



AVIATION



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# Aviation Investigation Final Report

<b>Location:</b>	Palmyra, Virginia	<b>Accident Number:</b>	ERA24FA209
<b>Date &amp; Time:</b>	May 5, 2024, 08:54 Local	<b>Registration:</b>	N690BM
<b>Aircraft:</b>	ROCKWELL INTERNATIONAL 690A	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The airplane was in cruise flight at 20,000 ft on an instrument flight rules (IFR) cross-country flight when the pilot reversed course. When an air traffic controller queried the pilot, he replied, "we have lost...we need to climb." The controller then asked the pilot, "what is your issue?" and the pilot responded, "we have lost autopilot." There were no further communications received from the pilot and radar contact with the airplane was lost shortly thereafter. A witness who saw the airplane as it descended toward ground impact described that it was on fire.

The wreckage of the airplane was heavily fragmented and scattered amongst a wooded area, with a debris path over 3 miles long. The left wing, left engine, left propeller, and empennage were heavily burnt and found at the main wreckage site. The right wing was separated at the wing root and was found 1/4-mile north of the main wreckage. The right wing was fire damaged, and the right engine and right propeller were not located. The vertical and horizontal stabilizers were found about 3/4-mile north of the main wreckage. All fractures exhibited overstress features consistent with an in-flight breakup. Mapping of the wreckage indicated that the tail components likely separated first, followed by the right wing. This structural failure resulted in the horizontal and vertical stabilizers deforming and subsequently separating from the airplane. The lack of heat damage indicated that this separation occurred before the fire and that the inflight fire observed by the witness was likely a result of the inflight breakup. No evidence of any mechanical malfunctions or failures that would have preceded the inflight breakup was found during the postaccident wreckage examination.

Review of data provided by a preflight planning application vendor revealed that before the accident flight, the pilot filed an IFR flight plan and received a weather briefing. The briefing included an AIRMET for moderate icing with the freezing level between 9,000 and 13,000 ft, with tops at 24,000 ft, which included a portion of the intended route of flight. This AIRMET

was active at the time of the accident. Satellite imagery of the accident area and upper air sounding model data depicted cloudy, instrument meteorological conditions across the region from the surface to above 30,000 ft. Upper air data and computer modeling also identified the potential for some icing as the airplane climbed above 11,000 ft, and it is possible that some trace icing could have accumulated on the airplane's structure during this time. Weather radar reflectivity values indicated that along the final portion of the accident flight path, the potential for an encounter with more significant structural airframe icing was greater, though the severity of that icing could not be definitively quantified.

The airplane was equipped with de-ice boots on the leading edges of the wings, horizontal stabilizer, and vertical stabilizer. Most of the components of the airplane's de-ice system were destroyed during the accident sequence and could not be examined. Review of maintenance logbooks did not reveal evidence of any anomalies or preexisting discrepancies that would have precluded normal operation of the de-ice system before the accident flight.

The pilot's statement to air traffic control that he had "lost the autopilot," shortly before radar contact with the airplane was lost and the airplane broke up in flight, suggest that he may have been experiencing difficulty controlling the airplane, either with or without the aid of the autopilot. The airplane's pilot's operating handbook contained an airworthiness directive (AD) that explicitly warned pilots who encountered certain types of structural icing in flight not to utilize the autopilot, as it could mask tactile cues indicative of adverse changes in the airplane's handling characteristics. Given this information, it is likely that the pilot's loss of control that ultimately resulted in the airplane's inflight breakup was preceded by an accumulation of structural ice that altered the airplane's handling characteristics in a way that the pilot had not anticipated and was unable to recover from.

## 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 an encounter with structural icing, which resulted in an inflight breakup of the airplane.

### Findings

<b>Personnel issues</b>	Aircraft control - Pilot
<b>Environmental issues</b>	Conducive to structural icing - Response/compensation



## Factual Information

### History of Flight

Enroute-cruise	Structural icing
Enroute-cruise	Loss of control in flight (Defining event)
Uncontrolled descent	Aircraft structural failure

On May 5, 2024, about 0854 eastern daylight time, a Rockwell International 690A, N690BM, was destroyed when it was involved in an accident near Palmyra, Virginia. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to air traffic control information obtained from the FAA, the airplane was on an instrument flight rules IFR flight plan from Manassas Regional Airport (HEF), Manassas, Virginia, to Georgetown County Airport (GGE), Georgetown, South Carolina. The flight departed HEF at 0828. Radar data showed that the airplane was in cruise flight at 20,000 ft when it reversed course. The controller queried the pilot, who replied, "We have lost...We need to climb." When the controller asked the pilot, "what is your issue?" the pilot responded, "We have lost autopilot." There was no further communication from the pilot and radar contact was lost shortly thereafter.

A witness stated that he was inside his house when he heard what he thought was thunder. When the noise became louder, he went outside, looked up, and saw an airplane flying, "on its left side and on fire in the middle of the airplane." The airplane descended and impacted trees and the ground across the street from his house.

The pilot's logbook was not recovered. Review of his insurance application, dated May 23, 2023, revealed that he had reported a total flight experience of 3,801 hours, all of which was in multi-engine airplanes; 2,860 hours were in turboprop multi-engine airplanes. The pilot reported 17 flight hours during the previous 6-month period, of which 8 hours were in instrument meteorological conditions.

The accident airplane was manufactured in 1975 and equipped with two Airesearch (Honeywell) 776-horsepower turboprop engines. It was also equipped with inflatable de-icing boots on the leading edges of the wings, horizontal stabilizer, and vertical stabilizer, as well as a heated windshield for deicing purposes. Review of maintenance records revealed that the airplane's most recent inspection was completed on November 27, 2023. At that time, the airframe had accumulated 9,069 total hours of operation and the engines had accrued 1,619 hours since overhaul. The maintenance logbooks did not document any anomalies or discrepancies that would have precluded normal operation of the de-ice system.

The accident airplane make and model was subject to FAA AD 98-20-34, which became effective on November 3, 1998, and required that the Airplane Flight Manual incorporate the AD into the limitations section and normal procedures sections. The AD stated that if during flight, severe icing conditions were detected, the pilot should immediately contact air traffic control and ask for a change in altitude to exit the icing condition. Also, the use of autopilot was prohibited when certain icing indications were observed by the pilot, including an unusually extensive ice accumulation on the airframe and windshield in areas not normally observed to collect ice; accumulation of ice on the lower surface of the wing aft of the area protected by the de-icing system; or an accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed. The AD warned that since an operating autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot was prohibited when any of the above icing was observed by the pilot, or when unusual lateral trim requirements or autopilot trim warnings were encountered while operating in icing conditions.

The airplane was equipped with a Collins AP-106 autopilot system. The autopilot had two modes of operation: attitude mode and guidance mode. When the autopilot was engaged, an autopilot flight director computer control unit controlled the autopilot primary servos, which positioned the flight controls in response to steering commands from the computer section. The autopilot would automatically disengage when any of the following events occur: Autopilot power failure, gyro monitor failure, pitch or roll gyro rate exceeded, and auto-trim failure.

A review of weather data for the accident location and time revealed weather radar base reflectivity imagery that depicted altitudes above the accident location of between about 15,200 and 23,100 feet. The weather radar imagery identified light values of reflectivity along the final portion of the accident airplane's flight path, which a hydrometeor classification algorithm identified as dry snow and ice crystals.

A High-Resolution Rapid Refresh (HRRR) model sounding for near the accident site at 0900 identified broken to overcast cloud layers from below 1,000 feet through 34,000 feet. The freezing level was about 11,500 feet. The wind between 10,000 and 25,000 feet was from the southwest at magnitudes between 15 and 25 knots. There were no areas of significant turbulence noted above 10,000 feet. Light rime and mixed icing were noted between about 13,000 and 23,000 feet.

Visible and infrared satellite imagery depicted clouds over the accident region. The minimum brightness temperature over the final portion of the accident airplane's flight path was 229 Kelvin (-44°C), which, when considering the 0900 HRRR sounding, corresponded to cloud top heights of about 32,700 feet.

Data from the National Center for Atmospheric Research's (NCAR) prototype Current Icing Potential (CIP) algorithm were generated using NCAR's visualization software. According to NCAR, there was roughly a 50% chance of icing at the higher altitudes with severity up to moderate. Possible supercooled large drops (SLD) would likely be in the form of freezing drizzle. There was no supercooled liquid water in the model along the flight track, despite

some potential for icing according to CIP. Using the relationship between CIP severity and liquid water content, it was estimated that before encountering the area of reflectivity identified by the weather radar imagery, the airplane could have accreted 0.1 to 0.2 mm of ice, with above 0.35 mm being very unlikely.

Review of ForeFlight data revealed that the pilot filed an IFR flight plan and received a weather briefing for the accident flight. The briefing included an AIRMET for moderate icing with the freezing level between 9,000 and 13,000 ft, with tops at 24,000 ft, which included a portion of the route of flight. The AIRMET was active at the time of the accident.

The accident site was located in a wooded area and the wreckage path was over 3.5 miles long. The airplane was heavily fragmented and scattered along the debris path on a heading of 180° magnetic. The left wing, left engine, left propeller, and empennage were heavily burnt and located at the main wreckage site. The main wreckage came to rest inverted on a heading of 310°. The right wing was separated at the wing root and was located .25 mile north of the main wreckage. The right wing was fire damaged. The right engine and right propeller were not located. The vertical and horizontal stabilizers were located about .75 mile north of the main wreckage.

The instrument panel was fire damaged and all instruments, as well as all of the autopilot components, were destroyed; no useful information was obtained. The de-ice boots, cockpit switch for the de-ice system, and de-ice system timer were all destroyed by fire and could not be examined.

The right wing structure was deformed in a downward direction between the fracture at the root and the nacelle. The fractured surfaces were visually inspected, and they had a dull, grainy appearance consistent with overstress fractures. The right wing's leading edge skin was deformed upward on the upper and lower surfaces. The inboard mount block remained attached to the wing and did not show signs of deformation (this section was cut during recovery operations). The outboard mount fractured and deformed in the outboard direction. The left wing had a deformation in the downward direction near the wing root.

The right horizontal stabilizer separated from the airplane and was recovered in the debris field in three major pieces with no heat or fire damage. The right elevator was not recovered. The first piece comprised the right horizontal stabilizer forward spar, leading edge, the center spar, and most of the upper and lower skins from the root to about 80 inches outboard. The forward spar was completely fractured about 80 inches outboard of the root. The forward spar was partially fractured about 48 inches outboard of the root and the forward spar, leading edge, and portions of the upper and lower skins were twisted about 180° leading-edge-down between 48 and 80 inches outboard of the root. The second piece comprised the right horizontal stabilizer aft spar, portions of the center spar, and the upper and lower skins from about 5 inches inboard of the root to about 80 inches outboard of the root. The third piece consisted of the outboard end of the right horizontal stabilizer that spanned from about 80 inches outboard of

the root to the tip. The third piece was mostly intact with little damage. The fractured surfaces were visually inspected and had a dull, grainy appearance consistent with overstress fractures.

The left horizontal stabilizer separated from the airplane in two major pieces with no heat or fire damage. The elevator and most of the aft and center spars separated from the rest of the stabilizer and were not recovered. The first piece comprised the left horizontal stabilizer forward spar, leading edge, and most of the upper and lower skins from the root to about 50 inches outboard. The forward spar was fractured approximately 50 inches from the root. The second piece comprised the outboard section of the left stabilizer from about 50 inches outboard of the root to the tip, with little damage to the outboard end. The aft spar was fractured approximately 45 inches from the tip and the center spar was fractured approximately 39 inches from the tip. The forward spar and leading edge were deformed at the fracture location, consistent with the elevator tip moving upwards and slightly leading-edge-up. The fractured surfaces were visually inspected and had a dull, grainy appearance consistent with overstress fractures.

The vertical stabilizer separated from the airplane with no heat or fire damage. The rudder was not recovered. The vertical stabilizer was deformed to the right relative to the fuselage mount structure attached at the base. The fractured surfaces were visually inspected and had a dull, grainy appearance consistent with overstress fractures.

The left engine was sent to the manufacturer for further examination, which revealed that the type and degree of damage was indicative of an engine that was operating at the time of impact. The left anti-ice valve was unremarkable and undamaged.

According to the Commonwealth of Virginia, Department of Health, Office of the Chief Medical Examiner, the cause of death for the pilot was blunt force injuries. Toxicology testing of samples recovered from the pilot's remains was performed by the Medical Examiner and the results were negative for tested substances.

## Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	63, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	April 29, 2023
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	3817 hours (Total, all aircraft), 18 hours (Last 90 days, all aircraft)		

## Passenger Information

<b>Certificate:</b>		<b>Age:</b>	
<b>Airplane Rating(s):</b>		<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>		<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>		<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>		<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>		<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>			

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	ROCKWELL INTERNATIONAL	<b>Registration:</b>	N690BM
<b>Model/Series:</b>	690A NO SERIES	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1975	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	11311
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	11
<b>Date/Type of Last Inspection:</b>	November 27, 2023 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	10250 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo prop
<b>Airframe Total Time:</b>	9069 Hrs as of last inspection	<b>Engine Manufacturer:</b>	AIRESEARCH
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	TPE331-5&6SER
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	776 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	CHO,644 ft msl	<b>Distance from Accident Site:</b>	20 Nautical Miles
<b>Observation Time:</b>	08:53 Local	<b>Direction from Accident Site:</b>	327°
<b>Lowest Cloud Condition:</b>	Scattered / 300 ft AGL	<b>Visibility</b>	2 miles
<b>Lowest Ceiling:</b>	Broken / 900 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	30.15 inches Hg	<b>Temperature/Dew Point:</b>	13°C / 11°C
<b>Precipitation and Obscuration:</b>	Moderate - None - Mist		
<b>Departure Point:</b>	Manassas, VA (HEF)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Georgetown, SC (GGE)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	08:29 Local	<b>Type of Airspace:</b>	Class A

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	1 Fatal	<b>Aircraft Fire:</b>	In-flight
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	Unknown
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	37.859827,-78.229488

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Boggs, Daniel
<b>Additional Participating Persons:</b>	Steve Harness; FAA/FSDO; Richmond, VA Camp Morton; Honeywell; Phoenix , AZ
<b>Original Publish Date:</b>	April 29, 2026
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=194204">https://data.nts.gov/Docket?ProjectID=194204</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).