AA2011-10

AIRCRAFT ACCIDENT
INVESTIGATION REPORT

PRIVATELY OWNED

J A 2 5 5 3

October 28, 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

PRIVATELY OWNED
VALENTINE TAIFUN 17EII
(MOTOR GLIDER, MULTIPLE SEATS), JA2553
TAKASU GLIDING FIELD
TAKASU-CHO, MATSUZAKA CITY, MIE PREFECTURE
AT ABOUT 14:45 JST, JUNE 12, 2010

October 7, 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 THE AIRCRAFT ACCIDENT INVESTIGATION

1.1 Summary of the Accident

On June 12 (Saturday), 2010, a Valentin Taifun 17EII, registered JA2553, operated by a private pilot took off from Takasu Gliding Field in Takasu-cho, Matsuzaka City, Mie Prefecture. After completing an approximately 30-minute test flight above the city of Matsuzaka it made a hard landing on the grass of Runway 14 of Takasu Gliding Field at about 14:45 Japan Standard Time (JST; unless otherwise stated all times are indicated in JST [UTC + 9h]), and sustained damage on the airframe.

The captain and a passenger were on board, and both of them were seriously injured.

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 June 12, 2010, The Japan Transport Safety Board designated an investigator-in-charge of the investigation and another investigator to investigate this accident.

1.2.2 Representatives from the Relevant States

An accredited representative of Germany, the State of Design and Manufacture of the aircraft involved in this accident, participated in the investigation.

1.2.3 Implementation of the Investigation

June 13–14, 2010	On-site investigation, Airframe examination, and Interviews
October 20, 2010	On-site investigation
October 21, 2010	Airframe examination

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

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

1.2.5 Comments from the Relevant State

Comment on the draft report were invited from the Relevant State.

2 FACTUAL INFORMATION

2.1 History of the Flight

A Valentin Taifun 17EII, registered JA2553 (hereinafter referred to as “the Aircraft”), operated by a private pilot, took off from Runway 14 of Takasu Gliding Field (hereinafter referred to as “the Gliding Field”) in Takasu-cho, Matsuzaka City, Mie Prefecture for a test flight after conducting an engine inspection with the captain in the left seat and a passenger in the right seat at about 14:15 on June 12, 2010. The history of the flight up to the time of the accident is summarized below, based

on the statements by the captain of the Aircraft, the passenger, and the witnesses.

(1) Captain

After the mechanic conducted the maintenance and testing of the engine, I performed exterior checking. I then taxied the Aircraft on the runway twice, and took off from Runway 14 at around 14:15. Because the flight was to be within nine km, I did not submit a flight plan. I think the wind direction at the time of takeoff was 80–90° and the wind velocity was below 5 kt. As the fuel tank was full, I took off with the flaps at +15° and propeller rotations at 3,000 rpm, following the flight manual and considering that the takeoff distance would be longer. On my way to just above the city of Matsuzaka, I checked the temperatures of the cylinder head and the engine oil, and the status of the propeller rotation. I flew a round trip from the city of Matsuzaka to the mouth of Kushida River about three times at the approximate altitude of 1,500–2,000 ft.

Half an hour after takeoff, I entered the right-side traffic pattern of Runway 14 for landing, and began the final approach at the altitude of approximately 500 ft after confirming that the landing gears were down properly. The windsock, which had been used by radio-controlled plane lovers, was about one m long and was smaller than standard ones. It was blocked by a parked vehicle, so it was not visible. The airspeed was 65 mph (56 kt) when I slightly turned back the air brakes at the altitude of approximately 400 ft, and had the flaps at +15° as usual. I confirmed that the throttle was in the fully closed idle power position and that the propeller pitch was controlled at a climb pitch of 3,000 rpm at the final approach landing checks. As the wind was blowing slightly from the left, I made my approach directly facing the runway, with the wings low. Normally I would flare[1] the Aircraft at a little above my height, but the nose abruptly dipped prior to the flare at the height of about three m, and before I knew it, it made contact with the land, with the propeller first.

I did not check the speed at the time the nose of the Aircraft dropped. I did not pull the control lever or maneuver to open the throttle in response to the nose drop. If it had been near the stall speed I think there would have been some indications, but there were no such indications. During the final approach, the flaps were maintained at +15° and the position of the air brakes was not changed from about five cm since the Aircraft passed the altitude of 400 ft. For a motor glider equipped with air brakes, applying air brakes has powerful effect. Controlling a motor glider by lowering flaps like controlling an airplane would make approach angle greater and landing operations difficult. Therefore, I maintained the flaps at +15° in combination with air brakes in making the approach. I had never before gone into a stall during approaches at 65 mph (56 kt). No abnormality occurred in the engine, and the weather was fair.

(2) The Passenger (the owner of the Aircraft as well as the mechanic/airworthiness inspector)

For a test flight, the Aircraft took off from the Gliding Field, and 30 minutes later it began the approach at about 1,500 ft above the city of Matsuzaka. After descending to about 700 ft and circling for final approach, it was approaching by aiming at the runway threshold and adjusting its approach angle. Although I did not check the final approach speed, the

[1] "Flare" means a maneuver by which the nose of an aircraft is pitched up just before landing on a runway in order to reduce forward speed as well as descending speed.

panel showed that it was around the yellow triangle (62 mph [54 kt]) on the speedometer. The fuselage sank abruptly and the nose dropped at a height slightly above the levee (approximately five m) toward the right, and hard-landed. The propeller and nose tire contacted first, and then the nose gear got retracted.

The stall speed warning alarm never went off, as it appeared the sinking had not been caused by reaching the stall speed. Nor did it appear that the speed had been lowered. The front windshield glass was broken when the Aircraft struck the ground. After the Aircraft came to a stop I opened the windshield, and as people on the ground came to our aid I had the master switch and the ignition switch turned off. During the test flight, there was no uneasy feeling nor did I think there was any problem with respect to weight and balance.

(3) Eyewitness A (the operator of the Gliding Field and former owner of the Aircraft)

Because there is no radio telephone on the ground, I was observing the Aircraft from a platform approximately 1.5 m high at the time of takeoff. I was also observing the Aircraft from the platform at the time of approach, and when I saw it made hard-landing at about 14:45–50, I immediately called the police. The Aircraft was directly facing the runway and, I believe, was making a perfect approach. Up until about five m, it was approaching normally and then suddenly sank as the nose seemed to drop.

(4) Eyewitness B (the Aircraft's maintenance assistant, who is a former flight engineer of an airline company)

The Aircraft entered the base leg at around 14:45. Its circling when it made the final approach appeared a little far and rather high, but it seemed to have managed the height adjustment very well. Being positioned in front of the Aircraft, I could not observe the final approach speed or the level of air brakes usage. The sound of the engine was of an idling rotation from the beginning to the end and was consistent. At the time of the final approach, the landing gears were down. The Aircraft was properly making its approach, when it plunged straightforward without a flare. After the touchdown it continued to run and stopped in short of the runway.

When I checked the position of the flaps after the Aircraft came to a stop, it was at + 15°. I drained fuel moisture prior to the Aircraft's flight, and there was no water or impurity. The preflight check revealed no abnormality in the flight control system either.
(Figure 1: Estimated Flight Route, Photo 1: Accident Aircraft and Accident Site)

2.2 Injuries to Persons

The captain and the passenger were seriously injured. According to a doctor's examination result, the captain suffered a first lumbar burst fracture and a spinal cord injury, and the passenger suffered a second lumbar compression fracture.

2.3 Damage to the Aircraft

2.3.1 Extent of Damage

Substantial damage

2.3.2 Damage to the Aircraft Components

(1) Fuselage: The front windshield glass in the cockpit was broken and fallen

out.
There were cracks on the fuselage in front of the vertical tail.

(2) Main Wings: There were a deformation and cracks in the middle of the lower surface of the right wing.

(3) Propeller: The both two blades were broken.

(4) Landing Gears

Nose Landing Gear: The locking device for extending the landing gear was damaged and the gear was pushed back.

Left Main Landing Gear: Broken outward

Right Main Landing Gear: Broken backward

(See Photo 2: Extent of Damage)

2.4 Personnel Information

Captain	Male, Age 63	
Private pilot certificate (Glider)		October 31, 1974
Type rating for high class glider		October 31, 1974
motor glider		January 6, 1977
Flight instructor certificate (Glider)		December 10, 1975
Class 2 aviation medical certificate		
Validity		September 5, 2010
Total flight time		About 2,000 h 00 min
Flight time in the last 30 days		4 h 22 min
Total flight time on the type of aircraft		6 h 14 min
Flight time in the last 30 days		4 h 22 min

2.5 Aircraft Information

2.5.1 Aircraft

Type	Valentin Taifun 17EII
Serial number	1113
Date of manufacture	March 1, 1981
Certificate of airworthiness	DAI-2009-38-04
Validity	August 8, 2010
Category of airworthiness	Motor glider Utility U
Total flight time	830 h 27 min
Flight time since last periodical check (100-hour inspection, conducted on July 31, 2009)	16 h 41 min

(See Figure 2: Three Angle View of Valentin Taifun 17EII)

2.5.2 Engine

Type	Limbach L2400 EBI.AB
Serial number	1085-1
Date of manufacture	June 8, 2009
Total time in service	16 h 51 min

2.5.3 Weight and Balance

When the accident occurred, the Aircraft's weight was estimated to have been 843 kg, and the position of the center of gravity is estimated to have been 4.21 m aft of the reference point, both of which are estimated to have been within the allowable range (maximum takeoff weight of 850 kg, and 4.00–5.40 m for the center of gravity range corresponding to the weight at the time of the accident).

2.6 Meteorological Information

2.6.1 General Weather Forecasts and Observation Values of Local Meteorological Observatory and Fire Station

(1) General weather forecasts for Mie Prefecture announced by Tsu Local Meteorological Observatory at 10:45 on the day of the accident were as follows:

The main island of Japan is covered with high pressure centered in the Sea of Japan and south of Japan. On the other hand, a front is extending from the Nansei Islands to South China. Because of this, it is clear in Mie Prefecture. Today in Mie Prefecture, it will be clear, generally being covered with high pressure.

(2) During the time period relevant to the accident, the observation values at Automated Meteorological Data Acquisition System in Obata, which is located about 11 km southeast of the accident site, were as follows:

14:00 Wind direction: Northeast, Wind velocity: 7.4 kt,
Maximum instantaneous wind velocity: 13.2 kt, Precipitation: 0.0 mm
Temperature: 28.4° C Sunlight hours: 100%

15:00 Wind direction: South-southwest, Wind velocity: 10.1 kt,
Maximum instantaneous wind velocity: 17.7 kt Precipitation: 0.0 mm
Temperature: 28.1° C Sunlight hours: 100%

(3) During the time period relevant to the accident, the observation values at Matsuzaka Fire Station, which is located about 5.5 km West-southwest of the accident site, were as follows:

14:00 Wind direction: East-Southeast, Wind velocity: 9.5 kt,
Maximum instantaneous wind velocity: 16.3 kt

15:00 Wind direction: South-Southeast, Wind velocity: 11.9 kt,
Maximum instantaneous wind velocity: 19.0 kt

2.6.2 Statements by the Captain and Eyewitnesses regarding Wind

(1) Captain

At the time of takeoff: Wind direction: 080-090°, Wind velocity: below five kt
At the time of approach: Wind from the left

(2) Eyewitness A

At the time of approach: Wind direction: 095°, Wind velocity: below 10 m/s (19 kt)
Place of observation Height: About three m above ground (about 1.5 m of the height of platform + about 1.5 m at the level of Eyewitness A's face)
Position: On a platform (on the slightly right of the Aircraft's

touchdown point and about 105 m ahead in the direction of the runway)

(3) Eyewitness B

At the time of takeoff and approach: Wind direction 110°, Wind velocity 4 m/s (8 kt)

Place of observation Height: About 1.5 m above ground (Eyewitness B's face level)

Position: Around the taxiway entrance on the slightly right of the Aircraft's touchdown point and about 109 m ahead in the direction of the runway

2.7 Accident Site and Wreckage Information

2.7.1 Accident Site Information

The accident site was the grass in front of the threshold of Runway 14 of the Gliding Field on a riverbed, around the mouth of Kushida River. The Runway is paved with asphalt to the extent of 500 m in length and 10 m in width, the magnetic bearing is 140°/320°, and the elevation is about 2.5 m. Reeds about three m tall are growing in mass approximately 8.5 m ahead of the left shoulder of Runway 14, and the levee, which is about 75 m beyond the right shoulder, is approximately five m high.

At the time of the accident a small windsock (about one m in length), which had been used by radio-controlled plane lovers, was placed on the grass about 120 m in the direction of the halfway marking center sign from the threshold of Runway 14 and about 30 m west of the runway center line. There was no radiotelephone on the ground that could be used to communicate with the glider.

The Aircraft was at a stop with its nose turned 005° and with its tail on top of the threshold of Runway 14. There was a scrape mark about five cm in width and ten cm in length across the entry direction about 59.3 m northwest of the spot where the Aircraft stopped. Further, there was a touchdown mark about 20 cm in width and about two m in length about 80 cm advanced from the scrape mark (equivalent to about 58.5 m northwest of where the Aircraft stopped) in the direction of the runway. In addition there were tire marks between the touchdown mark and where the Aircraft stopped, which had been left during landing roll, and propeller and windshield glass fragments were scattered around.

2.7.2 Detailed Information of Damage

(1) Fuselage: Most of the front windshield glass in the cockpit was broken and fallen out. There were cracks along the whole in the fuselage in front of the vertical tail. There was a scrape mark on the bottom surface of the nose cowling, made during landing roll after the touchdown, as well as a crack about five cm long, but there was no major damage.

(2) Main Wings: Deformation in two spots in the middle of the lower surface of the right main wing, in the form of cracks about 20 cm long

(3) Propeller: One of the two blades was broken at the base and a number of broken pieces were scattered. The other was broken halfway along the blade.

(4) Landing Gears

Nose Landing Gear: The locking device for extending the landing gear was damaged and the gear was pushed back to the storage position

Left Main Landing Gear: The landing gear was broken outward (in the direction of the

wing tip) from the inside near the base.

Right Main Landing Gear: The landing gear was broken backward (in the direction of the tail) from the point near the base.

2.7.3 Condition of the Flight Control System

The Aircraft's throttle was in idle position, flaps were at +15°, and the air brakes were opened by about five cm (1/3 of full brake), while it was at a stop. The ailerons, flaps, air brakes, elevators and rudder were working normally without any restraint, and no defects were found.
(See Figure 1: Estimated Flight Route, Photo 1: Accident Aircraft and Accident Site, Photo 2: Extent of Damage)

2.8 Tests and Research for Fact-Finding

2.8.1 Checking of Stall Warning System Operation

It was checked on the ground that the stall warning system was in operation and the warning sound would go off.

It had also been checked that the warning functions were operating normally during the previous test flight for an airworthiness inspection, which was conducted on August 1, 2009.

2.8.2 Measurement of the Angle when the Propeller Contacted the Ground

The angle, at which the tangent line connecting the tip of the propeller with the outer rim of the nose landing gear intersects the ground, was actually measured at 27°.

2.9 Additional Information

2.9.1 Flight Manual

Regarding the procedures for approach, landing, and go-around, the flight manual for the Aircraft provides as follows.

2-10 Instrument Indicator (Excerpts)

<Airspeed indicator>

Normal Operating Range	*(Green Arc)*	*86-185 km/h, 47-100 kts,53-115 mph*
Flight Operating Range with flap settings (+30°, +15°)		
	(White Arc)	*79-150 km/h, 43-81 kts, 49-93 mph*
Approach Airspeed	*(Yellow Triangle)*	*100 km/h, 54 kts, 62 mph*
Best Rate of Climb Speed	*(Blue Radial Line)*	*105 km/h, 57 kts, 65 mph*

Chapter 4 Normal Operation

4.15 Approach and Landing Check

- *Airspeed below 120 km/h (65 kts., 75 mph)*
- *Flap setting* *"+8°"*
- *Extend landing gears* *"down"*
- *elec. fuel pump* *"on"*
- *Propeller in "Take-off" position (mode "Take-off" or "Auto - 3000 RPM")*

The recommended minimum approach speed is 100 km/h (54 kts., 62 mph). As soon as the gliding angle is sufficient for the approach, set flaps to +30°. For adjustment of the gliding angle, use the air brakes. Shortly before touchdown, it should be noted though, that full movement (pulled out) of the air brakes lever will also actuate the wheel brakes. At low altitude and minimum airspeed, the flaps should never be changed from +30° to any other setting, as the loss of lift could result in a sudden high rate of sink. Before changing the flap setting increase the airspeed to about 100 km/h (54 kts., 62 mph).

4-17 Normal Landing Procedures

For certification, landing with a maximum crosswind component of 20 km/h (11 kts.,) was demonstrated.

Fly parallel to the ground, reduce airspeed to minimum flying speed (but avoid the stalling, for that can cause ground contact of the rudder). If required, shortly before touchdown, straighten the airplane in direction of the runway. Land on both main wheels simultaneously.(Rest is omitted)

4-18 Go-around

- *Retract air brakes*
- *Leave the flaps at present setting*
- *Increase throttle setting without delay*
- *Increase airspeed to 105 km/h (57 kts.,65 mph)*
- *Change flap setting cautiously to +15°*

2.9.2 Checklist Used by the captain

The self-made checklist used by the captain provided as follows.

Landing

1. Prop mode (AUTO 3000 RPM)	*SET*
2. Speed 75 MPH (65 KTS)	*SET*
3. Flaps	*15° SET*
4. Landing gears	*DOWN*
5. Turn on the green light	*C'K*
6. Flaps	*30° SET*
7. Power idle	*SET*
8. Approach speed 65 MPH (57 KTS) MINIMUM	*C'K*
9. Spoilers	*OPEN*

3 ANALYSIS

3.1 The captain held both 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.

According to the statements by the captain and the passenger described in 2.1, Accident Site and Wreckage Information in 2.7, and Checking of Stall Warning Operation in 2.8.1, it is considered probable that there were no abnormalities in the Aircraft's engine, flight control systems or other aircraft components before the accident occurred.

3.3 Relationship to Weather

It is considered probable that the weather on the day of the accident was fine and that visibility was not affected, as described in 2.1(1) and 2.6.1.

With respect to wind, it is generally necessary to increase the approach speed in anticipation of a decrease of airspeed at a lower, as opposed to higher, altitude due to a wind gradient effect (a type of wind shear), which causes a decrease of wind speed due to friction near the ground surface. In case of the Gliding Field, it is considered somewhat likely that the rate of the wind speed decrease was increased by the wind gradient effect brought about by the mass of about three m tall reeds growing beyond the left shoulder of Runway 14. It is considered somewhat likely, moreover, that the wind, which was blowing in the direction of the runway from the Kushida River at the time of the accident, had been disturbed by the effect of the mass of reeds as described in 2.6.

In this manner, the Aircraft experienced a sudden increase of drop rate after a decline of airspeed and lift at the height of about three to five m above ground as a result of turbulence created by the effect of the wind shear and the mass of reeds, during the final approach for landing.

In the case of a glider, its mass and inertial force are smaller than those of an airplane, and the effect of changes in wind is larger, so more cautious flying is desired.

3.4 Flight Operations by the captain

As described in the statements in 2.1(1) and (2), it is considered highly probable that the Aircraft, during its final approach, maintained the altitude of 400 ft, the throttle fully closed (idle), the propeller pitch control in "Auto-3,000 RPM" mode, the flaps at +15°, the air brakes at five cm, and the speed at 62–65 mph (54–56 kt). It is also considered highly probable that the pitch angle during the final approach was around −6°, which is the normal pitch angle of the Aircraft, as the captain stated that the approach was made as usual.

As described in 2.9.1 the Aircraft's flight manual provides that "the recommended minimum approach speed is 100 km/h (54 kts., 62 mph). As soon as the gliding angle is sufficient for the approach, set flaps to +30°. For adjustment of the gliding angle, use the air brakes. At low altitude and minimum airspeed, the flaps should never be changed from +30° to any other setting, as the loss of lift could result in a sudden high rate of sink. Before changing the flap setting increase the airspeed to about 100 km/h (54 kts., 62 mph)."

According to the statements in 2.1(1) and (2), however, the Aircraft had started the final approach at 62–65 mph (54–56 kt) by adjusting its gliding angle and aiming at the runway threshold, but continued its approach while maintaining the flaps at +15° as it was thought that lift would increase if the flaps were shifted to +30° from +15°, making the gliding angle adjustment by the use of the air brakes more difficult. It is considered somewhat likely that this contributed to the decrease of lift and sudden increase in the sinking rate as a result of the turbulence created by the effect of the wind shear and the massive reeds.

3.5 The Aircraft's Landing

It is considered probable that the scrape mark of about five cm in width and ten cm in length as described in 2.7.1 was made by the Aircraft's propeller because of the shape, and it is considered highly probable that the touchdown mark about 20 cm in width and about two m in length made by the Aircraft's nose landing gear. Judging from this, it is considered probable that the Aircraft's propeller contacted the ground slightly before the nose tire. Therefore, it is considered probable that the pitch angle at the time of landing exceeded −27° based on the fact that the tangent line connecting the tip of the propeller with the outer rim of the nose tire intersects the ground as described in 2.8.2.

In addition, because it is considered probable that the Aircraft made the final approach at the pitch angle of −6° as described in 3.4, and it is considered probable that it exceeded −27° at the time of landing as described above, it is also considered highly probable that the Aircraft sank as its nose suddenly dropped at the height of about three to five m just before the flare, causing the hard landing and damage to the airframe, and severe injuries suffered by the captain and the passenger.

3.6 Go-around

According to the statements in 2.1(1) the captain stated that he would normally flare a little above his height, but as the nose abruptly dropped at the height of about three m it made contact with the land with the propeller first before he knew it, giving him no chance to pull the lever or open the throttle.

Although go-around should immediately be undertaken when in doubt during an approach, it is considered somewhat likely that there was no time to manage a go-around when the nose abruptly dropped at the height of about three m.

3.7 Method of Ascertaining the Surface Wind

It is considered highly probable that the captain could not ascertain the surface wind accurately for the reasons that it was difficult to recognize the windsock on the Gliding Field visually, as it was about one m in length and smaller than regular ones; the vehicle parked in front of the windsock blocked the view for recognition; and the wind information from the ground could not be communicated as there was neither a wind vane and anemometer nor a radiotelephone on the ground. The captain, nevertheless, should have tried to ascertain the wind condition at the Gliding Field prior to landing in some way, such as by observing the tall and thick reeds bending before the wind, and if he was unable to ascertain the surface wind accurately during the approach, he should tentatively abort it and attempt another approach after judging the surface wind.

In addition, it deemed desirable for the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism to supervise organizations concerned and to make public on providing appropriate information regarding surface wind at gliding fields utilizing windsock, wind vane, anemometer, and radiotelephone.

4 PROBABLE CAUSES

It is considered highly probable that in this accident the captain and the passenger were seriously injured as a result of the hard landing caused by the sudden nose drop at the height of about three to five m just before the flare during the approach with the flaps at +15° when the Aircraft was landing, resulting in the damage to the airframe.

It is considered somewhat likely that with respect to the sudden drop of the Aircraft's nose, the drop was caused by turbulence created by the effect of wind shear and a mass of reeds.

Figure 1: Estimated Flight Route

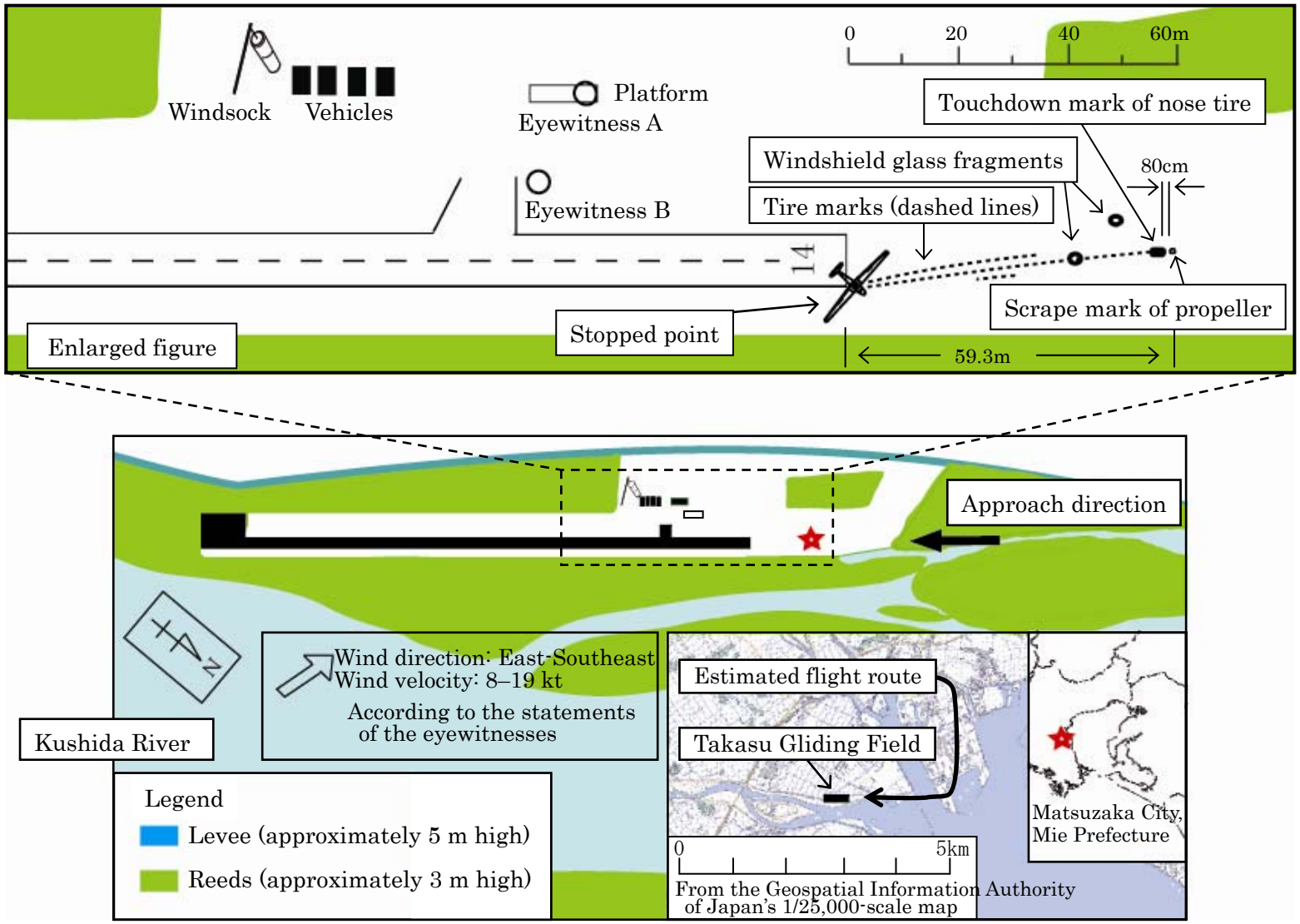


Figure 2: Three Angle View of Valentin Taifun 17EII

Unit: meters

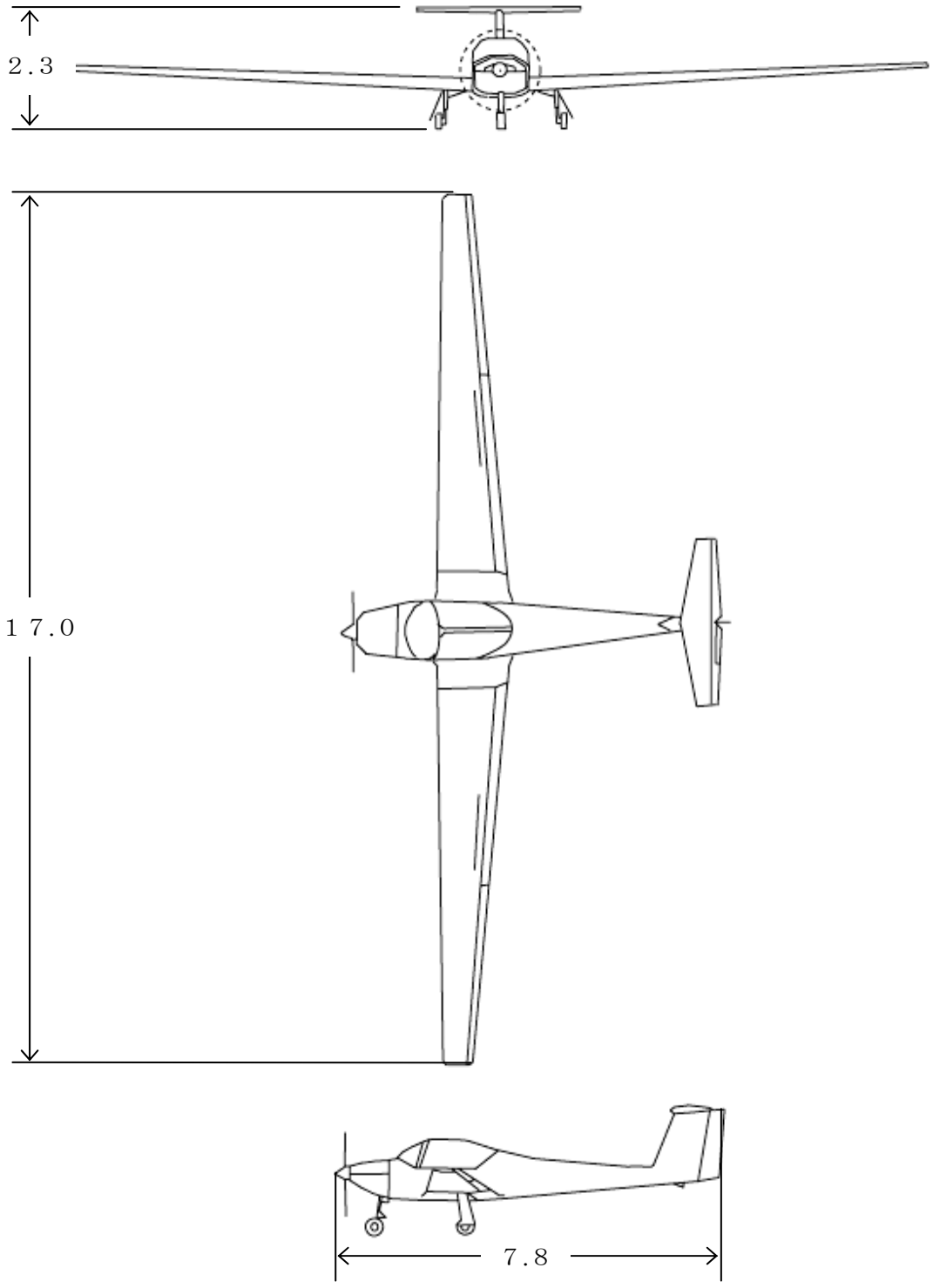
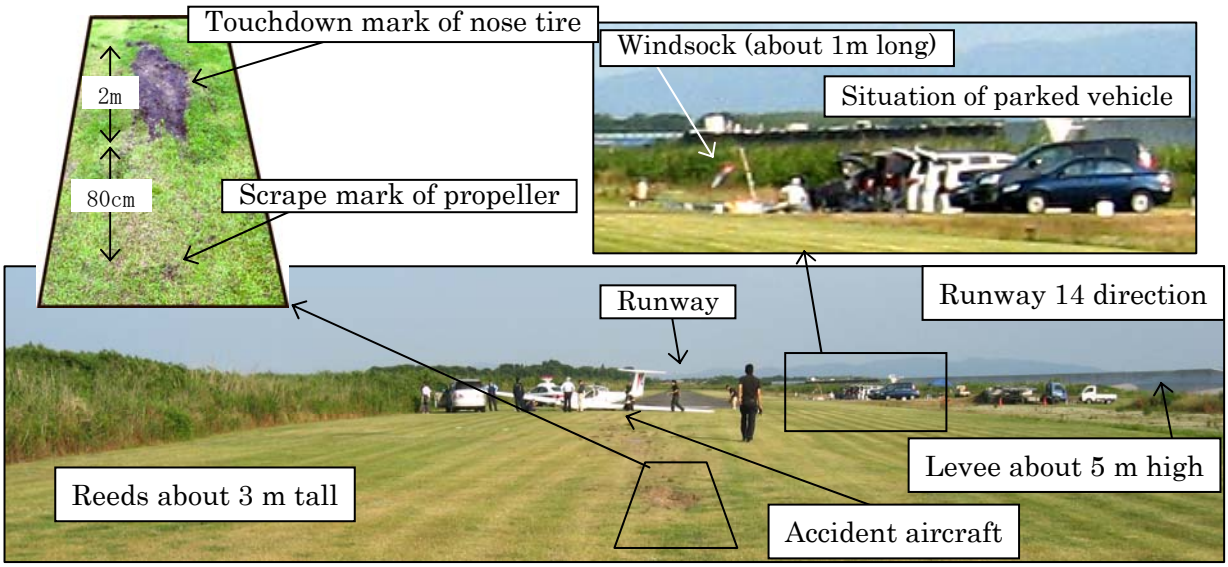


Photo 1: Accident Aircraft and Accident Site



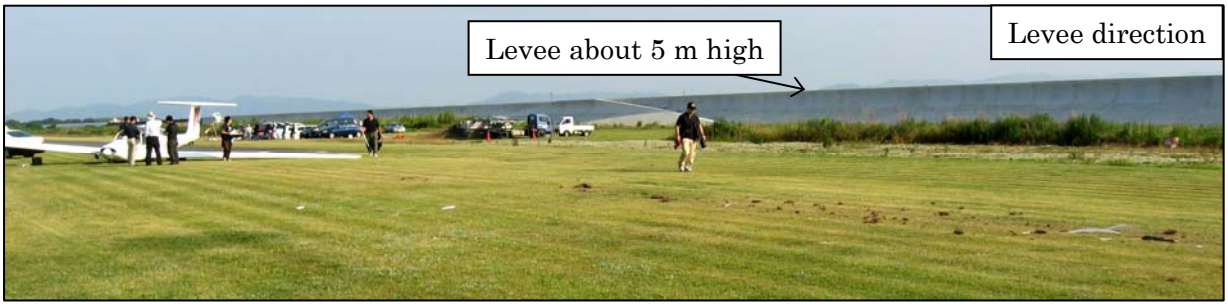
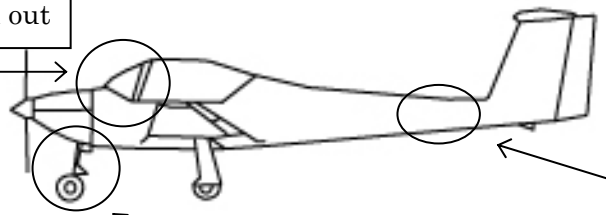
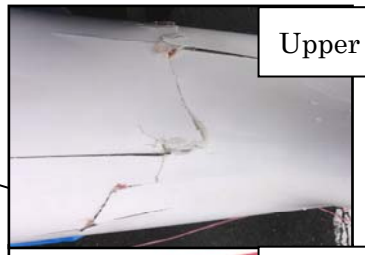


Photo 2: Extent of Damage

Front windshield glass was broken and fallen out





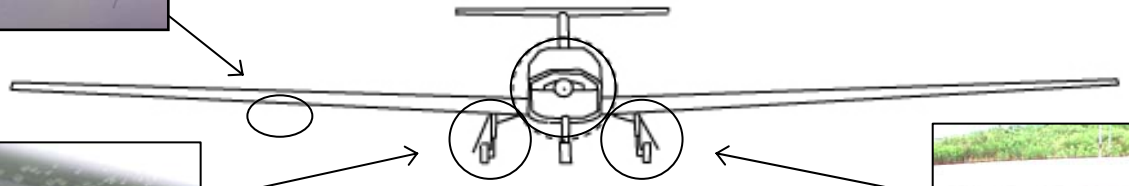
Upper side

Left side

The locking device of the nose landing gear was damaged and the gear was pushed back

Cracks along the whole in the fuselage

Cracks in the middle of the lower surface of the right wing



Right main landing gear was broken backward

Front (Broken propeller, cracks in the lower side)

Left main landing gear was broken outward
(taken from the rear of the left main landing gear)