

NTSB Airframe and Engine Examination Report

The helicopter was transported to Air Salvage of Dallas in Lancaster, Texas for the airframe and engine examination. The party members (Federal Aviation Administration and Rolls-Royce) and the technical advisor (Bell) documented and examined the wreckage on 8/22/2018.

Airframe (Bell 206B, serial number 340 – N352CT)

All structural components of the airframe were accounted for. Except for an outboard section of one main rotor blade and a tip section from one tail rotor blade, it is believed these missing sections traveled to an unknown area of the accident site and were not recovered.

Substantial damage was sustained to the main rotor system, the fuselage, the tailboom, and the tail rotor system. The main rotor blades and tail rotor blades were destroyed. The main rotor system was found detached from the main rotor mast at the recovery facility.

No evidence of a fire occurring was observed.

All restraint systems functioned normally when tested, and no damage was noted to any restraint systems.

During the accident sequence, the pilot's head impacted the main rotor brake handle on the overhead panel. The main rotor brake handle was bent to the left from the pilot's head impacting it.

All the flight controls remained attached to the helicopter. Flight control continuity was established for the airframe. No evidence of feedback, binding, resistance, or jamming with the flight control system was noted. No foreign object debris (FOD) was noticed that would have caused any jamming with the flight control system. The observed flight control tube fractures were consistent with overload fractures occurring during the impact sequence.

The tail rotor gearbox was observed to perform normally when rotated by hand. The tail rotor gearbox appeared to have a normal level of oil. The four tail rotor gearbox mounting bolts appeared to be sheared off from the accident sequence.

Continuity was established from the tail rotor gearbox going forward to the transmission. Tail rotor system rigging validation was unavailable due to the extensive damage sustained.

No evidence of any foreign objects impacting the main rotor system or tail rotor system was noted. Evidence of main rotor blade to tail rotor blade impact was observed on a fractured tail rotor blade tip section and likely occurred when the missing main rotor blade fractured tip section departed the helicopter during the impact sequence. No evidence of any blade weights separating from any of the main or tail rotor blades was noted. None of the main or tail rotor blades exhibited any sort of delamination or malfunction that contributed to the accident.

A test subject was brought in to test whether the accident pilot could fully move the tail rotor pedals. The simulated pilot, 5'2" (the same height as the accident pilot), was able to fully manipulate the tail rotor pedals at the specific adjustment settings at the time of the accident. It was noted during the test with a simulated passenger, 5' 10" (the same height as the accident passenger) seated in the left front seat and his feet on the tail rotor pedals, it was more difficult for the simulated pilot to move the tail rotor pedals.

No containments, debris, or water was noted in a fuel sample from the helicopter. About 30 gallons of fuel was noted in the fuel cell. No fuel cell breaching was noted.

No emergency locator transmitter was found installed in the helicopter.

The tail rotor hydraulic servo was removed and retained for further examination/testing. No anomalies were noted with the other components of the hydraulic system. The hydraulic system was not tested with a hydraulic mule system.

No preimpact mechanical malfunctions or failures with the airframe were noted.

Engine (Rolls-Royce M250-C20B, serial number CAE 801330BA)

All components of the engine and engine accessories were accounted for. No binding, wear, or damage was noted.

No evidence of a fire occurring was observed.

The engine was found attached to the engine mount system, which was attached to the airframe.

The engine case remained intact.

Linkages from the collective to the power turbine governor and from the throttle twist grip to the fuel control unit (FCU) were secure.

The FCU throttle input lever did not contact the max stop when the throttle was rotated to the "fly" position. The input lever also indicated low (<30 deg) when the throttle was rolled down to the idle detent.

All external air, fuel, and oil line connections were at least finger tight.

Residual fuel was noted in all the engine fuel lines.

The aircraft mounted fuel filter and engine mounted fuel filters were full of fuel which was normal in appearance and smell. Neither of the fuel filter elements presented contamination. A fuel sample was retained from the aircraft mounted filter bowl.

The N2 rotor turned freely and was continuous to the freewheeling unit output shaft and the tail rotor drive shaft. The N1 system could not be rotated. The compressor No. 1 bearing support exhibited impact damage, but the first stage compressor blades were intact with no significant damage noted. There was no other external engine damage observed.

The fourth stage turbine wheel was undamaged. The lower magnetic chip detector plug was removed to facilitate oil drainage and an appropriate amount of oil (~1/2 liter) was drained from the gearbox. Neither the upper nor lower chip detector displayed ferrous particles. The aircraft mounted engine oil scavenge filter was examined with no significant debris observed and the bypass indicator button was not extended. An oil sample was retained from the scavenge oil filter bowl.

No preimpact mechanical malfunctions or failures with the engine were noted.

Maintenance Records

An examination of the maintenance records provided by the operator revealed no evidence of uncorrected mechanical discrepancies with the helicopter.

The collection of maintenance records for the lifetime of the helicopter was incomplete. Per the pilot, some of these records were lost/destroyed from flooding several years ago. Historical records for the time-life and time between overhauls components were not available for examination.

CEN18LA290 – Bell 206B Flight Training Device Session Report

On 12/5/2018, the NTSB investigator-in-charge (IIC) traveled to the Bell Training Academy in Hurst, Texas. The purpose of the trip was to perform testing in a Bell 206B flight training device (FTD) on how the helicopter and pilot would react if there was passenger interference with the tail rotor pedals during liftoff.

A difference between the actual Bell 206B accident helicopter and the FTD is that the accident helicopter was equipped with a tail rotor servo which decreases pedal movement forces for the pilot. The FTD is setup to mimic pedal forces of the Bell 206B3, which is not equipped with a tail rotor servo. The Bell 206B3 requires unboosted direct force from the pilot's feet to move the pedals. The pilot of the accident Bell 206B would be accustomed to less pedal forces because of the tail rotor servo than experienced on the FTD and normally configured Bell 206B3.

The Bell 206B FTD was positioned on the ground, facing north with a wind condition of about 3-5 knots from the west (no wind gusts present). The FTD did not have "motion" selected for the occupants.

Mike Hodges (NTSB IIC) sat in the front left seat as the passenger. Marty Wright (Bell chief training pilot - CTP) sat in the front right seat as the pilot. Mona Polson (Bell air safety investigator) sat in the FTD control station.

In the Bell 206B, a small amount of left pedal applied during the pickup from the ground is required to assist with maintaining heading.

The NTSB IIC rested his feet on top of the tail rotor pedals for two flight iterations with no force applied and with medium force applied. When the CTP attempted to takeoff for both iterations, the helicopter started to immediately rotate to the right. The CTP had a hard time maintaining directional control due to the interference of the feet on the tail rotor pedals.

The NTSB IIC also placed the tips of his feet on the floorboards up against the tail rotor pedals. When the CTP attempted to takeoff for the third iteration, the helicopter started to immediately rotate to the right. The CTP had a hard time maintaining directional control due to the interference of the feet up against the tail rotor pedals.