SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-40

AIRCRAFT SERIOUS INCIDENT SHORT REPORT

CA18/3/2/1275: Separation of the left main wheel assembly on rotation.

Date and time	**:**	2 August 2019, 1515Z
Aircraft registration	**:**	ZU-FIU
Aircraft manufacturer and model	**:**	Bantam B22J
Last point of departure	**:**	Zandspruit Aero Estate, Limpopo Province
Next point of intended landing	**:**	Zandspruit Aero Estate, Limpopo Province
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	**:**	24°22'19.20" S 030°55'36.05" E, on Runway 35 at Zandspruit Aero Estate
Meteorological information	**:**	Wind: 330°/04 kt, Temperature 24°C, Dew point: 11°C, QNH: 1021 hPa, CAVOK
Type of operation	**:**	Private (Part 94)
Persons on-board	**:**	1 + 0
Injuries	**:**	None
Damage to aircraft	**:**	Minor

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 of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (2011), 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.***

Disclaimer:

1. SYNOPSIS

1.1. On 2 August 2019 at 1515Z, the pilot departed Zandspruit Aero Estate Aerodrome using Runway 17, with an intention to return to the same aerodrome. The flight was a private flight conducted in accordance with Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.2. The pilot reported that after rotation, the left-hand main wheel assembly separated from the aircraft. Upon realising this, the pilot carried out a teardrop and, subsequently, performed a successful landing on Runway 35. After touch-down and while the aircraft was still in motion, the pilot shut down the engine and kept the left side of the aircraft elevated until the aircraft lost its lift and the left assembly was in contact with the runway surface. The aircraft came to a stop 330 metres (m) from the threshold of Runway 35.

1.3. The aircraft sustained minor damage and the pilot did not sustain any injuries.

1.4. The left main gear axle nut which secures the main wheel assembly separated during rotation, followed by the separation of the main wheel assembly. It is likely that the axle nut separated due to its locking mechanism being worn out of limits and the omission to install split pins which would have secured the axle nut in place.

2. FACTUAL INFORMATION

2.1. On 2 August 2019 at 1515Z, the pilot departed Zandspruit Aero Estate Aerodrome using Runway 17, with an intention to return to the same aerodrome. The flight was a private flight conducted in accordance with Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

2.2. The pilot reported that after rotation, the left-hand main wheel separated from the assembly attached to the aircraft. Upon realising this, the pilot carried out a teardrop and subsequently performed a successful touch down on Runway 35. After touch-down and while the aircraft was in motion, the pilot shut down the engine and kept the left side of the aircraft elevated until the aircraft lost its lift and the left gear was in contact with the runway surface. The aircraft came to a stop 330m from the threshold of Runway 35.

2.3. The damage to the aircraft was limited to the area where the wheel scratched the upper side of the left-hand outer brake calliper assembly (see Figure 1). The pilot did not sustain any injuries.

2.4. The aircraft's last mandatory periodic inspection was a 25-hour inspection which was carried out on 13 May 2019 at 553.4 Tachometer hours. The aircraft was issued a Certificate of Release to Service (CRS) on 13 May 2019 at 550 Tachometer hours with an expiry date of 12 May 2020 or at 578.4 Tachometer hours. The aircraft flew for 1 hour after maintenance, accumulating a total of 554.4 Tachometer hours, including the incident flight.

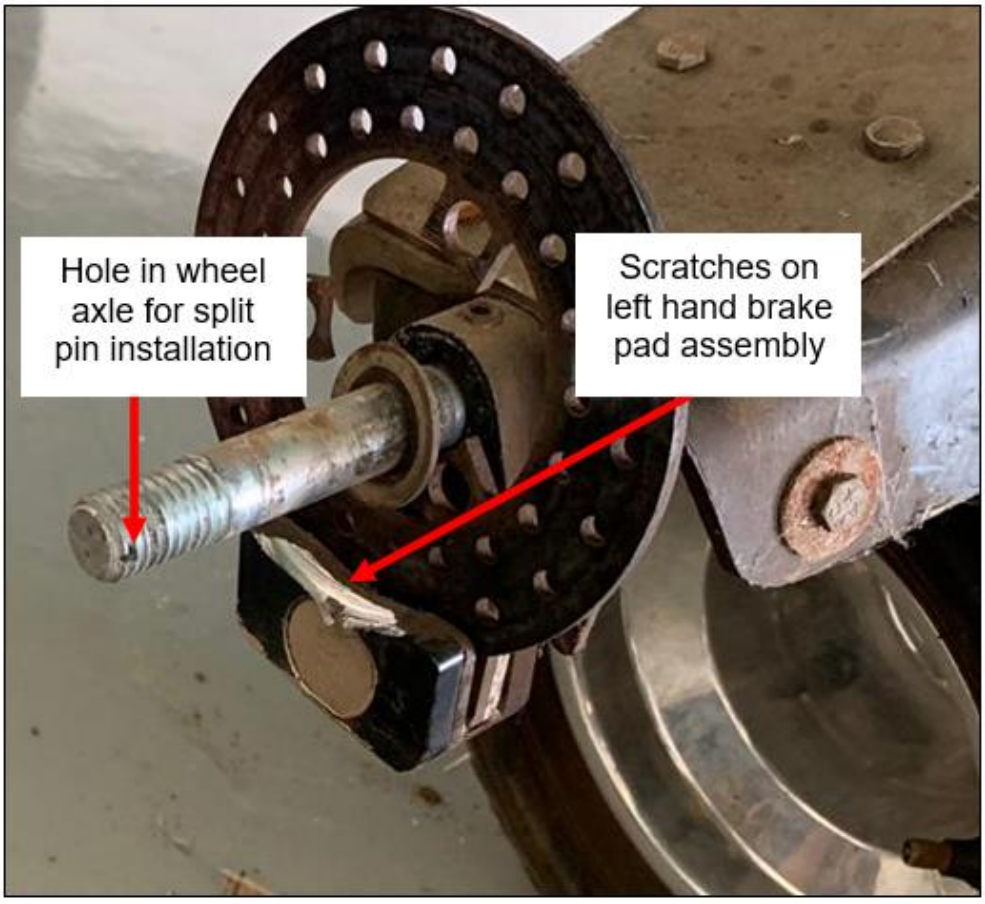

Figure 1: Minor damage to the upper area of the brake calliper assembly. (Source: Leading-Edge Maintenance)

2.5. The Bantam Manual for the B22J aircraft does not provide the illustrated parts catalogue (IPC) for the wheel hub, nor does the manual give clear directions on how to install the wheels and their attaching parts.

2.6. The South African Civil Aviation Training Standards (SA-CATS) Part 44 Annexure A states the following tasks: *"Minimum requirements for an annual inspection for amateur-built aircraft other than balloons mandatory 25-hour periodic inspection for microlight aeroplanes operated in terms of part 94*"

1.4 Landing Gear

1. Check the landing gear for general condition and security of attachment of all components.
2. Inspect the shock absorbing devices for correct fluid levels and pressures.
3. Check linkages, trusses and other members for condition and security of attachments.
4. Check retracting and locking mechanisms for condition and satisfactory operation.
5. Check hydraulic lines and retraction jacks for condition and any leakage of fluid.
6. Check electrical items for condition, chafing of cables and satisfactory operation of motors, switches and indicators.
7. Check mechanical indicators for conditions and satisfactory operation.
8. Check steering mechanisms for condition and bearings for condition, lubrication and correct adjustment.
10. Check tyres for condition and creep. Check tyre pressures.
11. Check brakes for condition, correct adjustment and operation.
12. Check floats, skis or skids for additional security.

2.7. The owner drilled a hole on the landing gear axle for extra safety to enable the fitment of a split pin following the installation of a nylock nut which is not caselated (see Figure 2).

Figure 2: Image of the Bantam B22J wheel secured by a split pin after the serious incident.
(Source: Leading-Edge Maintenance)

2.8. The interview with the pilot revealed that the right-hand axle was also not fitted with a split pin.

2.9. The flight was conducted in visual meteorological conditions (VMC) by day with fine weather conditions prevailing at the time of the serious incident.

2.10. The aircraft landed on Runway 35 at Zandspruit Aero Estate Aerodrome, which has an elevation of 1640 feet (ft) above mean sea level (AMSL). The location of the serious incident was at the following Global Positioning System (GPS) co-ordinates: 24°22'19.20" South 030°55'36.05" East, at an elevation of 1640 ft AMSL.

3. FINDINGS

3.1. The pilot was initially issued a National Pilot Licence (NPL) on 5 January 2010 and the aircraft type was endorsed on his licence. His last skills test was carried out on 1 December 2018. The pilot's licence was reissued on 1 December 2018 with an expiry date of 30 November 2020. He had accumulated a total of 3402.8 flying hours at the time of the incident, of which 1 hour was on the aircraft type.

3.2. The pilot was issued a Class 4 medical certificate on 31 August 2019 with an expiry date of 31 August 2022. The medical certificate was issued with a restriction to wear corrective lenses and for the pilot to undergo an annual lung function test.

3.3. The aircraft was issued a Certificate of Release to Service (CRS) on 13 May 2019 with an expiry date of 12 May 2020 or at 578.4 Tachometer hours, whichever occurs first. The last maintenance check carried out was an annual inspection on 13 May 2019 at 553.4 Tachometer hours. The aircraft had flown a further 1 hour since its last annual inspection and had accumulated a total of 554.4 Tachometer hours including this incident.

3.4. The aircraft was issued an Authority to Fly (ATF) certificate on 9 February 2018 with an expiry date of 29 February 2020.

3.5. The Bantam Manual for the B22J aircraft does not provide the illustrated parts catalogue (IPC) for the wheel hub, nor does the manual give clear directions on how to install the wheels and their attaching parts.

3.6. The aircraft does not come from the factory with holes on the axle nut for the fitment of a split pin as it uses self-locking nuts. The owner had drilled holes on both left and right landing gear axles as an extra safety feature which would allow the fitment of a split pin. The interview with the pilot revealed that there was no split pin fitted on the right-hand axle, thus, indicating that the left-hand side also did not have a split pin fitted.

3.7. According to SA-CATS Part 44 for Maintenance Rules for Non-type Certificated Aircraft, one of the minimum requirements is to check the landing gear for general condition and security of attachment of all components. The failure to secure and check the security of the landing gear in accordance with Annex A of the SA-CATS 44.01.6 paragraph (a) resulted in the left-hand main wheel's lock nut breaking and the wheel separating from the aircraft during rotation.

3.8. There were no faults reported with the aircraft's systems prior to the flight.

3.9. The METAR for Hoedspruit Air Force Base (FAHS) which is 7 nautical miles (nm) to the east of Zandspruit Aero Estate Aerodrome at the time of the serious incident was — Wind: 330°/4kt, Temperature: 24°C, Dew point: 11°C, Query Nautical Height (QNH): 1021 hectopascal (hPa) and visibility: CAVOK

3.10. The flight was conducted in VMC conditions by day with fine weather conditions prevailing.

3.11. Zandspruit Aero Estate Aerodrome is an unmanned and unlicensed aerodrome. The aircraft came to a stop approximately 330m from the threshold of Runway 35. The length of the runway is approximately 1000m and 10m wide. The runway is a prepared, paved surface with a positive slope of 1.3°.

3.12. The investigation revealed that the left main gear axle nut which secures the main wheel assembly separated during rotation, followed by the separation of the main wheel assembly. It is likely that the axle nut separated due to its locking mechanism being worn out of limits and the omission to install split pins which would have secured the axle nut in place.

4. PROBABLE CAUSE

4.1. The left main gear axle nut which secures the main wheel assembly separated during rotation, followed by the separation of the main wheel assembly. It is likely that the axle nut separated due to its locking mechanism being worn out of limits and the omission to install split pins which would have secured the axle nut in place.

4.2. CONTRIBUTING FACTOR

4.2.1. None.

5. REFERENCES USED ON THE REPORT

5.1. South African Weather Service Report.
5.2. South African Civil Aviation Regulations, 2011.
5.3. Aircraft Flight Manual.
5.4. Pilot Operating Handbook (POH).

6. SAFETY RECOMMENDATION

6.1. Safety message: NTCA maintenance organisation to comply with best practise maintenance in the absence of any maintenance procedure established by the manufacturer.

7. ORGANISATION

7.1. The flight was operated privately under Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended and on a hire-and-fly basis.

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa