Aviation Investigation Final Report

Location:	WEST COLUMBIA, South Carolina	**Accident Number:**	MIA96FA067
Date & Time:	January 19, 1996, 09:23 Local	**Registration:**	N50KW
Aircraft:	Mitsubishi MU-2B-60	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General aviation		

Analysis

The flight departed on a maintenance test flight with known wind gusts to 27 knots. Before takeoff the pilot performed an NTS check to each engine with no discrepancies noted. During flight the pilot performed an NTS check to the left engine. Two attempts to restart the left engine were unsuccessful. Each time the propeller came out of the feathered position and started to rotate but there was no fuel flow or ignition. The flight returned to land and while on short final to runway 29 with the wind from 250 degrees at 20 knots, a witness observed the airplane pitch nose up then down then heard the sound of power applied to the right engine. The airplane than rolled to the left, pitched nose down, impacted the ground coming to rest nearly inverted with the wing section separated. Postaccident examination of the left engine and accessories revealed no evidence of preimpact failure or malfunction. The left engine fuel shutoff valve was found in the 'closed' position and no fuel was found aft of the fuel shutoff valve. The pilot stated that he has no recollection of the accident. The left and right engines had just been installed following 'hot section' work to both, and both were then started the day after installation with no discrepancies noted by company maintenance personnel.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: a total loss of power on one engine for undetermined reasons, and the pilot-in-command's failure to maintain airspeed (VMC) resulting in an in-flight loss of control. Contributing to the accident was the wind gusts encountered while on final approach to land.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: MANEUVERING

Findings
1. 1 ENGINE
2. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

Findings
3. (F) WEATHER CONDITION - GUSTS
4. (C) AIRSPEED(VMC) - NOT MAINTAINED - PILOT IN COMMAND

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

Factual Information

HISTORY OF FLIGHT

On January 19, 1996, about 0923 eastern standard time, a Mitsubishi MU-2B-60, N50KW, registered to and operated by Bankair, Inc., experienced a loss of control while on short final approach to land at the Columbia Metropolitan Airport, West Columbia, South Carolina. Visual meteorological conditions prevailed at the time and an IFR clearance was received for the 14 CFR Part 91 maintenance test flight. The airplane was destroyed and the airline transport-rated pilot and a passenger/company mechanic were seriously injured. The flight originated about 0905 from the accident airport.

The pilot stated that he has no recollection of the accident. The purpose of the flight according to company maintenance personnel was to document engine parameters in flight following installation of the left and right engines after maintenance. The company mechanic stated after both engines were started and a Negative Torque Sensing (NTS) check of both engines on the ground was accomplished with no evidence of malfunction. The pilot then requested taxi clearance and advised that the flight had Airport Terminal Information Service (ATIS) "Juliet." The flight was cleared to taxi then takeoff and to fly and maintain 5,000 feet which the pilot acknowledged.

The mechanic stated that both he and the pilot discussed the procedures to accomplish an NTS check in flight to include altitude and airspeed to fly the airplane. The mechanic reported using his own checklist for the NTS in-flight check of the left engine first and stated that it took 20 seconds for the engine rpm to decrease from 100 to 30 percent. The pilot then feathered the left propeller which came to a complete stop. The first attempt to restart the engine was unsuccessful. The airstart procedures were then reviewed and a second attempt to restart the engine was also unsuccessful. The mechanic stated that on each attempt the propeller came out of the feathered position and started to rotate but there was no fuel flow indication or ignition. The pilot then elected to return to the airport and was provided a vector to runway 29 by the departure controller. The pilot then requested the winds which the Air Traffic Control (ATC) transcript indicates the pilot was advised that the wind was from 230 degrees at 20 knots with gusts to 30 knots; and runway 23 was available. At 0913.08, the pilot first advised the controller that the flight was single engine and requested runway 23. The controller asked if the pilot needed any assistance and the pilot responded negative but the Crash Fire Rescue personnel were alerted by the controller. At 0914.32, the controller alerted all inbound aircraft on that frequency that low level wind shear advisories were in effect for the airport. The pilot then requested runway 29 and the controller provided a vector for the flight that would allow another company airplane to land on runway 23. Another restart attempt was also unsuccessful. The pilot was then advised of the location of the company traffic that was inbound to runway 23 and the flight was cleared for a visual approach to runway 29, which the

pilot acknowledged. At 0921, the controller requested that the pilot slow 20-30 knots due to his groundspeed being 50 knots faster than the other company airplane inbound to runway 23. At 0921.20, the flight was cleared to land. The mechanic stated that he does not recall any airspeed indications but does recall that the landing gear was down and locked and the gear door light was not illuminated.

Witnesses observed the airplane on final approach with the left propeller in the "feathered" position and not windmilling and the flaps extended. A company mechanic who was a witness stated that when he observed the airplane on short final the airplane pitched nose up then down and about that time he felt two strong gusts of wind. He further stated that "During the second pitch up he heard what sounded like power being applied to the operative (right) engine. At this point the airspeed seemed to almost visibly decay as the aircraft yawed and rolled left..." He then observed the airplane impact the ground in a nose and left wing low attitude. The airport crash/fire rescue vehicles that were prepositioned near the approach end of runway 29 responded to the crash sight and sprayed the wreckage and surrounding area with AFFF. The pilot and passenger were both extricated from the wreckage and transported to medical facilities for treatment of their injuries.

PERSONNEL INFORMATION

Information pertaining to the pilot is contained on page 3 of the Factual Report-Aviation under the heading First Pilot Information. Additional information is also contained in NTSB Form Supplement U.

AIRCRAFT INFORMATION

Review of the left engine maintenance records revealed that on January 5, 1996, the "hot section" was disassembled due to binding and to comply with the hot section inspection. Sercviceable parts were installed and the engine was reassembled and installed on the airframe on January 16, 1996. Company maintenance personnel indicate that following installation specifically of the left engine, rigging of the fuel shutoff valve, power and condition levers were accomplished in accordance with the airplane maintenance manual. The left engine was operated several times after installation for adjustments and checks.

METEOROLOGICAL INFORMATION

The pilot did not obtain a preflight weather briefing before takeoff but had landed about 0815 that same morning. An automated surface observation station located on the airport recorded the wind at 0756 and 0824 to be from 260 degrees at 22 knots with gusts to 28 knots and 260 degrees at 19 knots with gusts to 27 knots respectively.

WRECKAGE AND IMPACT

Examination of the airplane at the crash site revealed that the main wreckage consisted of

the fuselage with the attached horizontal and vertical stabilizers. The wing section was separated into two sections, each of which had an engine attached and the left wing tip tank was separated.

Ground Scars were observed on grass about 23 feet south of the south edge of runway 23 and the flight path was about 229 degrees in a 100-110 degree angle of bank to the left in an approximate 30-degree nose low attitude. The first and second ground scars were noted to be in the shape of the tip tank which came to rest about 159 feet from the initial impact point. Continuing on the ground were ground scars from the left engine propeller which were located about 15 feet from the second tip tank ground scar. A ground scar in the shape of the nose section of the airplane was noted in the grass about 18 feet beyond the propeller ground scars. Continuing along the wreckage path were a section of one of the flaps, a section of one of the spoilers, and components from the weather radar unit from the nose section of the airplane. The left wing section with attached engine assembly was found on runway 23 with the nose spinner and propeller blades resting on the runway surface. The separated section consisted from the tip tank attach point to about the engine attach point area. The main wreckage which came to rest on a magnetic heading of 165 degrees was nearly inverted with the vertical stabilizer contacting the asphalt of runway 23. The right wing section was continuous from the attached tip tank through the center section and just outboard of the wing root area. The right wing section with attached engine and propeller was found about 5 feet aft of the main wreckage with the wing chord nearly perpendicular with the ground resting on the nearly separated wing tip and propeller blades.

Examination of the airplane at the accident site revealed that the cockpit/nose section was displaced about 45 degrees to the right and was nearly separated from the fuselage aft of the pilots and copilots side windows. Propeller slash marks on the right side of the fuselage aft of the copilots side window were noted. The vertical stabilizer/rudder were bent about 90 degrees to the left and the left horizontal stabilizer was bent down about 90 degrees. The right horizontal stabilizer was bent up about 90 degrees. The main landing gear were down and locked and the nose landing gear was collapsed. The flaps were extended 20 degrees. Examination of the elevator, rudder, and spoiler flight controls revealed no evidence of preimpact failure or malfunction. Examination of the cockpit revealed that the left engine condition lever was positioned to "emergency stop" and the right engine condition lever was in the minimum cruise position. The left and right power levers were found positioned about 1 1/2 inches aft of the forward stop. Both single red line (SRL'S) controllers and main fuel valves were found to be in the "on" position. Also both engines' "run, crank, stop" switches which were broken were found in the "run" position. Fuel contamination was not noted from samples taken from the main fuel tank and fuel filters. The smell of Jet A was noted at the crash site the following day.

Examination of the right propeller revealed that one of the four blades had an approximate 6-inch piece missing and the blade had chordwise scratches on and was slightly curled toward the cambered side. Gouges in the leading edge of the blade was noted. The remaining three blades were curled towards the cambered side and gouges were noted in two of the three

blades. Cursory examination of the right engine revealed no evidence of preimpact failure or malfunction. Fuel contamination was not noted in the fuel filter or in the fuel control unit. The right engine fuel control unit with attached engine driven fuel pump was removed and placed with the left engine assembly.

The left engine assembly, right engine fuel control and engine driven fuel pump, and both Single Red Line (SRL) controllers were removed and shipped to the engine manufacturer's facility for further examination. Disassembly of the left engine revealed no internal failure or malfunction. The fuel shutoff valve was found to be "closed" and the control arm was noted to be fractured at the valve. Externally, impact damage was noted to the valve adjacent to the control arm attach point. Examination of the linkage for the left engine condition lever at the engine revealed no evidence of preimpact failure or malfunction. Examination of the left engine fuel system revealed residual fuel at the fuel pump, fuel control unit, the fuel shutoff valve and to the inlet of the fuel flow divider valve. There was no fuel found in the outlet line from the flow divider valve. The left and right engine SRL controllers, the left ignition exciter, each igniter plug, the fuel nozzles, flow divider valve, constant speed propeller governor, right engine fuel control unit and fuel pump, and left unfeathering pump were bench tested at the engine manufacturers facility. See Tests and Research Section of this report.

The left propeller was sent to the manufacturers facility for examination which revealed no evidence of preimpact failure or malfunction. A copy of the report is an attachment to this report.

SURVIVAL ASPECTS

Both the pilot and company mechanic were wearing shoulder harnesses of the inertia reel type. Postaccident examination of the right front seat inertia reel revealed that it locked when the shoulder harnesses were pulled forcibly.

TESTS and RESEARCH

The SRL controllers, the ignition exciter, each igniter plug, the fuel nozzles, flow divider valve, constant speed propeller governor, right engine fuel control unit and fuel pump, and unfeathering pump were bench tested at the engine manufacturers facility. The results are included in a report from the engine manufacturer which is an attachment to this report. According to the engine manufacturer, there was no evidence of failure or malfunction that would have prevented starting of the engine. The left engine fuel control unit was sent to the manufacturer's facility for further examination due to impact damage. Bench test of the left engine fuel control unit revealed that the start fuel flow was within limits; however, two of the test points involving high altitude low pressure could not be performed due to impact damage. According to the manufacturer, test of the unit revealed no evidence of preimpact failure or malfunction. During the bench testing of the 10 duplex fuel nozzles it was noted that the spray pattern from the No. 5 nozzle was streaking. Also, nozzle No. 10 did not flow during the primary (start) circuit and was found to flow 23.4 pounds/hour low during test of the

secondary (run) circuit. According to the engine manufacturer, fuel nozzles Nos. 5 and 9 are directly in front of a igniter plug. Also tested at the engine manufacturer's facility was the fuel shutoff valve which revealed no evidence of preimpact failure or malfunction.

According to the engine manufacturer, the fuel shutoff valve is positioned to the manual closed position by placement of the condition lever in the cockpit to the emergency stop position. During the restart procedures in part, the condition lever is placed in the minimum cruise position which positions the fuel shutoff valve to the auto position. The unfeather switch is held and at 10 percent rpm, in part, the speed switch in the single red line (SRL) controller provides electrical current to the open coil of the shutoff valve which allows fuel flow to the manifold. The valve can't be opened by energizing the open circuit unless the lever is placed in the auto position.

According to the engine maintenance manual, the fuel shutoff valve acts as such in the line from the fuel control unit to the fuel manifold. Additionally, the fuel divider valve assembly which is located between the fuel shutoff valve and the fuel manifold, directs fuel flow to the manifold. The fuel divider also provides a path for fuel to be purged from the fuel manifold when the fuel shutoff valve is closed. This is accomplished when the "run, crank, stop" switch located in the cockpit is positioned to the "stop" position.

Review of the NTS in-flight check procedures reveal that the "run, crank, stop" switch is placed to the "stop" position and the time is noted for the engine rpm to decrease from 100 to 30 percent. At 30 percent the condition lever is placed to the "emergency stop" position.

ADDITIONAL INFORMATION

Mr. Roger Stallkamp of Hartzell Propeller, Inc., also participated in the investigation.

The wreckage was released to Mr. John E. Dickerson, the President of Bankair, Inc., on April 3, 1996. The retained components were also released to Mr. Dickerson on July 24, 1996.

Pilot Information

Certificate:	Airline transport	**Age:**	57,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 16, 1995
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	16878 hours (Total, all aircraft), 4348 hours (Total, this make and model), 15500 hours (Pilot In Command, all aircraft), 206 hours (Last 90 days, all aircraft), 59 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mitsubishi	**Registration:**	N50KW
Model/Series:	MU-2B-60 MU-2B-60	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	784S.A.
Landing Gear Type:	Retractable - Tricycle	**Seats:**	11
Date/Type of Last Inspection:	December 5, 1995 AAIP	**Certified Max Gross Wt.:**	11575 lbs
Time Since Last Inspection:	24 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	6073 Hrs	**Engine Manufacturer:**	Garrett
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TPE 33110511M
Registered Owner:	BANKAIR, INC.	**Rated Power:**	715 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	BKAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CAE ,236 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	09:31 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Broken / 2400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	19 knots / 29 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	7°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(CAE)	**Type of Flight Plan Filed:**	IFR
Destination:		**Type of Clearance:**	IFR
Departure Time:	09:05 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	COLUMBIA METROPOLITAN CAE	**Runway Surface Type:**	Asphalt
Airport Elevation:	236 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	29	**IFR Approach:**	
Runway Length/Width:	8602 ft / 150 ft	**VFR Approach/Landing:**	Straight-in

Wreckage and Impact Information

Crew Injuries:	2 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious	**Latitude, Longitude:**	33.939888,-81.150611(est)

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	JAMES A MALEK; WEST COLUMBIA , SC RALPH SORRELLS; DALLAS , TX ALAN LUEBS; PHOENIX , AZ EDWARD C LEACH; ROCKFORD , IL
Original Publish Date:	February 18, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=37892