Aviation Investigation Final Report

Location:	Cleveland, Texas	**Accident Number:**	FTW04LA142
Date & Time:	May 27, 2004, 15:56 Local	**Registration:**	N2948S
Aircraft:	Piper PA-34-200T	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The 2,919-hour airline transport rated pilot stated that the airplane was climbing through an altitude of 5,500 feet mean sea level (msl) when he heard a "pop" and started to smell something "funny," but there was no visible smoke. He elected to go to the nearest airport and land, and noticed that his push-to-talk button was no longer operative. The pilot set code 7700 in the transponder and began a descent. During the descent, the cockpit began to fill with an "acrid black" smoke, and he saw flames through an opening in the instrument panel. The pilot attempted to suppress the fire with a hand-held fire extinguisher; however, he was unsuccessful. The pilot elected to execute an emergency landing in a field, collided with a barbed wire fence, and the airplane was then consumed by fire. Examination of the airplane's electrical system revealed that the main battery cable that ran between the main power relay and the main power bus was severed approximately two inches from the main bus. There was beading and localized melting on both ends. Under magnification, the damaged areas had an eroded appearance and there was some evidence of pitting. This type of damage is indicative of an electrical arcing event, which most likely ignited the insulation surrounding the main power wiring assembly and spread to other combustible items in the area. The initiating event for the arc could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The in-flight fire that resulted from an electrical arc in the main battery cable near the main power bus. The cause of the arcing event could not be determined.

Findings

Occurrence #1: FIRE
Phase of Operation: CLIMB - TO CRUISE

Findings
1. (C) ELECTRICAL SYSTEM,BATTERY
2. (C) ELECTRICAL SYSTEM,ELECTRIC WIRING - ARCING

Occurrence #2: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
3. OBJECT - FENCE

Factual Information

On May 27, 2004, at 1556 central daylight time, a Piper PA-34-200T twin-engine airplane, N2948S, was destroyed during an emergency landing following an in-flight fire near Cleveland, Texas. The commercial pilot, sole occupant of the airplane, sustained minor injuries. The airplane was registered to and operated by the pilot. An instrument flight rules (IFR) flight plan was filed for the personal flight that originated at the Pearland Regional Airport (LVJ), near Houston, Texas, about 1530, and was destined for Palestine Municipal Airport (PSN), near Palestine, Texas. Visual meteorological conditions prevailed for the cross-country flight conducted under 14 Code of Federal Regulations Part 91.

In a telephone interview, the pilot reported that he was climbing through an altitude of 5,500 feet mean sea level (msl) when he heard a "pop" and started to smell something "funny," but there was no visible smoke. He elected to proceed to the nearest airport and land, and noticed that his push-to-talk button was no longer operative. The pilot set code 7700 in the transponder and began a descent. Shortly after, he began to smell smoke and extended the landing gear. As the airplane descended through 5,300 feet, the pilot turned off the master switch and descended at a rate of 1,000 feet per minute. As the airplane descended, the cockpit began to fill with an "acrid black" smoke, and he saw flames through an opening in the instrument panel. The pilot attempted to suppress the fire with a hand-held fire extinguisher; however, he was unsuccessful. He made an emergency landing in a field, collided with a barbed wire fence, and safely exited the airplane, which was later consumed by fire.

The pilot reported that he had the following electrical components turned on when he departed: master switch, panel mounted Garmin 430, all radios, transponder, and the audio panel. The airplane last annual inspection was completed in April 2004, and the only work performed on the electrical system was the replacement of the right hand ammeter. A new battery was also installed in December 2003.

The airplane's electrical system was examined on July 22, 2004, by a Safety Board Fire and Explosion Specialist. The main power wire assembly that ran between the main power relay and the main power buss was severed approximately two inches from the main buss. There was beading and localized melting on both ends. Under magnification, the damaged areas had an eroded appearance and there was some evidence of pitting. This type of damage is indicative of an electrical arcing event.

The arcing event most likely ignited the insulation surrounding the main power wiring assembly and spread to other combustible items in the area. The circuit breaker panel and main power bus were heavily fire damaged. The pilot stated that, after smoke started coming from the circuit breaker panel, the panel began to melt. The aluminum faceplate for the circuit breaker panel was melted and brittle with material missing in places having been consumed in

the fire. The circuit breaker switches were mostly consumed in the fire with only the spring remaining in the switch. The few remaining switches were delaminated and brittle. The circuit breakers were brittle with places where the Bakelite covers were chipped and delaminated. Several circuit breakers were unaccounted for. The copper bus bars were intact. The damage to these components are adjacent to the severed portion of the main power wire assembly.

The initiating event for the arc could not be determined. Electric arcing of a conductor can occur when either the conductor's insulation or the conductor is damaged or compromised. While there is no mention of any noticeable damage to the insulation of the wire assembly during the yearly inspection, there was no way to visually inspect the conductor inside the insulation. Since the conductor insulation had melted away as a result of the fire and the conductor was damaged as a result of the arcing event and subsequent fire, there was no way to determine if there was any preexisting damage to either the conductor or the conductor's insulation.

No other area in the main power system demonstrated severe fire or electrical damage. The battery was heavily sooted but otherwise undamaged. The main power relay was heavily sooted and plastic outer components were slightly melted. No anomalies were found in an x-ray of the relay other than uneven surfaces on the coil. According to the manufacturer, the unevenness of the coil is normal and is a result of a manufacturing process. In addition, there have not been any documented cases of this type of relay being involved in a fire event. The relay, when it does fail, tends to fail in the "open" position, which cuts the power off to the main power buss.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	55,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	March 18, 2003
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	July 1, 2003
Flight Time:	2919 hours (Total, all aircraft), 277 hours (Total, this make and model), 45 hours (Last 90 days, all aircraft), 15 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N2948S
Model/Series:	PA-34-200T	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	34-7970394
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 7, 2004 Annual	**Certified Max Gross Wt.:**	4200 lbs
Time Since Last Inspection:	15 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	1950 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	TSIO-360-EB1
Registered Owner:	Michael E. Buoy	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	IAH,97 ft msl	**Distance from Accident Site:**	28 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	225°
Lowest Cloud Condition:	Scattered / 5000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots / 17 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.81 inches Hg	**Temperature/Dew Point:**	33°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Pearland, TX (LVJ)	**Type of Flight Plan Filed:**	IFR
Destination:	Palestine, TX (PSN)	**Type of Clearance:**	None
Departure Time:	15:30 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Cleveland Municipal Airport 6R3	**Runway Surface Type:**	Grass/turf
Airport Elevation:	150 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	In-flight
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	30.340509,-95.069305(est)

Administrative Information

Investigator In Charge (IIC):	Yeager, Leah
Additional Participating Persons:	Thomas Scmitt; Houston FSDO
Original Publish Date:	April 28, 2005
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=59324