SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division Accident and Incident Investigation Division Form Number: CA 12-41

AIRCRAFT ACCIDENT SHORT REPORT

CA18/2/3/9906: Right main gear collapsed during landing roll on Runway 35 at FAGC.

Date and time	: 28 August 2020, 1300Z
Aircraft registration	: ZS-DVD
Aircraft manufacturer and model	: Piper Aircraft Corporation, PA-30-160
Last point of departure	: Grand Central Aerodrome (FAGC)
Next point of intended landing	: Grand Central Aerodrome (FAGC)
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	: On the right edge of Runway 35, FAGC GPS position: 25°59'16.72" South 028°08'28.57" East
Meteorological information	: Surface wind: 330°/10-15kts, temperature: 22°C
Type of operation	: Training (Part 141)
Persons on-board	: 2 + 0
Injuries	: None
Damage to aircraft	: Substantial

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.***

Ministerial Order regarding Aircraft Accident and Incident Investigations dated 26 May 2016 issued by Minister Dipuo Peters in terms of section 100 (1)(b) of the Civil Aviation Act, 2009 (Act No. 13 of 2009):
"The Aircraft Accident and Incident Investigation unit shall report functionally to the Minister of Transport through the Deputy Director-General: Civil Aviation in so far as it relates to accident and incident investigations and reports. The South African Civil Aviation Authority (SACAA) shall be responsible for managing operational resources (technical, human, financial) to conduct investigations without hindrance".

Disclaimer:

1. SYNOPSIS

1.1 On Friday, 28 August 2020 at 1300Z, a Piper PA-30-160 with registration ZS-DVD, sustained substantial damage when the right main gear collapsed during landing on Runway 35 at Grand Central Aerodrome (FAGC). Neither of the two pilots on-board the aircraft were injured in the accident. Visual flight rules prevailed, and a flight plan was filed for the flight which departed FAGC on a crew evaluation flight (Commercial Pilot Licence test). The flight was conducted under Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.2 The pilot flying (PF) was unable to maintain runway centreline after touch down on Runway 35 due to lateral forces the aircraft encountered during the crosswind landing, resulting in the right main gear push-pull rod bending on touch down and the subsequent collapse of the right main gear.

2. FACTUAL INFORMATION

2.1 History of Flight

2.1.1 On Friday, 28 August 2020 at 1120Z, a Piper PA-30-160 aircraft with registration ZS-DVD, took off from Grand Central Aerodrome (FAGC) at 1120Z with two pilots [a commercial pilot and a Designated Flight Examiner (DFE)] on-board. The purpose of the flight was to conduct a Commercial Pilot Licence (CPL) test for the commercial pilot.

2.1.2 After being airborne for 1 hour and 40 minutes, the pilots returned to FAGC for a full stop landing. The commercial pilot was the pilot flying (PF). The aircraft was cleared to land on Runway 35. The wind was variable and gusting from the left of the aircraft; 15° of flap was selected for landing. The approach was stable, and the landing gear was down with three greens. The aircraft touched down on the centreline abeam the approach lights. During the landing roll, the PF was required to make several rudder inputs due to the crosswind condition from the left to keep the aircraft on the centreline.

2.1.3 Approximately 300 metres (m) after touch down, the aircraft started to veer off to the right of the runway and the DFE instructed the PF to increase the left rudder input. With the left rudder pedal fully depressed, the right wing started to drop towards the ground. At this stage, the DFE took over control of the aircraft and requested the commercial pilot to press the left brake as there were no brake pedals on the rudder pedals on the right-side (DFE side). Full left aileron deflection was made in an attempt to keep the wings level. The right-wing tip tank's lower surface made contact with the runway surface and, from then onwards, it was not possible to correct the attitude of the aircraft. The DFE then pulled the mixture control levers to the cut-off position to shut off both engines to prevent damage to the engines and propellers.

The aircraft then veered off to the right of the runway and came to rest in a right-wing low attitude. The DFE then called the control tower and informed the air traffic control (ATC) of the accident. The crash alarm was activated by ATC and the Aerodrome Rescue and Fire-fighting (ARFF) personnel responded swiftly to the accident scene. On their arrival at the scene, they sprayed water and foam beneath the right engine to prevent grass fire. The aircraft sustained damage to the left wing, right-wing tip tank, right main gear, right aileron and right flaps. The right main gear had collapsed, and the right-wing tip tank had scraped along the runway surface, as well as on the grass. No person was injured during the accident sequence.

2.1.4 The accident occurred during daylight at a geographical position determined to be: 25°59'16.72" South 028°08'28.57" East at an elevation of 5 313 feet (ft) above mean sea level (AMSL).

2.1.5 Aircraft Information

The aircraft, a Piper PA-30-160, with serial number 30-445 was manufactured in 1964. It had a total time of 8 923.5 airframe hours at the time of the accident. The last maintenance inspection prior to the accident flight was performed on 11 March 2020 and the aircraft had flown a further 33.7 hours since the inspection.

2.1.6 Meteorological Information

The weather information entered in the table (below) was obtained from both pilots' questionnaires.

Wind direction	330°	Wind speed	10 kts gusting 15kts	Visibility	+10km
Temperature	22°C	Cloud cover	Nil	Cloud base	Nil
Dew point	6°C	QNH	1017 hPa		

2.1.7 Wreckage and Impact Information

Approximately 300m after touch down, the aircraft veered off to the right of Runway 35 and came to rest in a right-wing low position following the collapse of the right main gear during the landing roll. The right-wing outer section, forward of the main spar, was damaged when the wing collided with a runway landing light (see Figure 3). The right-wing tip tank's lower surface displayed damage as the wing tip tank had scraped along the runway surface (see Figure 4). The right aileron also displayed evidence of deformation. The outer section of the right flap displayed evidence of contact with the runway surface. The PF had selected 15° flap for landing. The push-pull rod on the left main gear displayed substantial bending (see

Figure 5). The push-pull rod on the right main gear also displayed evidence of bending (see Figure 6).

Figure 1: The aircraft as it came to rest on the right side of Runway 35 at FAGC.

Figure 2: The right-wing tank that came into contact with the ground during the accident sequence.

Figure 3: Damage caused to the right-wing lower skin following impact with a runway light.

Figure 4: Damage to the lower right-wing tip tank as it scraped along the runway surface.

2.1.8 Landing gear examination

The investigator had conducted an inspection of the aircraft after it was recovered. The landing gear system was visually inspected in the presence of an aircraft maintenance engineer (AME) who was rated on the aircraft type. It was not possible to perform a retraction test. It was found that the push-pull rod on the right main gear (see Figure 5) displayed evidence of substantial bending associated with lateral forces being applied on the aircraft during the landing roll. This was supported by the statement of the commercial pilot that she had to make several rudder inputs during the landing roll to remain on runway centreline due to a strong crosswind from the left of the aircraft. The left main gear push-pull rod also displayed evidence of bending but to a much lesser extent in comparison to the right side (see Figure 6). The left main gear, however, did not collapse (remained in the extended position).

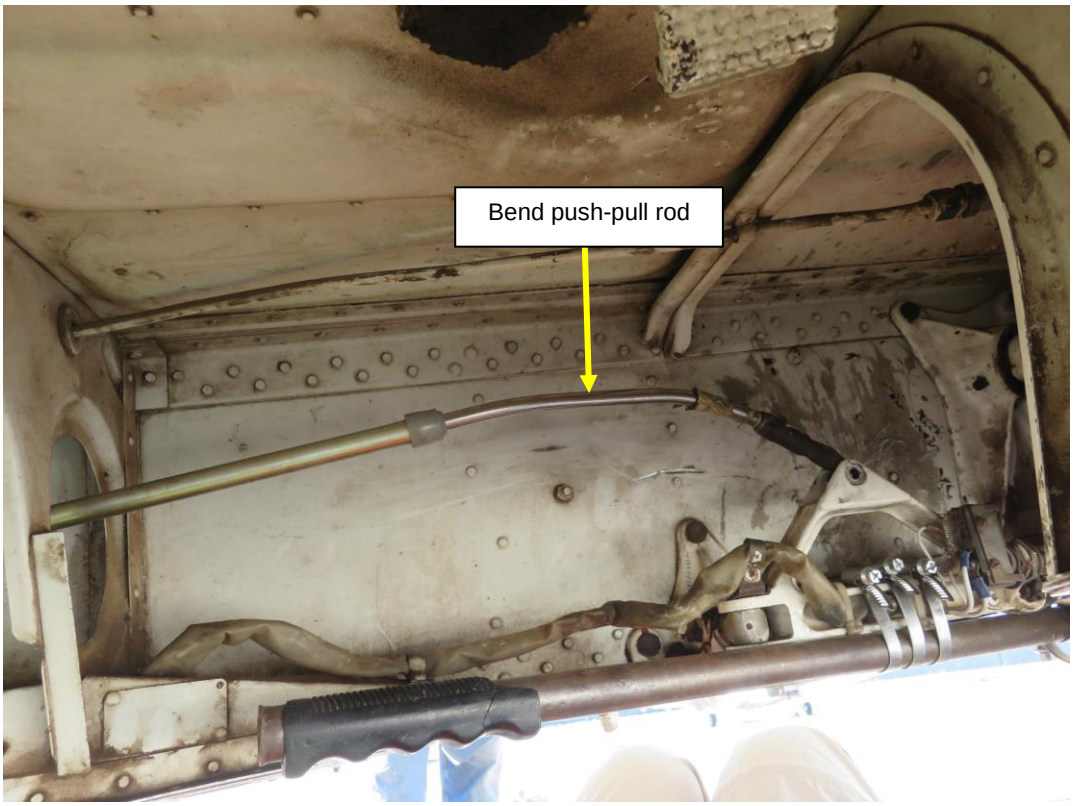


Figure 5: Substantial bending visible to the right main gear push-pull rod.

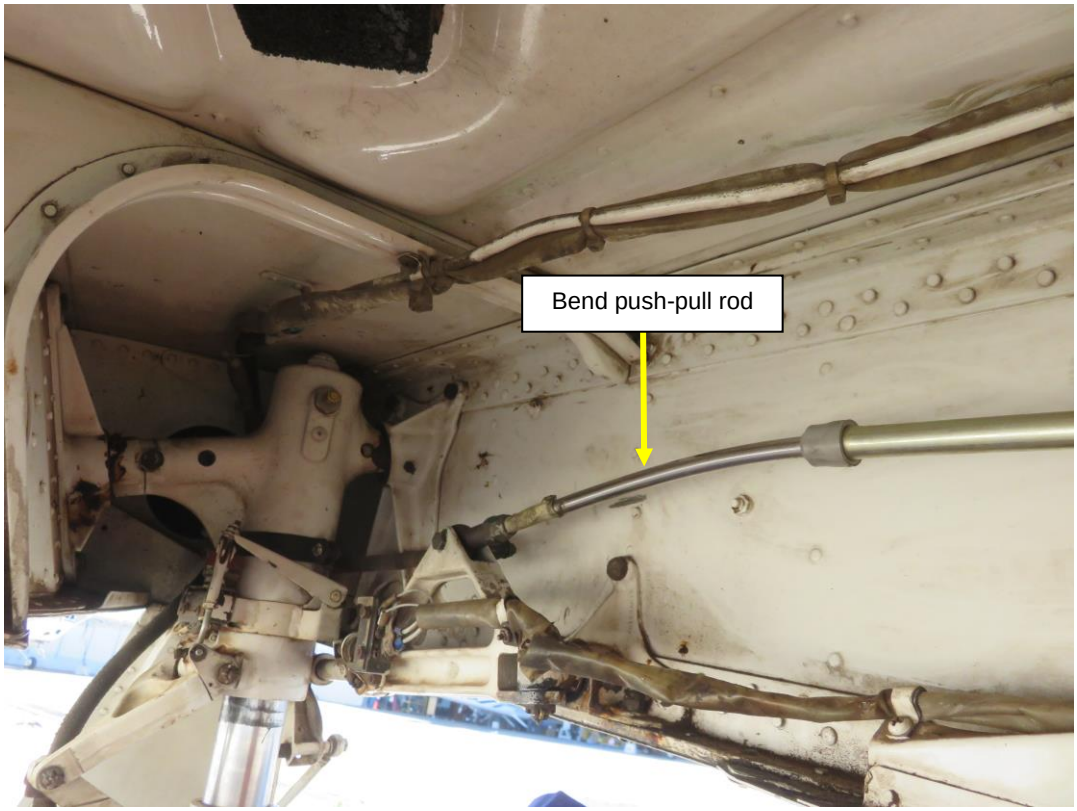


Figure 6: The left main gear push-pull rod also displayed evidence of bending.

2.1.9 Landing Gear Piper PA-30-160

Source: Pilot's Operating Handbook (POH), Section II, Pages 8, 9 and 10

"The nose gear is steerable with the rudder pedals through a 40° arc. During retraction of the gear the steering mechanism is disconnected automatically to reduce rudder pedal loads in flight. The nose gear is equipped with a hydraulic shimmy dampener.

Retraction of the landing gear is accomplished through the use of an electric motor and gear train located under the floor boards, actuating push-pull cables to each of the main gears and a tube to the nose gear. The landing gear motor is activated by a selector switch located on the instrument panel. To guard against inadvertent movement of the landing gear selector on the ground, a mechanical guard is positioned just below the selector handle. The handle should also be pulled aft before moving it upward. The gear selector is in the shape of a wheel to differentiate it from the electric flap control knob, which has an airfoil shape. As an added safety feature, the warning horn is connected to the gear selector switch. The horn will then operate if the selector is moved to the "UP" position with the master switch on and the weight of the airplane on the landing gear. As a final safety factor to prevent gear retraction on the ground, an anti-retraction switch is installed on the left main gear. This prevents the electric circuit to the landing gear motor from being completed until the gear strut is extended.

The gear indication lights are located above and below the gear selector switch. The green indicating light (located below the selector switch) is the indication that all gears are down and locked. The amber light (located above the gear selector switch) is the gear up indication. The amber light will also flash when power is reduced on one engine and the gear is not down and locked. The warning horn will operate when power is reduced (below approximately 12" of manifold pressure) on both engines and the gear is not down and locked. The brakes on the Comanche are actuated by toe brake pedals mounted on the left set of pedals. Hydraulic brake pedals are located above the brake pedals and are accessible in the cockpit for servicing. Parking brake valves are incorporated in each cylinder."

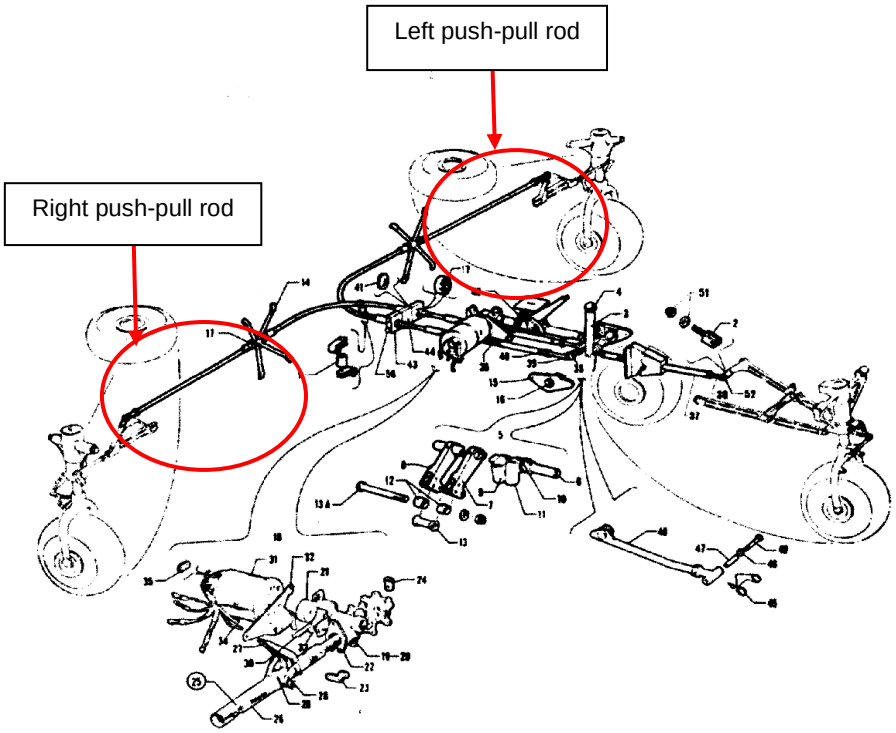


Figure 29. Landing Gear Retraction System

Figure 7: The landing gear retraction system. (Source: Piper PA-30-160 POH, Section II)

3. Findings

3.1 The DFE was initially issued an Airline Transport Pilot Licence on 19 January 1995. He held the necessary ratings to operate the aircraft and had flown a total of 26 464.7 hours, of which 233.4 were on the aircraft type.

3.2 The DFE was issued a valid Class 1 aviation medical certificate on 22 April 2020 with an expiry date of 30 April 2021, with a restriction to wear corrective lenses during flight.

3.3 The PF was initially issued a Commercial Pilot Licence on 27 July 2017. She had flown a total of 271.1 hours, of which 12.3 hours were on the aircraft type.

3.4 The PF was issued a Class 1 aviation medical certificate on 26 August 2020 with an expiry date of 31 August 2021, without restrictions.

3.5 This was a training flight conducted under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended. The aviation training organisation (ATO) was issued an ATO certificate by the South African Civil Aviation Authority (SACAA).

3.6 The aircraft was issued a Certificate of Airworthiness on 30 April 2003 with an expiry date of 30 April 2021.

3.7 The aircraft was issued a Certificate of Release to Service on 11 March 2020 with an expiry date of 10 March 2021 or at 8 989.8 airframe hours, whichever comes first.

3.8 The aircraft was issued a Certificate of Registration on 12 November 2018.

3.9 The last scheduled Mandatory Periodic Inspection (MPI) that was carried out on the aircraft prior to the accident flight was certified on 11 March 2020 at 8 889.8 airframe hours. The aircraft had accumulated an additional 33.7 airframe hours since its last inspection.

3.10 The right main landing gear collapsed during the landing roll, resulting in the aircraft veering off to the right of the runway.

3.11 The right main gear push-pull rod displayed substantial deformation (bending) after the accident. Bending on the left main gear push-pull rod was also observed, but not to the same extent as on the right side.

3.12 The flight was conducted under visual flight rules (VFR) by day.

3.13 The aircraft sustained substantial damage during the accident sequence.

3.14 None of the occupants on-board the aircraft were injured.

3.15 The accident occurred on a licensed aerodrome. The ATC had activated the crash alarm after the aircraft had veered off the runway. The ARFF personnel had responded swiftly to the accident site.

4. PROBABLE CAUSE

4.1 The right main gear push-pull rod was unable to withstand the lateral forces that were applied to it during the landing roll. This caused the push-pull rod to bend to an extent that it was not possible to support the right main gear, and the gear subsequently collapsed.

5. CONTRIBUTING FACTOR

5.1 None.

6. REFERENCES USED IN THE REPORT

6.1 Pilot questionnaires (form CA 12-03)
6.2 Operator questionnaire (form CA 12-04)
6.3 Aircraft maintenance documentation
6.4 Pilot's Operating Handbook, Piper PA-30-160.

7. SAFETY RECOMMENDATION

7.1 None.

8. ORGANISATION

8.1 This was a training flight which was conducted under the provisions of Part 141 of the CAR 2011 as amended.

8.2 The ATO was issued an ATO-approval certificate No. CAA/0212 by the SACAA on 9 February 2018 with an expiry date of 31 January 2023.

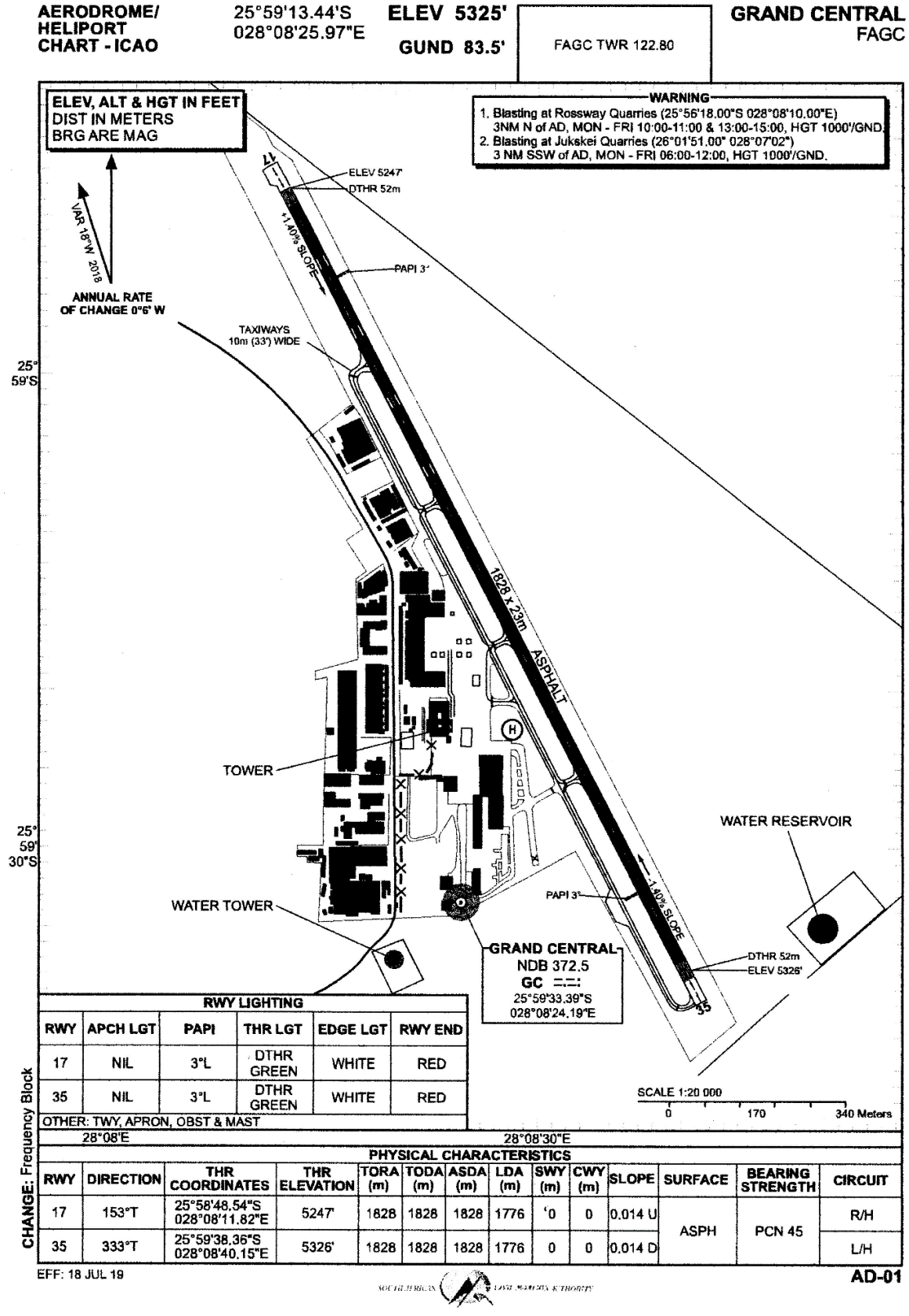
8.3 The last MPI that was carried out on the aircraft prior to the accident flight was certified on 11 March 2020 at 8 889.5 airframe hours. The aircraft maintenance organisation (AMO) was issued an AMO-approval certificate No. 210 by the SACAA on 3 August 2020 with an expiry date of 31 July 2021.

9. APPENDICES

9.1 Annexure A (FAGC Aerodrome Chart)

This report is issued by:
Accident and Incident Investigations Division (AIID)
South African Civil Aviation Authority
Republic of South Africa

ANNEXURE A



RWY LIGHTING

RWY	APCH LGT	PAPI	THR LGT	EDGE LGT	RWY END
17	NIL	3°L	DTHR GREEN	WHITE	RED
35	NIL	3°L	DTHR GREEN	WHITE	RED

OTHER: TWY, APRON, OBST & MAST

PHYSICAL CHARACTERISTICS

RWY	DIRECTION	THR COORDINATES	THR ELEVATION	TORA (m)	TODA (m)	ASDA (m)	LDA (m)	SWY (m)	CWY (m)	SLOPE	SURFACE	BEARING STRENGTH	CIRCUIT
17	153°T	25°58'48.54"S 028°08'11.82"E	5247'	1828	1828	1828	1776	'0	0	0.014 U	ASPH	PCN 45	R/H
35	333°T	25°59'38.36"S 028°08'40.15"E	5326'	1828	1828	1828	1776	0	0	0.014 D			L/H

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