Instructions For Continued Airworthiness

Integrated Flight Systems Air Conditioning System Instructions for Continued Airworthiness

SA-365N
SA-365N1
AS-365N2
AS 365 N3

Instructions For Continued Airworthiness

RECORD OF REVISIONS

Revision	Description	Date	Approval
IR	Initial Release	02/01/07	L. Aday
A	Update to add new configuration	02/28/13	
A-1	Update section "5. Maintenance Instructions – Hoses"	03/22/16	

LIST OF EFFECTIVE PAGES

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1	A	02/28/13
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Instructions For Continued Airworthiness

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR INTEGRATED FLIGHT SYSTEMS
SA-365N, SA-365N1, AS-365N2, AND AS-365N3
AIR CONDITIONING SYSTEM

Aircraft Make: Eurocopter France

Aircraft Model: SA-365N, SA-365N1, AS-365N2, AS 365 N3

1. **Introduction:** Kit #365-00-1 and 365-00-2 are applicable to all models of the SA/AS-365 series helicopter. It is a system utilizing R-134a (non-CFC type) refrigerant. This kit is compatible with utility, corporate, and EMS configuration. An Integrated Flight Systems unit is designated to be as maintenance free as possible. It incorporates in the design components that have proven themselves to be highly reliable.

2. **Description:** The Integrated Flight Systems (IFS) Air Conditioning System is a vapor (R134a refrigerant) recovery system. The compressor uses existing mounting points on the transmission case. To improve efficiency, two evaporators are used for this system, one mounted on the cabin roof behind the pilot's head, the other to the baggage compartment floor. Also, two 24-volt fan motors are used to circulate the cabin air through the evaporators. Air distribution is accomplished through the ducts in the cabin. The ducts are equipped with directional valves. The condenser is mounted below the aft baggage area near the aft evaporator. Another 24-volt fan motor circulates air through the condenser. The air enters through the intake screen on the belly of the aircraft below the baggage compartment and exits at the same panel through the outlet air screen.

   The system is activated by an On/Off switch in the pilot's compartment and a selector switch to provide high or low air velocity distribution options.

3. **Operation:** The air conditioning installation consists of a belt driven vapor cycle air-conditioning system using R-134a as the refrigerant.

   The air conditioning system provides for cabin comfort during all operations, both on the ground and in flight. During ground operations when the engines are running, cooling may be provided. Controls for the air conditioning system are located on or near the instrument panel. Three switches are provided. The Master Control Selector consists of a rocker type switch, labeled "A/C", "OFF", and "FAN". Selecting the "A/C" position turns on the system's dual evaporator fans, and condenser blower, and belt driven compressor. The second rocker switch is "HIGH", "LOW" evaporator fan speed selection for the forward cockpit, on 365N-00-1 only. The second rocker switch is "HIGH", "LOW" evaporator fan speed selection for the both the forward and aft evaporators, on 365N-00-2 only. A third switch is "OVERRIDE". It is used for ground operation or servicing when

only one engine is in operation. It may also be used in flight if a generator fails as long as the total DC amperage does not exceed 160 amps or 100%. The aft evaporator has a separate fan speed 2 position switch, HI/LOW, located in aft cabin, on 365N-00-1 only.

4. **Servicing Information:** All components are readily accessible for inspection or servicing. Major components are accessed as follows:
   - **A.** Compressor: Remove transmission cowling in accordance with the Direction Generale de l'Aviation Civile (DGAC) Maintenance Manual.
   - **B.** Condenser/Condenser Blower: Remove baggage compartment floor in accordance with DGAC Maintenance Manual.
   - **C.** Forward Evaporator/Evaporator Blower: Remove Pilot's headliner in accordance with DGAC Maintenance Manual.
   - **D.** Aft Evaporator/Evaporator Blower: Located in baggage compartment. Open baggage compartment door.
   - **E.** Service Ports/Sight Glass: Located in baggage compartment. Open baggage compartment door.

Charging Refrigerant (R-134a) Into System:

- **A. The refrigerant used in this system is R-134a and no other refrigerant is to be considered.** Normal safety practices, such as wearing of gloves and the use of goggles should be utilized.
- **B.** Charging of the system is a simple procedure whether on initial or recharging after leakage repair. A set of refrigerant gauges with a minimum of three hoses should be connected to the high side and low side service ports provided.
- **C.** The sight glass is located in the #6 line in the ceiling of the baggage compartment, on 365N-00-1 only.
- **D.** Charge the system in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

Oil Charging: R-134a Refrigerant

- **A.** Prior to the use of R-134a refrigerant, R-12 refrigerant was used in all IFS systems. **The PROPERTIES OF R-134a REFRIGERANT AND THE VARIOUS TYPES OF OIL USED WITH THIS REFRIGERANT ARE COMPLETELY DIFFERENT.**
- **B. The Sanden compressor uses a 100 viscosity POE type refrigerant oil. No other type oil can be utilized.**
- **C.** Charge the system in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

Initial Charging:

A. Charge the system in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

Adding R-134a Refrigerant to System:

A. If the system is found to be completely empty of R-134a, a set of charging gauges should be connected to both high and low side service ports and to a cylinder of R-134a. Purge the charging hoses from the cylinder to the service ports with R-134a vapor. Open both the low and high side charging valves and allow pressure from the cylinder to equalize through the system until at least 50 PSI is noted. Utilizing an electronic leak detector, check all fittings on the system to determine the point of leakage. Any fitting indicating an oily or dirty condition is a prime suspect.

B. Service the system in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

5. Maintenance Instructions: An Integrated Flight Systems unit is designed to be as maintenance free as possible. It incorporates design components that have proven themselves to be highly reliable. It is suggested that at each periodic inspection, whether at 50 or 100 hour intervals, at least a visual inspection be accomplished to the following items; to fulfill with inspection criteria per Appendix D, Far-43: Para A, Para B, 2, Para C, 1, 7, Para D, 2, 7, 9, and Para F, G, I, 2, 3, J.

A. Compressor
B. Compressor Clutch Bearing
C. Compressor Mount
D. Refrigerant Hose and Fittings
E. Evaporator Fans and Mountings
F. Condenser Blowers and Mountings
G. Condenser/Evaporator Coils

Compressor:

i) In addition to the above inspection, the compressor should be inspected for a true turning and free clutch. One mechanic should turn the main rotor blade while another observes the belt and clutch faceplate. Turn system to A/C and check magnetic operation of clutch plate. An independent #14 wire may be necessary from the compressor to an airframe ground in order to ensure that the clutch engages in a positive manner.

ii) If clutch plate and pulley show signs of excessive heat, replace clutch pulley assembly, bearing, and coil.

iii) The compressor mounts should be inspected for possible cracks, deterioration and that all bolts are firmly attached.

iv) Check condition of belt. Inspect for cracks, deterioration, separation and worn or flat spots. Change belt whenever any of these conditions exist or one thousand hours, whichever comes first.

Hoses and fittings:

i) Inspect hoses for general condition, cuts, swelling, deterioration, and chaffing. Check security of clamps and anti-chaff material. Replace as required.

ii) If hose(s) and/or fitting(s) replacement is required, remove and replace IAW Installation Drawings:

a. To install fitting(s) to hose(s) use crimper manufacturer instructions and Installation Drawings to ensure correct installation.

Evaporators, on 365N-00-1 only:

i) Forward evaporator blower motor is a permanent magnetic type. No repair is recommended other than replacement of the brushes. Unit should be returned to IFS for overhaul. If brush height is 5/16" or less, replace. Inspect every 200 hours.

ii) Aft evaporator blower motor is identical to the forward evaporator blower motor. It has removable brushes. If brush length is 5/16" or less, replace. Inspect every 200 hours.

iii) Run both of the evaporator blowers in the FAN position and perform visual inspection of the assemblies to see that foreign materials have not been ingested into the blowers, which might cause blade damage. The blowers should also be run at the various speeds available to check motor operation used on evaporator assembly, P/N: 560075 and the blower motor on aft. Evaporator assembly, P/N: 560022 is non repairable motor and should be replaced with P/N: 050127-1. There is no brush inspection on evaporator assembly, P/N: 560022.

Evaporators, on 365N-00-2 only:

i) Forward evaporator blower motor is a 5” brushless motor, and should be returned for a replacement, in the event of a failure. No inspection is required.

ii) Aft evaporator blower motor is a 5” brushless motor, and should be returned for a replacement, in the event of a failure. No inspection is required.

iii) Run both of the evaporator blowers in the FAN position and perform visual inspection of the assemblies to see that foreign materials have not been ingested into the blowers, which might cause blade damage.

Condenser, on 365N-00-1 only:

i) Either four (4) or two (2) brushes are located under caps on each side of the motor. Inspect brushes every 400 hours for wear. If brush length is 3/8” or less, replace brush.

ii) NOTE: TAKE CARE WHEN INSTALLING BRUSHES THAT BRAIDED POSITIVE LEAD DOES NOT CONTACT HOUSING, CAUSING SHORT.

iii) The fins of the condenser coil as well as the evaporator coil should be checked for cleanliness and that they are straight. If damage has occurred to the fins, a fin comb should be utilized to put them in like new condition.

Condenser, on 365N-00-2 only:

i) Forward evaporator blower motor is an 8" brushless motor, and should be returned for a replacement, in the event of a failure. No inspection is required.

ii) The fins of the condenser coil as well as the evaporator coil should be checked for cleanliness and that they are straight. If damage has occurred to the fins, a fin comb should be utilized to put them in like new condition.

6. Troubleshooting Information:

General:

A. Should the system not perform as expected, either because of unreasonably erratic pressure readings, total lack of cooling or reduced cooling, it will be necessary to use the trouble shooting procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

B. The high and low-pressure switches should be checked if electrical power is lost to the compressor clutch. These are in series, and they should be checked from their electrical source, which is the 50-amp condenser blower circuit breaker.

C. Always check system R-134a pressure first, as leaking unit may have caused the low-pressure switch to open. This switch is set to open at 7 PSI and close at 22 PSI.

D. Failure of the condenser blower or coil blockage could result in high side pressure switch opening. Both switches are designed to reset automatically.

E. **NOTE**: Internal blockage of the high-pressure side of the refrigerant system can cause a very low-pressure reading at the "low side" service gauge and may also cause a low-pressure reading at the "high side" service gauge. This can occur when either (or both) of the two (2) expansion valves in the system closes or when the receiver/drier becomes clogged.

Compressor:

A. The compressor installed is manufactured by Sanden International.

B. A copy of Sanden Service Manual can be found on the Sanden website at www.sanden.com.

C. No maintenance, other than "clutch bearing" or "coil replacement" should be attempted in the field.

Evaporators, on 365N-00-1 only:

A. If either the forward evaporator fan or aft evaporator blower fails to run, confirm that the Aircraft Master Switch is in the "ON" position and the Air Conditioning control Switch is placed in the "FAN" position. If the fan/blower still does not run, determine that electrical power is available to the aircraft from an outside

power source, such as a GPU or the aircraft power source. If power is available, it will be necessary to test with a voltmeter that electrical power is being supplied directly to the motor by the appropriate wire. If power is being supplied, and the motor is properly grounded, then it can be assumed that the motor has failed.

B. On the forward motor, P/N 050143, the bolts in the motor support loosen to allow removal of the motor. The motor may be obtained from Integrated Flight Systems and installed in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

C. On the aft motor, P/N 050143, the screws in the motor support loosen to allow removal of the motor. The motor may be obtained from Integrated Flight Systems and installed in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

D. **NOTE:** The Aft Evaporator Blower **SHOULD NOT BE DISASSEMBLED** other than to inspect the brushes. The Motor is ordered as a **UNIT.**

Condenser, on 365N-00-1 only:

A. The condenser blower may be checked by placing the Aircraft Master Switch "ON" and then placing the Air Conditioning Control Switch to the "A/C" position and the override switch "ON". If the 50-amp circuit breaker is not open, then power should be supplied directly to the condenser blower, which is mounted below the aft baggage area.

B. If air is not being exhausted, a voltmeter should be utilized to determine if the power is being supplied through the switch and relay to the appropriate wire. Check that all electrical terminals are secure and that power is directed to the motor's terminals. Inspect ground. If it is determined that the motor has failed, the screws holding the blower assembly in place should be removed. The blower assembly must be removed as an entire assembly and replaced in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N.

Receiver/Drier:

A. The receiver/drier may be replaced, if required, by discharging the R-134a from the system through a refrigerant hose or set of charging gauges. Again, all R-134a refrigerants **MUST BE CAPTURED**. Normally, the receiver/drier will not need replacement unless one of two factors is present:

i) The system has been left open for some time and may be contaminated by air and/or moisture.

ii) The receiver/drier has become plugged which is evident by a large temperature differential on either side of the receiver/drier. Normally, the liquid line to and from it would be of approximately equal temperature and will be quite warm. IF one side is relatively warm and the other side is very cool or attempts to frost, then blockage of the receiver/drier has been determined. The receiver/drier should be

removed and a new one installed in its place. The charging instructions should be followed in recharging the system.

Expansion Valves:

A. The Expansion Valves are of "O" ring type. Both expansion valves are identical.
B. NOTE: THE EXPANSION VALVES CONTAIN A "CHARGE" IN THE HEAD OF THE VALVE, CONTAINING R-134A.
C. It is EXTREMELY IMPORTANT that the sensing bulb be clamped tightly to the suction return line in the same manner as removed. Also, the line is to be clean, so good contact takes place between the sensing bulb and the line. This area must be re-insulated as in the original manner. Leak test and recharge in accordance with the procedures outlined in the IFS Maintenance Manual Document Number MM-365N and applicable sections of this Document.

Hoses:

A. Nylon "barrier type" hose with "Bubble" crimped ferrules are utilized with "O" ring fittings. They are found at all fitting locations and should be inspected. For security crimped fitting for leakage, and obvious defects.

Low Pressure Switch:

A. This switch, on 365N-00-1 only, is a non-adjustable type (normally open) and relocated to an area of the cabin roof. P/N 050107 (set at 7 PSI out, 22 PSI in) or P/N 090014 (set at 6 PSI out, 34 PSI in) is utilized. Both switches will automatically reset to the closed position as soon as pressure is applied in PSI, greater than the cut-in point. Non-adjustable switches are located under the cabin floor.
B. This switch, on 365N-00-2 only, is a non-adjustable type (normally open) and relocated to an area of the cabin roof. P/N 09-365-21-305-01 (set at 7 PSI open, 22 PSI close) is utilized. The switch will automatically reset to the closed position as soon as pressure is applied in PSI, greater than the cut-in point. Non-adjustable switches are located in the aft baggage compartment.

High Pressure Switch:

A. High-pressure switch, on 365N-00-1 only, is identified under P/N 090004. It is also located in the cabin roof area. It is a "normally closed" switch, which "opens" on a rise in pressure that exceeds the switches upper limit. Once the pressure has been reduced below the switches upper design point, it will again close, automatically.
B. High-pressure switch, on 365N-00-2 only, is identified under P/N 09-365-21-306-01. It is also located in the aft baggage compartment. It is a "normally closed" switch, which "opens" on a rise in pressure that exceeds 350 PSI. Once the pressure has been reduced below 350 PSI, it will again close, automatically.

System Operation Limitations:

A. Below 60 degrees Fahrenheit, it may be found that the air conditioning compressor will not come on line and remain in operation. This is due to that fact that coolness of the air available across the condenser does not allow the refrigerant system to maintain sufficient low side pressure to keep the safety low-pressure switch from tripping the compressor “off line”. The system should not be operated in temperatures below 66°F, except for re-circulation of air only.

7. **Removal and Replacement Information:** The Integrated Flight Systems Air Conditioning Kit Part Number 365N-00-1 and 365N-00-2 are installed and removed in accordance with Installation Instructions Document Number INST-365N.

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8. Diagrams:

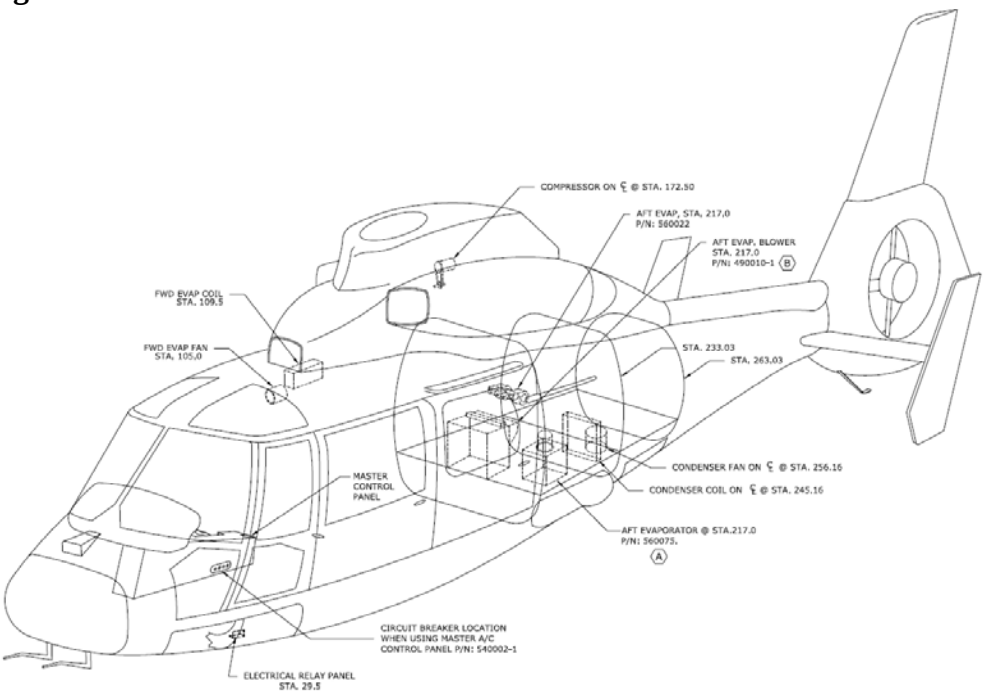

Figure 1. 365N-00-1

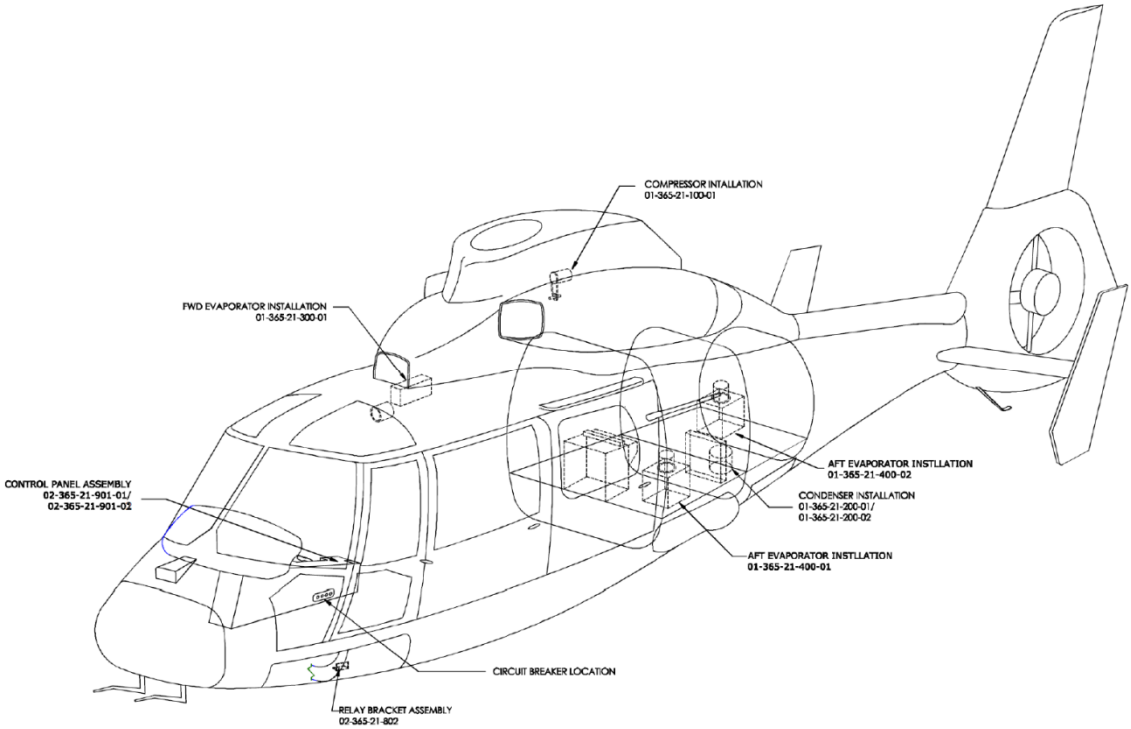

Figure 2. 365N-00-2

9. **Special Inspection Requirements:** No special inspections are required for this system.

10. **Application of Protective Treatments:** No special treatments are required after inspection and/or maintenance.

11. **Data:** Torque values for all attachment hardware are listed in the Integrated Flight Systems Installation Instructions Document Number INST-365N.

12. **List of Special Tools:** No special tools are required for inspection or maintenance of this system.

13. **Recommended Overhaul Periods:** No additional overhaul time limitations are required for this system.

14. **Airworthiness Limitation:** No additional Airworthiness Limitations are required for this system.

NOTE:
The Airworthiness Limitations section is FAA Approved and specifies maintenance required under § 43.16 and § 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA Approved.

15. **ICA Revision:** Any revisions to these instructions will be made available at the Production Approval Holders website: www.integratedflightsys.com.