



NTSB MEMORANDUM FOR RECORD

Adam Gerhardt
Air Safety Investigator
Eastern Region, Office of Aviation Safety (ERA)
National Transportation Safety Board

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Narrative:

The following record is a summary of notes provided by Bill Taylor, Enstrom Helicopters, and Mike Childers, Lycoming Engines, regarding an airframe and engine examination performed under the supervision of Kirk Jaeger, Federal Aviation Administration Inspector. The findings from the examination were summarized below:

AIRFRAME

Control Systems

The aircraft was stored at the owner's facility in a secure hanger with a tie strap between the main rotor mast and the tail cone. The right-hand stabilizer and tail rotor guard were separated from the aircraft. The main rotor blades were not there. The "A" tail rotor blade was on the floor in the cabin. Other than broken parts of the windshield, the rest of the aircraft was present. The cyclic control rods were continuous to the swashplate, but the left hand (lateral cyclic) bellcrank mount was fractured. The tail rotor controls were continuous to the tail rotor. The cables were slack due to the collapse of the tail cone. The collective push-pull rod that runs up the backwall was severed near the base and had localized buckling near the top. The throttle control was continuous to the engine. The damage to the control systems was consistent with what would be expected from a main rotor strike with significant energy in the rotor.

Tail Rotor System

The tail rotor drive shaft was severed just aft of the upper pulley at the taper pin in the coupling. This is consistent with a tail rotor strike. The "A" tail rotor blade had damage on the leading edge (3-4 inches from the root) that was consistent with a strike. The rear bolt was sheared and the forward bolt had been removed for transport. The tail rotor could not be rotated due to the bent drive shaft, but the blade feathering mechanism was smooth and free.

Main Rotor System

The main rotor blades were not with the wreckage. Mr. James reported that he "cut them up and left them in Pennsylvania." All of the damage to the main rotor head was consistent with blades strikes to the ground



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or other solid object while the rotor had energy. All of the droop stops were broken. The #1 blade grip was pitched approximately 90° upward. The pitch link was broken at the upper rod end. The end cap was pulled off of the damper housing. The #2 blade grip was relatively level. The upper rod end was pulled out of the push-pull tube. Three of the bolts on the pitch arm were sheared off. The end cap was pulled off of the damper housing. The drag link had separated at the inboard lugs and the T-T strap cover had indications that the blade had swung forward and contacted the grip. The #3 blade grip was pitched upward slightly, but all four bolts on the pitch arm were sheared off. The top of the push-pull tube was damaged, but the rod end was still attached. One of the outboard lugs on the drag strut was separated. The bottom two bolts securing the damper cap to the housing were separated, and there was a small gap at the bottom of the joint, but the top bolts were still in place.

Fuel System

The fuel tanks had indications of contact with the main rotor mast (on both sides) but there were no leaks. Otherwise the fuel tanks were undamaged. The filter on the gascolator was removed and was found to be clean with no evidence of water. The fuel screen on the fuel servo was removed and was clean.

Turbocharger

The exhaust pipe was removed to look at the turbo charger. The turbo was free spinning with no signs of discoloration or scrape marks on the turbine side. There was no evidence of oil in the turbo outlet. No issues were noted with the Turbocharger.

ENGINE

The engine cooling fan and the drive belt pulley remained attached to the engine crankshaft flange. The cooling fan blades were damaged and displaced opposite the direction of rotation. The drive belt was present and unbroken but was displaced forward and not fully engaged with the drive pulley grooves. The drive pulley and cooling fan were removed, and the engine was partially disassembled to facilitate the examination. The engine was rotated by turning the crankshaft flange and continuity of the crankshaft to the rear gears and the valve train was confirmed. Compression and suction were observed from all four cylinders.

The fuel injector servo remained attached to the engine and no damage was noted. The aircraft throttle and mixture controls remained attached to the servo throttle and mixture control arms. The turbocharger wastegate interconnect rod remained attached to the servo and to the wastegate control arm. The servo fuel inlet screen was removed and observed absent of debris. The servo was not removed from the engine. The flow divider, injector nozzles, injector lines and engine driven fuel pump remained attached to the engine and no damage was noted. They were not removed.

The magneto remained attached to the engine and no damage was noted. The magneto was removed and produced spark from all 8 ignition towers when rotated by hand.



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The upper spark plugs were Tempest URHB32E. The lower spark plugs were Champion RHB32S. The aircraft came to rest on its side with the #1 and #3 cylinders on the low side. The #1 and #3 top and bottom sparkplug electrodes exhibited normal condition and were oil soaked. The #2 and #4 top and bottom sparkplug electrodes exhibited normal condition and dark gray coloration.

Oil was observed in the engine. The oil suction screen and the oil filter media were absent of metallic debris. The oil cooler and associated hoses were secure.