



Aviation Investigation Factual Report

Location:	Anchorage, Alaska	Accident Number:	ANC23LA024
Date & Time:	March 5, 2023, 14:00 Local	Registration:	N5688R
Aircraft:	Enstrom F-28C	Aircraft Damage:	Substantial
Defining Event:	Hard landing	Injuries:	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Factual Information

On March 5, 2023, about 1400 Alaska Standard Time, an Enstrom F-28C Helicopter, N5688R, sustained substantial damage when it was involved in an accident in Anchorage, Alaska. The pilot and passengers were not injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot completed the preflight inspection and engine run-up with no anomalies noted. The helicopter departed from Lake Hood Seaplane Base (LHD), Anchorage, Alaska. The pilot reported that during takeoff, about 30 ft above the ground, the helicopter could not maintain main rotor rpm. He stated the engine lost partial power and the helicopter was too low to perform an autorotation procedure. The pilot made a run-on landing to a snow-covered lake. The helicopter sustained substantial damage to the tail boom. Review of the accident site revealed buildings and parked airplanes in front of the departure path of the helicopter.

An engine examination was performed by a National Transportation Safety Board investigator after the accident. The engine started normally and responded normally to throttle inputs with cylinder head temperature indications equal across all cylinders. Both engine magnetos were fully operational. Engine compression was good on all cylinders. The bottom spark plugs were removed from the engine and no anomalies were observed with their electrodes. The turbocharger was inspected, and all gaskets and hoses were secure, with the turbocharger fan moving freely. All intake and exhaust connections were secure and undamaged with no blockages observed. The main rotor blade belt tensioner operated normally and was in the engaged position at the start of the examination. No anomalies were identified with the main rotor drive belt. The main rotor transmission moved freely by hand. The examination of the engine and airframe revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation.

An annual inspection was completed May 5, 2022, to include a 100-hour inspection on the engine. The maintenance entry noted that the engine test run was satisfactory. On November 20, 2022, the helicopter main rotor blades were removed and the helicopter was placed in storage for the winter. On March 5, 2023, the main rotor blades were installed; the helicopter was run up and hover checks were satisfactory.

According to the Federal Aviation Administration's Helicopter Flying Handbook, as the main rotor rpm decreases, the amount of horsepower the engine can produce also decreases. Engine horsepower is directly proportional to its rpm, so a 10% loss in main rotor rpm due to overpitching will result in a 10% loss in the engine's ability to produce horsepower, making recovery even slower and more difficult than it would otherwise be. With less power from the engine and less lift from the decaying rotor rpm, the helicopter will start to settle. If the pilot

raises the collective to stop the settling the situation will feed upon itself, rapidly leading to rotor stall.

The pilot's operating handbook stated in part:

MAXIMUM POWER TAKEOFF FROM CONFINED AREAS

Conditions may occur in which the helicopter must be operated from confined areas in which take-off distances (from hover to best rate of climb speed) are not sufficient to clear obstacles that may be in the flight path (trees, buildings, wires, etc.). In order to clear such obstacles safely, the climb portion of the take-off must utilize the best angle of climb airspeed (30 MPH safe side of height velocity curve). This angle of climb will substantially shorten the distance required to clear obstacles. To accomplish this type of take-off, hover helicopter at 3 to 5 feet altitude and 2900 RPM. Apply forward cyclic smoothly. As the helicopter begins to accelerate forward, apply collective and throttle until 36.5 inches of manifold pressure is obtained at 2900 engine RPM. Do not increase collective beyond this point (over pitching) as this will cause engine and rotor RPM to decrease. Maintain 3 to 5 feet altitude by use of cyclic control. As translational speed is reached (15-20 MPH) apply aft cyclic to seek climb angle that will maintain 30-35 MPH (refer to height ~ velocity diagram in flight manual). After clearing all obstacles at this airspeed, apply forward cyclic and readjust collective and throttle as desired for further flight.

Allowing main rotor rpm to decrease below the allowable range is one of the most dangerous situations a helicopter pilot can get into. Low-rotor rpm can occur at almost any time, and it's usually the result of improperly coordinating the collective and throttle. If a pilot waits for the rotor rpm to decrease, it's too late because the helicopter is now on the back side of its power curve. As the blade tips cone upwards because of the reduction in rotor rpm, the apparent area of the rotor disc, as seen from above, decreases. With less area, the rotor disc produces less lift, and the helicopter descends. If the pilot reacts to the loss of lift by raising the collective, the extra drag on the rotor blades slows them down even more. If the pilot of a light, piston-engine helicopter lets low-rotor rpm develop, merely opening the throttle may not produce enough engine power to overcome the rapidly rising drag on the rotor blades. If the helicopter is close to the ground, lowering the collective may be the last thing on a pilot's mind, but simultaneously lowering the collective and applying full throttle is the only sure way to recover the lost rotor rpm.

Low main rotor RPM is a dangerous condition that can occur when rotor RPM is not carefully monitored, or maximum power limitations are not observed. If the rotor RPM is allowed to decay too far, recovery may be impossible. In the event of a low rotor RPM condition, the pilot should simultaneously apply full power and lower the collective until normal rotor RPM is achieved.

Pilot Information

Certificate:	Commercial	Age:	48, Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land; Multi-engine sea	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane single-engine; Helicopter	Toxicology Performed:	
Medical Certification:	Class 2 None	Last FAA Medical Exam:	October 11, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	January 15, 2022
Flight Time:	21000 hours (Total, all aircraft), 900 hours (Total, this make and model), 20500 hours (Pilot In Command, all aircraft), 13 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		Age:	
Airplane Rating(s):		Seat Occupied:	Right
Other Aircraft Rating(s):		Restraint Used:	Unknown
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Enstrom	Registration:	N5688R
Model/Series:	F-28C	Aircraft Category:	Helicopter
Year of Manufacture:	2015	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	466-2
Landing Gear Type:	None; Skid	Seats:	3
Date/Type of Last Inspection:	May 1, 2022 Annual	Certified Max Gross Wt.:	2350 lbs
Time Since Last Inspection:	3.2 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	1833.9 Hrs at time of accident	Engine Manufacturer:	Lycoming
ELT:	Installed	Engine Model/Series:	H10-36-E1AD
Registered Owner:	On file	Rated Power:	205 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	PANC,132 ft msl	Distance from Accident Site:	2 Nautical Miles
Observation Time:	13:53 Local	Direction from Accident Site:	270°
Lowest Cloud Condition:	Scattered / 20000 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	80°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.4 inches Hg	Temperature/Dew Point:	-7°C / -17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Anchorage, AK	Type of Flight Plan Filed:	None
Destination:	Willow, AK (UUO)	Type of Clearance:	VFR
Departure Time:		Type of Airspace:	Class D

Airport Information

Airport:	Lake Hood Seaplane LHD	Runway Surface Type:	
Airport Elevation:	73 ft msl	Runway Surface Condition:	Ice
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	1 None	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	61.184112,-149.97584(est)

Administrative Information

Investigator In Charge (IIC):	Ward, Mark
Additional Participating Persons:	Mitch Deremer; FAA; Anchorage, AK
Report Date:	
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=106823

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).