Aviation Investigation Final Report

Location:	Sahuarita, Arizona	**Accident Number:**	WPR22FA361
Date & Time:	September 28, 2022, 09:00 Local	**Registration:**	N74349
Aircraft:	GRUMMAN AMERICAN AVN. CORP. AA-5B	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot departed to a nearby airport, where he completed three takeoffs and landings before returning to his home airport. Flight track data indicated that the airplane slowed to about 60 knots (kts) on the downwind leg of the traffic pattern, much slower than its speed on the downwind leg during the previous two traffic patterns. Just before turning to the base leg, the airplane diverged away from the runway, then began a 180°, accelerating, descending turn. The airplane overshot the runway centerline but corrected before crossing the approach end of the runway. The airplane then continued past the runway, where it impacted a fence and terrain about 557 ft from the departure end of the runway. The pilot was fatally injured, and the airplane was destroyed by a postimpact fire.

Postaccident examination of the wreckage revealed that the aileron carry-through cable had fractured due to between-strand wear and overstress of the remaining wires. The loss of the carry-through cable degraded the aileron control system by only commanding movement of one aileron or the other, depending on which direction the pilot was turning. It is possible that the cable separated on the downwind leg of the last traffic pattern, as this was the first indication of a deviation of normal traffic pattern flight.

A review of maintenance records revealed the last annual inspection, occurred on October 1, 2021, and called for inspection of control cables, specifically at the pulleys.

Probable Cause and Findings

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

The pilot's loss of control following a separation of the aileron carry-through cable.

Findings

Aircraft	Aileron control system - Fatigue/wear/corrosion

Factual Information

History of Flight

Landing	Loss of control in flight (Defining event)

On September 28, 2022, about 0900 mountain standard time, a Grumman American Aviation AA5B airplane, N74349, was destroyed when it was involved in an accident near Sahuarita, Arizona. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot's partner, the pilot planned to fly from Flying Diamond Airport (6AZ8), Sahuarita, Arizona, to Ryan Field Airport (RYN), Tucson, Arizona, to practice touch-and-go landings and then return to 6AZ8. Automatic dependent surveillance-broadcast (ADS-B) data provided by the Federal Aviation Administration (FAA) recorded the airplane depart from 6AZ8 about 0830 and continue to RYN. The airplane crossed the runway three times and completed two traffic patterns. The airplane's ground speed as it crossed over the runway threshold was 63 kts on the first approach, 62 kts on the second, and 62 kts on the third. The airplane's groundspeed at midfield downwind was about 124 kts during the first traffic pattern and 110 kts during the second. The airplane then returned to 6AZ8.

The airplane's enroute altitude varied from about 1,000 ft above ground level (agl) to about 500 ft agl, and the airspeed varied from about 80 to 90 kts ground speed. The airplane entered the traffic pattern from the north, on an extended crosswind leg for runway 25, while about 500 ft agl, and about 75 kts. The airplane turned 90° to enter the downwind leg. While on the downwind leg, the airplane decelerated from about 83 knots groundspeed to about 57 kts. Just before turning base, the airplane diverged away from the runway slightly, as it entered a 180° base-to-final descending turn. During the 180° turn, the airplane accelerated to 96 kts and overshot the runway centerline. The airplane continued back toward the runway centerline and slowed to 88 kts when it crossed the runway threshold. The airplane's speed was about 65 kts at the runway midpoint. The last ADS-B data point recorded the airplane about 70 kts near the departure end of the runway. A witness who was near the approach end of runway 25, described the approach as "pretty fast and a little high."

The airplane came to rest about 557 ft west of the departure end of runway 25, in vegetation-covered terrain, at an elevation of about 3905 ft mean sea level (msl) (figure 1). A post-impact fire consumed most of the fuselage and wings. The top three strands of a barbed wire fence, located at the end of the runway, were fractured. Several bushes and trees between the runway and the wreckage exhibited breaks in the branches.

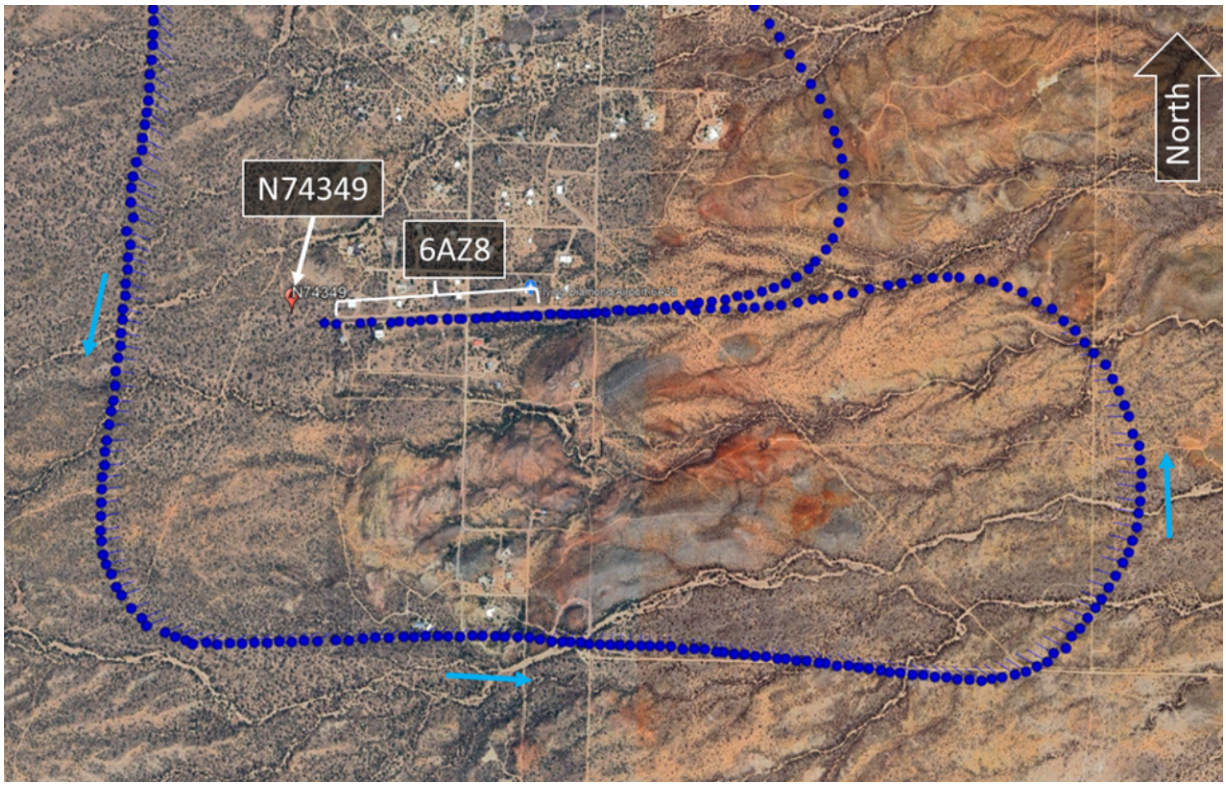

Figure 1. Google Earth image with ADSB data showing the traffic pattern upon returning to 6AX8. The flight route is indicated with blue arrows.

Postaccident examination of the airframe revealed a section of the right aileron carry-through cable had fractured. The fractured end exhibited two strands fractured about 5 inches from the remaining fractured cable strands, as depicted in Figures 2 and 3.

The fractured end of the cable was shipped to the National Transportation Safety Board's Materials Laboratory for further examination. Examination of the aileron control cable revealed areas of flat, elongated, angular fracture surfaces on the ends of many of the wires. The angular fracture surfaces displayed rub marks and the cross sections of the wires adjacent to separations had thinned wires still grouped together into strands. The orientation and characteristics of the fractured wire ends were consistent with between-strand wear and subsequent overstress separation. The remaining wires had cup-and-cone-like fracture surfaces accompanied by adjacent necking of the wire cross-section, consistent with overstress separation.

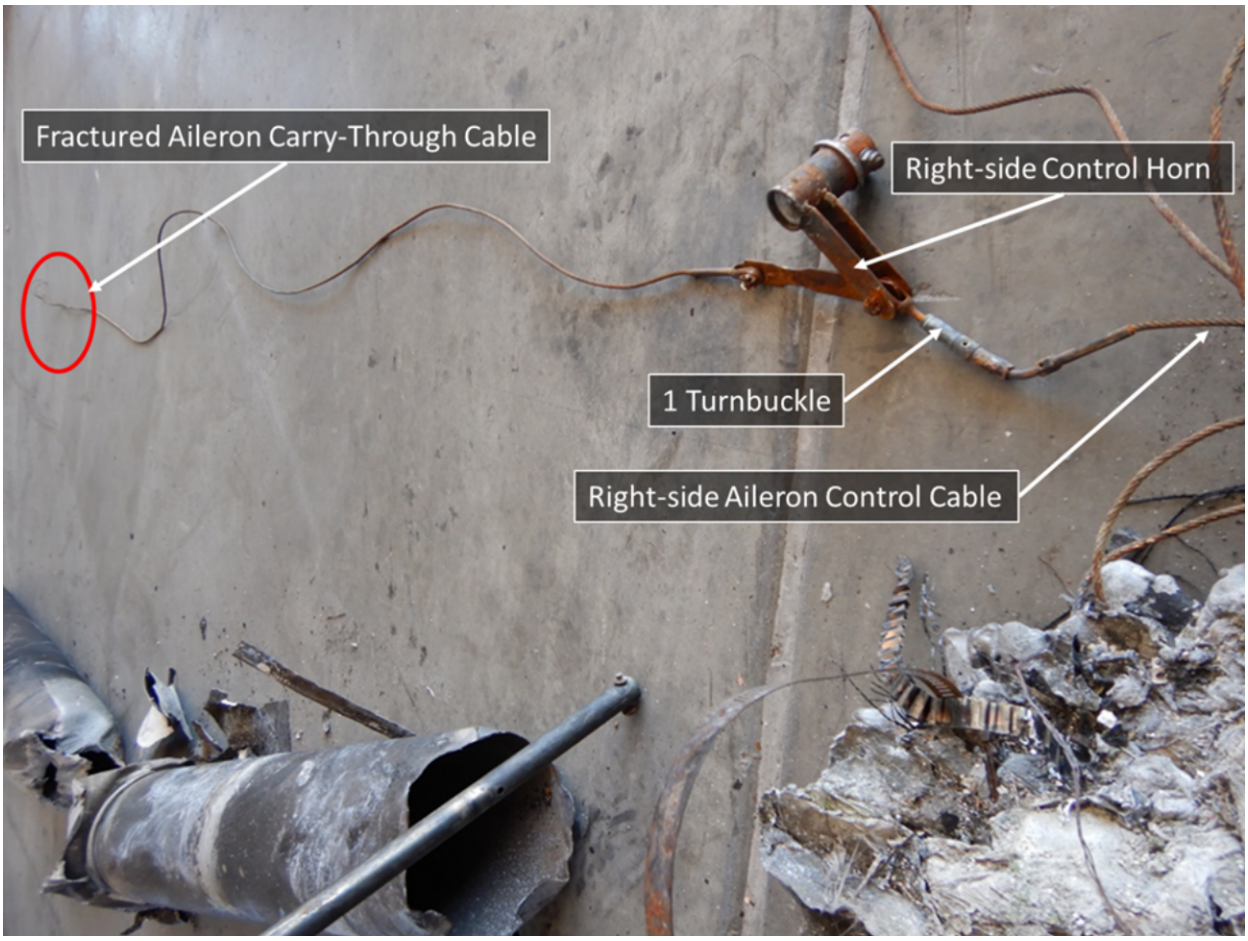

Figure 2. Image showing the components of the right aileron control system.

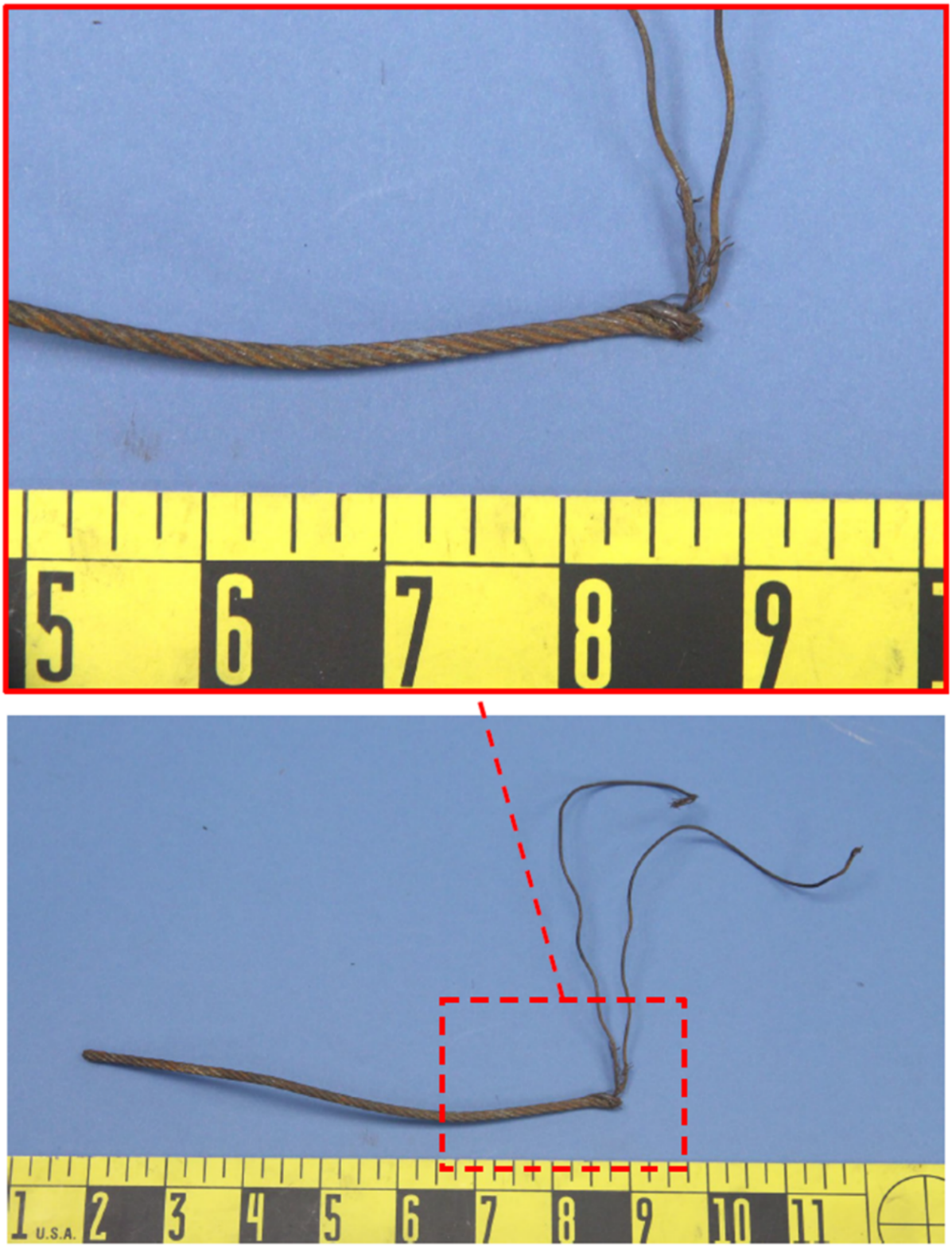

Figure 3. Fractured section of the aileron carry-through cable, showing the two distinctive break areas.

According to the maintenance manual for the AA-5 series airplane, “A carry-through cable, attached to the control horns, extends aft to the carry-through pulley in the aft fuselage. The cable provides completion of the aileron control loop such that as one aileron moves up, the other aileron moves down.” Figure 4 is an illustration of the aileron control system.

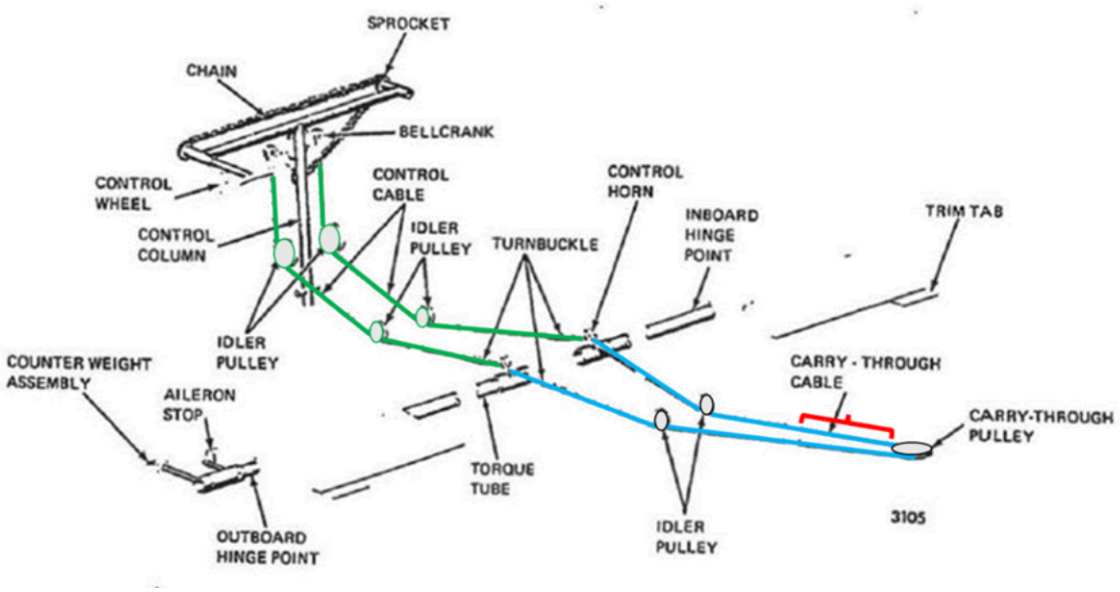

Figure 4. Illustration of the aileron control system. The control cables are highlighted in green, the carry-through cable is highlighted in blue, and the estimated location of the break is identified in red. Illustration courtesy of the AA-5 Series Maintenance Manual.

A review of the airplane’s maintenance records revealed the last annual inspection occurred on October 1, 2021. The annual or 100-hour inspection procedure checklist, for the accident airplane, stated in part, *“Cabin Group, Item 7. Check chains, cables, pulleys, turnbuckles, and cable ends for condition, secure attachments, and safeties. Specifically check cables at pulleys for fraying while actuating controls through full travel. (max four broken wires acceptable).”*

Pilot Information

Certificate:	Private	**Age:**	76,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	BasicMed With waivers/limitations	**Last FAA Medical Exam:**	January 15, 2022
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1126 hours (Total, all aircraft), 59.8 hours (Total, this make and model), 47 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	GRUMMAN AMERICAN AVN. CORP.	**Registration:**	N74349
Model/Series:	AA-5B	**Aircraft Category:**	Airplane
Year of Manufacture:	1975	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	AA5B-0203
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	October 1, 2021 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2316 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Not installed	**Engine Model/Series:**	O-360 A4K
Registered Owner:	On file	**Rated Power:**	180 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:	KRYN,2418 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	09:45 Local	**Direction from Accident Site:**	348°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:		**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:**	31°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sahuarita, AZ	**Type of Flight Plan Filed:**	None
Destination:	Sahuarita, AZ	**Type of Clearance:**	Unknown
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	Flying Diamond Airport 6AZ8	**Runway Surface Type:**	Asphalt
Airport Elevation:	3800 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	25	**IFR Approach:**	None
Runway Length/Width:	2650 ft / 35 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	Unknown
Total Injuries:	1 Fatal	**Latitude, Longitude:**	31.937408,-111.12437

Administrative Information

Investigator In Charge (IIC):	Salazar, Fabian
Additional Participating Persons:	Frank Waterhouse; Federal Aviation Administration Mark Platt; Lycoming Engines; Phoenix, AZ
Original Publish Date:	May 14, 2024
Last Revision Date:	May 14, 2024
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=106017