Aviation Investigation Final Report

Location:	BIG LAKE, Minnesota	**Accident Number:**	CHI97FA095
Date & Time:	March 29, 1997, 12:30 Local	**Registration:**	N77166
Aircraft:	Cessna 140	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Witnesses reported that the airplane was maneuvering when there was a loud bang. They reported that the airplane's right wing had failed, and the fuselage was distorted before the aircraft crashed. Aircraft examination revealed that the airplane's horizontal tail had failed due to a positive G maneuver, and the wings and wing struts had failed due to a negative G maneuver. Eight days previous to the accident the pilot had flown a Waco airplane in Hawaii doing aerobatics.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's maneuvers which exceeded the design stress limits of the airplane and resulted in structural overload of the horizontal tail followed by a structural overload of the wings.

Findings

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

Findings
1. HORIZONTAL STABILIZER - OVERLOAD
2. (C) DESIGN STRESS LIMITS OF AIRCRAFT - EXCEEDED - PILOT IN COMMAND
3. WING - OVERLOAD
4. WING,BRACING STRUT - OVERLOAD
5. FUSELAGE,BULKHEAD - OVERLOAD

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

Factual Information

HISTORY OF FLIGHT

On March 30, 1997 at 1230 central standard time (cst), a Cessna 140, N77166, was destroyed following an uncontrolled descent into terrain, near Big Lake, Minnesota. Witnesses reported hearing a loud bang and seeing the airplane spinning before it impacted the terrain. The private pilot was fatally injured in the accident. The 14 CFR Part 91 flight was operating in visual meteorological conditions and no flight plan had been filed.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was located in a wooded area. The wreckage path was consistent with a near vertical descent through the trees. Most of the aircraft's components were located within 20 feet of the main wreckage. Approximately one quarter mile from the main wreckage pieces of plexiglass which were from the airplane's windshield were found by local residents.

The right wing strut attachment was separated from the fuselage, and the right wing had wrapped around the aft fuselage of the airplane. Both right wing struts were buckled in numerous places. The brace strut for the right wing was not located. The location of the right wing's brace strut attachment to the spar had a portion of what appeared to be the strut attachment bracket, still attached. Both left wing struts had area's which were consistent with a buckling failure. The brace strut for the left wing was still attached to the main strut. Both wings of the airplane showed signs which appeared to indicate a negative G overload of the airplane.

The horizontal stabilizer was still attached to the airplane when the wreckage was found. The upper skin of the horizontal stabilizer was buckled. The spar of the horizontal stabilizer was buckled in compression on the lower surface at approximately the 10 percent span position, on both the left and right sides. The buckled spars appeared to indicate failure during a positive G loading of the airplane. No significant corrosion was found when the interior of the horizontal stabilizer, and the horizontal stabilizer's spar were inspected by the investigator in charge (IIC).

The vertical stabilizer was partially broken loose from its mount, but the vertical stabilizer was still attached to the fuselage.

Both elevators were attached to the horizontal stabilizer. Most of the rudder had separated from the vertical stabilizer. The left aileron was attached to the left wing. The right aileron was partially attached to the right wing. Both wing flaps appeared to be in a retracted position. No signs of any control surface flutter were noted by the IIC.

All flight control cables for the elevator, rudder and ailerons had continuity when checked by the IIC. No signs of any jammed control surface were found by the IIC.

The fuselage had numerous areas of skin buckling present. The cockpit area had sustained extensive crushing. Both plexiglass pieces which pass over the cabin area were shattered. The bulkhead that the wing strut attachment connects to showed many areas which appeared similar to an overload failure. The wing strut attachment bulkhead is located very close to the airplane's windshield.

The propeller signatures appeared to indicate a low power setting at the time of impact.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed by the Raminsey County Medical Examiner. Toxicological testing was performed by the Federal Aviation Administration in Oklahoma City Oklahoma. The toxicological testing was negative for all tests conducted.

TESTS AND RESEARCH

The engine was separated from the airframe on March 30, 1997. The gascalator screen, oil screen, and finger screen for the carburetor were all checked for contamination and were unremarkable. The carburetor was removed from the engine and when it was rotated, a sound similar to the float moving could be heard. All rocker covers were removed from the engine. The bottom spark plugs were also removed from the engine and were unremarkable. The engine was then rotated at the crankshaft to check for continuity and compression. All rocker arms moved and all cylinders had compression. The engine's number three cylinder's compression was very weak, until oil was poured into the cylinder through the spark plug hole. All of the ignition leads were cut, and both magnetos produced spark on all of the ignition leads.

ADDITIONAL INFORMATION

Two witnesses gave statement to the IIC. Both witnesses reported that they heard a loud bang, and then looked up to see an airplane spinning toward the ground. One witness reported that he was wearing ear muffs at the time, and even with the ear muffs on he heard the bang. One witness reported that the right wing was folded, during the descent to the ground, and that he heard many engine power changes before the accident. The other witness reported that he could see definite fuselage distortion, as the airplane was descending to the ground.

A review of the pilot's logbook indicated that eight days previous to the accident the pilot had flown a Waco airplane in Hawaii. The logbook entry for that flight indicated that the pilot had completed many different types of aerobatic maneuvers on that flight. The accident flight appeared to be the pilots first flight following the flight in Hawaii.

Pilot Information

Certificate:	Private	**Age:**	52,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	January 15, 1997
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	833 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N77166
Model/Series:	140 140	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	11628
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	June 1, 1996 Annual	**Certified Max Gross Wt.:**	1450 lbs
Time Since Last Inspection:	62 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4280 Hrs	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	C-85-12
Registered Owner:	MILTON GRINDIE	**Rated Power:**	85 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:	PNM ,985 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	12:17 Local	**Direction from Accident Site:**	30°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	40°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	6°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	MONTICELLO , MN (20Y)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	00:00 Local	**Type of Airspace:**	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:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	45.329612,-93.739387(est)

Administrative Information

Investigator In Charge (IIC):	Boldenow, David
Additional Participating Persons:	JOHN LION; MINNEAPOLIS , MN
Original Publish Date:	April 10, 1998
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=10422