AIRCRAFT INCIDENT REPORT AND EXECUTIVE SUMMARY

					Reference:	CA18/3/2/1270	
Aircraft Registration	ZU-CVT	**Date of Incident**	14 June 2019		**Time of Incident**	1218Z	
Type of Aircraft	UFM-10 Samba		**Type of Operation**		Private (Part 94)		
Pilot-in-command Licence Type	Private Pilot Licence		**Age**	19	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		78.9		Hours on Type	3.9	
Last Point of Departure	Wonderboom Aerodrome (FAWB) Gauteng Province						
Next Point of Intended Landing	Messina Aerodrome (FAMH) Limpopo Province						
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)							
At Messina Aerodrome's taxiway with Global Positioning System (GPS) readings S22 21 20.0 E029 59 00.0 at a field elevation of 1902 feet AMSL.							
Meteorological Information	Wind direction: 120°; Wind speed: 1kt; Air temperature: 28°C; Visibility: 9999m; Clouds: Broken at 2500 feet.						
Number of People On-board	1+1	**No. of People Injured**	0	**No. of People Killed**	0		
Synopsis							

On 14 June 2019, a pilot and a passenger were engaged in a private flight from Wonderboom Aerodrome (FAWB) to Messina Aerodrome (FAMH), which took approximately 2 hours and 25 minutes. The pilot reported that the aircraft landed at FAMH, however, during the landing roll, she felt that the aircraft's brakes were not responsive when she reduced speed. As the aircraft was nearing the end of the runway and still at high forward speed, the pilot opted to vacate the runway and continued on to a taxiway. However, during a turn on to the taxiway, the aircraft's nose landing gear broke off, causing the propeller to strike the ground. This resulted in both propeller blades breaking off during the incident sequence.

Both occupants were not injured during the incident sequence; the aircraft sustained damage.

The investigation revealed that the aircraft, which was travelling at high forward speed, broke its nose gear during a turn on to a taxiway after landing. There were no anomalies found with the brake system when it was tested after the incident.

SRP Date	10 March 2020	Publication Date	04 May 2020

ABBREVIATION	DESCRIPTION
AMO	Aircraft Maintenance Organisation
AMSL	Above Mean Sea Level
AP	Approved Person (Maintenance Approved person for NTCA)
ATO	Aviation Training Organisation
A to F	Authority to Fly
°C	Degrees Celsius
CAR	Civil Aviation Regulations
CAVOK	Ceiling and Visibility OK
PPL	Private Pilot Licence
C of R	Certificate of Registration
CVR	Cockpit Voice Recorder
FAMH	Messina Aerodrome
FAWB	Wonderboom Aerodrome
ft	Feet
GPS	Global Positioning System
kt	Knots
MPI	Mandatory Periodic Inspection
NTCA	Non-Type Certified Aircraft
POH	Pilot Operating Handbook
PSI	Pounds Per Square Inch
TBO	Time Before Overhaul
VMC	Visual Meteorological Conditions

Reference Number	**:** CA18/3/2/1270
Name of Owner/Operator	**:** Langkloof Pretoleum CC
Manufacturer	**:** Urban Air S.R.O
Model	**:** UFM-10 Samba
Nationality	**:** South African
Registration Marks	**:** ZU-CVT
Place	**:** Messina Aerodrome (FAMH)
Date	**:** 14 June 2019
Time	**:** 1218Z

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 (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****.*

Investigations process:

The incident was notified to the Accident and Incident Investigations Division (AIID) on 14 June 2019 at about 1230Z. The investigators went to Messina Aerodrome on 14 June 2019 where they co-ordinated with all authorities on site by initiating the accident investigation process according to CAR Part 12 and investigation procedures. The AIID of the South African Civil Aviation Authority (SACAA) is leading the investigation as the Republic of South Africa is the State of Occurrence.

Notes:
1. Whenever the following words are mentioned in this report, they shall mean the following:

- *Incident – this investigated incident*
- *Aircraft – the UFM-10 Samba involved in this incident*
- *Investigation – the investigation into the circumstances of this incident*
- *Pilot – the pilot involved in this incident*
- *Report – this incident report*

2. Photos and figures used in this report are taken from different sources and may be adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report are limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows or lines.

Disclaimer:

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 On 14 June 2019, the pilot, accompanied by a passenger on-board a light aircraft with registration markings ZU-CVT, was engaged in a private flight from Wonderboom Aerodrome (FAWB) to Messina Aerodrome (FAMH) when the incident occurred. On the day of the incident, a pre-flight inspection was conducted at FAWB. The aircraft had an uneventful take-off and was routed to FAMH in Limpopo province. The flight took approximately 2 hours and 25 minutes.

Figure 1: The aircraft route from Wonderboom Aerodrome to Musina Aerodrome.

1.1.2 Upon reaching FAMH, approach for landing was carried out and the aircraft touched down uneventfully with flaps setting at 20° landing configuration. However, when the pilot applied brakes during the landing roll, she noticed that the aircraft's brakes were unresponsive. As the aircraft was at a very high forward speed, the pilot opted to vacate the runway and continued with the landing roll on to a taxiway which is at the end of Runway 12.

1.1.3 According to the video footage taken by the aircraft's owner, the aircraft was observed taxiing at a high speed towards the runway's exit. During the turn onto the taxiway, the nose landing gear broke off, causing the propeller to strike the runway surface at a high rotating speed. As a result, both propeller blades broke off.

1.1.4 The aircraft incident occurred during daylight at Messina Aerodrome with Global Positioning System (GPS) position at S22° 21' 20.0", E029° 59' 00.0", at a field elevation of 1902 feet (ft) above mean sea level (AMSL).

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	1	-	1	-

1.3 Damage to Aircraft

Figure 2: The aircraft after the incident.

1.4 Other Damage

1.4.1 None.

1.5 Personnel Information

Nationality	South African	Gender	Female	Age	19
Licence Number	**********	Licence Type	Private Pilot Licence		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 January 2023				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	78.9
Total Past 90 Days	3.9
Total on Type Past 90 Days	3.9
Total on Type	3.9

1.5.1 The pilot's flight logbook indicated that her last flight was on 18 November 2018 where she accumulated a total of 75 hours. Seven months later, on 2 June 2019, she did a 1-hour conversion flight on a UFM-10 Samba and was signed off by an instructor as competent in her logbook. Her second flight was the incident flight on 14 June 2019 where she accumulated 2.9 hours. The pilot's Private Pilot Licence (PPL) training was conducted on a C172 which had rudder pedals brake application. Her 1-hour conversion involved an aircraft with a different brake application system that used a lever.

1.6 Aircraft Information

1.6.1 The fuselage on a UFM-10 Samba is a two-seat, single engine, low-wing aircraft with side-by-side seating. It is all composite in construction. The fuselage is made mainly of carbon laminate with local sandwich construction. The wing is equipped with slotted flaps. The flap positions are 20° and 45°. The tail section is of conventional layout. The undercarriage is a fixed tricycle with steerable front wheel and the main wheels are equipped with hand-operated brakes. The main undercarriage is a continuous laminated sprung composite lay-up. The nose gear is made of high-quality steel tubes welded together with a rubber shock absorber to spring the gear. The aircraft is equipped with integral fuel tanks with a capacity of 13 US gallons (50L) each.

The aircraft cockpit configuration and controls labelling:

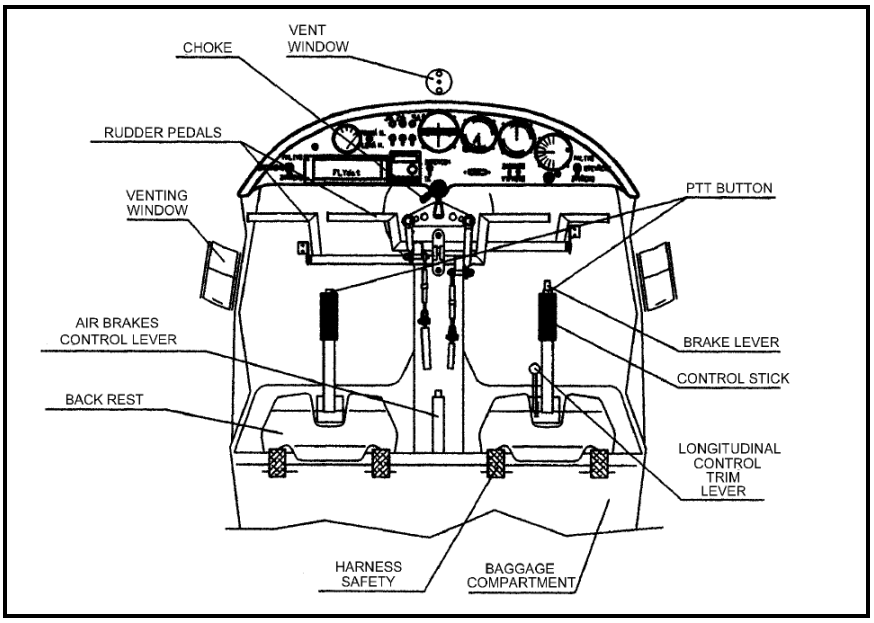

Figure : The layout of the aircraft's cockpit as per the aircraft maintenance manual.

Airframe:

Type	UFM-10 Samba	
Serial Number	33/10 2003	
Manufacturer	Urban Air S.R.O	
Date of Manufacture	2003	
Total Airframe Hours (At time of Accident)	265	
Last MPI (Date & Hours)	20 November 2018	253.1
Hours Since Last MPI	11.9	
C of A (Issue Date)	07/11/2018- 19/11/2019	
C of R (Issue Date) (Present owner)	17 May 2019 (Langkloof Petroleum CC)	
Operating Categories	NTCA Part 94	

Engine:

Type	Rotax 912 USL
Serial Number	4428771
Hours Since New	258
Hours Since Overhaul	TBO not yet reached

Propeller:

Type	Woodcomp S.R.O Varia
Serial Number	DA24
Hours Since New	258
Hours Since Overhaul	TBO not yet reached

1.6.2 The aircraft landing gear system:

The airplane is equipped with fixed nose wheel landing gear. The wheel is controllable. The main wheels on both legs are equipped with hydraulic brakes. There is the brake lever on the pilot's control stick. The main legs are formed from fiberglass springs. The main wheels of 400x100mm size consists of a duralumin alloy rim, bearings and duralumin brake disc. The brake calliper with one hydraulic cylinder is floating. There is a brake fluid hose connected to the brake calliper and the master cylinder on the control stick. The nose wheel leg is formed from high-quality steel tubes welded together. There is a rubber stock absorber to spring the leg. The nose steering is connected to the rudder control. The nose wheel has two ball bearings.

1.6.3 Aircraft Maintenance:

A review of the aircraft maintenance records (such as logbooks, SB, TI's and annual inspection maintenance service pack) were conducted. The last annual inspection maintenance was conducted on 20 November 2018 at 253.1 hours. During the engine run tests, it was detected that the revolutions per minute (RPM) were off calibration as they were not co-ordinating with the throttle setting and the expected RPM indication.

1.6.4 RPM Indication Calibration:

According to the maintenance technician, on the day of the incident flight, the aircraft's RPM indication unit was maintained by MGL Systems and Projects. The aircraft had just come out of the annual inspection at the time and the RPM indication calibration was not carried out as it was detected during engine run checks maintenance procedure. The RPM unit was reported to have been fluctuating at about a thousand RPM range on the high-power setting range. The technician had begun with the work; however, he was not yet finished. The initial task of sorting the unit wiring and stabilising the RPM pick off was completed and was readable. It was found that on high range, there was still a slight RPM fluctuation of not more than 25 RPM. The pilot was advised about the RPM unit which the technician was still working on. The technician was then informed that the flight cannot be delayed any further as the pilot was in a hurry to depart. The technician then released the aircraft as the RPM unit met the minimum MGL System and Projects standard.

1.7 Meteorological Information

1.7.1 FAMH is not equipped with a weather station, however, the closest aerodrome – Air Force Base Makhado (FALM) – weather was considered in relation to the pilot's questionnaire reporting date/ time.

Wind direction	120°	Wind speed	1kt	Visibility	9999m
Temperature	28°C	Cloud cover	Broken	Cloud base	2500ft
Dew point	08°C	QNH	1035hPa		

1.8. Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment as approved by the Regulator (SACAA) for the aircraft type. There were no recorded defects regarding the navigation system prior to and during the incident.

1.9 Communication

1.9.1 The aircraft was equipped with standard communication system as approved by the Regulator for the aircraft type. There were no recorded defects regarding the communication system prior to and during the incident.

1.10 Aerodrome Information

Aerodrome location	Messina Aerodrome (FAMH)	
Aerodrome co-ordinates	S22° 21' 21.0", E029° 59' 11.1"	
Aerodrome elevation	1902ft above mean sea level (AMSL)	
Runway designations	12/30	
Runway dimensions	1920m x 30m	
Runway used	12	
Runway surface	Asphalt	
Approach facilities	None	
Aerodrome status	Registered	

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor were they required by regulation for this aircraft type.

1.12 Wreckage and Impact Information

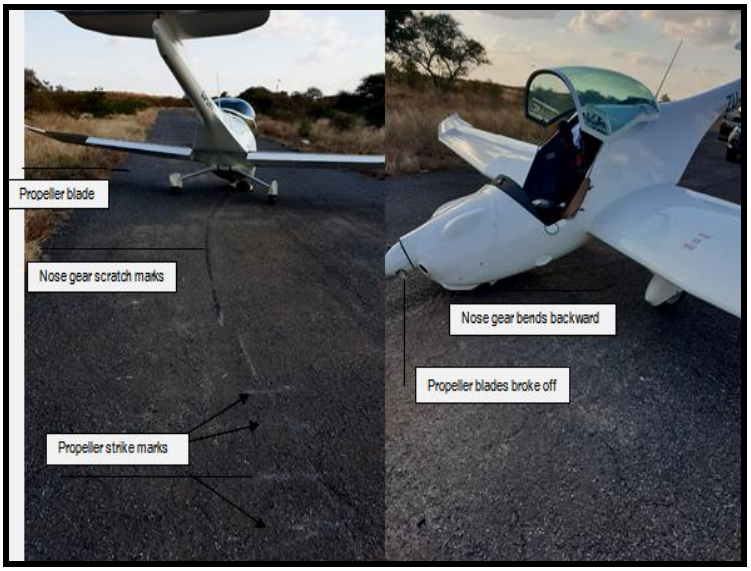

Figure 2: The aircraft after the incident.

1.12.1 The incident occurred on a taxiway after the pilot vacated the runway while the aircraft was still at a high forward speed. This was after the brake application system became unresponsive during landing to reduce forward speed so as to bring the aircraft to a desired taxiing speed for it to safely vacate the runway. According to the gathered information, the aircraft's nose landing gear broke off during a turn, causing the propeller to strike the taxiway at high rotational energy and braking off both propeller blades. The incident photos provided by the pilot revealed that the aircraft was leaning on its nose section's bottom part with the nose landing gear bent backward. The wreckage observation was as follows:

- The aircraft appeared to be leaning on its nose section.
- The aircraft propeller hub was missing the two propeller blades.
- The nose landing gear had broken backward with the aircraft's nose section laying on it.
- A trail of ground scars caused by the nose landing gear as it was dragged along were found.
- The four strike marks relating to the propeller strike during the incident sequence.

1.12.2 The wreckage distribution was localised and contained within a radius of approximately 5 metres. One of the propeller blades was found in front of the aircraft towards the left-hand side. The wreckage itself was mostly intact.

1.13 Medical and Pathological Information

1.13.1 None.

1.14 Fire

1.14.1 There was no evidence of pre- or post-incident fire.

1.15 Survival Aspects

1.15.1 The aircraft incident was considered survivable as the cockpit and cabin areas did not sustain damage which could have caused injury to the pilot and the passenger.

1.16 Tests and Research

1.16.1 The pilot reported a total brake failure which led to a decision to vacate the main runway at a high forward speed. This resulted in the nose landing gear braking off after making a turn on to a taxiway. The aircraft was recovered to an approved aircraft maintenance organisation (AMO) facility rated on the aircraft type for brake system testing and for further airworthiness maintenance post-accident. According to the AMO, tests were carried on the landing gear and no anomalies were found.

1.17 Organisational and Management Information

1.17.1 The aircraft is privately owned and operated.

1.17.2 The aircraft was maintained by an approved person (AP) 026 in accordance with manufacturer's prescribed procedure. The AP held a valid certificate of maintenance approval issued by the Regulator on 23 July 2018 with an expiry date of 31 July 2020.

1.18 Additional Information

1.18.1 On the day of the incident, the owner of the aircraft recorded the aircraft during its approach for land. The video was recorded near the apron's entrance. On the video, the aircraft's touchdown was uneventful; however, by the time it (the aircraft) reached the point where the video was being taken, it was still moving at a high speed. This is where the recording stopped.

Figure 3: The position of the video recorder.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 General

From the available evidence, the following analysis was made with respect to this incident. These shall not be read as apportioning blame or liability to any particular organisation or individual.

2.2

2.2.1 The pilot was issued a Private Pilot Licence on 28 September 2018 with an expiry date of 30 September 2019. The pilot had a valid medical certificate issued on 31 January 2018 with an expiry date of 31 January 2023. According to the available information, the pilot had not flown an aircraft for approximately seven months. On 2 June 2019, the pilot did a 1-hour conversion flight on the incident flight aircraft and, on 14 June 2019, she flew the incident aircraft for 2 hours and 25 minutes from FAWB to FAMH.

2.2.2 The aircraft was maintained by a Regulator approved person. At the time of the incident, the aircraft had a valid authority to fly issued by the Regulator on 7 December 2018, with an expiry date of 19 November 2019. According to the pilot, the aircraft brake system failed during the landing roll. She then opted to vacate the runway on to a taxiway situated at the end of Runway 12. The aircraft was still moving at a high forward speed when she vacated the runway and, upon turning on to a taxiway, the nose landing gear broke off; this led to the incident sequence. Post-incident maintenance inspection and tests revealed no anomalies with the brake system applicability or any aircraft

system. According to the maintenance technician who is rated on the aircraft type, during the engine power check prior to departure at FAWB, the pilot was struggling to keep the aircraft in place. She was then advised that she should apply a firm grip on the brake lever to effectively apply brakes on the aircraft type.

2.2.3 On the day of the flight, a technician was working on the multifunction display, which included the RPM indication. The one task of stabilising the high RPM indication was completed. The technician was then informed that the aircraft could not be delayed any further as the pilot was in a hurry to depart. The technician then advised the pilot that the task of stabilising the low RPM setting fluctuation (25 RPM) was not significant as opposed to the high-power setting where the RPM unit was fluctuating at about a thousand RPM. The multifunction display at 25 RPM fluctuation could not be considered a contributing factor in this incident.

2.2.4 Fine weather conditions prevailed in the area around FAMH on the day of the incident. The weather cannot be considered a contributing factor in this incident.

2.2.5 The pilot conducted the initial flight on this aircraft type 12 days before the incident flight. This was after about seven months of the pilot not actively flying any aircraft. The pilot flew only one leg with an instructor on-board and was then signed off. The pilot reported that the brakes were unresponsive during the landing roll when she applied them, therefore, the aircraft did not slow down. The AP did not find any anomalies with the brake system during maintenance inspection after the incident.

- The brake system application in this aircraft (that is, its control system) is located on the flight control stick. The pilot engages the brake system by depressing a button. Prior to the flight, the pilot was given advise to firmly grip the lever during brake application.
- In most aircraft types, brakes are engaged by depressing the rudder pedals using the correct applicable technique. The pilot's entire training for her PPL was conducted on an aircraft that uses the rudder pedals braking system.
- The pilot spent a long time without flying, however, on her return approximately seven months later, she did a conversion of 1 hour on an aircraft with a completely different braking system.
- Twelve days after the conversion, the pilot took off on a flight to FAMH as the pilot-in-command.
- It is probable that the pilot did not use the correct technique required on the aircraft type when she applied the brakes. It is likely that she could have used the rudder pedals to reduce the aircraft speed. As a result, the pilot decided to vacate the runway even though the aircraft was moving at a high forward speed, resulting in the aircraft's nose landing gear braking off during a turn on to a taxiway.
- It is likely that at the time of brake application, the aircraft's brakes could not counter the forward speed. The aircraft landed with the configuration of 20° flap settings, which could not significantly reduce the aircraft's forward speed at the landed distance. However, the pilot stated that the aircraft's brakes could not engage during application, hence, she attempted to vacate the runway even though the aircraft was moving at a high forward speed.

2.2.6 The investigation revealed that the aircraft, which was travelling at high forward speed, broke its nose gear during a turn on to a taxiway after landing. There were no anomalies found with the brake system when it was tested after the incident.

3. CONCLUSION

3.1 General

From the available evidence, the following findings, causes and contributing factors were made with respect to this incident. These shall not be read as apportioning blame or liability to any organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusions heading:

- **Findings –** are statements of all significant conditions, events or circumstances in this incident. The findings are significant steps in this incident sequence, but they are not always causal or indicate deficiencies.
- **Causes –** are actions, omissions, events, conditions or a combination thereof, which led to this incident.
- **Contributing factors –** are actions, omissions, events, conditions or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

3.2 Findings

3.2.1 The pilot was issued a PPL by the Regulator on 28 September 2018 with an expiry date of 30 September 2019. She had a medical certificate which was issued on 31 January 2018 with an expiry date of 31 January 2023.

3.2.2 According to the available information, the pilot did not fly any aircraft for approximately seven months. After this period, she then did a conversion to the incident aircraft type and accumulated 1-hour flight experience. Twelve days later, the pilot took off on a 2 hours and 25 minutes flight to FAMH.

3.2.3 The pilot's knowledge of the aircraft system operational limits seemed to be inadequate.

3.2.4 The aircraft was maintained by a Regulator approved person in accordance with manufacturer's prescribed procedure. The last maintenance carried out on the aircraft prior to the incident was an annual inspection on 20 November 2018 at 253.1 airframe hours.

3.2.5 The aircraft had a valid authority to fly issued by the Regulator in accordance with applicable approval procedures. The authority to fly was issued on 7 December 2018 with an expiry date of 19 November 2019. The aircraft's certificate of registration with the current owner was issued on 17 May 2019.

3.2.6 The pre- and post-incident maintenance inspection revealed no anomalies relating to the reported brake failure.

3.2.7 The investigation revealed that the aircraft, which was travelling at high forward speed, broke its nose gear during a turn on to a taxiway after landing. There were no anomalies found with the brake system when it was tested after the incident.

3.3 Probable Cause/s

3.3.1 The aircraft, which was travelling at high forward speed, broke its nose gear during a turn on to a taxiway after landing. There were no anomalies found with the brake system when it was tested after the incident.

3.4 Contributory Factors

3.4.1 The pilot's experience and knowledge of the aircraft type system and limitation was inadequate.

4. SAFETY RECOMMENDATIONS

4.1 General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report; the AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

4.2 Safety Recommendation/s

4.2.1 None.

5. List of Appendices

5.1 None.