

AA2011-2

**AIRCRAFT ACCIDENT  
INVESTIGATION REPORT**

**CIVIL AVIATION COLLEGE**

**J A 4 1 6 5**

**February 25, 2011**

**Japan Transport Safety Board**

The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board and with Annex 13 to the Convention on International Civil Aviation is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto  
Chairman,  
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

# AIRCRAFT ACCIDENT INVESTIGATION REPORT

CIVIL AVIATION COLLEGE  
BEEHCRAFT A36, JA4165  
ON THE RUNWAY OF KAGOSHIMA AIRPORT, JAPAN  
AT ABOUT 15:29 JST, OCTOBER 30, 2009

February 4, 2011

Adopted by the Japan Transport Safety Board

Chairman	Norihiro Goto
Member	Shinsuke Endoh
Member	Toshiyuki Ishikawa
Member	Sadao Tamura
Member	Yuki Shuto
Member	Toshiaki Shinagawa

# 1. PROCESS AND PROGRESS OF INVESTIGATION

## 1.1 Summary of the Accident

On October 30 (Friday), 2009, a Beechcraft A36, registered JA4165, operated by Independent Administrative Institution Civil Aviation College, took off from Kumamoto Airport for solo flight training at about 14:47 Japan Standard Time (JST: UTC+9hr, unless otherwise stated all times are indicated in JST based on a 24-hour clock). When the aircraft arrived at Kagoshima Airport at about 15:29, it landed on its belly and stopped on the runway.

There was one student pilot on board, who did not sustain any injuries.

The Aircraft sustained substantial damage, but there was no outbreak of fire.

## 1.2 Outline of the Accident Investigation

### 1.2.1 Investigation Organization

On October 30, 2009, the Japan Transport Safety Board designated an Investigator-in-Charge and another investigator to investigate this accident.

### 1.2.2 Representative from Foreign Authorities

An accredited representative of the United States of America, as the State of Design and Manufacture of the aircraft involved in this accident, participated in the investigation.

### 1.2.3 Implementation of the Investigation

October 31, 2009	Interviews, on-site investigation and aircraft examination
November 1, 2009	Interviews and examinations of management of flight operations and aircrafts
November 2, 2009	Interviews and aircraft examination
November 4, 2009	Interviews

### 1.2.4 Comments from Parties Relevant to the Cause of the Accident

Comments were invited from parties relevant to the cause of the accident.

### 1.2.5 Comments from the Participating State

Comments were invited from the participating State.

## 2. FACTUAL INFORMATION

### 2.1 History of the Flight

On October 30, 2009, the Beechcraft A36, registered JA4165 (hereinafter referred to as “the Aircraft”), operated by Independent Administrative Institution Civil Aviation College (hereinafter referred to as “the College”), took off from Kumamoto Airport for Kagoshima Airport (hereinafter referred to as “the Airport”) for solo flight training at around 14:47 with one student pilot (hereinafter referred to as “the Student”) on board.

The solo flight training was conducted under the supervision of a flight instructor in charge (hereinafter referred to as “the Instructor”).

The outline of the flight plan was as follows:

Flight rules: Visual Flight Rules (VFR)

Departure aerodrome:	Kumamoto Airport
Estimated off-block time:	14:25
Cruising speed:	160 knots
Cruising altitude:	VFR
Route:	Yatsushiro – Akune – Kamou
Destination aerodrome:	Kagoshima Airport
Total estimated elapsed time:	55 min
Fuel load expressed in endurance:	3 h and 30 min

The history of the flight up to the time of the accident is summarized below, according to the statements of the Student, an eyewitness and persons concerned.

(1) The Student

On the previous night, I went to bed about 30 minutes past midnight. Because I slept well, my physical condition was good. On the day of the accident, I got off at about 7:30 and attended a class on the meteorology in the morning. In the afternoon, I planned to get solo flight navigation training, departing from Miyazaki Airport and after landing at Kumamoto Airport and the Airport, returning to Miyazaki Airport.

There was no problem with the Aircraft in a post-flight inspection in the morning. I felt no abnormality with the Aircraft in a preflight inspection in the afternoon and during flights to and from Kumamoto Airport. The weather condition was favorable.

During the flight to the Airport, I made a position report to the Kagoshima Airport Traffic Control Tower (hereinafter referred to as “the Tower”) at an altitude of about 2,500 feet over Kamou. Based on instructions from the Tower, I entered a left downwind leg toward runway 34 and maintained an altitude of about 1,900 feet and an air speed of 110 to 120 knots. When I saw the runway threshold right on my side, I adjusted flap setting for approach (12°). Shortly afterward, a controller instructed me to make a short approach\*1. I became conscious of the distance with the preceding aircraft. A short approach in solo flight is prohibited by the training operation procedure prescribed by the College for single-engine commercial pilot training course. But I concluded that there was no particular problem with a short approach in consideration of the distance from the preceding aircraft, and I replied I would follow the instructions. I remember that I extended the landing gears around when I saw the preceding aircraft on my left and made a base turn. The place where I made the base turn eventually proved to be slightly closer to the runway than normal. While I was on the base leg, descending by reduced engine power, I felt something unusual, but not abnormal, such as wind noise, the attitude of the Aircraft, the reading of the speed indicator.

When I was instructed by the controller to make a short approach, I had no idea why such an approach was instructed. But, after making a final turn, when I aligned the Aircraft with the runway center line, I saw two airplanes waiting for takeoff on a taxiway near side of the runway. And I understood that the existence of the two waiting aircraft was the reason for the instructions.

After that, I was paying attention to whether the Aircraft was on an appropriate approach path in terms of the position, altitude and speed, and whether it is lined up

---

\*1 Short approach is a flying operation with a reduced route aimed at a shorter final approach in the traffic pattern.

with the runway center line with its axis in the right direction, I operated the flaps at an altitude of about 1,200 feet in the final leg (about 300 feet above the surface of the runway at the Airport). After extending the flap to full-down (30°), I conducted the 200-FEET PROCEDURE (the procedures which must be made until an aircraft comes down to an altitude of about 200 feet from the surface of the runway), which are stated in the training operation procedure prescribed by the College for the single-engine commercial pilot training course.

I made a landing approach normally, but the Aircraft did not touch the ground even though the sight of the runway looked as usual. After it descended slightly in the same manner, I heard a scraping sound with the body, and noticed that the Aircraft landed on its belly. The Aircraft slid on the runway with the lower fuselage contacted on the ground and it stopped with its nose inclined slightly to the left. I remember that before the Aircraft was stopped, I got the fuel selector valve off and cut off the mixture to idle then I realized that the landing gear selector lever was in the Down position and I judged on the instance that if activated, the landing gears would bring about a dangerous situation, therefore, I moved the landing gear selector lever to the Up position. After the Aircraft came to a halt, I turned off the magneto/start switch, the alternator switch and the master battery switch.

When I opened a small window on the left side, I felt a smell something like the Aircraft's body got burned by rubbing. I saw a smoke by friction, but I didn't worry about a fire because there was no other smoke.

I pushed the ground communication switch\*2 to report about the situation and contacted the controller, I was advised to wait there, so that I was waiting inside of the Aircraft. Fire engines came to the site and shortly later, I left the Aircraft because I was told to move out of the Aircraft.

As far as the landing gear system and flap operations and confirmation for them in the process of approach are concerned, I remember that I implemented the 3 Green\*3 confirmation procedures as prescribed on three occasions after I operated to extend the landing gears, when I confirmed with the checklist for landing, and when I carried out the 200-FEET PROCEDURE. I have no memories about the sound of the landing gear warning horn and the lighting of the gear up annunciator. I operated the landing gear selector lever only when I tried to extend the landing gears before the base turn while in flight, and I made no such operation later. I have no memory about whether I touched the flap selector lever after the Aircraft stopped.

## (2) Eyewitness

When the Aircraft was approaching the runway, the airplane I boarded was taxiing on parallel taxiway P1 toward T1 in order to take off from the Airport to Central Japan International Airport. Another aircraft of the College (JA4168) was waiting on T2. When I was entering T1 after passing T2, I received a controller instructions to hold short of the runway. When the Aircraft was about to pass the runway threshold, its landing gears had not been extended. After I made a turn to T1 and when I looked at the Aircraft again,

---

\*2 The ground communication switch, an instrument originally designed for the College means the switch to use a radio communication system with a battery power even when the battery switch is off.

\*3 3 Green means that the three green gear position lights are all lit up, indicating all landing gears are the Down lock position.

the Aircraft had belly-landed. I felt nothing unusual about its attitude in the approach.

(3) Controller

The Aircraft became visible from the Tower just before it enters the downwind leg.

Because a straight-in scheduled flight was coming behind the Aircraft, I judged that the Aircraft should be let in for the base turn as soon as possible and instructed the Aircraft to make a short approach. As far as I could see from the Tower, the Aircraft actually took a base turn course that is almost the same as normal, failing to make a required short approach. I did not know that the College had the procedure that prohibits making a short approach in solo flight.

Because the Aircraft appeared to be normally making landing rolls, I instructed the Aircraft to move out of the runway quickly. But when I looked at the Aircraft carefully, I realized that it stopped with an abnormal attitude and concluded that the Aircraft landed on its belly. Therefore, I instructed the following aircraft to go around and issued orders to close the runway.

Later, I received a response from the Aircraft to my call, and judging that there would be no problem even if the pilot stays within the Aircraft, I told him "Wait there, please."

I was watching the Aircraft when it was approaching the runway, but I have no memory about whether its landing gears had been extended.

In conversation in radio communications with the Aircraft, I felt nothing unusual. I did not notice anything like a warning sound whatsoever in the radio communications.

(4) Instructor

I have had students prepare plans for route and destination aerodrome for his /her solo flight after providing necessary instructions, and we adopted plans one day before the solo flight. When the Student flew to Kumamoto Airport on the previous day, I found that a slight delay in the timing for starting the descent and a lack of leeway in altitude adjustment were need to be improved in performance of the Student. Therefore, I told the Student to include Kumamoto Airport in his solo flight plan.

On the day of the accident, we had a preflight discussion for about 30 minutes from 12:15 at a briefing room. Then, I examine the maintenance condition and others using a prepared checklist and made an exterior check of the Aircraft. While I was doing these jobs, the Student filed a flight plan and he similarly run through the checklist and checked the exterior of the Aircraft. It was about 13:25 with my watch when the Aircraft ramped out. After that, I entered the operation control building and was collecting flight information of the Aircraft by radio communication. The Aircraft continued a smooth flight as scheduled until Kumamoto Airport. Later, I received a position report that the Aircraft passed Akune, and it was the last radio message from the Aircraft.

(5) Staff of Airport Security and Disaster Prevention Division, Kagoshima Airport Office, Osaka Regional Civil Aviation Bureau

On the day of the accident, I received a notification about the occurrence of an accident over a crash phone at about 15:30. One command car and three chemical fire engines, each carrying two staffers, had arrived at the site by about 15:32. After the arrival, we made them ready to extinguish a fire and checked whether there is a smoke or a fuel leakage. But we did not find any problems.

Later, we readjusted the formation of the fire engines because other vehicles were

anticipated to be mobilized to the site. Because the Student was staying within the Aircraft, we urged him to leave the Aircraft.

After moving the Aircraft to the hangar and confirming the safety of the situation inside the hangar, we finally removed the steps for alert at about 19:23.

The accident occurred at about 15:29 on October 30, 2009 on the runway of the Airport (Latitude 31°48' N, Longitude 130°43' E).  
(See Figure 1 Estimated Flight Route and ATC Communications, Figure 2 Accident Site Sketch, Photo 1 Accident Aircraft)

## 2.2 Injuries to Persons

There were no injuries.

## 2.3 Information about Damage to the Aircraft

### 2.3.1 Extent of Damage

Substantial

### 2.3.2. Damage to the Aircraft Components

Main wings	Pitot tube deformed, flaps damaged
Fuselage	Lower part of nose section and lower surface of body damaged
Propellers	Three blades bent
Landing gears	Landing gear doors damaged
Engine	Exhaust pipes on right and left sides damaged

## 2.4 Other Damage

None

## 2.5 Personnel Information

(1) Student	Male, Age 25	
Student pilot permission		
Validity		December 25, 2009
Total flight time		128 h 50 min
Solo flight time		20 h 00 min
(2) Instructor	Male, Age 42	
Commercial pilot certificate (Airplane)		January 17, 2000
Type rating for single-engine (land)		March 29, 1995
Type rating for multiple-engine (land)		October 13, 1998
Instrument flight certificate		October 7, 2002
Flight instructor certificate		July 23, 2008
Class 1 aviation medical certificate		
Validity		March 6, 2010
Total flight time		1,218 h
Flight time for flight instruction		495 h
Flight time for flight instruction in the last one year		422 h
Total flight time on the type of aircraft		852 h



## 2.6 Aircraft Information

### 2.6.1 Aircraft

Type	Beechcraft A36
Serial number	E-2751
Date of manufacture	September 29, 1992
Certificate of airworthiness	DAF-21-090
Validity	May 28, 2010
Category of airworthiness	Airplane, Utility U
Total flight time	9,392 h 45 min
Flight time since last periodical check (B Check on October 28, 2009)	8 h 38 min

(See Figure 3 Three Angle View of Beechcraft A36)

### 2.6.2 Weight and Balance

When the accident occurred, the Aircraft's weight is estimated to have been 2,962 pounds and the center of gravity is estimated to have been 78.4 inches aft of the reference point, both of which are estimated to have been within the allowable range (maximum takeoff weight of 3,650 pounds, and 74.0 to 87.7 inches of the range of the center gravity corresponding to the weight at the time of the accident).

## 2.7 Meteorological Information

Aeronautical weather observations made at the Airport around the time of the accident were as follows:

15:36	Wind direction	090°	Wind velocity	4 knots	Visibility	20 kilometers	
	Clouds	Amount 1/8	Type	Cumulus	Cloud Base	4,000 feet	
		Amount 3/8	Type	Alto cumulus	Cloud Base	15,000 feet	
	Temperature	24 °C	Dew point	11°C			
	Altimeter setting (QNH)	30.18 inHg					

## 2.8 Accident Site and Wreckage Information

### 2.8.1 Condition of the Accident Site

The runway at the Airport is 3,000 meters long and 45 meters wide with its direction at 16/34. The Aircraft landed on its belly and stopped at a point about 650 meters from the threshold of runway 34 and about 5 meters left of the center line, with its nose veered to the left by about 10°. Hit marks with propellers and traces of scratch made by the fuselage were found in a strip of about 230 meters gradually leaning to the left, running from the point about the centerline about 420 meters from the threshold of runway 34 to the point where the Aircraft stopped. Plastic and metallic pieces of the anti-collision light, the landing gear doors and other damaged parts were found scattered around in the area.

A picture shot just after the Aircraft stopped by a mechanic who happened to be at maintenance work at the hangar next to the runway shows the flap position was full down, but another picture shot later shows the flaps had been retracted.

Regarding the condition of the instrument panel of the Aircraft stored at the hangar, the throttle lever was in a position forward of IDLE, the flap and landing gear selector levers were in

the Up position. The master battery switch was off, while the ground communication switch was on, with the radio communication frequency selected for the Tower.

(See Figure 2 Accident Site Sketch, Photo 2 Instrument Panel at Cockpit, Photo 4 Change in Flap Position)

## **2.8.2 Details of Aircraft Damage**

### **(1) Main wings**

The inner rear edges of the right and left flaps were worn and deformed. The pitot tube attached to the lower part of the left wing was deformed from the bottom.

### **(2) Fuselage**

In the lower surface of the forward section of the fuselage, the exterior panels were worn from the nose landing gear bay to the air-conditioner condenser at the root of the main wings. The keel structure of the nose was partially worn.

The assist step built in the lower right section in the middle of the fuselage, the bottom of the air-conditioner condenser attached to the lower surface of the fuselage and the lower part of the DME antenna were worn, while the anti-collision light was damaged.

### **(3) Propellers**

The tips of all three blades were bent backward.

### **(4) Landing gears**

The hinges of the nose landing gear doors on both sides and the retract brace on the left side were worn and deformed.

The outer edges of the inner doors for the main landing gears on both sides and a projecting part of the inner door for the left main landing gear were worn and deformed.

### **(5) Engine**

The exhaust pipes on the left and right sides were deformed and their tips were worn.

(See Photo 3 Damage to the Aircraft Components)

## **2.9 Information about Fire and Fire Fighting**

The Airport Security and Disaster Prevention Division received a notification of an accident from the Tower at about 15:30 and mobilized four emergency vehicles consisting of one command car and three chemical fire engines. The emergency vehicles arrived at the site of the accident at about 15:32. After preparing to start a fire fighting operation, fire men checked whether there was a smoke or a fuel leakage. But because such signs were not detected, they actually made no fire fighting operation.

## **2.10 Information about Landing Gears**

### **2.10.1 Landing Gear Position Lights**

The landing gear position lights consist of three green lights and one red light showing the condition of the nose landing gear and the left and right main landing gears. Each green light is turn on when corresponding landing gear is in the down lock position. The red light is turn on when either of the three landing gears is in operation or in an intermediate position. All lights turn off when all landing gears are in the up lock position.

### **2.10.2 Landing Gear Warning Horn and Blink of Gear Up Annunciator**

In a situation where either landing gear is not in the down lock position, when the throttle

lever is reduced to a position equal to a manifold air pressure of 12±1 inHg or lower, or when the flaps are fully extended to 30°, the landing gear warning horn sounds at 500 Hz intermittently at a pace of about 1.5 times a second, and the red gear up annunciator light blinks.

### **2.10.3 Systems Relating to Activation of Landing Gears**

The Aircraft is equipped with following safety systems to prevent landing gears from retracting accidentally:

(1) Safety switches for main landing gear struts

Safety switches are installed on both main landing gear strut cylinders. The switches are so designed as they turn on when the main landing gear struts compressed. If either of the left or right safety switches is activated, an electric circuit for retracting the landing gears is cut off and as a result, the landing gears will not retract even when the landing gear selector lever is moved to the Up position.

(2) Safety switch for throttle lever

A safety switch for the throttle lever is equipped at a section where the lever is installed. When the throttle lever is reduced to a position equal to a manifold air pressure of 16 to 18 inHg or lower, the safety switch cuts off an electric circuit for retracting the landing gears. As a result, the landing gears will not be retracted even when the landing gear selector lever is moved to the Up position.

### **2.10.4 Confirmation of Movements of Switches**

The records about measuring checks for renewing the airworthiness certificate for the Aircraft, carried out on May 11, 2009, indicate that the throttle lever switch worked at a manifold air pressure of 16.2 inHg and the landing gear warning horn sounded at a manifold air pressure of 12.2 inHg, both falling within the allowable ranges.

## **2.11 Condition and Performance Check of Landing Gear System after Occurrence of the Accident**

- (1) As described in 2.8.2 (4), the landing gear doors in the landing gear system became worn due to the contact with the runway, but there was no damage to any landing gear strut and a mechanism for locking the landing gears to the Down position. There were no damage or any other abnormalities, either, for the safety switches installed on the struts for the main landing gears on both sides, a connecting rod for activating the safety switches and the switch for detecting the down lock and the up lock positions.
- (2) As described in 2.8.2 (4), the nose landing gear door of the Aircraft was worn and deformed due to touch with the runway and cease to function. The movement of the nose landing gear was checked after removing the door to ensure that the function to extend and retract landing gears were not influenced.

When the landing gear selector lever was shifted to the Down position, all landing gear struts were moved to the down lock position. Next, when the landing gear selector lever was shifted to the Up position, all landing gear struts was moved to the up lock position.

- (3) During the movement checks described in (1) and (2) above, a red landing gear position light was lit up when either of the landing gears was in operation. When the landing gears were in the down lock position, the red light was turned off and a green light was

lit up. When the landing gears were in the up lock position, the green light was turned off.

In response to the positions of the landing gears, the landing gear position lights lit up and turned off normally.

- (4) When the safety switches for the main landing gear struts detected a ground position or when the safety switch for the throttle lever detected a low power position, the safety system was activated normally without retracting the landing gears.
- (5) The landing gear warning horn and the gear up annunciator worked normally in response to the positions of the flap selector lever and the throttle lever.

## **2.12 Other Necessary Information**

### **2.12.1 Warning Sounds on ATC Communication Records**

Voices and sounds left on ATC communication records included the sound of the landing gear warning horn along with the Student's voice at 15:28:24 and 15:28:34 when the Aircraft replied at entering into the final approach.

### **2.12.2 Visual Information Taken by Closed Circuit TV Camera**

A closed circuit TV camera system established at the Airport by the Ministry of Land, Infrastructure, Transport and Tourism aimed at the Aircraft after the Aircraft landed on its belly and stopped on the runway, and it recorded the situation of the Aircraft from 15:31 on. According to this image, the Student did not get out of the Aircraft but stayed inside until 15:48.

### **2.12.3 The College's Views about Short Approach and How to deal with Emergency**

According to a statement by the superior of the Instructor, the College's views about short approach and how to deal with emergency are outlined below.

Generally speaking, a short approach in solo flight requires a higher level of technique than those for normal approach. In our lessons at the College, we instruct procedures for approach operations stage by stage. The procedures are basically so designed as to ensure an approach can be made almost in the allowable range if the students follow the instructions by arranging them in a certain manner. But, in the case of short approach, the entire process becomes different. The pilot must extend the landing gears at an early stage. Engine power should be slightly reduced because the approach angle becomes relatively high. Because closer flight route to the runway is taken, every step, such as the timing of starting a turn, must be differed. In this sense, higher levels of judgment and technique are required for this operation, increasing the difficulty of making a short approach.

The College has no specific rule regarding responses to instructions from a controller to make a short approach in solo flight. However, in some cases, we think students should state their intention to decline such instructions to the controller, and we teach students to do so.

As for responses in an emergency, our guidance is not supposed to instruct series of steps preparing for every possible situation. Students are aware of individual matters such as availability of emergency equipment and how to evacuate from aircraft, but there is no package material containing all these procedures. In the class on flight safety, we instruct them in examples of accidents, but we do not provide them with specific responses in a specific situation. Therefore, I remember that there was no specific standard action to be taken by the Student in this accident. I understand he made a judgment by himself in consideration of the actual situation there and I do

not think he failed to make a prescribed response.

### 2.12.4 Manuals and Procedures of the College

The College established operating manuals to implement actual flight training properly, in which provisions are described for the handling of training aircraft, training methods and so on. Detailed procedures for implementing the operating manuals included operating procedure for students in the single-engine commercial pilot training course (Annex 1), operating procedure for students in the multiple-engine instrument flight training course (Annex 2) and operating procedure for the staff training and instructor review (Annex 3). Provisions in Annex 1 are described as below. (Excerpt)

#### *Chapter 2 PROCEDURE AND CHECKLIST*

##### *2-1 CHECKLIST*

(Omitted)

##### *2-1-2 How to Use Checklist*

*A checklist is originally a “memorandum” used for avoiding wrong operations or lapse of memory. A user can perform an operation by checking the list or user can also check whether there was something mistaken or forgotten to do after the operation.*

(Omitted)

*(2) DO AND CHECK : This is a way to reconfirm with the checklist by picking up only the items which are vitally important for safety, after completing normal procedures or after confirming all systems and components installed on aircraft are operating and their positions are set properly.*

(Omitted)

##### *2-12 LANDING PROCEDURE AND CHECKLIST*

###### *A. LANDING PROCEDURE*

*Carry out these procedures usually before reaching the middle point of the base leg.*

(Omitted)

*(1) Flaps ..... (Omitted) ..... UP or APCH*

(Omitted)

*(2) Landing Gear ..... (Omitted) ..... DOWN 3 GREEN*

(Omitted)

*(3) Propeller ..... (Omitted) ..... HIGH RPM*

(Omitted)

*(4) Air Conditioner ..... (Omitted) ..... OFF*

(Omitted)

###### *C. 200- FEET PROCEDURE*

*This procedure shall be taken for all landing operations.*

*Check following items by AGL200 feet and call out.*

*(1) Landing Gear Down and 3 Green*

*Make final confirmation to ensure that the Control Lever is in the Down position and the 3 Green Lights are on. Call out “Gear Down & 3 Green”.*

*(2) Runway Clear and Landing Clearance*

*Call out “CLEARED TO LAND (FOR TGL)” or “RUNWAY is CLEARED” after confirming that a clearance for landing is given and the runway is cleared.*

(Omitted)

*Chapter 4 Takeoff and Landing*

(Omitted)

*4-4 NORMAL LANDING*

*1. PROCEDURE* (Omitted)

*2. Operating procedure*

*(1)* (Omitted)

*(2)* (Omitted)

*Flaps Full Down by AGL200 feet.*

*Flaps Full Down (Note: Until finish a solo flight more than three times in a course of Obihiro, use Flaps Approach.)*

*Make confirmation to ensure that the Control Lever is in the Full Down position and the Amber Light is on.*

(Omitted)

*Chapter 11 Emergency Operations*

*11-1 General*

*Nothing is more precious than human life. Therefore, it is important for pilots not only to commit themselves to safe operation but also prepare themselves for emergency. Pilots must fully understand the systems of the aircraft and their normal and emergency operations on the ground, and they must also be fully trained to operate them smoothly and without fail.*

(Omitted)

*11-5 LANDING GEAR TROUBLES*

(Omitted)

*11-5-2 LANDING GEAR RETRACTED – WITH POWER*

*If possible, choose solid grass field or a runway covered with foam. (Omitted) When it finds that it is certain to reach desired landing point without fail, conduct following items:*

(Omitted)

*8. Evacuate from the aircraft promptly after it stopped.*

(Omitted)

*Chapter 12 Solo Flight*

(Omitted)

*12-2 Prohibited Items in Solo Flight*

(Omitted)

*7. SHORT APPROACH*

### **3. ANALYSIS**

#### **3.1 Qualification of Personnel**

The Student held a valid student pilot permission. And the Instructor held a valid airman competence certificate, a valid flight instructor certificate and a valid aviation medical certificate.

According to the statement described in 2.1 (1), it is considered highly probable that the Student's physical condition was favorable on the day of the accident.

#### **3.2 Airworthiness Certificate of the Aircraft**

The Aircraft had a valid airworthiness certificate and had been maintained and inspected as

prescribed.

### **3.3 Weather Conditions**

It is considered highly probable that weather conditions at the time of the accident did not have any relation to the occurrence of the accident.

### **3.4 Situation of the Aircraft**

As described in 2.11, after the accident, there was no damage to the structure of the Aircraft and there were no abnormalities found as to the function of extending and retracting its landing gears, the function of the landing gear position lights and the functions of the safety switches. Therefore, it is considered highly probable that the landing gear systems of the Aircraft were functioning normally at the time of the accident.

### **3.5 Situation of the Aircraft until Occurrence of Accident**

#### **3.5.1 Situation from Downwind Leg to Base Leg**

Judging from the statement described in 2.1 (1) and the landing procedure described in 2.12.4, it is considered highly probable that the Student was instructed by the controller to make a short approach at the period of extending the landing gears while flying on the downwind leg. It is considered probable that the Student knew that the College designates a short approach in solo flight as a prohibited item, but he followed the instructions by concluding there would be no problem in the circumstances. It is considered somewhat likely that, trying to shorten the flight course to the base leg, the Student made a base turn while becoming conscious about the distance to the preceding aircraft, and he reduced the power to descend while flying on the base leg.

According to the statement described in 2.1 (1), the Student remembers that he extended the landing gears around when he saw the preceding aircraft on his left and then made a base turn. According to the statement, he operated the landing gear selector lever only when he tried to extend the landing gears before the base turn while in flight, and he made no such operation later. According to the statement described in 2.1 (2), when the Aircraft was about to pass the runway threshold, its landing gears had not been extended. As described in 2.12.4, a landing gear extending procedure shall be taken usually before reaching the middle point of the base leg. And as described in 3.4, it is considered highly probable that the landing gear systems of the Aircraft were functioning normally. Judging from the above, it is considered highly probable that, the Student mistakenly thought that he had extended the landing gears, and he had forgotten to carry out the landing gear extending procedure.

Judging from the statement described in 2.1 (1) and 2.12.4, it is considered probable that he had used the checklist by the time when the Aircraft reached the middle point of the base leg. As described in 2.12.3, short approach requires higher levels of judgment and technique than those for normal approach and therefore it requires different procedures. Therefore, it is considered probable that, the Student had to use the checklist and carry out a safety check without fail, but he became occupied with thinking about the distance to the preceding aircraft and the reason for the instructions for short approach, he therefore was unaware that the landing gear selector lever had not been in the Down position.

#### **3.5.2 Situation Regarding Failing to Notice Warning Signs such as Landing Gear Warning Horn**

As described in 2.12.1, the ATC communication records included the sound of the landing gear warning horn along with the Student's voice. Therefore, it is considered highly probable that, at the time, the landing gears remained in the Up position. According to the statement described in 2.1 (1), the Student stated that he understood the reason for the short approach instructions when he saw two airplanes waiting for takeoff on taxiways near side of the runway. It is considered somewhat likely that the Student had continued the approach while being unaware of the sounding of the landing gear warning horn and the blinking of the gear up annunciator because he had been paying his attention to the reason for a short approach until before the final turn, and then, he had concentrated on landing operations. Furthermore, it is considered highly probable that, when he was carrying out the 200-FEET PROCEDURE, the landing gear warning horn was sounding, the gear up annunciator was blinking, and the landing gear position lights were off. It is considered highly probable that the Student made the Aircraft land on its belly without noticing any of these signs.

### **3.5.3 Situation from Final to Landing**

According to 2.8.2, the damage of the Aircraft was limited to the propellers and the lower surface of the fuselage. Therefore, it is considered highly probable that the damage was caused when the Aircraft landed on its belly by sliding on the runway with its lower body contacting on the ground and its propellers hitting the ground.

Judging from the statement described in 2.1 (1), Photo 4 and 2.12.4, it is considered highly probable that he had set flaps to Full Down in the final approach. Since setting flaps to Full Down in the final approach basically means the procedure for landing, pilots should simultaneously check the landing gear position lights.

As to the Student failed to notice that the landing gear position lights were off in the 200-FEET PROCEDURE, it is considered somewhat likely that, in his usual training, he does not pay full attention to confirm the illuminating of the green lights and the position of the landing gear selector lever, being under the condition to read out mere procedure, and as a result, the safety check had become perfunctory. Therefore, it is considered probable that instructors in the College should have trained students to pay close attention to prevent check items established as procedures from becoming perfunctory and virtually unchecked.

### **3.5.4 Situation at the Time of Belly Landing**

Judging from the statement described in 2.1 (2), it is considered highly probable that the landing gears had not been extended until touchdown, but as described in 2.8.2(4), the inner main landing gear doors were worn and deformed. When the landing gear doors are closed, the doors are neither worn nor deformed. Further, according to Photo 1, with the assist step attached to the right side of the Aircraft, the right side of the fuselage becomes higher, and it makes the Aircraft lean to the left. Photo 3 shows the Aircraft sustained severe damage to the left side compared with the right side. And the landing gear doors open only when the landing gears are in operation. Judging from above, it is considered highly probable that the landing gears were operated downward while the Aircraft was sliding on the runway with its body leaned to the left after it landed on its belly.

As described in 3.4, it is considered highly probable that the landing gear systems of the Aircraft were functioning normally with no problem with hardware. And the landing gears are not activated unless the landing gear selector lever is operated. Therefore, it is considered highly probable that the landing gears were operated downward because the Student set the landing gear



selector lever to the Down position.

Regarding the condition of the operation devices when the Student left the Aircraft, the landing gear selector lever was in the Up position, as indicated in the statement in 2.1 (1) and 2.8.1. The Student shifted the landing gear selector lever to the Up position after the Aircraft belly-landed on its belly. However, as described in 2.10.3, due to the safety system, the landing gears will not be retracted by an operation of the landing gear selector lever alone. Therefore, it is considered highly probable that the throttle lever had been shifted forward in the direction to raise power.

According to Photo 4, the position of the flaps had changed from Full Down to Up. Therefore, it is considered highly probable that the Student shifted the flap selector lever to the Up position after the Aircraft stopped.

If the flap selector lever and the landing gear selector lever are operated before turning off the master battery switch, the motors to move the flaps and the landing gears will be activated. If fuel has leaked out, it may catch fire and cause an extremely dangerous consequence. Therefore, this kind of operation should not be made.

### **3.5.5 Response to the Situation after the Aircraft Stopped**

According to the statement described in 2.1 (1) and the image taken by the closed circuit TV camera as described in 2.12.2, the Student did not evacuate from the Aircraft and was remaining there from the time when the accident occurred until around 15:48. The Student basically should have taken prescribed actions and evacuated from the Aircraft promptly after the accident occurred in accordance with the descriptions regarding emergency operation such as the College's manuals and procedures as described in 2.12.4. However, it is considered highly probable that, being advised by the controller to stay inside the Aircraft when he contacted the controller over the radio installed on the Aircraft, seeing no smoke emerging from the Aircraft other than a smoke caused by friction and feeling only the smell something like the Aircraft's body got burned by rubbing, the Student had not worried about a fire and decided to remain within the Aircraft.

Students need to be instructed basically to leave aircraft as quickly as possible while placing maximum priority to human life, not limiting to the instructions regarding responses to the specific emergencies as described in 2.12.3.

Given that there is a possibility of a fire caused by fuel leakage in cases where an aircraft landed on its belly, it is considered probable that, the controller's advice for the Student to stay within the Aircraft, prevented the Student from evacuating quickly, and was not carefully enough from the point of view that human life shall be placed maximum priority in the event of an emergency.

### **3.6 Preventive Measures**

Since short approach is a prohibited item in solo flights under the manuals of the College, students should be trained to decline instructions from controllers to make a short approach unless it is necessary for ensuring safety. It is necessary for instructors to ensure compliance with the policy that basically they do not have students perform prohibited items .

It is necessary for students to carry out procedures or use checklist without fail, by reading out check items, preventing from carrying out mere procedure, operating levers by touching them with their fingers, checking whether lights are illuminated or not by pointing at them with their fingers.

Procedures and the contents of the checklist cover the results of the operations or the status of

the instruments concerned. However, confirming warnings about the results of the operations, such as warning horns and the indication of the gear up annunciator, were not covered. If these warnings are also checked, it is considered probable that omitted operations or errors are expected to be reduced. Assuming that students sometimes really fail to perform safety check even if they believe they have done, it is necessary for instructors to pay close attention to prevent the process of confirmation from becoming perfunctory.

#### **4. PROBABLE CAUSES**

It is considered highly probable that this accident occurred as follows: While the Student had forgotten to carry out the landing gear extending procedure and had been unaware of this situation in the subsequent process of safety check, the Aircraft landed with its landing gears retracted and was sliding on the runway with its lower body contacting on the ground, and as a result it suffered substantial damage to its fuselage.

With regard to the factor that the Student had forgotten to carry out the landing gear extending procedure and had been unaware of this situation, it is considered somewhat likely that, being required to carry out different procedures from those for normal approach due to the instructions from the controller to make a short approach at the period of extending the landing gears, becoming occupied with thinking about the reason for the instructions and the distance to the preceding aircraft, and his perfunctory safety check had contributed.

#### **5. ACTIONS TAKEN**

The College took following preventive measures in response to the accident:

- (1) Programs for safety education were implemented for all students and flight instructors by giving classroom lectures and by using flight simulators and tools which enable them to take a look at how does landing gear mechanism work.
- (2) “200-FEET PROCEDURE,” described as a final confirmation procedure for safe landing to be made on the final approach course as stipulated in Chapter 4 of the operation procedure for students in the single-engine commercial pilot training course, was revised as the “Final Check” with the following amendments included:
  - (i) “No Warning” was defined as “a situation where the Annunciator is off and the Warning Horn is not sounding,” and “No Warning” was added to the final check items.
  - (ii) It was stipulated that a go-around shall be made when landing gear annunciator blinked or warning horn sounded.
- (3) It was stipulated in Chapter 12 of the operation procedure for students in the single-engine commercial pilot training course that when students are to perform solo flights, they have to be checked by their supervising instructors by using a “preflight check sheet for solo flight” to ensure that required check items such as weather or experience are checked without fail.
- (4) The accident was included in the examples of accidents used for case study on flight safety.
- (5) The College held a “workshop on human factors” and a “special lecture on mental health by a clinical psychotherapist” for students and instructors. The College plans to hold these programs every term for students and at least once a year for instructors.

Figure 1 Estimated Flight Route and ATC communications

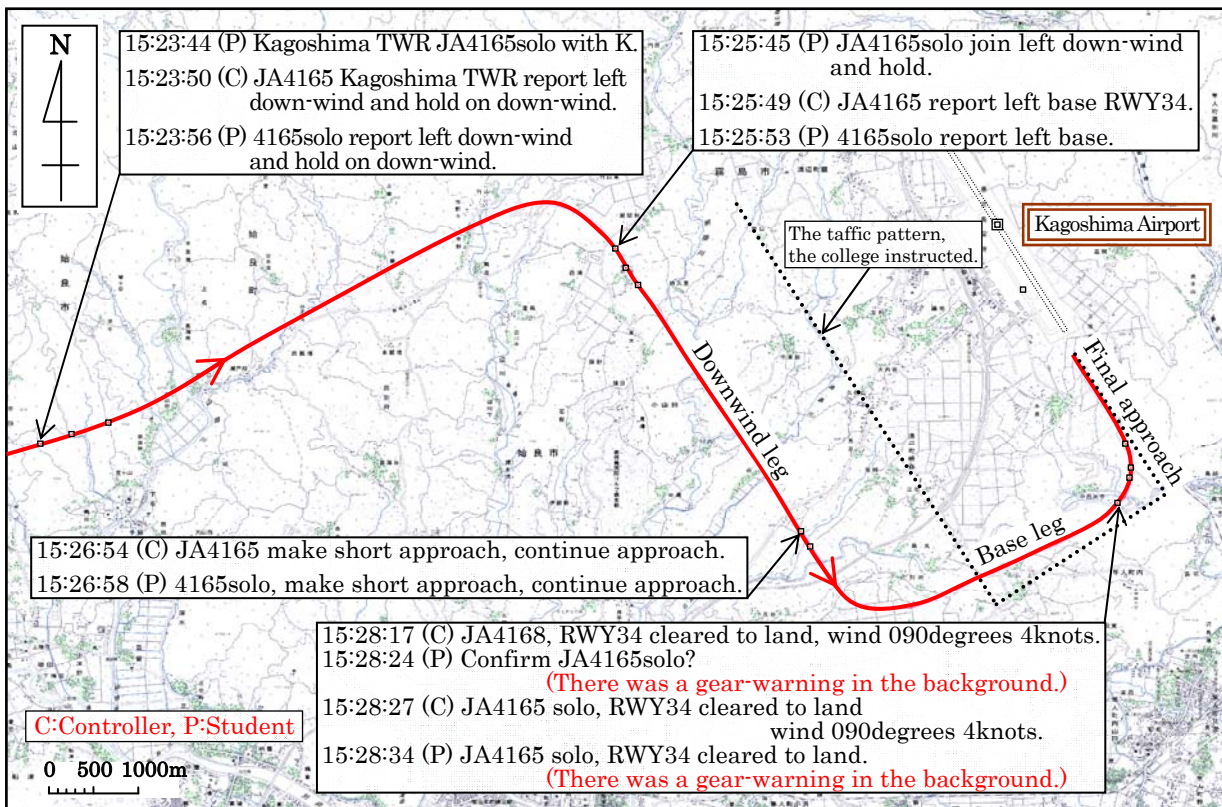


Figure 2 Accident Site Sketch

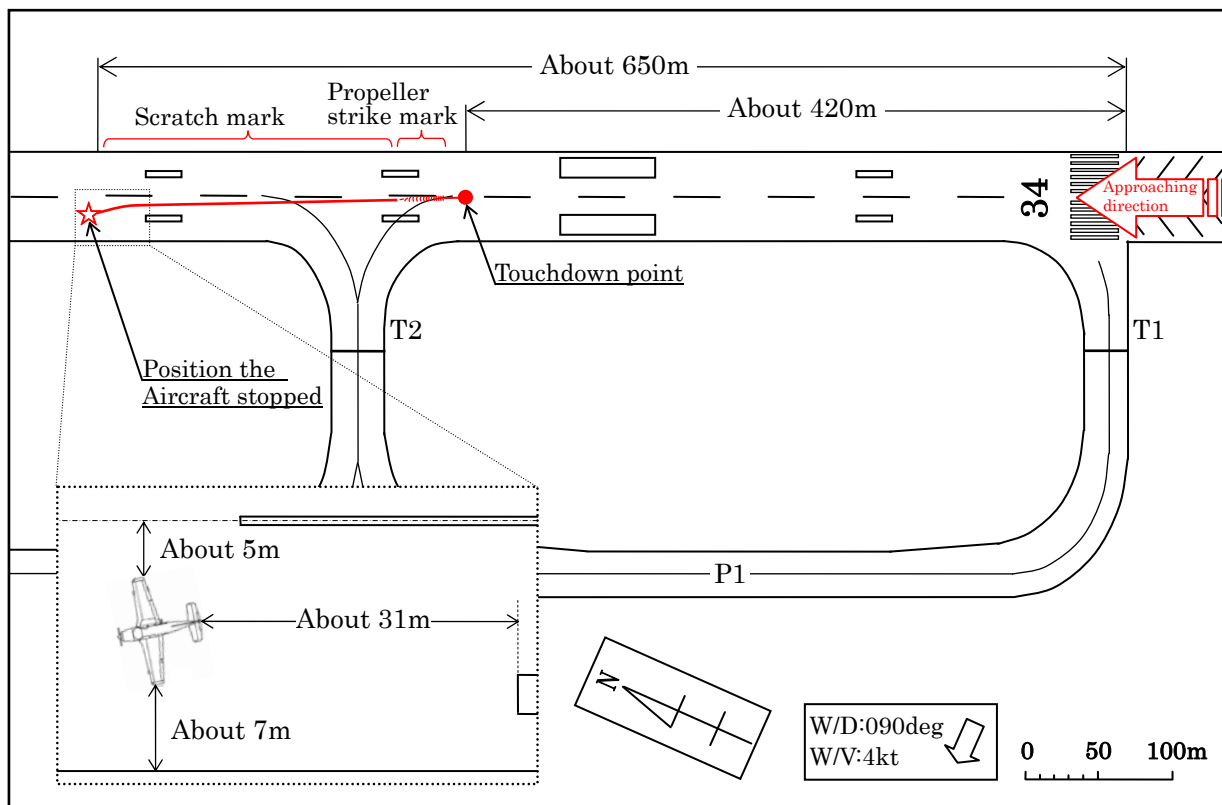


Figure 3 Three Angle View of Beechcraft A36

Unit : m

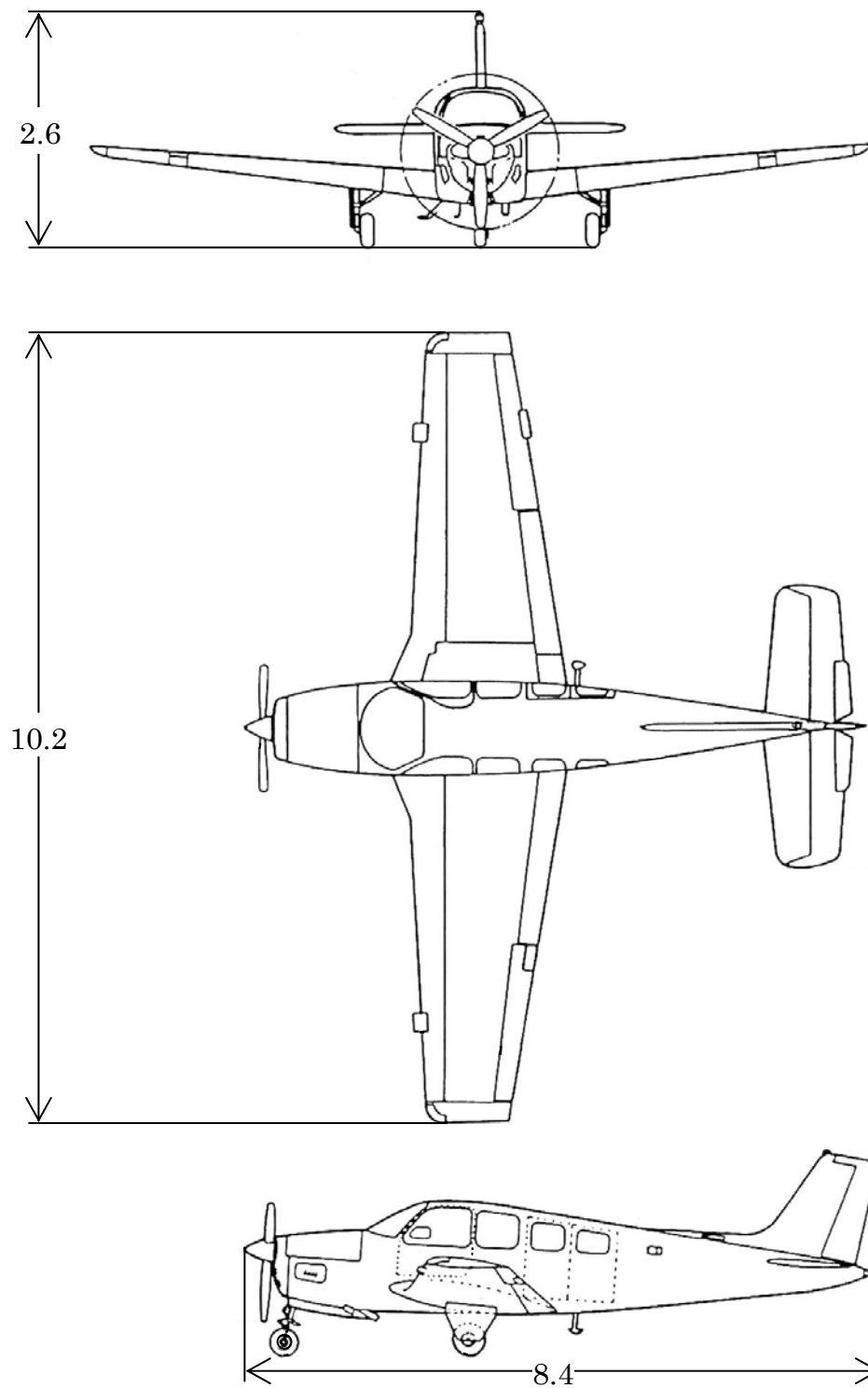
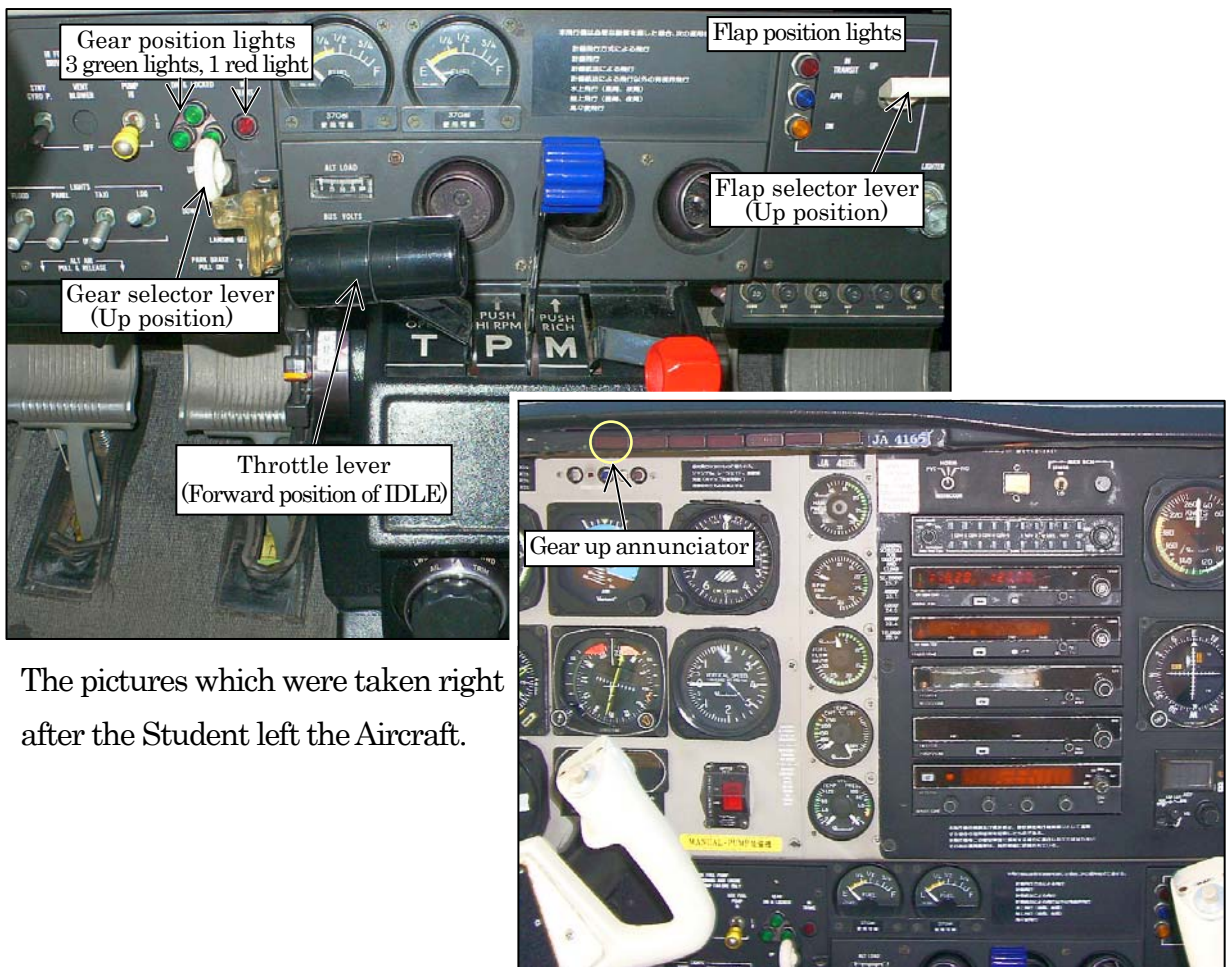


Photo 1 Accident Aircraft



Photo 2 Instrument Panel at Cockpit

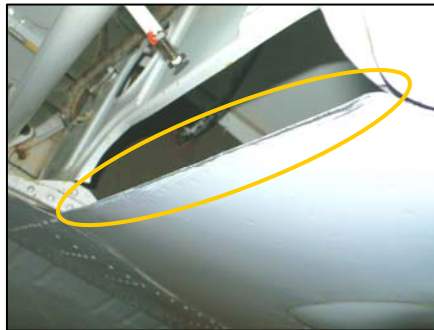


The pictures which were taken right after the Student left the Aircraft.

### Photo 3 Damage to the Aircraft Components



Damaged RH flap



Damaged RH main/landing gear door

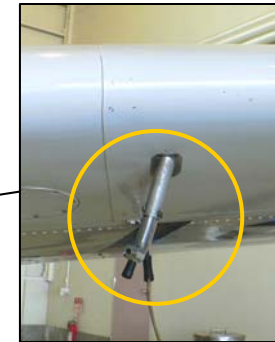


Damaged LH flap



The tips of all three blades were bent backward.

Damaged keel and exhaust pipes



Deformed pitot-tube



Damaged anti-collision light and air-conditioner condenser



Damaged LH main landing gear door

## Photo 4 Changes in Flap Position

About 15:30(Just after the Aircraft stopped)



Flaps were in full down position.

About 15:40



Flaps were retracted.