



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	La Crosse, Wisconsin	<b>Accident Number:</b>	CHI01FA180
<b>Date &amp; Time:</b>	June 16, 2001, 09:45 Local	<b>Registration:</b>	N301FM
<b>Aircraft:</b>	Potez-Air Fouga CM 170	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation		

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## Analysis

The airplane was destroyed on impact with terrain and post impact fire following an in-flight break up while maneuvering in the traffic pattern. The pilot and rear seat passenger were fatally injured. The accident airplane was cleared for a low approach. A record of interview with the Air Traffic Control Tower Chief stated "that when the aircraft was in front of the tower he first noticed a short vapor trail coming from the left wing tip and shortly thereafter the wing tip tank separated." A witness stated, "At approximately midway down the runway the aircraft began a 5 to 10 degrees climb at which point I observed the left wing tip fuel tank and what appeared to be a small section of the wing separate from the aircraft and smash through the tail section, which also became separated." Flight control push-pull link-rods were traced and continuity was established from the cockpits to the flight controls surfaces. The left wing was separated from the fuselage. Sections of the v-tail were found on runway 21. Both tip tanks were found in the grass area after the end of runway 21 and they were separated from their wings. The NTSB Materials Laboratory report stated, "Both of the [tip tank rear] studs were fractured flush with the exterior surfaces of the tip tanks. Examination of the fractures through the studs revealed similar features on the fractures from both tip tanks. ... Both fractures contained two diametrically opposite regions that were lighter in color and contained crack arrest positions, typical of reverse bending fatigue. On both studs fatigue initiation was from multiple initiation sites within a thread root. ... The fatigue cracking on the studs propagated through roughly 50 percent of the stud cross section before final fracture."

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The fatigue failure of the aircraft's left wing tip fuel tank rear attachment, while the aircraft was being maneuvered in a low approach, leading to the tank's in-flight separation and subsequent in-flight break up of the airplane and the aircraft's control not possible.

## Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: MANEUVERING

### Findings

1. (C) MISCELLANEOUS,BOLT/NUT/FASTENER/CLAMP/SPRING - FATIGUE

2. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

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Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

## Factual Information

### HISTORY OF FLIGHT

On June 16, 2001, about 0945 central daylight time, an experimental exhibition Potez-Air Fouga CM 170, N301FM, piloted by an airline transport pilot, was destroyed on impact with terrain and post impact fire following an in-flight break up while maneuvering in runway 21's pattern at La Crosse Municipal Airport (LSE), near La Crosse, Wisconsin. The business flight was operating under 14 CFR Part 91. Visual meteorological conditions prevailed at the time of the accident. No flight plan was on file. The pilot and rear seat passenger were fatally injured. The local flight originated from LSE about 0938, and was on the upwind portion of runway 21's pattern at the time of the accident.

Sponsorship forms for The Deke Slayton Airfest 2001 that was held on June 16 and 17, 2001 at LSE, listed the "[pilot's name] Fouga Jet" as an air show performer.

About 0943, the accident airplane was given a clearance from the LSE Air Traffic Control Tower (ATCT) for a low approach runway 21.

A Federal Aviation Administration (FAA) Inspector interviewed the LSE ATCT Chief. The FAA's record of interview with the Chief stated "that when the aircraft was in front of the tower he first noticed a short vapor trail coming from the left wing tip and shortly thereafter the wing tip tank separated."

The airplane's crew chief stated:

Aircraft departed runway[, ] retracted landing gear, made left turns to remain in the pattern. Base to final turn was to the left at [approximately] 60 [degrees] bank ([approximately] 7 [minutes] after start up) [and] then flew over the runway followed by a pull up of less than 2g's. At the [beginning] of the pull up the left tank separated from the aircraft.

A retired airline pilot stated:

Observed aircraft fly over the runway at about 1000'. [Aircraft] may have started a turn downwind (no abrupt maneuvering). Something long [and ] narrow came off the [Aircraft], hit the left v-tail. Shortly the [right] tail plane came off.

A US Army Parachute Team member stated:

At approximately midway down the runway the aircraft began a 5 to 10 degrees climb at which point I observed the left wing tip fuel tank and what appeared to be a small section of the wing separate from the aircraft and smash through the tail section, which also became separated.

An Aviation Medical Examiner stated:

Out of the corner of my eye I saw the Fouga making a pass along runway 21 at about 300 feet A.G.L [above ground level]. Just before the airplane passed abeam of me I saw that the left wing tank had separated and was falling in an approximately level attitude. It was not tumbling. I ... saw the Fouga start to pitch up and all kinds of parts suddenly separate upward from the top of it. Some of them were rectangular in shape. There was also a fuel mist visible streaming upward. The separation was quite violent. Almost immediately the left wing separated upward and sailed upward. The tail surfaces, I think, separated at about this time. I'm not sure when the right tank separated. The fuselage spiraled upward ball for a little while and then descended almost vertically. It impacted almost vertically, nose down, with the right wing pointing approximately south.

The FAA Air Show Monitor stated:

The aircraft in my prospective was about 400 to 600' above the ground [and] breaking up into numerous pieces. I could see that it was a Fouga jet. The aircraft continued without its left wing and fell to the ground in a falling leaf manner. The aircraft dropped out of sight because of the hangers, that blocked my view. I heard the aircraft hit the ground [and] with the engines still running. The engines were still running after impact. Then there was black smoke rising above the hangers and the engine noise ceased.

## PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate with an airplane multiengine land rating, commercial privileges for single-engine land airplanes, and private pilot privileges for single-engine sea airplanes. He was issued a first-class medical certificate on October 3, 2000, with limitations for corrective lenses. On the application for that flight physical, the pilot reported that he had accumulated 3,200 total flight hours and reported he had flown 100 hours in the past 6 months.

## AIRCRAFT INFORMATION

The accident airplane, N301FM, was a Potez-Air Fouga CM 170, Magister, serial number 240. The CM 170 is an all metal, medium-wing, twin-engine airplane with retractable tricycle landing gear. It has two tandem cockpits. The tail unit is v-shaped. Two Turbomeca Marbore VI turbojet engines power the airplane.

Logbooks showed that an annual inspection of the airplane was completed on March 1, 2001. The logbook entry for that annual inspection revealed that the airplane accumulated 8,691 hours of total time. The logbook showed that the right engine, serial number 10060, had accumulated 1,848 hours since overhaul and the left engine, serial number 10112, had accumulated 1,525 hours since overhaul.

The airplane can be fitted with wing tip fuel tanks. The CM 170's manual listed two wing tip fuel tank types, a metal 122-liter tank and a polyester resin 230-liter tank. The manual stated that "a hollow shaft joints the front section of ribs 1 and 2. This fitting is threaded on the inside, to receive the front attachment of the tank. ... On aircraft below [number] 200, the rear attachment of the tank is bolted to a reinforcement plate carried by rib 1. As of aircraft [number] 200, the rear attachment of the tank, which has been lengthened, engages in the spool which links ribs 1 and 1A. It is bolted to rib 1A."

The airplane's special airworthiness certificate showed the airplane was certified in the experimental category for the purpose of exhibition. The airplane's experimental operating limitations listed the pilot as the registered owner. The special airworthiness certificate and the limitations and were dated January 9, 1998. An excerpt from the limitations stated:

7. No person may operate this aircraft for carrying persons or property for compensation or hire.
8. No person may be carried in this aircraft during the exhibition of the aircraft's flight capabilities, performances, or unusual characteristics at air shows, motion picture, television, or similar productions, unless essential for the purpose of the flight. Passengers may be carried during flights to and from any event outlined in the program letter or during proficiency flying, limited to the design seating capacity of the aircraft.
- ...
10. The person operating this aircraft shall advise each person carried of the experimental nature of this aircraft.

## METEOROLOGICAL INFORMATION

At 0953, the LSE weather was: Wind variable at 3 knots; visibility 10 statute miles; sky condition clear; temperature 21 degrees C; dew point 12 degrees C; altimeter 30.04 inches of mercury.

## WRECKAGE AND IMPACT INFORMATION

An on-scene investigation was conducted. The fuselage and right wing were found 817 feet from the departure end of runway 21. The fuselage and right wing were found with a soot like substance on them. The fuselage was found deformed and consumed by fire. The grass in the area around the fuselage was found charred. The empennage forward of the v-tail was found deformed and covered with a soot like substance. Flight control push-pull link-rods were traced and continuity was established from the cockpits to the flight control surfaces. The left wing was separated from the fuselage and was located about 30 feet east of runway 21 at runway 21's intersection with runway 18. Sections of the v-tail were found on runway 21 where runway 21 and runway 18 intersect. Examination of the left wing and v-tail did not reveal any soot like discoloration. The left engine exhibited reverse bending of its compressor blades. The right engine exhibited scoring on its case along the plane of the turbine rotors. The

airplane's wing tip tanks were found in the grass area between the end of runway 21 and the area where the fuselage came to rest. Both wing tip tanks had separated from their wings. The tanks were constructed of a fiberglass like material. See appended photographs and wreckage diagram.

## MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Minnesota Regional Coroner's Office on June 18, 2001.

The FAA Civil Aeromedical Institute prepared a Final Forensic Toxicology Accident Report. The report was negative for all the tests conducted.

## TESTS AND RESEARCH

The left and right wing tip tank forward and rear attachment assemblies were forwarded to the National Transportation Safety Board's Materials Laboratory for examination. The laboratory produced Materials Laboratory Factual Report 01-112. See appended report. Excerpts from the report stated:

### FORWARD ATTACHMENT ASSEMBLIES

The left tip tank forward assembly was fractured ... Examination of the fracture in the left tank assembly ... revealed that the fracture was copper colored, typical of a brass or bronze component, and that the fracture was rough in texture, indicative of an overstress fracture. No evidence of progressive cracking was noted on the fracture.

### REAR ATTACHMENT ASSEMBLIES

The rear attachment assemblies consist of (1) a stud that attaches to and protrudes from the fiberglass tank surface, (2) a "U" shaped clevis that is threaded onto the stud and locked into position with a jam nut, and (3) a quick release pin through the two tines of the clevis. Both of the studs were fractured flush with the exterior surfaces of the tip tanks.

Examination of the fractures through the studs revealed similar features on the fractures from both tip tanks ... Both fractures contained two diametrically opposite regions that were lighter in color and contained crack arrest positions, typical of reverse bending fatigue. On both studs fatigue initiation was from multiple initiation sites within a thread root. ... The fatigue cracking on the studs propagated through roughly 50 percent of the stud cross section before final fracture. The fracture surface of the stud from the right tank ... contained superficial rust-colored deposits over the central portion of the fracture. The total lack of dark discoloration on any portion of the fatigue regions indicates that

the fatigue crack areas were not exposed to the environment for a significant time, and the relatively rough texture of the fracture surface within the fatigue regions indicates rapid propagation of the cracking.

Examination of the fracture faces of the stud pieces embedded within the tank structure revealed that the fatigue regions were on the upper and lower edges of the stud, based on the assumption that the slight curvature of the tank piece was predominantly in the hoop (circumferential) direction. Because the orientation of the tank pieces was not provided, it was not determined whether the upper or lower side of the studs contained the tensile side of the bending deformation (the side with elongated threads).

The French aircraft accident investigation authority, the Bureau Enquetes-Accidents was contacted and asked to search their accident and incident records for occurrences of tip tank, tail, and wing separations. Three tip tank incidents were found. They occurred between 1980 and 1994. The aft mount was found broken in all these incidents. The Bureau did report that "Aerobatic evolutions were forbidden in the [French Air Force] for aircraft with 230 [liter] tip tanks. The Bureau further reported that there are "no French registered Fouga aircraft equipped with larger capacity tanks (230 [liter])."

#### ADDITIONAL INFORMATION

A FAA Inspector interviewed a witness. That record of interview stated:

There are multiple levels of sponsorship and her level invited her to three rides - 1 in the T-6, 1 in the Golden Knights Aircraft and 1 in the Fouga. She had taken the ride in the T-6 on Friday [June 15].

The coroner's report stated that the accident pilot "was hired by the family and friends of [the passenger] ... to take her for a ride in a jet as a wedding present."

The parties to the investigation included the FAA and the aircraft's crew chief. The Bureau Enquetes-Accidents assigned an Accredited Representative to assist in the investigation.

The aircraft wreckage and retained items were released to a representative of the insurance company.

## Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	47, Male
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Front
<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>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Valid Medical--w/ waivers/lim	<b>Last FAA Medical Exam:</b>	October 3, 2000
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	3200 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Potez-Air Fouga	<b>Registration:</b>	N301FM
<b>Model/Series:</b>	CM 170	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Experimental (Special)	<b>Serial Number:</b>	240
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	March 1, 2001 Annual	<b>Certified Max Gross Wt.:</b>	7441 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo jet
<b>Airframe Total Time:</b>	8691 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Turbomeca
<b>ELT:</b>		<b>Engine Model/Series:</b>	MARBORE VI
<b>Registered Owner:</b>		<b>Rated Power:</b>	1058 Lbs thrust
<b>Operator:</b>		<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	LSE, 654 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	09:53 Local	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.04 inches Hg	Temperature/Dew Point:	21 °C / 12 °C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LA CROSSE, WI (LSE )	Type of Flight Plan Filed:	None
Destination:		Type of Clearance:	VFR
Departure Time:	09:38 Local	Type of Airspace:	Class D

## Airport Information

Airport:	LA CROSSE MUNI LSE	Runway Surface Type:	
Airport Elevation:	654 ft msl	Runway Surface Condition:	
Runway Used:	21	IFR Approach:	None
Runway Length/Width:	5299 ft / 150 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	On-ground
Total Injuries:	2 Fatal	Latitude, Longitude:	43.878887, -91.256668

## Administrative Information

Investigator In Charge (IIC):	Malinowski, Edward
Additional Participating Persons:	Tim H Anderson; Federal Aviation Administration; Milwaukee, WI Phil Roach; Attica, MI Nicolas Rallo; Bureau Enquetes - Accidents; 93352 LE BOURGET
Original Publish Date:	May 30, 2003
Note:	
Investigation Docket:	<a href="https://data.nts.gov/Docket?ProjectID=52553">https://data.nts.gov/Docket?ProjectID=52553</a>

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).