Aviation Investigation Final Report

Location:	Mayport, Florida	**Accident Number:**	ERA18LA227
Date & Time:	August 17, 2018, 13:20 Local	**Registration:**	N1330Z
Aircraft:	Beech 35	**Aircraft Damage:**	Substantial
Defining Event:	Fuel starvation	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that he was in cruise flight when the engine lost total power. The pilot's attempts to restart the engine were unsuccessful. He contacted air traffic control and reported that he was unable to make it to the closest airport and ditched the airplane into the Atlantic Ocean. Postaccident examination of the airplane revealed that both elevators had separated from the horizontal stabilizer during the ditching. Examination of the engine revealed that a fuel line that had been attached to the fuel flow sensor was broken. Detailed examination of the fracture surfaces on the broken fuel line fitting revealed features that were consistent with high-stress, low-cycle fatigue crack propagation. The crack initiated at the outside, progressing through the thickness of the aluminum fuel line and partially along its circumference until final overstress fracture. A review of the installation drawings and instructions revealed that the fuel flow sensor was installed without a mounting bracket per installation instructions. Given this information, it is likely that the fuel line fractured in fatigue due to the improper installation, and lack of support that would have been provided by the required bracket. The failure of the fuel line subsequently resulted in fuel starvation, and the total loss of engine power. While the available maintenance records detailed the installation of an engine monitoring device and accompanying cylinder head temperature probes, there were no records that indicated when the fuel flow sensor was installed.

Probable Cause and Findings

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

The failure of a fuel line due to improper installation of a fuel flow sensor, which resulted in

fuel starvation and a subsequent total loss of engine power.

Findings

Personnel issues	Installation - Maintenance personnel
Aircraft	Fuel distribution - Incorrect service/maintenance

Factual Information

History of Flight

Enroute-cruise	Fuel starvation (Defining event)
Enroute-cruise	Loss of engine power (total)
Emergency descent	Ditching

On August 17, 2018, about 1320 eastern daylight time, a Beech N35, N1330Z, sustained substantial damage when it was involved in an accident near Mayport, Florida. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The flight departed Rutherford County Airport (FQD), Rutherfordton, North Carolina, about 0930 and was destined for Ormond Beach Municipal Airport (OMN), Ormond Beach, Florida.

The pilot reported that he was in cruise flight with the airplane at an altitude of 4,500 ft when the engine lost total power. The pilot's attempts to restart the engine were unsuccessful. He contacted air traffic control and was advised that Mayport Naval Station (NRB), Mayport, Florida, was the closet airport to his current location. The pilot responded that he was unable to make it to the airport and ditched the airplane into the Atlantic Ocean, about 3 miles east of NRB. The crew of a nearby ship rescued the pilot.

Postaccident examination of the airplane after recovery revealed that both elevators were separated from the horizontal stabilizers. Due to the saltwater immersion, the continuity of the engine's valvetrain and powertrain could not be established. Visual examination of the engine revealed that a fuel line that had been attached to the fuel flow sensor was broken; the fuel flow sensor and the broken fuel line were removed and sent to the National Transportation Safety Board Materials Laboratory for further examination. Examination of the fracture surfaces on the broken fuel line revealed the features were consistent with high-stress, low-cycle fatigue crack propagation. The crack initiated at the outside, progressing through the thickness of the aluminum fuel line and partially along its circumference until final overstress fracture.

A review of the installation drawings and instructions revealed that the fuel flow sensor was installed without a mounting bracket per Insight drawing 1000-303 (bracket type 3), which depicts installation using a metal plumbing fitting for support directly to the engine fuel distributor. Insight drawing 1000-303 (bracket type 1) depicts the fuel sensor attached to the engine top case bolts and the fuel flow sensor plumbed with flexible hoses, and Insight drawing 1000-303 (bracket type 2) depicts the fuel sensor attached to the firewall and the fuel flow sensor plumbed with flexible hoses. The Insight Avionics installation manual states that the installing mechanic should determine which type of mounting is best for their installation, as all three types are approved.

A review of the maintenance logbook entries revealed no record of the fuel flow sensor installation. However, an Insight G-2 installation record dated January 18, 2016, indicated that the Insight G-2 engine monitor was installed with six exhaust gas and six cylinder head temperature probes only.

Pilot Information

Certificate:	Private	**Age:**	77,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	May 24, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 13, 2018
Flight Time:	(Estimated) 1566 hours (Total, all aircraft), 515 hours (Total, this make and model), 1447 hours (Pilot In Command, all aircraft), 12 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N1330Z
Model/Series:	35 N35	**Aircraft Category:**	Airplane
Year of Manufacture:	1961	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	D-6768
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	August 15, 2017 Annual	**Certified Max Gross Wt.:**	3650 lbs
Time Since Last Inspection:	37 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4693 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C91 installed, not activated	**Engine Model/Series:**	IO-470N
Registered Owner:		**Rated Power:**	260 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:	NRB,14 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	13:52 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Few / 4000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	31°C / 25°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rutherfordton, NC (FQD)	**Type of Flight Plan Filed:**	None
Destination:	Ormond Beach, FL (OMN)	**Type of Clearance:**	VFR
Departure Time:	09:30 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Mayport Ns (Adm David L Mcdona NRB	**Runway Surface Type:**	
Airport Elevation:	14 ft msl	**Runway Surface Condition:**	Water-calm
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:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	30.418333,-81.3675

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric		
Additional Participating Persons:	Robbie S Lasky; FAA/FSDO; Orlando, FL Michael H Council; Continental Motors; Mobile, AL		
Original Publish Date:	May 27, 2021	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98129		