

Turbomeca On Site Examination Report

Submitted By:		Approved By:	
DVO/TEA	Date: 19MAR15		Date:

NTSB Reference:

CEN15FA171

TM USA Reference:

(A-2015-003)

TM FR Reference:

(RA/2015/063)

Event Date/Time:

(12MAR2015) /(2325CST)

Event Location:

(EUFAULA, OK, USA)

Operator:

Eagle Med LLC

Aircraft Type:

AS350B2

Aircraft S/N:

4113

Aircraft Registration:

N919EM

Engine

0292005220

Variant:

Arriel 1D1

Engine S/N:

19080



Accident Site Photo

Date(s) of On Site Investigation:

Arrive:

13MAR15

Depart:

15MAR15

Turbomeca On Site Examination Report

Participants

Company / Agency	Role	Comments
1. NTSB	IIC	
2. FAA	AVP100 ASI	
3. FAA	FSDO ASI	
4. Eagle Med	Director of Safety	
5. Eagle Med	Asst Director of Maintenance	
6. Eagle Med	Regional Aviation Manager	
7. DOT TSI	Instructor	
8. Airbus Helicopters	ASI	
9. Turbomeca USA	ASI	
10.		
11.		
12.		
13.		
14.		

Turbomeca On Site Examination Report

Circumstances reported to Turbomeca:

During a night flight, the aircraft crashed in unknown circumstances.

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Turbomeca On Site Examination Report

Engine Information



Engine as found with no blade shedding encountered

Engine # 1 Variant	Arriel 1D1
Part Number	0292005220
Serial Number	19080
Time since new (TSN)	1932.5
Time since overhaul (TSO)	N/A
NG Cycles since new (NGCC)	3034.30
NTL Cycles since new (NTLCC)	3882.00
NG Cycles since overhaul	N/A
NTL Cycles since overhaul	N/A

Turbomeca On Site Examination Report

Engine Information

Engine

Module	Part Number	Serial Number	TSN	TSO	NGCC / NTLCC
Module 1	70BMO15420	10093	1932.5	N/A	
Module 2	70BMO25020	4007	1932.5	N/A	
Module 3	70BMO35420	10199	1932.5	N/A	3034.30 /
Module 4	70BMO45410	10542	1932.5	N/A	/ 3882.00
Module 5	70BMO55420	10232	1932.5	N/A	
FCU / HMU	0164548250	A151B	1932.5	N/A	

Turbomeca On Site Examination Report

Arriel 1D1 Technical Information

The ARRIEL 1D1 is a turboshaft engine with a free turbine which drives an output shaft via a reduction gear.

The free turbine has a constant speed of 41,586 rpm or 6,000 rpm for the output pinion of the reduction gear.

Rotational direction, seen from the rear of the engine is:

- Counter-clockwise for the gas generator,
- Clockwise for the free turbine and the output pinion of the reduction gear.

The turboshaft engine is supplied with all its equipment for immediate installation and operation on the helicopter. It includes:

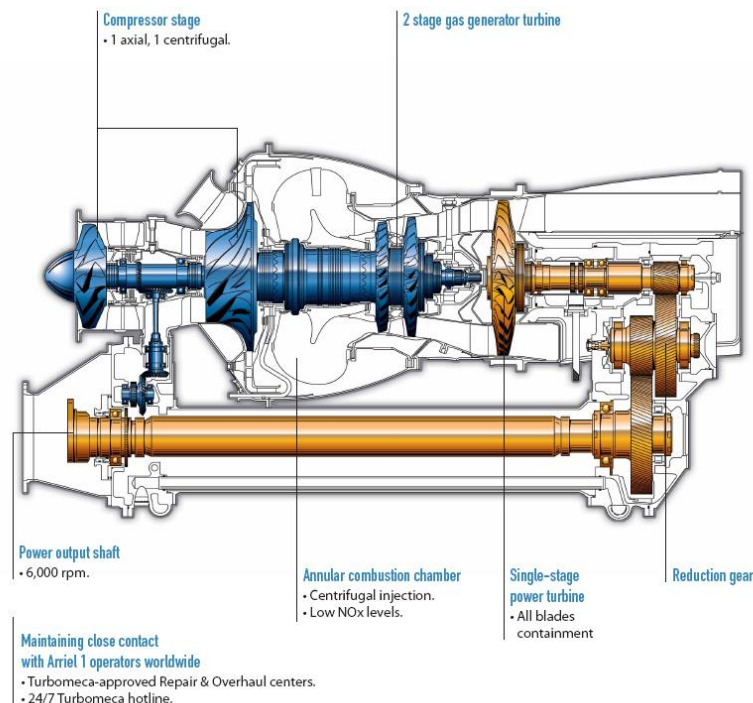
- The start and control devices (without the starter-generator),
- The lubrication system (without the tank and the oil cooler),
- The indicating and operation devices.

The maximum mass of the turboshaft engine supplied by TURBOMECA is: less than 123 kg

Minimum performances (on test bed, without air bleed).

Operational ratings	Power in kW	Specific consumption g/kW.h
Take-off rating	531 *	-
Max. continuous rating	466	-
Cruise rating		390

* The mechanical power was limited to these values although the engine is capable of values higher.



Turbomeca On Site Examination Report

Engine On Site Examination

Narrative of On Site Engine Examination:

The engine as found was partially separated from the airframe and sustained impact damage on the turbine case, linking tube, and exhaust pipe.

The axial compressor showed FOD damage on several blades and the gas generator could be turned by hand. The nose cone showed rotational scarring.

The free turbine could not be seen due to the crushed exhaust pipe, however the freewheel shaft could be turned by hand to confirm continuity through the reduction gearbox to the free turbine. Proper freewheel operation was confirmed.

All fuel, oil, and air connections were found installed with the proper safety wire.

The helicopter and engine were recovered to Air Salvage of Dallas where a engine exam will be conducted to inspect the input pinion alignment mark and any other items of interest to the investigation party.

Turbomeca On Site Examination Report

Engine On Site Examination

Narrative of On Site Engine Examination Continued:

24MAR15 : Recovered aircraft was examined at Air Salvage of Dallas.

Continuity was confirmed from the gas generator through the accessory gearbox.

The exhaust pipe had to be cut off in order to remove the module 5 reduction gearbox.

The input pinion alignment mark showed a misalignment of 1.5mm in the overtorquing direction consistent with the engine producing power at the time of a main rotor blade strike.

The NTSB retained the wreckage in the event any further examination is deemed necessary.

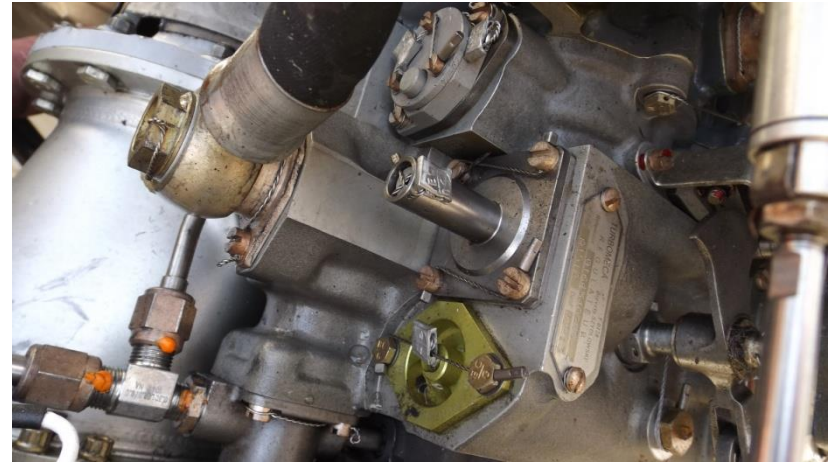
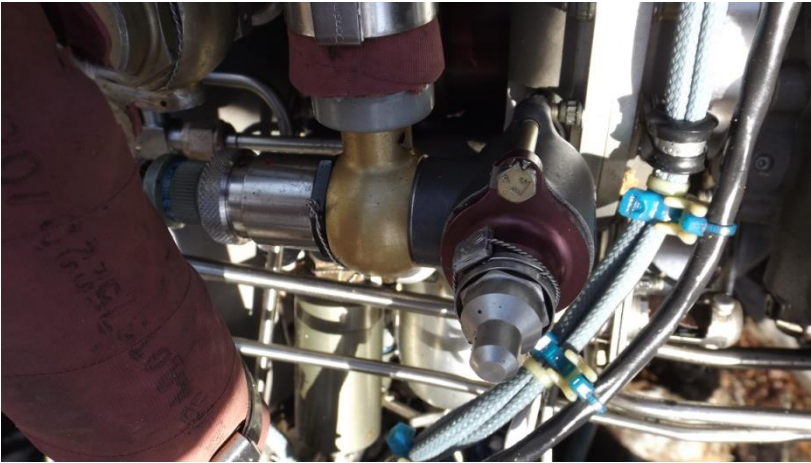
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Overall Engine



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Engine Fuel and Oil Connections



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Engine Electrical Connections



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Engine Axial Compressor with rotational scarring and FOD



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Engine Power shaft / Freewheel Output



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Engine Tail Rotor Drive Coupling



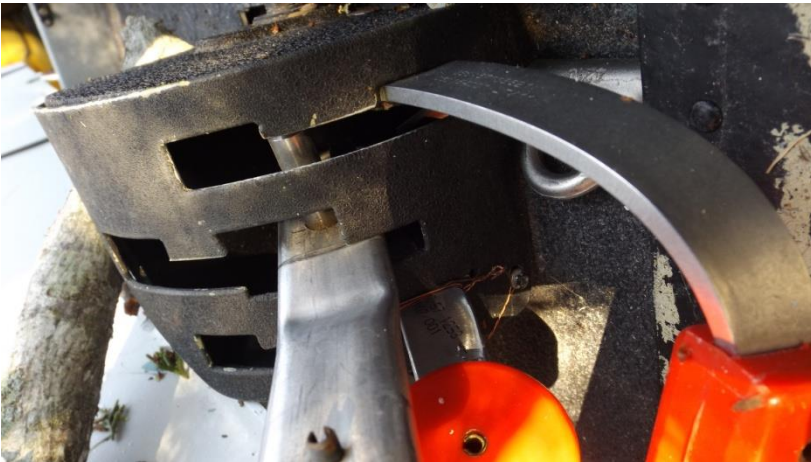
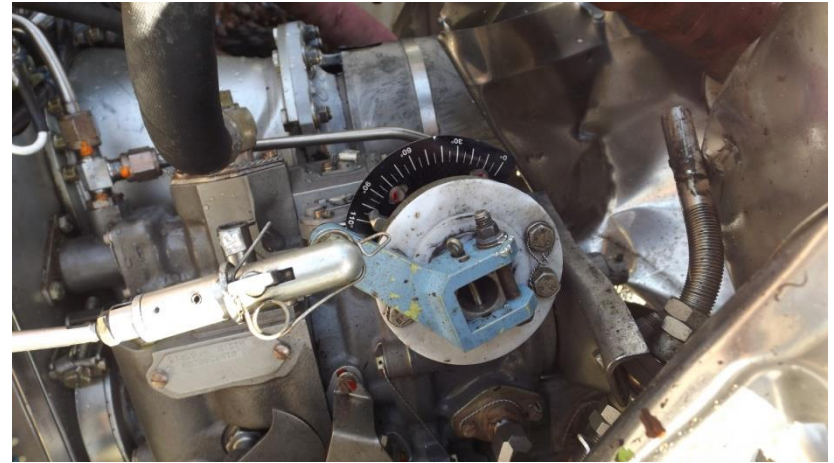
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Engine/Transmission Shaft



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Engine Rigging / Throttle Positions



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Bellmouth showing contact with rotating axial



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Main rotor blade



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Linking tube impacts at rear mount attachment points



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Emergency fuel cutoff (arm broken in off position)



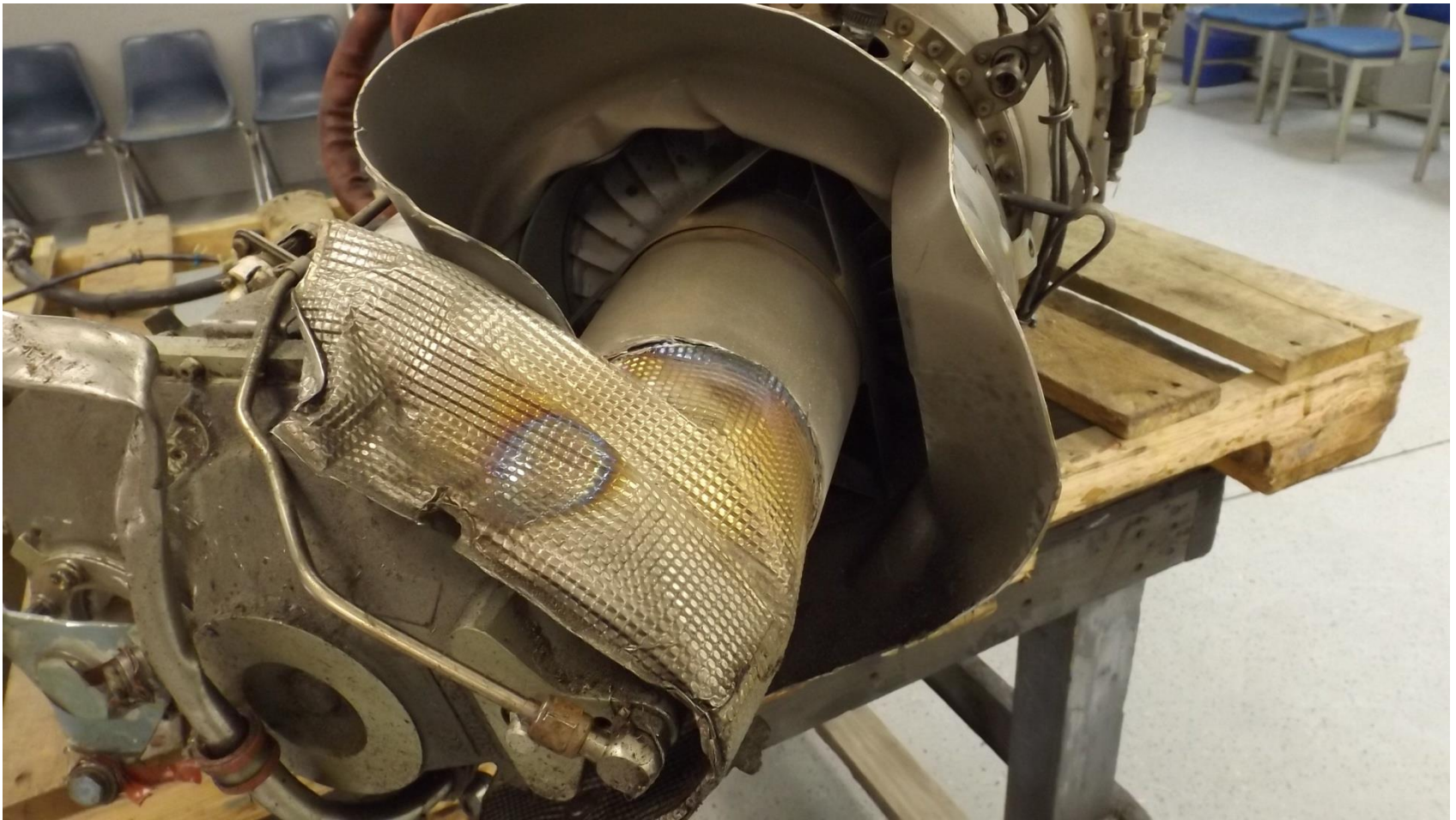
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Engine at salvage yard



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Exhaust pipe removed



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Input pinion mark with measuring tool



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Additional Information Flight

Flight Originated From:	Tulsa St Francis Hospital 4OK3
Departure Time:	2253 Local
Flight Time Prior to Occurrence:	32 Minutes
Purpose of Flight:	Repositioning back to home base
Flight Plan Filed:	no
Part 91 or 135:	135
VFR or IFR:	VFR encountering IIMC (according to witness interview)
NGV:	No
Last Refueling Point:	Unknown
Amount Of Fuel Received:	Unknown
Gross Weight at Takeoff:	Unknown
Terrain at Accident Site:	Heavily treed and rocky upward slope.