LIMITED ACCIDENT INVESTIGATION REPORT

Reference Number	CA18/2/3/10149										
Classification	Accident		**Date**	28 April 2022			**Time**	1525Z			
Type of Operation	Private (Part 94)										
Location											
Place of Departure	Kitty Hawk Aerodrome (FAKT), Gauteng Province			Place of Intended Landing			Kitty Hawk Aerodrome (FAKT), Gauteng Province				
Place of Accident	Runway 01 at FAKT, Gauteng Province										
GPS Co-ordinates	Latitude	25° 51´.42 S		Longitude	28° 26´.49 E		Elevation	4 586ft			
Aircraft Information											
Registration	N-818WT										
Make/Model	Giles G-202 (Serial Number: 0030)										
Damage to Aircraft	Substantial			Total Aircraft Hours			773.8				
Pilot-in-command											
Licence Type	Private Pilot Licence			Gender	Male		Age: 44				
Licence Valid	Yes										
Total Hours on Type	63.6			Total Flying Hours			264.7				
People On-board	2 + 0	Injuries	0	Fatalities	0		Other (On ground)	0			
What Happened											

On Thursday afternoon, 28 April 2022 at approximately 1445Z, two pilots on-board a Giles G-202 aircraft with registration N-818WT took off from Kitty Hawk Aerodrome (FAKT), located south-east of Pretoria in Boschkop, Gauteng province, with the intention to practise aerobatic manoeuvres at the aerobatic box on the west-side of FAKT's Runway 01. Visual meteorological conditions (VMC) by day prevailed at the time of flight. No flight plan was filed for the flight. The aircraft was categorised as an experimental amateur-built under authority of the Federal Aviation Administration (FAA) in the United States of America (USA) and was certified under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91, but was operated under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended. The pilot seated on the front seat was the pilot monitoring (PM) and the pilot seated on the rear seat was the pilot flying (PF) and owner of the aircraft.

The PF stated that good weather conditions prevailed at the time of the flight at FAKT, with the outside air temperature (OAT) at 20°C. Pre-flight inspection was conducted in front of the PF's hangar and nothing abnormal was uncovered with the aircraft. The aircraft had a total of 75 litres (l)

of Avgas 100LL in the tanks, which was free from contaminants. After engine start, the aircraft was taxied to the threshold of Runway 01 where pre-take-off checks were carried out. After making sure that the engine indications were within the acceptable limits, the PF opened the throttle and took off to the aerobatic box where approximately five aerobatic manoeuvres were performed in succession. After approximately 35 minutes, the PF flew the aircraft to the south, travelling at 160 knots indicated air speed (KIAS) before joining the traffic pattern for Runway 01. Prior to turning finals for Runway 01, the PF blindly broadcasted his intentions on FAKT frequency 120.65-Megahertz (MHz). After landing and as the aircraft's speed decreased to 35 knots, the landing gear collapsed, causing the aircraft to slide for approximately 82 metres (m) before the propeller blades struck the runway's surface about 15 times. Thereafter, the aircraft came to a stop. The aircraft sustained substantial damages during the accident sequence, however, none of the occupants was injured. The accident happened in the afternoon at 1525Z; the duration of the flight was 40 minutes.

The accident occurred during daylight at a geographical position that was determined to be 25° 51´.42" South 028° 26´.49" East at 4 586 feet (ft) above mean sea level (AMSL).

Figure 1: The aircraft post-accident, and skid marks on the runway.

Figure 2: Propeller blades strike marks on the runway.

The Aircraft

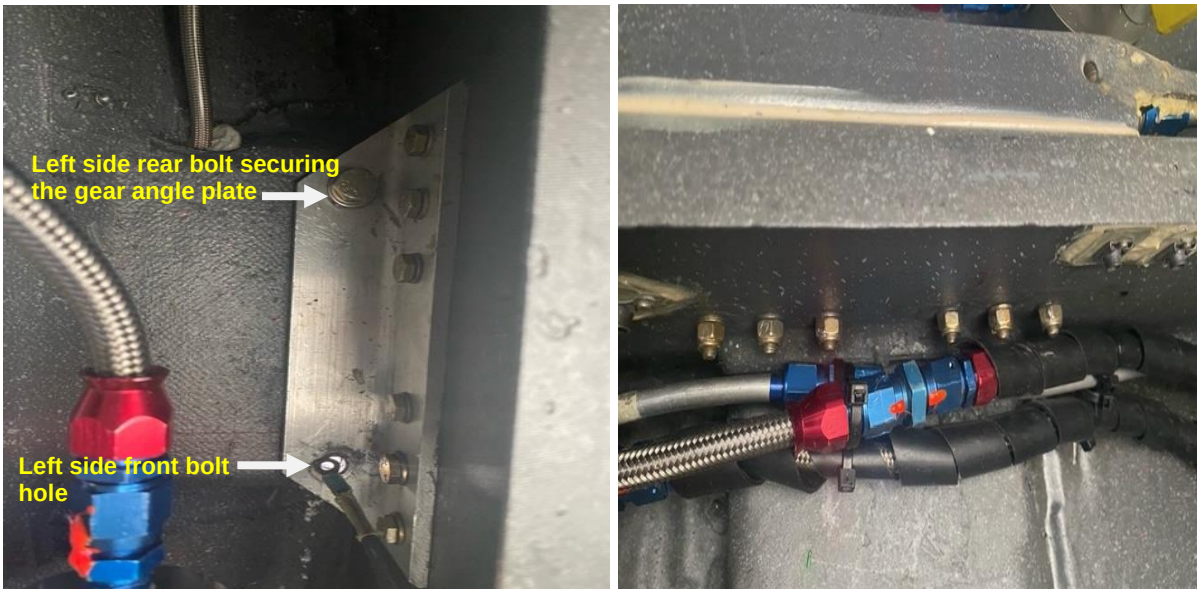
The Giles G-202 is a two-seat, low-wing amateur built aircraft featuring an enclosed cockpit with recliner seats in a tandem configuration certified for aerobatics. The aircraft was designed by Richard Giles and manufactured by AkroTech Aviation in Troutdale, Oregon, USA in 1998. The aircraft is constructed of glass-fibre-reinforced epoxy, carbon-fibre-reinforced epoxy, and glass fibre and carbon fibre honeycomb sandwich panels. This combination provides an exceptional power-to-weight ratio. The fuselage is of a monocoque-type design. The last maintenance inspection of the aircraft prior to the accident flight was carried out on 1 June 2021 at 746.8 airframe hours. The aircraft was flown a further 27 hours since the last inspection was completed. At the time of the accident, the aircraft had accumulated 773.8 hours. The last inspection was certified by the FAA designated airworthiness representative (DAR). The aircraft was reissued a Certificate of Airworthiness by the FAA on 22 October 2019 with an expiry date of 31 October 2022.

The aircraft is powered by a four-cylinder, direct drive, horizontally opposed air-cooled Lycoming AEIO-360-AIE engine driving a three-blade constant-speed MT-propeller, and producing 235 horsepower (hp). The rear cockpit is instrumented for the PF, but most of the flight instruments are repeated on the front panel. The cockpit has been designed to offer the best ergonomics to support a high G-load of plus/minus 10 Gs, giving it turns and loops and a range of aerobatic manoeuvres.

The landing gear description

The aircraft's landing gear consists of a two-wheel main landing gear with wheel spats/fairings and a self-steering tail wheel with a full swivel capability. The main wheels are interconnected and attached to the U-shape aluminium design landing gear which incorporates wheel alignment, spring and dampening action. The exposed leg section of the landing gear is airfoiled, while the mounting surfaces are flat for easy alignment. Two saddle brackets (Figure 3) are used to secure the landing gear to the aluminium angle plates that run to the firewall and spar box area on the aircraft's underbelly. Four bolts/nuts are used to hold the saddle brackets to the aluminium angles, together with a centrering pin that keeps the gear from moving sideways.

Figure 3: The saddle brackets holding the landing gear to the under-fuselage.



Figures 4 and 5: Left side aluminium angle plate (left) and how it was secured to the spar box (right).

On 28 August 2020, the aircraft was involved in an accident at Brakpan Aerodrome (FABB), Gauteng province. The aircraft had 746.8 airframe hours at the time. On approach at approximately 20 feet above ground level (AGL), the aircraft developed a high rate of descent, which resulted in a hard landing, followed by the collapse of the main landing gear on touchdown. The aircraft sustained substantial damages during this occurrence. The aircraft was recovered to Wonderboom Aerodrome (FAWB) for maintenance. The landing gear spar box area was repaired in accordance with (IAW) the Build Manual and the landing gear was refitted because it was not damaged. The maintenance was signed out by the FAA DAR and the aircraft was returned to service.

Weight and balance calculation

The investigation was unable to determine the detailed weight and balance calculations of the aircraft at the time of the (latest) accident. The aircraft had a total of 75l (54 kilograms [kg]) of fuel a day prior to the aerobatic flight around FAKT. Taking the total flight time into account (40 minutes [0.67 hours]), from the time the aircraft departed FAKT to the time of the accident, it was determined that approximately 40l (28.8kg) of fuel was used, meaning that only 35l (25.2kg) remained in the tank. Fuel consumption was based on a usage rate of approximately 50l per hour during aerobatics as per the Lycoming Operator's Manual. The aircraft had a maximum take-off weight (MTOW) of 725kg. Both occupants weighed 177kg. The calculated total take-off weight of the accident flight was 202.2kg. The aircraft was 522.8kg below the MTOW.

Kitty Hawk Aerodrome (FAKT):

FAKT is a Category 1 aerodrome with licence No: 0200, issued IAW Part 139 of the Civil Aviation Regulations 2011 as amended. The licence was renewed by the Regulating Authority on 30 July 2021, with the validity period from 1 August 2021 to 31 July 2022. The aerodrome has no air traffic control (ATC) service and has a single asphalt runway that is 810m long and 18m wide, with an elevation of 4 586ft. The runway's surface is relatively flat and smooth. The PF described it as being in good condition and well maintained.

Post-accident examination of the aircraft:

Visual examination of the aircraft indicated that the landing gear aluminium angle iron plates front nuts and bolts which secure the landing gear to the under-fuselage assembly had separated, causing the landing gear to collapse. The threads on the bolts which protrude on the underbelly had stripped. One of the nuts with stripped threads was found on the runway surface of the aircraft's landing path. Inspection of the under-fuselage (belly) area where the bolts protrude showed no signs of damage. Both main wheel tyres were found to be correctly inflated, and the threads were well defined.

The main landing gear tyres and their respective wheel hubs, friction pads, bearings, spacers, nuts, circlips and split pins were in place and properly fitted. The engine remained attached to its mountings and the firewall remained intact. The propeller remained attached to the engine. Damage was limited to the engine's bottom cowling, the propeller blades, the wheel fairings and the underwing structure. Flight control continuity was confirmed from the control column to both ailerons and the elevator through overload fractures in the rod ends of the push-pull tubes. No evidence of separation was found on the horizontal stabiliser and vertical fin junction.

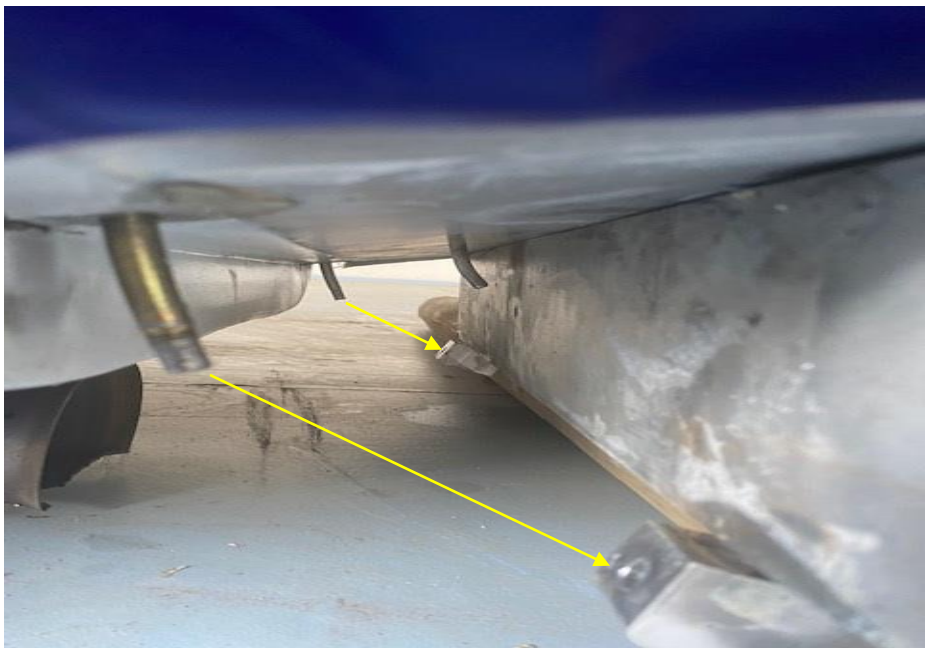


Figure 6: The collapsed landing gear showing the saddle brackets and the bolts protruding from the underbelly.

Figures 7 and 8: Stripped threads on the landing gear's left front bolt (left picture). Stripped threads on the landing gear's front right bolt (right picture).


Figures 9 and 10: The left and right main landing gear struts showing the wheel fairings that cut through the underwing structure.

What was found

(i) The PF (pilot-in-command) had a SACAA-issued Private Pilot Licence (PPL) and the aircraft type endorsement on his licence.

(ii) Scrutiny into the PF's file at the SACAA facility showed no evidence of the FAA validation issued to the pilot.

(iii) The PF had flown 6.3 hours during the past 90 days, including the accident flight, which was 0.67 hours.

(iv) The aircraft was operated within its weight limit; weight was, therefore, not compromised during the accident flight.

(v) None of the occupants was injured during the accident sequence. The occupants made use of the aircraft-equipped four-point safety harnesses.

(vi) The aircraft was deemed experimental – amateur-built by the FAA in the USA and was operated as a Title 14 Code of Federal Regulations, Part 91.

(vii) The last maintenance inspection that was carried out on the aircraft prior to the accident flight was certified on 1 June 2021 at 746.8 airframe hours. The inspection was certified by the DAR approved by the FAA; his approval was initially issued on 4 May 2015 and reissued on 1 March 2021 with an expiry date of 31 March 2023. The DAR had the accident aircraft type endorsement and privileges to maintain both the airframe and powerplant. The aircraft was flown a further 27 hours since the last inspection was completed.

(viii) The aircraft was certified, equipped and maintained IAW the Federal Aviation Regulations (FAR) and approved procedures. There were no open or differed maintenance items listed in the aircraft's journey logbook before the accident flight, and there was no evidence that failures of the aircraft structures, flight control system or engine contributed to the accident.

(ix) The aircraft was reissued the FAA Certificate of Airworthiness on 22 October 2019 with an expiry date of 31 October 2022.

(x) Fine weather conditions prevailed at the time of the flight at FAKT.

(xi) The accident was caused by the separation of fasteners (nuts and bolts) which secure the landing gear under the fuselage. Nothing abnormal was detected on the flight controls.

Probable cause

The main landing gear collapsed during the landing roll on Runway 01 because of the stripped saddle brackets front bolts and nuts that separated.

Contributory factor

Failure on the bolts and nuts which secure the landing gear saddle brackets seemed to have been initiated by previous hard landing/s.

Safety Action

None.

Safety Recommendation/Message

None.

Purpose of the Investigation

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

About this Report

This report provides an opportunity to share safety message/s in the absence of an investigation.

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.

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This report is issued by:

Accident and Incident Investigations Division

South African Civil Aviation Authority

Republic of South Africa