Aviation Investigation Final Report

Location:	Dunnellon, Florida	**Accident Number:**	ERA14FA464
Date & Time:	April 5, 2014, 13:59 Local	**Registration:**	N229P
Aircraft:	FORTUNA DAVE SONEX	**Aircraft Damage:**	Substantial
Defining Event:	Unknown or undetermined	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a personal cross-country flight. Witnesses at the airport reported that they observed the airplane depart and climb out and that everything appeared to be normal. The airplane proceeded west of the departure end of the runway, made a left climbing turn, and then proceeded in a southerly direction. GPS data showed that the airplane then climbed to about 817 ft mean sea level, which was below the floor of available radar coverage. The airplane then continued in a southerly heading while descending with the ground speed increasing until about 2 minutes 30 seconds after takeoff, at which point the airplane made a right 270-degree turn for unknown reasons. The airplane continued to descend during controlled flight. The airplane subsequently impacted trees and the ground and then came to rest inverted about 1.7 nautical miles and 187 degrees from the departure end of the departure runway. No distress call was received from the pilot.

About 2 days later, an employee of the intended arrival airport called the departure airport and reported the airplane overdue. Subsequently that same day, the Civil Air Patrol, multiple local and state agencies, the pilot's son, and several privately operated aircraft began search operations; however, despite several weeks of ongoing search efforts, the airplane was not located. About 6 months later, the inverted wreckage was spotted by an individual in a heavily wooded area. No emergency locator transmitter (ELT) signal was ever received, and the ELT switch was found in the "off" position. The investigation determined that miscommunications, which led to delayed coordination, occurred between the Civil Air Patrol and the multiple local and state agencies during the initial search efforts. The delayed coordination between the response agencies, the nonactivation of the ELT, and the airplane's flight below radar coverage hampered the search efforts. However, the accident was not survivable; therefore, these issues did not contribute to the pilot's death.

Examination of the airframe revealed no evidence of fire. The engine, which had separated during the impact sequence, exhibited heat damage, which precluded testing of its operability. However, the No. 3 cylinder was found to have low compression, which likely existed when the flight departed. Full flight control continuity was confirmed, but the flap extension could not be determined. Although a hole was

noted in a fuel supply line immediately adjacent to an engine control cable, extensive corrosion precluded a determination of whether the hole was preexisting or occurred postimpact.

Witnesses reported that the canopy opened while the pilot was taxiing to begin the flight, and it was found unlatched. However, the pilot was able to relatch it for taxi. Given that the fuel shutoff was found in the "off" position, it is likely that the pilot was preparing for a forced landing and unlatched the canopy at that time rather than it inadvertently becoming unlatched in flight. Based on the available evidence, the reason for the forced landing could not be determined.

Probable Cause and Findings

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

The in-flight collision with a tree in a heavily wooded area during controlled flight while the pilot was attempting a forced landing for reasons that could not be determined based on the available evidence. Contributing to the delay in locating the wreckage were the nonactivation of the emergency locator transmitter and delayed coordination between the Civil Air Patrol and multiple local and state agencies.

Findings

Not determined	(general) - Unknown/Not determined
Aircraft	Emergency locator beacon - Not used/operated
Organizational issues	Between groups/organizations - Other institution/organization

Factual Information

History of Flight

Initial climb	Unknown or undetermined (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)
Uncontrolled descent	Collision with terr/obj (non-CFIT)
Post-impact	Miscellaneous/other

On April 5, 2014, about 1359 eastern daylight time, a Fortuna Sonex, N229P, was substantially damaged during a forced landing in a heavily wooded area about 2.0 nautical miles south-southwest of the Marion County Airport (X35) Dunnellon, Florida. The private pilot, the sole occupant was fatally injured. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations (CFR) Part 91 as a personal flight destined for Zephyrhills Municipal Airport (ZPH), Zephyrhills, Florida. Visual meteorological conditions prevailed at the time and no flight plan was filed for the flight that originated about 1357.

Personnel at X35 reported that while attempting to taxi from the parking spot after power application, the canopy opened up, which one individual described as occurring "violently" enough to bend the frame, but not enough to rip it loose from the attachment side. The engine was secured and the pilot exited the airplane and informed another individual that he forgot to latch it. The pilot was assisted with shutting the canopy which was able to be fully lowered initially, and then latched in the taxi position for taxiing. The pilot was informed to check the canopy before takeoff and if it did not secure, to return and, "we will fix it." The engine was restarted, and the pilot was observed taxiing to runway 28 where he performed an engine run-up. The airplane was estimated to depart between 1353 and 1358, and the climb out and speed appeared normal. The airplane was observed making a crosswind turn to the south and leveled the wings then went out of view about 5 minutes later flying in a southerly direction.

A pilot who departed X35 about 7 minutes before the accident pilot departed stated that he did not hear any radio calls from the pilot of the accident airplane.

On April 7, 2014, about 1030, an individual at the intended destination airport contacted an individual at the departure airport and advised him that the airplane did not arrive. The Marion County Sheriff's Office was contacted the same day, and personnel of that organization contacted the X35 airport manager who relayed the circumstances of the departure of the accident airplane.

The Civil Air Patrol was notified of the missing airplane on April 7, 2014, at 1300 EDT and assigned mission number 14M-0150. A search for the airplane was initiated by the Civil Air Patrol, and Sherriff Departments from the following counties: Citrus, Marion, Hernando, Sumpter and Lake City. A search for the missing airplane was also performed by personnel from Marion County Fire Rescue, Florida Fish and Wildlife Conservation Commission (FWC). The ground and aerial based searches were negative. Additional aerial and ground based searches of the area were performed by personnel from Marion County Sheriff's Office the week of April 22nd through 26th, and April 25th and 26th, respectively; no

emergency locator transmitter (ELT) signal was ever received.

Multiple aerial searches were performed by the pilot's son which included the area where the airplane actually crashed, but the results were negative. Additionally, aerial searches were also performed by pilot's of airplanes based at X35 and also at ZPH.

On October 19, 2014, an individual walking in the area spotted the wreckage and contacted law enforcement.

Pilot Information

Certificate:	Private	**Age:**	74,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 None	**Last FAA Medical Exam:**	June 7, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2000 hours (Total, all aircraft)		

The pilot, age 74, held a private pilot certificate with airplane single engine land and airplane single engine sea ratings; the single engine land rating was first issued on November 3, 1968. He was issued a 3rd class medical certificate on June 7, 2007, with limitations, "Not valid for any class after 06/30/2008[.] Must wear lenses for distant, have glasses for near vision."

A review of the application for the pilot's last medical revealed he listed a total time of 1,504 hours, and 20 hours in the last 6 months.

The pilot's son reported that his father's most recent pilot logbook was not located; however, he reported having a conversation with his father in 2008, and recalled his father telling him he had 1,700 hours at that time. He also estimated that his father had "well over 2,000 hours." The son also reported that he last spoke with his father the day before, and during that conversation his father relayed to him about attending a fly-in luncheon the next day; his father seemed to be in good spirits. A record of conversation with the pilot's son is contained in the NTSB public docket.

Aircraft and Owner/Operator Information

Aircraft Make:	FORTUNA DAVE	**Registration:**	N229P
Model/Series:	SONEX	**Aircraft Category:**	Airplane
Year of Manufacture:	2001	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	018
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	April 2, 2013 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	637.2 Hrs as of last inspection	**Engine Manufacturer:**	Jabiru
ELT:	C91A installed, not activated	**Engine Model/Series:**	2200
Registered Owner:	WEISS THEODORE T	**Rated Power:**	
Operator:	WEISS THEODORE T	**Operating Certificate(s) Held:**	None

The amateur built Sonex airplane was manufactured in 2001, and was designated serial number 018. It was powered by a Jabiru 2200 engine and equipped with a fixed pitch Sensenich propeller.

By design, the airplane's fuel system consisted of a single fuel tank installed in the cockpit forward of the firewall, which has a fuel shutoff valve installed adjacent to the tank outlet fitting. There is no provision for an additional fuel shutoff valve on the instrument panel. The fuel is routed from the tank to a firewall fitting via an aluminum tube, and then to the fuel strainer also via an aluminum tube. Fuel then flows via flexible hoses to the auxiliary fuel pump, engine-driven fuel pump, then to the carburetor.

The accident airplane's fuel supply consisted of a shutoff valve installed at the tank outlet, and an aluminum tube was routed from the fuel tank to a shutoff valve installed on the instrument panel. An aluminum tube was installed between the shutoff valve and the fuel strainer, and flexible hoses were installed from the outlet of the fuel strainer to the auxiliary fuel pump, engine-driven fuel pump, and then forward to the carburetor.

The pilot's son reported that the maintenance records were not located; however, he did locate a logbook entry from 2011, that contained writing consisting of editing associated with a condition inspection dated April 2, 2013. The total time was written as 637.2, and the tachometer time was written as 21.9. A copy of the entry is contained in the NTSB public docket.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	OCF,90 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	13:50 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 3300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/ Unknown
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/ Unknown
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	27°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Dunnellon, FL (X35)	**Type of Flight Plan Filed:**	None
Destination:	Zephyrhills, FL (ZPH)	**Type of Clearance:**	None
Departure Time:	13:57 Local	**Type of Airspace:**	

A surface observation weather report taken at Ocala Municipal Airport (OCF) at 1350, or approximately 9 minutes before the accident, indicates the wind was from 190 degrees at 6 knots, the visibility was 10 statute miles, broken clouds existed at 3,300 feet. The temperature and dew point were 27 and 17 degrees Celsius, respectively, and the altimeter setting was 30.04 inches of Mercury. The accident site was located about 12 nautical miles and 225 degrees from OCF.

Airport Information

Airport:	Marion County Airport X35	**Runway Surface Type:**	
Airport Elevation:	65 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

The Marion County Airport is equipped in part with runway 10/28 (previously identified as 9/27) which changed in December 2012. The airport common traffic advisory frequency is 122.8 MHz, which is not recorded, and at the time of departure was not monitored by airport personnel.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	29.030834,-82.387779

The airplane crashed in the Halpata Tastanaki Preserve managed by the Southwest Florida Water Management District; the farthest most identified debris associated with the airplane away from the main wreckage consisted of a checklist which was located at 29 degrees 01.909 minutes North latitude and 082 degrees 23.206 minutes West longitude, or about 450 feet and 042 degrees from the main wreckage location. Further inspection of the accident site area revealed a separated section of the right wing containing the aileron was located in close proximity to the main wreckage; the separated wing section was located at 29 degrees 01.859 minutes North latitude and 082 degrees 23.261 degrees West longitude. The main wreckage consisting of the fuselage, full section of left wing, section of right wing, and empennage was located inverted on a magnetic heading of approximately 268 degrees at 29 degrees 01.854 minutes North latitude and 082 degrees 23.266 minutes West longitude. That location when plotted was located approximately 1.71 nautical miles and 187 degrees from the departure end of runway 28. The heading from the checklist to the main wreckage was approximately 223 degrees, with pieces of the canopy slightly west of the line between the 2 points.

Examination of the uprighted wreckage revealed the engine was separated and came to rest inverted forward of the resting position of the main wreckage; the engine sustained heat damage.

Examination of the wreckage revealed all components necessary to sustain flight were attached or in close proximity to the resting position of the main wreckage. There was no evidence of pre or postimpact fire to any observed airframe components, including the firewall.

Examination of the left wing revealed it was full span and the aileron and flap remained attached. The leading edge exhibited impact damage consistent with tree contact between 45 and 89 inches outboard of the wing root. The right wing exhibited leading edge impact damage consistent with tree contacts centered at 17 inches and 68 inches outboard of the wing root. The wing was fractured at the outer tree strike location and the outer portion of the wing contained the aileron; the aileron push/pull rod was fractured in bending overload at the outer wing fracture location. The vertical and horizontal stabilizers remained attached and the rudder, elevator, and elevator trim tab remained attached. Flight control continuity was confirmed for roll, pitch, and yaw from each respective flight control surface to each cockpit control. The flaps were extended an unknown amount and the flap selector was positioned full aft.

Examination of the cockpit revealed the master switch was down, the AV/EIS switch was down, and the Strobe/Nav switch was in the up position. The elevator trim tab selector was positioned full forward and the elevator trim tab was full tab trailing edge down. A shutoff valve installed on the outlet fitting of fuel tank was in the on position; the fitting was fractured at the attach point of the fuel tank. The fuel supply line from the fuel tank to a shutoff valve mounted on the instrument panel was fractured at the inlet of

the fuel shutoff valve, and the fuel supply line from the outlet of the fuel shutoff valve to the firewall fitting was fractured approximately 12.5 inches from the fuel shutoff valve, or adjacent to the B-nut at the firewall. A small diameter hole was noted in the line approximately 1 inch from the fracture point, and heavy corrosion was noted on the exterior surface of the line. Cracks were noted on one side of the line from the fracture point parallel to the line, and a crack was noted intersecting the hole perpendicular to the line. The carburetor heat control cable was noted to be in close proximity to the fracture point of the fuel line, which was retained for further investigation. The fuel shutoff valve at the instrument panel was confirmed to be in the "OFF" position, which agreed with the as-found position of the handle.

Examination of the canopy revealed the frame and Plexiglas pieces were fragmented and were found both immediately adjacent to the main wreckage and also along the path. The canopy remained structurally attached by the hinge on the right side, while the airframe structure adjacent to the lower portion of the frame on the left side was heavily impact damaged. The corresponding portion of the canopy frame was nearly straight and did not exhibit significant impact damage. Further examination of the canopy revealed it contained forward and aft latches each containing 2 latch positions (taxi and takeoff). Examination of each latch revealed no evidence of significant impact damage or deformation. Examination of the mating section of the airframe revealed no evidence of significant damage to either slot, and no damage was noted to the lower surface of the phenolic blocks beneath the airframe structure.

Further examination of the fuel supply system revealed residual 100 low lead fuel was noted between the fuel strainer and outlet of the auxiliary fuel pump. The bowl of the fuel strainer was removed and the screen was clean; corrosion was noted at the bottom of the bowl. The auxiliary fuel pump checked satisfactory when electrically tested.

Examination of the Ameri-King Corporation Model AK-450 emergency locator transmitter (ELT) revealed it was separated from its mounting location but remained attached to the airplane by the antenna connection. The switch was found in the off position. Examination of the ELT mounting bracket installed on the right side of the airplane aft of the seat and adjacent to the fuselage sidewall, parallel to the wings, revealed the lower portion of the bracket was secured by 3 rivets to a horizontal oriented piece of aluminum, which was secured to a longeron on the right side by rivets. The piece of aluminum did not exhibit any raised edges on any of the sides; however, the right side was immediately adjacent to the right fuselage skin. Examination of the ELT mounting bracket revealed the latch was disconnected, with no evidence of damage to the latch mechanism, and the lower horizontal portion attached to an aluminum plate exhibited slight deformation near the fuselage sidewall skin. The separated ELT was re-positioned into the bracket properly oriented for direction of flight and the latch was closed and secured, which revealed minimal force was required to dislodge the ELT from the bracket. Further, the lack of a raised edge on the forward side of the aluminum plate allowed the ELT to slide completely out of the bracket and away from the aluminum plate. Field testing of the ELT revealed it operated but the signal was weak. A sticker on the exterior surface of the ELT indicates "Replace Main Batteries by Date: 5-16." The ELT was retained for further examination.

Examination of the engine revealed the propeller and portion of engine mount remained attached, but the engine mount and one propeller blade were fractured. Heat damage was noted to the engine-driven fuel pump, ignition system components, and alternator, which precluded testing. Both ignition coils which remained attached to the alternator mount plate were heat damaged which precluded testing. The

alternator mount plate was removed to facilitate hand rotation of the propeller in the normal direction of rotation. Crankshaft, camshaft, and valve train continuity was confirmed to all cylinders, the rear of the engine, and to the engine-driven fuel pump drive; however, no suction and compression was noted at the No. 3 cylinder during hand rotation of the propeller. The No.3 cylinder was removed and the ring gaps of both compression rings were nearly aligned. The carburetor which separated from the engine but remained attached to the airframe by the control cable was dirt contaminated; however, there was no evidence of fire damage. The inlet fitting of the carburetor was open to the environment, and removal of the carburetor bowl revealed evidence of internal corrosion.

Examination of the propeller revealed one blade was full span and exhibited cracks on the leading edge near the hub between 3 and 16 inches inboard from the blade tip and also near the hub, while the other blade was fracture and heat damaged about 11 inches outboard from the hub. A piece of the fractured blade containing an emblem of the manufacturer consisting of the middle section of the blade was located at the accident site area.

Communications

The pilot was not in contact with any FAA air traffic control facility at the time of the accident.

Flight recorders

The airplane was equipped with an Electronics International R-1-4-G30R330 tachometer and a Grand Rapids Technologies, Inc., Model 2000 Engine Information System (EIS). A Garmin GPSmap 396 GPS receiver and a Garmin D2 Pilot watch were found at the accident site. All identified components were recovered and sent to the NTSB Vehicle Recorder Division for read-out.

According to the NTSB Electronic Devices Specialist's Factual Report, it was not possible to correlate the RPM history from the electronic tachometer with the GPS data because the large interval between sample rate and the unknown time when the GPS receiver was first powered relative to the tachometer. The last recorded tachometer reading of 2,760 rpm occurred at 8:09 elapsed time since instrument power up. No information was retrieved from the EIS, but data was downloaded from the GPSMAP 396 receiver. Data associated with the accident flight revealed the recording began at 1351:00, and depicted the airplane taxiing to the approach end of runway 28. The airplane was noted to be accelerating on the runway at 1357:26, and continue the takeoff. When the flight was west of the departure end of the runway, at 1358:29, the airplane made a left climbing turn and proceeded in a southerly direction attaining the maximum GPS altitude of 817 feet mean sea level (msl). Between 1359:16, and 1359:24, the airplane continued on a southerly heading but descended from 817 feet to 804 feet msl. The airplane

continued in a southerly heading while descending with an increasing ground speed until about 1359:35, then a right 270 degree turn was initiated. The airplane then proceeded in a southerly direction while descending, and the last GPS target at 1359:53, was located at 29.03224 degrees North latitude and 082.3862 degrees West longitude. The airplane at that time was flying at 154 feet GPS altitude on a southerly heading at 105 knots groundspeed. The accident site was located 0.11 nautical mile and 227 degrees from the last GPS data point. A copy of the report and downloaded data are contained in the NTSB public docket.

Medical and Pathological Information

A postmortem examination of the remains of the pilot was performed by the District Five Medical Examiner's Office. The cause of death was listed as "Multiple blunt force injuries due to airplane crash."

Forensic toxicology testing was not performed.

Tests and Research

The NTSB retained ELT was sent to the FAA Los Angeles Aircraft Certification Office for examination and testing at the manufacturer's facility with FAA oversight. Testing of the ELT consisted of a transmitter functional test, periodic maintenance test, acceptance test report (ATP), and measurement of the voltage of the alkaline batteries; the testing was performed on May 27, 2015. During the transmitter functional test, a swept tone signal was barely audibly heard and faded out during the first test. A subsequent test no tone was heard. During the periodic maintenance test steps 1 through 3 could not be performed as they are done on aircraft, but during test of the beacon the same weak swept tone response for the tests (functional and G-switch) was noted; the signal power was measured to be 21.3 dBM (minimum specification is 17.0 dBM). The ELT main unit expiration date was listed as May 16, 2011. All batteries voltage measured 1.565 volts or higher, and no evidence of battery leakage was noted; all batteries replace date were March 2016. A functional test of the G-switch was performed with the ELT main unit switch in the arm position and rapid forward and aft movement of the ELT; the main unit light illuminated as expected and a very weak swept tone was heard. A copy of the report from FAA is contained in the NTSB public docket.

A review of the installation and operation manual instructions by the ELT manufacturer indicates the specified mounting tray consists of a flat piece with raised edges on the forward and aft sides of the tray extending across the width of the tray, and raised edges on both sides of the tray extend for a certain length of the tray. The tray by design is intended to prevent movement of the ELT out of the tray as a result of impact forces.

Examination of the fractured fuel supply line from the fuel shutoff valve on the instrument panel to a fitting installed on the firewall was performed by the NTSB Materials Laboratory located in Washington, D.C. The results of the examination revealed severe pitting corrosion of both the tube and

cockpit side fittings in the area of separation. The corrosion had removed significant material from the surfaces of the fittings and from both the exterior and interior surfaces of the tube. No fracture features were present on the tube separation. A hole and cracks were also apparent adjacent to the separation, and were consistent with corrosion penetration. The remaining length of the cockpit side tube showed lesser amounts of corrosion, and the engine side fuel tube showed little or no corrosion. A copy of the NTSB Materials Laboratory Factual Report is contained in the NTSB public docket.

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Ric Riccardi; FAA FSDO; Orlando, FL Cory Best; FAA/FSDO; Orlando, FL
Original Publish Date:	May 23, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89037