Aviation Investigation Final Report

Location:	Pleasanton, Texas	**Accident Number:**	DFW05FA244
Date & Time:	September 21, 2005, 11:32 Local	**Registration:**	N63PA
Aircraft:	Diamond Aircraft Industries DA20-C1	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The 5,406-hour flight instructor was demonstrating a forced landing by simulating a loss of engine power when the single-engine airplane struck unmarked power lines approximately 30 feet above the ground. The training flight was the second flight for the student, who was a military officer enrolled in a government undergraduate flight training program. There were no reported witnesses to the accident, and no distress calls were received from the pilot. A postimpact fire consumed the composite airframe. Visual meteorological conditions prevailed and there were no obstructions to visibility at the time of the accident. Flight control continuity was established, and no mechanical anomalies or overdue inspections were noted with the engine or the airframe.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight instructor's failure to maintain clearance from an unmarked transmission line. A contributing factor was the low altitude flight.

Findings

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

Findings

1. OBJECT - WIRE,TRANSMISSION
2. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND(CFI)
3. (F) ALTITUDE - SELECTED - PILOT IN COMMAND(CFI)

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: DESCENT - UNCONTROLLED

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

Findings
4. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On September 21, 2005, at 1132 central daylight time, a single-engine Diamond Aircraft Industries DA20-C1 airplane, N63PA, was destroyed upon impact with terrain following an in-flight collision with power lines while maneuvering near Pleasanton, Texas. The certificated flight instructor (CFI) and non-certificated student receiving instruction sustained fatal injuries. The airplane was registered to Flying Monsters, Inc., of Plano, Texas, and was being operated by Check-Six Aviation, of San Antonio, Texas. Visual meteorological conditions prevailed and a flight plan was not filed for the instructional flight conducted under 14 Code of Federal Regulations Part 91. The local flight originated from the Stinson Municipal Airport (SSF), near San Antonio, Texas, approximately 1048.

The student, a 2005 graduate of the United States Air Force Academy who was a commissioned Air Force officer, was enrolled in a government undergraduate pilot training flight program that provided 50-hours of introductory flight training. The Introductory Flight Training program is taught by Check-Six Aviation, an Federal Aviation Administration (FAA) Part 61 certificated flight school. The program requires all candidates to solo prior to 25 flight hours, and to earn their private pilot certificate within 50 consecutive flight hours. An FAA third-class student medical certificate is also required prior to solo; however, the student had not yet received the student pilot certificate. The accident flight was the student's second flight, after receiving 1.2-hours flight time on the first flight on September 20, 2005. During her first flight the CFI demonstrated maneuvers and procedures for the student, including collision avoidance techniques.

The student sustained serious thermal injuries during the accident, but was able to give a recorded statement on October 8, 2005, to safety personnel from the Air Force Safety Center (AFSC). On January 10, 2006, the student succumbed to the accident injuries. The following excerpts were taken from the transcribed recorded statement:

The student stated that the flight instructor, who was flying the airplane, was demonstrating a forced landing by simulating a loss of engine power. The flight instructor simulated the maneuver by retarding the engine to idle. After completing the checklist, the flight instructor continued the demonstration by selecting a strip of farmland and positioning the airplane for the simulated forced landing. The student noticed that the airstrip was really short, and remembered hearing the flight instructor say how this "probably wasn't the best piece to pick; and on our way back up, in front of us I could see power lines." She added "there was a real loud noise when we hit them.... I don't really remember much that happened after that."

When asked by the AFSC personnel about the altitude of the airplane when the approach was

made, her answer was, "really close, it was almost as if we were going to land; I don't remember how high an altitude it was though." The student added, "I remember thinking the people who live here are probably wondering why we were buzzing their house or something like that, cause we were really, I think we were that low."

Another question asked by the AFSC personnel was about problems with either the airplane or engine, the answer was, "not really, we were fine."

The flight school stated that the flight training/practice area is normally conducted within a triangular area from SSF south to Pleasanton, Texas, northeast to Floresville, Texas, and back to SSF. The area is locally referred to as the "south practice area," and the altitude may extend up to 9,000 feet; however, the airspace and altitude are training guidelines and not fixed parameters.

A representative from American Electric Power (AEP) reported an electric power interruption at 1132 CDT, before arriving on-scene to repair two of five overhead power lines that were severed. The power company also stated that the 60-foot poles supporting the power lines are planted approximately nine feet into the ground, leaving 51 feet above grade level. The top two cables (about 0.37 inches in diameter) were shield lines, which do not carry line voltage; they were not damaged. The lower three cables (about 0.62 inches in diameter) were phase conductors, and are approximately the same height above the ground. The two cables nearest the wreckage were the ones severed. The estimated height above the ground of the severed cables, which included cable sag, was approximately 30 feet.

The flight was not in contact with Air Traffic Control (ATC) at the time of the accident. No radio transmissions or distress calls were received from the aircraft. There were no reported eyewitnesses to the accident.

PERSONNEL INFORMATION

The 64-year old CFI, held an airplane single-engine land rating and an airline transport certificate with airplane single-engine land and multi-engine land ratings. The CFI also held an instrument airplane rating.

The CFI's most recent FAA second-class medical certificate was issued on September 8, 2005, with the restriction of "holder shall possess glasses for near and intermediate vision." The pilot reported on the medical application that he had accumulated 5,406 hours of total flight time. The CFI was reported to be seated on the right seat of the side-by-side trainer.

AIRCRAFT INFORMATION

The 2004-model low-wing, two-place side-by-side composite airplane, serial number (S/N) C0269, featured a fixed tricycle landing gear. The airplane was powered by a single Teledyne Continental IO-240-B3B four-cylinder, horizontally opposed, fuel injected engine, S/N 650052,

rated at 125 horsepower. The fixed pitch, two-bladed wood propeller, model W69EK7-63 was manufactured by the Sensenich Wood Propeller Company.

According to the airframe and engine logbooks, the airplane's most recent Diamond 100-hour aircraft maintenance inspection, which included de engine and propeller, was performed on August 20, 2005. The airplane was found to be in an airworthy condition at that time. The airplane total time was recorded as 325.8 hours.

Aircraft and engine total time since new was 396.8 hours at time of accident.

The following two maintenance entries were recorded in the aircraft logbook:

1. August 23, 2005, an FAA form 8130-3 was submitted for the installation of up-dated software for the Garmin GTX-330 mode S transponder, as per Garmin Service Bulletin (SB) 0426.

2. Due to a low oil pressure gauge reading, the engine oil pressure relief spring, part number 627458, was replaced on September 7, 2005. After the maintenance action was accomplished, the engine was run, operationally checked, and the airplane was approved for return-to-service.

On September 21, 2005, the aviation fuel refueling tracking form indicated that 6.3 gallons of fuel was dispensed to top-off the fuel tank. A fuel sample was taken by airport personnel on September 21, 2005. The fuel sample was found to be clear and bright with no anomalies noted.

The examination of the maintenance records for the airplane did not reveal any unresolved maintenance discrepancies prior to the accident flight.

METEOROLOGICAL INFORMATION

At 1153, the automated surface observing system at SSF, which is approximately 22 miles North of the accident site, reported wind calm, visibility 10 statute miles, clear skies, temperature 32 degrees Celsius, dew point 19 degrees Celsius, and a barometric pressure at 30.07 inches of Mercury. The NTSB IIC calculated the density altitude at 2,406 feet.

COMMUNICATION

Air Traffic Control (ATC) recorded the communications between N63PA and ground control/tower at SSF. Houston Air Traffic Control Center (ARTC) provided an altitude profile using radar data from 1128 to the accident at 1132. Even though the accident airplane was not under positive contact, this data matched the recorded profile of N63PA. San Antonio Terminal Radar Approach Control (TRACON) also plotted radar tracking of the airplane from the start of its flight to moments before its impact with power lines using the same matched

recorded profile information.

At 1037, the flight called for taxi instructions on ground control for departure to the "south practice area negative flight following." Nine minutes later, at 1046 the airplane, squawking 1200 (VFR transponder code) was cleared for takeoff by the tower, and TRACON was able to generate a beacon-code track up to the time of the accident. N63PA reached a maximum altitude of 3,300 feet mean sea level (MSL) at 1051. At 1128, the airplane began its final decent from 2,400 feet MSL, with approximate descent rate of 600 feet per minute and ground speed of 75 knots. The last complete radar reading was recorded at 1131, when N63PA was on a heading of 283 degrees at an altitude of 1,000 feet MSL and 75 knots. The elevation in the area is approximately 425 feet; thus N63PA was about 575 feet above ground level (AGL) at that reading. The airplane then made a descending right turn to an easterly heading before it struck the power lines.

WRECKAGE AND IMPACT INFORMATION

The Global Positioning System (GPS) coordinates, recorded at the accident site using a hand held unit, were latitude 28 degrees 59.304 minutes North and longitude 98 degrees 30.352 minutes West, which was approximately 2.2 miles northeast of the Pleasanton Municipal Airport (PEZ). The elevation was recorded at 427 feet. A post impact fire destroyed most of the airplane and burned approximately seven acres of pasture. The property owner's house was approximately 273 yards to the south of the accident site.

The airplane came to rest 123 feet east of the electrical power lines in an inverted position on a heading of 332 degrees. No additional ground scars were noted at the site. Only the lower portion of the engine could visually be seen. The flap actuator's rod extension correlated to a flaps-up setting. Three pieces of the propeller blades were found at 17, 106, and 262 feet from the main wreckage.

The propeller spinner exhibited lined impact damage marks; with the wooden blades being fractured about four inches from the hub. The number two and four cylinder exhaust risers also exhibited lined impact damage marks. The fuel pump was removed and visually inspected. The fuel lines were disconnected at the injector nozzles, and no fuel was noted. The fuel pump was disconnected. The fuel pump drive coupling did not appear to be damaged, and the pump rotated freely by hand with no binding.

After the wreckage recovery team lifted the engine from the wreckage debris, a partial field examination of the engine was accomplished. The top and bottom plugs were removed, inspected, and found consistent with normal operation when compared to the Champion Aviation Check-A-Plug Wear Guide (part number AV-27). Thumb suction and compression were noted on the number one, two, and three cylinders; the number four cylinder exhibited air by-passing the intake valve.

On September 22, 2005, the wreckage was recovered to Air Salvage of Dallas (ASOD), near

Lancaster, Texas, for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on September 23, 2005, by the Bexar County Medical Examiner's Office, near San Antonio, Texas.

Toxicological testing on the pilot was performed by the FAA's Civil Aeromedical Institute (CAMI) Forensic and Accident Research center, near Oklahoma City, Oklahoma, for carbon monoxide, cyanide, volatiles, and drugs. The results of these tests were reported as negative.

TESTS AND RESEARCH

On December 13, 2005, at the facilities of ASOD, the wreckage was examined under the supervision of the NTSB investigator-in-charge (IIC) with representatives from Teledyne Continental Motors, Diamond Aircraft, and the U.S. Air Force.

Remains of the wreckage including flight controls, engine controls, instruments and fuel system were examined to check configuration and integrity. Most of the exhaust system components exhibited impact damage. Left, right, and center instrument panel switches, knobs, and circuit breakers were melted. The cockpit engine controls showed that the throttle was full forward, alternate air was on, and the mixture was full rich. Flight control continuity was established to all flight controls. The cockpit control push rod connections for the ailerons, flaps, and elevators were found attached in place with respective fasteners. The elevator trim actuator was positioned in a slight nose up setting, and the flap actuator was positioned in a flaps-up setting. Rudder cables were attached in place with fasteners. The fuel tank filler neck hose was displaced and collapsed. The landing gear legs were attached to the fuselage spar bridge, and the wing pins were found to be locked in place.

On March 16, 2006, at the facilities of Teledyne Continental Motors (TCM), Mobile, Alabama, the engine (S/N 650052) was examined under the supervision of the NTSB IIC with representatives from Teledyne Continental Motors and the U.S. Air Force Safety Center.

The engine assembly exhibited thermal discoloration from the postimpact fire, with the heaviest concentration toward the rear accessory-case end. The exhaust system risers, muffler and tailpipe assembly exhibited impact damage, with no restrictions from foreign material or contamination.

The crankshaft propeller flange was undamaged, with the propeller spinner and bulkhead attached. The two lower engine mount brackets were fractured. The fuel nozzles were in-place and exhibited thermal discoloration.

The fuel system throttle and metering assembly was flowed on the TCM test bench and functioned through its range of operation. The fuel pump drive appeared undamaged, with the

through bolt safety wire in place. The fuel pump showed evidence of the diaphragm melting at the cover to vapor separator section. The thermal discoloration pattern on the cover indicated that the mixture shaft was in the full rich position when it was exposed to the fire. All passages in the mixture shaft were unrestricted, and all passages in the fuel pump were clear and unrestricted.

There was evidence of diaphragm melting at the valve cover to body interface of the fuel manifold valve. The inlet fitting of the fuel manifold valve was fractured and a replacement fitting was installed to allow the flow testing on the TCM flow bench, with minor test fluid leakage at the interface. There was no leakage from the cover vent. After the cover was removed, the screen showed no restrictions or contaminates, and the diaphragm and plunger nut was tight.

The crankshaft to camshaft timing was verified by the alignment of the gear's timing marks. Both magnetos exhibited thermal discoloration and external/internal damage. Each cylinder was disassembled and all components inspected. The crankshaft, with connecting rods and bearings, camshaft, and crankcase, with crankshaft main bearings were inspected, with no signs of lubrication distress. The oil pump cavity showed normal operating signatures, with slight internal scratches, and the oil pressure relief valve and seat contained no obstruction. The accessory gears had continuity, and the gear teeth were undamaged with normal operating signatures. The vacuum pump exhibited thermal discoloration and damage. The drive coupling was melted, which prevented the shaft from being rotated by hand.

The examination of the engine did not reveal any pre-impact mechanical anomalies that could have prevented normal flight operation.

ADDITIONAL INFORMATION

The wreckage was released to the owner's representative on March 22, 2006.

Flight instructor Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	64,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	September 1, 2005
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	August 1, 2004
Flight Time:	5406 hours (Total, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Student pilot Information

Certificate:		**Age:**	
Airplane Rating(s):		**Seat Occupied:**	
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Diamond Aircraft Industries	**Registration:**	N63PA
Model/Series:	DA20-C1	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	C0269
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	August 1, 2005 Annual	**Certified Max Gross Wt.:**	1764 lbs
Time Since Last Inspection:	59.7 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	397 Hrs at time of accident	**Engine Manufacturer:**	Diamond Aircraft
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	DA20-C1
Registered Owner:	Flying Monsters, Inc.	**Rated Power:**	125 Horsepower
Operator:	Check-Six Aviation, Inc.	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SSF,577 ft msl	**Distance from Accident Site:**	21 Nautical Miles
Observation Time:	11:53 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	0 knots / 0 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.06 inches Hg	**Temperature/Dew Point:**	32°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Antonio, TX (SSF)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	10:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	28.988332,-98.505836

Administrative Information

Investigator In Charge (IIC):	McGill, C Frank
Additional Participating Persons:	John V Bures; Federal Aviation Administration; San Antonio, TX Gary Gaudreau; Diamond Aircraft; Ontario, Canada Jason Lukasik; Teledyne Continental Motors, Inc.; Mobile, AL Gary Howe; Major, U.S. Air Force; San Antonio, TX
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