

AI2009-5

**AIRCRAFT SERIOUS INCIDENT  
INVESTIGATION REPORT**

**PRIVATELY OWNED  
J A 4 1 4 0**

June 26, 2009

**Japan Transport Safety Board**

The investigation for this report was conducted by Japan Transport Safety Board, JTSB, about the aircraft serious incident of Private owned, Piper PA-46-310P registration JA4140 in accordance with the act for Establishment of the Japan Transport Safety Board and Annex 13 to the Convention on International Civil Aviation for the purpose of determining causes of the aircraft serious incident and contributing to the prevention of accidents/incidents and not for the purpose of blaming responsibility of the serious incident.

This English version of this report has been published and translated by JTSB to make its reading easier for English speaking people who are not familiar with Japanese. Although efforts are made to translate as accurately as possible, only the Japanese version is authentic. If there is any difference in the meaning of the texts between the Japanese and English versions, the text in the Japanese version prevails.

Norihiro Goto,  
Chairman,  
Japan Transport Safety Board

# AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

PRIVATELY OWNED  
PIPER PA-46-310P, JA4140  
YAMAGUCHI-UBE AIRPORT, YAMAGUCHI PREFECTURE, JAPAN  
AT ABOUT 14:47 JST, SEPTEMBER 23, 2008

May 29, 2009

Adopted by the Japan Transport Safety Board  
(Aircraft Sub-committee)

Chairman	Norihiro Goto
Member	Yukio Kusuki
Member	Shinsuke Endo
Member	Noboru Toyooka
Member	Yuki Shuto
Member	Akiko Matsuo

# **1. PROCESS AND PROGRESS OF AIRCRAFT SERIOUS INCIDENT INVESTIGATION**

## **1.1 Summary of the Serious Incident**

The occurrence covered by this report falls under the category of “Running off the side of a runway (limited to the case that the aircraft is unable to taxi by itself)” as stipulated in Clause 3, Article 166-4 of the Civil Aeronautics Regulations of Japan, and is classified as a serious incident.

On September 23 (Tuesday), 2008, a privately owned Piper PA-46-310P, registered JA4140, took off from Kitakyushu Airport for a leisure flight. At about 14:47, after landing at Yamaguchi-Ube Airport, the aircraft tilted forward with the tips of the propeller blades hitting the runway surface, and went off the side of the runway, stopping on its belly in a grassy area on the side of the runway.

The only person on board the aircraft was the captain, who did not sustain any injuries.

The aircraft incurred minor damage and there was no outbreak of fire.

## **1.2 Outline of the Serious Incident Investigation**

### **1.2.1 Investigation Organization**

On September 24, 2008, the Aircraft and Railway Accidents Investigation Commission (ARAIC) designated an investigator-in-charge and two other investigators for investigation of this serious incident.

### **1.2.2 Representative from Foreign State**

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

### **1.2.3 Implementation of the Investigation**

September 24, 2008    On-site investigation and interviews

October 8, 2008        On-site investigation and aircraft examination

October 9, 2008        Teardown examination of landing gear actuators

### **1.2.4 Comments from Parties Relevant to the Cause of the Serious Incident**

Comments were invited from parties relevant to the cause of the serious incident.

### **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 September 23, 2008, a privately owned Piper PA-46-310P Malibu, registered JA4140 (hereinafter referred to as “the Aircraft”), took off from Kitakyushu Airport with only the captain onboard in the left pilot seat for a leisure flight bound for Yamaguchi-Ube Airport.

The flight plan submitted to the Kitakyushu Airport Office of the Osaka Regional Civil Aviation Bureau is outlined below.

Flight rules:	Visual flight rules (VFR)
Departure aerodrome:	Kitakyushu Airport
Estimated off-block time:	14:40
Cruising speed:	150 kt
Cruising altitude:	VFR
Destination aerodrome:	Yamaguchi-Ube Airport
Total estimated elapsed time (EET):	10 min
Fuel load expressed in endurance:	3 h
Persons on board:	1

The history of the flight up to the time of the serious incident is summarized below, based on the statements of the captain of the Aircraft and the Air Traffic Services Flight Information Officer of the Yamaguchi-Ube Airport Mobile Communication Station (hereinafter referred to as “Ube Radio”).

#### (1) Captain

On the day of the accident, I conducted a pre-flight inspection prior to the take-off from Yamaguchi-Ube Airport, and I confirmed that the fuel tank was about one-third full. I took off from Yamaguchi-Ube Airport, landed at Kitakyushu Airport, and then took off from there at 14:40 to return to Yamaguchi-Ube Airport.

At about 8 nm west-southwest of Yamaguchi-Ube Airport, I made initial contact with Ube Radio. Ube Radio informed me of wind direction and velocity on the runway, and asked me which runway I wanted to use. I requested Runway 07, which, I thought, would allow me to land without a problem through a straight-in approach, despite an expected westerly tailwind in which I would have to land.

There was no other air traffic in and around the Yamaguchi-Ube Airport area and the weather was fine, which allowed me to comfortably make the approach at my own pace. Nevertheless, I tried to be aware of any tailwind in order to avoid flying too fast. The altitude and the flying speed when I extended the landing gears, as I remember, were about 1,000 ft and 115 kt, respectively.

When I made my 3-nm position report on the final approach, Ube Radio told me that Runway 07 was clear and informed me of the wind direction and velocity on the runway, while advising me to pay attention to the tailwind.

I remember extending the landing gears, but I'm not sure if it was before or

after the 3-nm position report. I believe it to be true that I extended the landing gears because I knew that the Aircraft would not slow down otherwise. I then descended at a speed of about 90 kt and extended the flaps, one position at a time. The flaps can be extended to any one of three positions; I usually use the full-flap position for landing, so I did the same for this landing. Since I was aware of the tailwind, I continued trying to reduce the speed.

The approach speed over the runway threshold was about 80 kt, which is a little slower than usual, and the approach path angle was normal, neither too high nor low. I touched down at a point around the east end of the runway aiming point marking; the landing was stable.

Several seconds after touchdown, the Aircraft tilted to the right, so I pressed the left rudder pedal. The nose then appeared to turn slightly to the left, but soon after this, it lowered and the propeller blades hit the runway surface, causing the engine to stop. The Aircraft then began turning right and, before I could do anything, it went off the runway.

When the Aircraft came to a stop after going off the runway, it was tilted a little but not obviously. Judging that there was no fuel leaking, I set the gear selector lever to the UP position, turned off all electrical power switches, and then exited the Aircraft. I remember that I set the gear selector lever to the UP position, but I was so upset that I did not know why I moved the lever to this position.

The Aircraft was not tilted when I exited, and the door's lower half, which, together with the upper half, constitutes an upward and downward opening door, was resting on the ground. I then walked down to the apron.

The flaps were in their retracted position, but I do not remember when I retracted them. It was my usual practice to retract the flaps soon after landing, so I may have unconsciously done the same in this landing, too.

After I extended the landing gears, I did not check for the green lights indicating the gear-down position, so I have no memory of whether they were lit up or not. I do remember the illumination of the annunciator\*<sup>1</sup>, but not its extinction.

I must have reduced the engine power before landing, but I do not remember hearing an audible landing gear alarm. I do not believe that the warning alarm sounded, because it is so loud and distinct I could not miss it if it sounded. In addition, since it is quite a challenge to slow down the Aircraft to a landing speed without the landing gears extended, I definitely reject any possibility that I extended the landing gears only immediately before landing because of a failure to do so beforehand.

There is a circuit breaker for the audible landing gear alarm in the Aircraft, which I had never touched; this was also true with this flight.

The landing at Kitakyushu Airport went smoothly as normal, with the flaps fully extended.

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\*<sup>1</sup> : The annunciator refers to the panel of lights located on the instrument panel in front of the pilots' seats. After the gear selector lever is operated, the red "GEAR WARNING" lights and orange "HYD PUMP" lights remain illuminated until the landing gears are stowed in the UP position or downlocked in the DOWN position. (See Photo 4)

(2) Air Traffic Services Flight Information Officer of Ube Radio

After receiving a report that the Aircraft took off from Kitakyushu Airport, I then received an 8-nm position report from the Aircraft together with a request for landing information. With the prospect of Runway 07 being usable even in the then prevailing wind from 250° at a velocity of 7 kt, which is a tailwind for a landing aircraft, I asked the captain which runway he wanted to use. The captain requested Runway 07. When I subsequently received a 3-nm position report from the Aircraft on its final approach, I provided wind direction and velocity information and told the captain that Runway 07 was clear, also advising him to pay attention to the tailwind.

When I received the 3-nm position report from the captain, I confirmed the Aircraft using a binocular telescope. I do not remember whether or not the landing gears were extended at that time, but the Aircraft as seen through the telescope did not give me the impression of anything different from normal. While observing the runway and the Aircraft alternately, I found nothing unusual with the Aircraft's landing, which seemed to be a normal approach path angle and a normal touchdown.

I confirmed the Aircraft's touchdown at 14:47 and logged it. After rollout over a small distance, the Aircraft started turning to the right and then went off the runway. I made a crash phone call for emergency vehicle mobilization, and I also called the Aircraft on the radio, but did not receive a response.

The serious incident occurred at about 14:47 at a grassy area on the south side of Runway 07 at Yamaguchi-Ube Airport, which corresponds to a point about 700 m east of the runway threshold. (See Figure 1 and Photos 1, 2, and 4)

## **2.2 Damage to the Aircraft**

### **2.2.1 Extent of Damage**

Minor

### **2.2.2 Damage to the Aircraft Components**

- (1) Propeller blades: Both blades were bent at the tip
- (2) Nose portion of Aircraft: Bottom of engine cowls were deformed, scratched and worn
- (3) Right wing: Wing tip was scratched and otherwise damaged
- (4) Nose landing gear doors: Scratched and worn (The scratches and wear were only on the external surfaces; the door edges were free of deformation, scratches or any other damage.)
- (5) Right main landing gear: Outboard side (the side facing the right wing tip) of the tire/wheel was scratched

The Aircraft collapsed, with all three landing gears normally stowed and the flaps retracted.

There was no damage to the gear strut, gear-strut-to-actuator joint or actuator on any of the three landing gears. Except for the nose portion, the bottom surfaces of the Aircraft were free of

scratches and other damage both in the fuselage portion and the doors of the left and right main landing gears.

(See Photos 1 and 3.)

## 2.3 Crew Information

Captain: Male, aged 72

Private Pilot Certificate (Airplane)

Type rating for single-engine aircraft (land): January 26, 1984

Class 2 Aviation Medical Certificate

Validity: Until May 26, 2009

Total flight time (as stated by captain): Approx. 3,000 h

Flight time in the last 30 days: 2 h 48 min

Total flight time on the type of aircraft (as stated by captain): Approx. 1,000 h

Flight time in the last 30 days: 2 h 48 min

## 2.4 Aircraft Information

### 2.4.1 Aircraft

Type: Piper PA-46-310P

Serial number: 4608073

Date of manufacture: April 27, 1987

Certificate of airworthiness: DAI 20-309

Validity period: Until September 2, 2009

Category of airworthiness: Airplane Normal (N)

Total flight time: 1,845 h 06 min

Flight time since last periodical check  
(100-hour check on August 22, 2008): 8 h 35 min

### 2.4.2 Engine

Type: Continental TSIO-520-BE (2G)

Serial number: 273843-R

Date of manufacture: August 4, 2002

Total time in service: 395 h 58 min

(See Figure 2.)

### 2.4.3 Weight and Balance

When the serious incident occurred, the Aircraft's weight is estimated to have been 3,325 lbs and the position of the center of gravity is estimated to have been 136.2 in. aft of the reference point, both of which are estimated to have been within the allowable limits (i.e., maximum landing weight of 3,900 lbs and allowable center-of-gravity range of 134.5 – 147.1 in. based on the estimated Aircraft weight at the time of the serious incident).



#### **2.4.4 Fuel and Lubricating Oil**

The fuel used in the Aircraft was aviation gasoline 100. The lubricating oil was AeroShell W80.

#### **2.4.5 Maintenance Condition of the Aircraft**

The captain relegated the Aircraft's maintenance to an aircraft maintenance service company except for daily storage inspection and pre-flight and post-flight inspections, which he performed himself.

The captain had been flying the Aircraft once or twice every week throughout the year with no one other than himself on board except in the case of airworthiness verification flights.

Although the maintenance service company was in a position to handle temporary failures and malfunctions of the Aircraft, nothing was done other than regular inspections for more than one year prior to this serious incident because the Aircraft had not experienced any trouble during this period.

The service log has no record of any problems or maintenance service instructions related to the landing gear system since March 2000 when the captain purchased the Aircraft. Also, neither the maintenance engineers of the company nor the captain remember any problems with the Aircraft's landing gear system.

### **2.5 Meteorological Information**

Aeronautical weather observations for Yamaguchi-Ube Airport around the time of the serious incident were as follows:

15:00	Wind direction ... 250°,	Wind velocity ... 8 kt,	Visibility ... 10 km
	Cloud: Amount ... 1/8,	Type ... Cumulus,	Ceiling ... 2,500 ft
	Amount ... 3/8,	Type ... Cumulus,	Ceiling ... 3,500 ft
	Temperature ... 28°C,	Dew point ... 22°C	
	Altimeter setting (QNH) ... 29.82 inHg		

### **2.6 Conditions at the Serious Incident Site**

The Aircraft's touchdown point as stated by the captain was around the east end of the aiming point marking on Runway 07.

Starting from a point at about 120 m in the Aircraft movement direction from the touchdown point, there were propeller strike marks over a distance of about 30 m along the runway centerline marking. The interval between marks was 72 cm at the beginning of marks, but it gradually became greater as the distance increased and the last several marks consisted of longer, slanted line segments.

Starting from a point at about 40 m in the Aircraft movement direction from the end of the trail of propeller strike marks, there were double line scratch marks made by tires forming rightward arcs that originated at the runway centerline marking. Just beside the right tire mark, there was a white scratch mark of a wider width.

The right tire mark line was thicker than the left tire mark line. These marks extended

beyond the runway shoulder and ran on to the grassy area where the Aircraft lay on its belly. In addition, a scratch mark made by the right wing tip was found running from a point about 20 m before the grassy area.

The Aircraft collapsed in the grass at a point about 12 m from the runway shoulder edge, with its nose pointed in the direction of about 080°. This direction is about 60° counterclockwise relative to the direction of the tire marks entering the grassy area.

The point where the Aircraft collapsed was about 340 m from the east end of the runway aiming point marking.

(See Figure 1 and Photos 1 and 2)

## **2.7 Landing Gear Operation**

### **2.7.1 Structure and Operation of the Landing Gear**

During landing gear extension, the Aircraft's left and right main landing gears swing down from the fuselage side toward the wing tip side while the nose landing gear swings down in the forward direction. The strut of each landing gear is installed on the airframe in a way that allows free movement in both the extension and retraction directions of the gear. The gear is moved between the stowed and downlocked positions by a single actuator, which also serves to retain the gear in the stowed or downlocked position.

When the gear selector lever is moved to the UP or DOWN position, hydraulic pressure generated by an electrically driven hydraulic pump moves the actuator's piston rod to retract or extend each landing gear.

The hydraulic pump is reversible; its rotating direction when the gear selector lever is in the UP position is opposite to that when the lever is in the DOWN position. Even during the UP or DOWN movement of the gear, moving the lever from the current position to another causes the hydraulic pressure to work in the reverse direction. The gear motion then switches from retraction to extension and vice versa.

Each landing gear is equipped with a switch, which is activated when the gear is downlocked. The hydraulic pump stops only after all three downlock switches are activated. Even with the gear selector lever in the DOWN position, the hydraulic pump continues to operate until all three landing gears are downlocked.

The hydraulic pump system is equipped with a valve that maintains the hydraulic pressure at a constant level. Even when the landing gears are placed under the weight of the Aircraft during their extension stroke and the hydraulic system is subjected to excessive pressure, the valve protects the hydraulic pump from undue load, so the pump can continue to operate.

If the landing gears are not extended due to no electric power to drive the hydraulic pump, bypassing the hydraulic pressure that keeps the landing gears in their retracted position, allows the gears to move down under their own weight.

The landing gears are not designed to support the Aircraft on the ground if the gears are not downlocked. It could not be ascertained whether the landing gears were able to support the weight of the Aircraft under the conditions, i.e., the gears were not downlocked, the gear selector lever was in the DOWN position and the hydraulic pump was operating normally to feed the actuators with gear extending pressure, and the gears were in a slanted position.

(See Figure 3)

### 2.7.2 Retention of Landing Gears in the Extended and Retracted Positions

The downlock mechanism causes a lock pin to engage with a groove in the actuator's piston rod when the rod has reached the downlock position. The lock pin is designed to disengage only when gear retracting pressure is applied to the actuator so that it will not disengage by external impact or any other force.

Both the left and right main landing gears are provided with switches that are activated when the gears have reached the stowed position, whereas the nose landing gear is provided with a switch that is activated when the gear is stowed and the gear door is closed. The hydraulic pump stops after all three switches are activated, enabling the landing gears to be retained in the stowed position by the hydraulic pressure remaining in the system.

### 2.7.3 Landing Gear Switches, Warning/Caution Lights, etc.

The Aircraft is equipped with warning lights to indicate movement of the landing gears, an audible alarm system that prevents the pilot from forgetting to extend the landing gears, and other safety equipment. The flight manual of the Aircraft includes the following descriptions.

(Excerpts from 'Normal Operation' in Chapter 4 of the Flight Manual)

## 2.2. Landing Gears

*The pilot shall be acquainted with the functions and meaning of the landing gear position indicator lights and warning lights.*

*The red GEAR WARNING indicator and the audible landing gear alarm are activated simultaneously when:*

- a) In air, with the gear selector lever not in the DOWN position, the throttle is closed for an intake air pressure lower than about 14 inHg.*
- b) In air, with the gear selector lever in the UP position, the flaps are extended to more than 10°.*
- c) On the ground, the gear selector lever is moved to the UP position.*

*With the aircraft on the ground, the squat switch on a landing gear prevents the hydraulic pump from turning in the gear retracting direction.*

*The three green lights on the instrument panel illuminate individually when the associated gear is locked in the down position.*

The description in a) above says "with the landing gear selector lever not in the DOWN position." However, according to the relevant wiring diagram in the service manual of the Aircraft, the red GEAR WARNING indicator and the audible landing gear alarm are activated unless the landing gears are downlocked even when the gear selector lever is in the DOWN position.

The squat switch described in c) above is installed on the left main landing gear and operates upon contraction of the gear orifice support tube.

(See Photo 4)

#### **2.7.4 Nose Landing Gear Doors**

The nose landing gear doors are closed by the actuators connected to the doors after the gear is raised to the stowed position. When the doors are closed, the hydraulic pump stops and the hydraulic system remains pressurized to retain the gear in the stowed position and the doors in the closed state.

The doors open under the force of springs when the hydraulic pressure works on the actuator's gear extending side or when oil pressure on the actuator arm is released. The doors are retained in the open position only by the force of the springs, so they can be closed when external force is applied to the doors.

### **2.8 Examination of Landing Gear Retracting and Extending Operations**

The collapsed Aircraft was lifted using a crane, the electric power was turned on, and the landing gears were extended using the standard procedure. The gears operated normally and downlocked successfully. Operation of the nose landing gear doors in this test was normal although it involved some interference.

Then, with the Aircraft supported on a stand, extensions and retractions of the landing gears were repeated. The landing gears operated normally in both directions without any problem, and there were no abnormalities found in their downlock condition.

The hydraulic pump stopped when all three landing gears were stowed and the nose gear door was closed as well as when all three gears were downlocked. When the gear selector lever was moved to the UP position with the Aircraft's weight on the gears on the ground, the audible alarm sounded, and it was then confirmed that the GEAR WARNING light was illuminated and the hydraulic pump remained stationary.

A landing gear extension test was conducted using the emergency gear extension procedure with the electric power turned off. The main landing gears lowered under their own weight and could be downlocked by pushing them by hand, showing normal operating conditions.

Landing gear operation as observed when they were extended and retracted using the normal procedures was as follows.

(1) Extending operation

The left and right main landing gears lowered and, at the same time, the nose gear door opened.

The left and right main landing gears moved to the downlock position.

The nose landing gear lowered from the landing gear bay and moved to the downlock position.

(2) Retracting operation (The downlocks on all landing gears were released as soon as the gear selector lever was moved to the UP position.)

The left and right main landing gears rose to a nearly stowed position.

The nose landing gear rose.

The nose landing gear door closed.

The landing gears took seven seconds to both extend and retract, which is the same value as that recorded during the last airworthiness verification flight conducted in August, 2008. The audible alarm, which should sound when the throttle is closed with the gears not downlocked,

sounded at about the same throttle position as the position recorded during the last airworthiness verification flight, although this test was conducted with the engine stationary.

The red GEAR WARNING light and the orange HYD PUMP light on the annunciator panel and the three gear position lights indicating that the gears are in the downlock position successfully lighted up.

The actuator arm for the right main landing gear was removed from the Aircraft and subjected to a teardown examination in order to inspect the downlock mechanism. No abnormalities were found.

(See Photo 4)

## **2.9 Gear Downlock Failure Cases on the Aircraft of the Same Type**

There are no accidents or serious incidents in the published reports of the Japan Transport Safety Board and the National Transportation Safety Board (NTSB) of the United States that occurred with the aircraft of the same type and that were caused by downlock disengagement due to a mechanical and/or electrical problem. According to the manufacturer of the Aircraft, there have been no reports from owners of the same type of aircraft regarding accidents or incidents for which the cause was identified as failure of the downlock mechanism.

There have been no technical service letters and bulletins issued by the manufacturer or no airworthiness directives issued by the State of Manufacture of the Aircraft regarding any modification or rework of the downlock mechanism.

### **3. ANALYSIS**

**3.1** The captain held a valid airman competence certificate and a valid aviation medical certificate.

**3.2** The Aircraft had a valid airworthiness certificate and had been maintained and inspected as prescribed.

**3.3** Although the Aircraft landed under tailwind conditions, it is considered probable that the prevailing meteorological conditions at that time did not contribute to the touchdown and the landing roll of the Aircraft.

#### **3.4 Landing of the Aircraft**

As described in 2.8, there were no abnormalities with either the extending/retracting operation of the landing gears or the downlock mechanism of the Aircraft. Therefore, it is considered highly probable that there were no problems with the landing gear system.

As described in 2.1, the captain was aware of the tailwind, descending in a tailwind would have been difficult unless the landing gears were extended, and the approach path angle and the touchdown conditions were normal. Therefore it is presumed that the landing gears were extended when the Aircraft made its landing. Also, it is presumed that the landing gears were downlocked at the time of touchdown considering that there were no abnormalities with the extending operation of the landing gears and there were no problems with the landing gear system, that the captain denied hearing an audible landing-gear alarm before landing, and that the Aircraft tilted after running straight over a distance of 40 to 50 m.

#### **3.5 Condition of the Landing Gears after Touchdown**

The condition of the landing gears of the Aircraft after touchdown is as follows.

**(1) Nose landing gear**

It is considered highly probable that the nose landing gear was stowed under the weight of the Aircraft's nose after touchdown due to downlock disengagement.

It is presumed that the door, which had opened due to the spring force, closed under the weight of the Aircraft's nose and came into contact with the runway surface in a closed condition after stowage of the gear considering that the door sustained only external surface damage with no damage to the edges, as described in 2.2.2 (4) and the description in 2.7.4.

Considering that scratches were the only damage to the bottom surfaces of the Aircraft's nose, it is considered highly probable that the propeller blades worked as a cushioning material, which prevented the nose from tilting rapidly and directly contacting the runway surface.

**(2) Right main landing gear**

Judging from the presence of scratch marks on the tire/wheel of the right main landing gear, scratch marks on the right wing tip, and the marks left on the runway as described

in 2.2.2 and 2.6, it is considered highly probable that the Aircraft ran on the runway with the downlock for the right main landing gear disengaged and the gear tilted by 30° to 50° over a distance of about 100 m before the Aircraft went off the runway.

(3) Left main landing gear

Considering that the left main landing gear left only a thin tire mark on the runway while the Aircraft swerved to the right with the nose in contact with the ground, it is considered highly probable that the left landing gear remained nearly vertical on the runway.

However, considering that the bottom surfaces of the Aircraft were completely free of scratches or other damage and not soiled with any mud at all, that all landing gears were stowed normally, and that the captain felt no large tilt when the Aircraft came to a stop as described in 2.1 (1), it is considered highly probable that the left main landing gear tilted with its downlock disengaged at the time that the Aircraft came to a stop.

### **3.6 Landing Gear Downlocks and Position of the Gear Selector Lever**

#### **3.6.1 Disengagement of the Landing Gear Downlocks**

As described in 3.4 and 3.5, it is considered highly probable that the downlocks on all three landing gears disengaged after the Aircraft touched down. The following are the accounts related to the disengagement of the landing gear downlocks.

- (1) As described in 2.7.2, the downlock disengages only when the hydraulic pressure works in the gear retracting direction.
- (2) Judging from the description in 2.9, it is considered unlikely that the disengagement of the landing gear downlocks occurred due to temporary failure of the landing gear system.
- (3) Considering that the retracting and extending operations of the landing gears conducted after the serious incident were normal and there were no abnormalities with the downlock mechanism of the Aircraft as described in 2.8, it is considered highly probable that the landing gears were in a normal state.

Judging from these, it is considered probable that the downlock disengagement of the Aircraft's landing gears occurred because the gear selector lever was temporarily moved to the UP position upon touchdown and also before the operation of the squat switch on the left main landing gear orifice support tube.

#### **3.6.2 Position of Gear Selector Lever**

As described in 3.6.1, it is considered likely that the gear selector lever was temporarily moved to the UP position, whereas it is presumed that the lever remained in the DOWN position until the captain moved it to the UP position after the Aircraft had gone off the runway and stopped, judging from the followings.

- (1) As the landing gears had never exhibited any problems, it is considered highly probable that if the lever had remained in the UP position, the gears would have soon been stowed, causing the Aircraft to collapse on the runway.

- (2) With regard to the landing gears were able to support the Aircraft even in their tilted position, it is considered highly probable that the gear selector lever was in the DOWN position, which caused the hydraulic pressure to continue working on the actuator in the gear extending direction.

It is therefore considered probable that the gear selector lever of the Aircraft was moved to the UP position once soon after the touchdown with the lever in the DOWN position, and was moved back again to the DOWN position.

As described in 2.1 (1), the captain usually retracted the flaps soon after landing. It is therefore considered possible that the captain mistook the gear selector lever for the flaps selector lever, and consequently operated the gear selector lever up and down.

### **3.7 Audible Landing Gear Alarm and Warning/Caution Lights**

Judging from the results of the examination described in 2.8, it is considered highly probable that the audible landing gear alarm, the warning lights, and the caution light for hydraulic pump operation status operated normally at the time of the serious incident.

It is considered highly probable that the captain reduced the throttle opening after touchdown. It is therefore considered highly probable that the warning and caution lights remained illuminated and the audible alarm continued to sound from the time immediately after downlock disengagement to the time when the Aircraft collapsed and the gears were stowed, even though the captain has no memory of these.

## **4. PROBABLE CAUSE**

It is considered highly probable that this serious incident occurred as follows:

The downlocks for the landing gears were released after the Aircraft landed, causing the nose to drop and the propeller blades to hit the runway surface, resulting in the Aircraft running off the runway and coming to collapse.

With regard to the disengagement of the landing gear downlocks, it is considered possible that the captain mistakenly operated the gear selector lever rather than the flaps selector lever.



Figure 1 Sketch of the Serious Incident Site

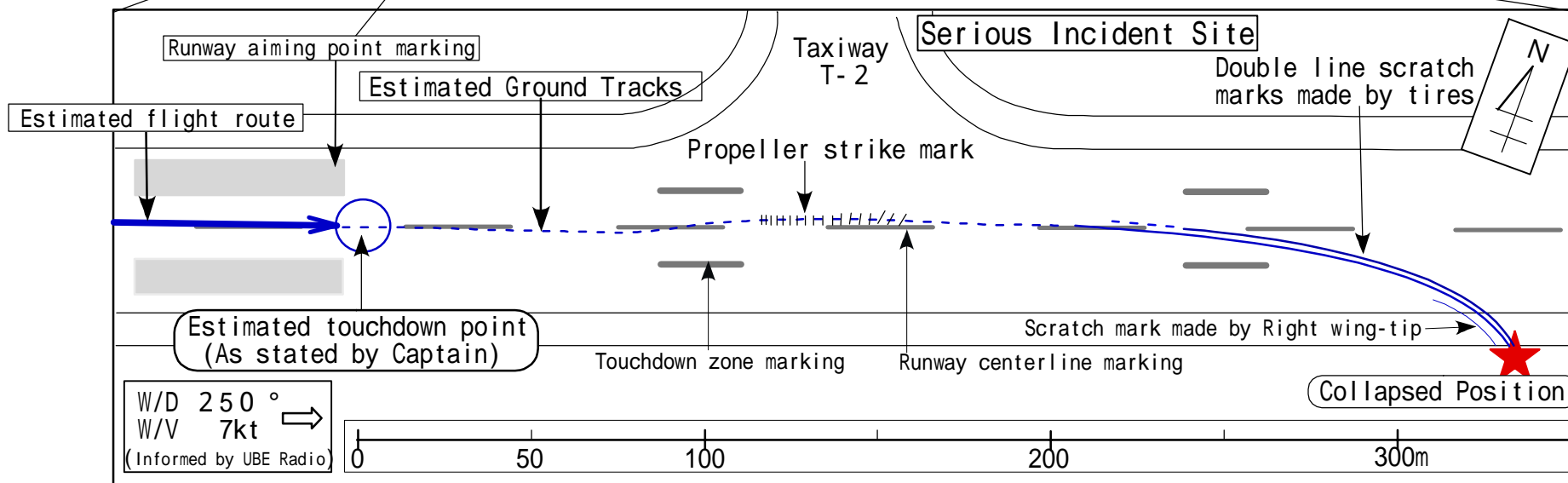
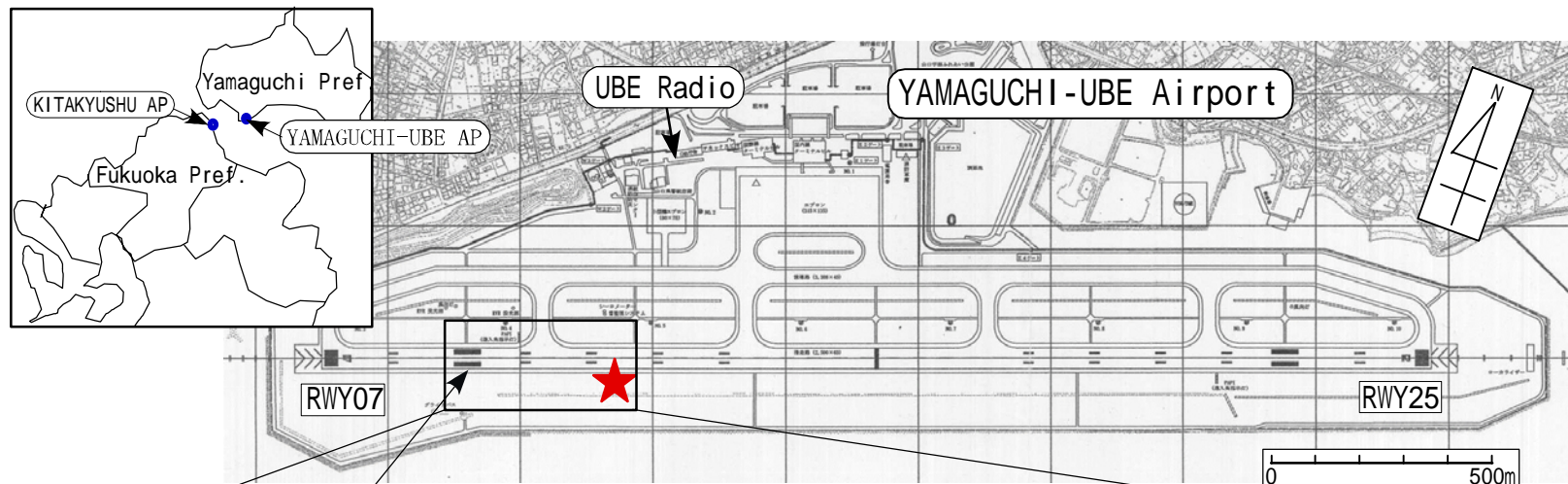


Figure 2 Three views of PIPER PA-46-310P

UNIT : m

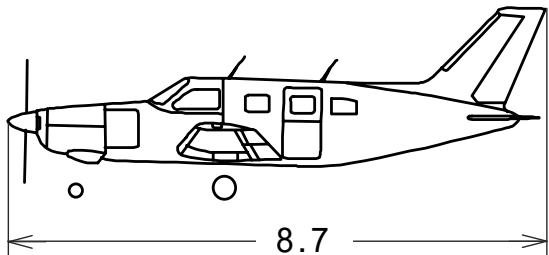
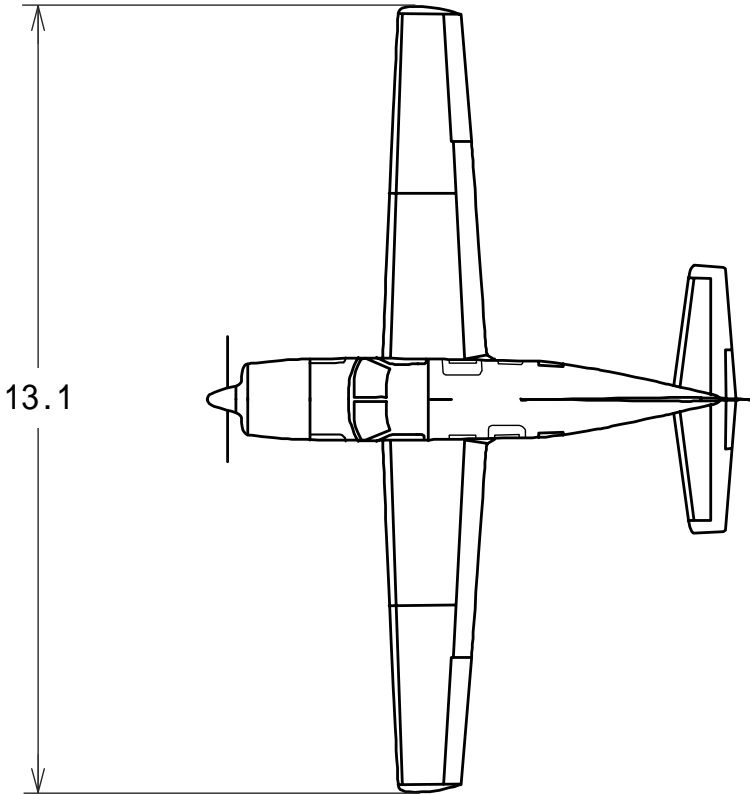
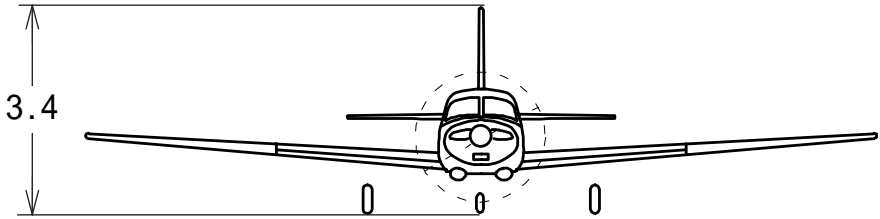
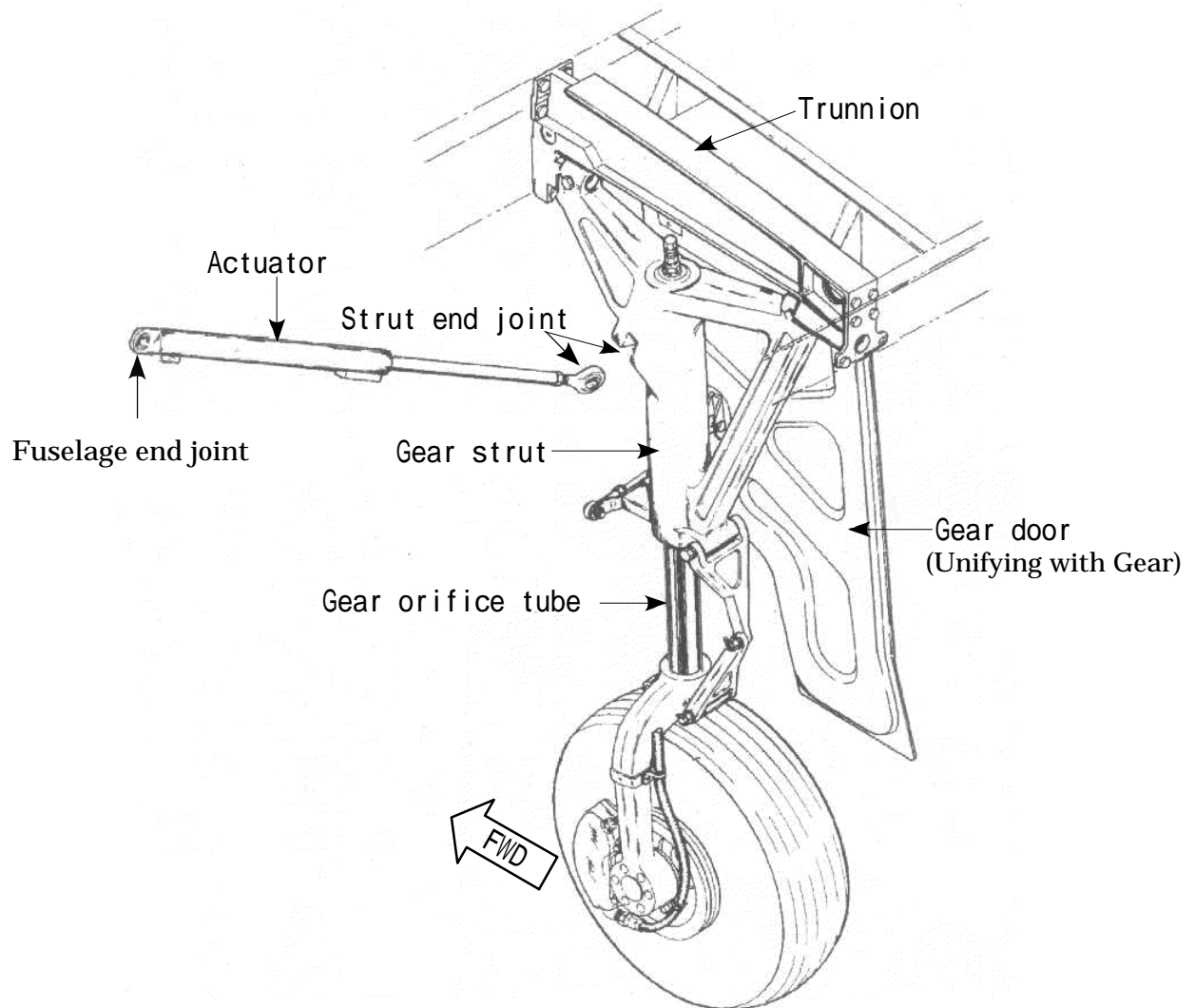
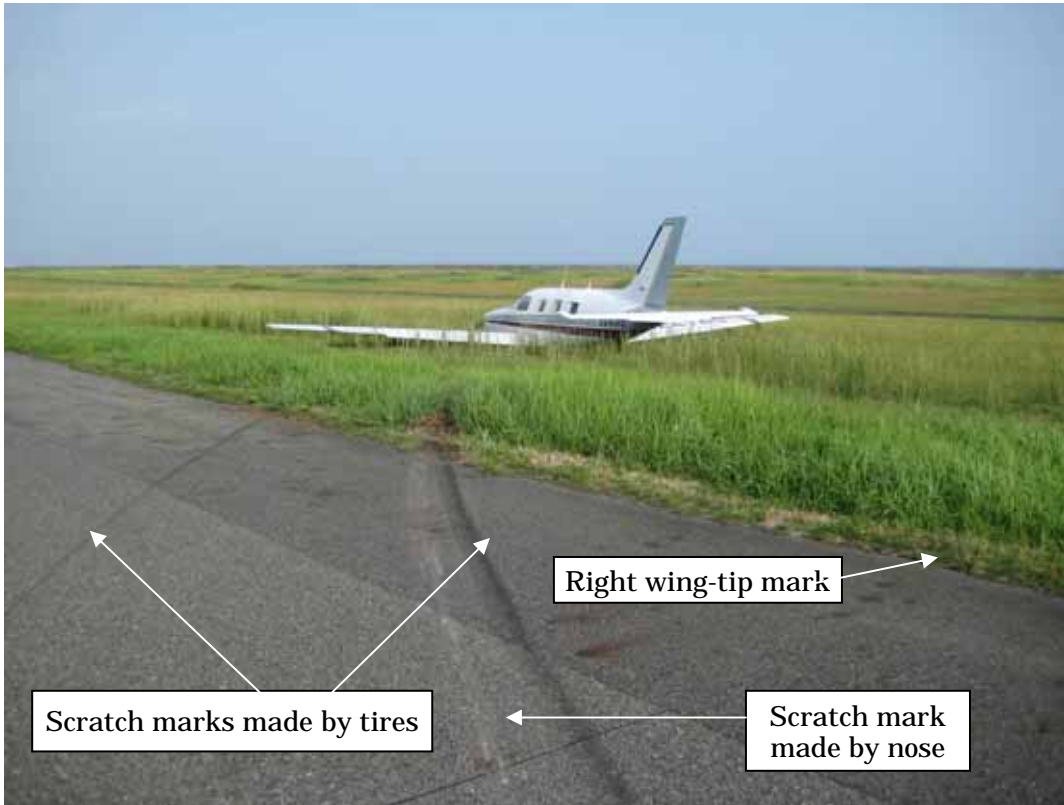


Figure 3 Right Main Landing Gear

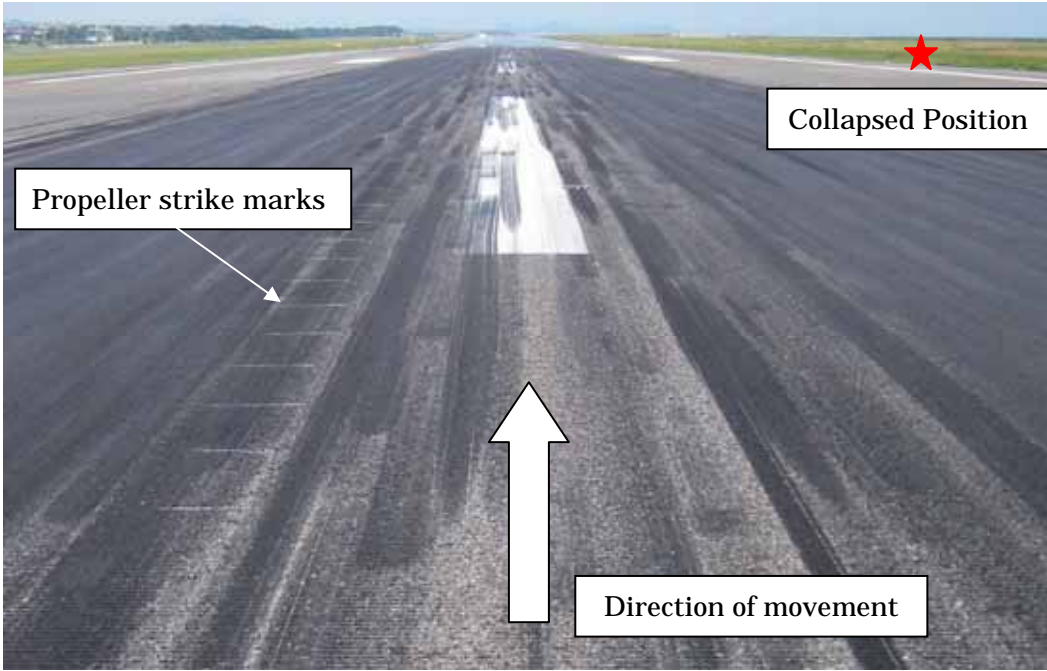


# Photo 1 The AIRCRAFT

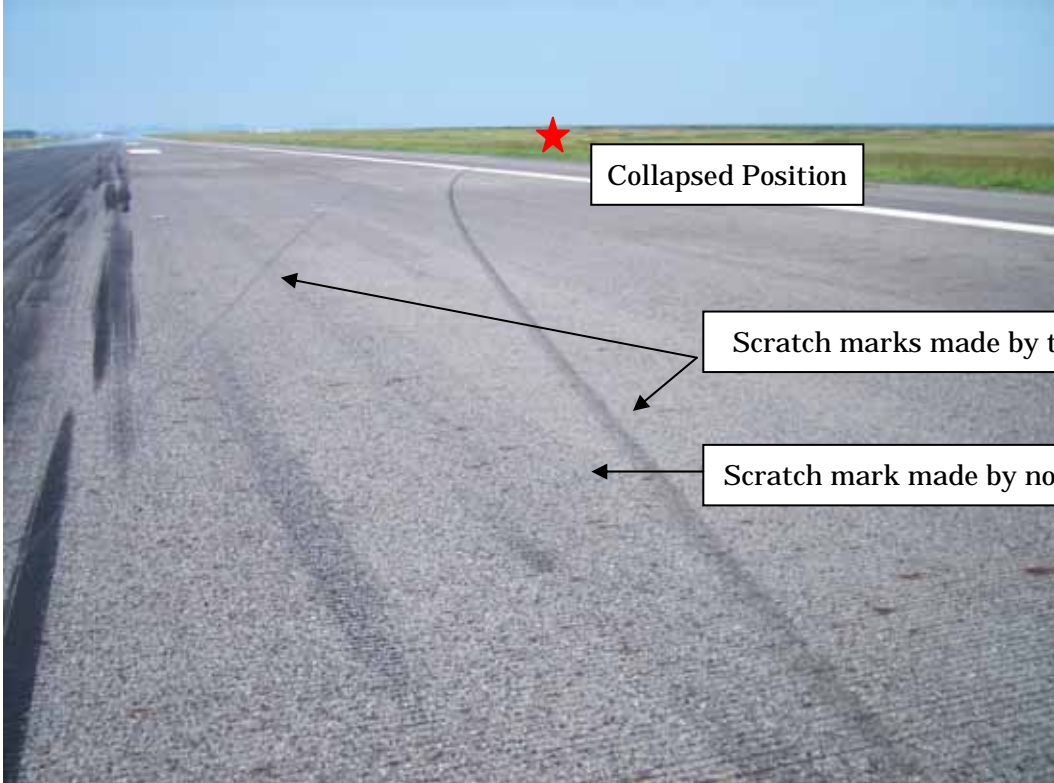


# Photo 2 Marks on the Runway

Propeller strike marks



Scratch marks made by Tires



### Photo 3 Landing Gears Stowed in the Bottom Part of the Fuselage

Nose landing gear door (Viewed from the nose)



Bottom part of the fuselage (Viewed from the tail)



Left main landing gear



Right main landing gear



# Photo 4 Cockpit

