Aviation Investigation Final Report

Location:	PITTSBURGH, Pennsylvania	**Accident Number:**	IAD96FA126
Date & Time:	August 4, 1996, 18:37 Local	**Registration:**	N2HT
Aircraft:	Aerotek PITTS SPECIAL S-1S	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

The pilot received clearance into the approved airshow aerobatic airspace, and initiated his first maneuver, a double snap roll. A video tape of the maneuver showed a deformation of the lower left wing within seconds of initiation of the maneuver. This was followed by a failure of the left outboard portion of the upper wing. Both the failed lower left wing and the failed upper left outboard portion of the top wing displaced aft against the empennage. The video then captured the airplane in a descent until water impact in an inverted attitude. According to witnesses, the pilot utilized airspeeds greater than the manufacturer's recommended maneuvering airspeeds. Witnesses also reported seeing the 'g' meter in the cockpit at higher positive and negative readings than recommended by the manufacturer. The pilot had voiced his concern about the airplane's wings because of flutter he experienced during recent flights.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's utilization of airspeeds greater than the manufacturer recommended maneuvering airspeeds which exceed the design limits of the airplane and resulted in the subsequent failure of the wing spar.

Findings

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

Findings
1. (C) AIRSPEED(VA) - EXCEEDED - PILOT IN COMMAND
2. (C) WING,SPAR - OVERLOAD
3. (C) DESIGN STRESS LIMITS OF AIRCRAFT - EXCEEDED - PILOT IN COMMAND
4. (C) WING,SPAR - FAILURE,TOTAL

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

Findings
5. TERRAIN CONDITION - WATER

Factual Information

HISTORY OF FLIGHT On August 4, 1996, approximately 1837 eastern daylight time, an Aerotek, Pitts Special S-1S, N2HT, was destroyed when a wing failed while performing aerobatics at the Three Rivers Regatta, and impacted in the Ohio River in Pittsburgh, Pennsylvania. The certificated commercial pilot/owner received fatal injuries. Visual meteorological conditions prevailed and no flight plan had been filed for the local flight conducted under 14 CFR Part 91.

The pilot took off from Allegheny County Airport at 1815. After a period of holding, the pilot received clearance into the Regatta Aerobatic Box. A video tape taken of the accident showed the maneuvering by the pilot for the planned initial maneuver, a double snap roll. Within seconds of the beginning of the video, the lower left wing and a portion of the top wing, failed. Both failed wings were seen folded aft against the empennage as the airplane descended and impacted the water inverted.

The accident occurred during the hours of daylight approximately 43 degrees, 27 minutes north latitude, and 80 degrees, 03 degrees west longitude.

PERSONNEL INFORMATION The pilot held a commercial pilot certificate with ratings for airplane single and multi-engine land, with the limitation that the carrying of passengers in airplanes for hire was prohibited at night and on cross-country flights of more than 50 nautical miles. His most recent Federal Aviation Administration (FAA) Second Class Medical Certificate was issued on May 16, 1996, with the limitation that he must wear corrective lenses for both near and far vision.

The pilot was a member of the International Council of Air Shows and possessed an Airshow Certification Evaluator card with an expiration date of December 31, 1996. A Statement of Acrobatic Competency with an expiration date of January 31, 1996, was found in the pilot's possessions. It contained maneuver limitations of "Solo Aerobatics," altitude limitations of "Level 1" surface, and authorized aircraft were "All Pitts." On July 25, 1996, the pilot signed the Certification of Pilot Briefing, which stated that he had read, understood, and would comply with all provisions and special provisions of the Certificate of Waiver. It also certified that the airplane utilized met the applicable airworthiness requirements of the Federal Aviation Regulations.

AIRCRAFT INFORMATION The airplane, a S-1S model, serial number 1-0014, was manufactured on February 21, 1974, by the Aerotek, Incorporated, of Afton, Wyoming. The engine was manufactured by Textron-Lycoming, and the original engine installed in the airplane as shown in the logbook was an IO-360-B4A, with a serial number of L-11808-51A. The left and right lower wings and the top wing were assigned serial number 014. The airplane received a Standard Airworthiness Certificate in the Aerobatic Category on April 19, 1974.

During the inspection of the engine, the model identification number was found obliterated and the engine had been modified since overhaul. The owner's son confirmed that the engine had been modified. The engine logbooks did not reflect detailed information on the modifications or the time in service or date when these modifications were accomplished. The modifications to the engine were discovered by an FAA inspector who changed the airplane's Airworthiness Certificate to the Experimental Category.

Examination of the airplane's maintenance records revealed that the last conditional inspection was conducted on September 16, 1995. The records contained numerous entries relating to the assembly of the top and bottom wings to fuselage. The investigation revealed that the owner routinely removed both top and lower wings in order to trailer and transport the airplane to the next airshow site.

WRECKAGE AND IMPACT INFORMATION The wreckage was recovered and transported to the Corporate Jets' hanger at the Allegheny County Airport. The examination of the wreckage was begun on August 7, 1996. The left upper longeron had been cut away during the rescue operation. There were numerous cracks observed at weld clusters throughout the forward fuselage which appeared to be impact related. The wing butt fittings on the left side were intact with all appropriate hardware in place, and still, attached to the fuselage. Wood from the wing spars on the left side remained in the wing attach fittings. The flying and landing wires were in place except for one broken landing wire, which had a bend in the wire prior to the fracture.

A review of the video tapes of the mishap did not reveal any visual or audible indication of an engine anomaly. Examination of the engine did not reveal any malfunctions.

MEDICAL AND PATHOLOGICAL INFORMATION An autopsy was performed on August 6, 1996, by Leon Rozin, MD, Chief Forensic Pathologist, Office of the Coroner, County of Allegheny, in Pittsburgh, Pennsylvania.

The toxicology testing report from the FAA Toxicology and Accident Research Laboratory, Oklahoma City, Oklahoma, revealed negative for drugs and alcohol for the pilot.

TEST AND RESEARCH Pieces of the left wooden spar were sent to the United States Department of Agriculture, Forest Service, Forest Products Laboratory, in Madison, Wisconsin. The Forest Products Laboratory determined the main structural material to be Sitka Spruce, with no evidence of decay present in the spar. The spruce spar had a specific gravity of .38, which was slightly lower than the dry species average of .40 listed in the USDA Wood handbook, but within the normal range that was expected for Sitka Spruce. The Forest Products Laboratory tests revealed that there was no apparent problem with the quality of the wooden material in the spar.

ADDITIONAL INFORMATION Witnesses interviewed after the accident and who knew the pilot,

stated that the pilot had told them that he used airspeeds higher than the manufacturer's recommended maneuver airspeeds in order to obtain better performance from the airplane.

Witnesses stated that they looked in the airplane on various occasions and saw higher positive and negative flight load factors than recommended by the manufacturer indicated on the load meter in the cockpit. Witnesses acknowledged that the pilot voiced his concern to acquaintances about the airplane's wings, and had purchase a set of wings for the airplane, because he had experienced flutter during recent flights.

The airplane wreckage was released on August 7, 1996, to John Coley, a representative of the owner's insurance company.

Pilot Information

Certificate:	Commercial	**Age:**	43,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Center
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 3, 1995
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	2625 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aerotek	**Registration:**	N2HT
Model/Series:	PITTS SPECIAL S-1S PITTS SPEC	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Aerobatic	**Serial Number:**	1-0014
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	September 16, 1995 Annual	**Certified Max Gross Wt.:**	1150 lbs
Time Since Last Inspection:	26 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1255 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	IO360-B4A-MOD
Registered Owner:	CLARENCE A. SPEAL	**Rated Power:**	200 Horsepower
Operator:		**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:	KAG ,1252 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	18:45 Local	**Direction from Accident Site:**	140°
Lowest Cloud Condition:	Scattered / 5000 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	19°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	, PA (AGC)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	18:15 Local	**Type of Airspace:**	Class E;Special

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:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	40.359764,-79.900222(est)

Administrative Information

Investigator In Charge (IIC):	Cain, James
Additional Participating Persons:	JEFFREY D HALLIDAY; WEST MIFFLIN , PA MARK HEINER; AFTON , WY DANIEL B FLETCHER; WILLIAMSPORT , PA
Original Publish Date:	March 31, 1998
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=28014