NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety-Eastern Region
Ashburn, Virginia 20147
June 5, 2014

AIRFRAME AND ENGINE EXAMINATION FIELD NOTES

A. ACCIDENT:

Location: Burnham, Maine
Date: July 3, 2013
Time: 1648 EDT
Aircraft: N888ZW, Sikorsky 269C

B. COMPONENT GROUP:

Chairman: Timothy W. Monville
National Transportation Safety Board (NTSB)
Senior Air Safety Investigator, Office of Aviation Safety
Ashburn, Virginia

Member: Mark Auclair
Federal Aviation Administration
Principal Maintenance Inspector
Portland, Maine

Member: Steve Gleason
Sikorsky Aircraft Corporation
Light Helicopter PSMT Lead, Accident Investigator
Elmira Heights, NY

Member: John Butler
Lycoming Engines
Senior Air Safety Investigator
Williamsport, PA

SUMMARY

On July 3, 2013, about 1648 eastern daylight time, a Sikorsky Aircraft Corporation (formerly Schweizer Aircraft Corporation) 269C, N888ZW, registered to and operated by Point of View Helicopter Services, LLC, collided with terrain near Burnham, Maine. Visual meteorological conditions prevailed at the time and flight plan information is unknown for the 14 *Code of Federal Regulation* (CFR) Part 91 aerial observation bear spotting flight that originated from the Waterville Robert LaFleur Airport, Waterville, Maine. The helicopter sustained substantial damage and the commercial pilot sustained serious injuries while the passenger sustained minor injuries.

The pilot stated that the purpose of the flight was black bear tracking, and he would be flying with a person whom he had not flown before. The weather pattern in the previous couple days precluded him from flying in the morning due to fog. He went to the KLEW Airport in early afternoon having arranged to meet the passenger at KWVL Airport between 1430 and 1500. He performed a preflight inspection of the helicopter which included checking the engine oil. He reported that he may have added 1 quart of oil. He also performed a check of the engine before departure which included checking the magnetos and doing a check of needle split. He listened to 122.8 MHz, and departed at 1430, for the estimated 35 minute flight to KWVL.

After an uneventful flight and landing at KWVL, he disengaged the main rotor but allowed the engine to continue to operate and hot fueled the helicopter himself filling both fuel tanks adding 13.5 gallons. He reported that his credit card receipt shows the fuel being paid at 1515. He did not check the fuel tanks or fuel strainer for contamination reporting that there was not adequate time for possible contaminants to settle and that he had drained the fuel prior to take off from KLEW. He further reported that he had previously fueled at KWVL and had not had a problem with the fuel from that airport, and further stated that with this aircraft he has never had a problem with the quality of fuel purchased at any airport.

While at KWVL and before takeoff, he set up the passenger's gear and gave the passenger a safety briefing, and also as his usual custom, informed her of the operational aspects of the helicopter explaining engine instruments and controls. He recalled showing Lisa the needle split, but does not recall doing a check of the magnetos since the engine had been continuously running. The weather in the area included calm wind and high overcast clouds. He departed at 1530, and proceeded to the study area northeast of KWVL. While en-route to the study area, and flying up the Sebasticook River as far as Benton Falls Dam, he showed the passenger a number of bald eagles and eagle nests he regularly monitors in conjunction with the Maine Dept. of Inland Fisheries and Wildlife, and then began tracking the bears.

They first started high between 1,000 and 2,000 feet performing a grid search until receiving radio collar signals, then when homing in on bears began descending (they were using 2 different antennas). He reported that he has a science background and has been radio tracking using a helicopter for about 8 years. While flying about 50 feet above the tops of trees at an airspeed between 10 and 20 knots, with a wind "fairly calm", or no more than1 to 3 knots, with the engine instruments reading normal, he began a "fading right turn" (a right turn with a sideways component of flight leading into it) with a "modicum" of left anti-torque pedal input while slowing.

He reported that perhaps 2 seconds from turn initiation the right turn (with the helicopter now perhaps 30-40 feet above the trees), escalated in the same direction into a spin (despite left pedal) about the main rotor axis consistent with sudden loss of tail rotor authority. As the out of control spin began and helicopter descended, his passenger asked "what's going on?" to which Friedman replied "I don't know" before pulling up on the collective to ease their imminent contact with the trees (approximately 40 feet in height). He stated by phone that because he was so low he could not lower collective (increasing his rate of descent), apply forward cyclic and accelerate out of any possible disturbed air. He does not know how many turns were completed but the helicopter was in the trees within about 2 seconds of the time from spin initiation-the time it took for his passenger to ask her question and for his response.

He blacked out upon entering the trees, and believes he was out for 30 minutes (now 40 minutes knowing actual ELT transmission time). He vaguely recalled the passenger helping him from the helicopter, and he thinks she was more disoriented than him, but she removed him from the helicopter and helped stabilize him. Their phone/radio communications were shot, and the passenger got the survival bag out of the helicopter at Ed's instruction. The next time reference he had by his watch was the passenger leaving to get help about 1800. She walked to get help flagging down a passing motorist. He estimated it was 45 minutes to 1 hour before 1st responders arrived. He was placed on a litter and walked out of the site, and was transported to a hospital for treatment of his injuries.

The passenger stated that the accident flight departed Waterville, Maine, between 1530 and 1600, with her seated in the right seat with the seatbelt and shoulder harness tightly secured. She was also wearing a headset. She later stated that she thought the harness was too tight but thought it was good like that and left it that way. After takeoff the flight proceeded over a watershed, and they looked at eagle nests. They then proceeded to the black bear study area near Unity Pond.

They flew over the areas she knew the target bear frequented and finally picked up the signal of the bear's collar. They honed in on the bear's location by running transects. They established that the bear was on the Northeast side of the tracks and descended to get a more accurate sense of where it was exactly. While flying at a low altitude, she noticed the helicopter was not operating as it had previously during the flight. She did not hear any clanging or banging.

She was asked if the sound was consistent with chugging and she said yes and also equated it to her vehicle stalling. She asked the pilot what was occurring and he said he did not know. The helicopter began spinning counterclockwise and the pilot was attempting to correct. She saw both hands and feet on the flight controls attempting to correct. Within seconds, the helicopter was falling through trees. She was asked what altitude they were flying at and she said they were low but she could not determine the altitude. She was not sure if the counterclockwise rotation continued to the ground, and she was asked if she heard any horns or heard any lights on the instrument panel; she said no.

FAA inspector Mark Auclair was present at the accident site when the helicopter was recovered on July 12, 2013. He reported the helicopter was somewhat disassembled and lifted with the use

of a Bell 206 and transported to a nearby flatbed trailer, then driven to the hangar at the Auburn-Lewiston Airport (see Figure 1). Representatives of Lycoming Engines and Sikorsky Aircraft Corporation were designated by NTSB as Parties to the Investigation, and coordination with them was made by FAA inspector Mark Auclair to inspect the airframe and engine on July 17, 2013.

Figure 1: Helicopter at the accident site.

C. DETAILS OF THE INVESTIGATION

Following recovery of the helicopter, inspection of the airframe and engine were performed by representatives of the airframe and engine manufacturer representatives with Federal Aviation Administration (FAA) oversight on July 17, 2013. The inspection of the engine and airframe was assisted by a FAA airframe and powerplant mechanic. For detailed notes concerning the airframe examination please see the Factual Report from the airframe manufacturer representative contained in the NTSB public docket.

During the inspection of the Lycoming HIO-360-D1A engine, S/N L-25431-51A, crankshaft, camshaft, and valve train continuity was confirmed; suction and compression was noted in each cylinder. The engine short shaft was OK, and the magneto to engine timing was correct. For detailed notes concerning the engine examination refer to the FAA Inspector statement contained in the NTSB public docket.

On August 6, 2013, with FAA oversight, components consisting of both magnetos, the servo fuel injector with lines and nozzles were removed, and shipped to the NTSB-IIC for further testing.

The Bendix Servo Fuel Injector RSA-7AA1, Parts List 2524347-10, S/N 70018202 was taken to a FAA certified repair station for bench testing (see Figure 2). Prior to bench testing the applied air fitting, gauge air fitting, and flow divider splitter were removed for bench testing. The unit was placed on the test bench as received and no contamination was noted coming from the unit. The unit passed 5 test points but failed the idle cutoff leakage amount. In that test the allowed leakage is 5 cc in 1 minute (measured leakage was 1 pound-per-hour). The servo fuel injector was not disassembled.

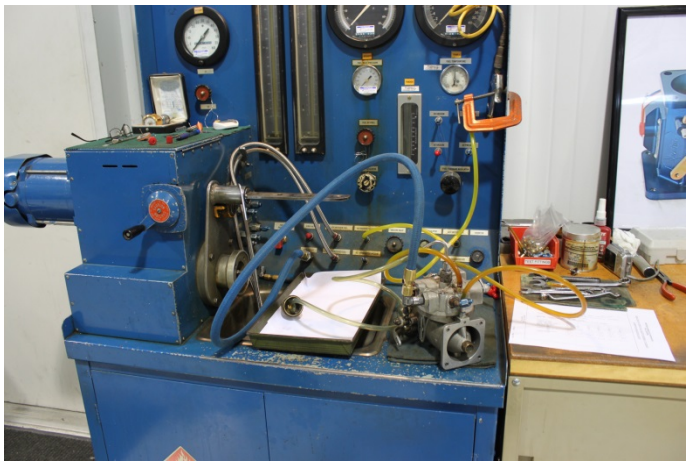

Figure 2: Servo fuel injector on test bench.

The fuel injector nozzles which were secured to the fuel injector lines and wrapped in plastic bags were removed from the bags and the lines. The insert for the No. 4 nozzle was not present. The nozzles were placed in a test fixture (see Figure 3) and all exhibited good flow pattern and good atomization, but all flowed 0.4 pounds-per-hour greater than specified. The insert from the No. 3 fuel injector nozzle was used to bench test the No. 4 fuel injector nozzle.

Figure 3: No. 1 fuel injector nozzle during testing.

Inspection of both magnetos was performed at a FAA certified repair station with NTSB oversight. Slick magneto model 4345, S/N 93090020, was manufactured in September 1993, and assigned sequence number 0020. The magneto was placed on the test bench as received with a slave ignition harness and was noted to produce consistent spark that jumped a 5 mm gap from all leads from 300 to 4704 magneto rpm (see Figure 4). Intermittent firing was noted between 250 and 300 magneto rpm. The magneto was removed from the test bench and complete disassembly of the magneto was performed. The distributor gear was tight and the e-gap was slightly advanced. The tab on the coil was bent up (see Figure 5); the coil tab should be flush to 1/32 inch below and parallel to the parting surface of the magneto frame. Inspection of the coil tab revealed wear due to its incorrect position and contact by the distributor gear shaft; the wear amount was not quantified. The point gap measured within limits, and slight pitting was noted on

the contact surfaces. The cam wear was normal. The coil primary and secondary resistance readings were within limits, and no carbon tracking was noted on the distributor gear or distributor gear support. The condenser tested within limits.

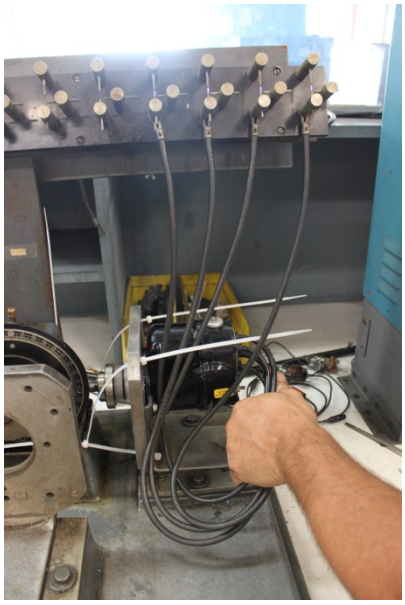

Figure 4: Magneto during bench testing.

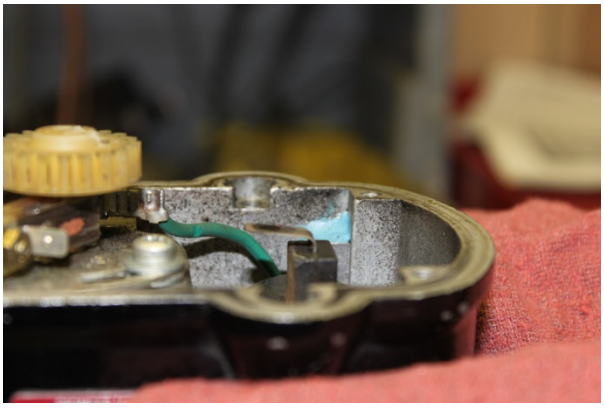

Figure 5: View of the coil tab position

Slick magneto model 4345, S/N 94100005 was manufactured in October 1994, and assigned sequence number 0005. The magneto was placed on the test bench as received with a slave ignition harness and was noted to produce consistent spark that jumped a 5 mm gap from all leads from 150 to 4704 magneto rpm; no discrepancies were noted during the bench testing. The magneto was removed from the test bench and complete disassembly of the magneto was performed. During removal of the distributor housing assembly the retard breaker switch lead separated easily from the contact breaker assembly. Further inspection of the retard breaker switch lead revealed 1 side of the push-on connector was broken (see Figure 6); this would affect starting only. The condenser lead at the contact breaker assembly was tightly secured. The distributor gear was slightly loose (should be a press fit). The tab on the coil was bent up; the coil

tab should be flush to 1/32 inch below and parallel to the parting surface of the magneto frame. Inspection of the coil tab revealed wear due to its incorrect position and contact by the distributor gear shaft (see Figure 7); the wear amount was not quantified but was significant. The point gap measured within limits, and slight pitting (normal) was noted on the contact surfaces. Slight wear of the cam was noted. The coil primary and secondary resistance readings were within limits, and no carbon tracking was noted on the distributor gear or distributor gear support. The condenser tested within limits.

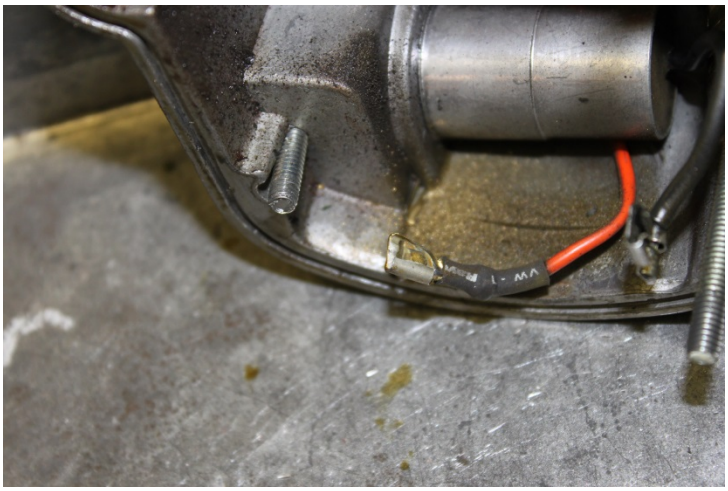

Figure 6: Broken push-on connector of the retard breaker switch lead.

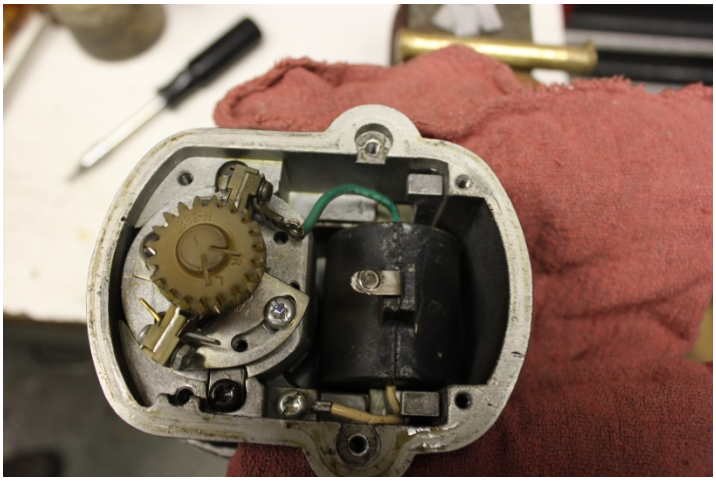

Figure 7: Wear on coil tab.

PARTS DISTRIBUTION

Both magnetos, servo fuel injector, injector lines, and injector nozzles were returned to the owner via UPS, and were delivered on May 27, 2014.