NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region
Seattle, WA

May 5, 2011

Group Chairman's Factual Report

Maintenance Records Group Chairman's Report

WPR10FA371

A. ACCIDENT

Operator:	Air Methods
Location:	Tucson, AZ
Date:	July 28, 2010
Time:	1342 mountain standard time
Aircraft:	American Eurocopter AS350B3, N509AM

B. MAINTENANCE GROUP

Chairman:	Kristi Dunks National Transportation Safety Board Seattle, WA
Member:	Robert Hendrickson Federal Aviation Administration Washington, DC
Member:	Frank Loscalzo Federal Aviation Administration Scottsdale, AZ

Member:	Vincent E'Calle BEA Le Bourget Cedex, France
Member:	Don Lambert Air Methods Corporation West Miffin, PA
Member:	Michael Koenes Air Methods Corporation Englewood, CO
Member:	Joe Syslo Eurocopter USA Grand Prairie, TX
Member:	David Lok Helicopter Services of Nevada Boulder City, NV
Member:	Archie Whitten Turbomeca USA Grand Prairie, TX

C. SUMMARY

On July 28, 2010, at 1342 hours mountain standard time, an American Eurocopter AS350B3, N509AM, rapidly descended and collided with terrain in an urban area of Tucson, Arizona. The helicopter was operated by Air Methods Corporation, as LifeNet 12, on a repositioning flight, under the provisions of Title 14 Code of Federal Regulations, Part 91. The commercial pilot and two medical flight crew were killed. The helicopter was substantially damaged and consumed by a post impact fire. Visual meteorological conditions prevailed, and a company flight plan had been filed. The flight originated at Marana Regional Airport, Tucson, Arizona, at 1332.

D. DETAILS OF THE INVESTIGATION

The airworthiness group was formed on July 31, 2010. The first meeting occurred at the facilities of Helicopter Services of Nevada (HSN), Boulder City, Nevada. On August 1, the group met at the field facilities of Air Methods, Marana, Arizona. The Maintenance Records Group did not participate in the on-scene portion of the investigation.

Air Methods and HSN provided maintenance records for the group to review. A follow up examination of the records commenced by the Maintenance Group Chairman on August 24, 2010, in the Denver, Colorado office of the National Transportation Safety Board.

The Maintenance Group Chairman Report consists of the following:

1.0 Section 1. Helicopter History and Maintenance

2.0 Section 2. Overview of Air Methods and FAA Oversight

3.0 Section 3. Overview of Helicopter Services of Nevada and FAA Oversight

E. FACTUAL INFORMATION

1.0 Section 1. Helicopter History and Maintenance

1.1 Helicopter Information

The American Eurocopter AS350B3 helicopter (SN4698) was manufactured in 2009. The helicopter was powered by a Turbomeca Arriel 2B1 engine. The total time on the helicopter at the time of the accident was 352 hours. The engine (SN 46268) had a total time of 352 hours, N1 602.28 cycles, N2 234.90 cycles, and 689 starts.

Examination of the helicopter at the accident site showed that the fuel union was not attached at its fitting to the engine compressor module (See Photo 1. Engine at Accident Site and Photo 2. Fuel Inlet Union at Attach Point). According to a Turbomeca representative, if this fuel line becomes disconnected, fuel starvation to the engine occurs.

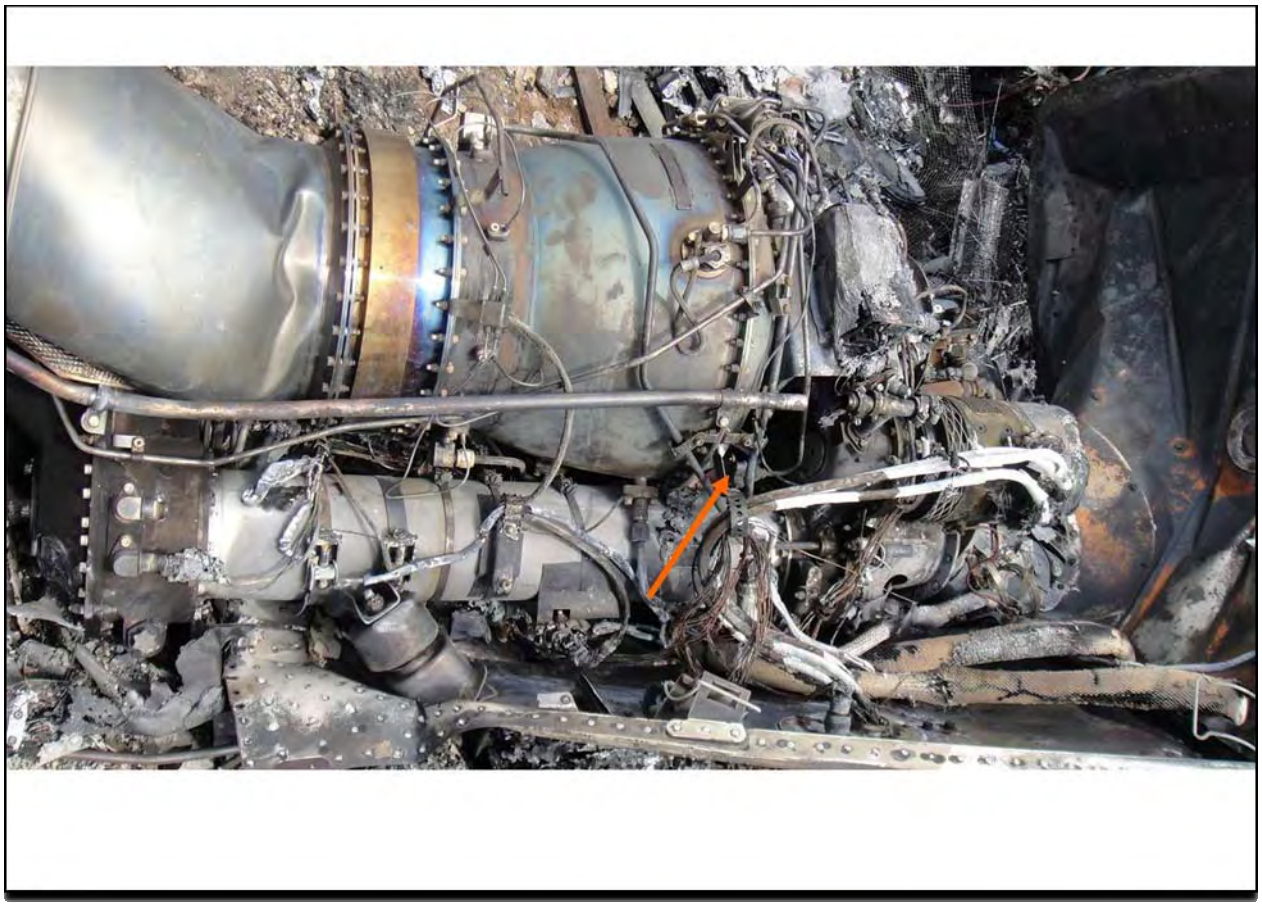


Photo 1. Engine at Accident Site (red arrow points to jet union)

Photo 2. Fuel Inlet Union at Attach Point

As noted in the Airworthiness Group Chairman's report, "Fuel is delivered directly into the combustion chamber through use of a radial fuel supply, centrifugal fuel injection system. The injector assembly consists of a stationary distributor (manifold) and a rotating injection wheel located within the combustion chamber. The manifold contains a series of holes, which deliver fuel to the wheel. Holes within the injection wheel, which is mounted between the compressor and turbine shaft, act as fuel spraying jets. Pressure seal between the wheel and the manifold is achieved by labyrinth seals, with rotation of the injection wheel resulting in the extraction of fuel through centrifugal force.

An internal supply line provides fuel to the manifold. The supply line routes from the manifold and along the outer combustor casing, where it protrudes through a boss on the compressor case. The exposed line protrudes in the form of a nipple through a flange on the case boss. An engine fuel inlet union, consisting of a body mounting flange and seal, provide the interface between the internal fuel line nipple and external fuel supply lines. The union is affixed to the compressor case boss with two sets five-point bolts (P/N: 72-43-00-01-304), and self locking nuts (P/N: 72-43-00-01-302). Vacuum seal is provided by the use of a metallic intermediate gasket at the flange, and fuel seal is provided by two o-ring seals on the internal fuel supply line nipple. A leak test plug is provided in the body of the union to test the seal integrity of the interface. The union is connected to the external fuel supply line through a B-Nut fitting.

External examination of the engine at the accident site revealed that the fuel inlet union, located on the lower right-hand-side of the engine, had become detached from the boss on the compressor case. The fuel supply line remained attached to the union and to the hydro-mechanical unit (HMU). The intermediate gasket was located in the fuselage debris, directly below the union. The remaining wreckage and ground area were extensively examined utilizing a

series of magnets and sifting grates, but did not reveal the presence of the two five-point bolts and self locking nuts for mounting the union to the compressor case flange." Figure 1 shows a view of the fuel inlet union, its associated hardware, and its attach point to the engine. Photo 3 shows an exemplar fuel inlet union as it should be installed.

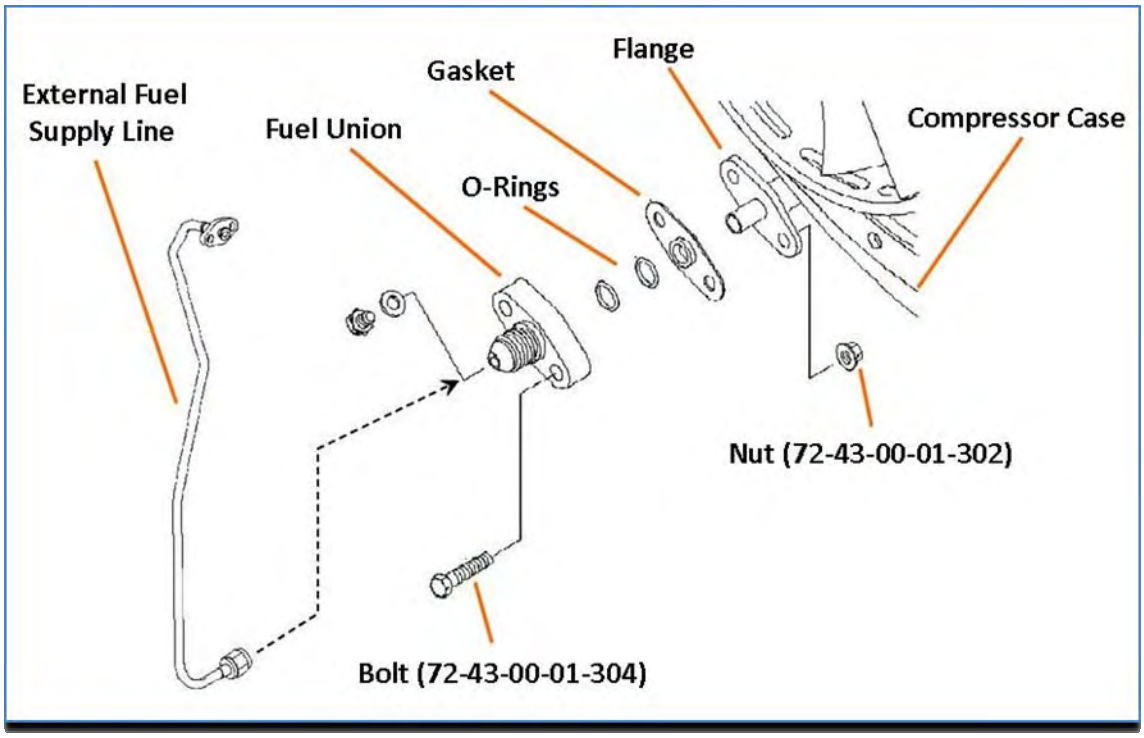


Figure 1. Exploded View of Fuel Inlet Union

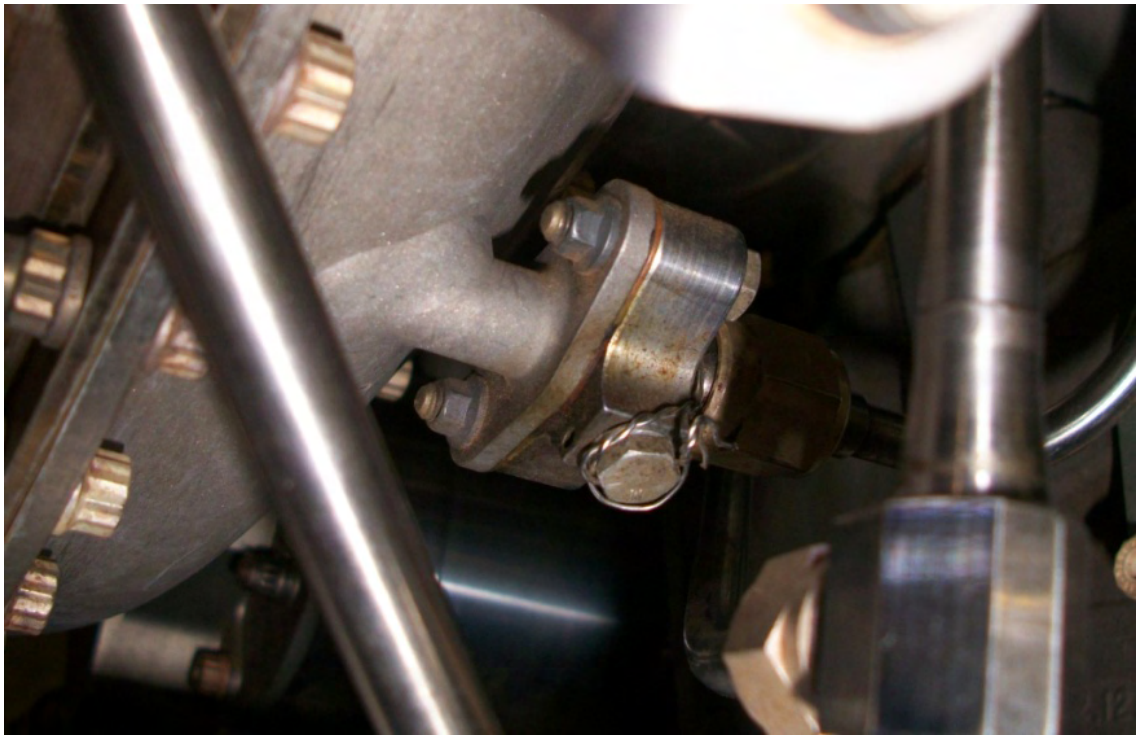


Photo 3. Exemplar Fuel Inlet Union Installed

1.2 Aircraft Records Review

The Maintenance Group Chairman reviewed the maintenance records for the helicopter. Immediately following the accident, Air Methods supplied electronic copies of the records. On August 12, 2010, an NTSB air safety investigator from the Denver Regional Office retrieved the hard copy records from the Air Methods facility. The Maintenance Group Chairman reviewed the records at the Denver Regional Office on August 24, 2010.

1.2.1 Previous Accident Data

The helicopter had not been involved in any previous accidents. A complete listing of all accidents involving Air Methods is listed in the Operations Group Chairman Report. Of the 26 occurrences, 4 were attributed to or had factors related to maintenance (See Table 1.)

Table 1. Air Methods Maintenance-Related Accidents

NTSB Number	Date	Location	Aircraft	Registration
DEN91LA095	01-Jul-91	Grand Junction, CO	BELL 412	N20703
CHI00FA111	14-Apr-00	St. Paul, MN	Bell 222U	N225LL
DEN04CA122	09-Aug-04	Englewood, CO	Eurocopter France EC-130 B4	N910U
WPR10FA112	17-Jan-10	Reno, NV	Eurocopter AS350 B3	N904CF

The accidents are summarized as follows:

> On July 1, 1991, a Bell 412 in cruise flight, the engine to transmission drive shaft forward coupling overheated and failed. The pilot executed an autorotation. During the landing flare, the pilot did not maintain adequate rotor rpm and the helicopter landed hard.

Company maintenance personnel dispatched the helicopter with a known drive shaft coupling grease leak which they had attempted to stop by using an unapproved silicon sealant. The Safety Board determined the probable cause of the accident was the pilot's failure to maintain adequate main rotor rpm to touchdown. Contributing to the accident was the disconnected engine to transmission drive shaft and the inadequate inspection by company maintenance personnel.[1]

On April 14, 2000, a Bell 222U, while in cruise flight, the pilot lost control of the helicopter and an uncontrolled forced landing was made onto the top of a two-story industrial warehouse. The pylon mounted actuator support assembly had separated from the transmission case. The support assembly, attachment hardware, and portions of the transmission case were sent to the NTSB Materials Laboratory for analysis. According to the NTSB Materials Laboratory Factual Report, "... all of the studs showed progressive fatigue cracking from multiple origins. The Safety Board determined that the probable cause was the loss of clamp-up force between the transmission case and the pylon mounted actuator support assembly which resulted in fatigue failure of the threaded studs and dowel pins, the failure of the flight control system, helicopter control not being possible after the flight control failure, and the inadequate maintenance procedures by the company maintenance personnel.[2]

On August 9, 2004, a Eurocopter EC-130 B4 had just undergone maintenance and was preparing for a second operational check flight. A thorough preflight had been conducted for the first operational check flight. While preparing for the second flight, another maintenance technician opened the transmission cowling. The pilot and two avionics technicians boarded the helicopter from the left side, without performing an additional preflight or walk around. The pilot performed a run-up and lifted the helicopter to a hover when an individual on the ground noticed that the cowling was open. The lead mechanic then signaled to the pilot for him to land. As the helicopter set back down, the transmission cowling detached and impacted a main rotor blade and the tail boom. The Safety Board determined that the probable cause was the pilot's failure to perform a preflight inspection.[3]

On January 17, 2010, the pilot of a Eurocopter AS 350 B3 reported that he lifted the helicopter from the helicopter pad for a flight to pick up a patient. The pilot positioned the helicopter into a 25-foot hover, and just as he was beginning the transition to forward flight, he heard a loud bang, and the helicopter experienced a partial power loss. The pilot lowered the collective slightly and landed hard on the helicopter pad. The post accident airframe examination revealed that the nuts to the bolts that attach the engine-to-main gear box flex coupling were not present on the bolts. An examination of the bolts and flex coupling by the Safety Board Materials Laboratory concluded that the nuts most likely had been hand tightened and that cotter pins had not been installed on the bolts. The improper installation lead to the failure of the flex coupling and resulted in a loss of

[1] NTSB accident identification number: DEN91LA095
[2] NTSB accident identification number: CHI00FA111
[3] NTSB accident identification number: DEN04CA122

power to the rotor system. The Safety Board determined that the probable cause was the improper installation of the engine-to-main gear box flex coupling, which resulted in the failure of the flex coupling and a loss of power to the rotor system during takeoff. Contributing to the accident was the mechanic who removed the engine's failure to follow the operator's maintenance procedures. Also contributing was the Quality Assurance inspector's failure to follow the operator's post-maintenance inspection requirements.[4]

1.2.2 Inspections

The helicopter began operating in the Air Methods fleet in December of 2009. A summary of the inspections and their completion dates follows on Table 2. The last inspection was a 20-hour inspection that was completed on July 27, 2010, at a total time of 352 hours.

A minimum equipment list (MEL) showed five deferred items: two were for an inoperative door warning system, a controllable search light was inoperative, the VHF FM was inoperative, and the warning flags on the right transmission cowling were inoperative. Of the discrepancies, all were listed on an associated deferred discrepancy log, except for the warning flags on the right transmission cowling being inoperative.

Table 2. AAIP Inspections

Section A. Airframe

Inspection	Frequency	Date Completed	Total Time	Cycles
A-22	10 Hours	7/18/2010	349.09	857
A-23	25 Hours	01/18/10*	40.23	157
A-24	30 Hours	7/3/2010	327.00	
A-25	50 Hours	7/3/2010	327.00	
A-26	100 Hours	6/8/10	281.51	473.10
A-27	110 Hours	6/9//10	281.51	700
A-28	200 Hours	4/16/10	190.37	479
A-29	300 Hours	6/8/10	281.49	699
A-30	350 Hours	7/14/2010	341. 32	839
A-41	7 Days	1/13/10*	29.18	125
A-42	30 Days	7/4/2010	331.54	
A-44	3 Months	6/25/10	312.00	523.32
A-45	6 Months	3/30/10	162.50	162+50

*Note: These were a pplicable to aircraft operating in a corrosive or salt water environment. Also, for A-41, no cargo swing was installed.

Section B. Powerplant

Inspection	Frequency	Date Completed	Total Time	Cycles
B-61	20 Hours	7/27/10	352.7	Ng 603.9 Np 235.33

[4] NTSB accident identification number: WPR10FA112

B-62	50 Hours	7/10/10	337.39	Ng 576.16 Np 225.48
B-64	300 Hours	6/8/10	281.49	Ng 472.75 Np 187.65

Section C. Instructions for Continued Airworthiness

Inspection	**Frequency**	**Date Completed**	**Total Time**
C-83 (Concord Battery)	50 hours	7/3/10	327.00
C-84 (Various)	100 hours	6/8/10	281.49
C-85 (Concord Battery)	150 hours	6/8/10	281.49
C-86 (EMS Interior, fire extinguisher mount)	200 hours	4/21/10	202.30
C-87 (Various)	300 hours	6/23/10	308.34
C-93 (Placards, PFDs)	30 days	7/4/10	331.54
C-90 (Installed equipment)	400 hours	6/30/10	321.10
C-95 (Concord battery)	3 months or 200 hours	6/25/10	312.00
C-96 (Various)	6 months	6/29/10	321.10
C-99 (Installed equipment)	12 months/1 year	6/9/10	281.51
C-102 (Hot purge)	3 months/ zero pressure	6/29/10	321.10

1.2.3 Airworthiness Directives

Review of the airworthiness directives (ADs) did not reveal any ADs that were not in compliance. Review of the maintenance records showed that on June 21, 2010, the engine cycles had exceeded the inspection requirements outlined in Airworthiness Directive 2009-09-03[5]. The airworthiness directive was due at 600 hours or 500 cycles, whichever occurred first. At the time of the inspection, the engine had accrued 308.34 hours and 515.28 cycles. The company identified the oversight and complied with the airworthiness directive.

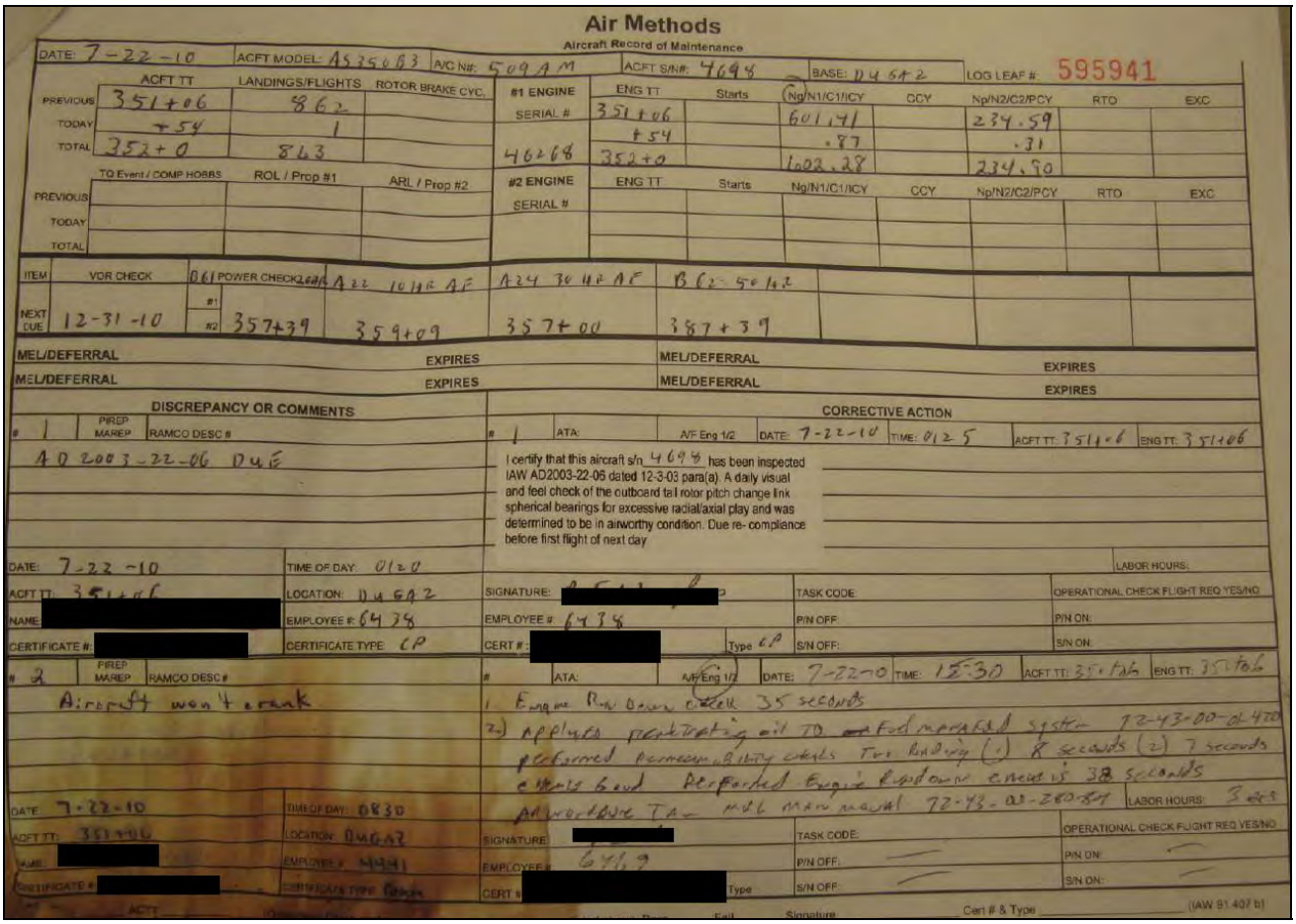
1.2.4 Service Bulletins

Air Methods is not required by the FAA to comply with service bulletins. According to Air Methods personnel, service bulletins are reviewed for applicability and company level of compliance and are implemented as necessary.

1.2.5 Engine Maintenance History

Review of the Air Methods maintenance records showed that on July 22, 2010, at 351.06 hours, the Air Methods "Aircraft Record of Maintenance" form noted "Aircraft won't crank." See Figure 2. Air Methods Record of Maintenance Log Leaf #595941.

[5] Airworthiness Directive 2009-09-03 requires an inspection of the high-pressure (HP) turbine according to Turbomeca S.A. Mandatory Service Bulletin (MSB) No. 292 72 2825, Version B.



Air Methods
Aircraft Record of Maintenance

DATE: 7-22-10 ACFT MODEL: AS350B3 A/C N#: 509AM ACFT S/N#: 4694 BASE: DUGA2 LOG LEAF #: 595941

	ACFT TT	LANDINGS/FLIGHTS	ROTOR BRAKE CYC.
PREVIOUS	351+06	862	
TODAY	+54	1	
TOTAL	352+0	863	

#1 ENGINE	ENG TT	Starts	Ng/N1/C1/ICY	CCY	Np/N2/C2/PCY	RTO	EXC
SERIAL #	351+06		601.71		234.59		
46268	+54		.87		.31		
	352+0		602.28		234.90		

TQ Event / COMP HOBBS	ROL / Prop #1	ARL / Prop #2
PREVIOUS		
TODAY		
TOTAL		

#2 ENGINE	ENG TT	Starts	Ng/N1/C1/ICY	CCY	Np/N2/C2/PCY	RTO	EXC
SERIAL #							

ITEM	VOR CHECK	DEI POWER CHECK	A22 10 HR AF	A24 30 HR AF	BC2 50 HR
NEXT DUE	12-31-10	#1			
		#2 357+39	359+09	357+00	387+39

MEL/DEFERRAL EXPIRES
MEL/DEFERRAL EXPIRES
MEL/DEFERRAL EXPIRES
MEL/DEFERRAL EXPIRES

DISCREPANCY OR COMMENTS

#	PREP MAREP	RAMCO DESC #
1		AD 2003-22-06 DUE

CORRECTIVE ACTION

#	ATA:	A/F Eng 1/2	DATE:	TIME:	ACFT TT:	ENG TT:
1			7-22-10	0125	351+06	351+06

I certify that this aircraft s/n 4694 has been inspected IAW AD2003-22-05 dated 12-3-03 para(a). A daily visual and feel check of the outboard tail rotor pitch change link spherical bearings for excessive radial/axial play and was determined to be in airworthy condition. Due re- compliance before first flight of next day

DATE: 7-22-10 TIME OF DAY: 0120 LABOR HOURS:
ACFT TT: 351+06 LOCATION: DUGA2 SIGNATURE: [redacted] TASK CODE: OPERATIONAL CHECK FLIGHT REQ YES/NO
NAME: [redacted] EMPLOYEE #: 6438 EMPLOYEE #: 6438 P/N OFF: P/N ON:
CERTIFICATE #: [redacted] CERTIFICATE TYPE: CP CERT #: [redacted] Type CP S/N OFF: S/N ON:

#	PREP MAREP	RAMCO DESC #	ATA:	A/F Eng 1/2	DATE:	TIME:	ACFT TT:	ENG TT:
2		Aircraft won't crank			7-22-10	1530	351+06	351+06

1. Engine Run Down Check 35 seconds
2. Applied penetrating oil TO fuel manifold system 72-43-00-01-420 performed permeability checks Fuel Pump (1) 8 seconds (2) 7 seconds check Good Performed Engine Rundown check is 38 seconds
All work done IAW M&L maintenance manual 72-43-00-280-851

DATE: 7-22-10 TIME OF DAY: 0830 LABOR HOURS: 3 1/2
ACFT TT: 351+06 LOCATION: DUGA2 SIGNATURE: [redacted] TASK CODE: OPERATIONAL CHECK FLIGHT REQ YES/NO
NAME: [redacted] EMPLOYEE #: 6439 P/N OFF: P/N ON:
CERTIFICATE #: [redacted] CERTIFICATE TYPE: [redacted] CERT #: [redacted] Type S/N OFF: S/N ON:

ACFT Signature Cert # & Type (IAW 91.407 b)

Figure 2. Air Methods Record of Maintenance Log Leaf #595941

On July 23, at 352 hours, the engine was removed for repair due to "fuel coking."

On July 24, the form noted "Removed and replaced injection manifold[6] referencing Arriel2 MTI [Maintenance Technical Instruction] No. X292M13032, update No. 4, January 30, 2008. Assembled referencing Arriel 2B1MM [Maintenance Manual] X292N54502, Revision No. 19, March 30, 2009. Work performed under WO [Work Order]#M517@FAA CRW KBMR477F, Helicopter Services of Nevada."

The work order and Turbomeca Technical Maintenance Report records completed by the Helicopter Services of Nevada technician were intermixed. According to HSN WO M-517, the cover page indicated the work order was pertinent to engine SN 46268; however, subsequent pages were applicable to engine SN 23366 and SN46268. Review of Helicopter Services of Nevada work order M-517 showed the following entries, all dated July 26:

[6] The term "injection manifold" is also called a "fuel manifold" in the maintenance entries. Turbomeca calls the component an "injection manifold."

"Disassembled engine 23366 to access M03 [module 3] S/N 20007. Removed fuel manifold 0292217030 S/N ANR 54450 and installed 0292217030 S/N 1956B references MTI No. X292MI3032."

"Reassembled engine 23366 to accommodate engine. Referencing Arriel 2B1. M.M. X292N54502 revision 19 March 30, 2009. Ground runs, oil pressure, and vibration good."

"HMU [Hydro-Mechanical Unit] is leaking from drain. Customer to replace TU43 seal.[7]"

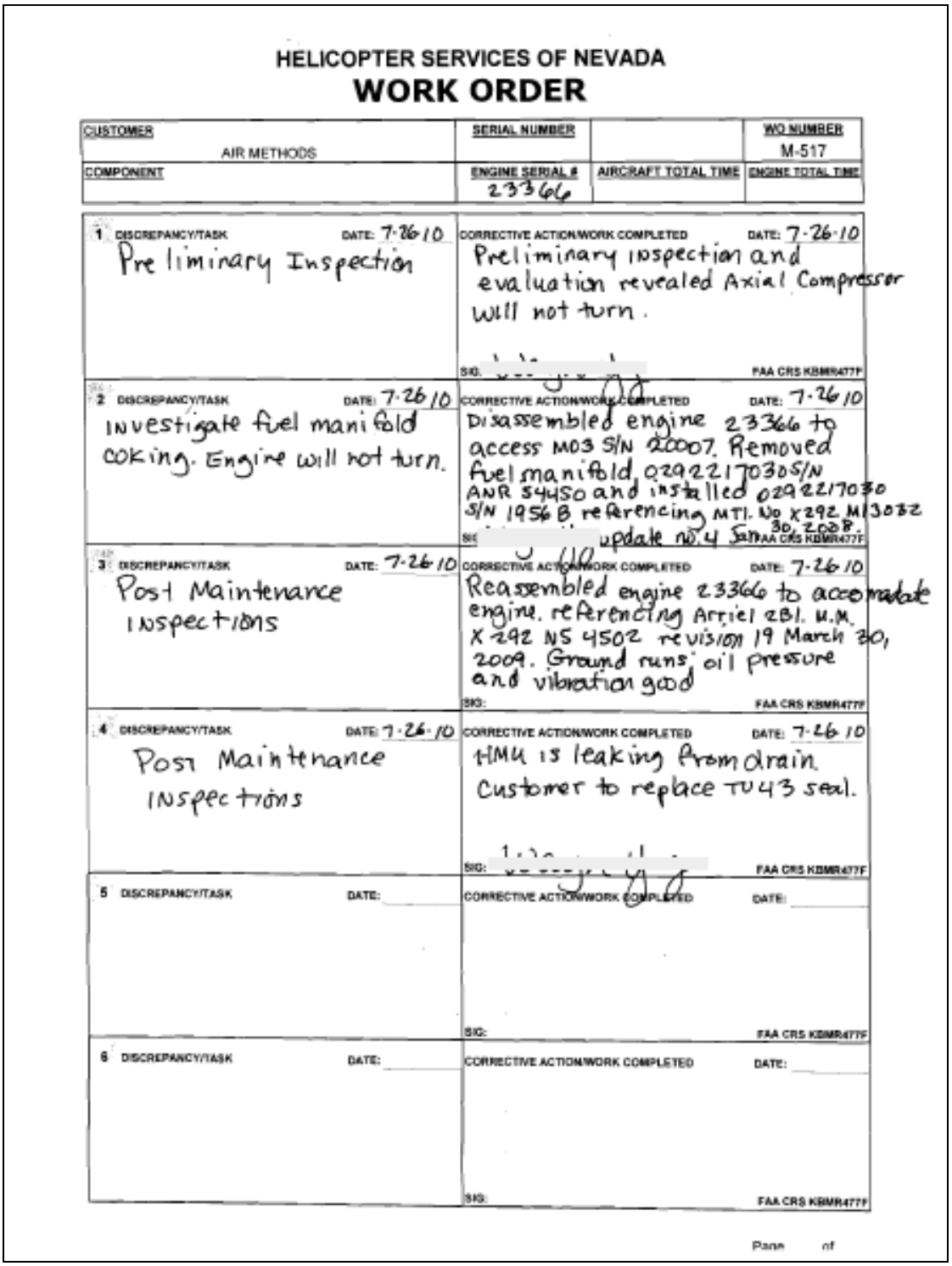
On HSN Work Order M-518, WO number M-517 was crossed out and M-518 was written in its place. The engine serial number noted on the document was 46268. The corrective action was indicated as follows:

"Disassembled engine 46268 to access MO 3, SN 9853. Removed fuel manifold PN 0292217030 SN ANR 2451 and installed 0292217030 SN 861B. Referencing MTI No. X292M13032 update No. 4, Jan 30, 2008."

Figure 3. Work Order M-517 Excerpt, shows the entry in the work order package. Figure 4, Work Order M-517 Excerpt, shows the other entry in the work order package. Figure 5. Logbook Entry, shows the entry by the Helicopter Services of Nevada Mechanic on the logbook page.

Examination of the Gas Generator Log Card (Figure 6 shows Page 1 of the card and Figure 7 shows page 2 of the card) revealed the absence of an entry for the July 2010 injection manifold replacement on the log card.

[7] This maintenance was not performed on engine SN 23366, but on the accident engine SN 46268.



HELICOPTER SERVICES OF NEVADA

WORK ORDER

CUSTOMER	SERIAL NUMBER		WO NUMBER
AIR METHODS			M-517
COMPONENT	ENGINE SERIAL #	AIRCRAFT TOTAL TIME	ENGINE TOTAL TIME
	23366		

DISCREPANCY/TASK	DATE	CORRECTIVE ACTION/WORK COMPLETED	DATE
1 Preliminary Inspection	7-26-10	Preliminary inspection and evaluation revealed Axial Compressor will not turn. SIG: FAA CRS KBMR477F	7-26-10
2 Investigate fuel manifold coking. Engine will not turn.	7-26-10	Disassembled engine 23366 to access MO3 S/N 20007. Removed fuel manifold, 0292217030 S/N ANR 5450 and installed 0292217030 S/N 1956 B referencing MTI. No X292 M13032 update no.4 Sept 30, 2008. SIG: FAA CRS KBMR477F	7-26-10
3 Post Maintenance Inspections	7-26-10	Reassembled engine 23366 to accomodate engine. referencing Arriel 2B1. U.M. X 292 N5 4502 revision 19 March 30, 2009. Ground runs oil pressure and vibration good SIG: FAA CRS KBMR477F	7-26-10
4 Post Maintenance Inspections	7-26-10	HMU is leaking from drain. Customer to replace TU43 seal. SIG: FAA CRS KBMR477F	7-26-10
5 DISCREPANCY/TASK	DATE:	CORRECTIVE ACTION/WORK COMPLETED SIG: FAA CRS KBMR477F	DATE:
6 DISCREPANCY/TASK	DATE:	CORRECTIVE ACTION/WORK COMPLETED SIG: FAA CRS KBMR477F	DATE:

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Figure 3. HSN W M-517 Excerpt[8]

[8] Turbomeca issued revision 21 of the Arriel 2B1 Maintenance Manual X292N54502 in June 2010.

HELICOPTER SERVICES OF NEVADA

WORK ORDER

CUSTOMER	SERIAL NUMBER		WO NUMBER
AIR METHODS			~~M-517~~ M-518
COMPONENT	**ENGINE SERIAL #**	**AIRCRAFT TOTAL TIME**	**ENGINE TOTAL TIME**
	46268		

1 DISCREPANCY/TASK DATE: 7.24.10	CORRECTIVE ACTION/WORK COMPLETED DATE: 7.24.10
Preliminary Inspection.	Preliminary evaluation and investigation. Axial Compressor is rough to turn. SIG: [redacted] FAA CRS KBMR477F
2 DISCREPANCY/TASK DATE: 7.24.10	**CORRECTIVE ACTION/WORK COMPLETED DATE: 7.24.10**
Investigate fuel manifold coking. Engine will not turn.	Disassembled engine 46268 to access #03 S/N 9853. Removed fuel manifold P/N 02922170305/N ANR 2451 and installed 02922170305/N 861B. Referencing MTI No X292M13032 update no.4 Jan 30, 2008. SIG: [redacted] FAA CRS KBMR477F
3 DISCREPANCY/TASK DATE: 7.24.10	**CORRECTIVE ACTION/WORK COMPLETED DATE: 7.25.10**
Post Maintenance Inspections.	Reassembled engine 46268 referencing Arriel 2B1 M.M. X292 N5 4502. revision 19 March 30, 2009. Ground runs, oil pressure vibration and leak check flight were all acceptable. SIG: [redacted] FAA CRS KBMR477F
4 DISCREPANCY/TASK DATE:	**CORRECTIVE ACTION/WORK COMPLETED DATE:**
	SIG: FAA CRS KBMR477F
5 DISCREPANCY/TASK DATE:	**CORRECTIVE ACTION/WORK COMPLETED DATE:**
	SIG: FAA CRS KBMR477F
6 DISCREPANCY/TASK DATE:	**CORRECTIVE ACTION/WORK COMPLETED DATE:**
	SIG: FAA CRS KBMR477F

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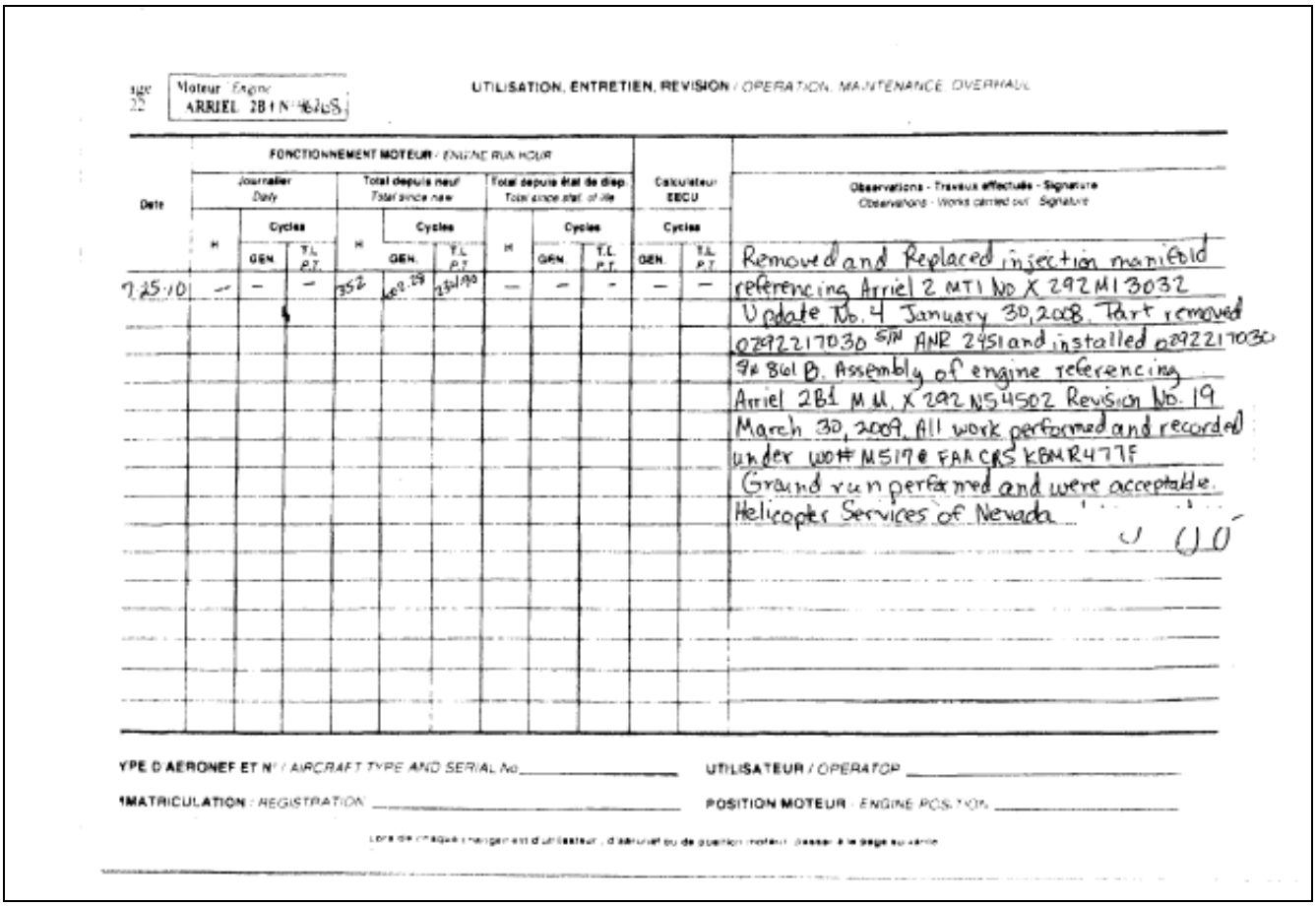
Figure 4. HSN WO-518 Excerpt



Moteur / Engine ARRIEL 2B1 N° 4625

UTILISATION, ENTRETIEN, REVISION / OPERATION, MAINTENANCE, OVERHAUL

Date	FONCTIONNEMENT MOTEUR / ENGINE RUN HOUR — Journalier / Daily H	Journalier / Daily Cycles GEN.	Journalier / Daily Cycles T.L. P.T.	Total depuis neuf / Total since new H	Total depuis neuf / Total since new Cycles GEN.	Total depuis neuf / Total since new Cycles T.L. P.T.	Total depuis état de disp. / Total since state of life H	Total depuis état de disp. / Total since state of life Cycles GEN.	Total depuis état de disp. / Total since state of life Cycles T.L. P.T.	Calculateur / EECU Cycles GEN.	Calculateur / EECU Cycles T.L. P.T.	Observations - Travaux effectués - Signature / Observations - Works carried out - Signature
7.25.10	–	–	–	3552	6823.59	2351/90	–	–	–	–	–	Removed and Replaced injection manifold referencing Arriel 2 MTI No X 292M13032 Update No. 4 January 30, 2008. Part removed 0292217030 S/N ANR 2451 and installed 0292217030 S/N 861B. Assembly of engine referencing Arriel 2B1 M.M. X 292N54502 Revision No. 19 March 30, 2009. All work performed and recorded under WO# N5179 FAR CRS KBMR477F Grand run performed and were acceptable. Helicopter Services of Nevada J. [illegible]

TYPE D'AERONEF ET N° / AIRCRAFT TYPE AND SERIAL No. _____ UTILISATEUR / OPERATOR _____

IMMATRICULATION / REGISTRATION _____ POSITION MOTEUR / ENGINE POSITION _____

Lors de chaque changement d'utilisateur, d'aéronef ou de position moteur, passer à la page suivante

Figure 5. HSN Engine Logbook Page Entry

N° 1

FICHE MATRICULE DE FOURNITURE ECHANGEABLE / *EXCHANGEABLE COMPONENT LOG CARD*

IDENTIFICATION DE LA FOURNITURE / *IDENTIFICATION OF COMPONENT*	
Désignation / *Identity*	**GENERATEUR DE GAZ** *GAS GENERATOR*
Référence / *P/N*	**70BM032020**
N° de série / *S/N*	**9853**
Fabricant / *Manufacturer*	**TURBOMECA**
Type de moteur / *Engine Type*	**ARRIEL 2**

Cette fiche est affectée à tout module ou composant à vie-limite ou potentiel pouvant être échangé par l'utilisateur.
Elle doit accompagner la fourniture dans tous ses mouvements et est remplacée si nécessaire lors du retour de celle-ci chez l'industriel (ou Réparateur Agrée TURBOMECA). Elle doit être insérée dans le livret du moteur sur lequel la fourniture est installée.

This card is used for any module or item with limited life or T.B.O. which can be exchanged by the operator. It must accompany the component in all its movements, and will be replaced if necessary when the component is returned to the manufacturer (or to an Approved TURBOMECA Overhaul Facility). This card should be inserted in the engine log book on which the component is installed.

TRAVAUX EFFECTUES / *WORKS CARRIED OUT*	**RENSEIGNEMENTS PARTICULIERS** / *REMARKS*	**STOCKAGE** / *STORAGE*
	Boîtier jonction et conf. T4.5 S/N **1700MA** Jonction box and T4.5 matching	
	Résistances d'homogénéisation de T4.5 T4.5 *homogeneisation resistance*	
	Ra = **3,5076** KΩ — Rb = **5,9166** KΩ	
	Code binaire = **0101001** — Code binaire = **1000101**	

TU en base : 13A - 17A

MODIFICATIONS APPLIQUEES A LA LIVRAISON / *MODIFICATIONS INCORPORATED AT TIME OF DELIVERY*

TU : 22 (CN F-2005-162 N/A) - 33A - 44A - 51 - 63A - 71A - 103A - 104A - 107A - 127A - 138 - 162.

POTENTIEL CALENDAIRE / *CALENDAR TBO*

11/2008 + 15 ANS = 11/2023

Lettre service / *Service letter* 2060 / 00 / AR 2B / 14 / Ed.8

FONCTIONNEMENT A LA LIVRAISON / *LIFE USED AT TIME OF DELIVERY*

Module	**Total heures** / *Total hours*	**Potentiel** *TBO*	**Heures neuf** *Hours new*	**Disponibilité en heures** *Remaining hours*		**Disponibilité en cycles** *Remaining cycles*	
	0	**3500**	**0**	**3500**		/	
	DESIGNATION *IDENTITY*	**REFERENCE** *P/N*	**N° SERIE** *S/N*	**Heures de fonct. Total** *Total run hours*	**Disponibilité** *To be run*	**Cycles effectués total** *Cycles carried out total*	**Disponibilité** *To be run*
Pièces à vie-limite *Life limited parts*	ROUET CENTRIFUGE *Centrifugal impeller*	**0292260880**	3934OTT	/	/	0	22 000
	ROUE D'INJECTION *Injection wheel*	**2292260210**	5115AD	/	/	0	6 500
	DISQUE TURBINE HP *Turbine disc HP*	**2292260060**	10988UP	/	/	0	17 000
Pièces à limite d'utilisation *Usage limited parts*	ROULEMENT *Bearing*	**9609000493**	2625	0	7 000	/	/
			N° appariement *Matching number*				
	PALES TURBINE HP *Turbine blades HP*	**229226A0B0**	TX6	0	6 000	0	10 000

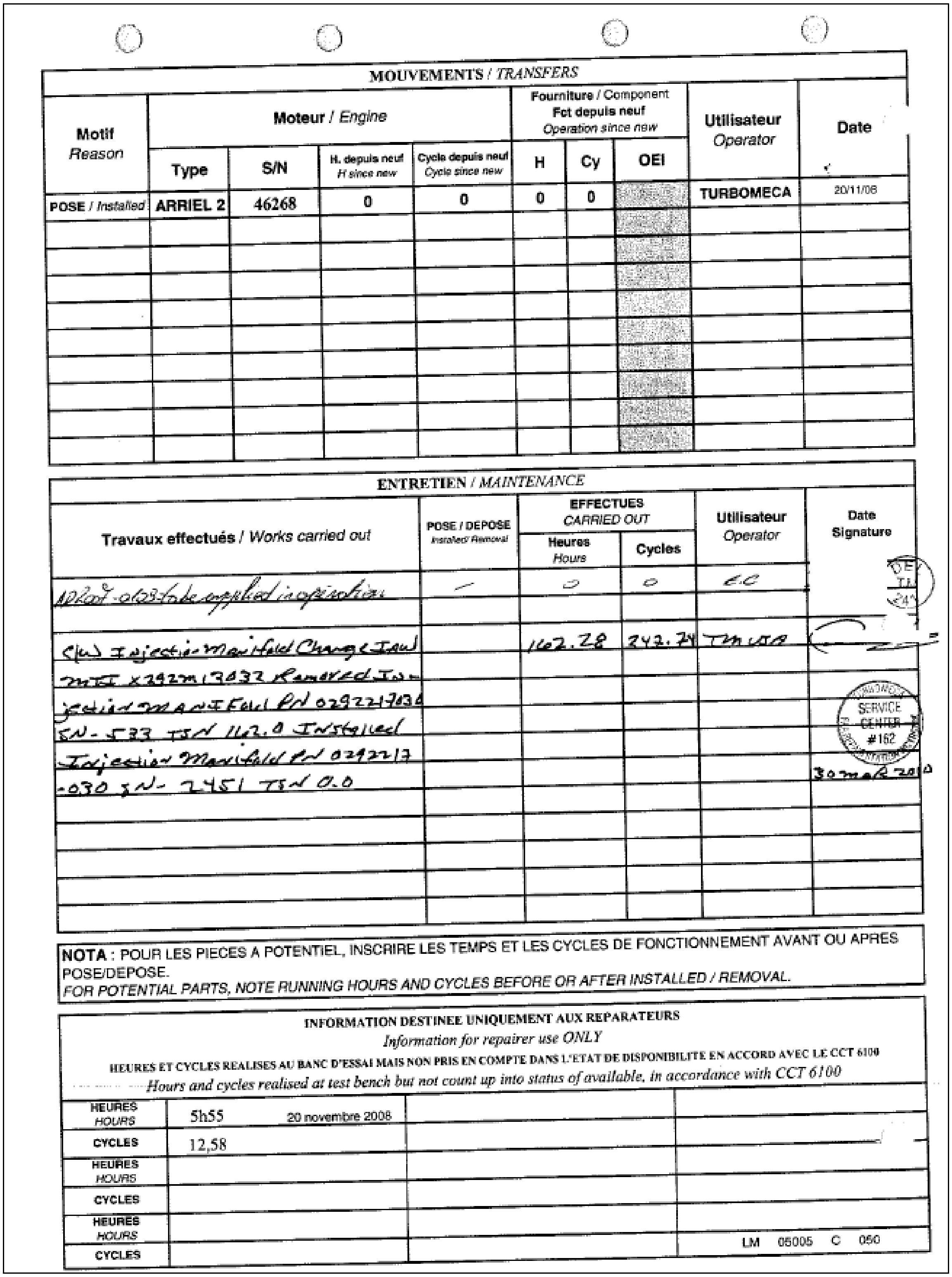
ATTESTATION DE CONTROLE / *CERTIFICATE OF INSPECTION*

Le signataire certifie que cette fourniture a été construite ou révisée conformément aux règles, a satisfait aux épreuves de réception et peut-être mise en service sous réserve du respect des consignes des Manuels agréés.
SI CETTE FOURNITURE A SUBI UN ACCIDENT, ELLE DOIT ETRE INSPECTEE ET RECEPTIONNEE PAR UN CENTRE AGREE PAR TURBOMECA AVANT D'ETRE REMISE EN SERVICE.
L'utilisateur est averti que l'utilisation en service d'un moteur - ou un composant - qui a subi un accident et n'a pas été inspecté et réceptionné par un centre agréé par TURBOMECA engage sa propre responsabilité.

The undersign certifies that the component described above has been manufactured or overhauled in accordance with applicable regulations, has completed all required acceptance testing and is approved for use in accordance with applicable operating and maintenance instructions.
N° THIS COMPONENT HAS BEEN INVOLVED IN AN ACCIDENT, IT SHOULD BE INSPECTED AND APPROVED BY AN APPROVED TURBOMECA OVERHAUL FACILITY BEFORE RETURNING IT TO SERVICE.
Operators are warned that placing an engine - or a component - into service that has been involved in an accident and has not subsequently been inspected and approved for return to service by an approved TURBOMECA overhaul facility is done strictly at the risk of the owner/operator.

L'Industriel / Réparateur agréé *The manufacturer / Approved overhaul facility*	**L'Autorité compétente** *The competent Authority*
Date - Signature	**Agrément de Production** FR.21G.0036 Date - signature
20 novembre 2008	20 novembre 2008
T45	DGA
	LM 05005 C 050

Figure 6. Gas Generator Log Card Page 1



MOUVEMENTS / *TRANSFERS*

Motif / *Reason*	Moteur / *Engine* Type	S/N	H. depuis neuf / *H since new*	Cycle depuis neuf / *Cycle since new*	Fourniture / Component Fct depuis neuf / *Operation since new* H	Cy	OEI	Utilisateur / *Operator*	Date
POSE / *Installed*	ARRIEL 2	46268	0	0	0	0		TURBOMECA	20/11/08

ENTRETIEN / *MAINTENANCE*

Travaux effectués / *Works carried out*	POSE / DEPOSE *Installed/ Removal*	EFFECTUES / *CARRIED OUT* Heures / *Hours*	Cycles	Utilisateur / *Operator*	Date Signature
10/20/7-0123 to be applied in operation	—	0	0	C.C	
C/W Injection Manifold Change IAW MTI X292M13032 Removed Injection Manifold P/N 0292217030 SN-533 TSN 1162.0 Installed Injection Manifold P/N 0292217-030 SN- 2451 TSN 0.0		1162.28	242.74	TM USA	SERVICE CENTER #162 30 mar 2010

NOTA : POUR LES PIECES A POTENTIEL, INSCRIRE LES TEMPS ET LES CYCLES DE FONCTIONNEMENT AVANT OU APRES POSE/DEPOSE.
FOR POTENTIAL PARTS, NOTE RUNNING HOURS AND CYCLES BEFORE OR AFTER INSTALLED / REMOVAL.

INFORMATION DESTINEE UNIQUEMENT AUX REPARATEURS
Information for repairer use ONLY

HEURES ET CYCLES REALISES AU BANC D'ESSAI MAIS NON PRIS EN COMPTE DANS L'ETAT DE DISPONIBILITE EN ACCORD AVEC LE CCT 6100
Hours and cycles realised at test bench but not count up into status of available, in accordance with CCT 6100

HEURES / *HOURS*	5h55 20 novembre 2008		
CYCLES	12,58		
HEURES / *HOURS*			
CYCLES			
HEURES / *HOURS*			LM 05005 C 050
CYCLES			

Figure 7. Gas Generator Log Card Page 2 (most recent injection manifold change not noted)

On July 26, the Air Methods maintenance records stated "Reinstalled repaired engine SN46268 I/A/W Turbomeca Maintenance Manual, Chap 71 & 72. Ground run check OK. Front oil

pressure check at 50 PSI. Rear oil pressure check at 19 PSI. Fuel Temp of 82 degrees, engine vibe check at 6 mms. The driveshaft balance check at .47 IPS." A later entry noted "HMU valve seal leaking[9]."

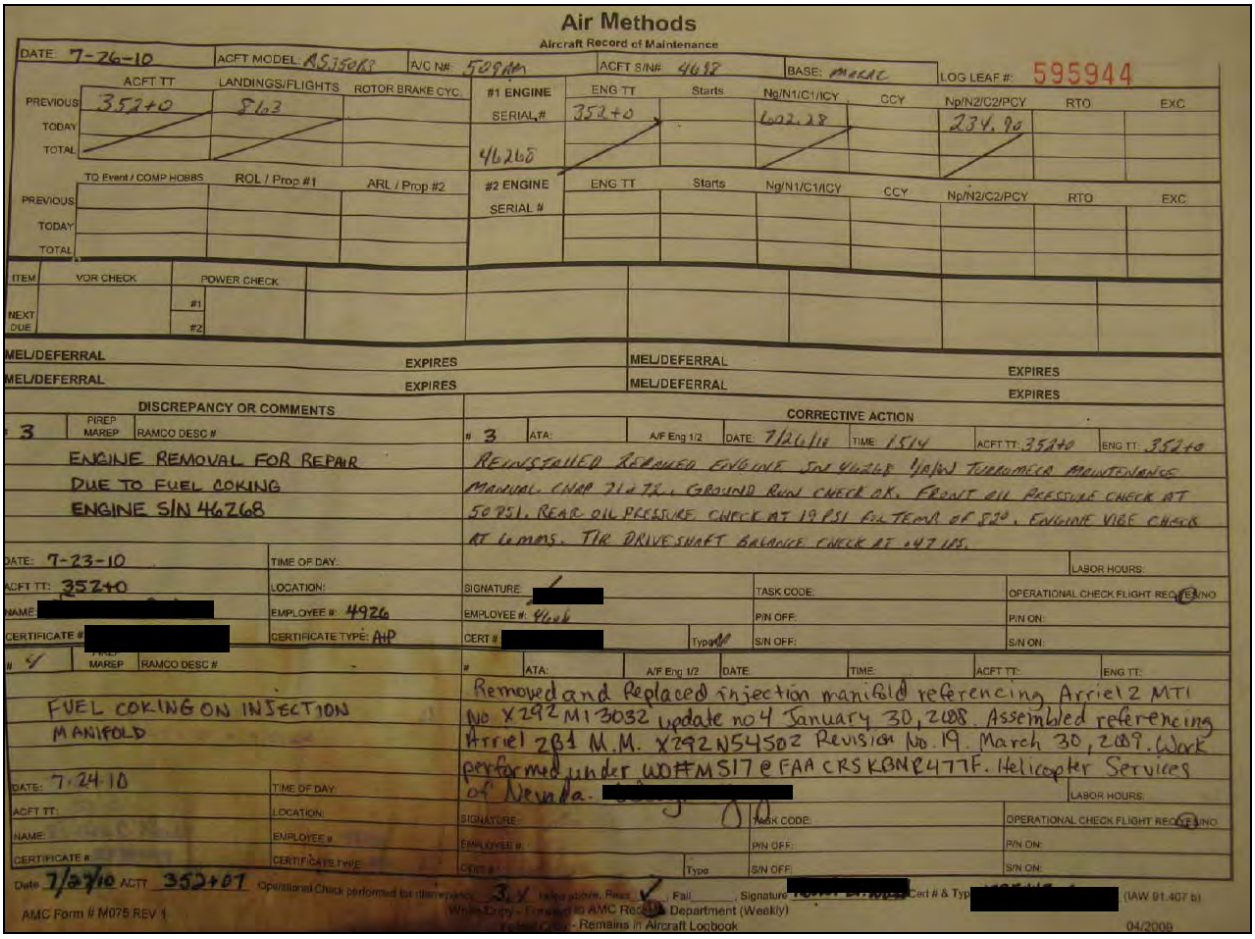


Figure 8. Engine Reinstallation

On July 27, "Removed HMU SN 26003 from aircraft and replaced valve seal. Reinstalled HMU SN 26003 in aircraft I/A/W Turbomeca Arriel 2B1 Maintenance Manual Chap 73, PN 95601706620 valve seal, 1 EA, PN 9794410095 oring4ea, PN 9794710300 -ring, 1EA, PN 9682001605, O-ring 1EA, PN979441032, O-ring 1EA, PN 979441075, O-ring 1EA, PN 9794710200, O-ring 1EA, PN 9794710028 O-ring 1EA." During this maintenance, the mechanic completed AD 2007-10-07, the HMU Coupling Shaft Spline Inspection.

Also on July 27, the Air Methods 20-hour engine inspection was completed and the following entry was noted: "I certify that this aircraft has been inspected I/A/W Air Methods Turbomeca Arriel 2B1 engine 20 hour B61 inspection and was found to be in an airworthy condition at this time. Next compliance due by 372+7, A/C T.T. 372+7 ENG T.T. PWR Ck: 96.2 NG, 795 CT4, 71 TQ, 392 NR, ZP 5780, 24.8 OAT, T4 Margin -40 degrees, TQ Margin 2.5 degrees."

[9] The HMU seal is a separate component from the fuel injection manifold and replacement of the seal does not require any maintenance related to the fuel injection manifold,

As discussed in the Airworthiness Group Chairman's Report, examination of the tail rotor output shaft flex-coupling revealed that its safety washer remained in place, but had not been bent into a locking position; the coupling remained firmly affixed to the shaft and exhibited no indication of slippage. According to Eurocopter maintenance instructions for engine removal-installation, the lock washer is removed and reinstalled per the stripping-fitting out instructions, 71.00.03.402, page 5, and this would have been accomplished during the most recent maintenance.

1.3 Manufacturer's Guidance

1.3.1 Turbomeca Injection Manifold "Coking"

According to a Turbomeca representative, fuel coking means that the injection manifold becomes coated with carbon deposits. As the engine temperature decreases, the tolerances usually decrease so that the engine will sometimes rotate with associated noise and the gas generator can seize when the engine cools down, preventing next starting. Fuel coking does not affect flight performance. Turbomeca has determined that fuel coking events occurring at the same time and regions were due to contaminated fuel. It was then suggested to concerned operators to check they fuel quality by frequent analysis and if possible change their supply sources. Turbomeca has released guidance regarding the fuel coking problem, determining factors, and possible actions, including service letter 2259/04/ARRIEL2/17 2nd issue, which pertains to the use of +100 additive to the fuel to prevent coking. At the time of the accident, Air Methods was not following the guidance provided by the service letter.

1.3.2 Maintenance Procedures and Manual Excerpts

1.3.2.1 Injection Manifold Replacement

Replacement of the injection manifold is outlined in Turbomeca Maintenance Technical Instruction (MTI) X292M13032Rev4. The MTI notes "…maintenance procedures carried out pursuant to a maintenance document must be recorded in the relevant engine log book section(s), and the exchangeable supply log card (module) or log card (accessory) where applicable." It later notes to "Note the embodiment of this Maintenance Technical Instruction in section "E" of the engine log book ("maintenance section") and on the back of the Module 03 card regarding the number of cycles and hours of the engine and module."

The MTI instructs the technician to disassemble the engine and remove the injection manifold. It is then inspected. Once it is determined if components will be repaired or replaced, the injection manifold (or replacement) is reinstalled, and the engine reassembled. The full manufacturer's guidance, MTI X292M13032Rev4, is included as an attachment to this report.

In the MTI guidance, it states the following:

Removal of the jet union (Refer to Figure 501) (Detail C)

- Remove the nuts (72-43-00-01-304) (x2).
- Remove the screws (72-43-00-01-302) (x2).
- Remove the jet union (72-43-00-01-300).

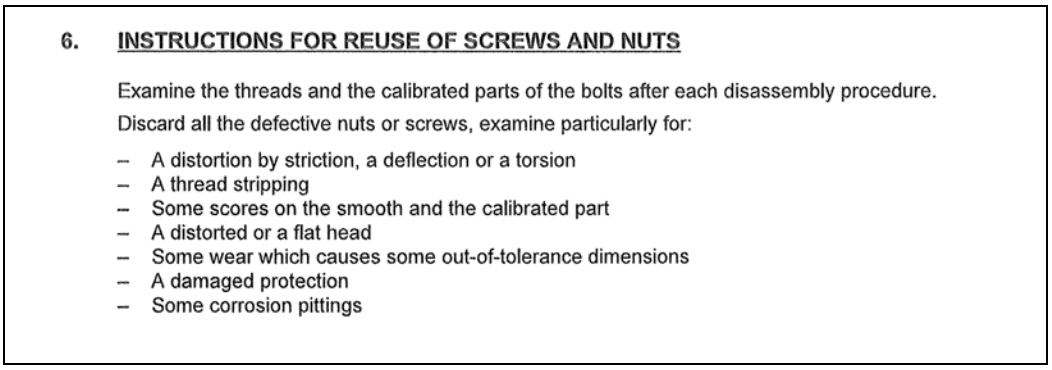
- Remove and discard the special seal (72-43-00-01-340).
- Remove and discard the preformed packings (72-43-00-01-330) (x2).
- Remove the screw (72-43-00-01-350) and discard the seal (72-43-00-01-360).

For reinstallation, it states the following:

Installation of the jet union (Refer to Figure 1006)
- Lubricate and install the preformed packings (72-43-00-01-330) (x2) on the jet union
- (72-43-00-01 -300).
- Install the special seal (72-43-00-01-340) on the flange of the intermediate casing (72-43-00-02-170).
- Install the jet union assembly (72-43-00-01-300) on the flange of the intermediate casing.
- Attach with the screws (72-43-00-01-302) (x2) and the nuts (72-43-00-01-304) (x2).
- Install the screw (72-43-00-01-350) with its seal (72-43-00-01-360) on the jet union
- (72-43-00-0 1 -300).
- Torque the nuts (72-43-00-01-304) (x2) and the screw (72-43-00-01-350) to 0.24 daN.m.

As installed, the jet union is visible when looking at the exterior of the engine. No torque striping is required.

Turbomeca authorizes reuse of hardware as noted in the maintenance manual[10] (See Figure 9. Turbomeca Hardware Reuse).



6. **INSTRUCTIONS FOR REUSE OF SCREWS AND NUTS**

Examine the threads and the calibrated parts of the bolts after each disassembly procedure.

Discard all the defective nuts or screws, examine particularly for:

- A distortion by striction, a deflection or a torsion
- A thread stripping
- Some scores on the smooth and the calibrated part
- A distorted or a flat head
- Some wear which causes some out-of-tolerance dimensions
- A damaged protection
- Some corrosion pittings

Figure 9. Turbomeca Hardware Reuse

1.3.2.1 Engine Removal and Installation

According to the Eurocopter Maintenance Manual (71.00.03.401, Section 09-31, Page 01.00), when an engine is removed and installed, maintenance personnel need to refer to the flight manual, Section 8, in addition to engine documentation, the maintenance manual, and the standard practices manual (See Figure 10). On Page 07.00 of this document, it states to perform a checkout ground run as per the Flight Manual Section 8 (See Figure 11).

[10] The Turbomeca instruction for reuse of screws and nuts is outlined in Turbomeca Maintenance Manual 70-41-00-940-801-A01, Tightening Torques General.

1.4 Applicable Documents

- Flight Manual (PMV) Section 8.
- Engine documentation
- Maintenance Manual (MET) W.C. 05.21.00.603 - 12.00.00.301 - 24.00.00.301 - 28.00.00.402 - 53.00.00.403 - 60.00.00.301 - 62.10.00.401 - 63.00.00.401 - 65.10.00.401 - 71.00.03.402 - 80.00.00.401.
- Standard Practices Manual (MTC) W.C. 20.02.01.103 - 20.02.05.404 - 20.02.05.405 - 20.02.06.402 - 20.02.06.404 - 20.02.06.409 - 20.02.07.101 - 20.02.07.401 - 20.04.01.402 - 20.05.01.211 - 20.05.01.214 - 20.05.01.222.

Figure 10. Applicable Documents

6 WORK COMPLETION CHECK ON ARRIEL 2B1 ENGINE

- After the installation of the engine :
  . Fill the tank with oil, if necessary, or top up the tank as per W.C. 12.00.00.301.
  . Bleed the fuel system as per W.C. 28.00.00.402.
  . Perform a checkout ground run as per Flight Manual (PMV) Section 8.
  . Perform the tasks stipulated in the engine manufacturer documents after the engine ground run.
  . Check the following for leakage at the engine/vehicle interface :
    .. oil system
    .. fuel system
    .. P2 system.

Figure 11. Work Completion Check

In addition to those items listed in the maintenance manual, post maintenance operational check flights are required. In the Flight Manual, Section 8, it states that in addition to the flight report, VEMD [Vehicle and Engine Multifunction Display] ground run checks, a hover flight, maximum continuous power climb, maximum takeoff power check, and maximum continuous power level flight checks must be performed (See Figure 12). There is no requirement to un-cowl the engine following the maintenance test flights.

8.3.2 LIST OF TEST SHEETS

N° 0 FLIGHT REPORT

N° 1 VEMD

N° 2 GROUND RUN

N° 3 HOVER FLIGHT

N° 4 MAXIMUM CONTINUOUS POWER CLIMB

N° 5 MAXIMUM TAKEOFF POWER CHECK

N° 6 MAXIMUM CONTINUOUS POWER LEVEL FLIGHT

N °7 AUTOROTATION - 65 kt (120 km/h)

TEST SHEETS TO BE CONDUCTED ACCORDING TO THE MAINTENANCE ACTION OR COMPONENT REPLACED:

TEST SHEETS No ➔ / MAINTENANCE ACTION OR COMPONENTS REPLACED ➔	0	1		2					3		4	5	6		7
		A	B	A	B	C	D	E	A	B			A	B	
ENGINE, FADEC OR MODULE	●	●	●	●	/	/	●	●	●	●	●	●	●	●	/
EBCAU	●	/	/	●	/	/	●	/	/	/	/	/	/	/	/
MGB OR MODULE	●	/	/	●	●	●	●	/	●	●	/	/	●	/	●
MAIN ROTOR HUB	●	/	/	●	●	●	●	/	●	/	/	/	●	/	●
TAIL ROTOR – TAIL ROTOR DRIVE	●	/	/	●	/	●	●	/	/	/	/	/	/	/	/
VEMD	●	●	●	●	/	/	●	/	/	/	/	/	/	●	/

Figure 12. List of Flight Tests

1.3.3 Engine Serial Number 23366 Follow Up Examination

Following the accident, a Turbomeca Technician from the Turbomeca USA facility examined engine SN 23366. The Technical Maintenance Report stated as follows:

"During disassembly flexible pipe PN 95301962070 had 16 mm hardware installed on the module 4 side instead of 14 MM. This allowed the bolts to appear torque but hardware was too long, so the flange on the pipe was loose….module 3 had an

unacceptable crack on the inner hub of the PT Nozzle. Module 3 had one unacceptable crack on the swirl plate."

1.3.4 Interviews of Maintenance Personnel

1.3.4.1 Air Methods

1.3.4.1.1.1 Air Methods Lead Mechanic- Mr. Joseph Merten

Mr. Joseph Merten was interviewed by members of the Airworthiness Group on August 1. The interview was recorded, and a full transcription is included as an attachment to this report. The following is a summary of the interview.

Mr. Merten is employed as a lead mechanic for Air Methods. Mr. Merten is an aviation maintenance technician for airframe and powerplant (A&P), with an inspection authorization (IA). As a lead mechanic, he was authorized to order parts. He also served as a rover mechanic, and would work at any of the following bases: Safford, Willcox, Douglas, Sierra Vista, and Marana.

Mr. Merten had been on vacation and returned on Sunday, July 25. He spoke with his boss who asked him to be in Marana on Monday morning because a helicopter (not the accident helicopter), N551AM, needed a check flight. Mr. Merten said that he arrived on Monday morning at 0630 and reviewed the helicopter logbooks. He noticed that there was an open entry, and then called his boss to advise him that the check flight could not be conducted until the Helicopter Services of Nevada mechanic, Mr. Wayne Young, signed off the maintenance that had been performed. They completed the ground checks, and then waited for Mr. Young to arrive. Mr. Young arrived about 0800. Mr. Merten, Mr. Young, and the maintenance operational check flight pilot went on the maintenance operational check flight. The helicopter was returned to service on Monday morning.

After N551AM was returned to service, Mr. Merten began working on N509AM (the accident helicopter). N509AM's engine was already assembled and ready to be installed in the helicopter. Mr. Merten and two Air Methods mechanics, Mr. Wayne Dickerson and Mr. Victor Reeb, hung the engine in the helicopter. Mr. Merten did not recall Mr. Young asking him to verify Mr. Young's work on the engine. Then, Mr. Reeb proceeded to work on a different helicopter. Mr. Merten and Mr. Dickerson continued to install the engine in N509AM, which included installing a breather hose, installing the generator, a drain, and the fuel line that comes off of the hydro-mechanical unit (HMU). Mr. Young was not at the facility at this time, but returned later when they conducted the ground runs. When Mr. Merten was asked if Mr. Young asked him to check his work he said "No" and that "Well, when I came on, like I said, it was assembled, ready to go…I would have figured that probably would have been done already."

Once Mr. Young had returned, the ground runs and all checks were completed satisfactory with Mr. Young, Mr. Dickerson, Mr. Reeb, and Mr. Merten present. Mr. Merten went inside to complete the maintenance entries. The mechanics outside began the ground checks per the flight manual. During the second test, the pilot noted fuel dripping out of the main drain in the rear of

the helicopter. After completing several tests, the mechanics concluded that they needed to replace the Varilip seal on the HMU. They did not have one available so they ordered one for the following day.

Mr. Merten obtained O-rings and a Varilip seal from the Sierra Vista base, in the event that they did not arrive. Everything arrived as scheduled, and Mr. Merten told Mr. Reeb on the morning of July 27 to remove the HMU, and if possible, to remove the seal. When Mr. Merten arrived to Marana, Mr. Reeb had removed the HMU and had the flange removed from the HMU. They worked together using the maintenance instructions on replacing the various O-rings and the seal. They also completed an airworthiness directive on the splines. The HMU was reinstalled, and the ground checks were completed. No fuel leakage was evident.

Mr. Merten reported that the engine was run three times on Monday and two times on Tuesday for an approximate total duration of 20 minutes on the ground. The battery was then replaced. Prior to the check flight, the cowling was removed to verify that the short shaft had been cotter pinned. Mr. Merten accompanied the maintenance operational check flight pilot on the check flight, which was 7 minutes in duration. Mr. Merten indicated that some pilots would perform longer check, but that the pilot he was flying with was experienced. Mr. Merten indicated that the check flights were never less than 7 minutes. Mr. Young did not participate in the check flights for N509AM.

Following the check flight, the 20-hour inspection was signed off. The helicopter was then returned to service.

Mr. Merten indicated that there is always pressure to accomplish the work required. He indicated that he simply tries to do his work properly, and tries not to let the pressure rush him. Mr. Merten reported that he overheard that Mr. Gerald “Jerry” Fijalka, the area aviation manager, was putting pressure on the weekend mechanics to finish the work.

Mr. Merten stated that in recent months, he had been working with Turbomeca and contract mechanics more often due to the number of manifold valves that were coking. Mr. Merten said to prepare for their arrival, the Air Method’s mechanics removed the engine, removed Modules 4 and 5, and took the 2/3 Module away from Module 1. Mr. Merten said once the technician completed the work, either the technician, a combination of technician and Air Methods' mechanics, or Air Methods' mechanics did the reassembly based on their qualifications[11].

Mr. Merten said that he signed off the engine installation, and Mr. Young signed off the work that he performed. The maintenance operational check flight pilot completed the check flight. The helicopter was returned to service at 1700 or 1800 on July 27.

1.3.4.1.1.2 Air Methods Mechanic- Mr. Wayne Dickerson

[11] Air Methods mechanics were authorized to perform Levels 1 and 2 maintenance, the Helicopter Services of Nevada technician was authorized to perform Levels 1, 2, and 3 maintenance.

Mr. Wayne Dickerson was interviewed following the accident by the Operations Group. He was employed as a mechanic for Air Methods. The following information was extracted from the record of conversation summary provided by the Operations Group Chairman. Mr. Dickerson is an aviation maintenance technician for airframe and powerplant (A&P), with an inspection authorization (IA). He holds a commercial pilot certificate, single-engine land and sea, rotorcraft-helicopter, and has approximately 2,800 hours of flight time. He received his A&P certificate in December 1973.

Mr. Dickerson recalled that he returned from vacation on Thursday, July 22. On July 23 he heard that the engine for N509AM was "coked up" and located at Marana. He helped another mechanic, Mr. Victor Reeb, remove the engine from N509AM. He separated module 5 from 4, and put module 3 on the stand. Mr. Reeb replaced the flux valve (avionics/compass system). Mr. Dickerson then removed engine modules 2/3 from module 1. At that point, they were ready to replace the fuel manifold (that was coked up), and waited for Mr. Wayne Young of Helicopter Services Nevada to arrive and do the work. The removal of the fuel manifold required a higher level of maintenance than what they could provide themselves. Friday night (July 23) it was determined that another helicopter (N551AM) had the same coking problem.

On Saturday (July 24) he arrived at 0900 and met Mr. Young at the hangar. They rolled N509AM outside. He and Mr. Young removed the engine from N551AM, and started to separate the engine modules. They separated the work area in the hangar, keeping the engine and parts for N509AM on one side of the hangar and the engine and parts for N551AM on the other side. In between the two areas was another airplane stored in the hangar. The parts for N551AM and N509AM were ordered for immediate delivery. The parts and special Turbomeca tools arrived on Saturday, and were picked up by Mr. Young Saturday evening. Mr. Dickerson ended his work shift at 1700.

On Sunday (July 25) he arrived at Marana Airport at 0900. He started prepping N551AM in the hangar, and he and Mr. Young reassembled the engine for N551AM. At noon another mechanic, Mr. Steve Osborne, picked up the parts for the engine at the counter. He and Mr. Osborne installed the built up engine into N551AM, then moved it to the ready pad. Mr. Dickerson did a ground check on N551AM with pilot Mr. Lee Waldron. Mr. Dickerson's work shift ended between 1930-2000. They rolled N509AM into the hangar. Mr. Young built up the engine for N509AM on his own.

On Monday (July 26) Mr. Joel Merton and Mr. Reeb arrived at 0630. Mr. Dickerson arrived at 0800. Mr. Merton and Mr. Reeb had finished doing the ground and daily for N551AM, and he signed off the maintenance for that helicopter. Mr. Young arrived at 0815. The Pilot and Area Aviation Manager, Mr. Jerry Fajelka, performed the functional check flight (~12 minutes in duration), and then took the helicopter to Tucson Medical Center (TMC) to pick up Aaron Todd, the CEO of Air Methods. Mr. Dickerson said that there was some pressure put on the mechanics by Mr. Fajelka to have the helicopter ready. Not only was the Air Methods CEO in the area, but the Safford Base was out of service (no operational helicopter), and the backup helicopter was in use at Douglas.

Mr. Dickerson then performed the preparation work on N509AM, and Mr. Reeb performed maintenance items on another helicopter that was due for a daily inspection. Mr. Dickerson and Mr. Young rotated the engine in the engine stand to the horizontal position, and put the spline adaptor on the tail rotor drive. He hooked up and tightened the fuel supply line, and tightened the b-nut. Mr. Dickerson and Mr. Merton installed the engine, he on the left side and Mr. Merton on the right side. The engine was serviced with oil, and taken outside for a ground run. The pilot for the ground run was Mr. Bob Wasik, and the ground run lasted 9 minutes. The helicopter was shut down, and a leak check performed; it was restarted, and a check was performed where the engine was brought up to 85% Ng and vibration checked (~4-5 minutes of run time).

Mr. Young then left after the vibes were verified. The short shaft was safety wired, and the vibe meter removed. Mr. Dickerson installed the exhaust drain and tail rotor driveshaft cover. Mr. Merton and Mr. Reeb disconnected HMU channel A and waited for 10 minutes, then restarted the engine. They found a fuel control leak from the shaft drive housing. At this point, Mr. Dickerson said they were “dead in the water,” because they did not have the parts necessary to repair the fuel leak. He ordered the parts, and they rolled N509AM into the hangar. He left the shop at 1700.

On Tuesday (July 27) he went to work at his normal base (Florence) and arrived around 1000. Mr. Dickerson stated that this area has 6 bases (Marana, Wilcox, Florence, Safford, Douglas, Sierra Vista). There are 8 mechanics in the area, 6 base mechanics, and 2 rovers. Each base has one dedicated mechanic. The rovers move from base to base as necessary. The base mechanics work 10 days on 4 days off. The rovers work a normal Monday-Friday work week. The base mechanics that are on duty over a weekend will cover the other bases that do not have the weekend duty mechanic. The work days vary from a normal 6 to 8 hour day up to a 12 hour day, depending on what the workload is. When Mr. Dickerson is working on a weekend, he covers his base (Florence) and Marana.

In summary, he recalled that Mr. Young singed off the deep maintenance work and build up on the accident engine, and had the maintenance manual open during that work. Mr. Merton signed off the engine installation on N509AM.

1.3.4.1.1.3 Air Methods Mechanic- Mr. Victor Reeb

Mr. Victor Reeb was interviewed by members of the Airworthiness Group on August 1. The interview was recorded, and a full transcription is included as an attachment to this report. The following is a summary of the interview.

Mr. Reeb reported working a normal Monday through Friday schedule the week of July 19. On July 23, he worked with Mr. Dickerson on removing the engine for N551AM and disassembling it. They disassembled the engine to the point where the 2/3 module was ready for the Helicopter Services of Nevada technician, Mr. Young, to begin work on it. They completed the disassembly on N551AM on Friday, and Mr. Reeb had the remainder of the weekend off of work.

When Mr. Reeb returned to Marana on Monday morning, he met Mr. Young. The engine for N551AM had been installed, and Mr. Reeb, Mr. Merten, Mr. Dickerson, and Mr. Young completed the ground checks. After the check flight of approximately 10 minutes, the helicopter was returned to service. Mr. Reeb stated that based on his recollection, Mr. Merten and the maintenance operational check flight pilot were the only people to go on the check flight.

The engine for N509AM had been reassembled, but had not been installed. Mr. Reeb, Mr. Merten, Mr. Dickerson, and Mr. Young, set the engine into place on the helicopter to the point where the hoist could be removed. Mr. Reeb did not recall Mr. Young asking him to look over the work that Mr. Young had completed on the engine. At that time, Mr. Merten told Mr. Reeb that he could go work on "104", the Marana helicopter. When he finished the work on the other helicopter, Mr. Reeb returned to N509AM and assisted with the ground runs. During the Channel B check, they noticed fuel was coming out of the drain. After troubleshooting, they determined that the Varilip seal on the HMU had to be replaced. They ordered the seals and waited for their arrival the following day.

On July 27, he and Mr. Merten replaced the seal and O-rings in the HMU together. The ground checks were then completed satisfactorily, and the maintenance operational check flight was performed. Following the maintenance operational check flight, the 20-hour inspection was completed, and the battery was replaced. The helicopter was then returned to service.

Mr. Reeb signed off the 20-hour inspection and the HMU maintenance. Mr. Merten signed off the engine installation and return to service.

1.3.4.1.1.4 Air Methods Flight Check Pilot- Mr. Robert Wasik

The following is a summary of conversation with Mr. Robert Wasik. The interview was conducted by members of the Operations Group.

Mr. Wasik was employed by Air Methods as a line pilot, and completed the post maintenance check flight on the accident helicopter. Mr. Wasik stated the he holds a commercial pilot certificate with ratings for rotorcraft-helicopter and airplane single-engine land. He has approximately 11,000 hours, which includes about 300 hours of fixed wing time. He has not received any type of post maintenance flight check training from Air Methods or Eurocopter, nor is any required.

Mr. Wasik said that Marana is an Air Methods maintenance base, and that if any maintenance is needed that cannot be performed at the helicopter's normal base, the helicopter will come to Marana for the maintenance. Being based at Marana, he gets to perform maintenance check flights. He said that any Air Methods pilot qualified in model can perform a maintenance check flight. He uses the AS350B3 pilot operating handbook, section 8.3 to determine which post maintenance checks have to be done. He and the mechanic would look and decide which checks were appropriate, and "not necessarily sticking strictly to the matrix provided in section 8.3." Once they decide what events need to be completed, the mechanic will fly with the pilot during the post maintenance checks.

Monday, July 26, was the first day of his 7-day duty shift. After lunch, he was asked to perform a maintenance check flight on N509AM that was coming out of maintenance. When an aircraft comes out of maintenance, he completes a thorough inspection, but this time he did not find any discrepancies. They did a ground turn with the first section of tail rotor cover off, checked the short shaft vibes and found everything was balanced, and did a leak check. They then shut down the helicopter. Next they disconnected channel A and performed the B channel check on the HMU, and checked the results on the vehicle and engine multi-function display (VEMD). They shut down again; during his walk, around he noticed fuel on the ground. He talked to the mechanics, and they thought that a seal in the HMU was leaking. To test this, Mr. Reeb turned on the boost pump, and fuel did come out the fuel drain.

Tuesday, July 27, the pilot flew in the morning. After lunch he readied himself to fly N509AM. They did a leak check, and there was no leak from the HMU. He performed a second leak check with the same results, and then performed the HMU B channel check. He put the rotor in flat pitch, established 370 rotor revolutions per minute (rpm), pushed the button and checked that rotor rpm went up to 390, and back down to 370 when he released the button.

In order for the duty pilot to do the maintenance flight, the base has to go out of service because the pilot is not immediately available to accept an EMS mission; he has to get permission from the Area Aviation Manager (Mr. Gerald "Jerry" Fijalka) to go out of service. Mr. Fijalka approved his request. The pilot got out the POH, turned to section 8.3, and he and Mr. Merten decided which post maintenance check flight items needed to be done. He briefed Mr. Merten and then they performed the following tests:

- Droop check. From the deck, bring the helicopter into a 5 foot hover in less than 2 seconds, watch the rotor droop and recover.
- Rate of climb check. Start at 5,000 feet, 65 knots, pull max continuous power and maintain a 2,000 feet per minute climb.
- Cruise power check. At 5,000 feet, power check in cruise. VEMD displays torque margin and T4 margin. VEMD tells him if the check is good or not.
- At 5,000 feet, 40knots, put the rotor into flat pitch, abruptly pull in collective to 1.0 FLI (flight limit indicator), should hear the 'gong' at redline limit.
- Flame out check. Max continuous power, bottom out the collective in 2 seconds, and bring in power before it overspeeds.
- Autorotation. 5,000 feet, 65 knots, rotor rpm at 410 should hear a 'gong', check rotor rpm build up in a sustained autorotation.

From Mr. Wasik's recollection, the entire fight took 7.5 minutes.

Once back at base, he noted that the battery had been weak, and the mechanics said that they knew that but had forgotten to install a new battery. They installed a new battery, and he signed off the log book in two places, for the HMU removal and replacement, and the engine removal and reinstall. Mr. Wasik stated that they don't keep the check flight test results, and there is no paperwork retained. During the flight, the mechanic who is reading from section 8.3, will tell the pilot if the test was in limits or not. He did not do a left pedal authority check, and did not record

the parameters during the max continuous rate of climb check, but he did read off altitude, torque, and T4 to the mechanic.

He does think that an extra pilot at the Marana base would be beneficial, since the pilots based at Marana have to do the majority of the maintenance check flights. This would allow the pilot conducting the maintenance flight check to not have the pressure of the base being out of service while the flight is being executed. Management wants the bases to be in service 100 percent of the time, but it is not possible if the duty pilot has to perform the maintenance flight. In general he has not heard the pilots or medical crew complain about the maintenance performed on the helicopters they fly. They generally feel management treats them fairly.

1.3.4.1 Helicopter Services of Nevada

1.3.4.1.2.1 Technician- Mr. Wayne Young

Mr. Wayne Young was interviewed by the Airworthiness and Structure Group Chairmen on July 31. The interview was recorded, and a full transcription is included as an attachment to this report. The following is a summary of the interview.

Mr. Young was employed as a technician for Helicopter Services of Nevada. Mr. Young is an A&P. He had been employed at Helicopter Services of Nevada since September of 2009 as the Director of Maintenance for Turbomeca Engines. Prior to coming to Helicopter Services of Nevada, Mr. Young worked for 23 years at Turbomeca. He began on the shop floor, and worked his way up in the company.

In his position, Mr. Young oversaw four mechanics, and was responsible for arranging work for his employees. Under contract with Turbomeca, the technicians for Helicopter Services of Nevada perform repairs and Level 3 maintenance[12]. They also perform maintenance at their facility in Boulder City. The majority of their work is in the field through the contract with Turbomeca[13].

Mr. Young accomplished his Level 3 Turbomeca training in 1998. In the past, two jobs per year was the requirement to remain current on the maintenance. Now, every 6 years, Turbomeca requires that technicians attend recurrent training. Mr. Young indicated that since he became employed by Helicopter Services of Nevada, their business had increased dramatically due to his relationship with Turbomeca.

Mr. Young received a call about an Air Methods helicopter engine in Marana, Arizona. He planned to travel to Marana on Friday evening and return home on Saturday evening, July 24,. He decided to respond to the call since his employees were busy and Air Methods was one of

[12] Level 3 maintenance is considered "deep maintenance" and consists of disassembly of a module and maintenance intervention.

[13] Turbomeca records showed that from July 2010 until July 2011, Mr. Young had filed 11 deep maintenance reports for Turbomeca. Of those, two were related to fuel injection manifold replacements and relate to the accident engine and engine SN 23366 discussed in this report.

their top customers. Mr. Young described the reported problem that the engine would not turn. Mr. Young told them when the engine cools to see if they could spin it. He indicated that usually, it will rotate again.

He ordered the parts and tooling to arrive on Saturday, July 24, and he arrived in Marana on Friday night. The engine had been pulled from the helicopter, and the modules were disassembled. Mr. Young stated that Module 2/3 was sitting on the work bench.

Prior to his arrival to the facility the following morning on July 24, the area manager called him and asked if he had heard about the other engine, and if he was able to fix that engine as well. Mr. Young indicated that the helicopters had to be operating by Monday, July 26. Mr. Young then contacted Turbomeca to have additional parts sent to perform the Level 3 maintenance.

The parts that he had originally ordered had not arrived yet, so they decided to push the first helicopter out of the hangar (the accident helicopter), and bring the second helicopter in. They removed the engine on the second helicopter, and disassembled the engine. The tools and parts arrived between 1500 and 1600, and they decided to stop and return the following day. One of the mechanics had to drive 90 miles home.

When they returned on the morning of July 25, all of the required parts were there. They pushed the first engine (the accident engine) that was pulled against the wall, and proceeded to work on the second engine that was pulled. Mr. Young changed the injection manifold.

To perform the maintenance function, Mr. Young stated that you remove Module 2 from Module 3, and then special tooling is used to remove the centrifugal compressor, intermediate casing, and the diffuser, which is attached to the manifold. The manifold and diffuser are pulled, and the burner can is next. They normally do not disassemble the whole Module 3 unless additional maintenance is necessary[14].

After the manifold and the diffuser are removed, they are pulled out. The other manifold is reinstalled using the same washers and bolts if they are in good condition. Then, it is reassembled in reverse order. Mr. Young noted that there was "coking" (hard carbon or fuel carbon) on the labyrinth and in the injection wheel. Before reassembly, he cleaned the injection wheel, and then reassembled everything . After everything was reinstalled, it spun freely. Mr. Young assisted the Air Method's mechanics in putting the modules back together, and they said that they could finish reassembling the engine.

Mr. Young replaced the injection manifold on the second engine, and began reassembling it. At that time, the Air Methods mechanics had completed the reassembly on the other engine, and had reinstalled it in the helicopter (the non-accident helicopter). On Monday morning, July 26, Mr. Young assisted in the ground and flight checks, and the helicopter was returned to service. He indicated that the flight was approximately 45 minutes.

[14] According to a Turbomeca representative, this is consistent with company procedures.

Then, they returned to the other engine (the accident engine). Mr. Young finished putting all of the modules on and the second engine, as well as installed all of the accessories and piping. The Air Methods mechanics did not assist him in the reassembly.

The engine was installed in the accident helicopter. Mr. Young double-checked all of the lines, and inspected the engine again before he released it. He went to town to check out of his hotel and when he returned, the helicopter was ready to go. They completed the ground runs and everything passed. As Mr. Young was completing the paperwork, the pilot indicated that the fuel control had a fuel leak from the drain. After troubleshooting, they determined that it was the TU43HMU seal. He told the mechanics that they could replace the seal on their own, and the instructions were in the maintenance manual. Mr. Young indicated that the logbooks were not available for his review. While signing off the work he performed, the Air Methods mechanics printed out blank section E pages (maintenance pages), and Mr. Young completed the maintenance entry.

In later email correspondence, Mr. Young indicated that when removing and replacing the fuel line that was found unsecured, the line is removed at the B-nut and then the union is removed.

> "When I removed the union I put the same bolts and nuts together with the union so as not to misplace them in case you do not receive them from the parts kit. I remember on this one I replaced the brass gasket and the o'rings but I did reuse the old bolts they were in good shape and still held their torque value. The union is installed and the modules are reassembled. The pipe is put on during the final assembly process. Again I rechecked every line before I gave them the engine and I asked them to look it over before we installed the engine in the A/C [aircraft]. I do think if this line or union was not installed with the bolts in it would have came off or leaked during or ground run checks."

1.4 Federal Aviation Regulations

1.4.1 14 Code of Federal Regulations 91.407: Operation after maintenance, preventative maintenance, rebuilding, or alteration.

(a) No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless--
(1) It has been approved for return to service by a person authorized under Sec. 43.7 of this chapter; and
(2) The maintenance record entry required by Sec. 43.9 or Sec. 43.11, as applicable, of this chapter has been made.
(b) No person may carry any person (other than crewmembers) in an aircraft that has been maintained, rebuilt, or altered in a manner that may have appreciably changed its flight characteristics or substantially affected its operation in flight until an appropriately rated pilot with at least a private pilot certificate flies the aircraft, makes an operational check of the maintenance performed or alteration made, and logs the flight in the aircraft records.

(c) The aircraft does not have to be flown as required by paragraph (b) of this section if, prior to flight, ground tests, inspection, or both show conclusively that the maintenance, preventive maintenance, rebuilding, or alteration has not appreciably changed the flight characteristics or substantially affected the flight operation of the aircraft.

1.4.2 14 Code of Federal Regulations 135.421: Additional maintenance requirements.

(a) Each certificate holder who operates an aircraft type certificated for a passenger seating configuration, excluding any pilot seat, of nine seats or less, must comply with the manufacturer's recommended maintenance programs, or a program approved by the Administrator, for each aircraft engine, propeller, rotor, and each item of emergency equipment required by this chapter.
(b) For the purpose of this section, a manufacturer's maintenance program is one which is contained in the maintenance manual or maintenance instructions set forth by the manufacturer as required by this chapter for the aircraft, aircraft engine, propeller, rotor or item of emergency equipment.

1.4.3 14 Code of Federal Regulations 65.101: Eligibility requirements: General.

(a) To be eligible for a repairman certificate a person must (1) Be at least 18 years of age; (2) Be specially qualified to perform maintenance on aircraft or components thereof, appropriate to the job for which he is employed; (3) Be employed for a specific job requiring those special qualifications by a certificated repair station, or by a certificated commercial operator or certificated air carrier, that is required by its operating certificate or approved operations specifications to provide a continuous airworthiness maintenance program according to its maintenance manuals; (4) Be recommended for certification by his employer, to the satisfaction of the Administrator, as able to satisfactorily maintain aircraft or components, appropriate to the job for which he is employed; (5) Have either (i) At least 18 months of practical experience in the procedures, practices, inspection methods, materials, tools, machine tools, and equipment generally used in the maintenance duties of the specific job for which the person is to be employed and certificated; or (ii) Completed formal training that is acceptable to the Administrator and is specifically designed to qualify the applicant for the job on which the applicant is to be employed; and (6) Be able to read, write, speak, and understand the English language, or, in the case of an applicant who does not meet this requirement and who is employed outside the United States by a certificated repair station, a certificated U.S. commercial operator, or a certificated U.S.air carrier, described in paragraph (c) of this section, have his certificate endorsed Valid only outside the United States.

(b) This section does not apply to the issuance of a repairman certificate (experimental aircraft builder) under 65.104 or to a repairman certificate (light-sport aircraft) under 65.107.

1.4.4 14 Code of Federal Regulations 65.103: Repairman certificate: Privileges and limitations.

(a) A certificated repairman may perform or supervise the maintenance, preventive maintenance, or alteration of aircraft or aircraft components appropriate to the job for which the repairman was employed and certificated, but only in connection with duties for the certificate holder by whom the repairman was employed and recommended.

(b) A certificated repairman may not perform or supervise duties under the repairman certificate unless the repairman understands the current instructions of the certificate holder by whom the repairman is employed and the manufacturer's instructions for continued airworthiness relating to the specific operations concerned.

(c) This section does not apply to the holder of a repairman certificate (light-sport aircraft) while that repairman is performing work under that certificate.

1.4.5 14 Code of Federal Regulations 145.151: Personnel requirements.

Each certificated repair station must—

(a) Designate a repair station employee as the accountable manager;

(b) Provide qualified personnel to plan, supervise, perform, and approve for return to service the maintenance, preventive maintenance, or alterations performed under the repair station certificate and operations specifications;

(c) Ensure it has a sufficient number of employees with the training or knowledge and experience in the performance of maintenance, preventive maintenance, or alterations authorized by the repair station certificate and operations specifications to ensure all work is performed in accordance with part 43; and

(d) Determine the abilities of its noncertificated employees performing maintenance functions based on training, knowledge, experience, or practical tests.

1.4.6 14 Code of Federal Regulations 145.153: Supervisory personnel requirements.

(a) A certificated repair station must ensure it has a sufficient number of supervisors to direct the work performed under the repair station certificate and operations specifications. The supervisors must oversee the work performed by any individuals who are unfamiliar with the methods, techniques, practices, aids, equipment, and tools used to perform the maintenance, preventive maintenance, or alterations.

(b) Each supervisor must—

(1) If employed by a repair station located inside the United States, be certificated under part 65.

(2) If employed by a repair station located outside the United States—

(i) Have a minimum of 18 months of practical experience in the work being performed; or

(ii) Be trained in or thoroughly familiar with the methods, techniques, practices, aids, equipment, and tools used to perform the maintenance, preventive maintenance, or alterations.

(c) A certificated repair station must ensure its supervisors understand, read, and write English.

1.4.7 14 Code of Federal Regulations 145.155: Inspection personnel requirements.

(a) A certificated repair station must ensure that persons performing inspections under the repair station certificate and operations specifications are (1) Thoroughly familiar with the applicable regulations in this chapter and with the inspection methods, techniques, practices, aids, equipment, and tools used to determine the airworthiness of the article on which maintenance, preventive maintenance, or alterations are being performed; and (2) Proficient in using the various types of inspection equipment and visual inspection aids appropriate for the article being inspected; and (b) A certificated repair station must ensure its inspectors understand, read, and write English.

1.4.8 14 Code of Federal Regulations 145.157: Personnel authorized to approve an article for return to service.

1.1 (a) A certificated repair station located inside the United States must ensure each person authorized to approve an article for return to service under the repair station certificate and operations specifications is certificated under part 65.

(b) A certificated repair station located outside the United States must ensure each person authorized to approve an article for return to service under the repair station certificate and operations specifications is (1) Trained in or has 18 months practical experience with the methods, techniques, practices, aids, equipment, and tools used to perform the maintenance, preventive maintenance, or alterations; and (2) Thoroughly familiar with the applicable regulations in this chapter and proficient in the use of the various inspection methods, techniques, practices, aids, equipment, and tools appropriate for the work being performed and approved for return to service.

(c) A certificated repair station must ensure each person authorized to approve an article for return to service understands, reads, and writes English.

1.4.9 14 Code of Federal Regulations 145.203: Work performed at another location.

A certificated repair station may temporarily transport material, equipment, and personnel needed to perform maintenance, preventive maintenance, alterations, or certain specialized services on an article for which it is rated to a place other than the repair station's fixed location

if the following requirements are met: (a) The work is necessary due to a special circumstance, as determined by the FAA; or (b) It is necessary to perform such work on a recurring basis, and the repair station's manual includes the procedures for accomplishing maintenance, preventive maintenance, alterations, or specialized services at a place other than the repair station's fixed location.

1.4.10 14 Code of Federal Regulations 145.205: Maintenance, preventive maintenance, and alterations performed for certificate holders under parts 121, 125 and 135, and for foreign air carriers or foreign persons operating a U.S.- registered aircraft in common carriage under Part 129.

a) A certificated repair station that performs maintenance, preventive maintenance, or alterations for an air carrier or commercial operator that has a continuous airworthiness maintenance program under part 121 or part 135 must follow the air carrier's or commercial operator's program and applicable sections of its maintenance manual.
(b) A certificated repair station that performs inspections for a certificate holder conducting operations under part 125 must follow the operator's FAA-approved inspection program.
(c) A certificated repair station that performs maintenance, preventive maintenance, or alterations for a foreign air carrier or foreign person operating a U.S.-registered aircraft under part 129 must follow the operator's FAA-approved maintenance program.
(d) Notwithstanding the housing requirement of §145.103(b), the FAA may grant approval for a certificated repair station to perform line maintenance for an air carrier certificated under part 121 or part 135, or a foreign air carrier or foreign person operating a U.S.-registered aircraft in common carriage under part 129 on any aircraft of that air carrier or person, provided—
(1) The certificated repair station performs such line maintenance in accordance with the operator's manual, if applicable, and approved maintenance program;
(2) The certificated repair station has the necessary equipment, trained personnel, and technical data to perform such line maintenance; and
(3) The certificated repair station's operations specifications include an authorization to perform line maintenance.

1.4.11 14 Code of Federal Regulations 145.213: Inspection of maintenance, preventive maintenance, or alterations.

(a) A certificated repair station must inspect each article upon which it has performed maintenance, preventive maintenance, or alterations as described in paragraphs (b) and (c) of this section before approving that article for return to service.
(b) A certificated repair station must certify on an article's maintenance release that the article is airworthy with respect to the maintenance, preventive maintenance, or alterations performed after—
(1) The repair station performs work on the article; and
(2) An inspector inspects the article on which the repair station has performed work and determines it to be airworthy with respect to the work performed.
(c) For the purposes of paragraphs (a) and (b) of this section, an inspector must meet the requirements of §145.155.

(d) Except for individuals employed by a repair station located outside the United States, only an employee certificated under part 65 is authorized to sign off on final inspections and maintenance releases for the repair station.

1.4.12 14 Code of Federal Regulations 145.201: Privileges and limitations of certificate.

(a) A certificated repair station may—

(1) Perform maintenance, preventive maintenance, or alterations in accordance with part 43 on any article for which it is rated and within the limitations in its operations specifications.

(2) Arrange for another person to perform the maintenance, preventive maintenance, or alterations of any article for which the certificated repair station is rated. If that person is not certificated under part 145, the certificated repair station must ensure that the noncertificated person follows a quality control system equivalent to the system followed by the certificated repair station. (3) Approve for return to service any article for which it is rated after it has performed maintenance, preventive maintenance, or an alteration in accordance with part 43.

(b) A certificated repair station may not maintain or alter any article for which it is not rated, and may not maintain or alter any article for which it is rated if it requires special technical data, equipment, or facilities that are not available to it.

(c) A certificated repair station may not approve for return to service'

(1) Any article unless the maintenance, preventive maintenance, or alteration was performed in accordance with the applicable approved technical data or data acceptable to the FAA.

(2) Any article after a major repair or major alteration unless the major repair or major alteration was performed in accordance with applicable approved technical data; and

(3) Any experimental aircraft after a major repair or major alteration performed under §43.1(b) unless the major repair or major alteration was performed in accordance with methods and applicable technical data acceptable to the FAA.

1.4.13 14 Code of Federal Regulations 145.219: Recordkeeping.

(a) A certificated repair station must retain records in English that demonstrate compliance with the requirements of part 43. The records must be retained in a format acceptable to the FAA.

(b) A certificated repair station must provide a copy of the maintenance release to the owner or operator of the article on which the maintenance, preventive maintenance, or alteration was performed.

(c) A certificated repair station must retain the records required by this section for at least 2 years from the date the article was approved for return to service.

(d) A certificated repair station must make all required records available for inspection by the FAA and the National Transportation Safety Board.

2.0 Section 2. Overview of Air Methods and FAA Oversight

2.1 Overview of Air Methods Maintenance

Air Methods Corporation is based at Centennial Airport, Englewood, Colorado, and is approved for helicopter emergency medical transport under Title 14 Code of Federal Regulations Part 135. At the time of the accident, the fleet of aircraft consisted of 305 helicopters (30 were AS-350-B3 helicopters), and 13 airplanes. Air Methods has 127 hospital bases, 112 community bases, and operates from 45 states. In 2009, they operated 139,196 flight hours. Air Methods employs 3,000 employees, with 361 employed at their headquarters. An organizational chart of the company is shown in Figure 13.

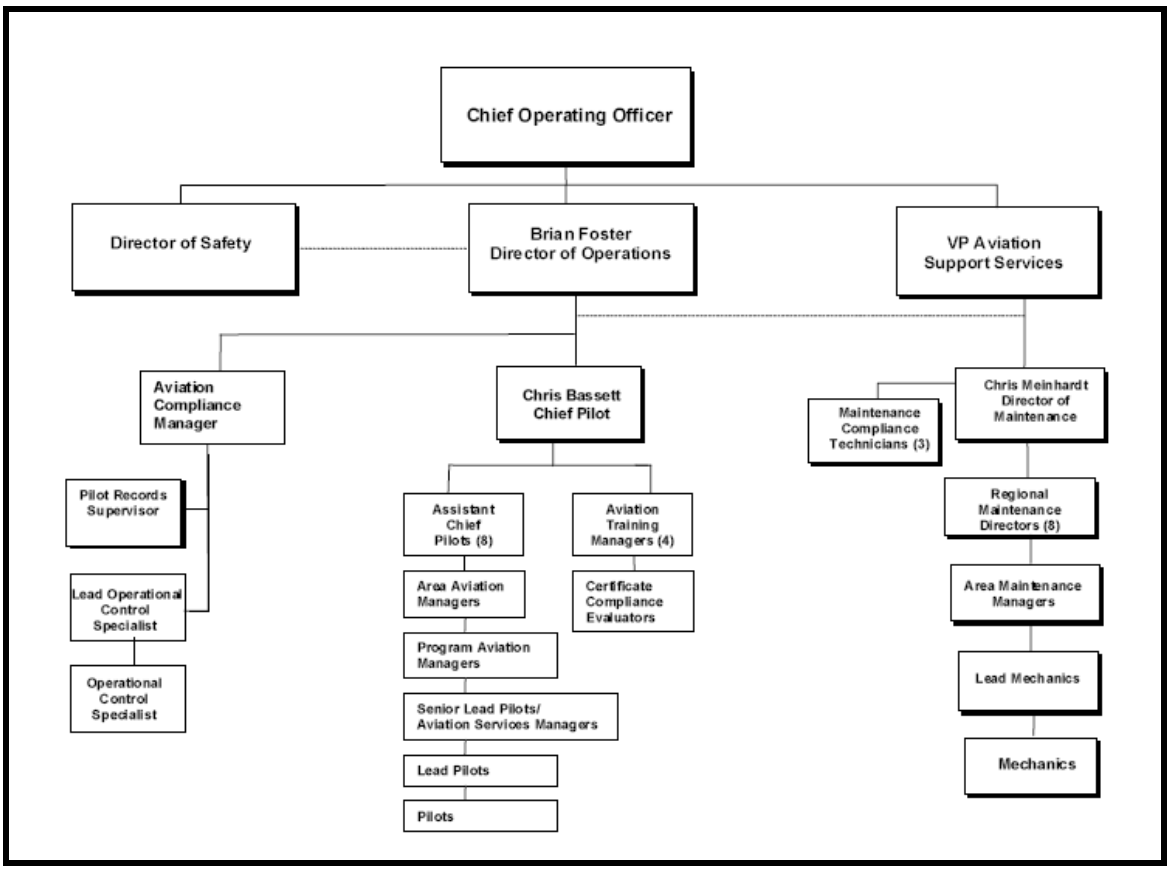


Figure 13. Organizational Chart (GOM)

2.1.1 Maintenance Program and History

Air Methods maintenance operations are managed by the Director of Maintenance (DOM). In addition to the DOM, the maintenance program consisted of three Maintenance Compliance Technicians, eight Regional Maintenance Directors, Area Maintenance Managers, lead mechanics, and mechanics. The DOM supervises all Regional Maintenance Directors and Maintenance Compliance Technicians. The Maintenance Compliance Technicians assist the

DOM by coordinating between manufacturers, suppliers, repair facilities, and the FAA. They also assist the DOM in ensuring all maintenance records and publications are compliant. The Regional Maintenance Directors supervise the Area Maintenance Managers and Leads and assist the DOM as required.

Air Methods employs about 435 mechanics nationwide. There are 21 total mechanics based in Arizona, with 4 based at the Marana, Arizona base (1 mechanic is assigned, 3 are available to cover if necessary). Air Methods designates some mechanics as "rover mechanics." These mechanics will travel to various bases within their coverage area, dependent upon workload and needs. The mechanics working from the Marana base were qualified to perform level 1[15] and level 2[16] maintenance on Turbomeca engines. Due to the nature of the injection manifold replacement requirements, it is considered level 3 maintenance[17]. The Helicopter Services of Nevada technician was brought in to perform the level 3 maintenance.

2.1.1.1 Approved Aircraft Inspection Program

The accident helicopter was maintained through a Federal Aviation Administration (FAA) Approved Aircraft Inspection Program (AAIP), based on the manufacturer's recommended inspection program. Section 2.11 of the AAIP noted that all FAA Airworthiness Directives and all mandatory airframe and engine bulletins that apply shall be complied with. Section 2.13 noted "All inspections performed on aircraft…by maintenance facilities other than Air Methods', shall be done in accordance with Air Methods' Approved Aircraft Inspection Program and Air Methods' Operations Manual."

The AAIP was divided into three sections: Section A (Eurocopter Model AS350 B3 helicopter), Section B (Turbomeca Arriel 2B/2B1 engine), and Section C (Eurocopter Model AS350 B3 helicopters in their FAA-approved altered state). The inspection schedules for each section were noted in Section 4.3, Schedule of Inspections.

2.1.1.1 Air Methods General Operations Manual Excerpts

The General Operations Manual (GOM) outlines the required procedures and maintenance performed on company aircraft. According to the GOM, page C-3/R-4/11-09-09, the Aircraft Logbook along with the Deferred Discrepancy Log constitutes the Aircraft Maintenance Logbook as required by 14 CFR Part 135. These "shall remain in the aircraft whenever it is flown." Additional maintenance information is provided in the following GOM excerpts:

2.1.1.1.2.1 Maintenance and Mechanical Discrepancies

[15] Level 1 maintenance is maintenance performed with the engine installed in the helicopter.
[16] Level 2 maintenance is maintenance performed requiring the engine to be removed from the helicopter and or the separation of the engine modules.
[17] Level 3 maintenance is also called "deep maintenance" and requires disassembly of a module and/or maintenance intervention.

Scheduled/Routine Maintenance and Mechanical discrepancies are entered in the Aircraft Log Book by an appropriately rated pilot or mechanic who discovers the discrepancy or prior to starting any Scheduled/Routine Maintenance. However, if a discrepancy occurs, the mechanic assigned to that aircraft shall be notified as soon as practical (135.23 (f) & 135.65 (a) (b)).

When a discrepancy is entered in the Aircraft Logbook it must be addressed and signed off by a certified A&P mechanic or an FAA certified repair station holding the proper rating, or properly deferred in accordance with an approved MEL. (FAR 91.407, 135.23(e) & 135.65(a)(c)). The pilot shall ensure that work performed is properly signed off in the Aircraft Logbook and/or Deferred Discrepancy Log (if applicable). (See mechanic's duties) (135.23 (i)) Any time an aircraft is out of service for more than 24 hours, the appropriate Maintenance Manager or Lead Mechanic will notify the applicable Regional Maintenance Director. If the out of service occurrence happens after normal business hours and no assistance is required, the notification is to be made at the beginning of business the next day.

If maintenance, preventative maintenance, or servicing is required at a place where previous arrangements for maintenance have not been made, the pilot shall contact the Director of Maintenance or his representative. A determination will then be made by the pilot and the above named company representative as to the nature and effect on safety and whether to repair the problem locally or defer in accordance with the MEL (if applicable).

If maintenance is performed by a non-certificated person, the Certificated Mechanic must personally observe the work being done to the extent necessary to ensure it is being properly done, and the company mechanic must be readily available, in person, for consultation. Print the name (not signature) of the non-certificated personnel in the appropriate corrective action statement of the maintenance record (43.3 (d)).

If a ground run or in-flight check is required following maintenance, that requirement must be entered in the Aircraft Log Book by the mechanic. The ground run or in- flight check must be satisfactorily completed prior to releasing the aircraft for any flight under FAR 135, and signed off by the pilot or mechanic, as appropriate. For specific guidance, refer to, Maintenance Operational Check (MOC) procedures.

All mechanical irregularities discovered during the course of a flight will be brought to the attention of the maintenance department after the flight.

2.1.1.1.2.2 Maintenance Operational Check- Post Maintenance

Prior to any maintenance performed on Air Methods' aircraft, the duty pilot must be verbally informed as to the area affected and the maintenance that is to be performed.

Any maintenance performed must be entered in the Air Methods' Record of Maintenance. All maintenance that is performed shall be checked by a certificated mechanic that did not perform the maintenance action. If a certificated mechanic is not available, then the pilot-in-command shall preflight the work performed, and review the approval for return to service to make final airworthiness determination.

The Post Maintenance Check shall consist of a face-to-face briefing with the person conducting the post maintenance inspection of the work area. The briefing will include the maintenance task that was performed, any cowlings/panels that were opened/removed and any components/lines that were repositioned or removed in order to facilitate maintenance. The Post Maintenance Check must be performed before the aircraft is returned to service. The Post Maintenance Check should include, at a minimum, a thorough pre-flight/visual check for:

• Loose or missing hardware in the area of maintenance.
• Obvious defects in the area of maintenance.
• Tools, loose hardware, rags, or foreign objects left on the aircraft.
• Proper safeties and cotter pins in the area of maintenance.
• The proper servicing of components that may have been affected by the maintenance task.

2.1.1.1.2.3 Maintenance Operational Check (MOC)

Aircraft Operation after Maintenance, Preventative Maintenance, Rebuilding or Alteration**:**

No person may operate any aircraft that has undergone maintenance, preventative maintenance, rebuilding or alteration unless:
• It has been approved for return to service by a certified A&P Mechanic or an FAA Certified Repair Station holding the proper rating; and
• The maintenance record entry required by FAR Part 43.9 (Content, form, and disposition of maintenance, preventative maintenance, rebuilding, and alteration record for inspections) has been made.
• No pilot may carry any person (other than required crew members) in an aircraft that has been maintained, rebuilt, or altered in a manner that may appreciably have changed its flight characteristics or substantially affected its operation in flight, until a maintenance operational check flight is conducted only by designated pilots in command (who have current FAR Part 135.293 (a)(b) check in the make and model aircraft requiring the MOC or a pilot approved by the company) and logs the flight in the aircraft records.

Maintenance operational check flight will be accomplished any time it is required by the manufacturer or by regulation. Maintenance operation check-flights will be conducted only in VFR conditions with the ceiling and visibility at or greater than 1000'/3 miles.

The aircraft does not have to be flown as required in the above paragraph if prior to flight, ground tests, inspections, or both show conclusively that the maintenance, preventative maintenance, rebuilding or alteration has not appreciably changed the flight characteristics or substantially affected the flight operation of the aircraft (ref. FAR Part 91.407 (C)).

2.1.1.1.2.4 Maintenance Record Keeping

The mechanic is responsible for accurate record keeping of all maintenance functions and for completing forms in the appropriate manner. Mechanics will make airframe, engine, and propeller logbook entries in accordance with the requirements of FAR 43.5, 43.9, 43.11, 43.13, (91.417 & 135.65 (c)).

The record keeping requirements of FAR 91.417 will be complied with in the following manner. The following items will be mailed to the office of the Director of Maintenance on a weekly basis:

- The white sheet of the Aircraft Log Book.
- A copy of any entries made in the engine log book (or the original engine log book page when it is filled full).
- A copy of any entries made in the propeller log book.
- Original versions of all maintenance release forms.
- Copies or originals of inspection forms.

The Aircraft Records Manager or a designated representative will ensure that the computerized tracking system has posted a current Status Report. The report contains the following sections:

- Items Due.
- Airframe Components / Inspections
    1. Airframe Bulletins
    2. Airframe ADs.
- # 1 Engine Components / Inspections.
- # 1 Engine Bulletins
    1. # 1 Engine ADs

These sections contain a listing of the following records:

- The total time in service of the airframe, each engine, each propeller, and each rotor.
- The current status of life-limited parts of each airframe, engine, propeller, rotor and appliance.
- The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.
- The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

- The current status of applicable airworthiness directives (AD) including, for each, the method of compliance, the AD number, and the revision date. If the AD involves recurring action, the time and date when the next action is required.
- A listing of the forms prescribed by FAR 43.9(a) for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

These listings will be used by the pilot and mechanic to determine the airworthiness of the aircraft and to schedule maintenance. None of the above listings is considered part of the permanent aircraft record.

The Aircraft Status Reports listed above shall be compared to the new copies to verify that all changes made are valid. Once the new copies are verified (or corrected by direct consultation with Inspections and Records Department personnel), the old forms may be disposed of. Records of the maintenance, preventative maintenance, and records of the 100-Hour, AAIP and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft will be retained at a minimum until the work is repeated or superseded by other work or for one
(1) year after the work is performed (91.417 (b) & 135.65 (d)).

Records containing total time in service and/or current status of life limited part and/or time since overhaul of each airframe, engine, propeller, and rotor as well as the current inspection status of the aircraft, will be retained and transferred with the aircraft at the time the aircraft is sold (91.419 (a)). Records containing the current status of applicable Airworthiness Directives (AD) including, for each, the method of compliance, the AD number, and revision date, and, transferred with the aircraft or the time the aircraft is sold (91.417 (b)).

Maintenance records will be available for inspection by the FAA or authorized representative of the NTSB.

2.1.1.1.2.5 Maintenance Memos

According to the General Operations Manual (Section A-3/R-2/09-01-08), "Maintenance Memos will address non-regulatory inspections, maintenance requirements, or company policies guidelines and procedures. These Maintenance Memos may be issued with an expiration date. Maintenance Memos may also be used to pass on maintenance tips or suggestions. Input from the field for Maintenance Memos is encouraged and appreciated. The Director of Maintenance or designee may issue Maintenance Memos.

2.1.1.1.2.6 Minimum Equipment List

According to the Operations Specifications, section D095. Minimum Equipment List (MEL) Authorization, the certificate holder is authorized to use an approved MEL provided the conditions and limitations of the specifications are met.

2.2 Federal Aviation Administration Oversight

Air Methods operates under Title 14 CFR Part 135.

2.2.1 National Flight Standards Work Program Guidelines (NPG)

The FAA's Directors, Flight Standard's Service (AFS-1) has responsibility for administering the national surveillance programs and for developing the guidelines for inspectors to use, as published in the NPG, FAA Order 1800.56J[18]. Regional flight standards offices have primary responsibility for implementation of the national surveillance programs at the local Flight Standards District Offices (FSDO).

According to NPG 1800.56, to ensure that the FAA fulfills its statutory and regulatory requirements, four major safety areas have been identified as critical to ensure an overall level of safety within the aviation system. The four identified areas, listed in order of FAA priority, are surveillance, investigation, certification, and aviation education. The NPG also indicated that, "surveillance is one of the most important functions performed by AFS field office personnel to ensure safety and regulatory compliance in the aviation system."

The AFS work program consists of required surveillance work activities, but classified the items as R-items and P-items. According to the NPG, the R-items "comprise the mandatory core inspection program that is based on critical oversight issues, which have been identified at a national level. The required inspection program provides an essential level of surveillance activity for certificate holders." The P-items "provide comprehensive targeted inspections that meet special surveillance requirements for each certificate holder operating within a field office's geographic district." The P-items ideally would provide "special emphasis inspection areas" that should be developed from safety trends affecting aviation safety.

Oversight of Air Methods Corporation (QMLA) FAR Part 135 operating certificate is accomplished primarily by a certificate management team (CMT) based at the Denver Flight Standards District Office in Denver, Colorado. There are 27 inspectors, supervisors, and administrative support personnel assigned to the CMT. There is one (1) each assigned Principal Operations, Maintenance, and Avionics inspectors who are assisted by 8 operations inspectors, 7 maintenance inspectors, and 3 avionics inspectors. (There is also an additional Principal Maintenance Inspector and Principal Avionics Inspector assigned to provide oversight of the company's FAR Part 145 repair stations.) The CMT is comprised of an Operations and an Airworthiness unit. Each unit has an assigned operations and airworthiness supervisor respectively. Each unit receives administrative support by 1 each assigned administrative assistant.

[18] FAA Order 1800.56J, National Flight Standards Work Program Guidelines was effective on September 26, 2008.

Oversight program development for QMLA uses a combination of National Work Program Guidelines ("R & P" Program) and the FAA's Large FAR Part 135 Safety Evaluation Program (SEP) and the Safety Evaluation Assessment Tool (SEAT) processes. This process allows the development of a comprehensive work program based on identified risks. Implementation of the program is accomplished by the CMT members, who travel throughout the carrier's system performing inspections and evaluations. Three of the CMT operations members are remotely sited in South Carolina, Tennessee and Massachusetts.

The CMT also utilizes inputs from other offices located throughout the U.S. The CMT does not specifically generate work program items for the other offices, however it does encourage support from the Flight Standards community. "Local" offices have and do incorporate work in their local geographic work programs. During the period FY 2008 through the present there have been a total of 4,631 surveillance activities on the carrier. (This includes operations, airworthiness, and avionics.) Of those activities, 1,487 were accomplished by offices other than the Denver Flight Standards District Office. A summary of the FAA's surveillance activity for Air Methods is shown in Tables 3 and 4.

Table 3. Airworthiness Inspection Items

	R-items	P-items	R-items completed	P-items completed
FY 2007	33	202	33	202
FY 2008	36	488	36	488
FY 2009	43	851	43	851
FY 2010	40	884	40	884

Table 4. Avionics Inspection Items

	R-items	P-items	R-items completed	P-items completed
FY 2007	9	112	9	112
FY 2008	12	155	12	155
FY 2009	14	292	14	292
FY 2010	15	671	15	671

2.2.2 FAA Inspector Interviews

2.2.2.1 Principal Maintenance Inspector Supervisor

Mr. Mark Stratton is the Airworthiness Supervisor (AS) for the Air Methods Certificate Management Team. He was interviewed on August 31, 2010, via telephone. He was represented by FAA Attorney Steve Dunn. The interview was not recorded, but a written summary is included as an attachment to this report.

Mr. Stratton began his employment with the FAA in 2007, as an Aviation Safety Inspector, and then joined the Air Methods Certificate Management Team. He served as the PMI for the 145 Repair Station for one year, then was the acting front line manager. In October 2009, he became the acting full time front line manager; in February 2010, he became the permanent front line manager for the Airworthiness Team. The size of the team increased from 4 to 17 over a year period, and it is now 27 members, including the Operations team members. The AS does not have extensive Turbomeca or Eurocopter experience, and has not received training on the makes/models. In his prior employment, the AS did work on avionics on Eurocopter helicopters, but he indicated that he has limited experience on these specifically. His work prior to the FAA included work as a pilot, lead mechanic, quality assurance inspector, maintenance site manager, maintenance foreman, directing quality assurance, and directing maintenance and quality.

The FAA Airworthiness oversight for Air Methods is managed through a 15-inspector certificate management team. The airworthiness team reviews the certificate and the complexity of the operator. Internal risk assessments are completed by looking at the records done by inspectors and other inspectors through an internal FAA computer system called SPAS. Through this evaluation, the team determines where Air Methods may be having the largest risks. If a risk is identified, a specialized evaluation is conducted, and additional planned inspection items are incorporated. Air Methods is divided into four zones with about 250 total bases across the United States, and the inspectors plan their inspections based on these zones.

According to the Mr. Stratton, his job is to ensure that the team has the appropriate personnel to conduct surveillance on the operator. He also must ensure that the inspectors receive appropriate training, reviews their time and attendance sheets, reviews the Program Tracking and Report System (PTRS) data, and ensures that employees are accomplishing what the FAA has set out to do by the NPG. He monitors the work program to ensure compliance with the surveillance items. Mr. Stratton feels that the team is large enough to provide adequate oversight. Over the past year, the FAA had conducted 1,600 surveillance items on Air Methods.

In order to perform surveillance, the Mr. Stratton receives the operating plan from FAA headquarters. This plan includes Planned (P) items that are created by the principle inspectors, and Required (R) items. The team then follows the guidelines set out; it ensures that the R items are completed, and the P items are completed as the work program allows. In fiscal year 2010, 209 R-items were on the plan, and 1,455 P items were on the plan. There were 336 closed unplanned items. Total, there were 2,316 separate surveillances. Of the R-items, 100 percent were completed. Of the P-items, 96.2 percent of the items were completed.

Mr. Stratton does spend time out of the office attending meetings with the operator. During these meetings, they discuss ideas, issues, letters of investigation, enforcements, SMS, voluntary disclosure programs, ASAP maintenance disclosures, and meetings. It is rare that Mr. Stratton visits the maintenance facilities. Mr. Stratton did go into the field to perform surveillance on FAA employees while they conducted surveillance at Air Methods.

The AS indicated that one year ago, Air Methods was still in the process of developing as a company, and the relationship between Air Methods and the FAA Certificate Management Team was still developing. The working relationship now between Air Methods and the FAA is good.

Air Methods realizes that they must be in compliance. The FAA assists Air Methods in developing programs, and Air Methods is proactive on safety issues. Air Methods is currently modifying their fleet and operations to comply with recent NTSB safety recommendations, even though the recommendations are not regulatory. Mr. Stratton indicated that the relationship between the FAA and Air Methods was professional. Air Methods will correct surface and safety of flight problems immediately. Systemic problems are cured by a root analysis process.

Mr. Stratton indicated that Air Methods seeks to be the industry leader in helicopter emergency medical services (HEMS) operators. Air Methods is concerned about the quality of their service and product. The implementation of SMS is a way to understand and improve the quality of their product. Air Methods does not let profits override safety decisions. Air Methods headquarters maintains good contact with regional maintenance directors and can implement changes immediately if problems are identified.

Mr. Stratton said that the teams attempt to visit all stations annually. Also, other FAA offices may do field inspections of bases within their surveillance areas. He obtains the data from these inspections through the PTRS system. Mr. Stratton indicated that although Air Methods is growing quickly[19], they continue to operate in accordance with FAA rules and regulations. Over the past year, the airworthiness group submitted 40 letters of investigation, and they are in a continual process of identifying potential issues. The majority of the problems identified are administrative issues.

Air Methods does not have any work turnover requirements, nor are any required under Title 14 CFR Part 135, nine or less passengers. If Mr. Stratton wants to query for a specific base, he can input the airport code or a location code. If there is no code for the base, additional searching in the database may be required, and the aircraft N-number can be used for this search. Mr. Stratton indicated that Air Methods has come a long way in a couple of years. Due to the large size of the company, they have attained a good ability to find problems and address them. Mr. Stratton feels that Air Methods is a very transparent company and very proactive.

In order to improve the airworthiness operations at Air Methods, Mr. Stratton suggested that mechanics on the Part 135 operation receive more training on documentation and standardization. Although this is not required under their current operating regulations, Mr. Stratton said that it could benefit their maintenance operation.

2.2.2.1 Principal Maintenance Inspector (PMI)

Mr. Rob Soluren is the Principle Maintenance Inspector (PMI) for the Air Methods Certificate Management Team. He was interviewed on August 26, 2010, at the Denver FAA FSDO. He was represented by FAA Attorney David Wiegand. Mr. Mark Stratton, the AS, was also present. The interview was not recorded but a written summary is included as an attachment to this report.

Mr. Soluren was interviewed regarding his work as the PMI and oversight of Air Methods. The following is a summary of the discussion. The inspector began his employment with the FAA on

[19] Air Methods acquired four air medical operating companies over the past 10 years.

August 11, 2003. While employed with the FAA, the PMI has held several positions. In 2003, he was hired as a general aviation maintenance inspector at the Albuquerque, New Mexico Flight Standards District Office (FSDO). He then became an inspector for 135 operators (on-demand 9 seats or less). During this time, he oversaw 8-10 operators, and one had 30 aircraft. He also oversaw three large air agencies, and provided oversight to Eclipse Aviation and nine designated airworthiness representatives (DARs). In 2006, he transferred to the Denver, Colorado, FSDO as an assistant PMI on the Air Methods certificate. In October of 2009, he became the acting PMI on the certificate, and then the primary PMI in February 2010. His primary job is to provide oversight to the Air Methods certificate. Additionally, he is required to perform accident duty, and assist with walk-in visits from the public.

Mr. Soluren spends 4 weeks per year in the field, six at a maximum. The PMI feels that his field and office requirements are a good balance in providing adequate oversight. Air Methods is a complex company operating over 17 different types of helicopters, 5 repair stations, 200 bases, Part135, Part145 repair stations, and Part133 operations, with about 1,500 employees. They are the largest helicopter emergency services operator.

Air Methods oversight is accomplished by an Airworthiness Supervisor, a Principal Maintenance Inspector, a Principal Avionics Inspector, with seven assistant maintenance inspectors and three assistant avionics inspectors. The operations side also has a group of inspectors, including three remotely based inspectors. In total, the Air Methods team consists of 27 members. Currently there are no remotely based maintenance inspectors. Due to the size of the certificate, turnover does occur. The previous PMI left in October 2009. The previous PAI left in January 2010, and the current PAI has been on duty for 3 months.

As the PMI, Mr. Soluren conducts surveillance on the certificate assigned to him and oversees the work activities of assistant PMIs on the certificate management team. Mr. Soluren tries to go to each station throughout the nation to sample areas with high flight time. His last visit was in March 2010, when he visited the Arizona stations, including Marana, Tucson, and Douglas. He spent a week conducting surveillance on the facilities. One of the main problems they have identified with Air Methods is vague logbook entries. This is a nationwide problem, and Air Methods is working to correct it with mechanic training. The most recent inspection was conducted by Mr. Soluren in July 2010.

Mr. Soluren indicated that the oversight of Air Methods is divided among the certificate management team members. They divide the United States into west coast, central coast, northeast, and southeast regional areas. Due to the large coverage area, Mr. Soluren monitors the work of his maintenance inspectors to assure that surveillance activities are being accomplished, that those activities match the program requirements, and that target areas are being hit. There are over 200 stations, and about 80 percent of the stations are visited annually.

According to Mr. Soluren, when inspectors visit the facilities, they prepare a daily report of what transpired, and they report back daily. If issues need to be addressed, the inspectors report them to the PMI. Mr. Soluren then prints out the problem areas and makes it available to other inspectors so that they can see if the same problems might be occurring in their coverage areas. If there are issues to discuss, meetings will be held, and inspectors take pictures to use as examples

for the other inspectors on the team. Once inspectors return to the office, PTRS entries are completed. Occasionally, the oversight team will enlist the support of other offices. Outside offices also sometimes get R-items pertaining to Air Methods. Mr. Soluren is not notified when this happens, but finds out through his own query of the computer system. He indicated that it would be helpful if he was notified when other offices are assigned these work items.

Mr. Soluren said that unless the operational base has a designator, he is unable to query the system for specific locations. If, for example, an Air Methods base is located at a hospital helipad, it may have no designator, because it is private property. The PTRS entries are broken down by year, month, and date, to include all comments associated with each inspection. Mr. Soluren indicated that Air Methods understands that the FAA is a regulatory agency, and is concerned with the operator's safety. Because Air Methods is a growing company, its maintenance program is also growing. Mr. Soluren indicated that Air Methods is a good company that is receptive to FAA needs, but due to their size sometimes their timeliness on handling issues can be less than desired. Mr. Soluren indicated that the company has a good communication system from their headquarters offices out to their base locations, but that the company must continue to evolve with their growth.

Mr. Soluren feels that he has all of the resources that he needs to perform his job functions. He also feels that when the work does become overly burdensome, he can reach out for regional support. Normally, Air Method’s 200 stations located in the continental USA are visited at least once every 2 years, sometimes twice, depending on base geographic location. Inspectors conduct off-hours visits approximately 10 percent of the time. Mr. Soluren indicated that due to the size of the company, it is impossible to visit every base annually.

Air Methods has had several voluntary programs including the Voluntary Disclosure Reporting Program (VDRP) program, Maintenance Aviation Safety Action Program (MSAP), and pilot Aviation Safety Action Program (ASAP). They are working on further improving these programs. Enforcement actions are currently with the FAA legal department, and approximately 40 letters of investigation are pending that involve airworthiness issues. Mr. Soluren does not have any special inspections planned following the accident, because he has not been fully briefed on the results of the post-accident investigation.

Air Methods is currently developing a General Maintenance Manual (GMM). Mr. Soluren participates in monthly meetings with the certificate management team and Air Methods to go over findings and actions. These are held at the FSDO or at the Air Methods facility.

2.2.2.1 Principal Avionics Inspector (PAI)

Mr. Joshua Pritchard is the Principal Avionics Inspector for the Air Methods Certificate Management Team. He was interviewed on August 31, 2010, via telephone. He was represented by FAA Attorney David Wiegand. The interview was not recorded but a written summary is included as an attachment to this report.

Mr. Pritchard began work with the FAA in 2006. His first job was as an assistant PAI in Louisville, Kentucky, for Part 135 operators (9 seats or less) and Part 145 Repair Stations (about

15 on the general aviation side). He did not oversee any helicopter operators other than his geographic surveillance work. Four months ago he was hired as the PAI for Air Methods.

Since coming onboard with the Air Methods Certificate Management Team (CMT), Mr. Pritchard has received training on Air Methods from his supervisor, and through reviewing the operational requirements. He has not had any Eurocopter or Turbomeca specific training.

Mr. Pritchard oversees three assistant avionics inspectors, develops the work program, delegates inspectors' work, approves/accepts manuals and their revisions, conducts field approvals, and conducts surveillance. Mr. Pritchard develops his inspections based off the plan developed and provided by FAA headquarters and the Northwest Mountain Region. Mr. Pritchard supplements the work program with planned items, based on the Surveillance and Evaluation Program (SEP) utilizing the Surveillance and Evaluation Assessment Tool (SEAT). As risks are identified, planned items are incorporated into the surveillance. Air Methods is a large operator with about 220 bases in 42 states.

Air Methods is broken into regional areas, and the inspectors perform surveillance items based on the plan requirements. Mr. Pritchard indicated that he is impressed with the operator, and they seem very safety conscious. They are establishing an SMS program, and they also use VDRP, ASAP, and MSAP. The PAI feels that Air Methods wants to do things correctly. Mr. Pritchard noted that there are some current enforcement investigations, but that the company is generally good.

Mr. Pritchard said that he will travel approximately two times per quarter to visit the operator, and assistant PIs will travel approximately two times per month. Inspectors' coverage areas are rotated on an annual basis providing a "different set of eyes" each year. The team strives to visit every base at least once throughout the fiscal year. If there are corrective actions, they may return to the base. It usually takes over one fiscal year to visit all of the bases. Mr. Pritchard indicated that they also incorporate off-hours visits to facilities.

The FAA uses other FSDOs to provide surveillance on bases outside of the Denver area, and Mr. Pritchard is able to query the computer system to determine which locations have been visited. If surveillance activities do not have an identifier, it takes additional work to locate a specific inspection record. When other offices assist, he reviews the PTRS entries to look at their findings. Many times inspectors will call and ask if specific areas need to be reviewed.

Mr. Pritchard has not noted any problems with the oversight of Air Methods. He was not aware of any specific corrective actions for the operator, but was aware of enforcement and letters of investigation that were underway. Mr. Pritchard stated that Air Methods is proactive about problems that are identified.

3.0 Section 3. Overview of Helicopter Services International and FAA Oversight

3.1 Overview of Helicopter Services of Nevada

Helicopter Services of Nevada LLC was designated by the FAA as a domestic repair station under Title 14 CFR 145.53[20], repair station certificate number KBMR477F. In the limitations sections of the operations specifications, it stated that Helicopter Services of Nevada was authorized to "Perform levels 1, 2, and 3 maintenance functions in accordance with the manufacturer's maintenance program and maintenance instructions. To include removal and installation of power plant, rigging of fuel control unit and power turbine generators." The company organization of Helicopter Services of Nevada is shown in Figure 14.

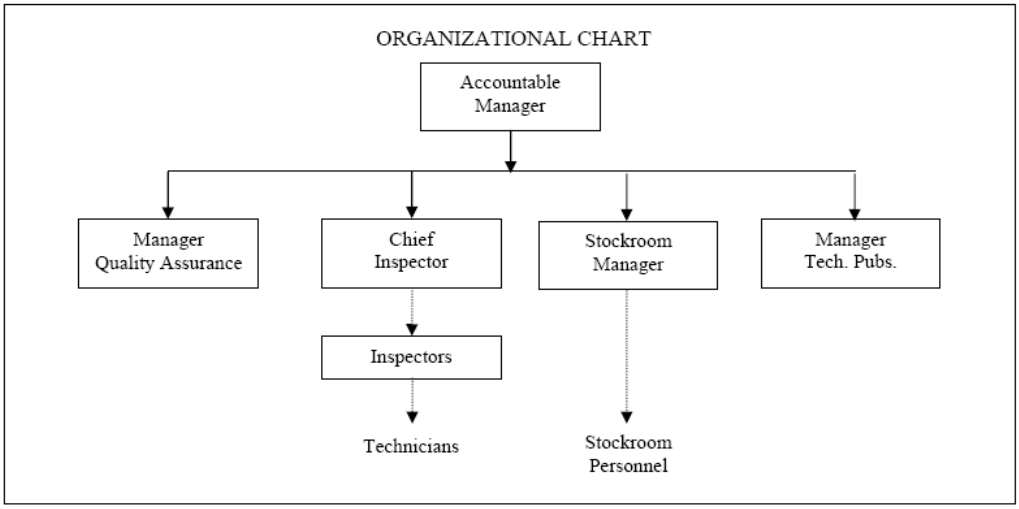


Figure 14. Helicopter Services of Nevada Organizational Chart

[20] 145.53 - Issue of certificate.
(a) Except as provided in paragraph (b), (c), or (d) of this section, a person who meets the requirements of this part is entitled to a repair station certificate with appropriate ratings prescribing such operations specifications and limitations as are necessary in the interest of safety.
(b) If the person is located in a country with which the United States has a bilateral aviation safety agreement, the FAA may find that the person meets the requirements of this part based on a certification from the civil aviation authority of that country. This certification must be made in accordance with implementation procedures signed by the Administrator or the Administrator's designee.
(c) Before a repair station certificate can be issued for a repair station that is located within the United States, the applicant shall certify in writing that all hazmat employees (see 49 CFR 171.8) for the repair station, its contractors, or subcontractors are trained as required in 49 CFR part 172 subpart H.
(d) Before a repair station certificate can be issued for a repair station that is located outside the United States, the applicant shall certify in writing that all employees for the repair station, its contractors, or subcontractors performing a job function concerning the transport of dangerous goods (hazardous material) are trained as outlined in the most current edition of the International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air. [Doc. No. FAA200315085, 70 FR 58831, Oct. 7, 2005]

According to the FAA approved operations specifications effective at the time of the accident, in section A004. Summary of Special Authorizations and Limitations, it stated the following:

> The certificate holder is *not authorized* and *shall not:*
>
> Perform work, including continuous operations, at additional locations other than at a primary fixed location.

On November 4, 2010, the operations specifications were changed and stated the following:

> The certificate holder, in accordance with the reference paragraphs, is authorized to:
>
> Perform work, excluding continuous operations, at additional locations other than at its primary Fixed Location.

According to FAA Order 8900.1, when providing surveillance of a 14 CFR part 145 repair station that performs aircraft maintenance away from its fixed location, the following circumstances apply:

A. **Special Circumstances.** When a special circumstance arises that allows work to be done away from the repair station on a temporary basis.
   1) Temporary Basis—Short Term. When a special circumstance arises such as a blown tire, radio, or navigation equipment changes, etc.
   2) Temporary Basis—Extended. When the repair or alteration requires the repair station to make repairs or alterations over an extended period, e.g., the aircraft is in for extended maintenance and an interior shop is requested to install a new interior at that location.
B. **Recurring Basis.** When it is necessary to perform such work on a recurring basis[21] with operations specification (OpSpec) D100 authority.

The order notes, "The circumstances in subparagraphs A1) and A2) require the repair station to submit a request to the principal inspector (PI) for evaluation on a case by case basis, except for emergency short term work when the repair station has a procedure in its manual. In this case, the repair station only needs to notify the PI in accordance with the procedure."

In a later interview with the PMI, he reported that in 2008, he removed Helicopter Services of Nevada's authorization to perform work away from their permanent station on a continuous basis. He indicated that he also verbally requested that the Repair Station Manual be updated to reflect this change. However, the manual was not changed and the PMI did not follow up on the request, nor did he log it in an FAA tracking system. The PMI indicated that Helicopter Services of Nevada was authorized to perform maintenance on a temporary basis at additional locations, but was not authorized to perform maintenance at outside locations on a recurring basis. The PMI indicated that a recurring basis would be defined as performing the same maintenance at the

[21] The FAA does not define "recurring" basis.

same location for the same company three or more times per month.[22] He was uncertain if Helicopter Services of Nevada exceeded this limit.

Review of Air Methods work orders from July 2009 to July 2010 for work performed by Helicopter Services of Nevada showed that 26 work orders had been created. Of those, 19 were performed at Air Methods' facilities, 2 were performed at Helicopter Services of Nevada facilities, and 5 locations were unknown.

According to the owner of Helicopter Services of Nevada, the removal of the authorization to "Perform work, excluding continuous operations, at additional locations other than at its primary Fixed Location" was a clerical error by the FAA. Additionally, the owner did not identify the change when signing page A004 of the Helicopter Services of Nevada operations specifications.

Helicopter Services of Nevada was designated as a Turbomeca Service Center. As a Service Center, they provided levels 1, 2, and 3, maintenance service, parts, and tools[23]. The Turbomeca Service Center technicians complete a Turbomeca-designed checklist and engine build form when performing field maintenance. Turbomeca does not require its outside service centers to document their work with the forms, and they are allowed to develop their own forms to document the work. The Turbomeca forms are included as an attachment to this report. Helicopter Services of Nevada developed their own work order forms and checklists that were completed when work items were accomplished. The Helicopter Services of Nevada forms are included as an attachment to this report.

3.1.1 Forms

3.1.1.1 Helicopter Services of Nevada Forms

In interviews with mechanic Wayne Young, he reported that when an in-house inspection is performed, FAA 8130-3 form[24], the work order package form, as well as a final inspection are completed. He reported that when mechanics are working in the field, they do not complete an 8130-3 form, and do not do the thorough inspections and paperwork that occurs when engines come into the repair station due to the specific nature of the field work items requested.

3.1.2 Field Procedures

3.1.2.1 Repair Station Manual Excerpts

3.1.2.1.1.1 Work Performed at a Location Other than a Fixed Location[25]

[22] There is no specific FAA guidance defining "recurring" basis.
[23] http://www.turbomeca-usa.com/our-locations/service-centers.html
[24] FAA Form 8130-3 is an "Airworthiness Approval Tag" and air agencies certificated under part 145 with a continuous airworthiness maintenance program are authorized to perform the approval function for a product that has been maintained or altered under part 43.
[25] According to the PMI, Section 1.6 of the Repair Station Manual is one that he requested be removed after he removed their authorization to work away from their fixed location.

In Section 1.6 of the Repair Station Manual, it stated that "Helicopter Services of Nevada will perform work away from its fixed location on a recurring basis. This work will be performed under the procedures set forth in this manual."

Only the Accountable Manager or Chief Inspector may initiate the forms associated with performing work at a location other than the repair station. It should be noted, however, that the Work Order Package may be initiated and completed after the maintenance has been accomplished, and will include only those forms applicable to the job work scope. The work scope shall be limited to those maintenance or inspection actions that can be accomplished with personnel, equipment, material, tooling, and technical data that can be transported to or are available where the maintenance will be performed. Therefore, upon initiation of a request for off-location work, the Accountable Manager or Chief Inspector shall request that the customer provide as detailed a description as possible of the discrepancy(ies), as well as the location of the article. This information shall be recorded along with a list of the required personnel, equipment, tooling, and data needed to accomplish the anticipated work scope.

Only technicians specifically familiar with and capable of performing the work scope anticipated shall be assigned to perform the maintenance requested. The Accountable Manager or Chief Inspector will assign the technicians. The Accountable Manager or Chief Inspector shall ensure that the personnel, equipment, tooling, and data necessary to accomplish the requested work scope (including the pertinent sections of this manual) are made available to the technicians. The Accountable Manager or Chief Inspector shall ensure that there is adequate and continual communication between the technicians in the field and the repair station.

Upon arrival, the technicians shall determine that the location where the work is to be performed is safe and protected from the elements as required by the applicable maintenance data. The exact location of where the work is actually performed shall be documented. If any equipment is used during maintenance other than that originally listed by the Accountable Manager or Chief Inspector, the technicians will record the use of that equipment by listing that equipment by nomenclature, type, manufacturer, and date of last calibration, as applicable.

Documentation of the work performed may be recorded in the aircraft and/or propeller log in accordance with 14 C.F.R. § 43.9. However, a record of the work performed shall also be entered for inclusion into the Work Order Package, which will be generated, to the extent necessary, in accordance with the procedures outlined in this manual. Normally, a Form 8130-3 will not be generated for work performed at a location other than the repair station. However, if a Form 8130-3 is generated, it will be completed as outlined in this manual.

Any article or part thereof removed from the outside location and transported to the repair station for a more complete work scope shall be routed through the repair station in accordance with the procedures set forth in this manual.

3.1.2.1.1.2 Final Inspection and Approval for Return to Service[26]

Before generating FAA Form 8130–3, or logbook entry, the appropriately qualified and certified person (see repair station roster) shall inspect the article and audit the work order package to determine whether—
• The work was accomplished in accordance with the work scope requested by the customer.
• Each task has been accomplished or determined to be nonapplicable to the work scope requested and the technician's signature or initials indicate that the task has been accomplished on the appropriate work order package document.
• Each inspection required by the work order package has been satisfactorily completed and recorded on the applicable document.
• Any discrepancies shall be handled in accordance with this manual.
Once the final inspection is complete, an appropriate description of the work performed shall be entered in Articles Logbook or is applicable; FAA Form 8130–3 and a person authorized and listed on the repair station roster to approve articles for return to service for the repair station shall sign the logbook entry, or FAA Form 8130-3. The logbook entry or FAA Form 8130-3 shall clearly state the general scope of work performed, and reference the principal documents used to perform the work. Procedures for completing the FAA Form 8130-3 is documented in the manual labeled "HSN FAA Forms & Tags" Remarks: An Airworthiness Directive may apply to the article(s) described here on. The installer is responsible for ensuring complete compliance with any applicable Airworthiness Directives.

The customer will receive the original FAA Form 8130–3, and if specifically requested a signed copy of the work order package documents. If a major alteration has been accomplished, the customer will be supplied with FAA Form 337. For major repairs, a Form 337 will be completed if requested by the customer. Otherwise, all information will be included in the Work Order package. (For additional information concerning Major Repairs and Major Alterations, the appropriate section of this manual.)

3.1.2.1.1.3 Process for Ensuring Continuity of Inspection Responsibility[27]

Inspections are a continuous process from receiving inspection through the various stages of repair or alteration until the final inspection prior to approval of the work for return to service. The in-process inspections will be performed in accordance with the manufacturer's recommendations or in accordance with the customer's program, as appropriate. In addition, as work progresses on a specific item, inspections will be made as necessary so that final inspection to determine airworthiness will not require disassembly. It will be the responsibility of the inspector approving the work on the article for return to service to determine through a review of the documentation, or through observation or inspection that all required inspections have been completed. No

[26] Repair Station Manual Section 7.1.8
[27] Repair Station Manual Section 7.1.9

article may have any additional work performed on it following an in-process inspection until all discrepancies noted during the inspection have been corrected. When the customer requests a specifically limited work scope, and the preliminary or in-process inspection indicates discrepancies which do not affect the completion of the limited work scope, the final inspection and approval for return to service will be limited to the particular work performed.

To ensure continuity of inspection, no maintenance or alteration may be accomplished following any item needing an in-process inspection until the inspection has been accomplished and the results found acceptable as evidenced by the inspector's stamp, initials or signature.

The repair station will perform work steps in sequence. If work out of sequence is contemplated, an appropriate review will be made to ensure that the airworthiness of the article will not be affected.

3.1.2.1.1.4 Equipment, Materials, and Technical Data[28]

All equipment, materials, and technical data needed for the work Helicopter Services of Nevada LLC performs will be available where the work is accomplished and be under the repair station's control when the work is being performed. The equipment used to make airworthiness determinations will be calibrated according to the procedures described below.

Helicopter Services of Nevada LLC will ensure it has accessible at least the following current technical data pertaining to the performance of any work under the Repair Station Certificate:
- Airworthiness directives,
- Instructions for continued airworthiness,
- Maintenance manuals,
- Overhaul manuals,
- Standard practice manuals, and
- Service bulletins.

Whenever a manufacturer updates its manual, the corresponding acknowledgment form will be placed in the manual to verify its currency. The technical data will be updated in accordance with the manufacturer's instructions.

Whenever a new article is introduced for maintenance, preventive maintenance or alteration, the Technical Publications Manager will ensure the currency of the technical information required to perform the work.

[28] Repair Station Manual Section 7.2

In addition, Helicopter Services of Nevada LLC will use those equipment, materials, and tools recommended by the manufacturer of the articles or equipment, materials, and tools equivalent to those suggested by the manufacturer. It is the responsibility of the Manager of Quality Assurance to determine equivalency and document that determination. When an equivalent equipment, material or tool is contemplated, a file will be created. Equivalency of equipment and tooling will be determined by reviewing in detail the manufacturer's recommendation and thereafter performing a comparative analysis of the specific usage for the equipment, material or tool. The evaluation will include a review of the maintenance manual to determine the exact requirements of the equipment, material or tool. Appropriate sections of the manual will be copied and made part of the equipment, material or tool file. Additionally, the specific function of the equipment, material or tool will be noted, i.e. the technical requirements of the material, the parameters of the test, the expectations of the work to be performed by the tools or equipment. The file will also contain the appropriate drawings and specifications that define the configuration, the type of material and specific dimensions of the substitute material, tool or equipment.

The tools and equipment used by the repair station are available for review by the FAA personnel. A list of calibrated tools and equipment are kept as delineated elsewhere in this manual.

The material required to perform maintenance, preventive maintenance or alteration is ordered as appropriate by the Stockroom Manager. Material is requisitioned from the stockroom to a particular job as needed to complete the work in an airworthy manner. No work is commenced, continued or completed without appropriate materials being used.

With respect to substitution of material (which includes raw material and parts), equivalency will be determined by the usage of the article and whether the substitute will return the article worked on to at least its original or properly altered condition. A file will be created delineating the original material or part recommendation along with the technical information necessary to determine equivalency.

3.2 FAA Oversight

3.2.1 National Flight Standards Work Program Guidelines

Oversight of the Helicopter Services of Nevada (KBMR) FAR Part 145 repair station operating certificate is conducted by two inspectors based at the Las Vegas Flight Standards District Office in Las Vegas, Nevada. Similar to Air Methods, the FAA oversight of Helicopter Services of Nevada is accomplished through the National Program Guidelines and consists of R-items, P-items, and special inspections as required.

3.2.2 FAA Inspector Interviews

3.2.2.1 Principal Maintenance Inspector (PMI)

Mr. Charlie Bierman is the PMI for Helicopter Services of Nevada. He was interviewed on September 16, 2010, via telephone. He was represented by FAA Attorney David Wiegand. The interview was not recorded but a written summary is included as an attachment to this report.

Mr. Bierman began airframe and powerplant school in 1974. He worked in general aviation for 10 years. He later worked at a Part 145 repair station on Bell Helicopters. He then worked at Beechcraft as a technical representative for 18 years. In September 1998, the FAA hired him. After undergoing 2 years of training, he began work as the PMI for tour operators in the Grand Canyon and several Part 145 operators. He has not had any Eurocopter or Turbomeca specific training in his work history, or while employed by the FAA. Due to his oversight of tour operators that operate Eurocopter helicopters, he has had experience with the Turbomeca technical representative (Mr. Wayne Young) reviewing the helicopter and learning the components. He also attended the 2-week course on rotorcraft accident investigation provided by the FAA. The PMI was assigned to Helicopter Services of Nevada in October of 2009.

Mr. Bierman's workload consists of 6 Part 135 operators, 4 Part 145 repair stations, and various on-demand duties. The PMI described his workload as tedious and sometimes overwhelming, although he indicated that he always had the time and resources to complete the work he is required to.

Mr. Bierman stated that his job function is to provide surveillance over the operator and to evaluate their compliance with Federal Aviation Regulations This includes reviewing work orders, training program, and their facility for the rating it holds. The work program is provided to the PMI from FAA headquarters and includes required (R) items. He is responsible for completing all of the R-items, and develops planned (P) items, dependent upon the previous year's activity. He indicated that usually Part 145 repair stations have 12-14 R-items. For Fiscal Year 2010, Helicopter Services of Nevada had 5 R-items and 1 P-item. All items were completed.

Mr. Bierman described Helicopter Services of Nevada as a very compliant company. Whenever problems are identified, they make changes immediately. Mr. Bierman interacts with the Accountable Manager, Mr. David Lok, who he believes is very knowledgeable about helicopters and repair station requirements. He does not oversee any of the remote work that is performed, nor is it required to oversee that work. He stated that he was not aware of any recent corrective actions, letters of investigation, or enforcement actions.

3.2.2.1 Principal Avionics Inspector (PAI)

Mr. Steven Biglin is the PAI for the Helicopter Services of Nevada. He was interviewed on September 16, 2010, via telephone. He was represented by FAA Attorney David Wiegand. The interview was not recorded but a written summary is included as an attachment to this report.

Mr. Biglin began his aviation career in the United States Air Force as an F15 egress mechanic. He was later employed at Raytheon AIS where he worked on a variety of military helicopters. From 2000-2007, he worked as the Avionics Manager for General Dynamics. In 2007, he came

to the FAA as an avionics inspector. He had not had any Eurocopter or Turbomeca specific training in his employment background, or since he had come onboard with the FAA.

In March 2009, he began as the PAI for Helicopter Services of Nevada. He currently oversees 15 Part 135 operators, 10 repair stations, and is required to do on-demand work such as accident duty. Mr. Biglin described his workload as busy, but indicated that he was able to perform his job duties.

Mr. Biglin stated that each fiscal year, the work program for Helicopter Services of Nevada is provided by FAA headquarters that are required inspection items (R). Planned items (P) are developed by the PAI dependent upon the previous year's activities. He and the PMI design a schedule to determine how they will complete the required and planned items throughout the year. R-items are required inspection items, and P-items are planned inspection items completed based on workload.

All R and P-items were completed for Helicopter Services of Nevada for fiscal year 2010. Occasionally, they will be required to conduct follow up inspections. When asked to provide an estimate of the number of required items that he completed for Helicopter Services of Nevada,Mr. Biglin indicated that usually repair stations have seven to eight each fiscal year. In Fiscal Year 2010, all required and planned inspection items were completed for Helicopter Services of Nevada. Helicopter Services of Nevada had 7 R-items and 1 P-item for the year.

Mr. Biglin stated that he primarily interacts with the Accountable Manager, Mr. David Lok, and the avionics technician that they have on staff. The PAI described the work culture as "very good" with "good business and safety culture." The PAI stated that he does not inspect any of the work that is completed remotely, nor is it a requirement.

Mr. Biglin said that currently, the operator was doing manual revisions, which is a common procedure. Most of the corrective actions for Helicopter Services of Nevada relate to on-the-spot corrections. Mr. Biglin is not aware of any recent letters of investigation or any enforcement actions.