National Transportation Safety Board
Aviation Accident Final Report

Location:	Napa, CA	**Accident Number:**	LAX04FA165
Date & Time:	03/11/2004, 2035 PST	**Registration:**	N966MA
Aircraft:	Mitsubishi MU-2B-40	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The airplane entered a descending turn while on a night visual approach and impacted a river. At 2030, the pilot reported leaving 6,000 feet, and stated that he had the airport in sight. The controller cleared him for the approach. He advised the controller that he would like to cancel his IFR clearance, and switch to the traffic advisory frequency. The controller cleared him to switch to advisory frequency. No further transmissions were recorded from the flight. According to radar data, the airplane was southeast of the airport, and maintaining a westerly heading south of the airport. At 2035, it crossed a river, and began a sharp left turn away from the airport. It completed about 90 degrees of turn before abruptly disappearing from radar contact, with the last radar target on the west side of the river near the impact location. The highly fragmented wreckage was recovered from the river after several weeks underwater. The teardown and examination of the engines disclosed that the left engine was not rotating or operating at the time of impact, and the left propeller was in feather. The type and degree of damage to the right engine was indicative of engine rotation and operation at the time of impact. Investigators found no pre-existing condition on either engine, or with the airframe systems, that would have interfered with normal operation, or explained the apparent shutdown of the left engine.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain control of the airplane following a shutdown of the left engine during a night visual approach. A factor contributing to the accident was the dark night.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH

Findings
1. 1 ENGINE
2. ENGINE SHUTDOWN - PERFORMED - PILOT IN COMMAND
3. (F) LIGHT CONDITION - DARK NIGHT
4. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. TERRAIN CONDITION - WATER

Factual Information

HISTORY OF FLIGHT

On March 11, 2004, at 2035 Pacific standard time, a Mitsubishi MU-2B-40, N966MA, crashed into the Napa River under unknown circumstances, while on approach to the Napa County Airport (APC), Napa, California. The pilot/owner was operating the airplane under the provisions of 14 CFR Part 91. The airplane was destroyed. The private pilot and one passenger were fatally injured. Visual meteorological conditions prevailed for the cross-country flight that departed the Imperial County Airport (IPL), Imperial, California, at an undetermined time. An instrument flight rules (IFR) flight plan had been filed.

The Federal Aviation Administration (FAA) issued a family concerned alert notice (ALNOT) on March 15, 2004, after the pilot had not contacted family members to inform them that he had returned. Local officials and the Civil Air Patrol initiated a search on March 16, 2004, in the Napa River area. They located the airplane on March 18, 2004, in the Napa River, 3 miles south of APC.

The FAA provided a summary of recorded radio transmissions, which indicated that the pilot checked in on Oakland Air Route Traffic Control Center (ARTCC) Center sector R41 frequency. At 2030, he reported leaving 6,000 feet; he also stated that he had the information for Napa Airport, and had it in sight. The controller cleared him for the approach. He advised the controller that he would like to cancel his IFR, and switch to traffic advisory frequency. At 2032, the controller cleared him to squawk 1200, and switch to advisory frequency.

A Safety Board specialist plotted recorded radar data. The target with the airplane's discreet beacon code maintained a westerly heading. At 2032, the target was southeast of Napa. The code changed to 1200, and the target continued in a westerly direction south of Napa. At 2035, the target crossed the Napa River, and began a left turn away from the airport. The target completed about 90 degrees of turn, and the last target was on the west side of the river near the accident site, which was in the river.

PERSONNEL INFORMATION

A review of FAA airman records revealed that the pilot held a private pilot certificate with ratings for airplane single engine land, multiengine land, and instrument.

The pilot held a second-class medical certificate issued on January 22, 2004. It had the limitations that the pilot must wear lenses for distant vision, and possess glasses for near vision. On his medical application, the pilot reported a total time of 4,500 total flight hours, with 100 hours flown in the past 6 months.

An examination of the pilot's logbook indicated a total flight time of 4,545.7 hours as of December 31, 2003, with 1,651.2 hours of MU-2 total flight time. The Safety Board investigator-in-charge (IIC) was not provided with a pilot logbook for the year 2004.

According to the pilot's logbook, he had regularly participated in flight training from Flight Safety International, Honeywell International, Inc., and Mitsubishi since he had purchased the airplane in September 1997.

AIRCRAFT INFORMATION

The airplane was a Mitsubishi MU-2B-40, serial number 405SA. A review of the maintenance

records provided by Crownair Aviation indicated a total airframe time of 4,119 hours at the last 100-hour inspection on January 14, 2004. The records indicated completion of 100-hour, 500-hour, 1,000-hour/3-year, and 2,000-hour periodic inspections in accordance with the Mitsubishi Inspection Program on June 4, 2003.

The left engine was with a Honeywell TPE331-10-511M, serial number P-36063C. Total time on the engine at the last 100-hour inspection was 4,119 hours with 585 hours since overhaul. The left propeller had 409 hours since overhaul at the last 100-hour inspection.

The right engine was with a Honeywell TPE331-10-511M, serial number P-36064C. Total time on the engine at the last 100-hour inspection was 4,119 hours with 585 hours since overhaul. The right propeller had 409 hours since overhaul at the last 100-hour inspection.

METEOROLOGICAL CONDITIONS

The closest official weather observation station was Napa, which was 3 nautical miles (nm) southwest of the accident site. The elevation of the weather observation station was 35 feet msl. An aviation routine weather report (METAR) was issued at 1954 with the following information: skies clear; visibility 10 miles; winds calm; temperature 59 degrees Fahrenheit; dew point 45 degrees Fahrenheit; altimeter 29.93 inHg.

WRECKAGE AND IMPACT INFORMATION

San Mateo County Sheriff's Boat Patrol found the airplane on March 18, 2004, in 20 feet of water with the use of their side-scan sonar. The Safety Board IIC, and a representative from Mitsubishi Heavy Industries America, Inc., a party to the investigation, responded to the accident site on March 20, 2004, for the recovery of the airplane from the Napa River.

The right wing and engine with propeller assembly separated from the fuselage, and was recovered with the airframe. All of the four propeller blades showed evidence of rotational damage with S-bending and leading and trailing edge gouging.

The right engine was recovered on March 20, 2004. The left engine was recovered on April 16, 2004. The left tip tank had been recovered by local area fisherman at the mouth of the Napa River a few days after the accident, and given to the FAA.

MEDICAL AND PATHOLOGICAL INFORMATION

The Napa County Coroner conducted an autopsy on the pilot on March 12, 2004. The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed a toxicological analysis from samples obtained during the autopsy. The results of the analysis of the specimens contained no findings for carbon monoxide, cyanide, and tested drugs.

The report contained the following results for tested volatiles:

31 (mg/dL, mg/hg) Ethanol detected in blood

48 (mg/dL, mg/hg) Ethanol detected in urine

57 (mg/dL, mg/hg) Ethanol detected in brain

49 (mg/dL, mg/hg) Ethanol detected in muscle

10 (mg/dL, mg/hg) Acetaldehyde detected in blood

1 (mg/dL, mg/hg) Acetaldehyde detected in urine

2 (mg/dL, mg/hg) Isopropanol detected in blood

1 (mg/dL, mg/hg) Isopropanol detected I urine

34 (mg/dL, mg/hg) Isopropanol detected in muscle

39 (mg/dL, mg/hg) N-Butanol detected in blood

23 (mg/dL, mg/hg) N-Butanol detected in urine

8 (mg/dL, mg/hg) N-Butanol detected in brain

46 (mg/dL, mg/hg) N-Butanol detected in muscle

3 (mg/dL, mg/hg) N-Propanol detected in blood

3 (mg/dL, mg/hg) N-Propanol detected in urine

2 (mg/dL, mg/hg) N-Propanol detected in brain

4 (mg/dL, mg/hg) N-Propanol detected in muscle

A clinical section also indicated a finding of 0.08 (pmol/nmol) serotonin metabolite ratio detected in urine.

A note was included in the toxicological report that stated that the ethanol found in this case was from postmortem ethanol formation and not from the ingestion of ethanol.

TESTS AND RESEARCH

Investigators examined the wreckage at Plain Parts, Sacramento, California, on May 4-5, 2004.

AIRFRAME

Examination of the wreckage indicated that the landing gear were down. The flaps were at 20 degrees (both selector and physically). The retriever cut the control cables, but the control cables remained attached to their respective bellcranks. Investigators established control continuity by matching the cut ends.

The left engine cockpit control was at the emergency stop position. The right engine was at the taxi position. Both generator switches were on.

The left main fuel selector valve broke, and the body was open (up). The right main fuel selector valve off lever was intact with two witness marks. One mark was in the OFF position; the other was in the ON position. Both wing valves were in the OFF position. The Mitsubishi investigator indicated that this was due to the deformation the structure experienced during the accident sequence.

ENGINES

Honeywell personnel examined the engines under the supervision of the IIC at their facility in Phoenix, Arizona, on June 15-17, 2005. They submitted a written report, and pertinent findings in the following section.

Fuel Pumps

The fuel pump from the left engine was functionally tested on June 17, 2004. Fuel flow for the left pump tested below the minimum discharge fuel rate for test points 3 and 8. Test point 3 represents the equivalent fuel pump speed at an engine speed of 100 percent. Maximum fuel

flow requirements of the engine at 100 percent speed range from 500 to 600 lb/hr. Since the discharge fuel flow (1080 lb/hr) was roughly twice that required by the engine, pump operation 17 percent below the test instruction specification would not negatively impact engine operation (i.e., the fuel pump is designed with excess capacity). Test point 8 represents an engine start/acceleration fuel flow, and does not impact the in-flight operation of the engine. Technicians disassembled both fuel pumps after the functional testing. Carbon bushings, which support the high-pressure pump, were fractured in both the left and right engine pumps due to impact damage. The remaining components of the fuel pumps were intact.

Investigators did not functionally test the fuel pump from the right engine due to housing damage. The housing on the right engine pump was cracked, and leaked fuel when pressurized.

Fuel Controls

Fuel controls from both engines were examined on August 25-26, 2004, at the Woodward Governor Company, Rockton, Illinois. Both fuel controls were corroded and contaminated with sand and river silt. The degree of corrosion and contamination resulted in fuel controls that were largely unresponsive to inputs. No evidence of a pre-incident condition was identified in either control.

Propeller Governors

Propeller governors from both engines were examined on August 25-26, 2004, at the Woodward Governor Company. Both governors contained sand and river silt that either prevented rotation of the drive shaft or caused the drive shaft to rotate with resistance. In order to functional test the governors, technicians removed the drive shafts from both governors, cleaned the gear rotor elements with MEK, and then lubricated them with oil. The drive shafts rotated freely upon reassembly.

Both governors were outside test calibration limits due to control linkage adjustments when the governor was installed and the system trimmed on the aircraft. Technicians used a test protractor and set the control speed to a nominal 3,754-rpm to determine if the could achieve the desired speed schedule. They detected some anomalies, but concluded that none of them would have interfered with normal engine operations.

P2T2 Sensors

P2T2 sensors from both engines were examined on August 25-26, 2004, at the Woodward Governor Company. Both bellow height measurements were taken under the prescribed 15-pound load and were within the limits.

Left Engine

There was mud and corrosion debris throughout the engine and its various components. Technicians lightly washed away mud and corrosion debris from the engine; however, a residue from the mud and corrosion remained on many of the components after the rinsing.

Lee Check Valve and Orifice Assembly

Honeywell technicians disassembled the lee check valve (negative torque sensing) and orifice assembly from the gear case housing, and submitted to the Safety Board Materials Laboratory for analysis of the debris contained within the check valve.

Materials Laboratory

Visual inspection of the negative torque sensing (NTS) check valve revealed that it was nearly filled with a waxy, translucent substance that was light in color. Energy dispersive spectroscopy (EDS) compositional analysis was used to determine what elements were present in the substance filling the NTS check valve. The resulting EDS spectrum showed that the substance blocking the valve was mostly chlorine and magnesium.

Honeywell concluded that the chlorine and magnesium resulted from the submersion of the engine in the river, and the corrosion of the magnesium gear case and nose cone housings.

There was no evidence of rotational scoring between the rotating and static components of the engine. The Honeywell investigator stated that this indicated that the engine was not rotating at the time of impact with the river. Metal spray was not present on the turbine rotors and stators, indicating that the engine was not operating at the time of impact with the river.

Right Engine

There was mud and corrosion debris throughout the engine and its various components. Technicians lightly washed away mud and corrosion debris from the engine; however, a residue from the mud and corrosion remained on many of the components after the rinsing.

The engine propeller shaft was free to rotate. The engine power section was not free to rotate.

There was rotational scoring through approximately 60 degrees on the propeller shaft immediately aft of the propeller shaft nut with corresponding rotational scoring damage on the sun gear forward inner bore.

The propeller coupler separated. Honeywell material analysis determined that the separation through the thinner center section of the coupling resulted from torsional overload. They detected no material defects.

The sun gear was intact, but was not free to rotate. There was rotational scoring through approximately 30 degrees on the forward inner bore with corresponding rotational scoring damage to the propeller shaft aft of the shaft propeller nut.

There was no foreign debris on the tip of the magnetic drain plug (chip detector).

There was a black residue on the chip detector housing.

There was rotational scoring through 360 degrees on the first-stage compressor shroud with corresponding rotational scoring damage to the shroud line edge of the first-stage compressor impeller blades.

There was rotational scoring on the shroud line edge of nearly all first-stage compressor impeller blades with corresponding rotational scoring damage to the first-stage compressor shroud. The leading edge of nearly all blades was bent opposite to the direction of rotation. There was rotational scoring through 360 degrees on the aft face of the impeller near the outer diameter with corresponding rotational scoring damage to the first stage compressor diffuser assembly.

There was rotational scoring through 360 degrees on the aft impeller hub with corresponding rotational scoring damage to the seal area of the first-stage compressor diffuser assembly. The aft curvic teeth were heavily damaged.

There was foreign object ingestion damage to the leading edge of nearly all of the vanes on the first-stage compressor diffuser assembly.

There was rotational scoring through approximately 150 degrees on the aft vane support of the first-stage compressor diffuser assembly with corresponding damage to the aft outer face of the first-stage compressor impeller. There was rotational scoring through 360 degrees on the air seal area of the diffuser assembly with corresponding rotational scoring damage to the aft hub of the first-stage compressor impeller and the forward hub of the second-stage compressor impeller. The housing of the diffuser was fractured.

There was rotational scoring through 360 degrees on the second-stage compressor housing shroud surface with corresponding rotational scoring damage to the shroud line edge of all second-stage compressor impeller blades.

There was rotational scoring through nearly 360 degrees on the forward second-stage compressor impeller hub with corresponding rotational scoring damage to the air seal area of the first stage compressor diffuser assembly. The forward curvic teeth were heavily damaged. There was rotational scoring on the shroud line edge of all impeller blades with corresponding rotational scoring damage to the second-stage compressor shroud. There was rotational scoring through nearly 360 degrees on the outer diameter of the impeller with corresponding rotational scoring damage to the second-stage compressor diffuser assembly. The aft curvic teeth were lightly damaged.

There was foreign object damage to the leading edge of 10 vanes of the second-stage compressor diffuser assembly. There was rotational scoring through approximately 30 degrees on the inner diameter of the second-stage diffuser assembly with corresponding rotational scoring damage to outer diameter of the second-stage compressor impeller.

There were metal spray deposits on the suction side of the vanes of the first-stage turbine stator. There was rotational scoring on seven first-stage turbine tip shroud segments with corresponding rotational scoring damage to the shroud line edge of all first stage turbine rotor blade tips.

The leading edge tips of the blades in the first-stage turbine rotor showed evidence of erosion damage. There was rotational scoring on the shroud line edge of all blade tips with corresponding rotational scoring damage to the first-stage turbine tip shroud segments. There were metal spray deposits on the suction side of the blades. The forward curvic teeth were lightly damaged. The aft curvic teeth were lightly damaged.

There was rotational scoring through approximately 135 degrees on the second-stage turbine stator tip shroud surface with corresponding rotational scoring damage to the shroud line edge of all second-stage turbine rotor blade tips. The trailing edge of one vane cracked.

There was rotational scoring on the shroud line edge of all second-stage turbine rotor blade tips with corresponding rotational scoring damage to the second-stage turbine blade tip shroud. The forward curvic teeth were undamaged. The aft curvic teeth were undamaged.

There was rotational scoring through approximately 135 degrees on the tip shroud surface of the third-stage turbine stator with corresponding rotational scoring damage to the shroud line edge of all third-stage turbine rotor blade tips.

There was rotational scoring on the shroud line edge of all third-stage turbine rotor blade tips with corresponding rotational scoring damage to the third-stage turbine blade tip shroud. The

forward curvic teeth were undamaged. The aft curvic teeth were undamaged.

There was foreign debris on the oil filter. The filter underwent Spectrometric Oil Analysis Program (SOAP) analysis. The oil bypass valve was in the retracted position.

Spectrometric Oil Analysis Program (Soap)

The IIC only sent the oil filters for analysis after the accident. Post accident oil samples were not submitted for analysis due to the large amount of water contamination. Honeywell specialists reported that the post accident results reflected sediment and debris deposited in the filters due to their being submerged in the river. Filter and oil samples prior to accident were classified as normal, and contained a recommendation to continue sending samples at the recommended interval. They concluded that there was no indication of a pre-exiting condition that would have affected normal operation of the lubricated components of either engine.

Propeller Coupler Material Analysis

With the permission of the Safety Board, the propeller coupler from the right engine was submitted to the Honeywell Component Investigation Laboratory to determine the fracture mode and verify the material properties. The propeller coupler from the left engine was intact and was not submitted for analysis. The coupler from the right engine separated into two pieces. The separation was through the thin center section of the coupling. The metallurgist indicated that the smooth appearance of the fracture surface was indicative of torsional overload.

Propellers

An investigator from Hartzell Propellers examined both propellers, and pertinent parts of the report follow.

There were cuts and slash marks on the right side of the fuselage caused by contact with the right propeller (the wing, with engine and propeller, separated from the fuselage).

Left Propeller

The left propeller had relatively little blade damage. Three blades were nearly straight, and the fourth blade was bent beneath the engine. This, plus the absence of rotational scoring, absence of blade twisting or tearing at the tips, and the piston at the feather position, indicates that the propeller was feathered at the time of impact. There were no useful witness marks to calculate a propeller blade angle at the time of impact.

Right Propeller

The right propeller had fore and aft bending of the blades, leading edge damage, and twisting and tearing of the blade tips. The piston was initially found at a position in the normal operating range. These indicate that the propeller was rotating with significant rotational energy at the time of impact. There was also a witness mark that indicated a 25.5-degree blade angle, which was consistent with normal power ON operation. Evaluation of the blade angle resulted in the following calculations:

Given: 1,591 rpm, sea level, standard day, and 25.5-degree blade angle

Airspeed/Horsepower

60 kts/424

80 kts/349

100 kts/260

120 kts/149

The investigator concluded that the left propeller was feathered at the time of impact. The right propeller was rotating with power ON at the time of impact. There were no discrepancies noted that would preclude normal operation. All damage was consistent with impact damage.

ADDITIONAL INFORMATION

The IIC released the wreckage to the owner's representative.

Pilot Information

Certificate:	Private	**Age:**	62, 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):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2	**Last FAA Medical Exam:**	01/01/2004
Occupational Pilot:		**Last Flight Review or Equivalent:**	06/01/2003
Flight Time:	4546 hours (Total, all aircraft), 1651 hours (Total, this make and model), 4364 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mitsubishi	**Registration:**	N966MA
Model/Series:	MU-2B-40	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	405SA
Landing Gear Type:	Retractable - Tricycle	**Seats:**	7
Date/Type of Last Inspection:	01/01/2004, 100 Hour	**Certified Max Gross Wt.:**	10520 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Prop
Airframe Total Time:	4119 Hours as of last inspection	**Engine Manufacturer:**	Honeywell
ELT:		**Engine Model/Series:**	TPE-331-10-50
Registered Owner:	Ronald S. Scott	**Rated Power:**	727 hp
Operator:	Ronald S. Scott	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Night/Dark
Observation Facility, Elevation:	APC, 35 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	1954 PST	**Direction from Accident Site:**	220°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	Calm /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.93 inches Hg	**Temperature/Dew Point:**	15°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	IMPERIAL, CA (IPL)	**Type of Flight Plan Filed:**	None
Destination:	Napa, CA (APC)	**Type of Clearance:**	IFR; VFR
Departure Time:	PST	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	38.161389, -122.294444

Administrative Information

Investigator In Charge (IIC):	Tealeye C Cornejo	**Report Date:**	09/14/2007
Additional Participating Persons:	Ely Nasr; Federal Aviation Administration; Sacramento, CA Ralph Sorrels; Mitsubishi Heavy Industries America, Inc.; San Angelo, TX Martin J Kruse; Honeywell Engines, Systems & Services; Phoenix, AZ Tom McCreary; Hartzell Propeller, Inc.; Piqua, OH		
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/.		