



February 19, 2015

To: Accident Case File #: 369FF/0174FF
N530KK, Las Vegas Metropolitan Police Department (LVMPD)
Las Vegas, Nevada
NTSB Identification: WPR15TA071

From: J. Hobby, Chief Accident Investigator, MD Helicopters, Inc.

Subject: Field Investigation Notes
Wreckage inspection, January 14, 2015
LVMPD Aviation Facility, Las Vegas, NV
Engine inspection, January 20, 2015
Aeromarine America Inc. Facility, Mesa, AZ

Copies Furnished: Van McKenny, IIC NTSB, Los Angeles, California

1. Parties to the Investigation:

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John Waugh, ASI Las Vegas FSDO, Las Vegas, NV 7 [REDACTED]
Paul Alukonis, ASI Las Vegas FSDO, Las Vegas, NV [REDACTED]
Rick Lund, Director of Maintenance, LVMPD, Las Vegas, NV 7 [REDACTED]
Bill Cassell, Safety Officer, LVMPD, Las Vegas, NV [REDACTED]
Jack Johnson, Rolls Royce Accident Investigator, Indianapolis, IN, [REDACTED]
John Hobby, MDHI Accident Investigator, Mesa, AZ [REDACTED]

2. General Information:

On December 31, 2014 at about 1:30 PM Pacific Standard Time, a model 369FF helicopter (serial number 0174FF), registration number N530KK, was substantially damaged during an emergency autorotation landing following a loss of engine power. The helicopter was owned and operated by the Las Vegas Metropolitan Police Department (LVMPD).

The helicopter had taken off from North Las Vegas airport about 7 minutes earlier to support local police operations for the city of Las Vegas, Nevada. The commercially rated pilot reported he had completed one orbit over the scene and noticed the engine and rotor (N2/Nr) RPM drop from 100% to 97%. He maneuvered the helicopter out of the orbit and back towards the airport and tried to increase the RPM using the N2 beep switch. The RPM stabilized momentarily but then the engine and rotor RPM rapidly degraded and the engine out/low rotor warning light and audio horn sounded. The pilot entered an autorotation and set up for an emergency landing to the street below. The pilot maneuvered to avoid power lines and impacted the street tail low. The helicopter impacted hard, severed the tailboom and slid approximately 120 feet before coming to rest. The helicopter stayed clear of objects on the ground and remained upright with the landing gear splayed and the aft lower fuselage contacting the street. Day visual meteorological conditions prevailed. Dual flight controls were installed with the pilot seated in the left seat and a commercially rated pilot/tactical flight officer in the right seat. The helicopter sustained substantial damage to the fuselage, rotor systems and drivetrain. The two pilots egressed from the helicopter without assistance and reported minor injuries. There was no post-crash fire and no reported fuel spill at the crash site.



3. Aircraft/Maintenance History:

The aircraft was manufactured in June 2010 and had accumulated approximately 7,313.8 hours total time. The last maintenance performed was a 100 hour inspection completed just prior to the accident flight at 7313.7 hours. Prior to this the previous scheduled inspection was a 100 hour inspection completed on December 19, 2014 at 7220.3 hours. The maintenance entries stated the inspections were performed in accordance CSP-HMI-2, 05-20-00. The completed inspection check sheet was included as part of the maintenance records. There was no recent entry of unscheduled maintenance action pertinent to the mishap. The aircraft appeared to be in compliance with all applicable Manufacturer Service Notices, Letters, Bulletins and applicable FAA Airworthiness Directives. Inspection of the aircraft indicated that the helicopter appeared to be in good mechanical condition and well maintained.

4. Aircraft Performance and Weight & Balance Data:

a. Operational Performance Data: The aircraft performance was reviewed within the scope of available documents and data representing the approximate power available conditions and aircraft configuration at the time of the mishap. Data indicates that at the time of the mishap there was sufficient power available for the conditions and configuration to perform the planned mission.

b. Weight & Balance: The latest weight and balance sheet from Rotorcraft Support Inc. dated 4/3/2014 showed the helicopter empty weight as 1975.22 pounds, 107.78 Inch arm, and 212,884.12 moment.

	Weight (lbs)	Arm (In)	Moment (In-lbs)
Empty Weight	1975.22	107.78	212,884.1
Pilot (Lt/Front)	200.00	73.50	14,700.0
Pilot (Rt/Front)	200.00	73.50	14,700.0
Fuel Onboard (Full, 64 gal)	435.00	97.70	42,499.5
A/C Gross Weight	2810.22	101.34	284,783.6
Weight & Balance Limits: MGW: 3100 pounds. Longitudinal CG Limit @ 3100 pounds: 99-103.3.			

Allowing for minor deviations in weight and configuration, the aircraft had been operating within the published weight and balance limits.

5. Systems Examination:

a. Airframe/ Fuselage/ Landing Gear:

The helicopter sustained substantial damage to the lower fuselage structure, aft fuselage section, tailboom and landing gear. There was no damage to the main structural members of the fuselage, FS 78.50 and FS 124 frames and the transmission/static mast support structure. The aft cabin was intact with no visible damage. The underside of the fuselage displayed damage to the belly skin and supporting interior structure with major damage to the aft landing gear fitting and center beam near FS 124.

The top aft surface of the composite engine air fairing showed evidence of main rotor blade contact along with the tailboom. The tailboom was severed into two segments at approximately FS 240.0 to 258.0. The forward segment was still attached to the upper aft boom fairing. The FS 197.78 frame tailboom attaching points and mounting bolts appeared undamaged. There was deformation and damage to the boom fairing and turtle back. The aft section of tailboom had the tail



empennage still attached. The vertical and horizontal stabilizer were both firmly attached. The vertical stabilizer's stinger was broken off and the vertical and horizontal stabilizers both displayed impact damage from ground contact.

The aft left and right landing gear struts were broken and splayed outward resulting in the helicopter coming to rest on the lower fuselage structure.

b. Cockpit and Instruments:

There was no visible damage to the cockpit door frames, doors or flooring. The canopy frames and windscreens were not broken. The cockpit seat box structures on the pilots and copilots sides were crushed from the hard landing. The instrument panel was securely mounted at the base support structure. Installed instruments and radios were undamaged. The engine reversion system and caution/warning lights were tested and found functional. The cockpit restraint system was undamaged and functioned.

c. Engine:

The aircraft was equipped with a Rolls-Royce 250-C30 Turboshaft engine, SN: CAE-900188. The engine was recently repaired and a test cell run performed by Helicopter Engine Repair Overhaul Service (HEROS). The HEROS maintenance release documents indicated the work performed was a turbine overhaul, N1 shafting inspection and repairs to the compressor and gearbox. The engine was installed by LVMPD on December 10, 2014 at 7173.7 airframe total time (140.1 hours prior to the accident). At 7313.7 airframe hours (0.1 hours prior to the accident) a 100 hour airframe and engine inspection was performed. In addition to visual inspection of the engine, the inspection included removal and cleaning the fuel nozzle. No other maintenance was reportedly performed relating to the engine or fuel system and there were no reported problems with the engine prior to the power loss.

Visual inspection of the engine found the engine and related systems sustained only minimal external damage. There was visible impact damage to the outer combustor case, fuel nozzle and fuel line. The fuel nozzle was cleaned just prior to the accident flight and the fuel line was reported loose at the accident site. However, the fuel line also showed impact damage that could have loosened the line. There was no obvious evidence of fuel leakage in the engine area. Inspection of the engine mounts found the aft engine mount legs bent at the turn buckles. The left and right engine side mounts appeared undamaged. There was contact marks on the FS 124 firewall from the engine driveshaft indicating movement of the engine during the crash sequence. With electrical power applied the engine trim switch (N²) was functional when tested. Some pneumatic and fuel line B-nuts had torque paint that was broken or misaligned. A check of air, fuel and oil lines found them to be at least hand tight. A check of the throttle and governor controls was completed with no discrepancies noted. The engine was removed from the airframe for further analysis.

Examination of the engine was conducted on January 20, 2015 at Aeromarine America Inc., located on Falcon Field in Mesa, Arizona. The damaged outer combustion case, combustion liner and fuel nozzle were replaced with serviceable items. Except for the fuel line to the fuel nozzle and the fuel supply line at the fuel control, no other fuel or pneumatic lines were altered prior to the test cell run. The engine was run on the test cell and no operational discrepancies were noted. After the test cell run, a pneumatic leak check was performed on the pneumatic portion of the fuel control system. The scroll to Pc filter line was disconnected and 30 PSI air pressure was applied to the Pc filter. A soap solution was used to check all fittings and lines in the system for leaks. The Pg accumulator line connection showed a formation of small air bubbles indicating a leak. The line was tightened with wrenches and the leak stopped. All the other lines were checked with a torque wrench and found to have 65 inch-pound or greater torque. See Rolls-Royce engine report-TBP for additional engine examination details.

d. Main Rotor System:

The main rotor system hub assembly and components displayed typical damage from main rotor blades contacting the tailboom during the hard landing. There was visible damage to the hub upper and lower shoe, feather bearings, pitch change housings, and droop stops. Damage was consistent with the excessive blade flapping and lead-lag excursions of the main rotor from sudden stoppage at low rotor RPM without engine power.

The main rotor blades displayed visible damage which varied in severity and included the blades being bent, cord-wise wrinkling of the upper and lower blade skins, leading/ trailing edge damage and tip cap damage. The blue main rotor



blade was fractured at the inboard end, just outboard of the root fitting. The fractured blue blade and the damage to other main rotor blades appear to be the result of the hard landing and contact with the tailboom/tail empennage during the accident sequence.

e. Main Transmission and Drivetrain:

The main transmission showed no exterior damage. Transmission oil was present in the sight gauge and the transmission rotated freely when rotated by hand. The main rotor driveshaft appeared undamaged. The engine to transmission interconnecting driveshaft and Kaflex couplings were intact but showed evidence of excessive misalignment from movement of the engine during the crash sequence. The oil cooler blower assembly appeared undamaged and functional. Drive from the transmission to the tail rotor output pinion was present. The tail rotor driveshaft was fractured due to main rotor strikes to the tailboom and sudden stoppage. The driveshaft forward and aft Kaflex couplings appeared undamaged. The over-running clutch functioned normally.

f. Tail Rotor System:

The tail rotor system was mostly intact and still in place on the aft portion of the tailboom. The tail rotor transmission was attached and appeared undamaged. The gear box turned smoothly when rotated by hand. There was no visible damage to the tail rotor pitch control, tail rotor hub and pitch links. The tail rotor blades exhibited a bent spar or tears to the blade skin surfaces. All damage appeared to be the result of a ground contact after the tail empennage was severed from the tailboom.

g. Flight Control System:

The aircraft was configured with dual controls with the pilot's position on the left side. Both cockpit cyclic and collective control sticks were in place and undamaged. Control continuity of the cyclic lateral and longitudinal controls was verified throughout the full range of travel from the cockpit up to the rotor hub. Collective control linkage was also continuous throughout the control travel. There was no major damage to the upper flight controls at the rotor head. With electrical power applied, the lateral and longitudinal trim actuators functioned normally. The pilot's anti-torque flight control pedal bracket mounted on FS 44.65 was fractured at the mounting legs. The fractured legs appeared to be overload as a result of the accident sequence. Anti-torque control continuity was verified from the pedals aft to the severed control rod in the tailboom and from the control rod in the aft severed section of tailboom to the tail rotor blades.

h. Fuel System:

The fuel cells were near full and there was no reported fuel spillage at the accident site. A vacuum check from the fuel inlet line at the fuel control to the fuel shut off valve was satisfactorily completed. The fuel cells were drained using the maintenance fuel pump located in the fuel cell and the left fuel cell cover removed. The fuel cells appeared undamaged and the fuel removed looked visually clean. The maintenance fuel pump was removed and the fuel inlet ports and fuel tank sump was inspected. No contamination or blockage was found. Inspection of the fuel line plumbing and fittings did not identify any damage or discrepancies.

6. Investigator Comments:

- a. The wreckage inspection failed to reveal any damage not associated with the hard landing.
- b. Damage to the main rotor blades, main rotor hub and drivetrain are consistent with low rotor rpm and loss of engine power.
- c. The wreckage inspection and engine test cell run did not identify any discrepancies relating to the airframe or engine that would have contributed to the accident.