National Transportation Safety Board
Aviation Accident Final Report

Location:	FORT WAYNE, IN	**Accident Number:**	CHI01FA032
Date & Time:	11/09/2000, 0123 EST	**Registration:**	N731AC
Aircraft:	Swearingen SA226TC	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The airplane was destroyed on impact with trees and terrain after takeoff. A post-impact fire ensued. A courier stated that he put 14 cases and 5 bags into the airplane and that "everything took place as it normally does." A witness stated, "I heard a very low flying aircraft come directly over my house. ... It sounded very revved up like a chainsaw cutting through a tree at high speed." The accident airplane's radar returns, as depicted on a chart, exhibited a horseshoe shaped flight path. That chart showed that the airplane made a left climbing turn to a maximum altitude of 2,479 feet. That chart showed the airplane in a descending left turn after that maximum recorded altitude was attained. The operator reported the pilot had flown about 75 hours in the same make and model airplane and had flown about 190 hours in the last 90 days. The weather was: Wind 090 degrees at 7 knots; visibility 1 statute mile; present weather light rain, mist; sky condition overcast 200 feet; temperature 9 degrees C; dew point 9 degrees C. No pre-impact engine anomalies were found. NTSB's Materials Laboratory Division examined the annunciator panel and recovered light assemblies and stated, "Item '29' was a light assembly with an identification cover indicating that it was the '[Right-hand] AC BUS' light. Examination of the filaments in the two installed bulbs revealed that one had been stretched, deformed and fractured and the other had been stretched and deformed." The airplane manufacturer stated that the airplane's left-hand and right-hand attitude gyros are powered by the 115-volt alternating current essential bus. Two inverters are installed and one inverter is used at a time as selected by the inverter select switch. The inverter select switch is located on the right hand switch panel. The airplane was not equipped with a backup attitude gyro and was not required to be equipped with one. The airplane was certified with a minimum flight crew of one pilot. Subsequent to the accident, the operator transitioned "from the single pilot operation of our Fairchild Metroliner to the inclusion of a First Officer."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The indicated failure of the right hand AC bus during takeoff with low ceiling. The factors were the low ceiling, night, and the execssive workload the pilot experienced on takeoff with an electrical failure without a second in command.

Findings

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

Findings
1. OBJECT - TREE(S)
2. VISUAL LOOKOUT - NOT POSSIBLE - PILOT IN COMMAND
3. (F) EXCESSIVE WORKLOAD (TASK OVERLOAD) - PILOT IN COMMAND
4. (C) ELECTRICAL SYSTEM - FAILURE
5. (F) WEATHER CONDITION - LOW CEILING
6. (F) LIGHT CONDITION - NIGHT

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: TAKEOFF

Findings
7. TERRAIN CONDITION - DIRT BANK/RISING EMBANKMENT

Factual Information

HISTORY OF FLIGHT

On November 9, 2000, about 0123 eastern standard time, a Swearingen SA226TC, N731AC, operated by Superior Aviation, was destroyed on impact with trees and terrain after takeoff from runway 14 (8,000 feet X 150 feet, wet/concrete) at Fort Wayne International Airport (FWA), near Fort Wayne, Indiana. A post-impact fire ensued. The non-scheduled domestic cargo flight was operating under 14 CFR Part 135. Instrument meteorological conditions prevailed at the time of the accident. The flight was on an IFR flight plan. The airplane was piloted by a commercial pilot. The pilot was fatally injured. The flight was originating about the time of the accident and was destined for General Mitchell International Airport, near Milwaukee, Wisconsin.

The courier on duty stated:

> I delivered and put 14 cases, 5 bags into the plane at around 12AM. The pilot showed up around 12:30. He checked the weather, went outside to do his pre-flight and distribute the cargo. ... He came back inside after his pre-flight, told [the lineman] that he was ready to go. They both went outside started the plane and he rolled down the taxi-way. I then left. He was in good spirit, everything took place as it normally does.

The lineman on duty stated:

> I gave the aircraft a GPU [ground power unit] start. Everything was normal. The aircraft taxied out to runway 14. I put the GPU back into the hanger. I went back outside to marshal in an arriving aircraft. While outside, I heard engine spooling and a loud 'thud' type sound. I went in and called the tower and [the operations manager].

The Federal Aviation Administration (FAA) supplied a tape recording and transcript of the FWA Air Traffic Control (ATC) radio transmissions. The first communication time listed below was 0619:50 Zulu, which was 0119:50 eastern standard time. The FWA Local Control was abbreviated as LC and the accident flight (call sign Spendair 1000) was abbreviated as HKA1000 in the transcript. An excerpt from the transcript stated the following:

Time	Abbreviation	Communication
0619:50	LC	and spendair one thousand runway one four cleared for takeoff turn left on course climb and maintain one zero thousand
0619:58	HKA1000	ok turn left on course cleared for takeoff

spendair one thousand and up to ten

0621:53	LC	spendair one thousand radar contact
0622:01	HKA1000	one thousand roger
0623:29	LC	spendair one thousand fort wayne
0623:59	LC	spendair one thousand fort wayne
0624:09	LC	spendair one thousand fort wayne radar contact lost

A witness stated:

> Approximately at 1:25 AM I was watching TV when I heard a very low flying aircraft come directly over my house. It sounded like it was going southeast to northwest. It went over very fast making me believe it was very low. The engine was very loud. It sounded very revved up like a chainsaw cutting through a tree at high speed. Several seconds later I heard a fairly loud thumping noise.

A security guard on duty at the Air National Guard base about 5,000 feet west of the wreckage stated, "I heard a boom and saw a orange flash east of base."

The captain of an airplane waiting for freight at FWA at the time of the accident stated:

> ... At approximately 1:30 am, we heard an aircraft apply a high power setting for a couple of seconds then heard an impact report that shook the building. We went to our aircraft, Douglas N44587, and listened to Tower/ Approach trying to locate an aircraft just departed. We called and informed tower what we heard. Then debris, which turned out to be bank checks, was drifting around our aircraft, located near the threshold of runway 23.

The FAA supplied a chart with the accident airplane's radar returns. The chart showed a horseshoe shaped flight path. The chart showed that the airplane made a left climbing turn to a maximum altitude of 2,479 feet followed by a descending left turn after that maximum recorded altitude was attained. (See appended chart.)

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with airplane multiengine land, airplane single engine land, and instrument airplane ratings. He held a flight instructor certificate with airplane single engine land and instrument airplane ratings. The pilot was type-rated in the Swearingen SA227 aircraft. The pilot held a first-class medical certificate issued on July 5, 2000, with no limitations. On the application for that medical, he listed 2,870 hours total time and 350 hours in the past six months. The operator reported that the pilot was hired on

September 7, 1999. The operator stated that he had flown approximately 75 hours in the same make and model airplane and had flown approximately 190 hours in the last 90 days.

AIRCRAFT INFORMATION

The accident airplane, N731AC, was a Swearingen SA226TC, Metro II, serial number TC-255, twin-engine turboprop, low-wing airplane, with retractable tricycle landing gear. The fuselage was a semi-monocoque structure. The interior of the airplane was configured to carry cargo. The cabin had two crew stations. The airplane was certified with a minimum flight crew of one pilot. The airplane was equipped with two Honeywell model TPE331-10UA-511G engines, each producing 900 shaft-horsepower.

An excerpt from the airplane's flight manual stated:

> A.C. [alternating current] POWER
>
> Two 115 volt, 400 HZ, single phase inverters supply A.C. power for the ITT gauges, torque gauges, fuel pressure gauges, oil pressure gauges, fuel quantity gauges, and for avionic A.C. requirements. The number one inverter is powered by the left essential bus; the number two inverter is powered by the right essential bus.

The operator stated that "two inverters are installed on each airplane but only one inverter is used at a time as selected by the inverter switch."

An excerpt from the airplane's maintenance manual stated:

> Warning Lights ...
>
> (2) R AC BUS light illuminated indicates Right AC Bus is not powered. The selected inverter has failed and the other inverter is not powering the bus, usually indicating a defect in the bus-tie circuit.

The airplane's flight manual stated:

> INVERTER INOPERATIVE
>
> Select other inverter.

The inverter select switch is located on the right hand switch panel.

The airplane manufacturer stated that the airplane's left-hand and right-hand attitude gyros are powered by the "essential [bus] 115 VAC [volt alternating current]." The airplane was not equipped with a backup attitude gyro and was not required to be equipped with one.

Maintenance records, dated November 6, 2000, supplied by the operator stated that the airplane had accumulated 20,874.1 hours of total flight time. The maintenance records further reported that the right and left engines had accumulated 12,087.0 and 18,543.8 hours, respectively, since new and that they had accumulated 9,157.4 and 5,095.7 hours, respectively, since overhaul. The records showed the airplane's annual inspection was completed May 5, 2000 and had a 'C' check completed on November 5, 2000.

METEOROLOGICAL INFORMATION

At 0154, the reported FWA weather was: Wind 090 degrees at 7 knots; visibility 1 statute mile; present weather light rain, mist; sky condition overcast 200 feet; temperature 9 degrees C; dew point 9 degrees C; altimeter 29.75 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

An on-scene investigation was conducted. The airplane impacted trees in a wooded area east of FWA. The airplane was found broken up into sections. Sections of the airplane impacted terrain and a creek bed. The Indiana State Police (ISP) produced a sketch of the area and wreckage site that showed the start of debris and tree impact was 2,177 feet east of Bluffton Road. The wreckage was widely spread in a debris path. The debris path's heading was about 325 degrees magnetic and about 500 feet in length. The airplane was carrying cases and bags of cancelled checks. Cancelled checks were found up to a mile from the site. Some of these checks were found with metallic colored deposits on their surfaces. Some of these checks were found charred.

The debris path had localized areas of charred trees and vegetation. Observation of the dispersed sections of the airplane revealed that part of the debris was found consumed, discolored, and deformed by fire and that the localized fires did not affect other parts of the debris.

The engines exhibited damage to internal components which included deformation of impeller blades opposite the direction of rotation and deformation of turbine rotor blades opposite the direction of rotation. Silver color deposits were found on the turbine rotor blades. The propeller blades exhibited leading edge nicks. No pre-impact engine anomalies were found.

The annunciator panel was found damaged. The panel was found missing some of its individual light assemblies. The wreckage was recovered to a hangar. During the recovery, raking of the area where the panel was found revealed some individual light assemblies. The annunciator panel and recovered individual panel light assemblies were shipped to the NTSB Materials Laboratory for further examination.

Flight control cables were traced from the cockpit to their respective surfaces. Broom straw shaped separations were observed in the cables. Control continuity was established to the flight controls. Door locking mechanisms and their mating surfaces were observed. No anomalies were detected with the door locking mechanisms and their mating surfaces.

No pre-impact anomalies were found during an examination of the bleed air system. No brake or wheel well pre-anomalies were found. Observation of the outflow valve did not show signs of discoloring.

The ISP provided a helicopter for an aerial view of the accident site. The ISP helicopter flew the approximate route of flight of the accident airplane. No other damage to trees, objects, and terrain was observed. No accident airplane parts were found along this route.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Allen County Coroner's Office on November 9, 2000.

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

TESTS AND RESEARCH

A fuel sample was taken from the fixed base operator's refueling truck that fueled the airplane. The Air National Guard at FWA shipped the sample to the Department of the Air Force Laboratory at Wright-Patterson Air Force Base, Ohio. The laboratory tested the sample. No anomalies were detected.

The airplane's annunciator panel was sent to the NTSB's Materials Laboratory Division for examination along with Swearingen drawing 27-19035, Panel Assembly, Annunciator Lights. The laboratory produced factual report 01-066. The report stated that the bulbs in light assembly '35' identified as 'SPARE', assembly '39' identified as 'L NTS', assembly '45' identified as 'R NTS', and assembly '49' identified as 'AW[I] #1 PUMP ON' showed no indications of filament stretching. The report showed that the filaments in assembly '44' identified as 'R W/S HEAT CYCLE' and assembly '46' identified as 'SAS DE-ICE' had been subjected to stretching. An excerpt of that report stated:

> Item '29' was a light assembly with an identification cover indicating that it was the "R AC BUS" light. Examination of the filaments in the two installed bulbs revealed that one had been stretched, deformed and fractured and the other had been stretched and deformed.

A copy of the recorded air traffic control tower transmissions were sent to the NTSB's Vehicle Recorders Division. A Sound Spectrum Study was performed. That study reported:

> The frequency response of the pilot's headset, the aircraft radios and the tower's recording system were such that a signature was recorded during each of the transmissions from [N731AC]. The signals were clearest during the non-voice sections (pauses between words and near the beginning and end of the transmissions). Notably, from the content of the radio transmission, it would appear that the signature was evident prior to takeoff and also after the aircraft was in flight; the same signature was evident during both radio transmissions. Because the signature was constant, it did not appear to be associated with the engines or the propeller. The signature corresponded to a signal with a fundamental frequency of 121.6 Hz and its 2nd, 3rd, 4th, 5th, 6th, 7th, and 8th harmonics.

> Regardless, after consulting with the engine and aircraft manufacturers, the signal could not be correlated to any known engine or aircraft system.

ADDITIONAL INFORMATION

The parties to the investigation included the FAA, Honeywell, Fairchild Aerospace, and Superior Aviation, Inc.

The aircraft wreckage was released to a representative of United States Aviation Underwriters Incorporated.

Subsequent to the accident, the operator has established a two pilot operation with the Metro II. The operator's web site stated:

> Superior Aviation, as of January 9, 2001 is pleased to announce our transition from the single pilot operation of our Fairchild Metroliner to the inclusion of a First Officer.

Pilot Information

Certificate:	Commercial	**Age:**	39, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	07/05/2000
Occupational Pilot:		**Last Flight Review or Equivalent:**	09/09/2000
Flight Time:	2870 hours (Total, all aircraft), 75 hours (Total, this make and model), 190 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Swearingen	**Registration:**	N731AC
Model/Series:	SA226TC SA226TC	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	TC-255
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	11/05/2000, Continuous Airworthiness	**Certified Max Gross Wt.:**	12500 lbs
Time Since Last Inspection:	11.4 Hours	**Engines:**	2 Turbo Prop
Airframe Total Time:	20885.5 Hours at time of accident	**Engine Manufacturer:**	Garrett
ELT:	Installed	**Engine Model/Series:**	TPE-331-10UA
Registered Owner:	SUPERIOR AVIATION, INC.	**Rated Power:**	900 hp
Operator:	SUPERIOR AVIATION, INC.	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:		**Operator Designator Code:**	ETA4

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Night
Observation Facility, Elevation:	FWA, 815 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	0154 EST	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Unknown	**Visibility**	1 Miles
Lowest Ceiling:	Overcast / 200 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	9°C / 9°C
Precipitation and Obscuration:			
Departure Point:	FORT WAYNE, IN (FWA)	**Type of Flight Plan Filed:**	IFR
Destination:	MILWAUKEE, WI (MKE)	**Type of Clearance:**	IFR
Departure Time:	0123 EST	**Type of Airspace:**	Class C

Airport Information

Airport:	FORT WAYNE INTERNATIONAL (FWA)	**Runway Surface Type:**	
Airport Elevation:	815 ft	**Runway Surface Condition:**	
Runway Used:	14	**IFR Approach:**	None
Runway Length/Width:	8000 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	EDWARD F MALINOWSKI	**Report Date:**	04/18/2003
Additional Participating Persons:	ROBERT C KONEFUL; Federal Aviation Administration; SOUTH BEND, IN David Looper; Honeywell; Phoenix, AZ Jack D Morgan; Fairchild Aerospace; San Antonio, TX Thomas McBeath; Superior Aviation, Inc; Kingsford, MI		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		