

AIRCRAFT ACCIDENT INVESTIGATION REPORT

AIRCRAFT DAMAGE FROM BELLY LANDING ACADEMIC CORPORATE BODY HIRATA GAKUEN TEXTRON AVIATION G58, JA212H KOBE AIRPORT AT ABOUT 14:27 JST, MAY 31, 2024

August 8, 2025

Adopted by the Japan Transport Safety Board

Chairperson RINOIE Kenichi

Member TAKANO Shigeru

Member MARUI Yuichi

Member SODA Hisako

Member TSUDA Hiroka

Member MATSUI Yuko

1 PROCESS AND PROGRESS OF THE AIRCRAFT ACCIDENT INVESTIGATION

1.1 Summary of the Accident	On Friday, May 31, 2024, a Textron Aviation G58, JA212H, operated by Academic Corporate Body HIRATAGAKUEN, made a belly landing, causing damage to the aircraft when landing on Runway 09 at Kobe Airport during the training to acquire an instrument flight certificate. There were three people on board the aircraft, consisting of the captain, two trainees, but no one was injured.
1.2 Outline of the Accident Investigation	On May 31, 2024, the Japan Transport Safety Board (JSTB) designated an investigator-in-charge and two other investigators to investigate this accident. An accredited representative of United States of America, as the State of Design and Manufacture, participated in the investigation. Comments on the draft Final Report were invited from the parties relevant to the cause of the accident and the relevant state.

2 FACTUAL INFORMATION

2.1 History of the Flight

According to the statements of the captain and two trainees, the air traffic control communication records and the radar track recordings, the flight up to the accident was summarized below:

At 13:58 Japan Standard Time (JST: UTC + 9hrs, unless otherwise stated all times are indicated in JST on a 24-hour clock) on May 31, 2024, a Textron Aviation G58, JA212H, operated by Academic Corporate Body HIRATA GAKUEN (hereinafter referred to as "the Academic Corporate Body") took off from Runway 09 at Kobe Airport, operated by Trainee A for training for the instrument flight rating with the captain who was an instructor sitting in the right seat, Trainee A sitting in the left seat and Trainee B sitting in the right rear seat. This was the third training on the Textron Aviation G58 aircraft for Trainee A.

The aircraft was planned to land on Runway 09 after five touch-and-goes.

The aircraft conducted three touch-and-goes along the traffic pattern on the south side of Runway 09, as recommended by the Academic Corporate Body. The aircraft was then to land after completing two touch-

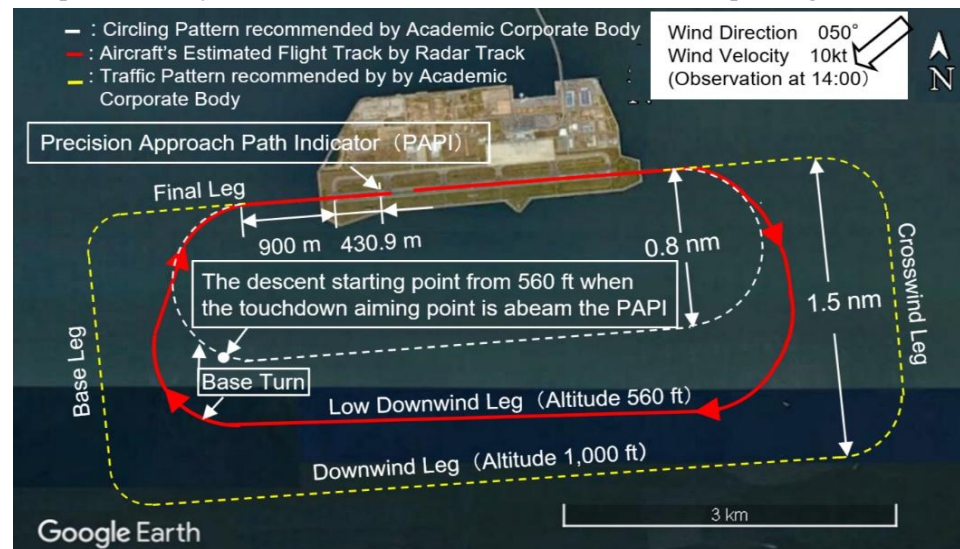


Figure1: Estimated Flight Route

and-goes while flying along the pattern, which would be used for the training of landing descending from the minimum descent altitude in a circling approach^{*1}, and lower in altitude and shorter in distance (hereinafter referred to as the "circling pattern") than the traffic pattern on the south side of the runway recommended by the Academic Corporate

*1 A "circling approach" refers to an approach in which an aircraft approaches an airport by instrument approach procedures, visually confirms the airport or runway, changes flight route, flies visually within the circling approach area toward the landing runway, and then lands.

Body. Besides, according to the flight instructions in the pilot textbook prepared by the Academic Corporate Body (hereinafter referred to as the "Flight Instructions"), the procedure was to keep the landing gear down when flying the circling pattern during touch-and-goes. In addition, it was the first time that Trainee A had flown the circling pattern.

The aircraft completed four touch-and-goes without incident, including the first touch-and-go, which was performed when flying the circling pattern before the accident.

When the aircraft performed a second touch-and-go while flying the circling pattern, the captain instructed Trainee A to make a go-around just before landing. Trainee A raised the landing gear and also fully retracted the flaps following the normal go-around procedure. After flying straight up to an altitude of 560 ft, the normal altitude for flying the circling pattern, Trainee A put the flaps into the approach position when making a right turn toward the downwind leg of the circling pattern (hereinafter referred to as the "low downwind leg") in preparation for landing.

The captain confirmed that Trainee A was performing a go-around and advised the Academic Corporate Body by radio that they would land while the aircraft was still heading straight ahead. When a trainee performs a go-around during a touch-and-goes and continues to fly a circling pattern, the captain would advise the trainee to extend the landing gears when the go-around is complete, but the captain forgot to give this advice on this occasion.

When the aircraft completed the turn towards the low downwind leg, the captain instructed Trainee A to make corrections as the captain recognized that the aircraft's airspeed was high and that the distance between the aircraft and the runway was long.

Trainee A started the base turn while correcting the distance between the runway and the low downwind leg. As the aircraft's speed at the time, it started the base turn faster than the target speed of 110 knots, therefore, Trainee A had to start the descent when the aircraft's flight altitude and the descent path 3° from the touchdown aiming point intersected while correcting the aircraft's speed and also had to operate putting the flaps fully down. The captain provided Trainee A with instructions about the airspeed and the descent path. While Trainee B was also looking at the runway to determine the descent path, Trainee B was concerned that the aircraft was approaching the maximum speed of 122 kt at which the flaps could be fully down.

The aircraft was late in establishing a three-degree descent path

	toward the touchdown aiming point and an airspeed at which it could fully lower the flaps, and Trainee A fully lowered the flaps near the approach end of the approach lights. Trainee A did not have time to carry out the NORMAL LANDING checklist, which should have been carried out after the flaps were fully lowered, and therefore continued the approach without carrying out the checklist. Although Trainee A was aware that a warning sound was sounding to indicate that the landing gears were not extended, Trainee A was unable to respond to the warning sound because Trainee A was concentrating on controlling the airspeed and descent path. The captain only realized afterwards that a warning had sounded, but Trainee B did not notice the warning sound. Trainee A felt that the time to touch down was longer than usual, and that the runway surface was close during the landing flare. The captain also felt something was wrong. Afterwards, the aircraft touched down and the captain and the two trainees realized that it had landed with the landing gears up, by the sound of the propellers hitting the runway surface and the lower fuselage touching the runway surface. Once the aircraft came to a stop, the captain reported to the air traffic controllers that the aircraft had landed with the landing gears up. The captain carried out landing and parking procedures and instructed the two trainees to disembark, and the three disembarked on their own. In addition, immediately after the accident, the aircraft's landing gear handle was in the up position. This accident occurred at around 14:27 on May 31, 2024, at Kobe Airport (34° 37' 57" N, 135° 13' 20" E)
2.2 Injuries to Persons	None
2.3 Damage to Aircraft	Extent of Damage: Substantially damaged • Lower fuselage structure: Scratch marks (see Figure 3)



Figure 2: The aircraft

	(Damage equivalent to major repairs) • Lower fuselage : Scratch marks, Detachment of panels, Antenna (Radio communication: Detached and damaged, ATC transponder: Damaged) • Both propeller blades: Bent, Scratch marks (see Figure 2) Figure 3: Lower Fuselage Figure 4: Left Flap																																						
2.4 Personnel Information	(1) Captain (Instructor): Age 68 <table><tr><td>Commercial Pilot Certificate (Airplane)</td><td>March 16, 1977</td></tr><tr><td>Pilot Competency Assessment Confirmation</td><td></td></tr><tr><td>Expiration Date of Piloting Capable Period</td><td>May 12, 2025</td></tr><tr><td>Type rating (Airplane Land Multi-Engine)</td><td>March 16, 1977</td></tr><tr><td>Instrument Rating (Airplane)</td><td>May 29, 1997</td></tr><tr><td>Class 1 Aviation Medical Certificate</td><td>Validity: February 18, 2025</td></tr><tr><td>Total flight time</td><td>14,035 hours 19 minutes</td></tr><tr><td>Flight time in the last 30 days</td><td>20 hours 56 minutes</td></tr><tr><td>Flight time on the type of aircraft</td><td>1,037 hours 03 minutes</td></tr><tr><td>Flight time in the last 30 days</td><td>13 hours 16 minutes</td></tr></table> (2) Trainee A: Age 27 <table><tr><td>Commercial Pilot Certificate (Airplane)</td><td>April 22,2024</td></tr><tr><td>Pilot Competency Assessment Confirmation</td><td></td></tr><tr><td>Expiration Date of Piloting Capable Period</td><td>April 22,2026</td></tr><tr><td>Type rating (Airplane Land Multi-Engine)</td><td>April 22,2024</td></tr><tr><td>Class 1 Aviation Medical Certificate</td><td>Validity: May 16, 2026</td></tr><tr><td>Total flight time</td><td>277 hours 05 minutes</td></tr><tr><td>Flight time in the last 30 days</td><td>2 hours 52 minutes</td></tr><tr><td>Flight time on the type of aircraft</td><td>2 hours 52 minutes</td></tr></table> (3) Trainee B: Age 30 <table><tr><td>Commercial Pilot Certificate (Airplane)</td><td>April 22,2024</td></tr></table>	Commercial Pilot Certificate (Airplane)	March 16, 1977	Pilot Competency Assessment Confirmation		Expiration Date of Piloting Capable Period	May 12, 2025	Type rating (Airplane Land Multi-Engine)	March 16, 1977	Instrument Rating (Airplane)	May 29, 1997	Class 1 Aviation Medical Certificate	Validity: February 18, 2025	Total flight time	14,035 hours 19 minutes	Flight time in the last 30 days	20 hours 56 minutes	Flight time on the type of aircraft	1,037 hours 03 minutes	Flight time in the last 30 days	13 hours 16 minutes	Commercial Pilot Certificate (Airplane)	April 22,2024	Pilot Competency Assessment Confirmation		Expiration Date of Piloting Capable Period	April 22,2026	Type rating (Airplane Land Multi-Engine)	April 22,2024	Class 1 Aviation Medical Certificate	Validity: May 16, 2026	Total flight time	277 hours 05 minutes	Flight time in the last 30 days	2 hours 52 minutes	Flight time on the type of aircraft	2 hours 52 minutes	Commercial Pilot Certificate (Airplane)	April 22,2024
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	Pilot Competency Assessment Confirmation Expiration Date of Piloting Capable Period April 22,2026 Type rating (Airplane Land Multi-Engine) April 22,2024 Class 1 Aviation Medical Certificate Validity: May 16, 2025 Total flight time 349 hours 50 minutes Flight time in the last 30 days 3 hours 10 minutes Flight time on the type of aircraft 3 hours 10 minutes
2.5 Aircraft Information	Aircraft Type: Textron Aviation G58 Serial Number: TH-2504 Date of Manufacture: June 28,2018 Certification of airworthiness: No. Dai-2023-380 Validity: September 27,2024 Both the weight and the position of the center of gravity were within limits at the time of the accident.
2.6 Meteorological Information	Observation values of aviation weather during the time period relevant to the accident at the Airport were as follows: 14:00 Wind direction: 050°, Wind velocity: 10 kt, Prevailing visibility: 10 km or more Present weather: Light shower Clouds: Amount 1/8, Type Stratus, Cloud base 800 ft Amount 3/8, Type Cumulus, Cloud base 3,000 ft Amount 7/8, Type Altocumulus, Cloud base 7,000 ft Temperature:20 °C, Dew point: 15 °C Altimeter setting (QNH): 29.77 inHg
2.7 Additional Information	(1) Information regarding Accident Site The field elevation of the airport is 18 ft and the runway is one runway of 09/27 whose length of 2,500m and width of 60 m. The precision approach path indicator (PAPI) is installed at the position to the left of Runway 09 and 430.9 m from the runway threshold. The aircraft stopped on the runway at about 1,100 m from the threshold of Runway 09. The aircraft's propeller was observed to have made contact with the runway surface from about 620 m from the threshold. (2) Warning for Landing Gears

According to the aircraft's Flight Manual, the warning sound will sound intermittently when the landing gears are retracted and one



Figure 5: PFD with developing the warning

of the throttle levers is retarded until the manifold pressure goes down to about 13 inHg or less, or the flaps are moved to the full down position. The ALERT soft key at the bottom right on the PFD*2 will also change to the red flashing warning (see Figure 5 (b)) with the text warning of GEAR UP (see Figure 5 (a)) in red in the annunciation window of the PFD. In the case of an audible warning, the procedure in the Academic Corporate Body is for the pilot to voice the situation and identify the cause of the warning.

During the onsite investigation, it was confirmed that the warning sound, the text displays on the PFD and the red flashing warning of the ALERT soft key was operating normally.

In addition, all three people had the experience of hearing the warning sound, with Trainee B stating that the warning sound was audible even when sitting in the rear seat.

(3) Checklist

The checklist in the Airplane Flying Handbook, published by the Federal Aviation Administration of the United States of America, is summarized as follow:

Checklists have been the foundation of pilot standardization and flight deck safety. The checklist is a memory aid and helps to ensure that critical items necessary for the safe operation of aircraft are not overlooked or forgotten. Without discipline and dedication to using the appropriate checklists at the appropriate times, the odds are on the side of error. The importance of consistent use of checklists cannot be overstated in pilot training. The flight instructor must promote a positive attitude toward the use of checklists, and the student pilot must realize its importance.

In addition, the Academic Corporate Body has established a checklist for normal operations in its Aircraft Operations Manual (AOM) which sets

*2 "PFD" stands for Primary Flight Display and an integrated display that provides essential flight information such as aircraft attitude, altitude, and airspeed.

out the standards for conducting flights to ensure the safe and proper operation of the Textron Aviation G58 aircraft, and Chapter 4, Normal Operations, contains the following descriptions.

4-1 Regarding Normal Checklist

The normal checklist is based on "Chapter 4: Normal Operations" of the Airplane Flight Manual and is used to check and confirm operations and understand the situation for important items of the normal procedures that are performed in memory for each phase of flight, thereby ensuring the safe and efficient operation of the aircraft.

4-2 How to Use the Normal Checklist

After performing the Normal Procedure, the captain will perform the normal checklist at an appropriate time to ensure that it can be performed (Omitted).

On the other hand, for training flights, the Academic Corporate Body also uses a separate checklist (hereinafter referred to as the "Training Checklist") described in the Academic Corporate Body's Educational Implementation Regulations. The checklist was prepared based on the normal operations of the Airplane Flight Manual (AFM) with operational convenience in mind and covers all normal operations specified in the AFM, with some exceptions.

Table 1 shows excerpts from the normal operations in the AFM, the checklists in the AOM, and the Training Checklists relating to landing gear operation.

In addition, the Academic Corporate Body instructed that, except when flying a circling pattern during touch-and-goes, the BEFORE LANDING checklist should be performed in advance, and then the flaps should be fully down when it is determined on the final leg that the landing would be safe, and the NORMAL LANDING checklist should be performed. On the other hand, the Academic Corporate Body has instructed that when flying a circling pattern during touch-and-goes, only the NORMAL LANDING checklist should be done out of the Training Checklists.

Table 1: Description of AFM and Checklist (Excerpt)

Airplane Flight Manual Normal Procedures	Checklist	
	AOM	Training
8. Take-Off (Five items) (5) Landing Gears (When obtaining a positive rate of climb)Retract	AFTER TAKE-OFF (One item) 1. Gear & Flaps UP	CLIMB (Six items) 1. Landing Gear UP
12. Before Landing (Nine items) (7) Landing Gears (152 kts or below)Down and Check	BEFORE LANDING (Five items) 2. Landing Gear DOWN	BEFORE LANDING (Ten items) 8. Landing Gear (152kts or below) DOWN & CHECK
		NORMAL LANDING (Five items) 3. Landing Gear (CONFIRM) DOWN & 3 GREEN

(4) Flight Procedure of Circling Pattern

The following summary descriptions of the procedure for flying the circling pattern are given in the Flight Instructions.

- a. After takeoff, turn with a maximum bank angle of 30 degrees and fly so that the distance between the runway and the low downwind leg is 0.8 nm. When flying the low downwind leg after a touch-and-go, keep the landing gears down.
- b. When the landing gears and the flaps are in the up position on the low downwind leg, fly at 110 kt with the flaps in the approach position and the landing gear in the down position.
- c. After starting the base turn, perform the NORMAL LANDING checklist with the flaps fully down when it is determined that landing can be made safely, flying at a speed of 100 kt.

(5) Go-around Procedure

According to the Flight Instructions, the go-around procedure is summarised below.

- a. Make the engines maximum power
- b. Raise the nose to 7°
- c. Set the flaps in the approach position
- d. Retract the landing gears after confirming an aircraft climb
- e. Set the flaps in the up position

	The Academic Corporate Body instructed to perform the BALKED LANDING checklist (Figure 6) described in the training checklist after carrying out the above procedures. However, the specific procedure relating to the landing gear operation when conducting touch-and-goes by flying along the circling pattern after a go-around had not been specified. The captain would advise a trainee to down the landing gears after the trainee had completed the go-around procedure, however, no pre-explanation to the trainees had been given. In addition, Trainee A did not recall having received any prior briefing on flying a circling pattern after a go-around, including the operation of the BALKED LANDING checklist. (6) Records of Flight. The Textron Aviation G58 aircraft, owned by the Academic Corporate Body, vary in the level of Flight Data Monitoring (FDM) ^{*3} equipment, which can record images and sound in the cockpit, depending on when each aircraft was introduced, and the aircraft was not equipped with it. The integrated instrument system (Garmin 1000) has the capability to automatically record flight data and engine data, however, the Academic Corporate Body did not plan to use this data, and no media was installed to record those data.
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<i>BALKED LANDING</i> 1. <i>Throttles & Propellers FULL FORWARD</i> 2. <i>Airspeed.....95 KT</i> 3. <i>Landing GearUP</i> 4. <i>Flaps.....UP</i> 5. <i>Cowl Flaps.....AS REQUIRED</i>

Figure 6: BALKED LANDING Checklist
(Training Checklist)

3.ANALYSIS

(1) From Go-around to Low Down Wind Leg The JTSB concludes that it is certain that when Trainee A performed a go-around as instructed by the captain, Trainee A retracted the landing gears and moved the flaps in the up position in accordance with the Flight Instructions. Meanwhile, the captain was monitoring Trainee A's operations and would normally have advised Trainee A to extend the landing gears, which had been raised during the go-around. However, the captain missed the opportunity to

^{*3} “Flight Data Monitoring (FDM)” refers to a system that identifies unsafe elements during operation and takes measures before an accident occurs by recording and analyzing the aircraft's in-flight data and images inside the cockpit.

(Reference) Japan Transport Safety Board Digests No. 42 (issued in August 2023) “For Prevention of Accidents of Small Aircraft: Do you know flight data monitoring device (FDM)?”
(https://jtsb.mlit.go.jp/bunseki-kankoubutu/jtsbdigests_e/jtsbdigests_No42/No42_pdf/jtsbdi-42_all.pdf)

advise because the captain was communicating by radio with the Academic Corporate Body to inform them of the landing and it is probable that the captain subsequently forgot to advise.

Subsequently, Trainee A did not carry out the BALKED LANDING checklist, which was on the Training Checklist to be carried out after the go-around, and the captain was unaware of Trainee A's status of carrying out the checklist, and when flying a circling pattern during touch-and-goes, the Flight Instructions specified by the Academic Corporate Body required to fly with the landing gears down, so it is most likely that the captain and Trainee A assumed that the landing gears would remain down and did not notice that they were up. It is probable that Trainee A did not conduct the BALKED LANDING checklist because Trainee A was concentrating on flying the circling pattern at an altitude of 560 ft. In addition, the fact that Trainee A had not received a prior briefing on the use of the BALKED LANDING checklist after a go-around, and that the Academic Corporate Body had instructed that only the NORMAL LANDING checklist should be carried out when flying a circling pattern during touch-and-goes, likely contributed to Trainee A not carrying out the BALKED LANDING checklist.

Although the flaps of the aircraft were moved to the approach position on the crosswind leg in preparation for landing, it is most likely that as the aircraft was unable to correct the airspeed which increased due to the reduction in air resistance caused by the retraction of the landing gears, the turning radius increased and when the aircraft completed its turn on the low downwind leg, the distance between the aircraft and the runway was greater than that for flying along the circling pattern recommended by the Academic Corporate Body. In addition, the increased turning radius was probably due to the aircraft having a tailwind as it turned towards the low downwind leg. The captain realized that the distance between the aircraft and the runway had increased because the aircraft's airspeed had increased. However, as the captain assumed that the landing gears would remain down, it is most likely that the captain did not even realize that the speed was increasing due to the reduction in air resistance caused by the landing gear retraction.

Besides, it is more likely that the captain did not inform Trainee A in advance of the captain's intention regarding the handling of the landing gears and the use of the BALKED LANDING checklist when flying a circling pattern after a go-around, which contributed to Trainee A's operation and the speed of the aircraft. The captain (instructor) must share the same understanding of the training content with the trainees in advance during a briefing. In addition, as the Academic Corporate Body has not established a specific procedure when flying the circling pattern after a go-around, which may lead to different responses depending on the instructor and place a burden on the trainees, therefore, the Academic Corporate Body needs to establish procedures for flying a circling pattern after a go-around and make them known to instructors and trainees.

Furthermore, the landing gear warning was not issued because Trainee A did not operate the throttle lever to a position that would reduce the engine intake pressure to approximately 13 inHg or less while flying on the low downwind leg after performing the go-around, and it is more likely that the captain and the trainees did not have the opportunity to notice that the landing gears

were retracted.

(2) From Base turn to Landing

The JTSTB concludes that it is certain that the aircraft made a belly landing and sustained damage because the landing gears were not extended when the aircraft landed on the runway following a circling pattern, which should be flown with the landing gears down after the landing gears were retracted following a go-around during touch-and-goes in a training flight.

The aircraft most likely started the base turn from a position farther from the runway than when flying the circling pattern recommended by the Academic Corporate Body and started the descent for the landing from a different position when flying the pattern recommended by the Academic Corporate Body, although Trainee A attempted to correct this. Besides, as the aircraft's landing gears were not down, the speed tended to be higher for the same engine power than when the landing gears were down, therefore Trainee A also had to deal with the airspeed. Furthermore, at the time of the accident, as this was Trainee A's third training on the Textron Aviation G58 aircraft, it is probable that Trainee A's familiarity with the Textron Aviation G58 aircraft was low, so the workload on Trainee A was high.

Although the flaps of the aircraft were fully down near the end of the approach lights, it is most likely that Trainee A did not notice that the landing gears were not being down because Trainee A was concentrating on controlling the descent path to the touchdown aiming point and the aircraft's airspeed, and did not carry out the NORMAL LANDING checklist, which included checking the landing gears. In addition, it is most likely that the captain did not notice that the landing gears were not being down because the captain's attention was focused on instructing Trainee A on the airspeed and descent path, and the captain did not himself check the progress of Trainee A's checklist or the items on the NORMAL LANDING checklist.

In addition, although Trainee A was aware that a warning sounded to inform that the landing gears were not being down, it is more likely that Trainee A was unable to respond to the warning at the time of the accident and did not even think of performing a go-around because Trainee A was concentrating on the airspeed and descent path. As the captain stated that the captain only realized afterwards that a warning had sounded, it is more likely that the captain and Trainee A paid relatively little attention to the warning sound because they were highly focused on piloting the aircraft for landing and on giving instructions. Because the warning sounds indicate that an aircraft is in an unusual situation, it is important that the Academic Corporate Body should re-instruct pilots on the conditions under which warnings are activated and how to respond to them, and re-instruct training instructors on the need to monitor the entire flight situation.

(3) Checklist Handling

The JTSTB concludes as follows;

For training flights, the Academic Corporate Body has established Training Checklists based on the normal operations in the AFM, taking into account operational convenience. In addition, the Academic Corporate Body also instructs that when flying a circling pattern during touch-and-goes, if it is determined that the safely landing would be assumed after initiating the base turn,

the flaps should be fully down, and then only the NORMAL LANDING checklist should be carried out. It is more likely that the Academic Corporate Body used to instruct that only the NORMAL LANDING checklist should be carried out, because when flying a circling pattern, the time between take-off and landing is short, it specifies that the flight should be made with the landing gears down. However, on and after the base in which the NORMAL LANDING checklist is performed, many operations must be performed at low altitude, such as turning to meet the runway centerline, establishing a descent path toward the touchdown aiming point, and controlling airspeed, and it is also likely that the five items listed in the checklist cannot be carried out with certainty. In addition, it is more likely that the "Landing Gear ... (CONFIRM) DOWN & 3GREEN" described in the NORMAL LANDING checklist should be used to confirm and check the landing gear status by performing the BEFORE LANDING checklist in flight, except when flying a circling pattern during touch-and-goes.

It is important that because checklists are memory aids and help to ensure that important items necessary for the safe operation of an aircraft are not overlooked or forgotten, the right checklist is used at the right time. It is more likely that the Training Checklist established by the Academic Corporate Body covers all the normal operating procedures in the AFM with some exceptions, and includes elements to enable trainees to remember and confirm the normal operating procedures in the AFM, however, it is likely that the act of checking itself may be neglected because there are many items to check in flight. On the other hand, although the AOM's normal checklist is based on the assumption that the normal operating procedures in the AFM are carried out with memory, it is more likely to be items that the Academic Corporate Body has deemed important among the normal operating procedures to ensure the safe and efficient operation of aircraft. Based on the purpose and use of the AOM checklist established for the safe and proper operation of the Textron Aviation G58 aircraft, the Academic Corporate Body should consider ensuring that the checklist is performed at an available appropriate time, including during training, and should revise it as necessary.

(4) Records of Flight

The JTSB concludes that although the Academic Corporate Body had not considered using the data recorded in the aircraft's integrated instrument system and had not inserted a media to record the data, it is more likely that the engine data would be useful as documentation for maintenance, the flight data would be useful for flight reviews and would also be useful in daily operation. In addition, in the event of an accident or other incident, the recorded data will be useful as objective factual information in the investigation. It is desirable for the Academic Corporate Body to record, manage, and utilize the data.

4.PROBABLE CAUSES

The JTSB concludes that it is certain that the aircraft made a belly landing and sustained damage because the landing gears were not extended when the aircraft landed on the runway following a circling pattern which should be flown with the landing gears down after the landing gears were retracted following a go-around during touch-and-goes in a training flight.

Regarding the landing gears not being down, it is most likely that neither the captain nor Trainee A noticed that the landing gears were not down because Trainee A did not carry out the NORMAL LANDING checklist, which included checking the landing gears, and the captain did not himself check the progress of Trainee A's checklist and the items on the NORMAL LANDING checklist.

5.SAFETY ACTIONS

5.1 Safety Actions Required	As described in “3. Analysis,” the Academic Corporate Body is required to consider the timing and content of the checklist handling when flying circling patterns during touch-and-goes.
5.2 Safety Actions Taken after the Accident	The Academic Corporate Body took actions below. (1) The Training Checklist at the time of the accident was revised to a list of procedures (Implementation Procedures). It was decided to use the checklist described in the AOM for checking and confirming operations. (2) For touch-and-goes, it was decided that of the procedures to be carried out after take-off and before landing, only those necessary to check and confirm touch-and-goes should be carried out, and then the following descriptions were added to 4-2 How to Use the Normal Landing Checklist and it was decided to use the AFTER TAKEOFF and BEFORE LANDING checklists described in the AOM after revision. (2) <i>Carry out the items marked with ☆ only those items on the in-flight checklist when conducting touch-and-goes on traffic patterns and circling patterns,</i> (Note) The checklist items marked with ☆ are as follows. After Take-off: Landing gears and Flaps Before Landing: Landing gears, Flaps and Propeller Levers (3) The timing of landing gear extension when flying a circling pattern after a go-around was clarified. In addition, it was decided to perform the AFTER TAKE-OFF checklist. (4) By the time the aircraft reaches runway threshold elevation +200 ft, it was decided to reconfirm that a stable attitude toward the aiming point has been established, flight specifications, the status of the landing gears, the status of FLAPs, landing clearance received, and that there are no aircraft or other obstacles on the runway, then call out "FLAP FULL DOWN, GEAR DOWN 3 GREEN NO WARNING." It was also decided to execute a go-around if this cannot be reconfirmed.