National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: ERA09FA419	Aircraft Registration Number: N974BW
Occurrence Date: 07/17/2009	Most Critical Injury: Fatal
Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Camp Butler			0830	UTC	

Airport Proximity: Off Airport/Airstrip

Distance From Landing Facility:

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
MD HELICOPTER INC	530 (369FF)	Helicopter

Revenue Sightseeing Flight: No

Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

*** Note: NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this aircraft accident report. ***

HISTORY OF FLIGHT

On July 17, 2009, about 0830 coordinated universal time (1130 local time), an MD Helicopters MD-530 (369FF), N974BW, operated by Presidential Airways, Inc., was destroyed when it impacted terrain at Camp Butler, about 20 miles east of Baghdad, Iraq. The copilot and the left door gunner were fatally injured, while the pilot in command (PIC) and the right door gunner were seriously injured. The right door gunner subsequently succumbed to his injuries on February 8, 2010. The aerial gunnery training flight was operating on a company flight plan under military training range regulations.

Under the provisions of Annex 13 to the Convention on International Civil Aviation, and by mutual agreement, the Iraqi government delegated the investigation to the United States. The Iraq Civil Aviation Authority designated an accredited representative to the investigation on behalf of the government of Iraq.

According to the PIC, his was one of two helicopters that had arrived at Camp Butler from Baghdad, each with two pilots and two door gunners onboard. Crewmembers of the other helicopter reported that the accident helicopter first landed at the range to provide a radio to range personnel, while the second helicopter loitered to the south. After the radio transfer, both helicopters proceeded to the range, and conducted a "range sweep." Both helicopters subsequently completed firing runs, and while the accident helicopter was conducting additional training, the second helicopter was orbiting off range, to the south, and none of its crewmembers saw the accident.

During a telephone interview, the PIC of the accident helicopter stated that the gunnery range included an east-west track, approximately 1 mile long, with four targets just to the north of the track and three targets just to the south of it. Each target would be engaged as it came into range, with fire coming from both sides of the helicopter. After engaging all of the targets along the track, the helicopter would reverse course and commence another firing run.

The PIC also noted that a total of eight tracks were flown prior to the accident, four in each direction. The first two tracks were flown at 60 knots, the second two at 70 knots, the third two at 90 knots, and during the last two tracks, the helicopter decelerated as it approached each target. All of the eastbound tracks were flown by the copilot, and all the westbound tracks were flown by the PIC. After the completion of each track, the pilots transferred control of the helicopter, and the new pilot at the controls would execute the course reversal.

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Narrative (Continued)

In regards to the accident sequence, the PIC recalled that after the copilot had completed the final eastbound track, he transferred the controls to the PIC. The PIC, seated in the right seat, then began a left-turning course reversal at an altitude approximately 100 feet above the ground. The next thing the PIC remembered was that, while in the turn, and “like a hazy dream,” he saw the copilot’s finger moving toward the instrument panel, and after that, “being dragged, shaken, and bumped along the ground.”

In a subsequent response to written questions, the PIC stated that he believed the copilot was directing his attention to "a situation of decaying rotor and/or engine rpm...which would have been associated with a rapid nose tuck [and] rapid loss of altitude."

When asked if he had flown the training profiles previously, the PIC responded that he had done so many times. Firing range training was normally scheduled once a week, and would have been completed each week "unless something else came up." The PIC also noted that in the almost 2 years he had been there, the tactics had been modified “very little.”

The PIC further recalled that a “pretty standard” preflight briefing had been conducted, with both flight crews present, and which included actual threats (low), weather (good), and temperatures (in the low 100s - normal for that time of year). The briefing also included the routes to be flown, training elements to be performed, actions in the event of hostile contact, and downed aircraft recovery procedures.

When asked about engine power checks, the PIC noted that military-type “HIT” checks were not conducted prior to each flight of the day; however, hover power checks were completed prior to all takeoffs. The PIC subsequently calculated the density altitude to be approximately 3,100 feet at the time of the accident.

When asked how the helicopter was operating, the PIC stated that although he had a “very hazy gray recollection,” as far as he could recall, the helicopter was operating "properly," with no warnings, cautions, or changes in sound. He also noted that even though the copilot appeared to be pointing at something, the copilot did not speak or otherwise indicate that anything was wrong.

According to the father of the door gunner who initially survived, his son did not recollect anything about the accident.

Neither the PIC, nor any other witness, indicated that hostile fire was present about the time of the accident.

PILOT INFORMATION

The PIC, age 62, held an airline transport pilot certificate with airplane single engine land, and rotorcraft-helicopter ratings. He also had commercial pilot privileges for airplane multi-engine land, and held a flight instructor certificate for airplane single and multi-engine, rotorcraft-helicopter, and instrument airplane and helicopter. According to the operator, the PIC had accrued 18,600 total flight hours, with 6,500 flight hours in make and model. Operator records indicated that the PIC had flown 66 hours within the preceding 90 days, but had not flown within the previous 30 days.

The PIC's latest FAA second class medical certificate was issued on January 6, 2009.

The PIC stated that he had accrued about 19,000 hours of flight time during a 41-year period, and never previously had an accident, incident or violation. He further noted that the copilot and both gunners were ex-military and very experienced. In addition, he noted that crews were assigned together on a random basis, and that he had flown with the copilot "approximately four times previously."

The copilot, age 42, held a commercial pilot certificate with rotorcraft-helicopter, and instrument helicopter ratings. He also had private pilot privileges for airplane single engine land and instrument airplane.

Narrative (Continued)

The operator did not provide the copilot's total flight experience; however, on his application for his latest FAA Second Class Medical Certificate, dated December 5, 2008, the copilot indicated 6,275 hours of total flight time. Operator flight records indicated that the copilot had flown 15 hours within the preceding 30 days.

AIRCRAFT INFORMATION

The helicopter was powered by a single Rolls Royce 250-C30 engine, capable of 650 shaft horsepower (shp) with 425 shp usable at takeoff. The operator reported 2,662 hours of airframe time, and 1,148 hours of engine time since overhaul. The helicopter's latest annual inspection occurred on May 25, 2009.

WEATHER INFORMATION

According to the operator, the 0900 weather observation at Baghdad included clear skies, with no restrictions to visibility, winds from 340 degrees at 15, gusting to 25 knots. No turbulence, temperature 38 degrees C, and an altimeter setting of 29.75 inches Hg.

WRECKAGE INFORMATION

A description of the accident scene was provided in a draft (no final was produced) U.S. State Department, Diplomatic Security Service Memorandum Report of Investigation:

"It appeared as though the aircraft was traveling in a westward direction upon impact. The first point of impact appears to be…on the east edge of the dried-up pond; the pond stretches 17 meters from west to east. The initial point of impact appear to show disturbance in the dirt where the two skids (right and left) impacted the edge of the pond; approximately 1 meter east from the impact of the skids is a disturbance in the dirt which clearly shows feathering on the dirt, indicative of the spinning tail rotor making contact with the ground. The second point of impact appears on the west edge of the same dried up pond. No impacts were found within the pond itself though some large pieces of debris were found between point of impact one and two. Distance between point of impact one and the eventual resting point of the bulk of the fuselage is approximately 44 meters. South of the fuselage approximately 20 meters is the remains of the tail boom. East of the tail boom approximately 24 meters is the remains of the tail rotor."

The draft Memorandum also noted that, according to a person in the area at the time, it was "extremely unlikely" that any hostile action caused the accident. The perimeter was maintained by U.S. and Iraq Army personnel, the terrain was flat and expansive, and was treated as an active firing range.

According to contacts in Iraq, to protect the helicopter wreckage, it was loaded into a secure storage container at Camp Butler on the day of the accident. It was subsequently trucked, still in the storage container, to secure storage in Baghdad. The wreckage was eventually shipped to the United States, and arrived at Anglin Aircraft Recovery Services, LLC, Clayton, Delaware, in late January, 2010.

On February 17, 2010, the wreckage was examined with NTSB participation. The wreckage was removed from the sealed storage container and laid out for examination. The fuselage had been mostly consumed by fire. The tail boom exhibited fire damage at the point it where it was separated from the main fuselage. There was another separation of the tail boom, with mechanical twisting and crushing consistent with main rotor blade strikes, about 2 feet forward of the vertical stabilizer.

The left landing gear was separated, with fractures of the fore and aft gear struts consistent with overstress. The right landing gear, displaying contact and thermal damage, was still attached to the airframe.

The cockpit was destroyed, and exhibited thermal and impact damage. The aft compartment was completely consumed by fire with few parts readily identifiable except for the steel components of the transmission support frame that formed the aft compartment ceiling.

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Flight control continuity from the cockpit to the control surfaces could not be determined due to thermal and impact damage. However, there was continuity at the tail rotor pitch change mechanism when the tail rotor bell crank was moved by hand.

Drive train continuity could also not be confirmed due to thermal and impact damage, except at the aft portion of the tail rotor drive at the tail rotor gearbox. The transmission case was melted but still attached to the underside of the support frame. The static mast was still connected to the transmission support frame and the main rotor hub was still mounted on the mast.

The main rotor hub exhibited thermal damage to most components. Four of the five pitch change housings were fractured. Four feather bearings were still in place. There were varying degrees of contact damage to lead lag links dampers droop stop ring and rollers, consistent with flailing main rotor blades at operational rpm.

All of the main rotor blade spars were bent aft and exhibited trailing edge separation. One blade was fractured and separated just outboard of the root doubler. The remaining four blades were still attached to the hub, but separated at the blade root doubler, and exhibited thermal damage. The separated blade exhibited damage consistent with main rotor blade strikes to the ground and tail boom at operational rpm.

The tail rotor blades exhibited impact damage just outboard of the root fitting. One blade was completely separated, with the other blade bent aft and partially separated. Skin wrinkling and trailing edge damage was evident on both blades. The tail rotor gear box housing was fractured at the output gear. All damage was consistent with presence of power at impact.

The engine exhibited thermal and impact forces, and was coated in soot and sand. The engine mounts were all fractured in overload. The exhaust duct was crushed against the engine, and most pneumatic, fuel and oil lines were crushed or destroyed.

One compressor blade was bent in the direction opposite rotation, and the leading edges of all blades exhibited a fine coating or either sand or soot. The compressor could only be rotated about 90 degrees, but the rotation was smooth and quiet.

The magnetic chip detectors were free of ferrous material.

The exhaust stack was removed, and examination of the No. 4 turbine revealed no evidence of failure or operational damage.

The annunciator panel was recovered and subsequently hand-carried to the NSTB Materials Laboratory to determine if there was evidence of stretching relaxation of the indicator bulbs' filament coils, indicating a possibility of being illuminated at impact. A preliminary examination revealed filament stretching of the ENGINE OUT warning bulbs, and as a result, further engine examination was performed.

On April 7, 2010, the engine was disassembled under NTSB oversight at the Rolls Royce facility in Indianapolis, Indiana. According to the NTSB investigator's summary report, no pre-impact mechanical anomalies were found.

Scoring was found on the interior of the compressor shield and was most prominent at the 6 o'clock position. The score marks appeared to be consistent with blade contact, were most prominent between the 3 o'clock and 6 o'clock positions, and were about 1/2 inch in width in those areas. Other score marks were about 1/4 inch in width. An engineering evaluation indicated that the scoring was consistent with the engine operating at impact, but it could not be determined at what speed the engine was rotating.

On April 21, 2010, the Materials Laboratory Factual Report regarding filament stretching was completed.

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Narrative (Continued)

According to the report:

"The warning light panel was fire damaged. Each indicator was made up of four bulbs. Two of the indictors (BLANK and PUSH TO TEST) had no bulbs. For indicator lights that had bulbs, all of the bulbs were intact.

The bulbs for two annunciators (XMS OIL PRESSURE, and GEN OUT) had damage to the glass filaments. However, there were sufficient fragments visible to make a determination of filament stretching.

The four ENGINE OUT indicator bulbs were the only indicator bulbs that showed filament stretching."

On June 29, 2010, the main rotor mast was removed from the transmission under NTSB oversight. An examination of the overtorque verification stripe, which ran from one end of the mast to the other, revealed no deviation in the straightness of the stripe.

ADDITIONAL INFORMATION

According to a representative of the airframe manufacturer, the engine out/low rotor advisories for this particular airframe included:

"The red flashing ENGINE OUT warning light would be activated when engine compressor speed (N1) falls below 55 per cent or main rotor rpm (Nr) falls below 453.

When the ENGINE OUT is activated, audio warnings in the headset and an audible 'beeping' sound in the crew compartment are also activated together with the engine auto reignition system and the yellow RE-IGN P RST caution light. The ENGINE OUT and RE-IGN P RST lights will remain ON until N1 and Nr increase back above the values (55 per cent N1 and 453 Nr) that activated the warning and caution indicators."

The representative also noted that the ENGINE OUT warning and RE-IGN P RST caution indicators could illuminate during an accident sequence where the engine is running and the main rotor blades make hard contact with the ground. In addition, "During rapid maneuvering of the helicopter, the pilot can droop the rotor and activate the ENGINE OUT warning system."
Updated on Jan 13 2014 4:15PM

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Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
		Ft. MSL	N/A		

Runway Surface Type:

Runway Surface Condition:

Approach/Arrival Flown: NONE

VFR Approach/Landing: None

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
MD HELICOPTER INC	530 (369FF)	0139FF

Airworthiness Certificate(s): Normal

Landing Gear Type: High Skid

Amateur Built Acft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	4	3100 LBS	1

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Shaft	Rolls Royce	250-C30	650 HP

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
100 Hour	05/2009	Hours	2662 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?
No		

Owner/Operator Information

Registered Aircraft Owner	Street Address	City	State	Zip Code
AVIATION WORLDWIDE SERVICES LLC	PO BOX 849	MOYOCK	NC	27958-0849

Operator of Aircraft	Street Address	City	State	Zip Code
PRESIDENTIAL AIRWAYS	PO BOX 849	MOYOCK	NC	27958-0849

Operator Does Business As:

Operator Designator Code: P4YA

- Type of U.S. Certificate(s) Held:

Air Carrier Operating Certificate(s): On-demand Air Taxi

Operating Certificate:

Operator Certificate:

Regulation Flight Conducted Under: Part 91: General Aviation

Type of Flight Operation Conducted: Instructional

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First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	62

Sex: M | Seat Occupied: Right | Occupational Pilot? Yes | Certificate Number: On File

Certificate(s): Commercial

Airplane Rating(s): None

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Helicopter

Instructor Rating(s): Helicopter

Current Biennial Flight Review?

Medical Cert.: Class 2 | Medical Cert. Status: | Date of Last Medical Exam: 01/2009

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	18600	6500								
Pilot In Command(PIC)										
Instructor										
Instruction Received										
Last 90 Days	66									
Last 30 Days	0									
Last 24 Hours										

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: Company VFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
Camp Butler		NONE		

Destination	State	Airport Identifier
Local Flight		NONE

Type of Clearance: None

Type of Airspace:

Weather Information

Pilot's Source of Wx Information:

Unknown

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
NOAA	0900	UTC	Ft. MSL	20 NM	300 Deg. Mag.

Sky/Lowest Cloud Condition: Clear Ft. AGL

Condition of Light: Day

Lowest Ceiling: None Ft. AGL

Visibility: 10 SM

Altimeter: 29.75 "Hg

Temperature: 38 °C

Dew Point: °C

Weather Conditions at Accident Site: Visual Conditions

Wind Direction: 340

Wind Speed: 15

Wind Gusts: 25

Visibility (RVR): Ft.

Visibility (RVV) SM

Precip and/or Obscuration:

No Obscuration; No Precipitation

Accident Information

Aircraft Damage: Destroyed

Aircraft Fire: Ground

Aircraft Explosion Unknown

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot		1			1
Second Pilot	1				1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew	2				2
Passengers					
- TOTAL ABOARD -	3	1			4
Other Ground					
- GRAND TOTAL -	3	1			4

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Administrative Information

Investigator-In-Charge (IIC)

Paul R. Cox

Additional Persons Participating in This Accident/Incident Investigation:

Robert Drake
FAA/AAI-100
Washington, DC

John Hobby
MD Helicopters, Inc
Mesa, AZ

Adrian Booth
The Boeing Company
Mesa, AZ

Jack Johnson
Rolls-Royce
Indianapolis, IN

Ron Hire
Presidential Airways
Moyock, NC

Saleem A Saeed
Iraq CAA
Baghdad, Iraq,