply the recommended installation torque, wait 15 seconds, then again apply the same torque value to the nut.

TABLE 3: TORQUE VALUES (IN-LBS.)

CAUTION THE FOLLOWING TORQUE VALUES ARE DERIVED FROM OIL FREE CADMIUM PLATED THREADS.					
TORQUE LIMITS RECOMMENDED FOR INSTALLATION (BOLTS LOADED PRIMARILY IN SHEAR)			MAXIMUM TORQUE LIMITS	ALLOWABLE TORQUE LIMITS	TIGHTENING TORQUE LIMITS
Thread Size	Tension type nuts MS20365 and AN310 (40,000 psi in bolts)	Shear type nuts MS20364 and AN320 (24,000 psi in bolts)	Nuts MS20365 and AN310 (90,000 psi in bolts)	Nuts MS20364 and AN320 (54,000 psi in bolts)	
<b>FINE THREAD SERIES</b>					
8-36	12-15	7-9	20	12	
10-32	20-25	12-15	40	25	
1/4-28	50-70	30-40	100	60	
5/16-24	100-140	60-85	225	140	
3/8-24	160-190	95-110	390	240	
7/16-20	450-500	270-300	840	500	
1/2-20	480-690	290-410	1100	660	
9/16-18	800-1000	480-600	1600	960	
5/8-18	1100-1300	600-780	2400	1400	
3/4-16	2300-2500	1300-1500	5000	3000	
7/8-14	2500-3000	1500-1800	7000	4200	
1-14	3700-5500	2200-3300*	10,000	6000	
1-1/8-12	5000-7000	3000-4200*	15,000	9000	
1-1/4-12	9000-11,000	5400-6600*	25,000	15,000	
<b>COARSE THREAD SERIES</b>					
8-32	12-15	7-9	20	12	
10-24	20-25	12-15	35	21	
1/4-20	40-50	25-30	75	45	
5/16-18	80-90	48-55	160	100	
3/8-16	160-185	95-100	275	170	
7/16-14	235-255	140-155	475	280	
1/2-13	400-480	240-290	880	520	
9/16-12	500-700	300-420	1100	650	
5/8-11	700-900	420-540	1500	900	
3/4-10	1150-1600	700-950	2500	1500	
7/8-9	2200-3000	1300-1800	4600	2700	

The above torque values may be used for all cadmium-plated steel nuts of the fine or coarse thread series which have approximately equal number of threads and equal face bearing areas.  
 \* Estimated corresponding values.

Reference AC 43.13-1B Table 7-1, Recommended Torque Values



## 7 REFERENCES

AC43.13-1B Table 7-1, Recommended Torque Values

14 CFR, Part 27

The following Paravion Technology Inc. Installation Drawings for the 505AC-101-1, or -3 Air Conditioning Kit:

- A. 505AC-101 Air Conditioning System Configuration
- B. 505AC-440 Evaporator Installation
- C. 505AC-524 Outlet Plenum Installation
- D. 505AC-540 Plumbing Installation
- E. 505AC-601 Electrical Installation

The following Paravion Technology Inc. Installation Drawings for the 505AC-103-1 Right-Hand Evaporator Installation Kit

- A. 505AC-103 Right-Hand Forward Evaporator Installation Configuration
- B. 505AC-443 Evaporators Installation
- C. 505AC-513 Inlet Duct Installation
- D. 505AC-523 Outlet Duct Installation
- E. 505AC-543 Plumbing Installation
- F. 505AC-603 Electrical Installation

Paravion Technology Inc. PR-505AC-900M Air conditioning System Installation Instructions

Bell Helicopter Textron Model 505 Maintenance Manuals

Bell Helicopter Textron BHT-SPM-ALL, Standard Practices Manual

Bell Helicopter Textron BHT-ELEC-SPM, Electrical Standard Practices Manual

SECO Seals Torque Recommendations Chart