



National Transportation Safety Board Aviation Accident Final Report

Location:	OSWEGO, IL	Accident Number:	CHI00FA003A
Date & Time:	10/01/1999, 1600 CDT	Registration:	N300SH
Aircraft:	Beech D-45	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General Aviation -		

Analysis

N300SH, a Beech D-45, was destroyed on impact with terrain following a midair collision with N5367G, a Beech T-34, during a practice maneuver by the Lima Lima Flying Squadron. Both aircraft departed in sequence from 6-ship delta formation to perform a maneuver called a pop top break. The pop top break involved each aircraft to depart from the formation in sequence by entering a climbing 180-degree turn to follow the lead aircraft in trail. The narrow area of the human eye's visual field is approximately 10-15 degrees. A video tape of the accident flight shows a delayed entry into the turn by the D-45 relative to the T-34's entry into the maneuver. The pilot of the T-34 stated that he did not see the D-45 prior to the midair collision. The Lima Lima Flying Squadron did not have procedures in place to recover or adjust for maneuvers that were not successful.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the visual lookout not obtained by the pilot of the Beech T-34 and the inadequate procedure by the Lima Lima Flying Squadron. The delayed entry into the maneuver by the pilot of the Beech D-45 was a contributing factor.

Findings

Occurrence #1: MIDAIR COLLISION

Phase of Operation: MANEUVERING - TURN TO REVERSE DIRECTION

Findings

1. (F) MANEUVER - DELAYED - PILOT IN COMMAND
2. (C) PROCEDURE INADEQUATE - OTHER INSTITUTION
3. (C) VISUAL LOOKOUT - NOT OBTAINED - PILOT OF OTHER AIRCRAFT

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On October 1, 1999, at 1557 central daylight time, a Beech-Nogle D-45, N300SH, operated by the Lima Lima Flying Squadron Incorporated, was destroyed on impact with terrain following an in-flight collision with a Beech T-34, N5367G. N5367G was substantially damaged and made a landing at Aurora Municipal Airport, Aurora (ARR), Illinois. Both aircraft had departed in sequence from a Lima Lima 6-ship delta formation performing a non-aerobatic maneuver called a pop top break. N300SH was the number two aircraft and N5367G was the number three aircraft. Visual meteorological conditions prevailed at the time of the accident. The 14 CFR Part 91 practice flight was not operating on a flight plan. The airline transport pilot of N300SH was fatally injured. The airline transport pilot of N5367G reported no injuries. The Lima Lima Squadron departed from Naper Aero Club Airport, Naperville, Illinois, at approximately 1530, en route to a practice area located approximately 5 miles southeast of Oswego, Illinois, prior to landing at an intended destination of Merrill C. Meigs Field Airport, Chicago, Illinois.

The pilot of N5367G reported the following in a written statement: "I was flying #3 in a flight of six in a practice routine. We were over farm fields south of Oswego. The flight was executing our "pop top" maneuver when the accident occurred. I was just rolling level after the 180 [degree] turn when I felt, and heard, a very pronounced "whump". I looked left and saw my damaged left wing. I never saw the other airplane prior to the contact with my aircraft. I accessed my airplane, and it was stable. #4 stayed with me and handled the radio transmissions to get me a straight-in landing on R/W 27 at Aurora airport. I checked the airplane for flyability at lower airspeeds, and with the gear down. All was normal. I landed on R/W 27."

The number four pilot reported the following in a written statement: "Upon completing a normal practice, the final maneuver (pop-top, with a right break) began. All appeared normal and well flown by all team members when the final maneuver began. Upon command, I began the required climbing right turn, visual acquired #3 and dressed upon his flight path as is normal procedure. The leader radioed a reminder that we will be using "25 squared" on the downwind so just before I leveled behind #3, I checked my power and made minor adjustment to 25"/2500 RPM. When I looked forward again, I could see #3 had perfectly executed the pop-top, and he was flying in line with #1. I immediately observed another airplane just above and slightly right of #3. He looked larger, so it appeared he was behind #3. The airplane was pitching up and beginning to roll left, not unlike the beginning of a barrel roll. As the #3 aircraft rolled through about 60 degrees of bank, I could see what appeared to be a broken left wing, with the section outboard of the flap bent up about 90 degrees on the #2 aircraft. As I looked ahead, the #3 airplane remained in its level position behind the leader. I made a maneuver to the right to clear the two planes as the #2 airplane spiraled down under my left wing..."

PERSONNEL INFORMATION

The pilot of N300SH was 60 years old and held a airline transport pilot certificate with single engine land and multiengine land ratings. He also held B-737, DC-8 and DC-10 type ratings. He held a flight engineer certificate with reciprocating and turbojet powered ratings. Federal Aviation Administration (FAA) records indicate that he accumulated a total civilian flight time

of 16,066 hours of which 27 hours were in the T-34. He received a second class medical certificate on March 4, 1999 with a restriction, "must wear corrective lenses". He was rated as a wingman by the T-34 Association with an expiration date of December 31, 1999.

The pilot of N5367G was 70 years old and held a commercial pilot certificate with an airplane single engine land rating. He held a airline transport pilot certificate with a multiengine land rating and B-727, B-737, B-757, B-767, DC-6, DC-7 and DC-10 type ratings. He received a second class medical certificate on February 4, 1999 with no restrictions. He accumulated a total flight time in excess of 20,000 hours of which 600 hours were in the T-34. Of the 600 hours, 25 hours were in the last 30 days. He was rated as a wingman by the T-34 Association with an expiration date of December 31, 1999.

WRECKAGE AND IMPACT INFORMATION

The main wreckage was found in a cornfield near the practice area. The airplane's fuselage, wings, empennage, and engine were found with the main wreckage, in an area about 30 feet in diameter. The airplane's control surfaces were found intact. The outboard section of the airplane's right wing was bent vertically half-way through the right aileron and twisted along the airplane's lateral axis.

The engine was separated from the airframe. The engine was rotated by hand and air was expelled from each cylinder; engine continuity was established. Electrical continuity of the magnetos was established. All of the propeller blades from the three-bladed fixed pitch propeller were separated from the hub and displayed bending and twisting with curvilinear scratching.

Inspection of N5367G revealed that the outboard section of the aircraft's left wing was deformed in the downward direction with streaks of white, blue, and red paint on the wings upper surface. Color tracings and photos are included in this report. Aileron, elevator and rudder flight control continuity of N5367G was established following the accident. The altimeter was set to 30.08 inches of mercury and indicated approximately 730 feet msl while on the ground at (ARR) (ARR elevation was 708 feet msl). No other damage was noted to the remaining control surfaces.

Both aircraft possessed "star and bar" insignia with white, blue, and red paint. The "star and bar" insignias were located on the bottom right wings and upper left wings of each aircraft.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was conducted by the Coroner of Kendall County, Illinois, on October 2, 1999.

FAA toxicology test results indicates the presence of 44 (mg/dL, mg/hg) ethanol. The report states, "The ethanol found in this case is from postmortem ethanol formation and not from the ingestion of ethanol."

TESTS AND RESEARCH

During a post accident interview, the pilot of the number one aircraft, stated that the pop top has been performed since 1985. There are three different ways in performing the maneuver. He does not use a videotape very often in recording practice flights because they do not have the financial resources. The narrator is used in debriefing the performance of airshows but he is not used during practice. There is no procedure, just judgment, to recover from a botched

maneuver. There is also no definition of a botched maneuver. According to the number one pilot, the Lima Lima Flying Squadron did not discuss procedures for when a pilot did not acquire an aircraft that he was following; he added, they never thought of it since it never happened.

The pop top break maneuver was described as a 180-degree turn which would begin from the formation by entering into an initial 10 degree nose-up pitch with a subsequent 45-50 degree banked turn. Upon turning through 90 degrees the aircraft would be level with the horizon.

FAA-P-8740-51, How to Avoid a Midair Collision, states, "Statistics on 105 inflight collisions that occurred from 1964 to 1968 show that 82% were at overtaking convergence angles: 35% were from 0-10 [degrees] - almost straight from behind. Only 5% were from a head-on angle." The publication also states under "Limitations of the Eye", "Another inherent eye problem is that of narrow field of vision. Although our eyes accept light rays from an arc of nearly 200 degrees, they are limited to a relatively narrow area (approximately 10-150) in which they can actually focus and classify an object. Though we can perceive movement in the periphery, we cannot identify what is happening out there, and we tend not to believe what we see out of the corner of our eyes. This, aided by the brain, often leads to "tunnel vision"."

The Formation Flight Manual, 4th Edition, by the T-34 Association, contains information regarding formation basic training, standard 4-ship formation rules, qualification programs and formation dos and don'ts. Members of the Lima Lima Flying Squadron were credited in the writing and production of the Formation Flight Manual, which states under Formation Dos and Dont's, "don't take your eyes off the airplane you are flying formation on, except for the briefest of instants to make necessary cockpit checks".

ADDITIONAL INFORMATION

The wreckage of N300SH was released to registered owner's insurance.

The FAA, the Lima Lima Flying Squadron and the Raytheon Aircraft Company were parties to the investigation.

Pilot Information

Certificate:	Airline Transport; Commercial	Age:	61, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Front
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim.	Last FAA Medical Exam:	03/04/1999
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	16066 hours (Total, all aircraft), 85 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N300SH
Model/Series:	D-45 D-45	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Utility	Serial Number:	CN2
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	Unknown	Certified Max Gross Wt.:	2950 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Continental
ELT:		Engine Model/Series:	IO-520-BB
Registered Owner:	LIMA LIMA FLYING SQUADRON INC	Rated Power:	285 hp
Operator:	LIMA LIMA FLYING SQUADRON INC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	ARR, 706 ft msl	Distance from Accident Site:	5 Nautical Miles
Observation Time:	1553 CDT	Direction from Accident Site:	315°
Lowest Cloud Condition:	Clear / 0 ft agl	Visibility	10 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	10°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	16° C / 0° C
Precipitation and Obscuration:			
Departure Point:	NAPERVILLE, IL (LL10)	Type of Flight Plan Filed:	None
Destination:	CHICAGO, IL (CGX)	Type of Clearance:	
Departure Time:	1535 CDT	Type of Airspace:	Class G

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	IFR Approach:	
Runway Length/Width:		VFR Approach/Landing:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	MITCHELL F GALLO	Report Date:	04/06/2001
Additional Participating Persons:	EDWARD TOBIN; WEST CHICAGO, IL PAUL E YOOS; WICHITA, KS EDWARD I HICKS; NAPERVILLE, IL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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