Aviation Investigation Final Report

Location:	BRECKENRIDGE, Texas	**Accident Number:**	FTW00LA170
Date & Time:	June 4, 2000, 22:15 Local	**Registration:**	N700AF
Aircraft:	Aero Commander 700	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	4 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

According to the pilot, the flight departed with the fuel quantity gauges indicating 350-360 pounds of fuel in each fuel tank. Approximately 15 minutes from the destination, the fuel low light illuminated with an indication of approximately 100 pounds of fuel in each fuel tank. According to the aircraft manufacturer, the fuel low light should illuminate when there are 63 pounds of fuel remaining. When the flight was 5-10 miles from the airport, the fuel low light went out and the left engine lost power. The pilot turned the fuel boost pumps to high and noted that the fuel quantity gauges were indicating 50 pounds of fuel in each fuel tank. The pilot then opened the crossfeed valve and the left engine regained power. Shortly thereafter, both engines started to lose power. The pilot landed the airplane in a field; however, he could not stop the airplane before it impacted a barbed wire fence and mesquite trees. The pilot stated that the flight lasted 2 hours and 15 minutes. At a best power (76% BHP) fuel flow rate of 130 pounds/hour, each engine would have used approximately 292.5 pounds of fuel. Assuming each fuel tank contained 350 pounds of fuel at the start of the flight, this would leave approximately 57.5 pounds of fuel in each fuel tank, allowing for 26 minutes of flight time.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Fuel exhaustion as a result of an inaccurate fuel quantity indicating system. A factor was the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: APPROACH

Findings
1. 2 ENGINES
2. (C) FUEL SYSTEM - EXHAUSTION
3. (C) FUEL SYSTEM,FUEL QUANTITY FLOAT/SENSOR - INACCURATE

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Findings
4. OBJECT - FENCE
5. OBJECT - TREE(S)
6. (F) TERRAIN CONDITION - NONE SUITABLE

Factual Information

On June 4, 2000, at 2215 central daylight time, an Aero Commander 700 twin-engine airplane, N700AF, was substantially damaged when it impacted terrain during a forced landing following a loss of engine power near Breckenridge, Texas. The airline transport pilot and his three passengers were not injured. The airplane was registered to, and operated by one of the passengers. Night visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the 14 Code of Federal Regulations Part 91 personal flight. The 335-nautical mile cross-country flight originated at 2000, from the Sierra Blanca Regional Airport near Ruidoso, New Mexico.

In the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2), the pilot stated that upon landing at Ruidoso, the fuel quantity gauges indicated 170 pounds of fuel in each wing. Before the flight departed Ruidoso, the pilot checked the weather and aircraft performance and decided to add 30 gallons of fuel to each wing. Subsequently, the flight departed with 350-360 pounds of fuel in each wing. The pilot further stated that during their descent into Breckenridge, approximately 15 minutes from the airport, the fuel low light illuminated with the fuel quantity gauges indicating approximately 100 pounds of fuel in each wing. The pilot added that the fuel low light should illuminate with 51 pounds of fuel remaining. When the flight was 5-10 miles from the airport, the fuel low light went out and the left engine lost power. The pilot stated that he turned the fuel boost pumps to high and noted that the fuel quantity gauges were indicating 50 pounds of fuel on each side. The pilot then opened the crossfeed valve and the left engine regained power. The pilot briefed the passengers for a possible off airport landing and shortly thereafter both engines started to lose power. The pilot landed the airplane in a field approximately one mile west of the airport with the landing gear extended and the landing lights illuminated. The pilot stated that during the landing roll he could not stop the airplane before it impacted a barbed wire fence and mesquite trees.

A pilot-rated passenger, who was sitting in the right front seat, stated that the fuel low light illuminated approximately 15 minutes from Breckenridge, and the fuel quantity gauges indicated between 75-100 pounds of fuel in each wing. He added that the fuel flow gauge indicated 90 pounds per hour for both engines.

According to the aircraft's maintenance manual, the "fuel storage system consists of two integral tanks in each wing half. The two tanks are interconnected and are considered as one tank...The fuel tanks provide a total usable fuel capacity of 104 gallons per each side." A capacitance type fuel quantity indicating system measures the quantity of fuel in each wing and displays that amount in pounds. Calibration of the fuel quantity indicating system is required whenever a fuel quantity indicator or transmitter is replaced. It is unknown whether or not the accident airplane had a fuel quantity gauge or transmitter replaced. According to the aircraft's pilot operating handbook, the "LO FUEL" warning light should illuminate when there

are 63 (+/- 10) pounds of fuel remaining in either wing.

Two Textron Lycoming TIO-540-R2AD engines were installed on the accident airplane. In the NTSB Form 6120.1/2, the pilot stated that the flight lasted 2 hours and 15 minutes. Referencing the Textron Lycoming Aircraft Engines Operator's Manual revealed that the TIO-540-R series engine had a best power (76% BHP) fuel flow rate of 130 pounds/hour. At the referenced fuel flow, during a 2 hour and 15 minute flight, each engine would have used approximately 292.5 pounds of fuel. Assuming each fuel tank contained 350 pounds of fuel at the start of the flight, this would leave approximately 57.5 pounds of fuel in each fuel tank, allowing for 26 minutes of flight time. This calculation does not factor start and taxi fuel, which is approximately 40 pounds, nor does it figure a cruise climb fuel flow of 160 pounds/hour/engine.

According to the FAA inspector, who responded to the accident site, the left fuel tank was "dry" and the right fuel tank only contained 1/2-inch of fuel at its deepest point. The FAA inspector stated that the tail section was partially separated from the aircraft and the wings sustained structural damage.

Pilot Information

Certificate:	Airline transport; Commercial; Flight engineer	**Age:**	38,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):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	October 11, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	3418 hours (Total, all aircraft), 104 hours (Total, this make and model), 3240 hours (Pilot In Command, all aircraft), 161 hours (Last 90 days, all aircraft), 59 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Commander	**Registration:**	N700AF
Model/Series:	700 700	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	6987
Landing Gear Type:	Retractable - Tricycle	**Seats:**	7
Date/Type of Last Inspection:	May 9, 2000 Annual	**Certified Max Gross Wt.:**	6987 lbs
Time Since Last Inspection:	17 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	2334 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	TIO-540-R2AD
Registered Owner:	OWEN D. WOODWARD, INC.	**Rated Power:**	340 Horsepower
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:**	Night/dark
Observation Facility, Elevation:	ABI ,1790 ft msl	**Distance from Accident Site:**	51 Nautical Miles
Observation Time:	22:00 Local	**Direction from Accident Site:**	267°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	24°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	RUIDOSO , NM (SRR)	**Type of Flight Plan Filed:**	IFR
Destination:	BRECKENRIDGE , TX (BKD)	**Type of Clearance:**	IFR
Departure Time:	19:00 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:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 None	**Latitude, Longitude:**	32.750083,-98.909019(est)

Administrative Information

Investigator In Charge (IIC):	Charnon, Nicole
Additional Participating Persons:	PETER KWAAK; FORT WORTH , TX
Original Publish Date:	April 25, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=49349