National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: FTW03FA089	Aircraft Registration Number: N944FE
Occurrence Date: 01/24/2003	Most Critical Injury: Serious
Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
San Angelo	TX	76901	1015	CST	

Airport Proximity: Off Airport/Airstrip

Distance From Landing Facility: 0.5

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Cessna	208B	Airplane

Revenue Sightseeing Flight: No

Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

HISTORY OF FLIGHT

On January 24th, 2003, approximately 1010 central standard time, a Cessna 208B single-engine airplane, N944FE, was destroyed when it impacted terrain while landing at the Ducote Airpark (TS65), San Angelo, Texas. The airplane was registered to Federal Express Corporation, Inc., of Memphis, Tennessee, and was operated by Baron Aviation Services, Inc., of Vichy, Missouri. The check airman, who held an airline transport pilot certificate, and the pilot who was receiving a Part 135 proficiency check and also held an airline transport pilot certificate, sustained serious injuries. Visual meteorological conditions prevailed, and a flight plan was not filed for the 14 Code of Federal Regulations Part 91 instructional flight. The local flight originated at 0832 from the San Angelo Regional Airport/Mathis Field (SJT), San Angelo, Texas, and was destined for Ducote Airpark.

According to the check pilot, the purpose of the flight was to administer an FAR Part 135 proficiency check. He stated that the last event he could remember of the flight was when he had simulated an engine failure while on approach to Ducote Airpark.
According to communication and aircraft radar data provided by the Midland's Air Traffic Control Tower (ATCT) approach sector and Terminal Radar Approach Control (TRACON), the flight was practicing instrument approaches at SJT. At the completion of the VOR (Very high Omni-directional Range navigational aid) 21 approach, the flight crew requested a visual transition to Ducote Airport (which is located about 5 miles west of SJT). After conducting the missed approach, the flight departed the SJT airport area and proceeded west toward TS65. No further air traffic control communications were received.

According to witnesses who were at Ducote Airpark, they heard the sound of an engine "surging" and then looked to see an airplane approaching from the south. They stated that the airplane was approximately 100-200 feet above ground level (agl). Subsequently, the airplane's wings began to bank left and right, the airplane entered a descent, contacted power lines and trees, and impacted the ground. One witness reported that he could smell the fumes of jet fuel at the accident site. Two witnesses reported that they observed between and 1-inch of ice on the protected and unprotected surfaces of the airplane, respectively.

An aircraft performance study was conducted by the NTSB's Vehicle Performance Division utilizing radar data from the Federal Aviation Administration's (FAA) Continuous Data Recording at the San Angelo, Texas, Airport Surveillance Radar (ASR-9). The study was derived from ASR data assuming steady, coordinated flight and did not account for any ice accumulations. Approximately 3 minutes before the accident, the flight crew indicated that they would proceed to Ducote. The study revealed that around 1008:30, while the airplane was at a pressure altitude of 3,100 feet (1,100 feet above the ground) the airplane's computed true airspeed began decreasing from 130 knots, to 92 knots at 1009:00. This decrease in airspeed was associated with a relatively rapid descent rate

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Narrative (Continued)

that began at 1008:45, from a 300-foot/minute (fpm) climb to a 1,300 fpm descent. The rate of descent remained at 1,300 fpm for about 45 seconds, before increasing to its maximum of 2,000 fpm prior to impacting the ground. The true airspeed further decreased to about 82 knots and fluctuated for the last 40 seconds of flight between 82 and 102 knots.

PERSONNEL INFORMATION

Check Airman

The pilot who was acting as the check airman held an airline transport pilot certificate with a multi-engine airplane rating. He also held commercial and flight instructor certificates with single-engine and instrument airplane ratings. He was issued a second-class medical certificate, with no restrictions or limitations, on November 4, 2002.

The operator hired the pilot on August 31, 1998. He was approved as a check airmen in the Cessna 208 series of aircraft on July 2, 2001 by the company's principal operations inspector. A review of the pilot's annual resume, dated January 7, 2003, revealed that he had accumulated a total time of 4,356 hours.

He last obtained Cessna 208 training at Pan Am International Flight Academy between August 1 and 3, 2002, where he underwent 11 hours of ground training and 6 hours of simulator training. On October 25, 2002, the pilot passed an Anti-ice/Deicing Exam for Corporate Pilots following a review of a National Aeronautics and Space Administration (NASA) icing training video.

Second Pilot

The pilot receiving the Part 135 proficiency check also held an airline transport pilot certificate with a multi-engine airplane rating. He also held a commercial pilot certificate with a single-engine airplane rating. He was issued a second-class medical certificate, with no restrictions or limitations, on November 19, 2002.

The operator hired the pilot in April 1990. His latest annual resume, dated March 25, 2002, indicated that he had accumulated a total of 13,884 hours of flight time.

He last underwent Cessna 208 training at Pan Am International Flight Academy between June 27 and 29, 2002, where he received 11 hours of ground training and 5.5 hours of simulator training.

AIRCRAFT INFORMATION

The 1987-model airplane was equipped with a 675-horsepower PT6A-114 Pratt & Whitney turboprop engine, and a 3-bladed C-300 McCauley propeller. The airplane was also equipped with a flight into known icing package that included pneumatic deicing boots on the wings, wing struts, main landing gear struts, cargo pod, and the horizontal and vertical stabilizers.

The airplane was maintained on Baron Aviation's 12-Phase Approved Aircraft Inspection Program (AAIP), and the company utilized Cessna's CESCOM program to track, schedule and report maintenance activity. A phase is completed every 200 hours with a 100-hour mini-check conducted in between each phase. On January 4, 2003, the airframe, engine, and propeller underwent a Phase I Inspection. At that time the airframe and engine had accumulated a total of 7,493.5 hours and 6,808 cycles, and the propeller had accumulated a total of 2,792.5 hours. At the time of the accident the airplane/engine accumulated a total of 7,503.7 hours and 6,818 cycles.

There was only one discrepancy recorded in the flight log during the 9 previous flights, which stated that a Phase I inspection was due. The flight log page for the accident flight was not recovered from the accident site.

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METEOROLOGICAL INFORMATION

At 1053, the weather observation facility at SJT reported the following weather conditions: wind from 100 degrees at 7 knots, visibility 10 statute miles, an overcast ceiling at 2,300 feet agl, temperature -02 degrees Celsius, dew point -11 degrees Celsius, and an altimeter setting of 30.43 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

On-scene documentation of the wreckage at the accident site was conducted by FAA inspectors from the San Antonio Flight Standard District Office (FSDO), and representatives from Cessna Aircraft Company, FedEx, and Baron Aviation. According to photographs and information supplied by those entities, the accident site was located at 31 degrees 20.99 minutes north latitude and 100 degrees 36.78 minutes west longitude, approximately mile from the approach end of TS65 runway 35 at an elevation of 1,203 feet mean sea level (msl). The wreckage path was oriented along a magnetic heading of 300 degrees for about 300 feet, where at the 170-foot mark, the airplane impacted a fence and a power line. The left wing created a 170-foot furrow in the dirt field leading up to the fence/power line.

The fuselage came to rest inverted. The left wing was separated from the fuselage but remained attached to the airframe via the aileron control cables. The empennage was partially separated from the airframe and came to rest adjacent to the airframe's left side, but with the top of the vertical stabilizer pointing toward the nose of the airplane and the leading edges of the horizontal stabilizers pointing up in the air. The empennage remained attached to the airframe by some sheet metal and control cables. According to Cessna, all of the flight controls were accounted for and remained attached to their respective hinges. The flaps were in the retracted position, which was verified by the flap selector, the indicator and the flap actuator position. No evidence of a flight control malfunction was observed.

The right fuel selector handle was in the ON position and both right fuel tank shutoff valves were open. The left fuel selector handle was in the OFF position, but both left fuel tank shutoff valves were open. The left control cable was severed. Witnesses reported smelling fuel immediately following the accident, and a significant amount of fuel was removed from both fuel tanks during the aircraft recovery process.

The engine controls were examined and found in the following positions:

Throttle - full forward
Propeller - full forward
Fuel Condition Lever - full forward
Emergency Power Lever - above stop gate, in emergency regime, with the copper safety wire separated

The engine was partially separated from the firewall and the propeller, which was separated from the engine aft of the propeller flange, was located approximately half way between the fence line and the final wreckage position. All three propeller blades remained attached to the hub. The engine and propeller were shipped to their respective manufacturers' facilities where they were examined in more detail.

TESTS AND RESEARCH

On March 10 & 11, 2003 the engine was examined at the Pratt & Whitney Canada facility in Montreal, Canada, under the provisions of the NTSB investigator-in-charge (IIC). The engine displayed impact damage; however, there was no evidence of a preimpact catastrophic failure. The compressor

Narrative (Continued)

discharge air (P3) and power turbine control (Py) lines were continuous, and all connections and locking devices were in place. The chip detectors from the reduction gearbox and accessory gearbox were clean. The oil filter, fuel filters, and P3 filter were clean.

The accessory gearbox was separated from the engine. The fuel-to-oil heat exchange and the high-pressure fuel pump sustained damage to their respective mounting structures. The heater and pump were disassembled; no anomalies were noted. The fuel control unit was functionally tested; no anomalies were noted that could not be attributed to a field adjustment. The compressor bleed valve was functionally tested; the test resulted in anomalous readings that did not meet the manufacturer's specifications. Disassembly of the valve revealed that the anomalous readings were the result of a hole in the valve's internal diaphragm; however, according to the manufacturer, this would not have had a significant affect on the engine. The propeller and overspeed governors were functionally tested with no anomalies noted.

The 1st stage compressor blades displayed circumferential rubbing and the leading edges displayed heavy nicks and gouges. The 2nd and 3rd stage compressor blades displayed circumferential rubbing at the blade tips. The compressor stators, shrouds, spacers, impeller, and impeller shroud all displayed circumferential rubbing/scoring. The combustion section displayed no signs of distress and the soot patterns appeared normal. The compressor turbine guide vane ring displayed metallic material that was fused onto the vane trailing edges, and the inner ring displayed circumferential scoring. The compressor turbine (CT) shroud and blades displayed no signs of distress, and metallic material was fused onto CT blade airfoils. The power turbine guide vane ring and interstage baffle were circumferentially rubbed. The power turbine shaft was rotated smoothly by hand. Additionally, none of the engine's 4 bearings displayed signs of distress.

On March 12, 2003, the NTSB IIC examined the propeller at the McCauley Propeller's facility in Vandalia, Ohio. The examination revealed that all of the observed propeller damage (gouging, twisting, and bending) was due to impact forces with no evidence of any fatigue failures. The reverse stop and feather stop mechanisms were undamaged indicating that the propeller was not operating near those positions at the time of impact. According to the manufacturer, the propeller was being operated with power at the time of impact, but the exact blade angle or amount of power absorbed by the propeller blades could not be determined.

The aircraft was equipped with a power analyzer and recorder system (PAR). The PAR unit was recovered from the wreckage, and taken to Avionics Specialties Inc.'s facility for readout. The data collected on the PAR unit indicated that the last event recorded was a loss of electrical power. The maximum power of 610 horsepower (HP) was exceeded for 4.5 seconds at 698 HP. At the time of the excessive power, the following values were recorded:

Inter-Turbine Temperature = 691 degrees Celsius
Torque = 1,926 foot-pounds
Ng = 99.4%
Np = 1,904 RPM
Fuel Flow = 463 pounds per hour
Pressure Altitude = 1,532 feet
Indicated Airspeed = 90 knots
Outside Air Temperature = -4 degrees Celsius

It could not be determined whether or not this excessive power was associated with the 45-second rate of descent plateau discussed in the History of Flight section of this flight.

At the time when electrical power was lost, the PAR unit recorded the following parameters:

Inter-Turbine Temperature = 693 degrees Celsius
Torque = 1,937 foot-pounds

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Ng = 98.3%
Np = 1,774 RPM
Fuel Flow = 465 pounds per hour
Pressure Altitude = 1,532 feet
Indicated Airspeed = 90 knots
Outside Air Temperature = -4 degrees Celsius

ADDITIONAL INFORMATION

General Cessna 208B Information

According to the pilot operating handbook, the normal (e.g., no ice) maximum gross weight stall speed with flaps up and idle power is 78 knots calibrated airspeed (KCAS). The stall characteristics are described as "conventional and aural warning is provided by stall warning horn which sounds between 5 and 10 knots above the stall in all configurations."

Cessna's Known Icing Equipment Supplement

The pilot operating handbook's Known Icing Equipment Supplement indicated that the pilots were to maintain a minimum "enroute airspeed" of 105 KIAS with -inch or more of rime ice accumulation. Notes associated with this section of the supplement indicated that "an accumulation of one inch of ice on the leading edges can cause a large (up to 500 FPM) loss in rate of climb, a cruise speed reduction of up to 40 KIAS, as well as a significant buffet and stall speed increase (up to 20 knots)."

The before landing segment of the supplement indicates that pilots were to select a minimum flap setting and maintain extra airspeed consistent with the available runway length. A note associated with the landing segment indicated that pilots were to cycle all deice boots to shed any accumulated ice prior to a landing approach. The supplement adds that since pre-stall buffet onset and stall speed are increased slightly when deice boots are actuated, pilots are to "maintain extra airspeed (10 KIAS) before actuating [the] boots." Another note indicates that after a light rime ice encounter, pilots were to "maintain extra airspeed (10-20 KIAS) on approach to compensate for the increased pre-stall buffet associated with ice on the unprotected areas and the increased weightWith flaps up, maintain a MINIMUM approach speed of 105 KIAS."

Cessna Caravan Icing Assessment and Recommendations

From 1987 to 2003, 26 icing-related accidents and incidents involving Cessna 208 series airplanes occurred. Fifteen of the 26 icing-related events resulted from ice that had accumulated while the airplane was in flight (10 of those 15 in-flight events occurred during the approach and landing phases). As a result, the Safety Board conducted a safety assessment regarding the icing-related accidents. The assessment and follow-up meetings with Cessna Aircraft Company, Cessna 208 operators, and the FAA resulted in 4 recommendations directed toward the development and implementation of seasonal training, operational strategies and guidance materials for icing operations, and preflight inspection and deicing criteria.

In 2005/2006 the NTSB was involved in two foreign-led investigations involving Cessna 208 airplanes that crashed after encountering icing conditions. Another set of recommendations was issued when the Safety Board became concerned with the minimum recommended in-flight icing airspeed for the airplane. One of the accidents involved a Cessna 208B airplane equipped with a flight data recorder (FDR) and cockpit voice recorder (CVR). The data retrieved from the recorders indicated that the flight crew was reading the checklist for the descent when the airplane began to pitch up (from -0.1 to 7.3 degrees) and as the airspeed began to decrease. At the time the airplane was at 102 knots, the airplane experienced a decrease in vertical acceleration and a slight decrease in airplane pitch angle consistent with significant flow separation over the wings and the initiation

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of an aerodynamic stall. Calculation of the angle of attack indicated that it was about 9 degrees at the time of the upset. Additionally, the sound of the stall warning horn was not heard on the CVR before the upset.

Cessna's flight test personnel noted in certification data that with heavy ice accumulations, a "mild buffet or nose bobbing (partial stalls)" could occur at speeds as high as 95 KIAS and the flaps retracted.

As a result of the foreign investigations and data reviewed during the assessment, the Safety Board issued a series of recommendations during January 2006. One recommendation that would require a the minimum operating airspeed of 120 knots during flight in icing conditions, a second prohibiting Cessna 208 operators from flying in icing conditions determined to be more than light, and a third recommendation requiring Cessna 208 operators to disengage the autopilot and fly manually when operating in icing conditions.

Following the assessment and the Safety Board's recommendations, the FAA issued a number of airworthiness directives that resulted in updates to the pilot operating handbook's Known Icing Equipment Supplement. In 2005, the FAA issued Airworthiness Directive (AD) 2005-07-01, which called for the revision of the supplement by adding a warning indicating that "the stall warning system has not been tested in all icing conditions and should not be relied upon in icing conditions." In 2006, the FAA issued AD 2006-06-06, which again revised the handbook's supplement to create a new minimum airspeed limitation of 120 knots in a flaps-up condition for all phases of flight. In addition, operators were to place a placard on the instrument panel, which indicated the same. The supplement also included optional advisory and awareness systems. In 2006, the FAA issued AD2007-10-15, which required Cessna 208 operators to incorporate the most recent revision of the Known Icing Equipment supplement, which included the required installation of a functional low airspeed awareness system to operate the airplane in known icing conditions. The low airspeed advisory system included an aural warning when the propeller anti-ice switch was in the AUTO position and the indicated airspeed was less than 110 knots

Wreckage Release Information

All pilot records were released to the operator's representative on March 5, 2003. The aircraft's maintenance records were released to the operator's representative on April 4, 2003. On October 3, 2003, the wreckage was released to the operator's representative.

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Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Ducote Airpark	TS65	1974 Ft. MSL	35	3700	30

Runway Surface Type: Asphalt

Runway Surface Condition: Dry

Approach/Arrival Flown: NONE

VFR Approach/Landing: Simulated Forced Landing; Traffic Pattern

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Cessna	208B	208B0044

Airworthiness Certificate(s): Normal

Landing Gear Type: Tricycle

Amateur Built Acft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	2	8750 LBS	1

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Prop	Pratt & Whitney Canada	PT6A-114A	675 HP

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
100 Hour	01/2003	7493 Hours	7503.3 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?
Yes /	No	No

Owner/Operator Information

Registered Aircraft Owner	Street Address	City	State	Zip Code
Federal Express Corporation	3131 Democrat Rd	Memphis	TN	38118

Operator of Aircraft	Street Address	City	State	Zip Code
Baron Aviation Services Inc.	Rolla National Airport	Vichy	MO	65580

Operator Does Business As:

Operator Designator Code: DEMA

- Type of U.S. Certificate(s) Held:

Air Carrier Operating Certificate(s): On-demand Air Taxi

Operating Certificate:

Operator Certificate:

Regulation Flight Conducted Under: Part 91: General Aviation

Type of Flight Operation Conducted: Instructional

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First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	42

Sex: M | Seat Occupied: Right | Occupational Pilot? | Certificate Number: On File

Certificate(s): Airline Transport; Flight Instructor; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Single-engine; Instrument Airplane

Current Biennial Flight Review? 03/2002

Medical Cert.: Class 2 | Medical Cert. Status: Without Waivers/Limitations | Date of Last Medical Exam: 11/2002

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	4356		2758	1598	1898	280	100			
Pilot In Command(PIC)										
Instructor										
Instruction Received										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: None

Departure Point	State	Airport Identifier	Departure Time	Time Zone
San Angelo	TX	SJT	1005	CST

Destination	State	Airport Identifier
Same as Accident/Incident Location		TS65

Type of Clearance: VFR

Type of Airspace:

Weather Information

Source of Wx Information:

Unknown

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
SJT	1053		Ft. MSL	NM	Deg. Mag.

Sky/Lowest Cloud Condition: Ft. AGL | Condition of Light: Day

Lowest Ceiling: Overcast 2300 Ft. AGL | Visibility: 10 SM | Altimeter: 30.43 "Hg

Temperature: -2 °C | Dew Point: -11 °C | Weather Conditions at Accident Site: Visual Conditions

Wind Direction: 100 | Wind Speed: 7 | Wind Gusts:

Visibility (RVR): Ft. | Visibility (RVV) SM

Precip and/or Obscuration:

No Obscuration; No Precipitation

Accident Information

Aircraft Damage: Destroyed | Aircraft Fire: None | Aircraft Explosion None

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot		1			1
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot		1			1
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -		2			2
Other Ground					
- GRAND TOTAL -		2			2

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Administrative Information

Investigator-In-Charge (IIC)

Jason A. Ragogna

Additional Persons Participating in This Accident/Incident Investigation:

Frank G Fortmann
Federal Aviation Administration
San Antonio, TX

Jesse Cavazos
Federal Aviation Administration
San Antonio, TX

Emile Lohman
Cessna Aircraft Company
Wichita, KS

Tom Teplik
Cessna Aircraft Company
Wichita, KS

Matthew Duke
Federal Express
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C E Schmidt
Barron Aviation Services
Rolla, MO

Thomas Berthe
Pratt & Whitney Canada
Montreal, QC,

Tom Knopp
McCauley Propeller Systems
Vandalia, OH

National Transportation Safety Board
Washington, DC 20594

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Brief of Accident

Adopted 12/20/2007

FTW03FA089
File No. 22843 | 01/24/2003 | San Angelo, TX | Aircraft Reg No. N944FE | Time (Local): 10:15 CST

Make/Model:	Cessna / 208B
Engine Make/Model:	Pratt & Whitney Canada / PT6A-114A
Aircraft Damage:	Destroyed
Number of Engines:	1
Operating Certificate(s):	On-demand Air Taxi
Type of Flight Operation:	Instructional
Reg. Flight Conducted Under:	Part 91: General Aviation

	Fatal	Serious	Minor/None
Crew	0	2	0
Pass	0	0	0

Last Depart. Point:	San Angelo, TX
Destination:	Same as Accident/Incident Location
Airport Proximity:	Off Airport/Airstrip

Condition of Light:	Day
Weather Info Src:	Weather Observation Facility
Basic Weather:	Visual Conditions
Lowest Ceiling:	2300 Ft. AGL, Overcast
Visibility:	10.00 SM
Wind Dir/Speed:	100 / 007 Kts
Temperature (°C):	-2
Precip/Obscuration:	No Obscuration; No Precipitation

Pilot-in-Command Age: 42

Certificate(s)/Rating(s)
Airline Transport; Flight Instructor; Commercial; Multi-engine Land; Single-engine Land

Instrument Ratings
Airplane

Flight Time (Hours)

Total All Aircraft:	4356
Last 90 Days:	Unk/Nr
Total Make/Model:	Unk/Nr
Total Instrument Time:	380

The airplane impacted a dirt field and a power line following a loss of control during a simulated engine failure, while on a Part 135 proficiency check flight. Both pilots were seriously injured during the event and could not recall the specifics of the flight after the simulated engine failure. Witnesses to the accident heard the sound of an engine "surging," and observed the airplane approaching from the south about 100 to 200 feet above the ground. Subsequently, the airplane's wings began to bank left and right, the airplane then entered a descent, contacted power lines and trees, and impacted the ground. Two witnesses reported that they observed between and 1-inch of ice on the protected and unprotected surfaces of the airplane, respectively. A performance study on the accident flight revealed that the airplane entered a descent rate of 1,300 feet/minute (fpm) about 1,100 feet above the ground. This rate of descent was associated with a decrease in airspeed from 130 knots to 92 knots over a span of 30 seconds. The airplane's rate of descent leveled off at the 1,300-fpm rate for 45 seconds before increasing to a 2,000 fpm descent rate. The true airspeed fluctuated between a low of 88 knots to 102 knots during the last 45 seconds of flight. According to the aircraft manufacturer, the clean wing flaps up stall speed was 78 knots. However, after a light rime ice encounter, pilots were instructed to "maintain extra airspeed (10-20 KIAS) on approach to compensate for the increased pre-stall buffet associated with ice on the unprotected areas and the increased weight. With flaps up, maintain a MINIMUM approach speed of 105 KIAS." In addition, pilots were instructed to cycle the deice boots to shed any accumulated ice prior to a landing approach.

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File No. 22843 | 01/24/2003 | San Angelo, TX | Aircraft Reg No. N944FE | Time (Local): 10:15 CST

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: MANEUVERING

Findings
1. (F) WEATHER CONDITION - ICING CONDITIONS

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - BASE LEG/BASE TO FINAL

Findings
2. (C) ANTI-ICE/DEICE SYSTEM - NOT ACTIVATED
3. (C) AIRSPEED - NOT MAINTAINED - FLIGHTCREW
4. (C) STALL - INADVERTENT - FLIGHTCREW

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. TERRAIN CONDITION - GROUND

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.
The flight crew's failure to cycle the deice boots prior to conducting a simulated forced landing and their failure to maintain adequate airspeed during the maneuver, which resulted in an inadvertent stall and subsequent loss of control. A contributing factor was the ice accumulation on the leading edges of the airfoils.