



# Aviation Investigation Final Report

---

<b>Location:</b>	Flagstaff, Arizona	<b>Accident Number:</b>	LAX01FA212
<b>Date &amp; Time:</b>	June 16, 2001, 16:25 Local	<b>Registration:</b>	N424E
<b>Aircraft:</b>	Schultz Lancair IV-P	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Positioning		

---

## Analysis

The homebuilt experimental airplane was approaching its destination airport after a cross country flight of 3 hours 12 minutes duration when it lost engine power. The airline transport pilot reported to air traffic control that he was not going to make it to the airport and was going to crash. The airplane impacted trees and terrain about 2 miles from the airport. The FAA inspector, who responded to the accident site, reported the right fuel tank was empty, the left fuel tank was compromised by impact damage, and the fuel selector was on the left tank. A post accident examination of the engine revealed no preaccident anomalies. Examination of the right wing fuel tank revealed that a required fuel vent was not drilled into the spar. According to the builder of another experimental airplane of this design, the lack of the vent would have made filling the tank problematic as the affected section of the tank had no way to vent, and therefore, it would have been difficult to completely fill the tank, and there would have been no way to confirm how much fuel was in the tank. The owner of the airplane reported he had previously experienced problems getting the fuel tanks to accept the total designed fuel capacity of 80 gallons; however, he and the pilot believed this problem had been fixed. Additionally, a few days prior to the accident, the pilot had taken the airplane to a maintenance facility to correct several discrepancies, one of which was "problems with the fuel quantity indicating system." A mechanic reported that the pilot told him he had been flying for several weeks with neither of the fuel quantity indicators working properly. After examining the airplane, the mechanic told the pilot that the airplane's right fuel quantity sender was not calibrated properly and the left fuel quantity sender was defective and would have to be replaced. The pilot elected to defer the repairs to the fuel quantity indicating system until he arrived at his final destination.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the builder's failure to install a fuel compartment vent in the right wing, affecting the total available fuel capacity, and resulting in the loss of engine power due to fuel starvation. A contributing factor was the pilot's intentional flight with a known inoperative fuel gauging system.

## Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL

Phase of Operation: APPROACH

### Findings

1. (C) FUEL SYSTEM, VENT - NOT INSTALLED
2. (C) MAINTENANCE, INSTALLATION - NOT PERFORMED - MANUFACTURER
3. (C) FLUID, FUEL - EXHAUSTION
4. (F) FUEL SYSTEM, FUEL QUANTITY FLOAT/SENSOR - INACCURATE
5. (F) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - INTENTIONAL - PILOT IN COMMAND

-----

Occurrence #2: FORCED LANDING

Phase of Operation: EMERGENCY DESCENT/LANDING

-----

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: EMERGENCY LANDING

### Findings

6. OBJECT - TREE(S)

## Factual Information

### HISTORY OF FLIGHT

On June 16, 2001, at 1625 mountain standard time, a Schultz Lancair IV-P single engine experimental airplane, N424E, was substantially damaged when it collided with trees following a loss of engine power during a visual approach to the Pulliam Airport, Flagstaff, Arizona. The airline transport pilot, who was the sole occupant, received fatal injuries. The airplane was registered to and operated by Northwing Aviation, Tarzana, California, under the provisions of 14 CFR Part 91 as a positioning flight. Visual meteorological conditions prevailed and an instrument flight rules flight plan had been filed. The flight originated from Ada, Oklahoma, approximately 1312.

The pilot was flying the airplane to the owner in California, and intended to stop in Flagstaff for fuel. During the approach to Flagstaff, the pilot stated on tower frequency that he was going to crash and he was not going to make it. The airplane impacted trees and terrain about 2 miles northeast of the airport.

### PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate with an airplane multiengine land rating and commercial privileges in single engine land airplanes. According to Northwing Aviation, the pilot was a retired airline pilot, and he had accumulated a total of 31,000 hours of flight time, of which 1,000 hours were in Lancair IV-P airplanes.

The pilot also held a Federal Aviation Administration (FAA) issued "repairman; experimental aircraft builder" certificate with a limitation indicating the certificate was valid for inspection of a Lancair IV-P manufactured by the pilot.

### AIRCRAFT INFORMATION

The homebuilt experimental airplane (serial number LIV-011) was built in Chino, California, by a hired builder of Lancair airplanes. The 4-seat pressurized airplane utilized a Teledyne Continental Motors TSIO-550-B1B turbocharged engine.

A review of the FAA's records concerning the accident airplane revealed it was issued a Special Airworthiness Certificate for an experimental category airplane on May 23, 1998. A Designated Airworthiness Representative (DAR) issued the Special Airworthiness Certificate.

On November 7, 2000, the owner of the airplane requested another Special Airworthiness Certificate issuance because a major alteration had been conducted on the airplane, which

included the addition of an air conditioning system and full paint and upholstery changes. On November 12, 2000, a different DAR issued Experimental Operating Limitations for initial test flights with the additional equipment. Excerpts from the airplane records revealed the airplane completed "the prescribed flight test hours" on December 5, 2000.

According to the owner, he wrote a letter, dated November 20, 2000, to his mechanic requesting specific maintenance be conducted on his airplane. Item number nine on that letter indicated, "the fuel capacity mystery needs to be solved. [Two persons] report that the wings hold L-34.4 and R-33.0. According to the specs there should be more capacity so please see what is wrong and fix this." In that same letter, the owner indicated the accident pilot would be assisting with any repairs. According to the owner, the airplane's fuel capacity should be 40 gallons for each fuel tank, providing a total of 80 gallons of fuel.

On December 20, 2000, the accident pilot flew the airplane from Burbank, California, to Arlington, Washington. The pilot corresponded with the owner following that flight and indicated that the fuel burn was 18 gallons per hour, as opposed to the 21.6 gallons per hour that was displayed on the electronic flight instrument system (EFIS).

From December 20, 2000, to January 8, 2001, the owner corresponded with the mechanic and received updates concerning the listed items in the November 20th letter. According to the owner, the mechanic told the owner, "he had found no problem with the left wing and that the right wing problem was related to blockage in the rib and that he had repaired it so that now the aircraft was able to take a full 80 gallons of fuel. He stated the left wing held 38 gallons and the right wing 40 gallons."

The owner also spoke with the accident pilot on January 8, 2001, and confirmed with him that all of the requested repairs had been taken care of. According to the owner, the mechanic told the pilot that he solved the fuel problem and that "it sounded like some kind of blockage in the right wing was the root of the problem." The pilot told the owner he would test fly the airplane and afterwards, he would drain the right wing and check its fuel capacity.

On January 14, 2001, the pilot reported to the owner that he had verified the right wing held 39.6 gallons of fuel, and that he should be aware that "the last 4 or 5 gallons required that you wait and let the fuel settle in order to get these last few gallons in." The pilot added he had to wait 15 minutes, and reported it was not unlike other airplanes he was familiar with. The pilot provided the owner a fuel receipt, dated January 13, 2001, for 39.6 gallons of fuel.

On January 15, 2001, the accident pilot and the owner flew the accident airplane from Seattle, Washington, to Burbank. While en route at flight level 230, after refueling in Shasta, California, the engine lost power. The owner reported they had just switched from the right fuel tank to the left fuel tank within 2 minutes prior to the loss of engine power. They switched the fuel selector back to the right fuel tank and the engine restarted. The pilot and owner determined they did not have enough fuel to continue the flight and diverted to Livermore, California. Once on the ground in Livermore, they removed the left wingtip and discovered the left fuel vent tube

had been crimped. The owner had the crimped section removed, reattached the fuel vent line, and refueled the airplane. They then departed for Burbank and experienced no other anomalies. The pilot commented to the owner that the reason for the loss of engine power was probably the crimped fuel vent line "since it would create suction when fuel started being used and would not allow ample fuel flow."

The owner spoke with the mechanic and told him about the loss of engine power. The mechanic indicated that the vent line more than likely was crimped when he removed and reattached the wingtip to move the airplane in and out of the hangar. The owner asked another mechanic to check the right wingtip for similar damage and was told there was none.

On May 26, 2001, the owner flew with the pilot from Burbank to Kansas City. The owner reported they flew at flight level 230 and the flight was uneventful. The flight lasted 2 hours 39 minutes, and after the flight, they added 50.4 gallons of fuel to the airplane. The pilot told the owner he thought the airplane was using 19.5 gallons of fuel per hour and estimated the fuel endurance was 4 hours. The pilot discussed flight planning and fuel consumption with the owner and advised the owner to plan for 2 gallons of fuel usage for taxi, 7 gallons for climb, and 19 gallons per hour for cruise. The owner indicated that the pilot recommended this after flying the airplane 30 to 40 hours.

On June 12 through the 15th, 2001, the pilot took the airplane to an avionics shop in Charlottesville, Virginia. The pilot wanted to correct problems with "noise in the radios, autopilot wiring, and problems with the fuel quantity indicating system." The mechanic, who dealt with the pilot, reported that the pilot told him he had been flying for several weeks with neither of the fuel quantity indicators working properly. When the mechanic inspected the fuel quantity senders, he found the right sender was out of calibration, and the left sender was putting out a constant high voltage signal and would have to be replaced. According to the mechanic, the pilot elected to have the calibration of the right sender postponed until such time as the left sender could be replaced. Replacement of the left sender required removal of the left wing, and the pilot planned to have this done after he returned to California.

On June 16, 2001, the accident pilot flew the airplane from Little Rock, Arkansas, to Ada, Oklahoma, to have a mechanic check for induction system leaks. According to that mechanic, his facility found "a couple of small leaks that were deemed minor. One of the leaks was in a scat duct [and] some minor repairs were made." The mechanic reported the pilot remarked that the fuel gauges were either inoperative or inaccurate. The pilot also mentioned to the mechanic that the airplane originally only held 72 gallons of fuel, but the problem was fixed and it now held 80 gallons of fuel. The mechanic added the airplane was refueled with 24.5 gallons of 100LL aviation fuel. A fuel receipt confirmed that the pilot purchased 24.5 gallons of aviation gasoline in Ada on the day of the accident.

The owner spoke with the pilot while he was in Ada. The pilot told the owner he was leaving to fly to Burbank and would make a fuel stop in Flagstaff, Arizona, since it was a high altitude airport and he would spend less time climbing and descending to and from cruise flight level.

The airplane's maintenance records provided to the FAA and the National Transportation Safety Board did not incorporate any of the aforementioned maintenance actions. The builder's records were not provided to the Safety Board's investigator-in-charge (IIC).

#### WRECKAGE AND IMPACT INFORMATION

Examination of the accident site by the FAA revealed the wreckage was scattered over a linear path measuring 433 feet. At the beginning of the wreckage distribution path, there was a tree measuring approximately 40-50 feet in height. The tree displayed fresh broken limbs. Another 50-foot-tall tree displayed fresh breaks and was 40 feet further down the wreckage debris path. A ground scar, measuring approximately 37 feet in length, was noted approximately 171 feet past the second tree. Another ground scar was noted 48 feet past the first ground scar. Fifty feet past the second ground scar, a shallow crater was noted with two propeller blades lying adjacent to the crater. The airplane came to rest approximately 87 feet past the shallow crater with its left wing tip found separated. The engine remained with the airframe, and the third propeller blade remained attached to the propeller hub.

Post accident examination of the airplane revealed that the landing gear and the flaps were in the retracted position at the time of ground impact. The fuel selector was in the left fuel tank position. According to the FAA inspector, who responded to the accident site, the right fuel tank was found empty. The left fuel tank was compromised due to the wing damage.

The wreckage was removed from the accident site and was taken to a storage facility for further examination.

#### MEDICAL AND PATHOLOGICAL INFORMATION

Toxicological tests for drugs, volatiles, cyanide, and carbon monoxide were conducted on the pilot. The test results were negative.

An autopsy was conducted on the pilot at the Coconino County Medical Examiner's office in Flagstaff. According to the autopsy summary, the pilot died as a result of multiple injuries sustained in the airplane accident.

#### TESTS AND RESEARCH INFORMATION

The airplane and engine were examined on June 26, 2001, by the Safety Board, the FAA, a representative from the engine manufacturer, and another Lancair builder. During the examination of the airplane's right wing structure and wet wing section, it was noted that a required fuel tank vent hole at wing station BL147 was not built into the fuel tank compartment. The vent hole was built into the left wing at station BL147. According to the Lancair builder, the absence of the vent hole would have made filling the right fuel tank problematic, as the D section and main spar compartments of the right fuel tank had no way to

vent. As a consequence, one would not know how much fuel would be in the right fuel tank.

The engine's top spark plugs were removed and examined. According to the engine representative, the spark plugs exhibited lean mixture operating signatures. Upon crankshaft rotation, all six cylinders produced compression and normal valve actuation. The left magneto was found broken off of its mount at the accident site, but the right magneto was found to operate normally during crankshaft rotation.

The airplane was equipped with an Archangel Systems Inc. Engine Fuel Data System (EFDS). The EFDS had nonvolatile information stored in its database and the unit was sent to Archangel for examination. The EFDS system was connected to an exemplar unit and was checked for proper working condition. The stored data was extracted from the unit and it was noted that the fuel totalizer value was 14.8 gallons. The engineers at Archangel Systems emphasized the fact that the total fuel level is calculated as the difference in the initial fuel (as input by the pilot), and the outgoing and return fuel flows. The initial fuel level is supplied through an EFIS input by the pilot, and as such, the accuracy of the fuel remaining calculation is dependent on the pilot inputting a correct initial fuel quantity. In addition, any fuel loss due to leakage or tank rupture would not be reported in the total fuel value calculated by the EFDS.

A Lancair IV-P checklist and performance table pamphlet were found in the airplane. On the last page of the pamphlet, a cruise power and fuel flow chart was provided. The chart depicted the fuel flow, true airspeeds, and indicated airspeeds for various altitudes with a 65 percent engine power setting (2,400 rpm, 30 inches of manifold pressure, and a maximum exhaust gas temperature of 1,580 degrees Fahrenheit). The cruise chart found in the airplane depicted a fuel flow of 20.5 gallons per hour for a flight level of 21,000 feet.

Air traffic control information was provided to the IIC. A review of the records revealed the pilot was cleared to climb to flight level 200 at 1313. At 1329, the pilot requested clearance to climb to flight level 220, and was granted the clearance. At 1536, the pilot requested a clearance to descend back to flight level 200, and was issued the clearance. At 1610, the air traffic controller cleared the airplane to descend down to 12,000 feet. The pilot was instructed to contact the Flagstaff air traffic control tower at 1618. The accident occurred at 1625.

Utilizing the total flight time (3 hours 12 minutes) and the 20.5-gallon-per-hour fuel burn rate, a Safety Board investigator calculated the total fuel burn for the flight (cruise only) as 66 gallons. This calculation did not include start, taxi, and engine run-up fuel burn, nor did it include climb or descent fuel burn rates. The checklist found in the aircraft indicated that a rich mixture setting is used for normal cruise climb with a power setting of 31.5 inches of mercury and 2,500 rpm, and an enriched mixture setting is to be used during the descent.

#### ADDITIONAL INFORMATION

The checklist pamphlet indicates the pilot should position the fuel tank selector to the fullest tank during the before landing check. The emergency procedures section of the pamphlet

discussed "Engine Failure in Flight." According to the information provided in the pamphlet, engine failures fall into two main categories; those occurring instantly, and those giving ample warning. The instant failure is rare and usually occurs only if ignition or fuel flow completely fails. Most engine failures are gradual and afford the alert pilot ample indication that he may expect a failure. The pilot should determine the reason for engine failure before attempting an air start. The three most common causes for engine failure are fuel tank depletion, engine-driven fuel pump failure, or retarding the throttle to idle. Closing the throttle may cause engine combustion to cease, depending on the mixture setting, auxiliary fuel pump operations, and altitude. The pamphlet then discusses the actions a pilot should take with the failure of the engine-driven fuel pump.

### Pilot Information

<b>Certificate:</b>	Airline transport; Commercial; Flight instructor	<b>Age:</b>	66, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Valid Medical--w/ waivers/lim	<b>Last FAA Medical Exam:</b>	June 23, 2000
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	31000 hours (Total, all aircraft), 1000 hours (Total, this make and model)		



## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Schultz	<b>Registration:</b>	N424E
<b>Model/Series:</b>	Lancair IV-P	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	Yes
<b>Airworthiness Certificate:</b>	Experimental (Special)	<b>Serial Number:</b>	LIV-011
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	November 12, 2000 Condition	<b>Certified Max Gross Wt.:</b>	3400 lbs
<b>Time Since Last Inspection:</b>	106.4 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	106.4 Hrs at time of accident	<b>Engine Manufacturer:</b>	Continental
<b>ELT:</b>		<b>Engine Model/Series:</b>	TSIO-550-B1B
<b>Registered Owner:</b>	Northwing Aviation	<b>Rated Power:</b>	
<b>Operator:</b>		<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	FLG,7011 ft msl	<b>Distance from Accident Site:</b>	2 Nautical Miles
<b>Observation Time:</b>	16:56 Local	<b>Direction from Accident Site:</b>	225°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	13 knots / 20 knots	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	220°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.3 inches Hg	<b>Temperature/Dew Point:</b>	27°C / -3°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Ada, OK (ADH )	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Flagstaff, AZ (FLG )	<b>Type of Clearance:</b>	VFR
<b>Departure Time:</b>	14:12 Local	<b>Type of Airspace:</b>	Class D

## Airport Information

<b>Airport:</b>	Flagstaff Pulliam FLG	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	7011 ft msl	<b>Runway Surface Condition:</b>	Unknown
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	Forced landing

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	35.164443,-111.639167

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Petterson, George
<b>Additional Participating Persons:</b>	Douglas Weeldreyer; Weeldreyer Aviation (Lancair); Manhattan Beach, CA Michael J Grimes; Teledyne Continental Motors; Lancaster, CA Steve Hanes; Federal Aviation Administration; Scottsdale, AZ
<b>Original Publish Date:</b>	March 30, 2004
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=52516">https://data.nts.gov/Docket?ProjectID=52516</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).