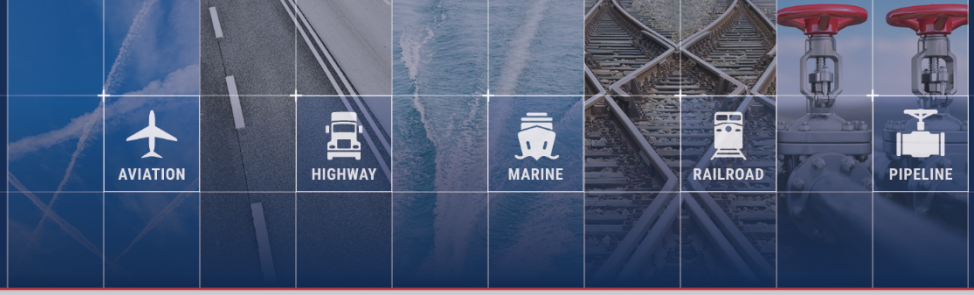

Aviation Investigation Final Report

Location:	INDIANTOWN, Florida	**Accident Number:**	ATL96FA123
Date & Time:	August 24, 1996, 10:30 Local	**Registration:**	N234VW
Aircraft:	Burkhart Grob G-115D	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight was scheduled as an aerobatic flight, but no witnesses actually saw the airplane maneuvering. Hunters reported hearing the engine 'revving up' and saw pieces of the airplane falling to the ground. Wreckage was scattered over an area about 2400' long by 400' wide. Separated pieces of the airplane included: an 8' section of the left wing, pieces of the left and right elevators, and other debris from the empennage & canopy. The top portion of the rudder assembly was found about 2400' from the main wreckage. The left aileron was found intact, and it weighed 7.15 pounds; balance checks of the left aileron showed that its residual hinge moment was between +0.138 and +0.200 foot-pounds (trailing edge heavy), exceeding the Grob specification which ranges from -0.22 (leading edge heavy) to +0.074 foot-pounds (trailing edge heavy). A review of the aircraft maintenance logs revealed the airplane had been repainted, but the flight control surfaces had not been rebalanced. Manufacturing records showed that when the left aileron was originally installed, it weighed 6.40 pounds and had a residual hinge moment of +0.071 pounds. Estimates of the residual hinge moments of the other flight control surfaces, including the rudder, disclosed that they also exceeded Grob's trailing-edge-heavy service limits. Grob's flutter analysis, based on control connection stiffness, indicated potential rudder flutter under these conditions. Oxide deposits found on several of the elevator hinge contact surfaces evidenced disbonding/delamination.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of maintenance personnel to rebalance the flight controls after the airplane had been repainted, which resulted in rudder flutter and in-flight breakup of the airplane.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: MANEUVERING

Findings
1. AEROBATICS - PERFORMED
2. (C) FLIGHT CONTROL,RUDDER SURFACE - FLUTTER
3. (C) MAINTENANCE,BALANCING - NOT CORRECTED - OTHER MAINTENANCE PERSONNEL
4. FLIGHT CONTROL,ELEVATOR ATTACHMENT - DELAMINATION
5. EMPENNAGE - OVERLOAD
6. EMPENNAGE - SEPARATION
7. WING - OVERLOAD
8. WING - SEPARATION

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On August 24, 1996, about 1030 eastern daylight time, a Burkhart Grob G-115D, N234VW, experienced an in flight break-up over Dupuis Reserve near Indiantown, Florida. The airplane was operated by SunQuest Aviation, under the provisions of Title 14 CFR Part 91 and visual flight rules. A flight plan was not filed for the local, aerobatic instructional flight. Visual meteorological conditions prevailed. The two certificated flight instructors were fatally injured, and the wreckage was nearly consumed by a post-impact ground fire. The flight's exact departure time from North Palm Beach County Airport, in West Palm Beach, Florida, was not determined.

According to an official from SunQuest Aviation, N234VW was scheduled for an aerobatic flight with a proposed 0900 departure time. The airplane was refueled by the local Fixed Base Operator (FBO) before the departure. Both pilots were equipped with parachutes, but the total purpose of the flight and the destination training area were not known. After the departure, the flight was next heard by several hunters in the reserve. One hunter stated that the airplane was in a level attitude at about 500 feet. The other hunters became aware of the airplane when they heard the high "revving" sound of the engine. As the hunters looked in the direction of the revving sound, they saw debris from the airplane falling.

According to the President of SunQuest Aviation, she was not aware of the level of planned aerobatic training for this flight.

AIRCRAFT INFORMATION

Information on the airplane is included in this report on page 2 of the factual report under the data field labeled ''Aircraft Information". A review of the aircraft maintenance logs disclosed that N234VW was reassembled, test flown, and issued a utility/aerobatic airworthiness certificate after its shipment from The Republic of Germany.

PERSONNEL INFORMATION

Information about the First Pilot is included in this report on page 3 of the factual report under the data field labeled "First Pilot Information". Information about the second pilot on board the airplane is found in "Supplement E" of the factual accident report.

METEOROLOGICAL NFORMATION

Visual weather conditions prevailed at the time of the accident. Weather information is

contained in this report on page 3 of the factual report under the data field labeled "Weather Information".

WRECKAGE AND IMPACT INFORMATION

The wreckage was found scattered over an area about 2400 feet long by 400 feet wide, along a 130 degrees magnetic heading. The top half of the rudder was located about 2400 feet northwest of the main wreckage, with additional empennage debris scattered between the rudder section and the main wreckage. The fire damaged main wreckage was approximately 400 feet southeast of a dirt road. Additional aircraft components attached to the main wreckage included the left wing assembly, the engine and propeller assemblies, and the empennage section.

An eight foot section of the left wing assembly was located 900 feet north of the main wreckage. Examination of the left wing assembly disclosed that the upper left wing shell and honeycomb sandwich material appeared to have sustained a relatively clean or tensile type failure. The left flap assembly was torn from the wing assembly. The upper and lower skin of the left wing flap was broken into several pieces but two thirds of the flap spar was attached (See attached structures group report).

South of the left wing assembly, debris from the canopy and tail cone assemblies was located adjacent to and on the dirt road (See attached wreckage diagram). Plexiglass debris from the canopy assembly was scattered along the wreckage path and in the vicinity of the canopy assembly. Examination of the canopy assembly revealed that the red emergency jettison handle was wired in place. The canopy handle and locking mechanism were attached and appeared to function normally, however, the latching lateral detent pin, used to secure the latching hook in the locked position, was missing. Both canopy locking pins were bent 15 to 20 degrees downward and slightly inboard. The right emergency canopy jettison pin was bent 45 degrees.

The tail cone structure was located adjacent to the canopy assembly along the roadway. Examination of the assembly disclosed that the elevator control stops were not damaged. The elevator trim tab actuator and lever were bent and distorted but remained attached to the airframe. The lower rudder hinge pin assembly that was torn from the rudder assembly, remained secured to the rudder hinge bearing mounting plate. The hinge bearing mounting plate was bent downward 5 to 10 degrees.

The horizontal stabilizer and elevator debris was located approximately 900 feet northwest of the main wreckage in a grove of palmetto palm trees. Examination of the horizontal stabilizer assembly disclosed little damage to both the top and bottom shells. Examination of the right elevator assembly disclosed that the top and bottom shells had separated. The left elevator assembly examination revealed that the assembly was completely detached from the horizontal stabilizer.

An examination of the right elevator hinge assembly revealed the presence of oxide deposits on the hinge contact area. The right elevator was almost completely disbonded from the underlying portion of the elevator spar. The separation was typical of one which had been disbonded for an extended period of time. The typical discoloration observed on the outboard hinge was also seen on the inboard hinge (See attached Metallurgist's Factual Report).

Only the upper section of the rudder assembly, with the balance horn, was recovered for examination. This section of the rudder was located approximately 2400 feet from the main wreckage; no other rudder debris was discovered at the accident site. Examination of the rudder assembly disclosed that the upper rudder pivot pin remained attached to the horn rib and appeared undamaged.

MEDICAL AND PATHOLOGICAL INFORMATION

On August 25,1996, the postmortem examinations on both pilots were conducted by Dr. Fredrick P.Hobin at the Florida Division Of Forensic Science in Fort Pierce, Florida. The toxicological examinations were negative for alcohol and other drugs.

ADDITIONAL INFORMATION

A review of the aircraft maintenance records revealed that the airplane had been sanded and painted about 96 hours prior to this accident; the exact date the painting operation was completed was not determined. There were no aircraft maintenance records showing that the aircraft flight controls had been balanced after the most recent aircraft painting. According to SunQuest Aviation records, N234WV had flown several aerobatic flights subsequent to the completion of the painting operation; there were no problems reported by the pilots who had flown this airplane.

The left aileron was the only flight control surface that survived the impact forces with minimal damage. The left aileron was subsequently subjected to the Grob balancing procedures. The procedure determined that the left aileron weighed 7.15 pounds and the residual hinge moments were measured +0.200 foot pounds and +0.138 foot-pounds. The aileron weight conformed to Grob's specification which is between 6.16 and 7.48 pounds. However, the residual hinge moments exceeded Grob's service specifications which ranged from -0.22 foot pounds (leading edge heavy) to +0.074 foot pounds (trailing edge heavy). According to Grob, the aileron weighed 6.40 pounds when it was originally installed with a residual hinge moment of +0.071 foot pounds (See attached weights and residual moments of control surfaces)..

In addition to determining the balance status of the left aileron, samples of the exterior skin were metallographically prepared and the paint thickness measured (See attached Metallurgist's Factual Report). The paint thickness information was subsequently used to evaluate the balance and residual hinge moment for the remaining flight control surfaces. The test determined that all control surfaces were not in compliance with Grob's specifications.

According to FAA Advisory Circular 23.626-1A, the experimental mass properties of control surfaces and tab are important ingredients in flutter substantiation.

A review of the aircraft maintenance logs also disclosed that, on August 8, 1996, a Grob factory mechanic completed several outstanding service bulletins which included the replacement of the upper rudder bearing (from aluminum to steel). All work was accomplished in accordance with instructions from the Grob factory (see attached excerpts from aircraft maintenance logs).

The aircraft wreckage was released to Mr. Bill Harwell (insurance adjustor)
1175 Peachtree Street 100 Colony Square
Atlanta, Georgia 30361

Pilot Information

Certificate:	Commercial	**Age:**	35,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	August 30, 1995
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	1211 hours (Total, all aircraft), 1 hours (Total, this make and model), 1055 hours (Pilot In Command, all aircraft), 20 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Burkhart Grob	**Registration:**	N234VW
Model/Series:	G-115D G-115D	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Aerobatic	**Serial Number:**	820101D
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	August 22, 1996 100 hour	**Certified Max Gross Wt.:**	2028 lbs
Time Since Last Inspection:	3 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	589 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	AEIO-360-B1F
Registered Owner:	MAGPIE AVIATION INC.,	**Rated Power:**	180 Horsepower
Operator:	SUNQUEST AVIATION	**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PBI ,19 ft msl	**Distance from Accident Site:**	25 Nautical Miles
Observation Time:	10:30 Local	**Direction from Accident Site:**	350°
Lowest Cloud Condition:	Scattered / 3000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 4000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	29°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	WEST PALM BEACH, FL (F45)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	00:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	27.189647,-80.240676(est)

Administrative Information

Investigator In Charge (IIC):	Powell, Phillip
Additional Participating Persons:	LINDA HOWELL; FT LAUDERDALE , FL PAUL ALEXANDER; WASHINGTON , DC JIM WILDEY; WASHINGTON , DC MIKE KIESOV; KANSAS CITY , KS
Original Publish Date:	June 30, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=3658