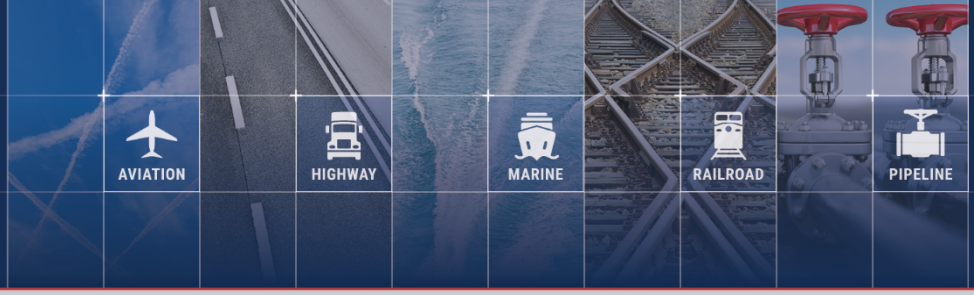

Aviation Investigation Final Report

Location:	OKLAHOMA CITY, Oklahoma	**Accident Number:**	FTW96FA063
Date & Time:	December 9, 1995, 16:03 Local	**Registration:**	N25756
Aircraft:	Balloon Works FIREFLY 7-15	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Witnesses observed the balloon drift across an interstate highway in level flight and impact a high voltage (138kV) power line. As the balloon's basket came into contact with the current carrying wires, 'a blinding blue-white flash of electricity' was followed by an explosion. The basket and envelope caught fire, and the balloon then ascended to 100 to 150 feet AGL before the suspension ropes burned through and the basket separated from the envelope. Examination revealed that one of the balloon's three propane tanks was ruptured and a dime-sized hole opposite the ruptured section appeared to be the result of arcing. Evidence of arcing was also noted on the skirt ring and the burner shield. Functional testing and disassembly of the burner revealed no evidence of any pre-impact mechanical discrepancies. Toxicological testing detected small amounts of fenfluramine and phentermine in the pilot's blood and liver fluid. Neither of these medications is approved by the FAA for use while flying.

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 obstacle clearance during low altitude straight and level flight.

Findings

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

Findings
1. OBJECT - WIRE,TRANSMISSION
2. (C) LOW ALTITUDE FLIGHT/MANEUVER - PERFORMED - PILOT IN COMMAND
3. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #2: FIRE/EXPLOSION
Phase of Operation: OTHER

Findings
4. FUEL SYSTEM,TANK - ARCING

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

Findings
5. BALLOON EQUIPMENT,SUSPENSION SYSTEM/CABLES - BURNED
6. BALLOON EQUIPMENT,BASKET - SEPARATION

Factual Information

HISTORY OF FLIGHT

On December 9, 1995, at 1603 central standard time, a Balloon Works Firefly 7-15, N25756, was destroyed by an inflight fire/explosion that erupted when it collided with power lines during low altitude straight and level flight near Oklahoma City, Oklahoma. The private pilot and the passenger received fatal injuries. The balloon, owned and operated by the pilot, departed Oklahoma City approximately 1554 for the personal flight conducted under Title 14 CFR Part 91. Visual meteorological conditions prevailed and a flight plan was not filed.

The balloon was the second of a group of three balloons to depart from a vacant lot near the intersection of NE 7th Street and Martin Luther King Jr. Avenue. According to members of the ground crew, the balloon initially ascended to approximately 1000 feet AGL and began drifting south-southwest towards the intersection of I-35 and I-40. The pilot of the lead balloon submitted a sketch (enclosed) indicating that the accident balloon leveled out at approximately 1100 feet AGL, then descended to and leveled out at approximately 800 feet AGL, and finally, entered a descent down to 125 feet AGL. As he viewed the accident balloon from above, he noted that the parachute valve was "in place and fully seated against the top load ropes" as the balloon approached the power line.

A witness who was driving eastbound on I-40 observed the balloon "descending rapidly at about a 45 degree angle" and "saw a visible plume or column of hot air coming from the top of the balloon." This witness then lost sight of the balloon as he turned south onto I-35; however, two other witnesses who were in vehicles eastbound on I-40 pulled over "to watch" the balloon "land". One of the witnesses reported that the balloon drifted across the interstate "in level flight" and observed that "the man in the balloon was putting the gas on and off." The other witness reported that the two people in the gondola were "moving around quite a bit, standing up" and "appeared almost frantic" as the balloon drifted by "about level, maybe descending slightly." This witness did not observe the burner operating until it came on "about 5 seconds before" the balloon contacted the power line.

The driver of the chase vehicle for the lead balloon saw the basket "against the power lines" and observed "a blinding blue-white flash of electricity followed about a half second later by the explosion of one (or more) of the three propane tanks on board." As the basket and envelope of the balloon began to burn, a man (later identified as the pilot) was observed to "jump or fall" from the basket. The balloon then "lifted off the wires and began to ascend, drifting to the south." After reaching an altitude of "100 to 150 feet" AGL, "the lines holding the basket to the balloon burned through, and the basket fell to the ground." As the basket continued to burn, "there was a large explosion" and a "tank spun up in the air spewing fire."

PERSONNEL INFORMATION

After purchasing the balloon in March 1994, the pilot utilized it to complete the training leading to the issuance of his private pilot certificate on August 16, 1994. Review of the pilot's logbook revealed that he had accumulated 60 hours flight time as pilot-in-command of the balloon.

AIRCRAFT INFORMATION

The balloon was equipped with a Model F1 burner, S/N 209, manufactured by The Balloon Works of Statesville, North Carolina. According to statements submitted by relatives of the pilot, the burner had been returned to the manufacturer for repairs on two separate occasions.

On July 1, 1995, following hot inflation of the balloon, "the burner continued to burn from the bottom of the burner" after the pilot removed his thumb from the burner lever. Activation of the on-board Halon fire suppression system did not put out the fire, which was finally extinguished with a hand held fire extinguisher. Inspection of the burner by the manufacturer revealed that "a small piece of metal" had become lodged in the main blast valve and was allowing fuel to leak past the valve seat and "drift out the bottom of the burner."

An entry in the pilot's logbook for a flight conducted on September 2, 1995, indicated a "pilot light malfunction" had occurred. Examination of the burner by the manufacturer found that soot was obstructing the orifices in the pilot light tubes.

The balloon was equipped with three 10 gallon cylindrical aluminum propane fuel tanks. Each tank was coated with a dense high-dielectric plastic material designed to prevent an arc-strike through the tanks in the event of contact with a power line carrying voltage of 8 kV or less. The main fuel tank (#1) was equipped with a main fuel valve, a backup (Fire 2) fuel valve, and a pilot light valve. The slave tanks (#2 and #3) were each equipped with a main fuel valve; one of the slave tanks (designated as tank #2) was also equipped with a refueling fitting.

WRECKAGE AND IMPACT INFORMATION

The power line contacted by the balloon runs east-west approximately 400 feet south of the eastbound lanes of I-40. According to Oklahoma Gas and Electric Company, the line carries voltages of 69 and 138 kV and the poles supporting the line are approximately 90 feet high. Examination of the accident site revealed that there was black soot on the uppermost 6 feet of one of the poles and an area of burned grass extended southwest from the base of the pole.

The wreckage of the basket was located on a sand bar on the south side of the Canadian River approximately 1000 feet from the power pole on a measured magnetic heading of 205 degrees. Continuing along the same heading, the balloon envelope was located about 500 feet beyond the basket. The main fuel tank (#1) and one of the slave fuel tanks (#3) were found with the basket. The other slave fuel tank (#2) was located approximately 100 feet from the basket. Examination of the Halon bottle, which was lying on the sand approximately 30 feet

from the basket, revealed that the balloon's fire suppression system had been activated.

The burner was lying on the sand approximately 10 feet from the basket. The outer stainless steel shield was bent sharply near the center and the vaporizing coils beneath the shield were kinked. The main fuel inlet fitting had been pulled out of the burner, the Fire2 backup burner valve was bent, and the threaded barrel of the pilot light shutoff valve was cracked. Sand residue was found inside the pilot light shutoff valve.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was performed by Larry E. Balding, MD, of the Office of the Chief Medical Examiner in Oklahoma City, Oklahoma. Toxicological testing detected fenfluramine and phentermine (anorexiants) in the pilot's blood and liver fluid. According to Dr. Canfield of the FAA's Civil Aeromedical Institute, the levels detected were "within therapeutic range." Neither of these medications is approved by the FAA for use while flying.

FIRE

Fire consumed the basket down to the level of the floor. The envelope was burned away between gores 12 and 18 from the throat to the equator. One of the 18 kevlar suspension cables and all three of the nylon suspension ropes were burned through. Fuel tank #3 was ruptured and tanks #1 and #2 were bulged outward.

Inspectors from the State of Oklahoma Liquefied Petroleum Gas Administration examined the fuel tanks. It was their opinion that a dime-sized hole opposite the ruptured section in the #3 tank was probably a result of arcing. In addition, evidence of arcing was noted on the skirt ring and the burner shield.

TESTS AND RESEARCH

On January 4, 1996, a functional test and subsequent disassembly of the burner were performed, under the supervision of an FAA inspector, at the manufacturer's facility in Statesville, North Carolina. In order to perform the functional test, it was necessary to replace the main fuel inlet fitting, the pilot light shutoff valve, the Fire2 valve, and the vaporizing coils. The pilot lights, main burner, and backup burner "operated correctly during the testing." No leakage of propane past the main blast valve seat was noted, and during disassembly, the valve was found to be absent of any foreign objects. For further details see the enclosed inspector's statement and manufacturer's report.

Samples of the sand residue removed from the pilot light shutoff valve on the burner and sand adhering to the exterior of the burner shield were sent to the NTSB Material Laboratory in Washington, DC, for comparison. Both samples "appeared similar" when examined with a stereo microscope and using energy dispersive X-Ray spectroscopy.

ADDITIONAL INFORMATION

The wreckage, with the exception of the burner and the sand residue retained for testing, was released to a representative of the owner on December 13, 1995. Following testing, the burner and the sand residue were returned to the owner's representative and the respective releases were signed on February 1, 1996, and March 6, 1996.

Pilot Information

Certificate:	Private	**Age:**	46,Male
Airplane Rating(s):	None	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	Balloon	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Unknown Unknown	**Last FAA Medical Exam:**	
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	74 hours (Total, all aircraft), 67 hours (Total, this make and model), 60 hours (Pilot In Command, all aircraft), 19 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Balloon Works	**Registration:**	N25756
Model/Series:	FIREFLY 7-15 FIREFLY 7-	**Aircraft Category:**	Balloon
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	F7-843
Landing Gear Type:		**Seats:**	0
Date/Type of Last Inspection:	March 22, 1995 Annual	**Certified Max Gross Wt.:**	1750 lbs
Time Since Last Inspection:	43 Hrs	**Engines:**	Unknown
Airframe Total Time:	69 Hrs	**Engine Manufacturer:**	
ELT:		**Engine Model/Series:**	
Registered Owner:	JOHN G. CURTIS	**Rated Power:**	
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:	OKC ,1295 ft msl	**Distance from Accident Site:**	7 Nautical Miles
Observation Time:	15:56 Local	**Direction from Accident Site:**	235°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	350°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	-3°C / -18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	15:54 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	In-flight
Ground Injuries:	N/A	**Aircraft Explosion:**	In-flight
Total Injuries:	2 Fatal	**Latitude, Longitude:**	35.450836,-97.570091(est)

Administrative Information

Investigator In Charge (IIC):	Snyder, Georgia
Additional Participating Persons:	MANUEL F PEREZ; OKLAHOMA CITY , OK SIDNEY CONN; STATESVILLE , NC ROBERT J SCHILLING; CHARLOTTE , NC
Original Publish Date:	February 4, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=19611