Aviation Investigation Final Report

Location:	Springfield, Illinois	**Accident Number:**	CEN20FA070
Date & Time:	January 28, 2020, 15:03 Local	**Registration:**	N6071R
Aircraft:	Piper PA60	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was conducting an instrument landing system (ILS) approach in instrument meteorological conditions at the conclusion of a cross-country flight. The airplane had been cleared to land, but the tower controller canceled the landing clearance because the airplane appeared not to be established on the localizer as it approached the locator outer marker. The approach controller asked the pilot if he was having an issue with the airplane's navigation indicator, and the pilot replied, "yup." Rather than accept the controller's suggestion to use approach surveillance radar (ASR) approach instead of the ILS approach, the pilot chose to fly the ILS approach again. The pilot was vectored again for the ILS approach, and the controller issued an approach clearance after he confirmed that the pilot was receiving localizer indications on the airplane's navigation equipment.

The airplane joined the localizer and proceeded toward the runway while descending. The pilot was instructed to contact the tower controller; shortly afterward, the airplane entered a left descending turn away from the localizer centerline. At that time, the airplane was about 3 nautical miles from the locator outer marker. The pilot then told the tower controller, "we've got a prob." The tower controller told the pilot to climb and maintain 3,000 ft msl and to turn left to a heading of 180°. The pilot did not respond.

During the final 5 seconds of recorded track data, the airplane's descent rate increased rapidly from 1,500 to about 5,450 ft per minute. The airplane impacted terrain about 1 nm left of the localizer centerline in a left-wing-down and slightly nose down attitude at a groundspeed of about 90 knots. A postimpact fire ensued.

Although the pilot was instrument rated, his recent instrument flight experience could not be determined with the available evidence for this investigation. Most of the fuselage, cockpit, and instrument panel was destroyed during the postimpact fire, but examination of the

remaining wreckage revealed no anomalies. Acoustic analysis of audio sampled from doorbell security videos was consistent with the airplane's propellers rotating at a speed of 2,500 rpm before a sudden reduction in propeller speed to about 1,200 rpm about 2 seconds before impact.

The airplane's flightpath was consistent with the airplane's avionics receiving a valid localizer signal during both instrument approaches. However, about 5 months before the accident, the pilot told the airplane's current maintainer that the horizontal situation indicator (HSI) displayed erroneous heading indications. The maintainer reported that a replacement HSI was purchased and shipped directly to the pilot to be installed in the airplane; however, the available evidence for the investigation did not show whether the malfunctioning HSI was replaced before the flight. The HSI installed in the airplane at the time of the accident sustained significant thermal and fire damage, which prevented testing.

During both ILS approaches, the pilot was cleared to maintain 3,000 ft mean sea level (msl) until the airplane was established on the localizer. During the second ILS approach, the airplane descended immediately, even though the airplane was below the lower limit of the glideslope. Although a descent to the glideslope intercept altitude (2,100 ft msl) would have been acceptable after joining the localizer, such a descent was not consistent with how the pilot flew the previous ILS approach, during which he maintained the assigned altitude of 3,000 ft msl until the airplane intercepted the glideslope.

If the HSI provided erroneous heading information during the flight, it could have increased the pilot's workload during the instrument approach and contributed to a breakdown in his instrument scan and his ability to recognize the airplane's deviation left of course and descent below the glideslope; however, it is unknown if the pilot had replaced the HSI.

Probable Cause and Findings

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

The pilot's failure to follow the instrument landing system (ILS) course guidance during the instrument approach.

Findings

Personnel issues	Use of equip/system - Pilot

Factual Information

History of Flight

Approach-IFR initial approach	Loss of control in flight (Defining event)

On January 28, 2020, about 1503 central standard time, a Piper PA-60-601P airplane, N6071R, was destroyed when it was involved in an accident near Springfield Abraham Lincoln Capital Airport (SPI), Springfield, Illinois. The pilot and two passengers, and a dog were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

About 1301, the flight departed from Huntsville International Airport (HSV), Huntsville, Alabama, on an instrument flight rules (IFR) flight plan to SPI. According to automatic dependent surveillance-broadcast (ADS-B) data, the flight departed runway 18L at HSV and turned north-northwest toward SPI. The airplane subsequently climbed to 10,000 ft mean sea level (msl) and continued direct toward SPI.

At 1440:34, the pilot established radio contact with Springfield approach and reported level flight at 10,000 ft msl. The approach controller replied that the pilot should expect radar vectors to join the localizer for the instrument landing system (ILS) to runway 31 at SPI. At 1441:20, the approach controller told the pilot about pilot reports (PIREP) for light-to-moderate mixed icing in the clouds at 3,000 ft msl and cleared the pilot to descend and maintain 3,000 ft msl. At 1441:32, the pilot reported leaving 10,000 ft msl for 3,000 ft msl. At 1441:43, the approach controller instructed the pilot to fly a 350° heading for vectors to the localizer. The pilot confirmed the heading change, and the airplane turned to a 350° course while still in a descent.

At 1448:54, the pilot reported that the cloud tops were at 3,000 ft msl. At 1449:00, the approach controller told the pilot, "roger, thank you, seven miles from CALDE [the locator outer marker], turn left heading three four zero, maintain three thousand until established on the localizer…I-L-S runway three one approach." The pilot replied, "three four zero on the turn, here we go."

At 1449:29, the pilot transmitted, "we're not picking these navs [navigation signals] on thirty one." At that time, the airplane was still flying along the assigned 340° heading to intercept the localizer and was about 0.6 nautical miles (nm) left of the localizer, as shown in figure 1. At 1449:36, the approach controller asked the pilot to repeat his previous transmission, and the pilot replied, "we still got neg nav [negative navigation] lights on thirty one." At 1449:53, the approach controller transmitted "we're getting green indications here… (unintelligible) just to verify that you are on one one zero point one five on the localizer?"

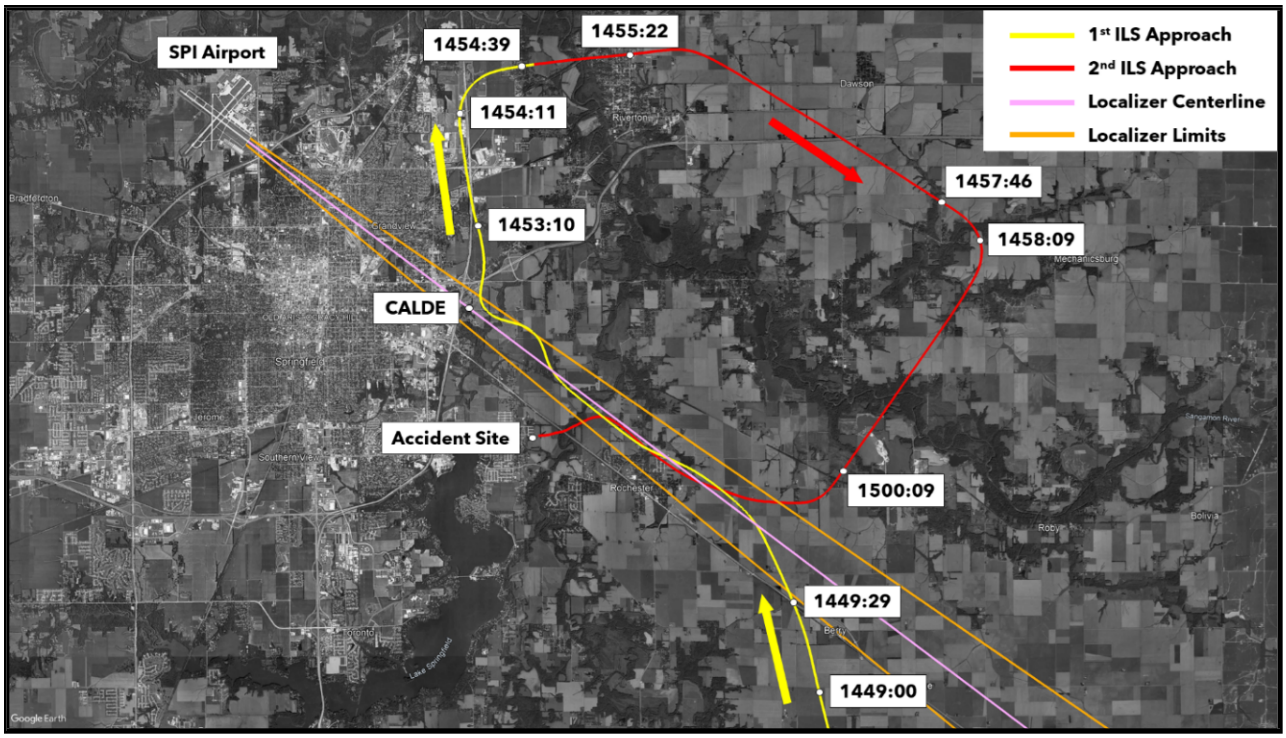

Figure 1. ADS-B track data with localizer centerline and limits.

At 1449:59, the airplane flew through the localizer centerline while still on the assigned 340° heading, as shown in figure 2. After crossing through the localizer centerline, the airplane made a left turn to a 295° course.

Figure 2. ADS-B track data for first ILS approach to runway 31.

At 1450:01, the pilot replied to the approach controller, "one one zero, three." At 1450:04, the approach controller transmitted, "it's one one zero point one five" and asked the pilot if he wanted to be revectored for the approach. At 1450:10, the pilot asked the controller, "Is it one one zero, five?" The approach controller replied, "It is one one, ah, zero point one five. one one zero point one five. ten point one five." The pilot did not respond to the controller's question.

At 1450:24 and 1450:40, the approach controller asked the pilot if the airplane was established on the localizer and receiving the glideslope, respectively, and the pilot responded affirmatively. At that time, the airplane was flying through the localizer at 2,930 ft msl while still on the 295° course and was about 3.8 nm southeast of CALDE. At 1450:45, the approach controller told the pilot to contact the tower controller. At 1450:52, the airplane made a right turn to a heading of about 306° to rejoin the localizer centerline.

At 1450:58, the pilot established contact with the tower controller and, 1 minute later, told the controller that the airplane was established on the localizer. At 1451:10, the tower controller cleared the pilot to land on runway 31. At that time, the airplane was at 2,960 ft msl and was heading toward CALDE about 0.1 nm left of the localizer centerline.

At 1451:25, the tower controller told the pilot that the airplane appeared to be "slightly left of course." The pilot replied, "correcting." The airplane crossed through the localizer centerline on a 340° course and an altitude of 2,450 ft msl.

At 1451:56, the tower controller transmitted, "cancel any clearance, climb and maintain three thousand, turn right heading three six zero," At 1452:02, the pilot replied, "Okay (unintelligible) thousand, here we go, seventy one romeo." At 1452:11, the tower controller transmitted, "seven romeo lima, again, cancel any clearance, climb and maintain three thousand, turn right heading three six zero." At 1452:16, the pilot replied, "three six zero on the turn, here we go, seventy one romeo." At 1452:37, the tower controller told the pilot, "seven one romeo, contact departure, they'll vector you around for another, ah, approach here, you were, ah, right (and) left of course we, ah, it just didn't look safe from here so contact departure one two six point one five."

At 1453:10, the pilot reestablished contact with Springfield approach control and reported flying along a 360° heading. The approach controller asked the pilot if he wanted to be vectored back to the ILS 31 instrument approach or change to the ILS 22 instrument approach. At 1453:45, the pilot replied, "How about we go back to three one?" The approach controller told the pilot to turn right onto a heading of 090° for vectors to the ILS runway 31 approach.

At 1454:11, the approach controller asked the pilot, "are you having some issues with your nav head?" The pilot replied, "Yup." At 1454:17, the approach controller asked the pilot if he would prefer to fly an approach surveillance radar (ASR) approach instead of the ILS approach. The pilot's response was unintelligible. At 1454:27, the approach controller told the pilot that his transmissions were intermittent and asked him if the airplane was having electrical issues. At

1454:33, the pilot replied, "Ah, that's negative." At 1454:39, the pilot transmitted, "we will just do three one over again and…we're picking up a little ice." At 1454:35, the approach controller asked the pilot again if he would prefer the ASR approach instead of the ILS approach. At 1454:52, the pilot replied, "Okay, no we will try it again, it just, ah, took off when we, ah (unintelligible) when we were ah about twenty three hundred."

At 1455:22, the approach controller told the pilot to turn right to a 130° heading and asked if the airplane was still in icing conditions. The pilot replied that the airplane was above the icing conditions at 3,000 ft msl. At 1457:46, the approach controller told the pilot to turn right to a 220° heading and then asked the pilot to verify if the airplane was receiving the localizer signal. At 1458:12, the pilot replied, "we're picking up the localizer."

At 1500:09, the approach controller transmitted, "six miles from CALDE, turn right heading two eight zero, maintain three thousand until established on the localizer, cleared I-L-S runway 31 approach." The pilot acknowledged this instruction. The airplane entered a descent from 3,000 ft msl following the approach clearance. The published glideslope intercept altitude for the ILS runway 31 approach was 2,100 ft msl.

Between 1500:35 and 1501:00, the airplane's course was about 270° as it approached the localizer from the east, as shown in figure 3. At 1501:00, the airplane turned right to a 290° course and subsequently flew through the localizer centerline at 1501:28. When the airplane flew through the localizer centerline, about 4.4 nm from CALDE, the airplane was descending through 2,650 ft msl. The airplane continued toward CALDE slightly left of the localizer centerline. At 1502:03, the approach controller transmitted, "Aerostar seven one romeo, is everything looking good now, we are showing you on course." At 1502:07, the pilot replied, "yup, looking good."

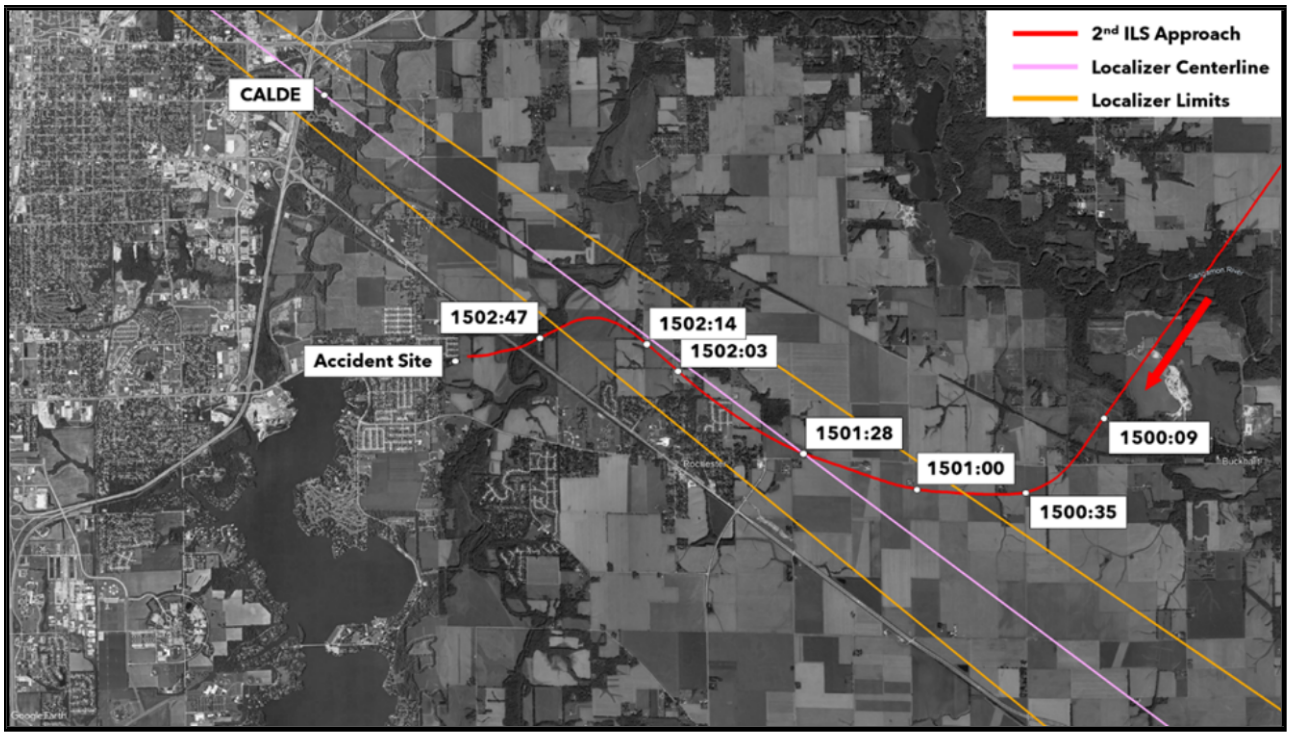

Figure 3. ADS-B track data for second ILS approach to runway 31.

At 1502:11, the approach controller instructed the pilot to contact Springfield tower, and the pilot acknowledged this instruction. At that time, the airplane was about 3 nm from CALDE, descending through 2,300 ft msl, and 0.05 nm to the left the localizer centerline. About 1502:16, the airplane entered a left turn away from the localizer and descended below the glideslope intercept altitude (2,100 ft msl), as shown in figures 3 and 4.

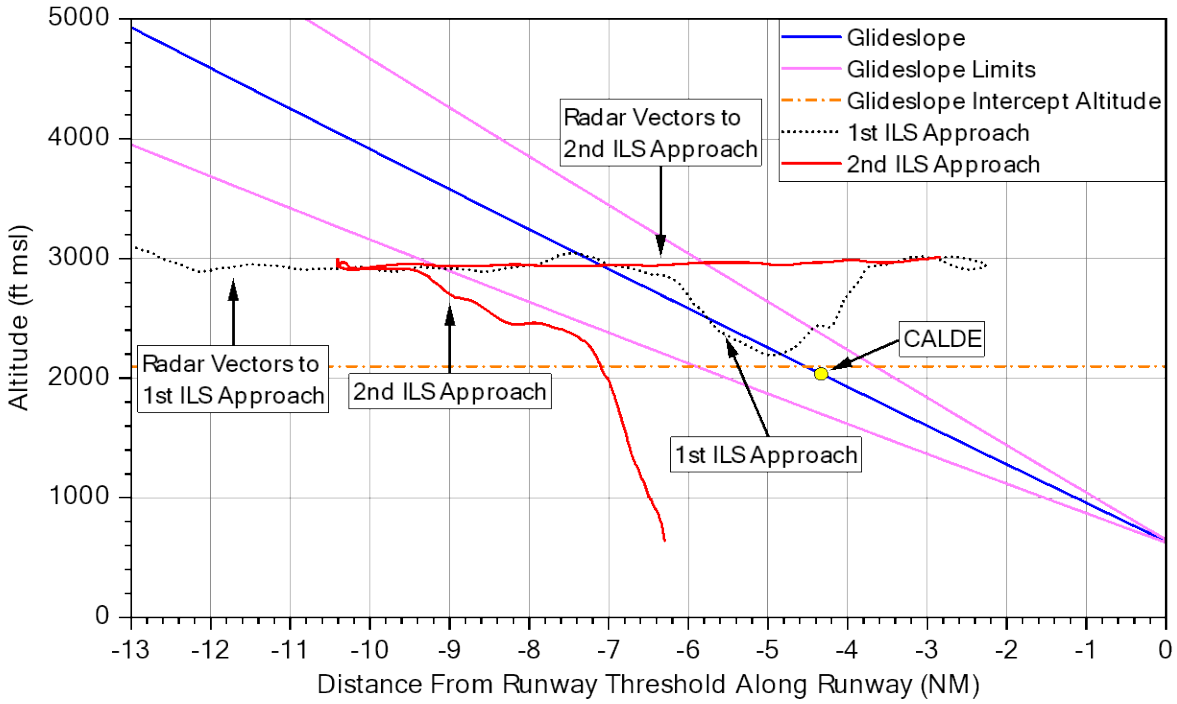

Figure 4. Airplane altitude with glideslope reference.

At 1502:37 and 1502:45, the tower controller attempted to contact the pilot. At 1502:47, the pilot replied, "we've got a prob," and then the transmission cut off. At that time, the airplane was descending through 1,275 ft msl on a 246° course. No further transmissions were received from the pilot.

The final recorded ADS-B data point, at 1503:11, indicated that the airplane was at an altitude of 641 ft msl (about 66 ft above ground level [agl]) with a groundspeed and ground track of 87 knots and 267°, respectively, as shown in figure 5. During the final 5 seconds of recorded data, the airplane's descent rate changed rapidly from 1,500 to about 5,450 fpm. The final ADS-B data point was located about 380 ft east-northeast of the location where the airplane impacted terrain. A postcrash fire ensued.

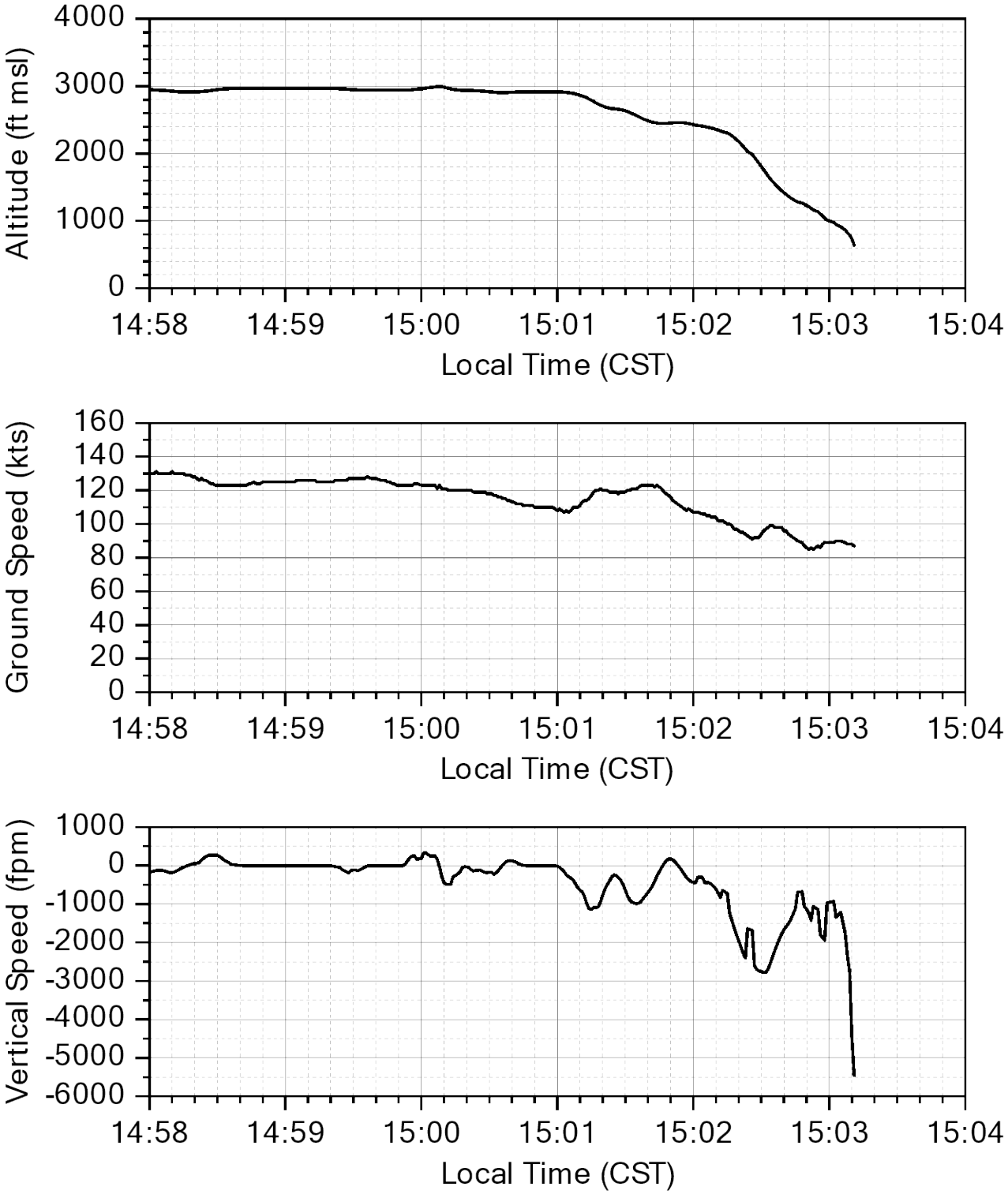

Figure 5. Altitude, groundspeed, and vertical speed data for the second ILS approach.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	69,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 6, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 29, 2017
Flight Time:	(Estimated) 5500 hours (Total, all aircraft)		

A review of available logbook documentation revealed that the pilot's last recorded flight was for a 2017 flight review. The available evidence for this investigation did not indicate whether the pilot had a more current logbook. The pilot was instrument rated, but his recent instrument flight experience could not be determined with the available evidence.

From August 21 to 23, 2019, the pilot received initial training in the Piper PA-60-601P airplane from Advanced Flight Training International, Sarasota, Florida. The flight instructor who provided the training stated that the pilot had received a certificate of completion that was limited to visual flight rules (VFR) operations because the airplane had a malfunctioning horizontal situation indicator (HSI) during training, which prevented an evaluation of the pilot's ability to fly solely by reference to instruments. The flight instructor stated the pilot had demonstrated, "very good piloting skills operating the aircraft in a safe manner and keeping it within its limitations."

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N6071R
Model/Series:	PA60 601P	**Aircraft Category:**	Airplane
Year of Manufacture:	1979	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	61P-0686-7963324
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	August 1, 2019 Annual	**Certified Max Gross Wt.:**	6000 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	3542.7 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-540-AA1A5
Registered Owner:		**Rated Power:**	350 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

The airplane was equipped for operations in instrument meteorological conditions and icing conditions. The airplane’s total fuel capacity of 173.5 gallons (165.5 gallons usable) was distributed between two wing fuel tanks and a fuselage tank. According to fueling documentation, the airplane's fuel system was topped-off before the accident flight.

Shortly after purchasing the airplane in August 2019, the pilot had an issue with the airplane’s HSI not synchronizing with the remote compass. According to the airplane’s current maintainer, an overhauled HSI was purchased and shipped directly to the pilot to be installed in the airplane. A review of available maintenance documentation and discussions with several maintenance facilities were unable to establish if the malfunctioning HSI had been replaced before the flight. The HSI installed in the airplane at the time of the accident sustained significant thermal and fire damage which prevented testing.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SPI,598 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	14:52 Local	**Direction from Accident Site:**	315°
Lowest Cloud Condition:		**Visibility**	5 miles
Lowest Ceiling:	Overcast / 700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.1 inches Hg	**Temperature/Dew Point:**	-1°C / -3°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Huntsville, AL (HSV)	**Type of Flight Plan Filed:**	IFR
Destination:	Springfield, IL (SPI)	**Type of Clearance:**	IFR
Departure Time:	13:01 Local	**Type of Airspace:**	Class C

An AIRMET was active for moderate icing while operating in clouds between the freezing level and 8,000 ft msl. The pilot reported to the approach controller that the cloud tops were about 3,000 ft msl.

At 0734 on the morning of the accident, the pilot filed, via ForeFlight, IFR flight plans from Sarasota/Bradenton International Airport (SRQ), Sarasota, Florida, to HSV and then from HSV to SPI. A weather briefing was automatically generated for both flights, but it is unknown if the pilot reviewed the provided weather data. The pilot did not access any static weather imagery, such as AIRMETS or other graphic products, during his session. ForeFlight reported that, at 1245, the pilot accessed the meteorological aerodrome report (METAR) and terminal area forecast (TAF) for both HSV and SPI. The SPI METAR, issued at 1152, reported a 5-mile surface visibility with mist, a 500-foot agl overcast ceiling, and a 3-knot surface wind of variable direction. The SPI TAF, issued at 1142, forecast a 1,500-ft agl overcast ceiling, a surface visibility greater than 6 miles, and a 3-knot surface wind of variable direction between 1400 and 1800.

Airport Information

Airport:	Abraham Lincoln Capital Arpt SPI	**Runway Surface Type:**	Asphalt
Airport Elevation:	598 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	31	**IFR Approach:**	ILS
Runway Length/Width:	7400 ft / 150 ft	**VFR Approach/Landing:**	None

The airport was equipped with an air traffic control tower and approach control that were operational at the time of the accident. According to FAA documentation, all components of the ILS runway 31 approach were functioning properly at the time of the accident.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	39.762389,-89.57219

The airplane impacted a harvested cornfield about 6.3 nm southeast of the runway 31 threshold and about 1 nm left of the localizer centerline. A 200 ft long debris path, oriented on a 248° magnetic heading, preceded the location of the main wreckage. The airplane's left wingtip impacted the ground first, followed by the left and right propellers, respectively. The nose landing gear wheel was found separated from the fork assembly about 40 ft from the initial point of impact. The outboard 2.5 ft of the left aileron was found separated from the left wing along the wreckage debris path.

The main wreckage came to rest at the western edge of the cornfield amongst several trees and a wire fence, and consisted of the entire fuselage, both wings, and the empennage. The fuselage cabin and cockpit exhibited extensive damage from the postaccident fire.

Both wing spars were fractured at their wing roots and each wing remained partially attached to the fuselage by engine control cables. Flight control continuity could not be verified because the control push/pull tubes for the ailerons, elevators, and rudder exhibited extensive impact and fire damage. Both ailerons and flaps exhibited impact and fire damage. The hydraulic flap actuators were found extended about 1.5" consistent with about 20° of flap extension. The flap control handle was found in an intermediate position. Both elevators remained attached to the horizontal stabilizer and exhibited fire damage. The rudder remained attached to the vertical stabilizer; however, most of the rudder was destroyed by fire. The landing gear selector handle

was not located during the investigation, but the landing gear was found extended at the accident site. The throttle quadrant was destroyed by impact and fire damage.

The instrument panel sustained significant thermal damage during the postaccident fire. The airspeed indicator and altimeter were destroyed by fire. The attitude indicator and HSI were extensively damaged by fire and could not be tested. The internal gyros of the attitude indicator and HSI did not exhibit any evidence of rotational scoring. The turn indictor gyro was found separated from its instrument case that was not located during the investigation. The turn indicator gyro did not exhibit any evidence of rotational scoring. The backup course deviation indicator was destroyed by fire. The electronic engine trend monitor was destroyed by fire. The engine tachometer indicated 1,200 rpm for both engines. The manifold pressure gauge indicated 28 and 30 inches of mercury for the left and right engines, respectively.

Both engines remained attached to their respective engine mounts and nacelles. Internal engine and valve train continuity were confirmed for each engine. Compression and suction were noted on all cylinders in conjunction with crankshaft rotation. Both magnetos on each engine were damaged by fire and could not be tested. The spark plugs exhibited features consistent with normal engine operation. Borescope examination of each cylinder did not reveal any anomalies with the cylinders, pistons, valves, or valve seats. Both oil pumps discharged oil when their respective engine crankshaft was rotated. The pressure pump installed on each engine could not be rotated because of fire damage to their respective drive gears; however, a partial disassembly of both pumps revealed no evidence of internal failure that would have precluded normal function during flight. The turbocharger system components remained secured at their respective mounts. The turbocharger compressors and turbine impellers remained intact and undamaged. The turbine impellers rotated freely by hand. The exhaust bypass valves remained secured at each turbocharger exhaust pipe and their butterfly valves remained intact and undamaged. The postaccident engine examinations did not reveal any anomalies that would have precluded normal operation during the flight.

The left propeller remained attached to the engine propeller shaft flange. The spinner dome was dented with one counterweight mark on the internal surface in the normal blade angle range of operation. Propeller blade no. 1 was bent aft, bent opposite rotation and twisted towards low pitch. Propeller blade no. 2 was bent slightly aft with no remarkable twisting. Propeller blade no. 3 was bent aft, opposite rotation and twisted towards low pitch. All three propeller blades exhibited chordwise/rotational scoring isolated to the leading edges on both the camber and face side. The low pitch stop had an impact mark consistent with the propeller operating on or near the low pitch stop angle.

The right propeller remained attached to the engine propeller shaft flange. All three propeller blades appeared to be in the normal blade angle range. The spinner dome was dented with counterweight impressions that were consistent with normal blade angle range of operation. All three propeller blades were bent aft, opposite rotation in varying degrees and twisted towards low pitch. All three propeller blades exhibited chordwise/rotational scoring isolated to

the leading edges on both the camber and face side. The low pitch stop had an impact mark consistent with the propeller operating on or near the low pitch stop angle.

Additional Information

Garmin GPS Navigation/Communication Devices -
The database cards for the airplane's Garmin 430 and 530 panel-mounted GPS navigation/communication devices were recovered at the accident site and placed in a test device to determine their expiration dates. The obstacle database and IFR database cards expired on September 13, 2018. Further review of the IFR database cards established that the stored localizer frequency for the ILS runway 31 approach at SPI was the same frequency (110.15 MHz) that was listed on the current approach plate.

Doorbell Security Camera Analysis -
A doorbell security camera located about 260 ft north of the accident site captured video and audio of the final seconds of the flight. A review of the camera footage revealed that the airplane descended toward the ground in a left-wing-down and slightly nose-down attitude, as shown in figure 6. All three landing gear were observed to be extended before impact. The initial impact with the ground was obscured by a porch post and trees; when the airplane reemerged, it was sliding on its lower fuselage. Smoke from a postimpact fire was observed seconds after the accident.

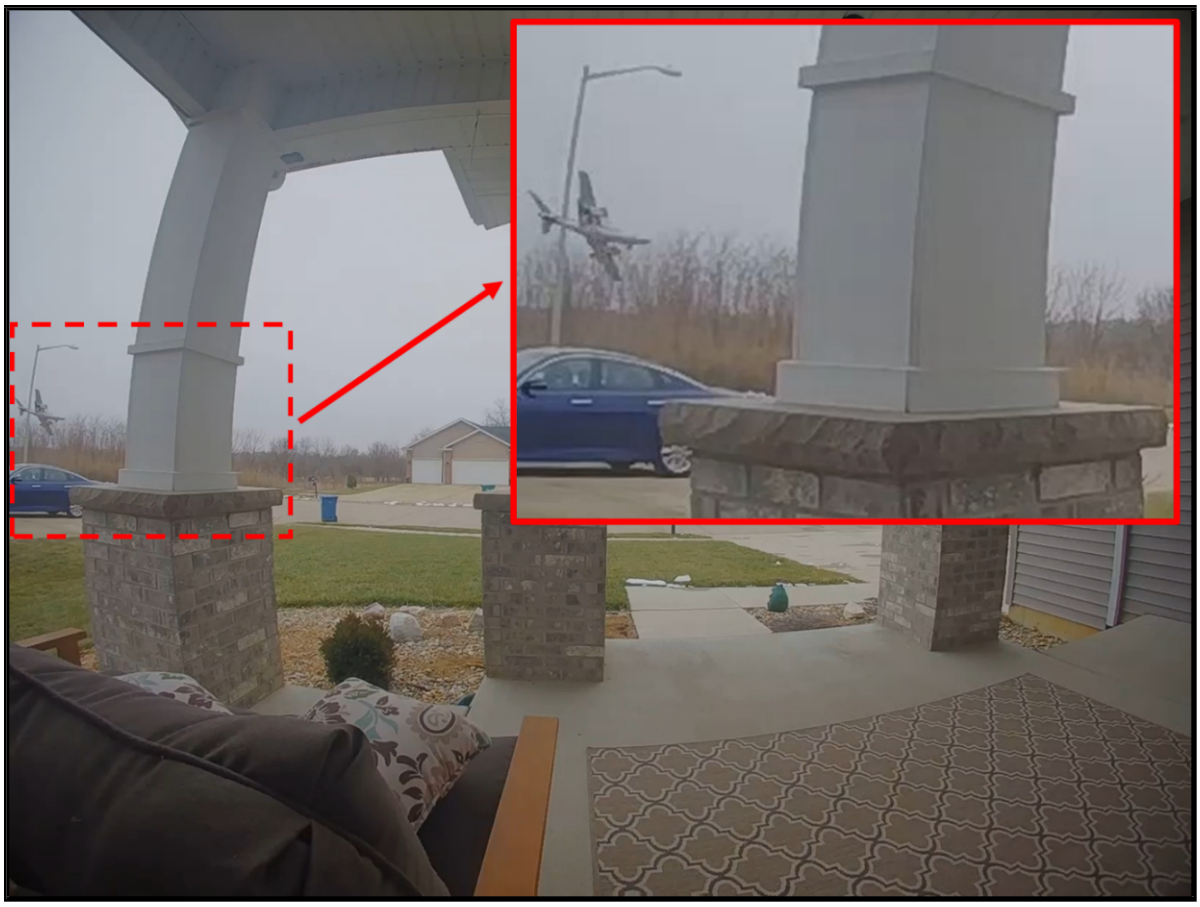

Figure 6. Doorbell camera image of accident airplane shortly before impact.

A second doorbell security camera, located about 0.6 nm south of the accident site, captured audio of the final seconds of the flight. The sound spectrums of both doorbell cameras were assessed to identify any propeller sound signatures that were consistent with the propellers rotating under engine power. Both sound spectrums exhibited a relatively constant propeller noise signature until about 2 seconds before impact. The results of an acoustic analysis were consistent with the airplane's propellers rotating at 2,500 rpm before a sudden reduction in propeller speed to about 1,200 rpm about 2 seconds before impact.

Both propellers left three distinct slash marks in the soil. The average distance between the left propeller strike marks was 2.50 ft. The average distance between the right propeller strike marks was 2.64 ft. An estimation of the airplane's groundspeed at impact was calculated using the average distance between the propeller strike marks and a propeller rotation speed of 1,200 rpm (as determined by the electronic tachometer and the sound spectrums from the videos). According to the propeller strike mark calculations, the airplane's groundspeed was between 88 and 94 knots at impact.

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew		
Additional Participating Persons:	Nick Loftus; Federal Aviation Administration, Springfield FSDO; Springfield, IL Mark Platt; Lycoming; Phoenix, AZ Les Doud; Hartzell Propeller; Piqua, OH		
Original Publish Date:	February 7, 2023	**Investigation Class:**	3
Note:			
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100880		