Aviation Investigation Final Report

Location:	Flushing, Michigan	**Accident Number:**	CEN14LA202
Date & Time:	April 19, 2014, 14:10 Local	**Registration:**	N594T
Aircraft:	Nanchang CJ6 - A	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a personal cross-country flight with a pilot-rated passenger on board. A witness reported hearing the engine "sputter" and seeing the propeller slow as the airplane began descending toward an open field with the landing gear extended. Another witness, who was watching the airplane fly eastbound at low altitude, reported that it suddenly pitched down and impacted terrain in an approximate 45-degree, nose-down attitude, indicative of a stall. Based on the evidence, it is likely that the pilot was conducting a forced landing to the field due to a loss of engine power and subsequently failed to maintain adequate airspeed and exceeded the airplane's angle-of-attack, which resulted in the aerodynamic stall. An examination of the dry, flat field showed that it was an adequate emergency forced landing area.

A postaccident examination of the airframe, engine, and propeller revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. Weather conditions at the time of the accident were conducive to carburetor icing at glide and cruise power. Although the carburetor heat control was found in the "on" position, it is possible that the pilot delayed the application of carburetor heat, which likely resulted in the formation of carburetor ice and the loss of engine power.

An examination of damage to the airplane's structure showed that both the front seat and rear seat cockpit areas remained substantially intact and had provided a protective shell around both occupants during the crash sequence. Both pilot seats were equipped with a five-point lap belt and shoulder harness system. Evidence at the scene showed that the front seat pilot had been ejected from his seat during the crash sequence and had impacted the front cockpit instrument panel; however, he remained inside the cabin area. Examination of the front seat's lap belt and shoulder harness system latch, which was found unfastened, did not allow for a determination of whether the latch was unfastened, was fastened and failed, or whether it separated at the time of impact. The passenger in the rear seat remained restrained by his lap belt during the crash sequence; however, he impacted the rear cockpit instrument panel due to the failure and complete separation of his shoulder harness fitting. It is likely that the lack of adequate restraint for both occupants contributed to the severity of their injuries.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to maintain adequate airspeed during an off-airport forced landing after a loss of engine power due to carburetor icing and his exceedance of the airplane's critical angle-of-attack, which resulted in an aerodynamic stall. Contributing to the accident was the pilot's delayed application of carburetor heat while operating in conditions conducive to carburetor icing. Contributing to the severity of both occupants' injuries was the lack of adequate restraint.

Findings

Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Aircraft control - Pilot
Environmental issues	Conducive to carburetor icing - Effect on equipment
Personnel issues	Delayed action - Pilot
Aircraft	Intake anti-ice, deice - Incorrect use/operation
Aircraft	Seat/cargo attach fitting - Failure
Aircraft	Seat/cargo attach fitting - Incorrect use/operation

Factual Information

History of Flight

Maneuvering	Loss of engine power (total)
Emergency descent	Off-field or emergency landing
Emergency descent	Aerodynamic stall/spin (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On April 19, 2014, about 1410 eastern daylight time, a Nanchang CJ-6A single-engine airplane, N594T, was substantially damaged during an off-airport forced landing near Flushing, Michigan. The pilot and the pilot rated passenger were fatally injured. The airplane was registered to Haywards Aviation; Vassar, Michigan, and was being operated by a private individual. Visual meteorological conditions (VMC) prevailed at the time of the accident and a flight plan had not been filed for the 14 Code of Federal Regulations Part 91 personal flight. The airplane had departed Tuscola Area Airport (CFS), Caro, Michigan, about 1350 and was destined for Maple Grove Airport (65G), Fowlerville, Michigan.

A witness reported hearing the engine sputter and saw the propeller slow as the airplane began descending toward an open field with the landing gear extended. Another witness was watching the airplane flying eastbound at low altitude when it suddenly dropped and impacted terrain in a nose down attitude of about 45 degrees.

Evidence at the accident scene showed the airplane came to rest upright about 19 feet from the initial ground scar. Witnesses called 9-1-1 emergency and several persons immediately responded to render aid to the two occupants.

PERSONNEL INFORMATION

Pilot

The pilot, age 63, seated in the front seat, held a Federal Aviation Administration (FAA) private pilot certificate, most recently issued on March 29, 2010, with a rating in only airplane single engine land. He also held a restricted FAA third-class aviation medical certificate, which was issued on May 24, 2013, with a limitation "must wear lenses".

Based on a review of copies of partial pilot logbook entries, partial aircraft logbook entries, FAA documents, and other sources, the pilot's total flight experience on April 19, 2014, was estimated as a total of 1,525 hours in all aircraft, which included about 145 hours of pilot experience in Nanchang CJ-6A airplanes. His pilot experience in the previous 90 days was estimated as about 13 hours, with all of that experience in the accident airplane.

Pilot Rated Passenger

The pilot rated passenger, age 49, seated in the rear seat, held an FAA private pilot certificate most recently issued on July 15, 2000, with ratings in only airplane single engine land and rotorcraft helicopter. He also held a restricted FAA third-class aviation medical certificate, which was issued on February 28, 2013, with a limitation "must wear lenses for distant, have glasses for near vision".

The pilot rated passenger's personal logbooks were not available for examination by the NTSB during the course of the investigation. Based on a review of FAA documents, the pilot rated passenger's flight experience on February 28, 2013, was estimated as a total of 300 hours in all aircraft. No record was found which indicated that the pilot rated passenger had any previous pilot experience in the accident airplane or in any similar airplane.

AIRCRAFT INFORMATION

The low-wing, retractable tricycle landing gear, single-engine airplane, manufacturer's serial number (s/n) 3632009, was built in China, in 1983, by Nanchang Aircraft Manufacturing Corporation. It was built as a military pilot training airplane and had provisions for two pilots seated in two tandem cockpits, each with its own sliding canopy.

The airplane was powered by a 285 horsepower Zhuzhou Huosai HS6A 9-cylinder carbureted radial engine, which drove a Huosai JD61 two-blade aluminum alloy controllable pitch propeller. It had a maximum takeoff weight of 3,087 pounds and a listed maximum speed of 230 miles per hour.

The airplane was imported from China to the United States and in 2002 the airplane was issued an FAA airworthiness certificate in the experimental exhibition category.

Based on a review of copies of selected pages of the aircraft maintenance records, the accident airplane had completed a satisfactory annual condition inspection on February 13, 2014. The flight times on that date were estimated as an aircraft total time of 2,737 hours and a total time since engine overhaul of 572 hours. The engine total time and the propeller total time could not be determined.

METEOROLOGICAL INFORMATION

The closest official weather reporting station was at KFNT, Flint, Michigan; located 10 miles southeast from the accident location, At 1353 the automated surface observation system at KFNT reported wind from 080 degrees at 10 knots, visibility 10 miles, clear of clouds, temperature 12 degrees Celsius (C), dew point - 1 degrees C, and an altimeter setting of 30.43 inches of mercury.

The carburetor icing probability chart from FAA Special Airworthiness Information Bulletin (SAIB): CE-09-35 Carburetor Icing Prevention, June 30, 2009, shows a probability of icing at glide/cruise power at the temperature and dew point reported at the time of the accident.

COMMUNICATIONS AND RADAR

No record was found that showed N594T had made any radio contact with FAA air traffic control (ATC).

No witnesses reported hearing any radio transmissions from N594T during the time of the accident.

A postaccident review of FAA ATC radar data showed a primary only target which first appeared southwest of CFS at 1353:15.6. There was no transponder reply and no Mode-C altitude information. The radar track was not very consistent and dropped off three times. The last primary radar target was seen at 1409:35.7 near the accident location.

WRECKAGE AND IMPACT INFORMATION

FAA inspectors who responded to the scene reported that the airplane impacted an agricultural field on a generally easterly heading with the initial impact ground scars about 200 feet west of the north-south boundary road, and about 400 feet south of the east-west boundary road.

The dimension of the field was estimated as about 3,000 feet from the boundary road on the north side of the field to the distant south edge of the field which was bordered by a tree line. The east to west dimension of the field was estimated as about 2,500 feet. There were no power lines, fences, trees, bushes, or other obstructions in the field, and there were no power lines, fences or other obstructions on either side of the road on the north side, or on either side of the road on the east side of the field. The FAA inspectors also reported that the dry flat cultivated agricultural field was an adequate emergency forced landing area.

There was evidence of adequate fuel onboard, and there was a slight postimpact fuel spill, however there was no postimpact fire.

The airplane came to rest with the nose of the airplane oriented about 30 degrees to the right of the eastbound direction of the main landing gear ground scars. The eastbound ground scars corresponding to the main landing gear were 10 feet 4 inches apart, were about 3 to 4 inches deep, and measured about 19 feet from the first point of impact.

A 15 foot long crater corresponding to impacts from the nose gear, propeller, and engine cowing was about 24 inches wide at an initial depth of about 7 inches and ended about 11 inches deep.

All portions of the accident airplane remained attached or partially attached and were observed at the scene. The rudder and elevator remained attached to their fittings and flight control continuity was confirmed. The empennage sustained substantial damage.

The ailerons remained attached to their fittings and flight control continuity was confirmed. The nose gear was observed to be extended, but collapsed aft. The engine and engine mount were impact displaced down and displaced slightly left. The flap surfaces were observed in the retracted position.

Both propeller blades showed evidence of some chordwise smearing in the soft dirt, however there was only a slight amount of impact damage on leading edges of both propeller blades. One propeller blade was bent aft about 45 degrees, and the other propeller blade had only a slight amount of bending damage. No twist damage to either propeller blade was observed. Damage to the propeller blades was consistent with some rotation at the moment of impact, but there was no indication of significant engine power at impact.

A VFR Sectional chart was observed in the cockpit by the front seat pilot's left knee, and the chart was opened to the area of flight.

The propeller control was observed in the mid-range position. The fuel valve control in the cockpit was observed in the ON, or full forward, position. The carburetor heat control in the cockpit was observed in the ON, or full forward, position. The throttle control in the cockpit was observed in the full forward position. The mixture control in the cockpit was observed in a position consistent with a lean setting. The magneto switch in the cockpit was observed in the "1-2", or BOTH, position. The flap control in the cockpit was observed in the UP position. The in-line fuel screen was clean with no evidence of contamination. The spark plugs showed normal wear and a gray color. Oil was present throughout the engine and no metal contamination was observed in the oil or the oil system. Both main landing gear were partially separated and displaced aft, and the main landing gear attach fittings were displaced aft and twisting up.

The Garmin GTX320A transponder had some minor impact damage. The power switch on the transponder was observed in the ALT position. When removed from the aircraft the transponder was not fully inserted into its mounting tray and fell out when the tray was moved. The lock tab on the transponder was in the "latch" position.

The examination of the fuel system showed the header tank contained approximately 1.5 pints of fuel. The left and right fuel lines were tight and safety wired to fittings in header tank. The left and right fuel feed line "flapper" valves were free to operate and showed normal wear marks from vibration of the brass valve on the fitting. The header tank fuel screen had debris from rivet pieces, drill shavings and paper on the fuel tank side. The engine feed side of the screen was clean. The carburetor and engine driven fuel pump sustained impact damage and could not be further examined. There was no fuel in the line running from the fuselage to the impact damaged fuel pump or the impact damaged carburetor.

The FAA inspectors reported that their examination of the airframe, engine, and propeller revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

SURVIVAL ASPECTS

The front seat was equipped with a five-point lap belt and shoulder harness system. Evidence at the scene showed that the latch for the front seat belt system was not fastened at the time of impact. The front seat pilot was observed ejected from his seat and had impacted the front cockpit instrument panel, however he remained inside the cabin area.

Evidence at the scene also showed that the rear seat five-point lap belt and shoulder harness system and latch was fastened at the time of impact, however the metal shoulder harness fitting for the rear seat was fractured and had completely separated on impact. The pilot rated passenger in the rear seat remained restrained by his lap belt during the crash sequence, however he impacted the rear cockpit instrument panel as a result of the complete separation of his shoulder harness fitting.

The FAA inspectors noted that crash impact damage to the surrounding structure in both the front seat and the rear seat cockpit area remained substantially intact and without serious collapse, failure, or deformation to the extent that the airframe structure in those areas had provided a protective shell around both occupants during the crash sequence.

MEDICAL AND PATHOLOGICAL INFORMATION

Pilot

An autopsy was performed on the pilot by Sparrow Forensic Pathology in Lansing, Michigan.

Forensic toxicology was performed on specimens from the pilot by the FAA Civil Aerospace Medical Institute (CAMI), Oklahoma City, Oklahoma. The toxicology report stated that carbon monoxide was not detected in blood, tests for cyanide were not performed, and ethanol was not detected in vitreous. Citalopram was detected in blood and urine, N-desmethycitalopram was detected in blood and urine, and oxymetazoline was detected in blood and urine.

The pilot had a history of treatment for high cholesterol and high blood pressure, which he had reported to the FAA. Although the pilot had not reported to the FAA his history of depression and PTSD or his ongoing treatment with citalopram, there was nothing to suggest his psychiatric disease played a role in the accident.

Pilot Rated Passenger

An autopsy was performed on the pilot rated passenger by Sparrow Forensic Pathology in Lansing, Michigan.

Forensic toxicology was performed on specimens from the pilot rated passenger by CAMI, Oklahoma City, Oklahoma. The toxicology report stated that carbon monoxide was not detected in blood, tests for cyanide were not performed, ethanol was not detected in vitreous, and no listed drugs were detected in blood.

TESTS AND RESEARCH

Seat Belt and Shoulder Harness Systems

The seat belt and shoulder harness systems for both the front and rear cockpits were removed from the wreckage and sent for further examination to the National Transportation Safety Board (NTSB) Materials Laboratory in Washington, D.C.

An examination showed bending of several metal components from the rear seat harness system when compared with similar components from the front seat harness system which did not exhibit similar bending. The examination of the latch for the belt and shoulder harness system in the front seat showed there were small nicks and gouges attributed to normal wear, however the components of the latch mechanism were intact and it operated correctly. All other restraint system hardware (3-bar adjusters, tilt-lock adjusters and anchor mounting brackets) exhibited no significant deformation or bending.

It could not be determined whether the latch for lap belt and shoulder harness system in the front seat was unfastened, or was fastened and failed, or whether it separated at the time of impact.

The front seat shoulder harness anchor plate mounting bracket was examined and compared with the corresponding mounting bracket from the rear seat shoulder harness. The front seat shoulder harness bracket was relatively undamaged and the rear seat shoulder harness bracket had fractured and separated

and exhibited a load bending inward. Further examination using a scanning electron microscope (SEM) showed that the fracture surfaces on the rear seat shoulder harness anchor plate mounting bracket had failed due to tensile overloading.

The manufacturer of the restraint systems, Racers Choice, Incorporated (RCI), reported that they had discontinued manufacture of this system in 1999, and thus the components were at least 15 years old or older. RCI also reported that (SFI 16.1) required a recertification every two years. No record could be found showing that recertification had been accomplished.

Devices Containing Non-Volatile Memory

Several electronic devices containing non-volatile memory were removed from the wreckage and sent for further examination to the NTSB Vehicle Recorder Laboratory in Washington, D.C.

A Garmin Aera 560 GPS was examined and the data extracted included 58 sessions and 10,001 total data points from June 5, 2013, through April 19, 2014. Three sessions were located with the recorded accident event date of April 19, 2014; however, the accident event was not captured on this device.

A Lowrance AIRMAP 2000 GPS was examined and data was downloaded normally. Multiple different flights were observed, however the accident flight was not captured.

A Shadin Microflo Fuel Flow Indicator was examined. The unit did not directly interface with the airplane's fuel quantity system. Instead, the design of the system required the flight crew to manually enter the initial fuel on board the airplane. Data was downloaded from the unit which showed fuel used, fuel remaining, and total fuel. No other useful information was available.

ADDITIONAL INFORMATION:

The FAA Pilot's Handbook of Aeronautical Knowledge states that when conditions are conductive to carburetor icing that carburetor heat should be applied immediately and should be left on until the pilot is certain all the ice has been removed. Additionally, if ice is present the application of partial carburetor heat or leaving heat on for an insufficient time might aggravate the situation.

Pilot Information

Certificate:	Private	**Age:**	63,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	None
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	May 24, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 20, 2013
Flight Time:	(Estimated) 1525 hours (Total, all aircraft), 145 hours (Total, this make and model), 13 hours (Last 90 days, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	49,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	February 28, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 300 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Nanchang	**Registration:**	N594T
Model/Series:	CJ6 - A	**Aircraft Category:**	Airplane
Year of Manufacture:	1983	**Amateur Built:**	
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	4032008
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	February 13, 2014 Condition	**Certified Max Gross Wt.:**	3087 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2737 Hrs as of last inspection	**Engine Manufacturer:**	Huosai
ELT:	C91 installed	**Engine Model/Series:**	HS-6A
Registered Owner:	On file	**Rated Power:**	285 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KFNT,782 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	153°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.43 inches Hg	**Temperature/Dew Point:**	12°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	CARO, MI (CFS)	**Type of Flight Plan Filed:**	None
Destination:	FOWLERVILLE, MI (65G)	**Type of Clearance:**	None
Departure Time:	13:50 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	43.043609,-83.928886(est)

Administrative Information

Investigator In Charge (IIC):	Latson, Thomas
Additional Participating Persons:	Larry McKillops; FAA Eastern Michigan FSDO; Bellville, MI Richard D Anderson, Jr.; FAA Eastern Michigan FSDO; Bellville, MI
Original Publish Date:	June 16, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89083