KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA

FINAL

KNKT.22.10.15.04

Aircraft Accident Investigation Report

PT Reven Global Airtranspor

Cessna Caravan 208 B; PK-RVA

Ilaga, Papua

Republic of Indonesia

25 October 2022

2025

This Final Report is published by the Komite Nasional Keselamatan Transportasi (KNKT), whose address is on the Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the KNKT. It is in accordance with Annex 13 to the Convention on International Civil Aviation, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

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Jakarta, 28 February 2025
KOMITE NASIONAL
KESELAMATAN TRANSPORTASI
CHAIRMAN

SOERJANTO TJAHJONO

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ABBREVIATIONS AND DEFINITIONS

AME	:	Aircraft Maintenance Engineer
AMM	:	Aircraft Maintenance Manual
AOC	:	Air Operator Certificate
CASR	:	Civil Aviation Safety Regulation
CPL	:	Commercial Pilot License
DGCA	:	Directorate General of Civil Aviation
GPS	:	Global Positioning System
KNKT	:	*Komite Nasional Keselamatan Transportasi* (is the Indonesia Independent Investigation Authority also known as National Transportation Safety Committee/NTSC)
LT	:	Local Time
MSL	:	Mean Sea Level
OM	:	Operation Manual
PIC	:	Pilot in Command
PF	:	Pilot Flying
PM	:	Pilot Monitoring
SIC	:	Second in Command
SD	:	Secure Digital
TIBA	:	Traffic Information Broadcast by Aircraft
VFR	:	Visual Flight Rules

SYNOPSIS

On 25 October 2022 a Cessna C208B aircraft, registration PK-RVA was being operated by PT. Reven Global Airtranspor (RGA) for an unscheduled cargo flight.

The occurrence flight was the third flight of the day, from Timika to Ilaga. The aircraft departed Timika at 2339 UTC (0839 LT) and cruising at an altitude of 13,000 feet. On board on this flight were two pilots and the cargo consisting of six motorcycles and some groceries. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM).

About 0911 LT, the aircraft landed within touchdown zone of Runway 25. The pilot applied reverse and brakes. The Garmin flight data logging recorded that during the landing roll, the parameters of normal acceleration and vertical speed indicated the aircraft bounced three times. Realizing that the aircraft would overrun, and the pilot cut off the fuel lever to shut down the engine. The aircraft continued to roll and stopped about 77 meters beyond the end of Runway 25.

The pilots evacuated the aircraft. No person was injured, and there was no other damage to property or the environment. However, the aircraft suffered substantial damage, including bent propeller blades, a detached nose wheel, and damage to the left main landing gear and right wingtip.

The investigation determined that there was no issue related to the weather, aerodrome, and weight and balance. Therefore, the analysis will focus on operational procedures and aircraft maintenance. The investigation concluded the contributing factors of the excessive normal acceleration during touchdown that was likely contribute to aircraft bouncing led to the remaining runway distance was not sufficient to stop the aircraft.

Following this accident, PT Reven Global Airtranspor has issued safety actions that are considered relevant to improving safety. However, there are still safety issues that need to be addressed. Therefore, KNKT issued safety recommendations to the aircraft operator.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 25 October 2022, a Cessna C208B (Grand Caravan) aircraft, registration PK-RVA was operated by PT Reven Global Airtranspor (RGA) for an unscheduled cargo flight. The scheduled flights for the day were Timika[1] - Ilaga[2] - Timika - Ilaga - Timika - Ilaga - Timika - Sinak[3] - Timika. The flights were conducted in accordance with Visual Flight Rules (VFR).

The occurrence flight was the third flight of the day, from Timika to Ilaga. The aircraft departed Timika at 2339 UTC[4] (0839 LT) and cruising at an altitude of 13,000 feet. On board on this flight were two pilots and the cargo consisting of six motorcycles and some groceries. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM).

During the descent, passing about 8,700 feet, the pilot contacted airport personnel to report their current position. The airport personnel informed the pilot that the weather at Ilaga was clear. The pilot then performed the approach checklist, including a brake check by pressing brake pedals. The pilot felt there was pressure in the brake pedals.

On final approach, the pilot noticed on the Primary Flight Display (PFD) that the airspeed indicated 83 knots with a tailwind indicated of about 3 knots. There was no traffic on the ground, and the runway was clear.

About 0911 LT, the aircraft landed within touchdown zone of Runway 25. The pilot applied reverse and brakes. The Garmin flight data logging recorded that during the landing roll, the aircraft bounced three times. Realizing that the aircraft would overrun, and the pilot cut off the fuel lever to shut down the engine. The aircraft continued to roll and stopped about 77 meters beyond the end of Runway 25.

The pilots evacuated the aircraft. No person was injured, and there was no other damage to property or the environment.

1.2 Damage to Aircraft

The aircraft was substantially damaged. The detailed damages were as follows:

1. The propeller blades were bent.
2. The left landing gear strut bent upward and the left main wheel tire deflated.
3. The right wingtip dented and wrinkled skin on the right-wing root.
4. The nose landing gear strut was broken, and the nose wheel was detached.

[1] Timika in this report is referred to Mozes Kilangin Airport, Timika (WAYY), Papua.
[2] Ilaga in this report is referred to Aminggaru Ilaga Airport, (WAYL), Papua.
[3] Sinak in this report is referred to Sinak Airport, (WABS), Papua.
[4] The 24-hours clock in Local Time (LT) is used in this report to describe the local time as specific events occurred. Local time is Universal Time Coordinated (UTC) +9 hours

Figure 1: Damage to the aircraft propeller

Figure 2: Damage to the left main landing gear

Figure 3: The nose wheel strut detached

Figure 4: Damage to the right wingtip

1.3 Personnel Information

1.3.1 Pilot Information

Gender	:	Male
Age	:	22 years
Nationality	:	Indonesia
Date of joining company	:	1 October 2019
License	:	Commercial Pilot License (CPL)
Date of issue	:	25 March 2019
Aircraft type rating	:	Single Engine Land (SE Land)
Instrument rating validity	:	12 February 2019
Medical certificate	:	Class I
Last of medical	:	1 July 2022
Validity	:	1 January 2023
Medical limitation	:	Holder shall wear corrective lenses
Last line check	:	2 September 2022
Last proficiency check	:	23 October 2021
Flying experience		
Total hours	:	1,506 hours
Total on type	:	1,493 hours
Last 90 days	:	192 hours 38 minutes
Last 60 days	:	133 hours 10 minutes
Last 30 days	:	34 hours 50 minutes
Last 24 hours	:	6 hours and 35 minutes
This flight	:	35 minutes

1.3.2 Second in Command

Gender	:	Male
Age	:	26 years
Nationality	:	Indonesia
Date of joining company	:	1 December 2021
License	:	CPL
Date of issue	:	25 March 2019
Aircraft type rating	:	SE Land
Instrument rating validity	:	11 November 2017

Medical certificate	:	Class I
Last of medical	:	19 May 2022
Validity	:	7 December 2022
Medical limitation	:	None
Last line check	:	25 March 2022
Last proficiency check	:	28 March 2022
Flying experience		
Total hours	:	1,112 hours
Total on type	:	1,112 hours
Last 90 days	:	119 hours 11 minutes
Last 60 days	:	62 hours 32 minutes
Last 30 days	:	23 jam 55 minutes
Last 24 hours	:	6 hours 35 minutes
This flight	:	35 minutes

1.3.3 Engineer

The engineer was a 30-year-old Indonesian with about 10 years of experience as aircraft maintenance personnel. In November 2021, the engineer was certified for Airframe and Powerplant (A1 and A4). Since 29 March 2022, the engineer has held an Aircraft Maintenance Engineer (AME) License with Cessna 208 series and PT6 engine type rating. Since 1 August 2022, the engineer has been authorized by the company for Return to Service and Maintenance Release.

The engineer had experience in rectifying the brake system for more than ten times since March 2022.

1.4 Aircraft Information

1.4.1 General

Registration Mark	:	PK-RVA
Manufacturer		Textron Aviation Inc.
Country of Manufacturer	:	United States of America
Type/Model	:	Cessna Caravan 208B
Serial Number	:	208B2255
Year of Manufacture	:	2010
Certificate of Airworthiness		
Date of issue	:	29 September 2022
Validity	:	28 September 2023
Category	:	Normal

Limitation	:	None
Certificate of Registration		
Date of issue	:	29 September 2020
Validity	:	28 September 2023
Time Since New	:	11,846,1 hours
Cycles Since New	:	21,057 cycles
Last Major Check	:	11,798,9 hours
Last Minor Check	:	11,798,9 hours

1.4.2 Engines

Manufacturer	:	Pratt & Whitney Canada
Type/Model	:	PT6A-114
Serial Number engine	:	PCE-PC2368
Time Since New	:	2,674 hours 5 minutes
Cycle Since New	:	4,722 cycles

1.4.3 Propellers

Manufacturer	:	McCauley Textron
Type/Model	:	P7036368-0154
Serial Number propeller	:	101002
Time Since New	:	12,221 hours 7 minutes

1.4.4 Weight and Balance

This aircraft had been modified and certified for Aircraft Payload Extender Short Take Off Landing (APE STOL), allowing increased takeoff and landing weight with enhanced capability for performing takeoffs and landings on shorter fields. According to the Pilot Operating Handbook (POH) Supplement, the maximum takeoff weight limitation was 9,062 lbs, and the maximum landing weight was 9,000 lbs. Based on information from the weight and balance sheet for the occurrence flight, the calculated takeoff weight was 8,706 lbs, and the estimated landing weight was at 8,507 lbs. The aircraft was operated within the weight and balance envelope.

1.4.5 Recent Maintenance History

On 24 October 2022 (one day prior to the occurrence flight), during a post-flight inspection, the engineer found that the right wheel brake lining backplate was out of limit and hydraulic fluid was leaking from the brake cylinder. The brake lining and O-ring piston were replaced.

After completing the removal and installation process, the engineer performed bleeding on the right main wheel brake using a hand pump connected to the right brake wheel cylinder bleeder valve, with the parking brake in the off position. The bleeder valve was opened and the hydraulic fluid was pumped into the brake system until the fluid level on the reservoir indicator passed the MAX fill line. The hand pump was then disconnected from the cylinder bleeder valve, which remained open about a quarter turn, allowing hydraulic fluid to drain until the fluid in the reservoir dropped below the MAX fill line. The bleeder valve was then closed. The engineer entered the cockpit, pressed the brake pedal several times, and felt equal pressure in both the left and right brake pedals. The engineer then set the parking brake, and upon checking the right brake, the engineer found that the caliper was tight and the piston was pushing the pressure plate against the brake disc.

The brake system was considered normal, and no hydraulic leakage was found. The engineer asked another engineer to cross-check the brake maintenance. The other engineer performed a similar action by pressing the brake pedal several times and visually inspecting the right brake. The brake maintenance was deemed complete, and the aircraft was returned to service.

At the day of the occurrence (on 25 October 2022), during flight preparation in Timika, the engineer rechecked the brake system by pressing the brake pedal. The engineer informed to the pilot regarding the brake component replacement and advised the pilot to perform a brake burn-in[5], without providing detail instructions or guidance on how to do so.

During taxiing prior to take off, the pilot applied light brakes several times. The pilot also applied brakes during the takeoff roll when the groundspeed below 30 knots. The procedure was performed based on the pilot's experience and knowledge from initial training. The pilot noticed that the right brake pedal felt spongy and soft compared to the left side. Based on pilot's experience, this condition was considered normal after brake maintenance and the pressure would be equal on both sides after several uses of the brakes.

The flight continued to Ilaga and back. After landed in Timika, the pilot reported the spongy right brake pedal to the engineer. The engineer explained that this condition is common after brake lining replacement and that the brake pedal pressure would equalize after several uses. The engineer then suggested a brake checking. Later, the engineer and the pilot agreed to postpone the brake check until the daily inspection.

1.4.6 Brake System

The aircraft brake system, described in the POH, was as follows:

> *The airplane has a single-disc, hydraulically-actuated brake on each main landing gear wheel. Each brake is connected, by a hydraulic line, to a master cylinder attached to each of the pilot's rudder pedals. The brakes are operated by applying pressure to the top of either the left (pilot's) or right (copilot's) set of rudder pedals, which are interconnected. When the airplane is parked, both main wheel brakes may be set by utilizing the parking brake which is operated by a handle below to the right of the pilot's control wheel. To apply the parking brake, set the brakes with the rudder pedals and pull the handle aft. To release the parking brake, push the handle fully in.*

[5] Brake burn-in is a method to helps transfer an even layer of brake pad material onto the brake rotor which assists in smoother brake operation and improved braking power by multiple application of brake.

A brake fluid reservoir, located just forward of the firewall on the left side of the engine compartment, provides additional brake fluid for the brake master cylinders. The fluid in the reservoir should be checked for proper level prior to each flight.

For maximum brake life, keep the brake system properly maintained. Airplanes are equipped with metallic type brakes, and require a special brake burn-in before delivery (or after brake replacement). When conditions permit, hard brake application is beneficial in that the resulting higher brake temperatures tend to maintain proper brake glazing and will prolong the expected brake life. Conversely, the habitual use of light and conservative brake application is detrimental to metallic brakes.

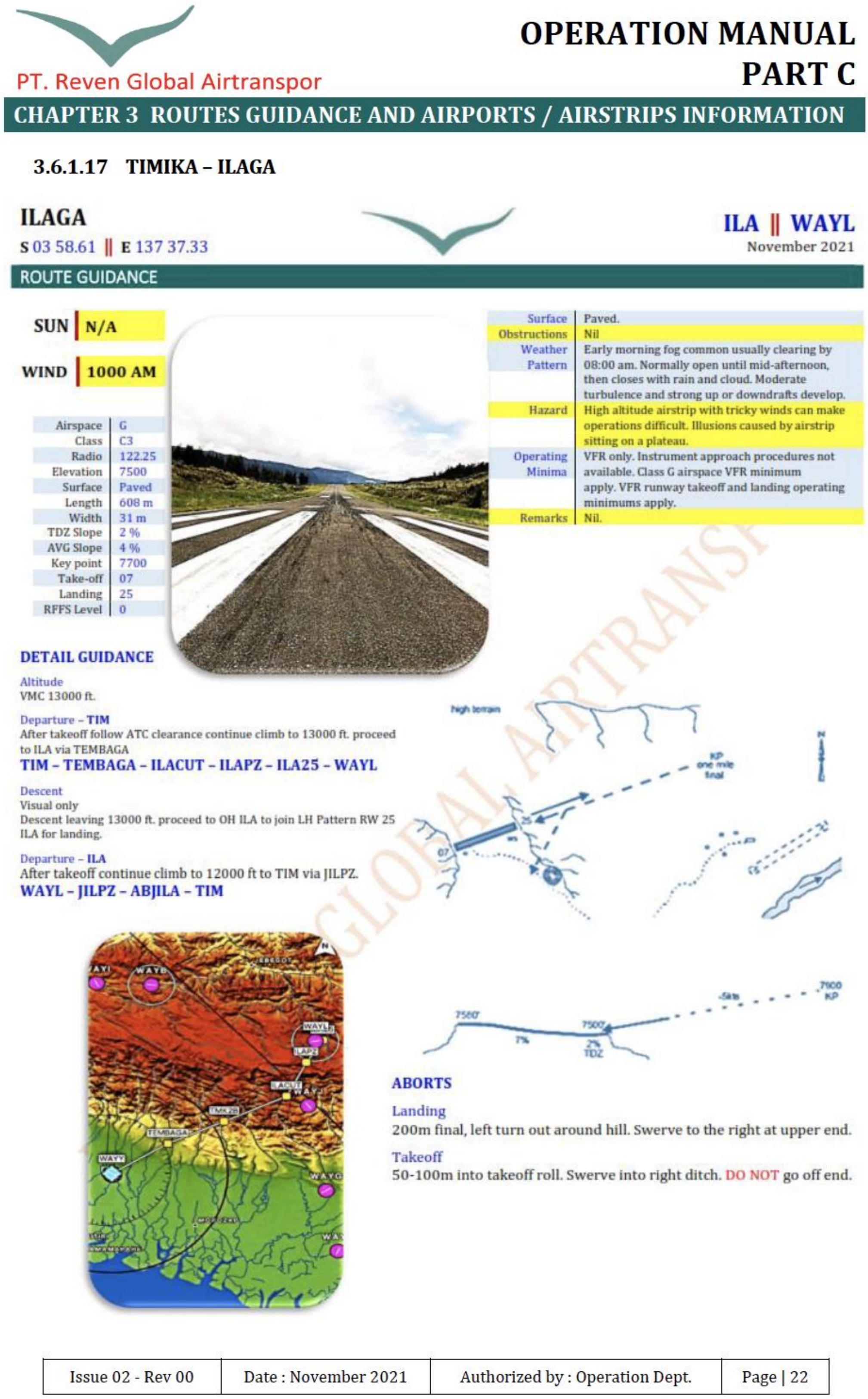
Some of the symptoms of impending brake failure are: gradual decrease in braking action after brake application, noisy or dragging brakes, soft or spongy pedals, and excessive travel and weak braking action. If any of these symptoms appear, the brake system is in need of immediate attention. If, during taxi or landing roll, braking action decreases, let up on the pedals and then re-apply the brakes with heavy pressure. If the brakes become spongy or pedal travel increases, pumping the pedals should build braking pressure. If one brake becomes weak or fails, use the other brake sparingly while using opposite rudder, as required, to offset the good brake.

1.5 Meteorological Information

There was no meteorological station available at Ilaga, the pilot relied on visual observation by airport personnel or other pilots. The pilot noticed that the weather along the route and in the area around Ilaga Airport was clear.

1.6 Aids to Navigation

The RGA developed standard VFR routes in the Operation Manual Part C (OM-C), which included routes and detailed guidance for Ilaga that were used internally. The route guidance for Timika - Ilaga was shown in the figure below.



OPERATION MANUAL
PART C

PT. Reven Global Airtranspor

CHAPTER 3 ROUTES GUIDANCE AND AIRPORTS / AIRSTRIPS INFORMATION

3.6.1.17 TIMIKA – ILAGA

ILAGA
S 03 58.61 || E 137 37.33

ILA || WAYL
November 2021

ROUTE GUIDANCE

SUN N/A

WIND 1000 AM

Airspace	G
Class	C3
Radio	122.25
Elevation	7500
Surface	Paved
Length	608 m
Width	31 m
TDZ Slope	2 %
AVG Slope	4 %
Key point	7700
Take-off	07
Landing	25
RFFS Level	0

Surface	Paved.
Obstructions	Nil
Weather Pattern	Early morning fog common usually clearing by 08:00 am. Normally open until mid-afternoon, then closes with rain and cloud. Moderate turbulence and strong up or downdrafts develop.
Hazard	High altitude airstrip with tricky winds can make operations difficult. Illusions caused by airstrip sitting on a plateau.
Operating Minima	VFR only. Instrument approach procedures not available. Class G airspace VFR minimum apply. VFR runway takeoff and landing operating minimums apply.
Remarks	Nil.

DETAIL GUIDANCE

Altitude
VMC 13000 ft.

Departure – TIM
After takeoff follow ATC clearance continue climb to 13000 ft. proceed to ILA via TEMBAGA
TIM – TEMBAGA – ILACUT – ILAPZ – ILA25 – WAYL

Descent
Visual only
Descent leaving 13000 ft. proceed to OH ILA to join LH Pattern RW 25 ILA for landing.

Departure – ILA
After takeoff continue climb to 12000 ft to TIM via JILPZ.
WAYL – JILPZ – ABJILA – TIM

ABORTS

Landing
200m final, left turn out around hill. Swerve to the right at upper end.

Takeoff
50-100m into takeoff roll. Swerve into right ditch. DO NOT go off end.

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Figure 5: Route guidance for Timika-Ilaga flight.

1.7 Aerodrome Information

Airport Name	:	Ilaga Airport
Airport Identification	:	WAYL/ ILA
Airport Operator	:	Directorate General of Civil Aviation (DGCA)
Coordinate	:	03° 58’ 37.65” S; 137° 37’ 12.59” E
Elevation	:	7,975 feet
Runway Direction	:	25/07
Runway Length	:	600 meters
Runway Width	:	18 meters
Surface	:	Asphalt

1.8 Flight Recorders

The aircraft was not fitted with flight data recorder or a cockpit voice recorder. Neither recorder was required by current Indonesian aviation regulations for this type of aircraft.

The aircraft was fitted with a Garmin G1000 system, which has the capability to log flight data stored on a Secure Digital (SD) card. The flight data has been successfully downloaded by KNKT, retrieving the flight data logging of 134 flights, which consisted of 57 parameters for each flight.

The relevant parameters recorded on the flight data logging related to landing of the accident flight were as follow:

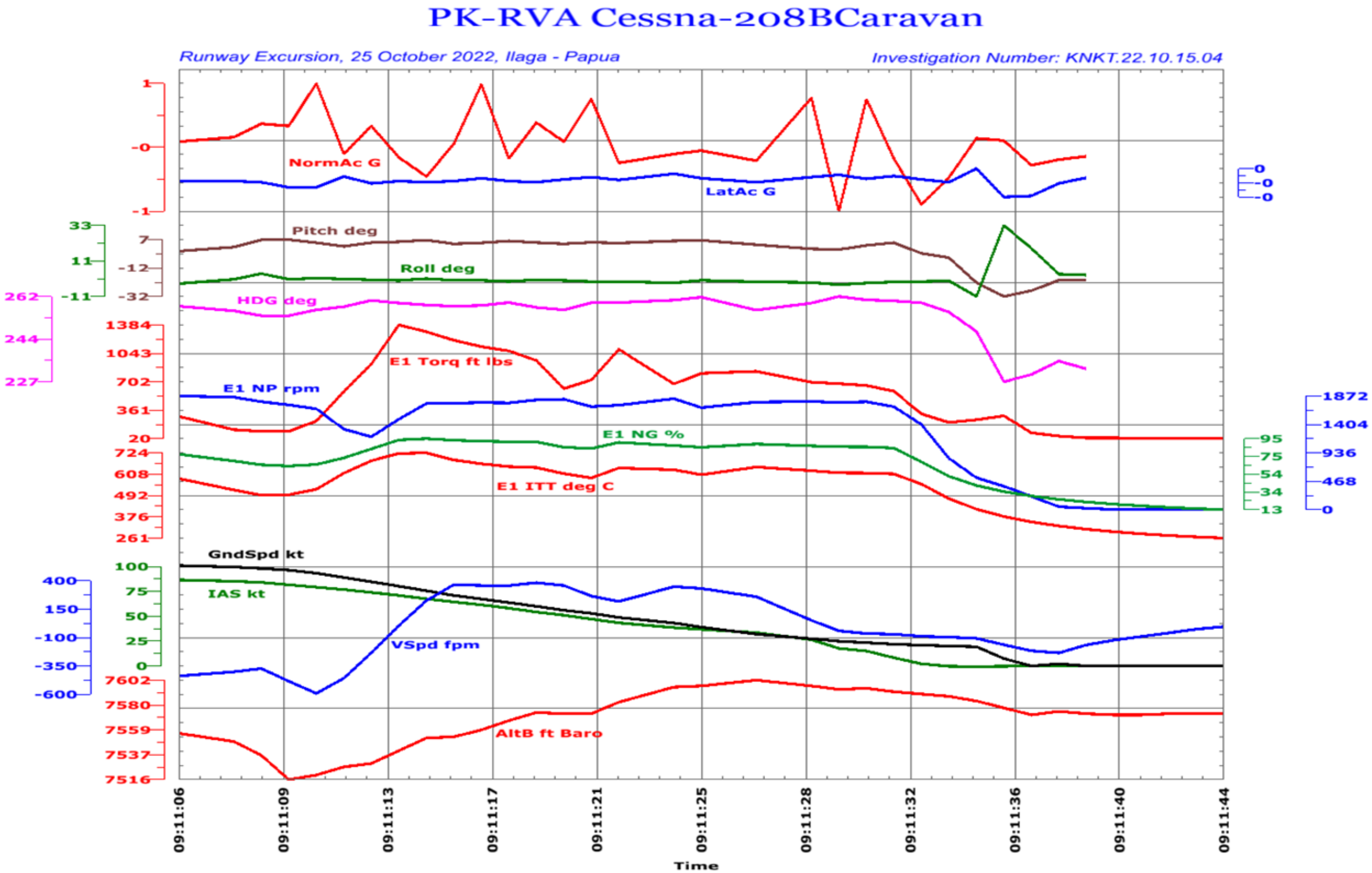


Figure 6: Relevant parameters recorded on the Garmin G1000 on the accident flight

The significant events from the flight data logging are as follows:

1. At 09:11:11 LT, the aircraft touched down at 98 meters from the beginning of Runway 25. The NormAc (normal acceleration) recorded 0.53 G, IAS was 79 knots, vertical speed -591 feet per minute, pitch of 5°, a roll of 0.4° and a heading of 256°.
2. At 09:11:14 LT, the reverse was activated, indicated by the engine torque increasing from 915 to 1,384 foot-pounds. The IAS was 70 knots, vertical speed increased from -591 feet per minute to 4 feet per minute, the pitch was 5.71° and the heading was 259°.
3. At 09:11:17 LT, the NormAc recorded 0.52 G, IAS was 61 knots, the GndSpd (ground speed) was 67 knots, vertical speed was 358 feet per minute, the pitch was 4.97°, the roll was -0.9° and the heading was 258°.
4. At 09:11:18 LT, the reverse was deactivated, indicated by the engine torque decreasing from 1,072 foot-pounds to 956 foot-pounds. The IAS was 58 knots, the vertical speed was 356 feet per minute, the pitch was 6.3°, and the heading was 259°.
5. At 09:11:21 LT, the NormAc recorded 0.39 G, the IAS was 47 knots, the groundspeed was 53 knots, vertical speed was 264 feet per minute, the pitch was 5.3°, the roll angle was -1.7° and the heading was 259°.
6. At 09:11:22 LT, engine torque was 1090 foot-pounds, indicating that the reverse was activated momentarily. The IAS was 43 knots, the groundspeed was 48 knots, the vertical speed was 217 feet per minute, the pitch was 5° and the heading was 259°. At this time, the aircraft position was at 479 meters from the beginning of Runway 25, leaving 121 meters of available runway.
7. At 09:11:31 LT, the aircraft exited the runway.
8. At 09:11:39 LT, the aircraft stopped at 77 meters from the end of Runway 25, and the recording stopped.

The investigation utilized relevant parameters from flight data logging to compare the relevant parameters during the landing roll of the occurrence flight with those of the three previous flights to Ilaga. The utilization of flight data log was limited, as there was no recorded parameters for brake pressure and air/ground status.

The investigation revealed that the aircraft typically landed at Ilaga with the NormAc parameter between 0.1 to 0.2 G and the vertical speed just prior to touchdown was between -31 to -176 feet per minute.

For the purpose of landing profile comparison, the investigation uses the associated parameters as recorded by the flight data logging to estimate the touchdown point such as:

a. the latitude and longitude,
b. the increased engine torque beyond 1,000 feet pounds which indicates the activation of the reverse,
c. the decreased engine torque below 1,000 feet pounds which indicates the deactivation of the reverse, and
d. the point where the aircraft reduced speed for taxiing to the Ilaga apron.

The investigation plotted the latitude and longitude of the data on Google Earth and visualized it as follows.

Figure 7: The visualization of the aircraft landing on previous flight 1

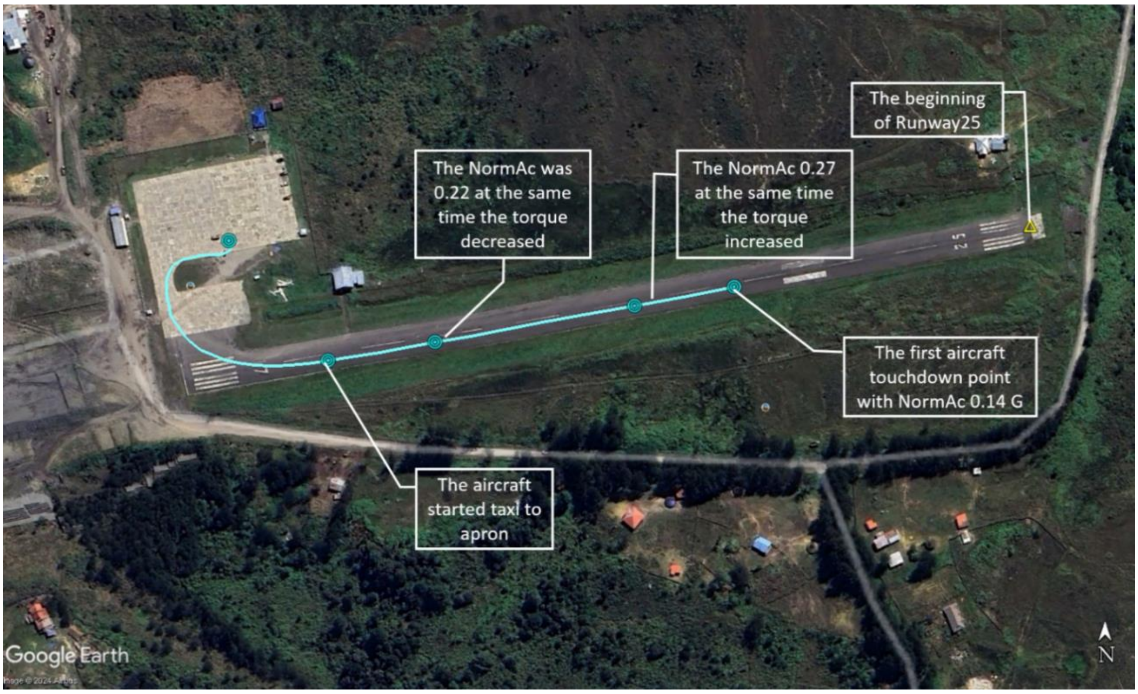


Figure 8: The visualization of the aircraft landing on previous flight 2

Figure 9: The visualization of the aircraft landing on previous flight 3

Figure 10: The visualization of the aircraft landing on occurrence flight

1.9 Wreckage and Impact Information

There was no marking found on the runway from the time the aircraft touched down until it exited the runway. The last position of the aircraft was about 77 meters beyond the runway.

The detached nose wheel was found on the right side of the aircraft, not far from its last position.

Figure 11: The last aircraft position relative to the runway

After the aircraft repositioned to the apron, the brake system was checked by pressing the brake pedals. There was pressure in the left brake pedal, while right brake pedal felt spongy and was able to travel to the end of its movement range. The brake fluid in the reservoir was found to be about 1 centimeter below the MAX line.

The observation of the right brake assembly showed that it was still in the position. The condition of the piston, brake lining, and disc brake were visually in good condition.

1.10 Survival Aspects

After the aircraft stopped, both pilots evacuated on their own. No one was injured.

1.11 Tests and Research

An examination was conducted on the right brake, which had exhibited performance issues. The investigation included measurements of the brake lining using a vernier caliper. The brake lining on the back plate had recently been replaced; therefore, its condition and thickness were essentially like new and well within the specified limits. Additionally, the brake lining on the pressure plate was measured and found to be within the acceptable limit, with a thickness exceeding the minimum requirement of 0.1 inch (2.5 mm).

Figure 12: Brake lining backplate and pressure plate condition

Disc brake measurements were conducted using a micrometer to determine the disc brake thickness, which was then compared with the requirements stated in the Aircraft Maintenance Manual (AMM). Measurements were taken at six different positions to obtain the average thickness. The minimum required thickness for the brake disc specified in the AMM, is 0.537 inches (equivalent to 13.64 mm). The average thickness of the brake disc was found to be below the minimum requirement. The detailed measurement results are shown in Table 1.

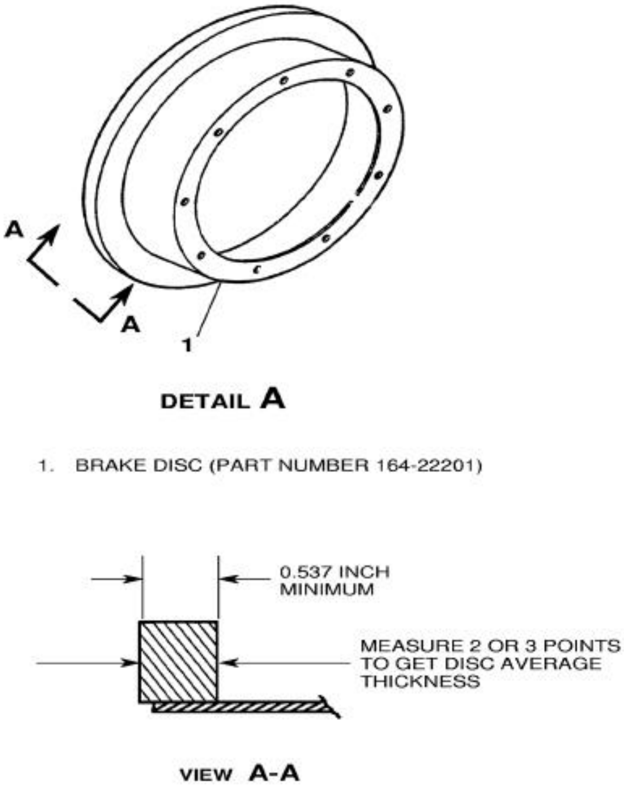


Figure 13: Measurement the brake disc dimension A-A in accordance aircraft maintenance manual

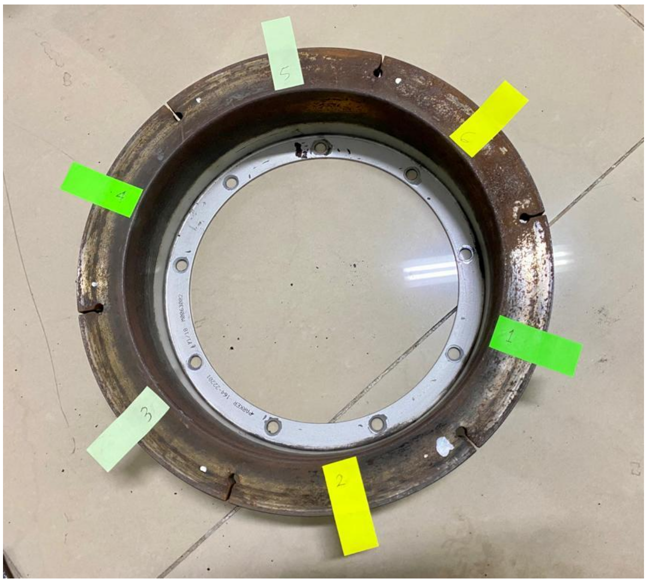


Figure 14: Positions of the measurements that were taken (dimension A-A)

The brake disc measurement result was as follows:

Point	Outer side (mm)	Inner side (mm)	Mid-side (mm)
1	14.20	13.25	13.42
2	13.41	13.33	13.06
3	13.03	13.38	13.29
4	13.09	13.21	13.01
5	13.20	13.39	13.45
6	13.00	13.46	13.49
Total	79.93	80.02	79.72
Average	13.32	13.33	13.28

1.12 Organizational and Management Information

1.12.1 Aircraft Operator

The aircraft was operated by PT Reven Global Airtranspor and held a valid Air Operator Certificate (AOC) with the number 135-066. Under Civil Aviation Safety Regulation (CASR) Part 135, the operator was authorized by the Directorate General of Civil Aviation (DGCA) to conduct non-scheduled air transportation carrying passengers and cargo within Indonesia.

1.12.2 Operational Procedure

1.12.2.1 Landing procedure

According to the POH APE STOL Section 4 Normal procedures, the landing procedure was stated as follow:

LANDING

SHORT FIELD LANDING PROCEDURES WITH APE STOL (FLAPS LAND)

Wing Flaps – FULL DOWN.
Airspeed – 80 KIAS (Refer to Section 5 of this AFMS for speeds at reduced weights).
Power Lever – REDUCE to IDLE after clearing obstacles.
Touchdown – MAIN WHEELS FIRST.
Power Lever – BETA range (lever against spring) after TOUCHDOWN.
NOTE
Further reduction of landing roll will result from use of reverse thrust (See Section 5, Landing Distance – Short Field, Note 5 on page 26 of this AFMS).

Brakes – APPLY HEAVILY while holding elevator control full aft.
Wing Flaps – RETRACT for maximum brake effectiveness at light weights.

1.12.2.2 Landing Performance

According to the POH APE STOL, Chapter 5 (Performance), general information for all short field landing distance charts, provides the calculation of factors affecting the landing distance, which are as follows:

CARGO POD INSTALLED

SHORT FIELD LANDING DISTANCE

NOTES:

The following general information is applicable to all SHORT FIELD LANDING DISTANCE Charts.

1. *Short field technique as specified in Section 4 of the basic Cessna AFM.*
2. *Decrease distances 10% for each 11 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.*
3. *For operation on a dry, grass runway, increase distances by 40% of the "Ground Roll" figure.*
4. *If a landing with flaps UP is necessary, increase the approach speed by 15 KIAS and allow for 40% longer distances.*
5. *Use of maximum reverse thrust after touchdown reduces ground roll distance by approximately 10%.*
6. *Where distance values have been replaced by dashes, operating temperature limits of the airplane would be greatly exceeded. Those distances which are included but for which the operation slightly exceeds the temperature limit are provided for interpolation purposes only.*

CARGO POD INSTALLED

SHORT FIELD LANDING DISTANCE

CONDITIONS:
Flaps **FULL**
Zero Wind
Maximum Braking
PROP RPM Lever **MAX**
Paved, Level, Dry Runway

POWER Lever **IDLE** after clearing obstacles. **BETA** range (lever against spring) after touchdown.

Refer to Page 26 for appropriate notes applicable to this chart.

8500 Pounds — Speed at 50 Feet: 78 KIAS

Pressure Altitude Feet	-10° C		0° C		10° C	
	Grnd Roll Feet	Total Dist To Clear 50 Foot Obst	Grnd Roll Feet	Total Dist To Clear 50 Foot Obst	Grnd Roll Feet	Total Dist To Clear 50 Foot Obst
Sea Level	740	1,525	765	1,565	790	1,605
2000	775	1,590	800	1,630	830	1,670
4000	815	1,655	840	1,700	870	1,745
6000	860	1,730	890	1,780	920	1,825
8000	905	1,810	940	1,860	970	1,910
10,000	960	1,900	995	1,955	1,025	2,000
12,000	1,020	1,995	1,055	2,045	1,090	2,100

Pressure Altitude Feet	20° C		30° C		40° C	
	Grnd Roll Feet	Total Dist To Clear 50 Foot Obst	Grnd Roll Feet	Total Dist To Clear 50 Foot Obst	Grnd Roll Feet	Total Dist To Clear 50 Foot Obst
Sea Level	815	1,645	840	1,685	865	1,720
2000	855	1,710	880	1,755	910	1,790
4000	900	1,785	925	1,825	955	1,870
6000	950	1,865	980	1,915	1,010	1,960
8000	1,000	1,955	1,035	2,005	-----	-----
10,000	1,060	2,045	1,095	2,100	-----	-----
12,000	1,125	2,150	-----	-----	-----	-----

Figure 15 Short field landing distance charts

Based on the estimated conditions during the aircraft landing, the required landing distance can be estimated as follows:

- The landing weight was estimated at 8,507 lbs.
- The aircraft was configured with full flaps, and the speed at 50 feet was assumed to be 78 knots
- Elevation was 7,975 feet, for the calculation, this was rounded up to a pressure altitude of 8,000 feet.
- Outside Air Temperature (OAT): approximately 16–18 ºC (the closest value from the table is 20 ºC).
- The tailwind was approximately 3 knots, which increased the distance by 15% (landing distance increased by 10% for every 2 knots of tailwind).

Based on the Short Field Landing Distance table, the required ground roll distance was calculated to be 1,000 feet. With the addition of a 15% correction for the tailwind, this resulted in a total required distance of 1,150 feet (350 meters).

1.12.2.3 Approach and Landing Accident Reduction/Control Flight into Terrain Training

The aircraft operator established Approach and Landing Accident Reduction/Control Flight into Terrain (ALAR/CFIT) Training as a mandatory training as stated in the Operation Manual Part D (OM-D) subchapter 2.10. The objective of ALAR training is for the trainee to satisfactorily develop awareness of potential hazards during approach and landing, while the objective of the objective of the CFIT training program is to qualify flight crew to a proficient understanding of all aspects of aircraft performance in terrain awareness for avoidance of control flight into terrain.

The initial and recurrent ALAR/CFIT training was conducted by third parties training provider with total duration of 8 hours, which contains of topics for:

a. Ground Training:

1. Background: An introduction to the relevant topics.
2. Controlled Flight Into Terrain (CFIT) Accident Fatalities Review: A detailed analysis of accidents resulting from CFIT incidents.
3. CFIT Accident Contributing Factors: Identification of the main factors that contribute to CFIT accidents.
4. Enhanced Ground Proximity Warning System (EGPWS): An overview of the system's design, warning modes, and display features.

b. Procedures Related to EGPWS Warnings:

1. Recommendations: Best practices, including the use of altimeters, maintaining safe altitude, effective communication with Air Traffic Control (ATC), and managing flight crew complacency.
2. Procedures: Emphasizing the importance of understanding approach charts, maintaining a stabilized approach, and using auto-flight systems.
3. Training: Focusing on EGPWS escape maneuvers and identifying hazards that can lead to CFIT incidents.
4. Awareness: Promoting good Crew Resource Management (CRM), including the importance of briefings and callouts.
5. Evaluation: Utilizing the CFIT Checklist for specified airports to assess preparedness and operational awareness.

Both pilots had attended the ALAR/CFIT training. The investigation received the training modules from the training provider. The modules did not cover topics related to bouncing during landing and the bounce-recovery technique.

1.12.3 Maintenance Procedures

1.12.3.1 Brake Replacement Procedure

The aircraft manufacturer provided the brake replacement procedure in the Aircraft Maintenance Manual (AMM), Chapter 32-40-00, which is described as follows:

Brake Assembly Removal/Installation

A. Remove the Brake Assembly (Refer to Figure 202).

(1) Without applying brakes, pull parking brake handle to the ON position (fully out).

(2) Disconnect brake line at brake cylinder and allow fluid to drain from brake line.

(3) Remove backplate bolt's and backplate's.

(4) Slide brake cylinder assembly off torque plate.

B. Install the Brake Assembly (Refer to Figure 202).

(1) Install pressure plate over anchor bolts.

CAUTION: Do not use a liquid lubricant on the anchor bolts or torque plate bushings. Liquid lubricant can attract dirt and moisture that can cause the accelerated wear or corrosion of the components.

(2) Lubricate the anchor bolts and torque plate bushings with the following:

(a) For non-amphibious environments, use Silicone Spray, Dri-Slide® Multi-Purpose Lubricant or LPS Force 842® Dry Moly Lubricant (equivalent substitutes are permitted).

(b) For amphibious environments, use Lubriplate X-357 Extreme Pressure Moly Lubricant (equivalent substitutes are permitted).

(3) Purge any air from the brake assembly before installation on the torque plate.

(4) Slide brake cylinder assembly onto torque plate.

(5)With shim positioned against backplate's, install backplate bolts and torque from 85 to 90 inch-pounds (9.6 to 10.2 N.m).

NOTE: Backplate bolts incorporate a special self- locking feature and are typically good for approximately four to six reuses. If backplate bolt can be fully engaged into the backplate by hand with no resistance, the self-locking feature of backplate bolt has been destroyed and the backplate bolt should be rejected. Replacement bolts can be ordered from Cessna Parts Distribution.

(6) Connect brake line at wheel cylinder fitting.

(7) Push parking brake handle to the off position (fully in).

(8) Bleed brake system. Refer to Brake System Bleeding.

(9) Do the Operational Check of the Brakes. Refer to Chapter 32-40-00, wheels and Brakes - Inspection/Check, Brakes Operational Check.

1.12.3.2 Brake Operational Check

The procedure in the AMM for performing a Brakes Operational Check after the brake replacement is described as follows:

A. General

(1) Move the airplane to the parking ramp.

(2) Set the parking brake. The parking brake must lock without more than necessary tension on the control and hold and release freely.

NOTE:

Brake checks must include both pilot and copilot positions.

(3) Start the engine and obey all operating limitations. Refer to Pilot's Operating Handbook and Approved Flight Manual.

(4) Advance the throttle as follows:

(a) (PT6A-114 and PT6A-114A Powered Airplanes) Smoothly advance the throttle to the lesser of 1500 foot-pounds or Maximum Allowable Takeoff Torque (Dynamic Redline not to exceed 805°C ITT).

(b) (PT6A-140 Powered Airplanes) Smoothly advance the throttle to the lesser of 2000 foot-pounds or Maximum Allowable Takeoff Torque (Dynamic Redline not to exceed 850°C ITT).

(5) Make sure that the brakes prevent the tires/wheels from rolling.

(6) Return the throttle to the idle position.

(7) Release the parking brake.

(8) Taxi the airplane.

(9) Apply pressure to the pilot's brakes.

(a) Make sure that the brakes do not drag, fade, or bypass fluid.

(b) Make sure that the pedals do not oscillate from a warped or incorrectly aligned disc.

(10) Apply pressure to the copilot's brakes.

(a) Make sure that the brakes do not drag, fade, or bypass fluid.

(b) Make sure that the pedals do not oscillate from a warped or incorrectly aligned disc.

(11) Shut down the engine. Refer to Pilot's Operating Handbook and Approved Flight Manual.

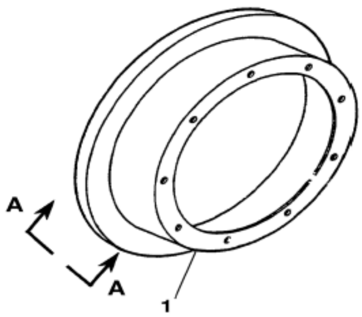
(12) If the parking brake did not prevent the tires/wheels from rolling or other brake problems were encountered. Refer to Wheels and Brakes - Troubleshooting.

1.12.3.3 Brake Detailed Inspection

The operator issued Engineering Instruction number RGA/EI/ENG/XIII/XII/2022 which required to perform detailed brake inspections every 50 hours with tolerance of +10 or -10 hours. The investigation did not find any documentation of the last detailed brake inspection performed before the occurrence. The procedure for detailed brake inspections, as outlined in the AMM Chapter 32-40-00-220, is as follows:

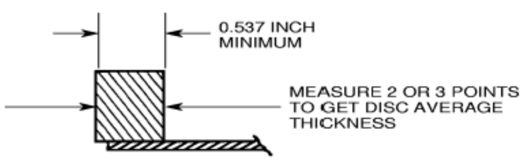
Brakes Detailed Inspection

1) *Remove the brake from the airplane. Refer to Brake Assembly Removal/Installation.*
2) *Disassemble the brake. Refer to Brake Assembly Disassembly/Reassembly.*
3) *Examine the brake linings for deterioration and maximum permissible wear. Replace the lining when worn to 0.100 inch (2.5 mm).*
4) *Examine the brake cylinder bores for evidence of scoring and deterioration. Replace scored cylinders.*
5) *Examine the anchor bolts and brake piston housing at the anchor bolt mounting surface for evidence of wear, cracks or corrosion. Replace all unserviceable or worn parts as required.*
   (a) The anchor bolt must fight tightly into the brake piston housing. Replace parts as necessary to maintain a tight fit between the anchor bolts and the brake piston housing. Refer to the Parker Component Maintenance Manual for External Design Wheels & Brakes, Section 300 - Off Aircraft Maintenance for additional information on fits and clearances.
6) *Reassemble the brake. Refer to Brake Assembly Disassembly/Reassembly.*
7) *Before you install the brake, examine the disc for warpage, wear, grooves, deep scratches, and excessive general pitting or coning (refer to dimension A-A).*



DETAIL A

1. BRAKE DISC (PART NUMBER 164-22201)



VIEW A-A

(a) Coning beyond 0.015 inch (0.38 mm) in either direction is cause for replacement.

(b) Single or isolated grooves up to 0.030-inch (0.76 mm) deep are not cause for replacement, although general grooving of the disc faces will reduce lining life.

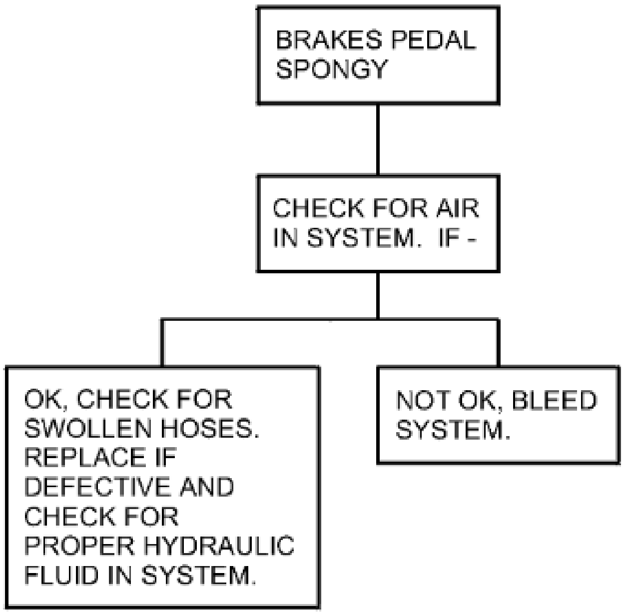
NOTE: Heat checks may develop on the wearing surface of the disc. Heat checks are considered to be superficial surface cracks and are not detrimental to braking performance, although brake disc replacement is necessary if any one crack has a length greater than 0.500 inch (12.7 mm), or a depth greater than 0.250 inch. (6.3 mm).

(8) Replace the brake disc if more than three cracks are found in a disc, or if more than one crack per 90-degree quadrant is found in a disc.

(9) Install the brake. Refer to Brake Assembly Removal/Installation.

1.12.3.4 Troubleshooting Brake System

The troubleshooting chart in the AMM is provided to assist the engineers or maintenance personnel in diagnosing and resolving issues with the aircraft system. The troubleshooting chart for the brake system, related to a spongy brake, as mentioned in the AMM Chapter 32-40-00, was as follow:



1.12.3.5 Brake Bleeding Procedure

The AMM, Chapter 32-40-00, describes the procedure for brake system bleeding as follows:

NOTE: Anytime a brake line is disconnected or a spongy feel to the brake pedal is detected, there is a likelihood that air has entered the system. To make sure the proper braking action is gotten, all the trapped air must be removed from the system by the following procedures.

NOTE: Only use hydraulic fluid with MIL-H-5606 specifications.

(1) Ensure the parking brake handle is off (fully in).

(2) If installed, remove the wheel fairings.

(3) Connect a hydraulic pressure source, such as a hand pump or Hydro Fill unit, to the right brake wheel cylinder bleeder valve.

(4) Open the bleeder valve and begin pumping the hydraulic fluid into the system while observing fluid level in the brake system reservoir, located on lower left corner of the firewall in engine compartment.

(5) When the reservoir is full, close the wheel-brake bleeder valve and remove pressure source.

(6) Using a test syringe or equivalent, remove 90% of fluid from the reservoir.

(a) Make sure that the remaining fluid covers the outlet fitting in the base of the reservoir.

(7) Connect a hydraulic pressure source to the left wheel-brake bleeder valve.

(8) Open the left wheel-brake bleeder valve and pump hydraulic fluid into the system while you observe the fluid level in the brake system reservoir.

(9) When the reservoir is full, close the left wheel-brake bleeder valve and remove the pressure source.

(10) Make sure that the reservoir is filled to within 0.50 inch (12.70 mm) of the MAX fill line shown on the reservoir.

(11) Torque each of the wheel-brake bleeder valves to 35-45 In-Lbs (3.96-5.08 N-m).

(12) If installed, install the brake fairings.

1.12.3.6 Brake Burn-In Procedure

The burn-in process involves controlled heating and cooling of the brakes to improve braking performance. During this process, an even layer of brake pad material is transferred to the brake rotors. The aircraft will stop much faster and more smoothly when the layer of brake pad material is already present on the rotor. The burn-in procedure is achieved by applying an adequate base layer of pad material on the rotor to ensure optimal braking performance.

The relevant procedure for the burn-in of new brakes provided in the AMM Chapter 32-40-00 were as follows:

A. Airplanes 20800001 thru 20800135 and 208B0001 thru 208B0102.

(1) Perform six consecutive light braking applications from 20 to 35 knots. Allow brake discs to cool substantially between stops.

CAUTION: Do not set the parking brakes while they are hot. This will help to prevent irregular friction surface mix transfer that can result in brake clatter, noise and vibration.

B. Airplanes 20800136 and On, 208B0103 and On, and All Spares.

NOTE: The brake pads are of a metallic composition and require the following break-in procedure.

(1) Perform two consecutive full stop braking applications from 30 to 35 knots.

CAUTION: Do not allow brake discs to cool substantially between stops. Use caution in performing this procedure, as higher speeds with successive stops could cause the brakes to overheat, resulting in warped discs and/or pressure plates.

1.13 Additional Information

1.13.1 Ballooning and bounced landings according to the FAA Airplane Flying Handbook

The Airplane Flying Handbook issued by Federal Aviation Administration (FAA) describes several common landing imperfections, such as ballooning and bounced landings. The detailed descriptions are as follows:

Ballooning During Round Out

If the pilot misjudges the rate of sink during a landing and thinks the airplane is descending faster than it should, there is a tendency to increase the pitch attitude and AOA too rapidly. This not only stops the descent, but actually starts the airplane climbing. This climbing during the round out is known as ballooning. [Figure 9-34] Ballooning is dangerous because the height above the ground is increasing and the airplane is rapidly approaching a stalled condition. The altitude gained in each instance depends on the airspeed or the speed with which the pitch attitude is increased.

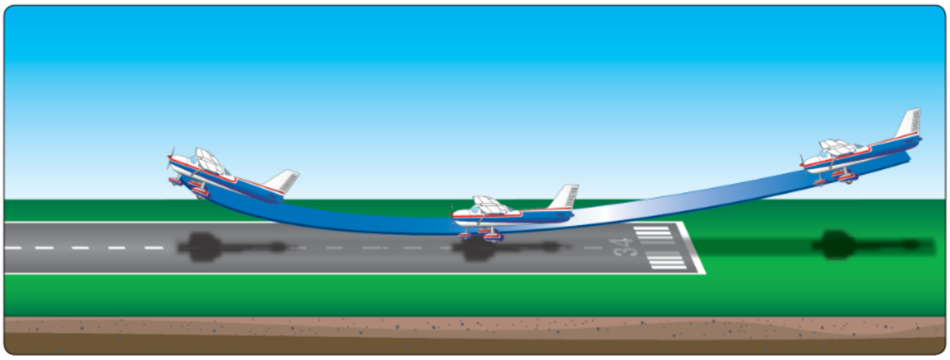


Figure 9-34. *Ballooning during roundout.*

Depending on the severity of ballooning, the use of throttle is helpful in cushioning the landing. By adding power, thrust is increased to keep the airspeed from decelerating too rapidly and the wings from suddenly losing lift, but throttle should be closed immediately after touchdown. Torque effects vary as power is changed, and it is necessary to use rudder pressure to keep the airplane straight as it settles onto the runway.

The pilot needs to be extremely cautious of ballooning when there is a crosswind present because the crosswind correction may be inadvertently *released or it may become inadequate. Because of the lower airspeed after ballooning, the crosswind affects the airplane more. Consequently, the wing has to be lowered even further to compensate for the increased drift. It is imperative that the pilot makes certain that the appropriate wing is down and that directional control is maintained with opposite rudder. If there is any doubt, or the airplane starts to drift, the pilot should execute a go-around.*

When ballooning is excessive, it is best to execute a go-around immediately and not attempt to salvage the landing. Power should be applied before the airplane enters a stalled condition.

Bouncing During Touchdown

When the airplane contacts the ground with a sharp impact as the result of an improper attitude or an excessive rate of sink, it tends to bounce back into the air. Though the airplane's tires and shock struts provide some springing action, the airplane does not bounce like a rubber ball. Instead, it rebounds into the air because the wing's AOA was abruptly increased, producing a sudden addition of lift.

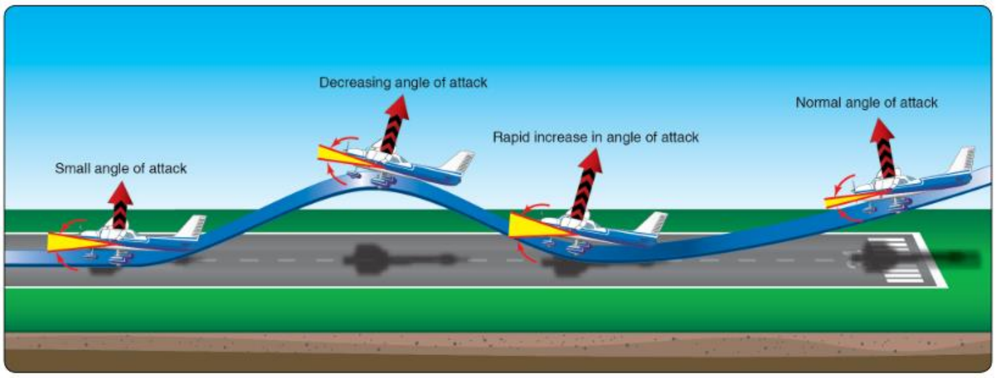


Figure 9-35. *Bouncing during touchdown.*

The abrupt change in AOA is the result of inertia instantly forcing the airplane's tail downward when the main wheels contact the ground sharply. The severity of the bounce depends on the airspeed at the moment of contact and the degree to which the AOA or pitch attitude was increased.

Since a bounce occurs when the airplane makes contact with the ground before the proper touchdown attitude is attained, it is almost invariably accompanied by the application of excessive back-elevator pressure. This is usually the result of the pilot realizing too late that the airplane is not in the proper attitude and attempting to establish it just as the second touchdown occurs.

The corrective action for a bounce is the same as for ballooning and similarly depends on its severity. When it is very slight and there is no extreme change in the airplane's pitch attitude, a follow-up landing may be executed by applying sufficient power to cushion the subsequent touchdown and smoothly adjusting the pitch to the proper touchdown attitude. In the event a very slight bounce is encountered while landing with a crosswind, crosswind correction needs to be maintained while the next touchdown is made. Since the *subsequent touchdown is made at a slower airspeed, the upwind wing has to be lowered even further to compensate for drift.*

Extreme caution and alertness should be exercised any time a bounce occurs, but particularly when there is a crosswind. Pilots should not release the crosswind correction. When one main wheel of the airplane strikes the runway, the other wheel touches down immediately afterwards, and the wings become level. Then, with no crosswind correction as the airplane bounces, the wind causes the airplane to roll with the wind, thus exposing even more surface to the crosswind and increasing any drift.

When a bounce is severe, the safest procedure is to execute a go-around immediately. The pilot should not attempt to salvage the landing. Apply full power while simultaneously maintaining directional control and lowering the nose to a safe climb attitude. The go around procedure should be continued even though the airplane may descend and another bounce may be encountered. Landing from a bad bounce should not be attempted, since airspeed diminishes very rapidly in the nose-high attitude, and a stall may occur before a subsequent touchdown can be made.

1.13.2 Bouncing and bounce recovery Flight Safety Foundation

The ALAR briefing note issued by Flight Safety Foundation help to prevent the approach and landing accident including the description of bounce recovery – rejected landing the relevant note related to bounced landings and recovery technique were as follows:

Bouncing and Bounce Recovery

Bouncing during a landing usually is the result of one or more of the following factors:

- *Loss of visual references;*
- *Excessive sink rate;*
- *Late flare initiation;*
- *Incorrect flare technique;*
- *Excessive airspeed; and/or,*
- *Power-on touchdown (preventing the automatic extension of ground spoilers, as applicable).*

The bounce-recovery technique varies with each aircraft type and with the height reached during the bounce.

Recovery From a Light Bounce (Five Feet or Less)

When a light bounce occurs, a typical recovery technique can be applied:

- *Maintain or regain a normal landing pitch attitude (do not increase pitch attitude, because this could lead to a tail strike);*
- *Continue the landing;*
- *Use power as required to soften the second touchdown; and,*
- *Be aware of the increased landing distance.*

Recovery From a High Bounce (More Than Five Feet)

When a more severe bounce occurs, do not attempt to land, because the remaining runway may be insufficient for a safe landing.

The following go-around technique can be applied:

- *Maintain or establish a normal landing pitch attitude;*
- *Initiate a go-around by activating the go-around levers/ switches and advancing the throttle levers to the go-around thrust position;*
- *Maintain the landing flaps configuration or set a different flaps configuration, as required by the aircraft operating manual (AOM)/quick reference handbook (QRH).*
- *Be prepared for a second touchdown;*
- *Be alert to apply forward pressure on the control column and reset the pitch trim as the engines spool up (particularly with underwing-mounted engines);*
- *When safely established in the go-around and when no risk remains of touchdown (steady positive rate of climb), follow normal go-around procedures; and,*
- *Re-engage automation, as desired, to reduce workload.*

1.14 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 ANALYSIS

The investigation determined that there was no issue related to the weather, aerodrome, and weight and balance. Therefore, the analysis will focus on operational procedures and aircraft maintenance.

2.1 Landing Roll

Based on the Garmin flight data logging, the aircraft touched down approximately 98 meters from the beginning of Runway 25. The airspeed during touchdown was recorded at 79 knots. According to the (Pilot Operating Handbook) POH, the calculated ground roll distance required for the existing conditions was 1,150 feet or 350 meters. The available runway length at Ilaga Airport was about 600 meters, which should be sufficient for the aircraft to stop.

Based on the Garmin G1000 flight data logging, the investigation estimated that at 09:11:11 LT, the aircraft touched down on Runway 25. The normal acceleration recorded 0.53 G, while the IAS was 79 knots and the aircraft pitch was nose up 5°. In comparison the three previous flights to Ilaga, the normal acceleration during landing ranged between 0.1 and 0.2 G. The normal acceleration of 0.53 G and nose-up pitch of 5°, indicated that the aircraft experienced an excessive normal acceleration .

The excessive normal acceleration recorded was influenced by the high vertical speed just prior to touchdown, which was recorded at -590 feet per minute, while the previous flight from Timika to Ilaga recorded between -31 to -176 feet per minute.

At 09:11:14 LT, or 3 seconds later, the reverse was activated, indicated by an increase in engine torque from 915 to 1,384 foot-pounds. The vertical speed increased from -591 feet per minute to 4 feet per minute and the aircraft pitch was 5.7°, while the aircraft was still on the runway, on a heading of 259°. The changed in vertical speed from a descent to a climb indicated that the aircraft was moving upward, suggesting that the aircraft experienced a bounced landing. It was very likely that the excessive normal acceleration during touchdown contributed to aircraft bounced and the deformation of left main landing gear.

The Garmin G1000 flight data logging recorded that at 09:11:17 LT, the aircraft touched down again on Runway 25 with a normal acceleration of 0.52 G. This excessive normal acceleration caused the aircraft to bounce again, as indicated by an increase in vertical speed of about 350 feet per minute. One second later, the reverse was deactivated.

The second bounce was likely caused by unrecovered first bounce. After the first and second bounces, the Engine Torque parameter recorded a rapid increase to more than 1,000 foot-pounds, which might indicate the reverse was engaged instead of applying power to soften the touchdown.

At 09:11:21 LT, the aircraft made the third touchdown with the normal acceleration of 0.39 G and IAS of 47 knots (the ground speed was 53 knots). At a speed of 43 knots, the reverse was activated momentarily, as indicated by an increase in engine torque to 1,090 foot-pounds, while 121 meters of runway remained available.

Although the bounced was not significantly high, it reduced traction between the wheels and the runway hence the braking becomes ineffective and decreasing the deceleration of the aircraft. After two bounces, the aircraft finally settled firmly on the ground with approximately 121 meters of runway remaining, and the aircraft groundspeed was 43 knots. The reverse was applied, however, since the brake parameter was not recorded in the flight data logging, the investigation did not have adequate information on whether the brake was applied. This remaining runway distance was insufficient to stop the aircraft, which came to a stop at 77 meters beyond Runway 25.

2.2 Maintenance of Brake System

The last maintenance action related to the brake system was carried out the previous day of the occurrence. After replacing the brake lining and the seal O-ring, brake bleeding was performed. The engineer pumped hydraulic fluid into the right brake system via the bleeder valve until the reservoir indicator surpassed the MAX fill line. Then, the engineer left the bleeder valve open about a quarter turn to allow the hydraulic fluid to drain by gravity until the fluid in the reservoir dropped below the MAX fill line. Once the fluid level fell below the MAX fill line, the engineer closed the bleeder valve and pressed the brake pedals several times to ensure there were no leaks in the brake system. After confirming no hydraulic leaks, the engineer deemed the task complete. Following the replacement of the brake lining and the bleeding procedure, the engineer advised another engineer to double-check the task's completion. The other engineer repeated similar actions to verify the work.

The brake bleeding procedure, as required by the Aircraft Maintenance Manual (AMM), states that hydraulic fluid should be pumped into the system while monitoring the fluid level in the brake system reservoir. Once the reservoir is full, the wheel-brake bleeder valve should be closed, and the pressure source removed. Using a test syringe or an equivalent tool, 90% of the fluid should be removed from the reservoir, ensuring that the remaining fluid covers the outlet fitting at the base of the reservoir. Afterward, connect a hydraulic pressure source to the left wheel-brake bleeder valve and repeat the same procedure performed on the opposite brake. Ensure that the reservoir is filled to within 0.50 inch (12.70 mm) of the MAX fill line indicated on the reservoir. Finally, tighten the bleeder valve to the specified torque, completing the bleeding process.

There were differences between the bleeding procedure performed by the engineer and the one prescribed in the AMM, as follows:

Firstly, after pumping hydraulic fluid into the reservoir, the engineer did not use a syringe or an equivalent tool to remove approximately 90% of the fluid from the reservoir, but instead left the bleeder valve open about a quarter turn to allow hydraulic fluid to drain by gravity until the fluid in the reservoir dropped below the MAX fill line. This was performed because the engineer was not aware of the procedure specified in the AMM. This deviation may have led to air bubbles remained in the system, causing the brakes to feel spongy.

Secondly, the engineer did not perform the bleeding process on the left brake system, as required by the AMM, because the engineer assumed the problem was limited to the right brake system. This may have allowed air bubbles to remain in the system, potentially affecting the left brake's performance.

Thirdly, after completing the brake bleeding process, the action of pressing the brake pedals several times was not mentioned in the AMM. This practice was based on common methods that may have become habitual among the company's engineers. Since the aircraft was in a static position with no load applied to the brake system, the spongy feeling may not have been detected, and only visual signs of leaks could have been observed.

Furthermore, the AMM procedure for the replacement of brakes stated that the subsequent step after brake bleeding is to conduct an operational check of the brakes. This check requires that the aircraft be parked with the parking brake set, the engine running, and the throttle advanced to the lesser of 1,500 foot-pounds or the maximum allowable takeoff torque to ensure the brakes prevent the wheels from rolling. Further operational checks should include taxiing the aircraft to confirm that the brakes do not drag, fade, or bypass fluid, and to ensure that the pedals do not oscillate due to a warped or incorrectly aligned disc. The operational check should be performed on all brake pedals, including both the pilot and copilot sides.

The operational check was not conducted as the engineer was unaware of the required procedures. Moreover, the engineer did not have authorization to perform an engine run-up or taxi the aircraft. The absence of this operational check consequently resulted in the sponginess of the brakes becoming unidentified and uncorrected.

The engineer was aware that after replacing the brake lining, the burn-in should be performed as required by the AMM. During the preflight of the first flight on the day of the occurrence, the engineer informed the pilot to perform the burn-in process without detailed guidance and instruction, based on the assumption that the pilot was already familiar with the burn-in procedure.

The pilot applied light braking several times during taxi. Subsequently, the pilot used the brakes during the takeoff roll when the ground speed was below 30 knots.

The applicable procedure for the burn-in of new brakes, as specified in the AMM for PK-RVA (serial number 208B2255), is to perform two consecutive full-stop braking applications from 30 to 35 knots without allowing the brake discs to cool substantially between stops. However, the procedure followed by the pilot seems to reference the burn-in procedure for aircraft with serial numbers 208B0001 through 208B0102, which involves performing six consecutive light braking applications from 20 to 35 knots, allowing the brake discs to cool substantially between stops.

This disparity likely occurred due to the absence of detailed guidance from the engineer and the pilot's lack of awareness of the correct burn-in procedure, which may have led the pilot to conduct the burn-in incorrectly.

During the previous flight, after landing in Timika, the pilot verbally reported to the engineer that the right-side brake pedal felt spongy or softer than the left. This condition was likely caused by trapped air in the brake system, which could prevent hydraulic fluid from flowing properly. In response to the pilot report, the engineer suggested that the pressure would equalize after several uses of the brakes, a suggestion the pilot agreed with.

The spongy condition was considered non-normal according to the AMM and POH. The AMM stated that the troubleshooting chart for spongy brakes required verifying the presence of air in the brake system. The rectification for that symptom is removing trapped air in the brake system by performing brake bleeding.

The engineer’s suggestion that the spongy condition would disappear after several brake usages, which was agreed upon by the pilot. This understanding might have influenced the pilot's decision to continue the subsequent flight from Timika to Ilaga, thereby delaying the necessary rectification.

Examinations of the brake disc after the occurrence revealed that the average thickness was below the minimum limitation. The operator was required to check the brake disc thickness periodically during scheduled detailed inspection of the brakes every 50 hours. The procedure stated that the brake disc should be replaced if the thickness is found to be below the minimum requirement. However, the investigation could not find records of the last 50-hour detailed inspection of the brake system maintained by the operator.

Despite recent deviations from the maintenance procedure, the investigation highlighted that these issues did not directly contribute to the aircraft’s runway overrun.

3 CONCLUSIONS

3.1 Findings

The findings are statements of all significant conditions, events, or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

In this occurrence, the KNKT identified several findings as follows:

1. The aircraft had a valid Certificate of Airworthiness (C of A) and a valid Certificate of Registration (C of R) and was operated within the weight and balance envelope.
2. Both pilots held valid licenses and medical certificates.
3. Both pilots had received ALAR/CFIT training. The training modules from the training provider did not cover topics related to bouncing during a landing and the bounce-recovery technique. Both pilots had not been trained for bounce landing recovery.
4. The engineer held a valid Aircraft Maintenance Engineer (AME) license with a type rating for a Cessna 208 and PT6 engine.
5. On 24 October 2022, the right brake lining and O-ring piston were replaced. After removal and installation were completed, the engineer performed bleeding on the right main wheel brake.
6. The brake bleeding procedure conducted was different with the guidance provided on the aircraft maintenance manual.
7. There was no operational check performed after the maintenance action on the brake system, and then the aircraft returned to service.
8. On 25 October 2022, during flight preparation in Timika, the engineer informed the pilot to perform brake burned in without detail instruction or guidance on how to perform.
9. The pilot applied light braking during the taxi several times. Subsequently, the pilot applied the brakes during takeoff roll when the ground speed was below 30 knots. This procedure did not align with the instructions in the AMM that apply to PK-RVA aircraft.
10. Before departure for the occurrence flight, the pilot informed the engineer that the right brake pedal was spongy compared to the left side. The engineer suggested this condition commonly occurs after replacement of brake lining, and the brake pedal pressure would disappear after several uses. The engineer and the pilot agreed to postpone the brake check until the daily inspection.
11. The aircraft touched down approximately 98 meters from the beginning of Runway 25. The airspeed during touchdown was recorded at 79 knots. According to the POH, the calculated ground roll distance required for the existing conditions was 1,150 feet or 350 meters.

12. During the first touchdown, the NormAc parameter recorded 0.53 G, while the IAS was 79 knots and the aircraft pitch was nose up 5°. If compared with the three previous flights to Ilaga (the NormAc ranged between 0.1 and 0.2 G). indicated that the aircraft experienced an excessive NormAC. It was very likely that the aircraft bounced due to the excessive NormAc during touchdown.
13. The second aircraft touched down on Runway 25 with a NormAc of 0.52 G. This excessive NormAc caused the aircraft to bounce again, as indicated by an increase in vertical speed of about 350 feet per minute. The aircraft deactivated the reverse one second later.
14. After the first and second bounces, the engine torque parameter recorded a rapid increase to more than 1,000 foot-pounds, which might indicate the reverse was engaged instead of applying power to soften the touchdown.
15. The aircraft made the third touchdown with the a NormAc of 0.39 G and IAS of 47 knots (the ground speed was 53 knots). At a speed of 43 knots, the reverse was activated momentarily, as indicated by an increase in engine torque to 1,090 foot-pounds.
16. The aircraft settled firmly on the ground with approximately 121 meters of runway remaining, and the aircraft groundspeed was 43 knots. This remaining runway distance was insufficient to stop the aircraft, which stopped about 77 meters beyond Runway 25.
17. Examinations of the brake disc after the occurrence revealed that the average thickness was below the minimum limitation.

3.2 Contributing Factors

Contributing factors is defined as actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident.

The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability. The presentation of the contributing factors is based on chronological order and not to show the degree of contribution.

The KNKT concluded the contributing factors as follow:

The excessive normal acceleration during touchdown that was likely contribute to aircraft bouncing led to the remaining runway distance was not sufficient to stop the aircraft.

4 SAFETY ACTION

At the time of issuing this draft Final Report, the KNKT had been informed of safety actions resulting from this occurrence taken by the related parties.

4.1 Directorate General of Civil Aviation

The Directorate General of Civil Aviation (DGCA) issued Safety Circular number SE.01 of 2023 on 9 January 2023. The summary of the circular is as follows:

A. Emphasize the Aircraft Operator Certificate (AOC) 135 and Operator Certificate (OC) 91 holders operating Cessna 208 series aircraft must comply with the applicable Civil Aviation Safety Regulation (CASR) part 91.403(b), part 13.363(a)(2), and Part 43.13(a).

B. Regarding to the replacement/installation of new brake linings on Cessna 208 series aircraft, aircraft operators are encouraged to:

1. Ensure that the procedures for replacing/installing new brake linings and performing the Brake Burn-In follow the current Cessna 208 Series Maintenance Manual, Chapter 32-40-00
2. Ensure that the replacement/installation of new brake linings and Brake Burn-In are completed as part of the process before the aircraft is declared Return to Service (RTS) by a Licensed Aircraft Maintenance Engineer (LAME).
3. Require that the Brake Burn-In process is performed by a qualified pilot, accompanied by a LAME, in accordance with the applicable procedures
4. Require that the Brake Burn-In process is recorded in the maintenance logbook and signed by the pilot
5. Ensure that the aircraft has been officially released for Return to Service (RTS) before performing any commercial flight.
6. Enhance communication and coordination between the Maintenance and Operational Departments to improve synergy and prevent aircraft accidents or incidents.

4.2 PT Reven Global Air Transport

The aircraft operator issued Quality Notice number RGA/QN/001/XI/2022 on 4 November 2022 to the engineers. The summary of the notice is as follows:

1. Engineers are required to replace both the backplate and pressure plate brake linings (8 pieces).
2. Engineers are required to conduct the Burn-In Procedure as per the C208B Maintenance Manual Chapter 32-40-00 No. 10.B by conducting two full stops at 30-35 knots after performing brake maintenance (brake lining, brake disc, or piston O-ring replacement).
3. The aircraft shall not be released for Return to Service until the Burn-In Procedure has been completed.

4. The Burn-In Procedure must be conducted by the pilot, who must then sign the Aircraft Flight and Maintenance Log (AFML). Only after this can the engineer release the aircraft.
5. If the pilot has doubts after brake bleeding performed by the engineer, the pilot must carry out the Burn-In Procedure and sign the AFML.
6. Engineers are advised to hold aircraft operations in response to verbal complaints regarding the brake system.
7. Engineers are required to refer and attaching the hard copy of the Maintenance Manual as a reference of the troubleshooting process during rectification.
8. Engineers are required to be present during aircraft transit and consult with pilots about the aircraft's condition.
9. For the Bolt Caliper, refer to the C208B Maintenance Manual, Chapter 32-40, No. 6.B.3. The Brake Caliper Bolt is typically used 4 to 6 times. If you manually tighten the bolt until the thread runs out, you must replace it, even if it has been used fewer than 4 times.
10. When replace the brake disc, sand the area that comes into contact with the brake lining mount with 220-grit sandpaper until the paint is completely removed.

5 SAFETY RECOMMENDATIONS

The KNKT acknowledges the safety actions taken by the DGCA and RGA. The safety actions was considered relevant to improve safety, however there still safety issues remain to be considered. Therefore, the KNKT issued safety recommendations to address safety issues identified in this report.

5.1 PT. Reven Global Airtranspor

- **04.O-2022-15.02**

  ALAR briefing note issued by Flight Safety Foundation help to prevent the approach and landing accident including the description of bounce recovery. The investigation received a sample of the ALAR/CFIT training modules from the training provider. The modules did not cover topic related to bouncing during a landing and the bounce-recovery technique. The absence of this technique may affect the pilot's actions and decisions during a bounce landing.

  Therefore, the KNKT recommends that the operator review the syllabus and ensure that the ALAR/CFIT training provides to their pilots includes bounce landing and recovery techniques.

- **04.O-2022-15.03**

  The investigation found that maintenance practices on the brake system included several deviations from the procedures specified in the Aircraft Maintenance Manual (AMM). This deviation may have allowed air bubbles remain in the system, causing the brakes to feel spongy. Deviation from adhering to the specified maintenance procedure may result in improper problem rectification.

  Therefore, KNKT recommends that the aircraft operator ensure all maintenance actions are performed according to the AMM.

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