

AI2005-5

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

PRIVATELY-OWNED
BEEHCRAFT C-23, JA3683
AREA 6Km NORTH-NORTHEAST OF NAGASAKI AIRPORT
OCTOBER 24, 2004

September 30, 2005

Aircraft and Railway Accidents Investigation Commission
Ministry of Land, Infrastructure and Transport

The investigation for this report was conducted by Aircraft and Railway Accidents Investigation Commission about the aircraft serious incident of a privately-owned Beechcraft C-23, JA3683, in accordance with Aircraft and Railway Accidents Investigation Commission Establishment Law and Annex 13 to the Convention of International Civil Aviation for the purpose of determining cause of the aircraft serious incident and contributing to the prevention of incidents and not for the purpose of blaming responsibility of the incident.

This English version report has been published and translated by Aircraft and Railway Accident Investigation Commission to make its reading easier for those who are not familiar with Japanese as well as English speaking people. Although efforts are made to translate as accurate as possible, only the Japanese version is authentic. If there is difference in meaning of the texts between the Japanese version and the English version, texts in the Japanese version are correct.

Junzo Sato,
Chairman,
Aircraft and Railway Accidents Investigation Commission

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

PRIVATELY-OWNED

BEEHCRAFT C-23, JA3683

DITCHING INTO OMURA BAY APPROX. 4.5KM N.N.E. OF

NAGASAKI AIRPORT, NAGASAKI, JAPAN

AT ABOUT 19:29 JST, OCTOBER 24, 2004

September 14, 2005

**Decision by the Aircraft and Railway Accidents Investigation
Commission(Air Sub-committee Meeting)**

Chairman	Junzo Sato
Member	Yukio Kusuki
Member	Susumu Kato
Member	Sumio Matsuura
Member	Yukiko Kakimoto
Member	Akiko Matsuo

1. THE PROCESS AND PROGRESS OF THE SERIOUS INCIDENT INVESTIGATION

1.1 Summary of the Serious Incident

A serious incident investigation was conducted in accordance to Civil Aeronautics Regulation 166 part 4 section 7 “continued stoppage of an engine during flight”.

On Sunday October 24, 2004, a privately-owned Beechcraft C-23, JA3683, departed from Nagasaki Airport at around 19:11 on a ferry flight with only the commander on board. While flying for Fukuoka Airport, the aircraft became low on fuel and turned back toward Nagasaki Airport, but at around 19:29, the engine stopped and the aircraft was ditched into Ohmura Bay around 4.5km north-northeast of Nagasaki Airport and sank.

Persons on board: One (the commander) Slightly injured
Damage to the aircraft: Minor damage to the aircraft. There was no outbreak of fire.

1.2 Outline of the Serious Incident Investigation

1.2.1 The Organization of the Investigation

On October 24, 2004, the Aircraft and Railway Accident Investigation Commission (ARAIC) assigned an Investigator-in-Charge and one investigator.

1.2.2 Cooperation by Foreign Authorities

An accredited representative of the U.S. government, the state of design and manufacture of the serious incident aircraft, participated in the investigation.

1.2.3 The Implementation of the Investigation

October 25–28, 2004	Interviews and on-site investigation
November 11, 2004	Investigation of the aircraft
November 12~December 22, 2004	Engine teardown investigation

1.2.4 Hearings from Persons associated with the Cause of the Serious Incident

Hearings are planned to gather opinions from persons related to the cause of the serious incident.

1.2.5 Hearings from the Participating States

Hearings will be held to hear the opinions of the state participating in the investigation.

2. FLIGHT HISTORY

2.1 The Progress of the Flight

On October 24, 2004, a privately-owned Beechcraft C-23 “Sundowner”, JA3683, took off from Nagasaki Airport’s runway 18 (runway-A) at around 19:11 on a ferry flight to Fukuoka Airport under Visual Flight Rules (VFR) with a single person (the commander) on board.

The flight plan for the aircraft submitted to the Nagasaki Airport Office was as follows:

FLIGHT RULES:	VFR
DEPARTURE AERODROME:	Nagasaki Airport
TIME:	19:15
CRUISING SPEED:	110kt
LEVEL:	VFR
ROUTE:	Saga-Yamato
DESTINATION AERODROME:	Fukuoka Airport
TOTAL EET:	35 minutes
ENDURANCE:	2 hours 00 minutes
PERSONS ON BOARD:	1

The following is a summary of the occurrence of the serious incident based on the statements of the commander and other witnesses.

2.1.1 Statements of Witnesses related to the Flight History

(1) The Commander

“At around 18:00 on the day of the serious incident, I carried out the preflight checks on the aircraft and found nothing unusual. I used a non-transparent black plastic container when I drained water from the fuel tanks. I didn’t check the fuel quantity, but I remembered I had confirmed on the previous flight there were around 20 liters in the left fuel tank and around 40 liters in the right fuel tank, a total of around 1 hour 30 minutes of fuel. I set the fuel selector cock to the left tank, which had the least fuel in it, and ran the engine to warm it up for about five minutes.

“I then I checked the engine, magnetos, etc. in accordance with the airplane flight

manual, and as there was nothing abnormal, I took off from runway-A at around 19:11. After take-off, I turned left and climbed smoothly to 4,500 ft.

“After reaching 4,500ft, there were two successive large drops in the engine revolutions. A few seconds later, the fuel pressure indicator needle began to fluctuate, so thinking that the left fuel tank that was being used was almost empty, I switched the fuel selector cock to the right tank. I didn’t check the fuel quantity in left fuel tank at the time, and the right fuel tank quantity indicator needle was indicating half way between 1/4 and 1/2. After switching to the right fuel tank, the engine ran smoothly, and while turning around I considered whether to continue to Fukuoka Airport or to return. I thought that there would not be sufficient fuel if I had to hold to land at Fukuoka Airport, and decided to return to Nagasaki Airport. I reported to that intention to Nagasaki Tower (Tower), and when asked by the Tower whether there were any problems, I replied that there was no trouble. I descended with the engine at idle. During descent, I set the carburetor heater to cold and switched the fuel boost pump off. While turning left onto the runway-A final approach, I saw one white light and three red lights of the Precision Approach Path Indicator (PAPI) near a power station chimney, and thinking I was low, I advanced the throttle lever to increase the engine revolutions slightly, but as I did so, the engine suddenly stopped. During the descent, until just before the engine stopped, there had been no rough running of the engine; the revolutions had been normal and there had been no sticking of the throttle lever. After the engine stopped, I tried to restart it two or three times, but it did not start. I thought that I wouldn’t be able to reach runway-A, so I reported engine failure to the Tower, avoided land area and ditched into Ohmura Bay.

“After ditching, I put on a life jacket and escaped from the aircraft by myself, and while I was swimming I was rescued by a fishing boat that approached. After ditching, the aircraft stayed afloat for one or two minutes and then sank.

“On September 24, after I had flown from Yao Airport to Nagasaki Airport, the aircraft was put in a hanger for two to three days because of a typhoon, but otherwise it had been parked outside until the day of the accident. Recently, I have been using high-octane automobile gasoline as fuel, and I last fuelled the aircraft by myself with around 80 liters at Yao Airport on September 24.”

(2) An Eyewitness on a fishing boat working near the ditching point

“At around 19:00 on October 24, while I was working in Ohmura Bay near Ohmura City, Nagasaki Prefecture, I saw an aircraft with a red light flying low at around 100m approaching our boat from the northeast. I could see clearly that it was a small aircraft with a white fuselage. The aircraft was silent at the time so I thought that its engine had stopped. I immediately started to move my boat to avoid the aircraft, and as I did so the aircraft landed in the water about 50m away. The aircraft remained afloat after landing, and as I approached it, the pilot came swimming toward the boat by himself,

and I rescued him.”

(3) A Controller in the Tower

“The aircraft took off from runway-A at around 19:11 on October 24. I received a position report from the aircraft stating that it was passing a point 5nm north-northeast of Nagasaki Airport at 3,500ft.

“At around 19:24, the aircraft reported that it was returning to Nagasaki Airport, and I instructed it to report when it reached 5nm north. At that time I asked the aircraft to report its present position and whether it was experiencing any problems, and the aircraft replied that it was 6.5nm northeast of Nagasaki Airport and was not experiencing any problems. After that, the aircraft reported its position as 3nm north of runway-A, and I cleared it to land. I sighted the aircraft at that time, and thought its flight condition was normal. I could not see the aircraft after that because it was lost in the light of the background.

“At around 19:29, the aircraft reported ‘engine trouble, over the sea, 2nm’ and immediately afterward communication with the aircraft ceased. Another controller in the Tower reported the emergency condition to the relevant facilities at that time.”

The serious incident site occurred at around 19:29, in an area 6km north-northeast of Nagasaki Airport (around 4km north of approach end of runway-A).

(See Figure 1 and Photograph)

2.2 Injuries to Persons

The commander sustained an abrasion of the left wrist and bruising of the forehead during the ditching.

2.3 Damage to Aircraft

- | | |
|---|-----------|
| (1) Aircraft nose lower section and windshield: | damaged |
| (2) Left flap attachment area: | fractured |

(See Photograph)

2.4 Damage to Other than the Aircraft

None

2.5 Crew Information

2.5.1 Flight Crew

(1) Commander: Male, aged 41	
Private Pilot License (Airplane)	Issued August 5, 1998
Type Ratings	
Airplane single engine (land)	Issued August 5, 1998
Class 2 Airman Medical Certificate	
Term of Validity	until January 7, 2005
Total flight time	767 hours 58 minutes
Flight time during the previous 30 days	0 hours 0 minutes
Total flight time on the same model of aircraft	696 hours 25 minutes
Flight time during the previous 30 days	0 hours 0 minutes

2.6 Aircraft Information

2.6.1 The Aircraft

Type	Beechcraft C-23
Serial Number	M-14861964
Date of manufacture	October 8, 1973
Certificate of Airworthiness	Dai-16-198
Term of validity	July 10, 2005
Category	Airplane Normal (N), Utility (U), Special (X)
Total flight time	1,536 hours 2 minutes
Flight time since scheduled maintenance (100 Hr Check on July 5, 2004)	33 hours 5 minutes

2.6.2 The Engine

Type	Lycoming O-360-A4J
Serial Number	L-26303-36A
Date of manufacture	September 28, 1994
Total flight time	2,533 hours 18 minutes
Flight time since scheduled maintenance (100 Hr Check on July 5, 2004)	33 hours 5 minutes
Flight time since last overhaul	701 hours 11minutes

2.6.3 Weight and Center of Gravity

The weight of the aircraft at the time of the serious incident is estimated to have been approximately 1,830lb, with the center of gravity at 111.7 inches. It is estimated that both values were within the allowable limits (maximum take-off weight 2,450lb, with an allowable center of gravity range corresponding to the weight at the time of the serious incident of 108.3–118.3 inches).

2.6.4 Fuel and Lubricating Oil

The fuel on board was automobile gasoline. The lubricating oil was Aero-Shell W-80.

2.6.5 The Automatic Direction Finder (ADF)

Because the ADF equipment installed on the aircraft had a sensitivity defect, the aircraft had passed an airworthiness inspection with the ADF equipment removed on June 26, 2004. However, the ADF system had been reinstalled at the time of the serious incident. It could not be confirmed for whether an inspection of the re-installation had been carried out by the Civil Aviation Bureau (CAB).

2.7 Meteorological Information

The aviation meteorological observations by Nagasaki Airport at around the time of the serious incident were as follows:

Time of Observation	19:00 JST	19:48 JST
Wind Direction	variable	100°
Wind Speed	2kt	3kt
Visibility	greater than 10km	greater than 10km
Cloud Amount	1/8	1/8
Cloud form	stratocumulus	stratocumulus
Height of Cloud Base	5,000ft	5,000ft
Cloud Amount	4/8	---
Cloud form	altocumulus	---
Height of Cloud Base	17,000ft	---
Temperature	20°C	18°C
Dew Point	15°C	14°C
Altimeter setting (QNH)	30.27inHg	30.29inHg

2.8 The Serious Incident Site and Aircraft Wreckage

2.8.1 The Serious Incident Site

The aircraft sank in around 4m of water in Ohmura Bay approximately 2.3km north of the approach end of runway-A (approximately 4.5km north-northeast of Nagasaki Airport). From the time the aircraft sank until it was salvaged, nothing that could be considered as fuel leakage from the aircraft could be observed on the sea surface near the aircraft's location.

2.8.2 Detail of the Damage to the Aircraft

The aircraft had sunk inverted with its nose pointing west. It was salvaged on the fourth day after it had sunk. Seawater and seawater corrosion were found inside the aircraft. The positions of the main levers and switches were as follows.

Throttle	FULL OPEN
Mixture	FULL RICH
Carburetor heat	COLD
Ignition switch	OFF
Fuel booster pump	OFF
Fuel selector	LEFT
Left fuel tank drain port	CLOSED
Right fuel tank drain port	CLOSED
Fuel strainer drain port	CLOSED

No sticking or other abnormalities were found in any of the drain ports after the aircraft was salvaged. Around 54 liters of seawater and around 150cc of automobile gasoline were collected from the left fuel tank drain port, and around 40 liters of seawater and around 400cc of automobile gasoline were collected from the right fuel tank drain port.

2.9 Information from Nagasaki Airport Air Traffic Control Radar

Position information thought to correspond to the aircraft was recorded in air traffic control radar recordings at four-second intervals between 1910:21–1929:49. The flight course of the aircraft was estimated based on this data.

(See Figure 1)

2.10 Air Navigation Facilities

Air navigation radio aids, air-ground radio communication systems and aerodrome lighting aids relevant to the operation of the aircraft were all operating normally at the time of the serious incident.

2.11 Tests and Research to Find Facts

The results of an engine disassembly investigation to examine the cause of the engine stoppage in flight are summarized as follows.

- (1) Because of immersion, seawater had entered the inside of the engine and its accessories, and the entire engine had corrosion as a result. However, no external damage was found.
- (2) There was no evidence of abnormality such as incorrect assembly, defects or binding of parts in the internal parts of the engine.
- (3) No abnormalities were found in the internal parts of the combustion and fuel system.
- (4) No anomalies that could have caused engine stoppage were found in the electrical system.

2.12 Other Relevant Information

The operating limitations and normal procedures in the aircraft's flight manual is summarized as follows.

- (1) Operating limitations
 - ① Fuel specification: Aviation fuel, grade 100 (green), 100LL (blue), or Minimum grade 91/96 (blue)
 - ② Fuel quantity and usable fuel: Fuel capacity is around 113 liters in each tank, and usable fuel is around 110 liters in each tank.
- (2) Normal procedures:
 - ① Preflight check: Fuel tank: check quantity
 - ② Before engine start: Fuel selector: set to the tank with the greatest fuel quantity

3. ANALYSIS

3.1 The commander had valid aircrew proficiency certificates and a valid aircrew medical certificate.

3.2 The aircraft had a valid certificate of airworthiness. However, as described in paragraph 2.1(1), it is estimated that the commander had been using a fuel that was not specified in the operating limitations of the airplane flight manual at the time of the serious incident. Further, as described in section 2.6.5, it is estimated that ADF equipment which had not been certified by the CAB was installed on the aircraft.

3.3 According to the commander's statement described in paragraph 2.1(1), when the commander conducted the preflight check prescribed in the airplane flight manual, it is

estimated that he did not use an appropriate method to check for water in the fuel tanks and did not check the fuel quantity.

3.4 According to the statements of the commander described in paragraph 2.1(1), and of the eyewitness described in paragraph 2.1(2), it is estimated that the aircraft ditched because its engine stopped in flight and could not be restarted.

3.5 As a result of the engine teardown inspection described in section 2.11, it is estimated that there were no anomalies or malfunctions related to the engine stoppage in flight at the time of the serious incident.

Further, as described in 2.1(1), according to that the commander's statements that there was no rough running of the engine, no abnormal revolutions and no sticking of the throttle lever at the time of the serious incident, it is estimated that there was carburetor icing, water contamination of the fuel etc. related to the engine stoppage in flight.

3.6 As described in (1) above, the commander stated that there was fuel remaining in the right fuel tank at the time of the serious incident. However, as described in section 2.8.2, the total quantity of fuel found in both the aircraft's fuel tanks after salvage was around 550cc. Further, as described in section 2.8.1, it is estimated that there was no leaking of fuel from the aircraft from the time of its ditching until it was salvaged. It is therefore considered that the fuel in both tanks was practically exhausted when the engine stopped.

3.7 According to sections 3.4–3.6, because the fuel in the fuel tanks was exhausted, fuel could not be supplied to the engine, and it is estimated that this led to the continuous stoppage of the engine in this serious incident.

3.8 Based on the flight course estimated as described in section 2.9, it is estimated that at around 1928:36, the aircraft began to left turn at around 4.3km north of the approach end of the runway-A, at around 1928:48, the aircraft was in a shallow left turn and was on the final approach path to runway-A around 4.1km of the approach end of the runway.

The PAPI for the runway-A is located around 290m beyond the approach end at an elevation of around 5m (around 16ft). The approach angle when one white light and three red lights are visible was determined to be around 2.5–2.8°. When the PAPI was viewed in this condition, the commander stated that the aircraft's engine stopped during a left turn onto the final approach path of runway-A when the PAPI appeared to be near the chimney of a power station. The chimney of the power station is located around 4km from the approach end of the runway-A. From these, the altitude of the aircraft at the time of the engine stoppage was computed as around 700ft.

3.9 As described in paragraph 2.1(1), the commander had flown without checking the fuel quantity before flight. Further, although it is estimated that it is not directly related to the probable cause of the serious incident, as described in section 3.2, it is estimated that the commander had not used a fuel of the specified standard, and further, ADF equipment had

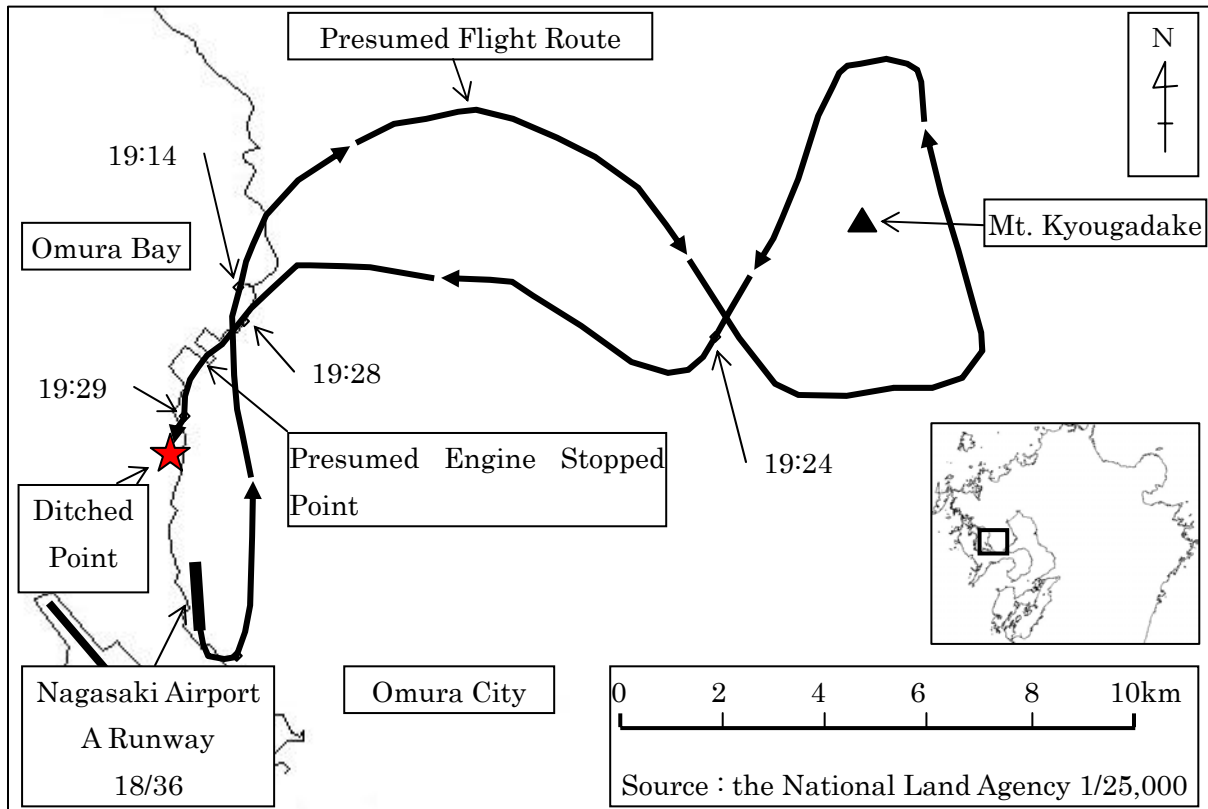
been installed on the aircraft without being inspected by the CAB. It is therefore estimated that the commander had been flying without due regard of matters directly related to flight safety prescribed in the Civil Aeronautics Law and the airplane flight manual. It was necessary for the commander to ensure the safety of flight by adhering to the Civil Aeronautics Law and airplane flight manual.

4. PROBABLE CAUSE

It is estimated that this serious incident resulted from continued engine stoppage in flight due to fuel exhaustion.

It is estimated that the commander's failure to check the fuel quantity before flight contributed to the fuel exhaustion.

Figure 1 Presumed Flight Route



Photograph Serious Incident Aircraft



Figure 2 Three angle view of Beechcraft C 2 3

Unit : m

