



Aviation Investigation Final Report

Location:	LEBANON, New Hampshire	Accident Number:	BF093FA135
Date & Time:	July 24, 1993, 13:00 Local	Registration:	N90BC
Aircraft:	KROWELL EAGLE II	CHRISTEN	Aircraft Damage: Destroyed
Defining Event:		Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

OPENING ACT WAS FOR 3 JUMPERS TO EXIT FROM JUMP-PLANE (J/P) AT 3500' AGL; 2 JUMPERS WERE TO JOIN AT 2000' TO DISPLAY FLAG, WHILE 3RD JUMPER WAS TO CIRCLE ABOVE. N90BC & N31485 WERE TO CIRCLE JUMPERS IN OPPOSITE DIRECTIONS. N90BC WAS TO CIRCLE CLOCKWISE, OUTSIDE TURN RADIUS OF N31485, WHICH WOULD CIRCLE COUNTERCLOCKWISE. WHEN 2 OF 3 JUMPERS EXITED FROM J/A, PILOT OF N31485 BANKED LEFT INTO SPIRAL, APPARENTLY UNAWARE OF 3RD JUMPER. 3RD JUMPER DELAYED UNTIL N31485 WAS CLEAR, THEN JUMPED AS J/A CONTINUED ON SAME HEADING. PHOTO SHOWED N90BC WAS TO THE RIGHT & AT AN UNDETERMINED DISTANCE BEHIND N31485 AS 1ST 2 JUMPERS EXITED. AFTER 3RD JUMPER EXITED, HE & N90BC COLLIDED. N90BC WAS DAMAGED, WENT OUT OF CONTROL & CRASHED. AFTER ACCIDENT, SOME PARTICIPANTS OF PRESHOW BRIEFING DID NOT RECALL A 3RD JUMPER BEING MENTIONED, ALTHOUGH OTHERS REMEMBERED. 3RD JUMPER WAS NOT PRESENT FOR PRESHOW BRIEFING, BUT AC 91-45C ALLOWED FOR ONLY 1 MEMBER FROM EACH TEAM TO ATTEND PRESHOW BRIEFING, THEN BRIEF OTHER TEAM MEMBERS.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: INADEQUATE CREW/GROUP COORDINATION.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: MANEUVERING

Findings

1. OBJECT - OTHER PERSON
2. (C) CREW/GROUP COORDINATION - INADEQUATE

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

Factual Information

HISTORY OF FLIGHT

On Saturday, July 24, 1993, at 1300 eastern daylight time, a Christen Eagle II, N90BC, owned, operated, and piloted by Mary J. McGrath of Colchester, Vermont, collided with a parachutist during the opening act of an airshow over the Lebanon Airport in Lebanon, New Hampshire. The pilot and parachutist were fatally injured. The airplane was destroyed. Visual meteorological conditions prevailed at the time of the accident. The flight was conducted under 14 CFR Part 91. The airshow was operating under an aviation event waiver issued by the Federal Aviation Administration (FAA).

On July 25, 1993, two jumpers from the airshow's opening act were interviewed. The jumpers stated that their planned opening routine consisted of three jumpers deploying from the jump airplane at 3,500 feet above ground level (agl). Two jumpers would join together at 2,000 feet agl and display the American Flag, while a third jumper circled above. One of the jumpers stated that the act was planned in advance and there were no last minute additions to the act.

During an interview after the accident, the pilot of the Pitts S 2S, N31485, who also participated in the opening act, stated that he and the pilot of N90BC (the accident airplane) discussed the opening act routine after the required preshow briefing. He stated that they both agreed they would take off after the jump airplane and fly to the right of the jump airplane prior to the start of the opening act. The pilot of N31485 also stated that he said to the pilot of N90BC that she should "...fly in a line abreast position on my right wing at a comfortable distance..." while observing the jumpers deploy, maintaining both visual contact and separation from the jumpers.

The pilot of N31485 stated that during the opening routine, he was to remain in close proximity to the jumpers while the pilot of N90BC would fly the right wing position until breaking formation to circle the jumpers. Once the two jumpers were joined up after deploying from the jump airplane, the two biplanes would then break away from each other and turn on their smoke machines. N90BC was to circle the jumpers in a clockwise direction outside the track of N31485, while N31485 circled the jumpers in a counter clockwise direction. The two biplanes would continue to fly opposing, descending spirals around the jumpers until the end of the act.

The pilot of N31485 stated that during their private discussion after the preshow briefing, he and the pilot of N90BC reviewed emergency procedures and alternate plans in the event that something went wrong during the set up for the opening act. He stated that if one airplane was not in proper position at the beginning of the act, the procedure was for the out of position airplane to depart the area until the completion of the act. He also stated that during their

discussion, he did not reference a specific number of jumpers that were to be involved in the opening act and only used the word "stack" as a reference to the jump team.

The pilot of N31485 stated that after the airplanes were airborne and about four minutes prior to the jumpers deploying from the airplane, N90BC passed his airplane and the jump airplane and then turned right, away from both the airplanes. The pilot of N31485 stated that as N90BC passed both airplanes, the pilot of N90BC made a comment over the radio. The Lebanon Air Traffic Control tower tape revealed, at 1655:39, the pilot of N90BC stated over the radio, "It would have been nice if I had (unintelligible) this." (See attached tower tape transcript.)

During an interview with the jump airplane's pilot, he stated that he too saw N90BC pass N31485 and his airplane and then turn right. Both the jump airplane pilot and the pilot of N31485 stated that they assumed the pilot of N90BC turned the airplane right to circle back to get in the "briefed" position, which was "...abreast and to the right..." of the Pitts. The jump airplane pilot stated that he did not see N90BC again. The pilot of N31485 said he looked over his right shoulder and saw N90BC flying in the opposite direction and did not regain visual contact with N90BC for the duration of the act.

According to the tower tape, at 1700:14, about four minutes and 35 seconds after N90BC turned away from the other airplanes, the pilot of the jump airplane stated over the tower frequency, "Tower tower jumpers are about fifteen seconds away fifteen seconds." At 1700:29, the pilot of N90BC stated over the tower frequency, "Don you call it when I break right okay." At 1700:39, the jump airplane pilot announced, "Jumpers are away jumpers are away." At 1700:42, the pilot of N31485 stated, "Okay Mary you can break right." For the duration of the act, no other transmissions were made from the act participants, except for one transmission made at 1701:28, by the pilot of N31485, who queried the position of N90BC.

The pilot of N31485 stated that as soon as he saw the two jumpers deploy from the airplane, he initiated a left banking turn into a spiral. He said he continued to fly the predetermined maneuvers but did not release smoke from his airplane, as briefed, because he did not know the location of N90BC. A photograph taken seconds after the first two jumpers were deployed from the jump airplane revealed N90BC was to the right and behind N31485 at an undetermined distance.

The pilot of the jump airplane stated that the first two jumpers departed the airplane and the third jumper did not immediately follow the other two jumpers. He stated the third jumper was standing in the door ready to jump when the jumper leaned backward and hesitated. The pilot stated that he thought that was "strange" so he looked over his shoulder to the jump door. The pilot stated that he saw the red Pitts (N31485) under the jump airplane prior to the deployment of the third jumper. He stated that when N31485 was clear of the jump airplane, the third jumper jumped.

Two videos of the airshow taken during the time of the accident were compiled and reviewed. One video tape began with two jumpers deployed from the jump airplane and N31485 banked

in a left counter clockwise turn on the left side of the jump airplane. N90BC was behind and to the right of both the jump airplane and the two deployed jumpers at an undetermined distance. N90BC appeared to be flying outside the same path as N31485 and was turning left in a counter clockwise direction. The jump airplane's track continued to move in a straight line. As time progresses, the straight track of the jump airplane and the counter clockwise turn of N90BC, placed N90BC inside and to the left of the jump airplane's position where N90BC collided with the third jumper. During the collision, the video shows the third jumper with his parachute deployed but not open.

After the collision, the second video showed N90BC in an uncontrolled descent towards the ground with smoke trailing the airplane. Spectators at the airshow reported seeing N90BC falling to the ground about one mile west of the airport near the Mascoma River. The video also showed the third jumper floating towards the ground with his reserve parachute deployed. The third jumper landed inside the airshow's "show line" boundary.

PERSONNEL INFORMATION

The pilot of N90BC received her renewal of Statement of Acrobatic Competency from the FAA on June 25, 1993. According to FAA records, FAA Forms 8710.7, Application for Statement of Acrobatic Competency, the pilot had flown in 19 air shows since July 8, 1990. The last airshow the pilot participated in was held in Burlington, Vermont, on September 20, 1992. The commercial pilot's log book showed that she had a total of 2,254 flight hours.

Two of the three jumpers were licensed through the United States Parachute Association (USPA). The parachutist that was fatally injured did not have a license, nor was it a requirement under 14 CFR Part 105, at the time of the accident.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was examined at the accident site on July 25, 1993. The examination of the wreckage revealed that the airplane came to rest together except for the left wing. Portions of the left wing were found scattered around the airport and near the accident site. Review of the video tapes revealed debris falling to the ground after the airplane collided with the jumper.

The airplane came to rest in a wooded area about one mile west of the airport. The engine was embedded in the ground about three feet below the ground's surface with the airplane wreckage resting on top. The accident occurred during daylight hours.

MEDICAL AND PATHOLOGICAL INFORMATION

The autopsy of the pilot was performed by Dr. Roger Fossum, Chief Medical Examiner, at the Office of the Chief Medical Examiner in Concord, New Hampshire, on July 25, 1993. The autopsy revealed no evidence of physical incapacitation or impairment. However, according to

the autopsy report issued by Dr. Roger Fossum, who also performed the autopsy on the parachutist, evidence indicated that the parachutist impacted the pilot and "...undoubtedly caused disabling if not lethal injuries to the pilot...."

The toxicology tests for the pilot were performed by Dr. Dennis V. Canfield at the Civil Aeromedical Institute located in Oklahoma City, Oklahoma. Negative results were reported for carbon monoxide and cyanide. Positive results were reported for drugs and volatiles. During a telephone conversation, Dr. Roger Fossum stated that the drugs and volatiles identified "...were most likely from putrefaction."

The autopsy of the parachutist revealed no evidence of physical incapacitation or impairment.

The toxicology tests for the parachutist were performed by Dr. Dennis V. Canfield at the Civil Aeromedical Institute located in Oklahoma City, Oklahoma. Negative test results were reported for all screened drugs and volatiles.

ADDITIONAL INFORMATION

Advisory circular (AC) 91 45C, Waivers: Aviation Events, provides prospective aviation event sponsors and other interested parties with information necessary to assist in planning and conducting a safe aviation event. It also provides information on the application process for a Certificate of Waiver or Authorization.

Waivers are issued based on the FAA policy that anytime the agency determines a proposed event will be in the public interest in terms of safety and environmental concerns, a waiver will be issued predicated on specific requirements of the event. An airshow is considered an aviation event and therefore must operate under a Certificate of Waiver or Authorization.

It is mandated by AC 91 45C, that a preshow briefing take place. Section 2, Part 25, Preshow Activity, States, "...For performing teams, it is permissible for just the team leader or other performing member to attend in lieu of every member. The team leader or other performing member must then assume the responsibility for briefing each of the other members of the team."

An attachment to the Certificate of Waiver, issued to the Lebanon Riverside Rotary Club, Mr. James E. Parker, Lebanon Municipal Airport, Lebanon, NH, applicable July 23 through 25, 1993, identified as "Special Provisions" for the New England Region Aviation Events/Airshows states under item number 5, "...No person may participate in any event unless they have received a briefing on the provisions of the waiver. Prior to beginning activities, the holder shall obtain a statement signed by all participants, stating that they have read, understood and will comply with the conditions of the Certificate of Waiver." Of the three members of the jump team participating in the opening act, one signed the waiver. Further, in a letter from the Portland, Maine, Flight Standards District office, dated July 9, 1993, written to the Director of the Lebanon Airshow, it states, "All participants of the airshow shall be in attendance at this

briefing."

After the accident, FAA personnel who approved and granted the Certificate of Waiver for the Lebanon airshow stated that regardless of how the "Special Provisions" and the statement in the letter were interpreted, it was acceptable to allow one member to represent a team at the required preshow briefing. FAA personnel also stated it was acceptable to allow one team member to represent the team by signing the waiver.

According to the airshow director, during the required preshow briefing, the opening act was briefed by the jump team leader. Members of the opening act present at the preshow briefing were two of the three jumpers and the pilots of N90BC and N31485. The pilot of the jump airplane was late to the briefing and was not present for the entire opening act briefing.

During a telephone interview after the accident, the jump team leader stated that he did not remember specifying how many jumpers were to deploy from the airplane and that during the briefing, he used the word "jumpers" to describe the team. The third jumper (subsequent fatality) was not present at the preshow briefing and had no previous airshow jump experience.

Numerous people who attended the preshow briefing were interviewed after the accident. (See attached Record of Interviews.) Most of the participants interviewed could not remember specifics about the opening act briefing. However, some thought a third jumper was mentioned, but stated the emphasis of the act was put on the two jumpers that were to join up with each other. One participant at the preshow briefing stated that he specifically heard that there were three jumpers mentioned for the opening act because he remembered wondering about the identity of the third jumper. Two people interviewed stated that they heard during the briefing for the opening act that "...two jumpers were going to jump out with a flag and a third jumper was to circle above with smoke." Some of the people interviewed stated that they could not be sure about the number of jumpers mentioned for a particular act because there were two acts involving parachutists that were briefed at the preshow briefing.

The pilot of N31485 stated that he only expected two jumpers to deploy from the airplane and he executed a left counter clockwise turn after the second jumper had cleared the jump airplane. He stated that after the accident, he reviewed his notes that he took during the preshow briefing. He said that his notes showed "...2 to join, 3500 2000(smoke)."

After the accident, the members of the jump team and the pilot of N31485 stated that they had performed this act together on previous occasions, with the pilot of N90BC, in prior air shows. They stated that occasionally, the opening act would use only two jumpers while other times there were three jumpers. According to the director of the Lebanon air show, the same persons, excluding the third jumper, performed the very same act three previous times: July 3, 1992, at the Sugarbush Airshow and twice in Augusta, Maine, in July, 1992.

The airplane wreckage was released to Debbie-Jo Kothe-Tennis, Vice President of American

Claim Service, Inc., of Memphis, Tennessee, on July 30, 1993.

Pilot Information

Certificate:	Commercial	Age:	45,Female
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Rear
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	October 12, 1993
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	
Flight Time:	2392 hours (Total, all aircraft), 663 hours (Total, this make and model), 2254 hours (Pilot In Command, all aircraft), 56 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	KROWELL	Registration:	N90BC
Model/Series:	CHRISTEN EAGLE II CHRISTEN E	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	05658EE
Landing Gear Type:	Tailwheel	Seats:	2
Date/Type of Last Inspection:	March 18, 1992 Annual	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	389 Hrs	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	AEIO-360-A1D
Registered Owner:	MCGRATH, MARY J.	Rated Power:	200 Horsepower
Operator:	MCGRATH, MARY J.	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:	LEB ,598 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	13:02 Local	Direction from Accident Site:	1°
Lowest Cloud Condition:	Unknown / 6000 ft AGL	Visibility	25 miles
Lowest Ceiling:	Broken / 6000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	6 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	330°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	26°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(LEB)	Type of Flight Plan Filed:	None
Destination:	(LEB)	Type of Clearance:	None
Departure Time:	12:45 Local	Type of Airspace:	Class D;Class E

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:	1 Fatal	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	Napolitan, Margaret
Additional Participating Persons:	BOB DZIADZIO; PORTLAND , ME PAUL J DWYER; CONCORD , NH
Original Publish Date:	September 20, 1994
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=8756

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](#).