



Aviation Investigation Final Report

Location:	Greenville, Ohio	Accident Number:	ERA22FA262
Date & Time:	June 7, 2022, 09:40 Local	Registration:	N600TA
Aircraft:	Enstrom F28	Aircraft Damage:	Substantial
Defining Event:	Collision with terr/obj (non-CFIT)	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and the passenger departed on a local flight in their helicopter and about 15 minutes later, the helicopter impacted the driveway at their residence. There were no witnesses to the accident and it could not be determined why they were operating the helicopter near their home. Impact marks at the accident site were consistent with the helicopter impacting the ground hard in a near-vertical descent. A postimpact fire consumed the aft cockpit area to the forward tail boom area, including the engine and both fuel tanks. Postaccident examination of the engine revealed no evidence of any preimpact mechanical malfunction or failure that would have precluded normal operation. Based on available information, the reason the helicopter impacted terrain could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

An impact with terrain for undetermined reasons.

Findings

Not determined (general) - Unknown/Not determined

Factual Information

History of Flight

Uncontrolled descent	Collision with terr/obj (non-CFIT) (Defining event)
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HISTORY OF FLIGHT

On June 7, 2022, about 0940 eastern daylight time, an Enstrom F28F helicopter, N600TA, was substantially damaged when it was involved in an accident near Greenville, Ohio. The private pilot and the passenger (a student pilot) were fatally injured. The flight was conducted as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot owned the helicopter, which was used for agricultural spraying on his family farm. The helicopter was based at a private hangar facility in Greenville. According to a Federal Aviation Administration (FAA) inspector, who visited the facility after the accident, the pilot and the passenger were observed on surveillance video departing the facility at 0925. The spray equipment had been removed from the helicopter. Several witnesses saw the helicopter flying in the local area at an altitude between 500 and 1,000 ft mean sea level. About 0940, law enforcement received a 911 call that the helicopter had crashed in the driveway of the pilot's residence, which was about 3 miles from the hangar facility.

There were no eyewitnesses or video of the accident. The pilot was not in contact with air traffic control, and no flight plan had been filed. A search for air traffic control radar data revealed no radar data was captured for the flight. Automatic dependent surveillance-broadcast (ADS-B) flight tracking equipment was installed on the helicopter, but no tracking data was captured for the accident flight. The helicopter was equipped with a DynaNav DynaFlight 3 navigational system; however, it was not being used during the accident flight and no flight data was recorded.

According to the pilot's flight instructor, who also flew spraying operations in the accident helicopter, he said the pilot had planned to fly to the Warren County Airport (I68), Lebanon, Ohio, later that day to drop the helicopter off for scheduled maintenance. The passenger was going to drive down and pick him up after he dropped off the helicopter. The instructor was not sure why the pilot and passenger were operating the helicopter at their home that morning.

PILOT INFORMATION

The pilot held a private pilot certificate for rotorcraft-helicopter. His last FAA third-class medical was issued on January 7, 2020. A review of the pilot's flight logbook revealed his last entry was on December 14, 2021. According to the pilot's father, the pilot was in the process of obtaining his commercial pilot certificate. As such, he could not legally conduct any

agricultural flights for hire. However, he would fly the helicopter to/from Lebanon, Ohio, for maintenance, which helped accrue flight hours. The father said the reason there was no flight time logged in the pilot's logbook from December 2021 to the date of the accident was most likely due to maintenance (they were awaiting parts from the helicopter manufacturer, who had recently filed for bankruptcy) and because they were busy with regular farming operations during that time.

The passenger held a student pilot certificate. Her last FAA third-class medical was issued on March 22, 2022. A review of the passenger's logbook revealed that she had a total of 24 flight hours (all dual instruction in the accident helicopter). The last flight she and her instructor logged was on December 19, 2021.

WRECKAGE DESCRIPTION

The helicopter came to rest upright, with the skids fully spread, on a magnetic heading of about 245°. A postaccident fire consumed the aft cockpit area to the forward tail boom area, including the engine and both fiberglass fuel tanks. All three main rotor blades remained secured to the main rotor head. The No.1 and No. 2 blades were undamaged, and the No. 3 blade, which came to rest above the postaccident fire, was partially delaminated and exhibited heat damage. There were no ground scars or impact marks observed around the main wreckage, consistent with the helicopter making a near-vertical descent. The helicopter struck a ½-inch coaxial cable that ran between the street and the home as it descended before it impacted the ground. The cable was severed and laying on the ground to the left and right of the main wreckage. One end of the cable was frayed and part of the black outer jacket of the cable was scraped away. Material from the cable was smeared on the leading edge of the No. 2 main rotor blade from the tip to about 88-inches inboard.

The main rotor blades were manually rotated and continuity to the tail rotor was free and smooth. The tail rotor gear box was intact, and one tail rotor blade was bent about 90 degrees. The other blade sustained minor damage. The tail rotor guard was broken in two sections and found about 20-30 ft behind the main wreckage, along with a cargo door.

The cockpit area was crushed downward, but the instrument panel was intact and undamaged. The wind/glareshield was shattered and numerous pieces of plexiglass were sitting on the ground in front of the nose of the helicopter. Both the left and right seat structures were crushed downwards. The on/off fuel shut off valve handle in the cockpit was bent downwards and the fuel selector valve was found in the "on" position.

Both sets of flight controls were installed in the helicopter and moved in sync (interconnected) with each other when manually moved. Breaks in the flight control system were observed that appeared consistent with fire and impact damage in the aft cockpit area. Flight control continuity for each cyclic, the collective pitch controls, and the anti-torque pedals was traced from the controls to their respective control surfaces.

The pilot's flight instructor said he flew the helicopter about a week before the accident. He said the helicopter "flew better than ever", and he was looking forward to flying it again during the regular ag-spraying season. The flight instructor also said that the dual controls were not installed when he flew the helicopter that weekend, and they are not normally installed when conducting ag spraying operations.

The engine sustained extensive fire damage and the accessory case was heavily burned. The engine was removed from the airframe, and the valve covers and top spark plugs were removed from all four cylinders. Manual rotation of the crankshaft produced strong compression on the No. 1 and No. 3 cylinders, and weak compression on the No. 2 and No. 4 cylinders. Valvetrain continuity was also observed on all four cylinders. An internal inspection of the No. 2 and No. 4 cylinders with a lighted borescope revealed that both intake and exhaust valves were properly seating. These cylinders were removed, and no anomalies were noted that would have contributed to the low compression. The piston rings were unremarkable on each piston. The No. 4 outer exhaust valve spring was found broken, but there were no indications that it would have contributed to an engine issue.

The oil sump screen was removed and absent of debris. The single-drive dual magneto remained attached to the accessory case, and the case had partially burned away exposing the driveshaft. When the engine was rotated, this drive was observed rotating. The ignition leads were consumed in the postaccident fire. Due to fire damage, the magneto could not be tested. The fuel injector nozzles were removed and exhibited a light amount of debris. The flow divider was intact, but the diaphragm sustained heat damage.

The helicopter was equipped with an Electronics International TC-1P engine monitor; however, this model monitor had no recording capability, and no engine data was recorded.

Postaccident examination of the airframe and engine revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation.

MEDICAL AND PATHOLOGICAL

Toxicology testing of the pilot was performed at the FAA Forensic Sciences Laboratory. The testing detected ketamine in the pilot's heart blood, hospital blood, and urine; norketamine in his heart blood, hospital blood, and urine; fentanyl in his heart blood and urine; norfentanyl in his heart blood and urine; and midazolam in his urine. Sevoflurane was detected in the pilot's hospital blood. The generally non-impairing medications albuterol, lidocaine, and trimethoprim were detected in the pilot's heart blood and urine. Post-accident medical records showed that all of these medications were administered post-accident.

Toxicology testing of the passenger detected diphenhydramine in her heart blood and liver.

Pilot Information

Certificate:	Private	Age:	34, Male
Airplane Rating(s):	None	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	January 7, 2020
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	92.1 hours (Total, all aircraft), 92.1 hours (Total, this make and model), 37 hours (Pilot In Command, all aircraft)		

Student pilot Information

Certificate:	Student	Age:	Female
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	None
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	March 22, 2022
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	24 hours (Total, all aircraft), 24 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Enstrom	Registration:	N600TA
Model/Series:	F28 F	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal; Other	Serial Number:	704
Landing Gear Type:	Skid	Seats:	3
Date/Type of Last Inspection:	April 24, 2022 Annual	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	2656.3 Hrs as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Not installed	Engine Model/Series:	HIO-360 FIAD
Registered Owner:	On file	Rated Power:	
Operator:	On file	Operating Certificate(s) Held:	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KVES,1008 ft msl	Distance from Accident Site:	10 Nautical Miles
Observation Time:	09:50 Local	Direction from Accident Site:	22°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Overcast / 1500 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	10 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	270°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	29.83 inches Hg	Temperature/Dew Point:	20°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Greeville, OH (None)	Type of Flight Plan Filed:	None
Destination:	Greeville, OH (None)	Type of Clearance:	None
Departure Time:	09:25 Local	Type of Airspace:	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	40.048345,-84.614168

Administrative Information

Investigator In Charge (IIC):	Read, Leah
Additional Participating Persons:	Duane "Dale" Hoff; FAA/FSDO; Cincinnati, OH David Hirsanyi; Lycoming; Williamsport, PA Bill Taylor; Enstrom; Menominee, MI
Original Publish Date:	November 8, 2023
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=105205

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](#).