LIMITED SERIOUS INCIDENT INVESTIGATION REPORT

Reference Number	CA18/3/2/1370										
Classification	Serious Incident		**Date**	5 September 2021			**Time**	±1620Z			
Type of Operation	Private (Part 91) Hire-and-Fly										
Location											
Place of Departure	Wonderboom Aerodrome (FAWB)			**Place of Intended Landing**			Wonderboom Aerodrome				
Place of Incident	Powerline that crosses overhead the M35 roadway near Soshanguve										
GPS Co-ordinates	Latitude	25°24'25.85" S		Longitude	028°06'00.83" E		Elevation	3 644 ft			
Aircraft Information											
Registration	ZS-SSB										
Make / Model	Cessna 172M										
Damage to Aircraft	Substantial			Total Aircraft Hours			3 716.2				
Pilot-in-command											
Licence Valid	Yes			Gender	Male		Age: 28				
Licence Type	Commercial Pilot Licence										
Total Hours on Type	296.7			Total Flying Hours			762.2				
People On-board	1 + 3	Injuries	0	Fatalities	0		Other (On Ground)	0			
What Happened											

On Sunday, 5 September 2021, a commercial pilot accompanied by 3 passengers took off from Wonderboom Aerodrome (FAWB) on a private flight at approximately 1545Z. The aircraft was hired from an Aviation Training Organisation (ATO) at the aerodrome and a weight and balance was submitted as per the hire and fly agreement. The aircraft was fuelled to capacity prior to the flight. No flight plan was filed for the flight. The intention of the flight was to fly towards the north of Pretoria and return when it was dark to have a look (sightseeing) at the city lights. Then they were to fly over Gold Reef City and route back via the Sandton area to FAWB. The Meteorological Aerodrome Report (METAR) for FAWB 5 September 2021 at 1500Z was as follows, surface wind: 300° at 03 knots (kts), visibility: CAVOK, temperature: 25°C, dew point: 6°C. The official sunset time for Pretoria on the day was 1556Z. Source: www.timeanddate.com

The pilot-in-command (PIC) stated the following: *"We took off at FAWB at around 1750 and routed to the GF1 requesting a low level about as it had started to grow darker, I climbed to 5100'. After*

30 minutes of flight over the crater, we felt something in the aircraft and heard a noise. I further climbed and check the performance of the aircraft as well as the flight controls. I made the decision to come back to FAWB for a thorough inspection. Upon seeing no damage, I concluded it could be an air pocket, which is commonly encountered, I resumed my flight to Johannesburg SRA. A few days later, a nick was found on the propeller."

Statements obtained from all three passengers on their account of the serious incident flight were as follows:
After take-off from FAWB they flew in a northly direction towards the Tswaing Meteorite Crater (GPS position: 25°24'31.55"South 028°04'58.44"East), which is near Soshanguve. After overflying the crater, they turned towards the east and continued on their intended route, which would have been via Kyalami routing towards Gold Reef City and back to FAWB via Sandton. According to the passenger that was seated on the front left seat (a private pilot), they descended to approximately 50 to 100 feet (ft) above ground level (AGL). They flew over an open field where after the pilot followed a road. While he was above the road, he flashed the landing light on to the oncoming traffic on the road. It was during this period that the aircraft propeller severed what they (witnesses) believed to be a powerline. The witness further stated that the aircraft shuddered, followed by a 'bang' sound and a flash of a bright white light. After this, the PIC climbed immediately and proceeded to test all flight controls. There were no anomalies found with the aircraft and all instrument parameters were normal. The passenger (private pilot) that was seated at the back stated that he tried to inspect the exterior of the aircraft with his headlamp, but he could not identify anything untoward. They then decided to return to FAWB to inspect the aircraft on the ground.

After landing, the PIC taxied the aircraft to the run-up bay for Runway 29 where he shut down the engine. The PIC and the passenger (private pilot) then exited the aircraft to inspect the exterior with their respective headlamps. The passenger inspected the aft (rear) and the lower fuselage of the aircraft, whilst the PIC inspected the front section. No visible damage was observed. They then boarded the aircraft again and took off to Sandton area, where after they returned to FAWB. After their return, the aircraft was taxied to the ATO apron where it was parked. During the after flight inspection, the PIC noted the damage to the propeller. He then asked the passengers that the blame should be shifted on to the student pilot who flew the aircraft the previous day.

On Tuesday, 7 September 2021, the operations manager at the ATO was called in by one of the flight instructors to examine the damage on one of the propeller blades. He then interrogated the booking system to see who flew the aircraft last. After he had engaged three of the four occupants who were on-board the aircraft, which included the PIC, none of the occupants came forward with what might have caused the damage. The fourth occupant was, at the time, visiting Pretoria for a weekend as she was residing in Durban. The next day, the operations manager was informed that new information regarding the flight on Sunday evening had become available. Following a detailed inspection of the aircraft, it was noted that the exhaust as well as the lower left main gear strut displayed evidence of wire markings. The aircraft was sent to an aircraft maintenance

organisation (AMO) where the propeller was removed and forwarded to an approved propeller maintenance facility for a detailed inspection.

The last maintenance inspection that was carried out on the aircraft prior to the serious incident was certified on 31 August 2021 at 3 697.6 airframe hours. Since the inspection, a further 18.6 hours were flown with the aircraft.

The PIC did not make any entry in the flight folio following the flight even though he was aware of the damage to the propeller. This was in contravention of Part 91.03.5 of the Civil Aviation Regulations (CAR) 2011.

Weight and Balance submitted by the PIC prior to the flight:

Item	Weight (lbs)	Arm (Inches)	Moment (lbs x inches)
Aircraft empty weight	1 520	38	57 760
Pilot + front passenger	240	37	8 880
Rear passengers	240	73	17 520
Luggage	10	115	1 150
Fuel (48 US gallons)	288	42	12 096
Take-off weight	2 280	42.7	97 406
Fuel used	-120	42	-5 040
Landing weight	2 160	42.7	92 366

The maximum take-off weight (MTOW) for this aircraft was 2 300 pounds (lbs).

Weight and Balance using the actual weights of the occupants.

Item	Weight (lbs)	Arm (Inches)	Moment (lbs x inches)
Aircraft empty weight	1 520	38	57 760
Pilot (78kg)	172	37	6 364
Front passenger (62kg)	137	37	5 069
Rear passengers (142kg)	313	73	22 849
Luggage	10	115	1 150
Fuel (48 US gallons)	288	42	12 096
Ramp weight	2 440	43.2	105 288
Fuel used for start & taxi (2 US gallons)	-13	42	-546
Take-off weight	2 427	43.2	104 742

The aircraft MTOW was exceeded by 5.5% during take-off from FAWB.

Figure 1: Indentation from the powerline on the propeller blade. (Source: ATO).

Figure 2: Wire strike markings on the exhaust.

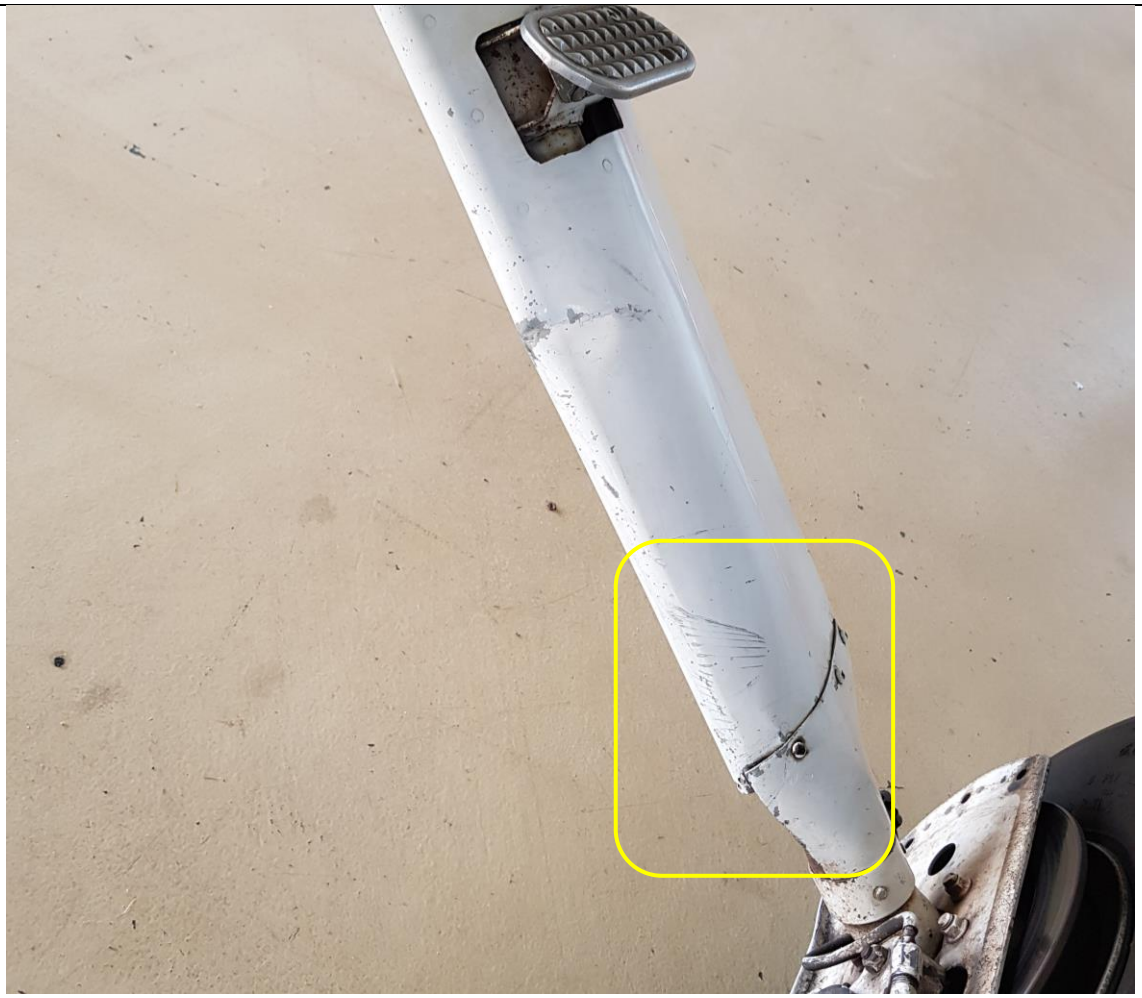

Figure 3: Wire strike markings on the lower left main gear strut.

Figure 4: Powerline overhead the M35 roadway that was struck by the aircraft's propeller.

The investigation made the following observations:

(i) The PIC flew the aircraft too low, thus, endangering the safety of the aircraft, the persons on-board the aircraft and property as contained in Part 91.01.10 of the CAR 2011 as amended, which states:

91.01.10 Endangering safety

(1) No person shall, through any act or omission—

(*a*) endanger the safety of an aircraft or person therein; or

(*b*) cause or permit an aircraft to endanger the safety of any person or property.

(ii) The PIC also did not adhere to the minimum heights as stipulated in Part 91.06.32 of the CAR 2011 as amended which states:

91.06.32 Minimum heights

(1) Except when necessary for taking off, or landing, or except with prior written approval of the Director, no aircraft—

(*a*) shall be flown over congested areas or over an obvious open-air assembly of persons at a height less than 1 000 ft above the highest obstacle, within a radius of 2 000 ft from the aircraft;

(*b*) when flown elsewhere than specified in paragraph (*a*), shall be flown at a height less than 500 ft above the ground or water, unless the flight can be made without hazard or nuisance to persons or property on the ground or water and the PIC operates at a height and in a manner that allows safe operation in the event of an engine failure*;* and

(*c*) shall circle over or do repeated overflights over an obvious open-air assembly of persons at a height less than 3 000 ft above the surface.

(iii) The weight and balance did not meet the requirements of the approved aircraft flight manual (AFM) as required in Part 91.07.11 of the CAR 2011 as amended. The PIC took off from FAWB with the aircraft MTOW exceeded.

91.07.11 Mass and balance

(1) The owner or operator of an aircraft shall ensure that, during any phase of the operation, the loading, mass and the centre of gravity of the aircraft complies with the limitations specified in the approved AFM referred to in regulation 91.03.2, or the operations manual if the limitations therein are more restrictive.

(2) The owner or operator shall establish the mass and the centre of gravity of the aircraft by actual weighing prior to initial entry into operation and, thereafter, at intervals of five years.

(3) The accumulated effects of modifications and repairs on the mass and balance of the aircraft shall be accounted for and properly documented by the owner or operator.

(4) The aircraft shall be weighed in accordance with the provisions of sub-regulation (2), if the effect of modifications on the mass and balance is not accurately known.

(5) The owner or operator shall determine the mass of all operating items and flight crew members

included in the dry operating mass of the aircraft, by weighing or by using the appropriate standard mass as prescribed in Document SA-CATS 91.

(6) The influence of the mass of the operating items and flight crew members referred to in sub-regulation (5) on the centre of gravity of the aircraft shall be determined by the owner or operator of such aircraft.

(7) The owner or operator shall establish the mass of the traffic load, including any ballast, by actual weighing, or determine the mass of the traffic load in accordance with the appropriate standard passenger and baggage mass as prescribed in Document SA-CATS 91.

(8) The owner or operator shall determine the mass of the fuel load by using the actual specific gravity or, if approved by the Director, a standard specific gravity.

Probable cause

The propeller struck a powerline while the pilot was flying the aircraft at a very low height over a road, endangering the safety of the aircraft, the occupants and property.

Figure 5: The incident aircraft, a Cessna 172M, ZS-SSB.

Safety Action/s
None.
Safety Message
Pilots flying for leisure with passengers on-board should ensure that they strictly adhere to the CAR requirements.
Purpose of the Investigation
In terms of Part 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
Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no 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 brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information 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 accident. *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