



Aviation Investigation Final Report

Location:	La Belle, Florida	Accident Number:	ERA21FA212
Date & Time:	May 6, 2021, 15:20 Local	Registration:	C-FAAZ
Aircraft:	Ted Smith Aerostar 600	Aircraft Damage:	Substantial
Defining Event:	Engine shutdown	Injuries:	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot, who was the owner of the airplane, and the pilot-rated passenger, whose maintenance facility had recently completed work on the airplane, departed on the second of two local flights on the day of the accident as requested by the pilot, since he had not flown the airplane recently. Flight track and engine monitor data indicated that, about 15 minutes after takeoff, fuel flow and engine exhaust gas temperature (EGT) values were consistent with a total loss of left engine power at an altitude about 2,500 ft. Engine power was fully restored about 4 minutes later. Between the time of the power loss and subsequent restoration, the airplane directly overflow an airport and was in the vicinity of a larger airport. It is likely that the left engine was intentionally shut down to practice one engine inoperative (OEI) procedures. Had the loss of power been unanticipated, the pilot would likely have initiated a landing at one of these airports in accordance with the airplane’s published emergency procedure, which was to land as soon as possible if engine power could not be restored; however, data indicated that engine power was restored, and the flight continued back to the departure airport.

About 7.5 minutes later, about 6 nautical miles from the departure airport, engine data indicated a total loss of right engine power, followed almost immediately by a total loss of left engine power, at an altitude about 3,500 ft. A battery voltage perturbation consistent with starter engagement was recorded about 1 minute later, followed by a slight increase in left engine fuel flow; however, the data did not indicate that left engine power was fully restored during the remainder of the flight. The airplane continued in the direction of the departure airport as it descended and ultimately impacted a tree and terrain and came to rest upright.

A witness saw the airplane flying toward her with the landing gear extended and stated that it appeared as though neither of the two propellers was turning. A doorbell security camera near the accident site captured the airplane as it passed overhead at low altitude. Sound spectrum

analysis of the footage indicated that one engine was likely operating about 1,600 rpm while the other was operating at less than 1,000 rpm.

The right propeller was found feathered at the accident site. An examination and test run of the right engine revealed no anomalies that would have precluded normal operation. The left propeller blades exhibited bending, twisting, and chordwise polishing consistent with the engine producing some power at the time of impact. Examination of the left engine and engine-driven fuel pump did not reveal any anomalies.

Based on the available information, it is likely that the pilots were conducting practice OEI procedures and intentionally shut down the right engine. The loss of left engine power immediately after was likely the result of the pilot's failure to properly identify and verify the "failed" engine before securing it, which resulted in an inadvertent shutdown of the left engine. Although partial left engine power was restored before the accident (as indicated by fuel flow values, damage to the left propeller, and sound spectrum analysis of security camera video), the left engine power available was inadequate to maintain altitude for reasons that could not be determined, and it is likely that the pilot was performing a forced landing when the accident occurred. It is also likely that the pilot's decision to conduct intentional OEI flight at low altitude resulted in reduced time and altitude available for troubleshooting and restoration of engine power following the inadvertent shutdown of the left engine.

The 67-year-old pilot was a Canadian national and had never applied for a Federal Aviation Administration medical certificate. According to the Transportation Safety Board of Canada, the pilot was issued a category 1 license with knowledge of a previous condition and knowledge of currently taking Xarelto (rivaroxabam). No acute or historical cardiovascular event was found on autopsy.

Toxicology testing detected the sedating antihistamine cetirizine just below therapeutic levels in the pilot's blood. A very low concentration of the narcotic pain medication codeine was detected in the pilot's blood and urine; codeine's metabolite morphine was also detected in his urine. The mood stabilizing medication lamotrigine was detected but not quantified in the pilot's blood and urine. Thus, the pilot was taking some impairing medications and likely had a psychiatric condition that could impact decision-making and performance; however, given the circumstances of the accident, including the presence of the pilot-rated passenger to operate the airplane, the effects from the pilot's use of cetirizine, codeine, and lamotrigine were not likely factors in this accident.

Probable Cause and Findings

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

The pilot's inadvertent shutdown of the left engine following an intentional shutdown of the right engine while practicing one engine inoperative (OEI) procedures. Contributing to the accident was the pilot's decision to conduct OEI training at low altitude.

Findings

Aircraft	(general) - Simulated malf/failure
Aircraft	(general) - Unintentional use/operation

Factual Information

History of Flight

Enroute-descent	Engine shutdown
Enroute-descent	Engine shutdown (Defining event)

On May 6, 2021, about 1520 eastern daylight time, a Ted Smith Aerostar 600, Canadian registration C-FAAZ, was substantially damaged when it was involved in an accident near La Belle, Florida. The airline transport pilot was fatally injured, and the pilot-rated passenger was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot-rated passenger reported that he was the proprietor of an aircraft maintenance facility at La Belle Municipal Airport (X14), and that the pilot, who was the owner of the airplane, brought his airplane to the facility for a 100-hour inspection. He said that as they began work on the airplane, they found discrepancies that required more work than originally anticipated. The owner wanted everything corrected and asked that they go ahead and perform a “full annual inspection” on the airplane, which they did. The work was completed almost 1 month before the pilot’s arrival to pick up the airplane on the day of the accident. The passenger said that he flew the airplane a “couple of times” while it was at his shop and that he “turned everything on” and all the systems and components worked as designed.

The passenger said that he and the pilot went over some paperwork in his office when the pilot announced that he had not flown the airplane “for a long time” and asked if they could go for a flight. The passenger said that they completed a short flight, returned, serviced the airplane with 130 gallons of fuel, and then departed again. When asked how the pilot performed during the preflight, engine start, taxi, takeoff, and the flight he responded, “He seemed thorough... he was good.” The passenger could not recall any further details of the accident flight or accident sequence, but stated that he typically conducted familiarization and test flights east of X14, “over by Lake Okeechobee,” where the terrain was mostly rural and sparsely populated.

Automatic Dependent Surveillance – Broadcast (ADS-B) track data showed that the airplane departed X14 about 1450 and climbed to an altitude about 3,100 ft on an approximate eastbound heading. The airplane continued about 34 miles when, about 1501:00, it entered a slow turn to the south near the intersection of Florida Route 27 and the shoreline of Lake Okeechobee. The airplane continued southbound for about 10 miles before it turned to the east.

Correlation of data obtained from the engine data monitor (JPI EDM 760) indicated that, at 1505:18, the left engine exhaust gas temperature (EGT) and fuel flow values were consistent

with a total loss of left engine power at an altitude about 2,500 ft. At 1507:30, recorded battery voltage showed a perturbation, consistent with engine starter engagement. At 1509:42, left engine EGT values were consistent with the left engine producing power.

At the time of the power loss, Airglades Airport, Clewiston, Florida, was 10 miles ahead of the airplane, but the airplane continued a turn to the north, and overflew another airport, Clewiston Golf Course Airport, 1 minute before left engine power was fully restored. The airplane continued a northerly heading with both engines operating for about 1 minute before it turned westbound in the general direction of X14.

For the next seven and a half minutes, recorded engine data values appeared nominal, until 1517:08, when right engine EGT and fuel flow values indicated a total loss of right engine power. Almost immediately thereafter, at 1517:12, the left engine EGT and fuel flow values also indicated a total loss of left engine power. At this time, the airplane was about 6 nautical miles from X14 at an altitude about 3,500 ft. A battery voltage perturbation was recorded at 1518:24 consistent with engine starter engagement. Around the same time as the voltage perturbation, EGT and fuel flow values for the left engine showed a slight increase, but the data indicated that the engine did not regain full power before the accident.

A witness reported to a Federal Aviation Administration (FAA) aviation safety inspector that she was travelling eastbound in her car when the airplane appeared immediately in front of her at treetop height travelling westbound. She said that the airplane was in a wings-level attitude and that she heard no engine sound. It appeared to her that the propellers were not turning, and that the landing gear was down. The witness believed the airplane would land on the road on which she was travelling, when it turned slightly to its right, struck the top of a tree, and then impacted the ground in a flat, nose-right attitude, before it continued into trees and a memorial garden on a church property, where it came to rest.

A doorbell camera located about 500 ft east of the accident site captured the airplane as it passed overhead at low altitude. The engine sound was smooth and continuous as it passed into and out of the camera's view. Seconds later, the sounds of impact were heard.

Pilot Information

Certificate:	Airline transport; Private	Age:	67, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Lap only
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Helicopter	Toxicology Performed:	
Medical Certification:	Class 1	Last FAA Medical Exam:	
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 10000 hours (Total, all aircraft), 65 hours (Total, this make and model)		

The Government of Canada issued the pilot an Airline Transport Pilot Certificate for helicopters with multiple type ratings. He was issued a private pilot certificate for airplanes in April 2017, with ratings for single and multiengine airplanes. The pilot's most recent medical examination was completed April 4, 2019.

Aircraft and Owner/Operator Information

Aircraft Make:	Ted Smith	Registration:	C-FAAZ
Model/Series:	Aerostar 600	Aircraft Category:	Airplane
Year of Manufacture:	1973	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	60-0148-065
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	April 9, 2021 Annual	Certified Max Gross Wt.:	5500 lbs
Time Since Last Inspection:	2.3 Hrs	Engines:	2 Reciprocating
Airframe Total Time:	5252.3 Hrs at time of accident	Engine Manufacturer:	Lycoming
ELT:		Engine Model/Series:	IO540K1F5
Registered Owner:	Michael Stockton	Rated Power:	300 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:	KRSW,31 ft msl	Distance from Accident Site:	23 Nautical Miles
Observation Time:	14:53 Local	Direction from Accident Site:	234°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	10 knots / 19 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	270°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	32°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	La Belle, FL	Type of Flight Plan Filed:	None
Destination:	La Belle, FL	Type of Clearance:	None
Departure Time:		Type of Airspace:	Class G

Airport Information

Airport:	LA BELLE MUNI X14	Runway Surface Type:	Asphalt
Airport Elevation:	20 ft msl	Runway Surface Condition:	Soft
Runway Used:	14	IFR Approach:	None
Runway Length/Width:	5254 ft / 75 ft	VFR Approach/Landing:	Forced landing;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal, 1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal, 1 Serious	Latitude, Longitude:	26.75829,-81.410371(est)

The wreckage path was oriented on a magnetic heading about 270° and measured about 230 ft long. The initial impact point was in a tree about 50 ft tall, and pieces of angularly-cut wood were found beneath the tree.

The airplane came to rest upright, with both wings displaying significant impact damage. Each engine was secure in its nacelle and the flaps appeared to be set between 10° and 15°. A detailed examination of the flaps revealed that the flap actuator extension was consistent with a 14° flap position.

Examination of the throttle quadrant revealed that the left throttle lever was in a full-forward position, while the right throttle lever was at or near the idle position. Both propeller levers were at or near the full-forward position. The left mixture lever was in the idle-cutoff position and the right mixture lever was slightly forward of mid-travel. Both left and right engine fuel boost pump switches were found in the off position.

The left propeller blades were secure in the hub, and each displayed similar twisting, bending, and chordwise polishing. The blades of the right propeller were secure in the hub and were in the feathered position.

The tail section of the airplane was separated and rested upright adjacent to the fuselage. The windshield posts were cut by rescue personnel and the roof was folded back over the cabin area. Flight control continuity was established from the cockpit area, through several breaks, to the flight control surfaces. The fractures at the breaks all displayed features consistent with overstress. The flap control handle was found in the "neutral" position, about midway between "up" and "down."

The wing fuel tanks were breached, and a slight odor of fuel was detected. An estimated 35 gallons of fuel was drained from the center fuselage tank, which remained intact.

The airplane was recovered from the accident site, and examination continued at the recovery facility. The airplane was powered on using its own battery, and the fuel selectors were run through each position; the corresponding fuel valves energized, and their respective actuator arms moved as designed. Both fuel boost pumps worked when energized.

The left engine was rotated by hand at the propeller and continuity was established from the powertrain through the valvetrain to the accessory section. Compression was confirmed using the thumb method. Borescope examination of the cylinders revealed normal wear and deposits. Ignition timing was confirmed, and when the magnetos were removed and energized with a drill, they produced spark at all terminal leads. The engine-driven fuel pump was removed, actuated with a drill, and pumped fluid. Examination of fuel and old screens and filters revealed that they were clean and absent of debris.

Examination and a test run of the right engine was performed at Lycoming Engines, Williamsport, Pennsylvania. Before the engine run, the fuel pump was removed, and fuel pressure was provided by the test stand. The fuel nozzles installed in cylinder Nos. 1 through 4 matched in type (two-piece), and the fuel nozzles in cylinder Nos. 5 and 6 matched each other but differed in type (one-piece). The No. 5 fuel nozzle was loose and tightened to the prescribed torque values.

The right magneto was impact damaged, but the engine started and ran with the magneto inoperative in its mount. The magneto was removed, disassembled, and failure of the points to open was confirmed. A slave magneto was installed, the engine was started, and a complete factory protocol was run on the engine in the test cell, during which the engine performed nominally.

Examination of the right propeller revealed that all three blades were in the feathered position and could not be rotated by hand force. The propeller mounting flange was undamaged with all six mounting studs intact. The spinner dome and spinner bulkhead were not shipped/presented for examination. Blade R1 was the only blade with any remarkable bending.

The propeller hydraulic unit was pressurized with shop air (95-100 psi) and cycled from feather to low pitch and onto the start lock. All three blades rotated freely and smoothly. The low pitch stop, feather stop, and start lock sleeve were then removed from the propeller. The low pitch stop contact points indicated forceful contact consistent with the propeller at or near the low pitch stop at the time of impact.

Additional Information

Sound Spectrum Studies

A spectrogram of the audio in the doorbell security camera video was created by the propeller manufacturer. A discrete noise trace was noted at approximately 95 Hz as the airplane approached the camera, decreasing to approximately 66 Hz as the airplane passed the camera. According to the report, the frequencies were consistent with a 3-bladed propeller turning at approximately 1,600 to 1,620 rpm on an aircraft at 100 kts true airspeed. There was also a faint noise signature at approximately 50 Hz while the airplane approached the camera, which was consistent with a propeller windmilling under no power at approximately 1,000 rpm.

An NTSB recorder's specialist reviewed the findings of the propeller manufacturer and completed a separate sound spectrum study. The spectrogram showed two signals within the frequency range of three-bladed propeller operation. One signal potentially corresponded with "Engine A" and was consistent with a three-bladed propeller turning at approximately 1,618 rpm. The other signal potentially corresponded to "Engine B" and was consistent with a three-bladed propeller turning at approximately 958 rpm.

Owner's Manual Procedures

The airplane's owner's manual Engine Failure During Flight checklist stated,

1. *Throttles – FULL FORWARD*

2. *Prop Controls – FULL FORWARD*
3. *Mixtures – FULL RICH*
4. *Boost Pumps – ON (if engine fails to restart, proceed with checklist)*
5. *Determine inoperative engine*
6. *Trim aircraft for single-engine flight*
7. *Inoperative engine:*
 - a) *Mixture – IDLE CUTOFF*
 - b) *Prop Control – FEATHER*
 - c) *Boost Pump – OFF*
 - d) *Fuel Selector Valve Switch – OFF*
 - e) *Magneto Switch – OFF*
 - f) *Alternator Switch – OFF*
8. *Attempt engine restart using procedure given for Restarting Feathered Engine in Flight*
9. *If engine does not start, land as soon as possible.*
10. *For prolonged single engine flight, refer to the Crossfeed System discussion in Section 1.*

Additional Guidance

The FAA Practical Test Standards for the airplane multi-engine flight instructor rating stated,

Feathering for pilot flight test purposes should be performed only under such conditions and at such altitudes (no lower than 3,000 ft above the surface) and positions where safe landings can be accomplished, in the event difficulty is encountered during unfeathering.

At altitudes lower than 3,000 ft above the surface, simulated engine failure will be performed by throttling the engine and then establishing zero thrust.

The Transport Canada Instructor Guide for the Multi-Engine Class Rating stated,

Transport Canada no longer recommends actual inflight engine shutdown, feathering, engine restart and unfeathering procedures. It has been determined that the training value of conducting this procedure in-flight is not worth the increased safety risk and engine/airframe abuse/damage that is often incurred.

Medical and Pathological Information

The 67-year-old pilot was a Canadian national and had never applied for an FAA medical certificate. According to the Transportation Safety Board of Canada, the pilot's most recent medical examination was completed in May 2020. The pilot was issued a category 1 license with knowledge of a previous condition and knowledge of currently taking Xarelto (rivaroxabam). The pilot had a restriction that he was to have reading glasses available.

An autopsy of the pilot was performed by the District 21 Medical Examiner, Ft. Meyers, Florida. According to the autopsy report, the pilot's cause of death was atlanto-occipital dislocation due to blunt force head and neck trauma due to airplane crash and the manner of death was accident. No significant natural disease was identified. Toxicology testing detected cetirizine in the pilot's heart blood at 137 ng/mL and urine. Codeine was detected at 4 ng/mL in his heart blood and urine; morphine was detected in his urine. Lamotrigine was detected in the pilot's heart blood and urine. The non-sedating pain medications acetaminophen and ketorolac were detected in blood and urine; caffeine was detected in his blood.

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian		
Additional Participating Persons:	Mike Childers; Lycoming Engines; Williamsport, PA Daniel Sullivan; FAA FSDO; Miramar, FL Les Doud; Hartzell Propeller; Piqua, OH		
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Note:			
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=103044		

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