LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10477										
Classification	Accident			**Date**	9 August 2024			**Time**	0920Z		
Type of Operation	Private (Part 94)										
Location											
Place of Departure	Grand Central Aerodrome (FAGC), Gauteng Province			Place of Intended Landing				Grand Central Aerodrome (FAGC), Gauteng Province			
Place of Occurrence	To the left of Runway 35 at FAGC										
GPS Co-ordinates	Latitude	25°59'20.51" S		Longitude	028°08'29.39" E			Elevation	5 327 feet		
Aircraft Information											
Registration	ZU-CNI										
Make; Model; S/N	Shadow Lite CC; Jabiru SP (Serial Number: 502)										
Damage to Aircraft	Minor				Total Aircraft Hours			1 053.1			
Pilot-in-command											
Licence Type	Private Pilot Licence			Gender	Male			Age	46		
Licence Valid	Yes	Total Hours		358.3	Total Hours on Type			111.2			
Total Hours 90 Days	35.6			Total Hours on Type Past 90 Days				14.4			
People On-board	1 + 0	**Injuries**	0	**Fatalities**	0			**Other (on ground)**	0		

What Happened

On Friday morning, 9 August 2024, a pilot on-board a Jabiru SP aircraft with registration ZU-CNI took off from Grand Central Aerodrome (FAGC) with the intention to return to the same aerodrome. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that he departed on a navigational flight from FAGC at 0700Z to Bela Bela and, thereafter, Loskop Dam, before returning to FAGC. The aircraft had 80 litres of fuel and the duration of the flight was 2 hours and 20 minutes. On his return flight, the pilot joined the left downwind for Runway 35. The approach was stable and the aircraft touched down with the main wheels first, followed by the nose wheel. During the landing roll as the aircraft decelerated, it suddenly yawed from the left to the right. He stated that it felt like there was something wrong with the nose wheel. Thereafter, the left main landing gear strut collapsed, and the aircraft veered off to the left of the runway.

The Aerodrome Rescue and Firefighting (ARFF) personnel responded to the scene after the air traffic control (ATC) activated the crash alarm. The aircraft sustained damage to the left main landing gear strut that bent backwards and caused the gear strut to partially collapse. The pilot was not injured.

The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 25º59’20.51” South 028º08’29.39” East, at an elevation of 5 327 feet (ft).

Figure 1: The yellow pin next to Runway 35 indicates the position of the aircraft after the accident. (Source: Google Earth)

Figure 2: The left main tyre markings on the runway. (Source: Pilot)

Figure 3: The aircraft as it came to rest next to the runway. (Source: Pilot)

Figure 4: The left main landing gear leaf spring strut that folded backwards. (Source: Pilot)

Meteorological Information

The weather information entered in the table below was obtained from the pilot questionnaire.

Wind Direction	327º	Wind Speed	4 knots	Visibility	9999 m
Temperature	17ºC	Cloud Cover	CAVOK	Cloud Base	Nil
Dew Point	1.4ºC	QNH	1024hPa		

The weather information entered in the table below was obtained from the meteorological aerodrome report (METAR) that was issued by the South African Weather Service (SAWS) on 9 August 2024 at 0800Z.

FAGC 090800Z 27009KT CAVOK 19/01 Q1025=

Wind Direction	270º	Wind Speed	9 knots	Visibility	9999 m
Temperature	19ºC	Cloud Cover	CAVOK	Cloud Base	Nil
Dew Point	1ºC	QNH	1025hPa		

Landing Gear

Source: Technical Manual for Jabiru Aircraft, Document No. JTM001-12, dated 18 January 2023

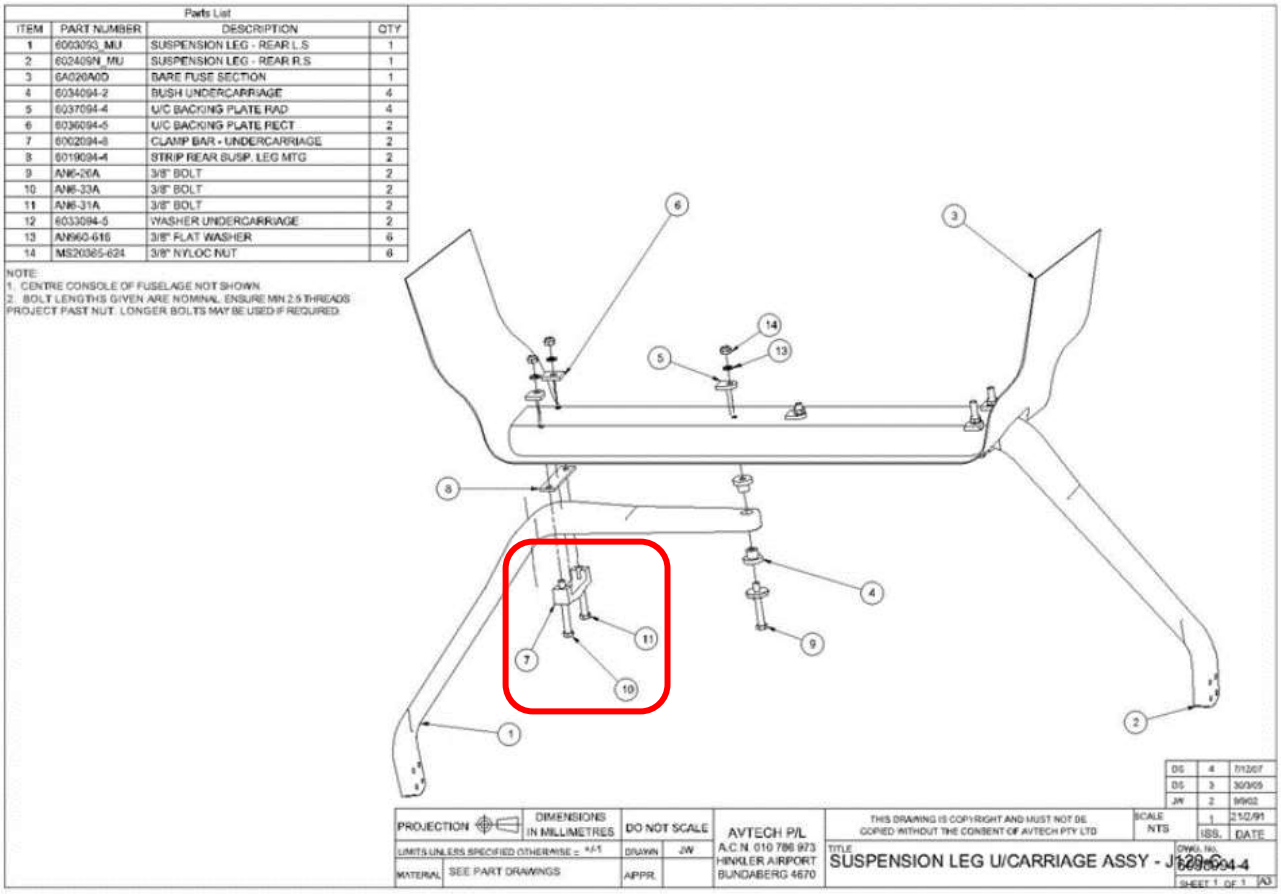
The main landing gear comprises two separate composite beams which are bolted to the fuselage at the top and centre and to the wheel stub at the bottom. The nose gear is a welded steel, trailing arm assembly with a rubber spring system. The nose wheel is steerable with the rudder pedals. Nose Wheel and Main Wheel Speed Fairings (wheel spats) are optional equipment. For all models discussed in this manual, the main undercarriage has the same general arrangement: a laminated composite spring forms the leg which is bolted to the fuselage at one end and the main wheels at the other.

Inspection and Repair

1. *Inspect composite beam for damage indicated by cracks or de-lamination. Pay particular attention to the area around the centre bend and to areas around drilled holes.*
2. *When inspecting the legs shown in Figure 5 pay particular attention to the area around each bend in the leg. Note that it is possible for this leg type to have internal damage which does not show on the surface. In this case, the best indicator of the damage is that the damaged leg will have lost stiffness compared to the other side and so the aircraft will lean in the direction of the damaged leg. If required, legs can be returned to Jabiru Aircraft for testing.*
3. *Inspect bolts and nuts for signs of stress, bending or corrosion – replace if in any doubt.*
4. *Inspect clamp for damage.*
5. *Inspect bolt seats in fuselage for signs of damage, wear or perishing.*
6. *For the leg shown in Figure 5 (below), inspect the outboard clamp flock bed & re-flock if damaged.*

Follow-up Inspection of the Aircraft

The aircraft was recovered to the aircraft maintenance organisation (AMO) facility where the aircraft was inspected by the investigator from the Accident and Incident Investigations Division (AIID). It was found that the left main landing gear outer support bracket with part number 6002094-8 (see Figure 5, item 7) had fractured during landing, which caused the left leaf spring landing gear strut to fold backwards (as shown in Figure 4). The aircraft did not sustain any other damage.



Parts List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	6003093_MU	SUSPENSION LEG - REAR L.S	1
2	602409N_MU	SUSPENSION LEG - REAR R.S	1
3	6A020A0D	BARE FUSE SECTION	1
4	6034094-2	BUSH UNDERCARRIAGE	4
5	6037094-4	U/C BACKING PLATE RAD	4
6	6036094-6	U/C BACKING PLATE RECT	2
7	6002094-8	CLAMP BAR - UNDERCARRIAGE	2
8	6019094-4	STRIP REAR BUSP. LEG MTG	2
9	AN6-26A	3/8" BOLT	2
10	AN6-33A	3/8" BOLT	2
11	AN6-31A	3/8" BOLT	2
12	6033094-6	WASHER UNDERCARRIAGE	2
13	AN960-616	3/8" FLAT WASHER	6
14	MS20365-624	3/8" NYLOC NUT	6

NOTE:
1. CENTRE CONSOLE OF FUSELAGE NOT SHOWN.
2. BOLT LENGTHS GIVEN ARE NOMINAL. ENSURE MIN 2.5 THREADS PROJECT PAST NUT. LONGER BOLTS MAY BE USED IF REQUIRED.

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MATERIAL SEE PART DRAWINGS

TITLE SUSPENSION LEG U/CARRIAGE ASSY - J120 6002094-4

DWG. NO. 6002094-4

SHEET 1 OF 1 A3

Figure 5: The main undercarriage with the failed bracket, item 7 depicted in the red window.

Figure 6: The fractured bracket.

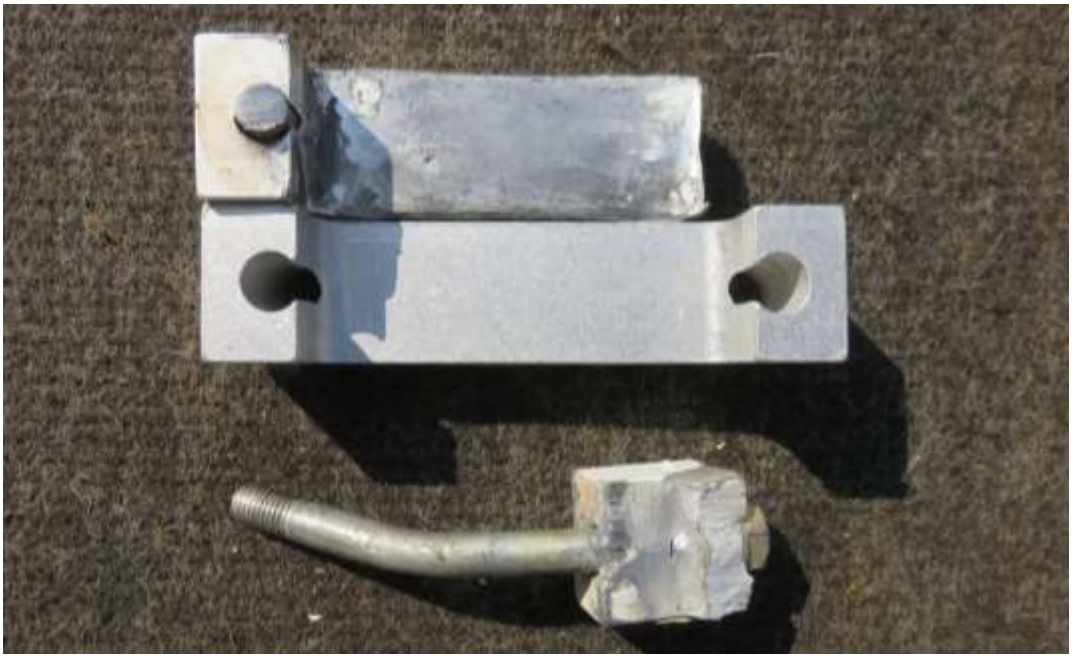

Figure 7: The picture depicts the fractured bracket and a new bracket.

Possible Failure Mode of Bracket:

1. Fractured surface (Figure 8): There seems to be a clear zone that has been exposed to the environment for a period (red circle).
2. Fractured surface (Figure 8): There also seem to be indications of fatigue beach-marks (blue arrows) suggesting a fracture progression direction.

3. Mechanical smearing indicated by the yellow circles (in Figure 8) suggested that the fracture existed for some time.

4. The primary fracture mode seems to be fatigue and not a single overload.

5. The extent of mechanical wear at the leaf spring/bracket interface suggested the following.

   (i) The aircraft was subjected to a high number of take-offs and landings.

   (ii) Incorrect torque of the bracket bolts (items 10 and 11 of Figure 5) during fitment.

   (iii) The level of wear also supports the notion that the bracket was exposed to exceedingly high loads during operation, thus, initiating the fracture.

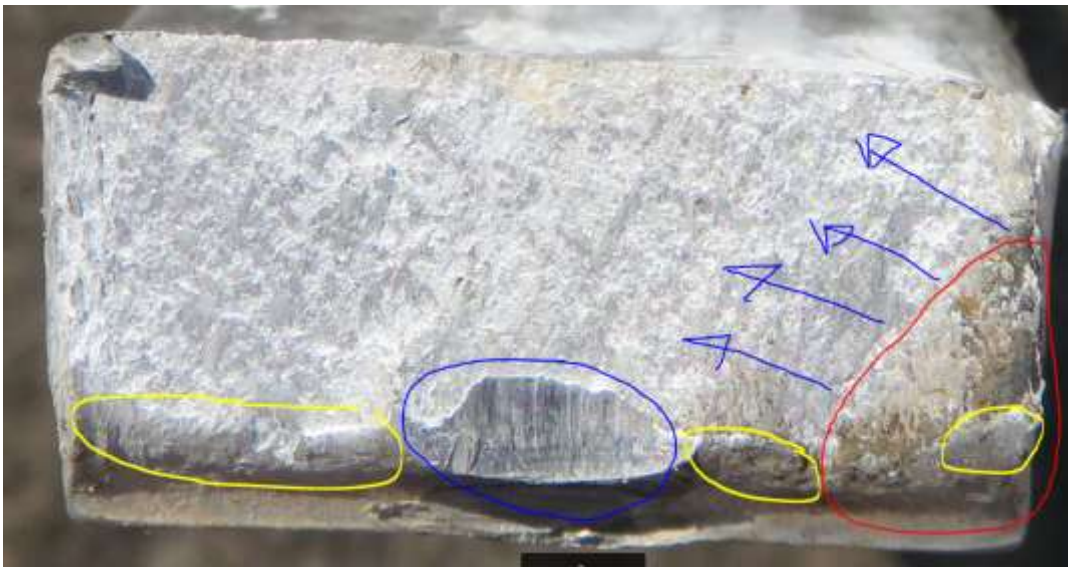

Figure 8: Fractures on the bracket surface.

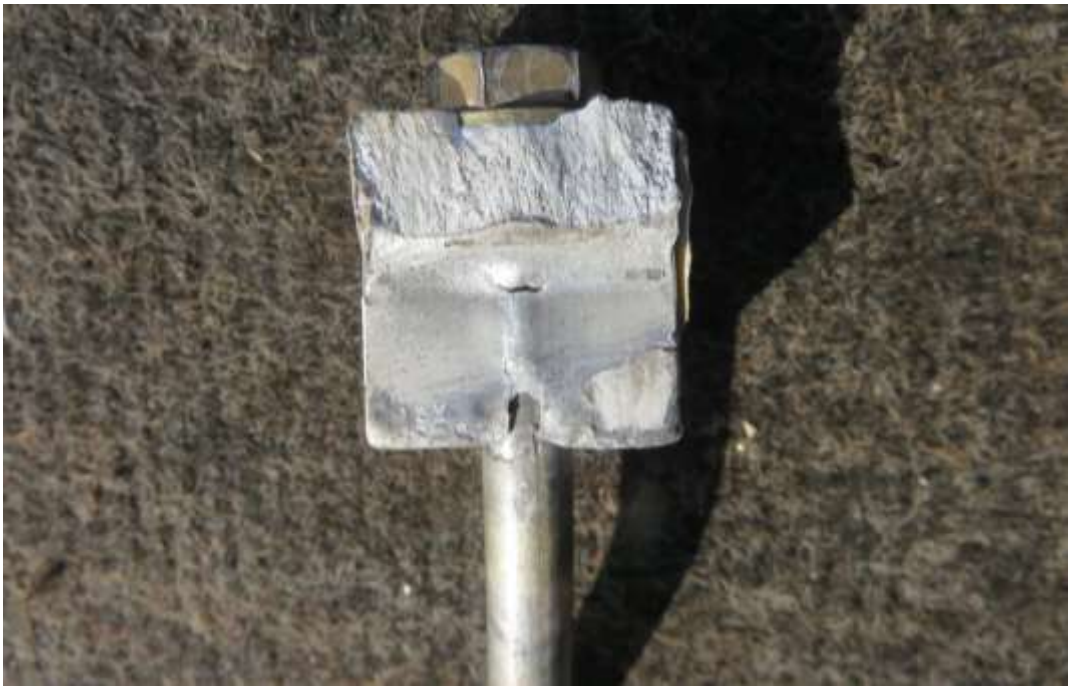

Figure 9: The bracket a with fractured surface.

Figure 10: The undamaged left main gear leaf spring strut.

Findings

1. Personnel Information

1.1 The pilot had a Private Pilot Licence (PPL) that was initially issued by the Regulator (SACAA) on 3 October 2022 with an expiry date of 30 September 2025. The pilot had flown a total of 358.3 hours with 111.2 hours flown on the aircraft type.

1.2 The pilot was issued a Class 2 aviation medical certificate on 27 February 2023 with an expiry date of 28 February 2025.

1.3 The pilot was required to wear corrective lenses for defective distant vision (VDL) whilst flying, according to his aviation medical certificate.

2. Aircraft Information

2.1 The last annual inspection that was conducted on the microlight aircraft before the accident flight was certified on 25 April 2024 at 1 038.7 airframe hours. Since the maintenance inspection, the aircraft was flown a further 14.4 hours.

2.2 The aircraft had a valid Authority to Fly (ATF) that was initially issued on 8 May 2019. The latest issued ATF had an expiry date of 31 May 2025.

2.3 The aircraft's Certificate of Registration (C of R) was issued to the present owner on 24 May 2023.

2.4 The aircraft was issued a Certificate of Release to Service (CRS) on 13 May 2024 with an expiry date of 31 May 2025 or at 1 138.7 airframe hours, whichever occurs first.

2.5 Apart from the failure of the left outer landing gear leaf spring support bracket, no other damage was caused to the aircraft.

2.6 The manufacturing of the Jabiru SP model, which is the aircraft in question, has been discontinued.

2.7 This aircraft was involved in a previous accident on 14 June 2010 when it veered off the runway during landing at a private aerodrome in Buffelspoort near Rustenburg; the aircraft entered a ditch and nosed over. The allocated reference number CA18/2/3/8796 to this accident.

Probable Cause(s)

The left main gear leaf spring strut folded backwards during the landing roll when the outer support gear strut bracket failed due to fatigue. This caused the aircraft to veer off to the left of the runway.

Contributing Factor(s)

None.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

It is recommended that the Director of Civil Aviation issue a Mandatory Advisory Notice (MAN) that calls for the replacement of all old main gear leaf spring strut outer brackets on the Jabiru SP series of aircraft with the newer version (shown in Figure 7 of this report) which requires thicker bolts to secure the brackets.

About this Report

The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.
Purpose
In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.
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This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa