AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9352		
Aircraft Registration	**ZU-FVW**	**Date of Accident**	12 August 2014			**Time of Accident**	0955Z
Type of Aircraft	Sling 2 (Aeroplane)		**Type of Operation**		Private		
Pilot-in-command Licence Type	Private pilot licence		**Age**	28	**Licence Valid**		Yes
Pilot-in-command Flying Experience	Total Flying Hours		168.3		**Hours on Type**		124.3
Last point of departure	Port Elizabeth (FAPE) international aerodrome: Eastern Cape.						
Next point of intended landing	Tedderfield private aerodrome (FATA): Gauteng.						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On a privately owned farm at GPS coordinates determined to be (S 32° 50.45.0 ´ E 025° 48 .25.0´) at an elevation of approximately 1 782 feet above mean sea level (AMSL).							
Meteorological Information	CAVOK weather conditions were reported.						
Number of people on board	1 + 1	**No. of people injured**	0	**No. of people killed**	0		

Synopsis

On Tuesday morning 12 August 2014, a Sling 2 aircraft with the pilot and a passenger on-board was conducting a private flight from Port Elizabeth (FAPE) international bound for Tedderfield (FATA) when the accident occurred. According to the pilot he went through the aircraft technical documentation before departure and later performed a thorough pre-flight inspection. Everything was normal. He later started the engine, taxied towards the holding point of runway 28 and took off without difficulties. En-route smoke emanated from the cockpit instrument panel followed by the engine stoppage. The aircraft lost height and he then spotted an open space for a forced landing on a privately owned farm. On landing the aircraft nose gear collapsed and the propeller smashed into the ground. The aircraft was substantially damaged but no injuries were reported. The investigation revealed that the inflight engine upset was a result of a latent defective voltage regulator installed on the aircraft.

Probable Cause

Unsuccessful forced landing following the engine stoppage inflight.

Contributing factor/s:

Electrical system failure.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Madiba Bay School of Flight.
Manufacturer : The Airplane Factory
Model : Sling 2
Nationality : South African
Registration Marks : ZU-FVW
Place : On a privately owned farm
Date : 12 August 2014
Time : 0955Z

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 (1997) 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 establish legal liability****.*

Disclaimer:

This report is produced without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION:

1.1 History of Flight:

1.1.1 On Tuesday morning 12 August 2014, a certified private pilot licence (PPL) holder accompanied by a passenger took off from Port Elizabeth (FAPE) international on a private flight destined for Tedderfield (FATA) located South of Johannesburg. A visual meteorological condition (VMC) flight plan was filed with the Cape Town information desk. The pilot stated that the purpose of the flight was to build up flying hours. Before departure in the morning, the pilot went through the aircraft's technical documentation and later performed a thorough pre-flight inspection.

1.1.2 According to the pilot all was in order and after few minutes they embarked the aircraft and started the engine. The engine idled for a while and the aircraft was then taxied to the holding point of runway 28. Take off and climb was uneventful. After approximately one and half hour's flying time, at FL 095 feet at 90 knots indicated airspeed (IAS), smoke emanated from the instrument panel and degraded the visibility within the cockpit area to the extent that the instruments could not be scanned. The pilot immediately through the aircraft radio frequency, 131.125 MHz alerted the Cape Town control tower. However the aircraft radio became inoperative during the conversation.

1.1.3 An electrical burning odour soon became apparent and the pilot told the passenger to retrieve a portable hand held Halon fire extinguisher (as prescribed in document SA-CATS 91) and be on alert for fire. The pilot remained calm and took firm control of the aircraft as per the operator's standard operating procedure (SOP). After few minutes all electrical equipment became inoperative, including the transponder and the electronic flight instrument system (EFIS) screen. The pilot tried to switch on the back-up EFIS screen, but without success. The smoke in the cockpit intensified rapidly to the extent that the horizon could not be seen. Since the aircraft was not equipped with oxygen and smoke protection masks, the pilot initially considered opening the canopy with the view to ventilate the cabin, but decided against it as he would most likely have jeopardized the aircraft's safety.

1.1.4 He then took the aircraft down to FL 075 and during the process the engine stopped. The smoke began to clear allowing sufficient visibility and the pilot instantly followed the operating procedures contained in the quick reference handbook (QRH). He switched on the engine control unit (ECU) back up switch and tried to restart the engine but without success. The pilot spotted an open space for a forced landing on Thorn Groove farm located in the Cacadu district municipality. The aircraft glided to the identified area and during the landing, the nose wheel collapsed. No injuries were reported and the pilot turned off the aircraft master switch before vacating the aircraft. No fire was spotted. The pilot via his cell phone alerted the operator and provided him with the area co-ordinates. A team of maintenance personnel was dispatched.

1.1.5 The FACT control tower officer reported that they tried several times to establish radio contact with the aircraft but without success. The aeronautical rescue coordination centre (ARCC) based in Johannesburg was informed that ZU-FVW had disappeared from the surveillance radar and was believed to have landed or crashed somewhere. The South African Police Service (SAPS) was notified and the aircraft was spotted in an aerial search by a Squirrel helicopter. The rescue team landed at the accident site without incident and the occupants were reported to be fine but a bit shaken. According to the authority to fly (ATF), the aircraft was certified to operate under the provisions of Part 141 of the South African Civil Aviation Regulations which permitted the aircraft use for conducting pilot training operations.

1.1.6 The accident happened in day light at GPS coordinates determined as S32° 50.45.0´ E025°48.25.0 ´ at an elevation of approximately 1 782 feet AMSL.

1.2 Injuries to Persons:

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

1.3 Damage to Aircraft:

1.3.1 The landing gear, wings, propeller and the lower cowling were damaged.

Figure 1: The aircraft as found at the accident site

1.4 Other Damage:

1.4.1 None.

1.5 Personnel Information:

Nationality	Angolan	Gender	Male	Age	28
Licence Number	0272448515	Licence Type	Private pilot licence		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Nil				
Medical Expiry Date	28 February 2015				
Restrictions	None				
Previous Accidents	Nil				

Experience:

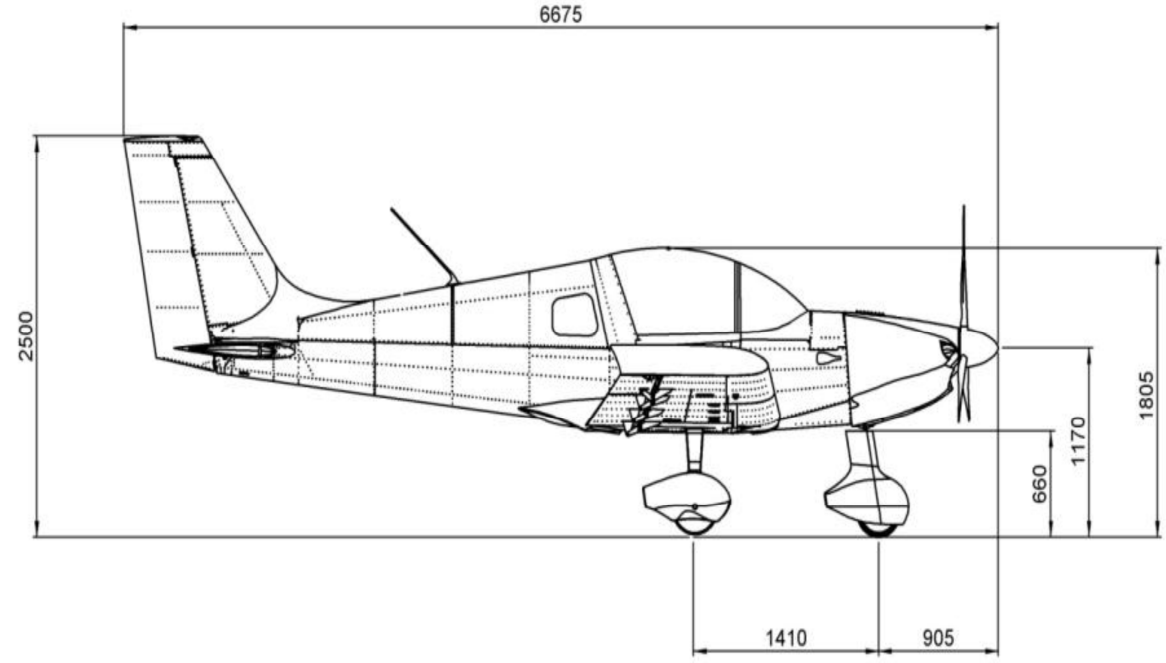
Total Hours	168.3
Total Past 90 Days	103.02
Total on Type Past 90 Days	103.02
Total on Type	124.3

*NOTE: The pilot was an Angolan national and was in possession of a South African Civil aviation authority (SA CAA) pilot licence dated 19 May 2014. According to the available information from the CAA pilot file, the pilot flew the Piper PA-28/140 series of aircraft only during his training and later had a Sling 2 aircraft endorsed on his profile. His profile revealed no accident or incident history, enforcement actions, pilot certificate or rating failure, or retest history. His logbook was examined and all entries were found to have been accurately logged.

1.6 Aircraft Information:

A Sling 2 is a single-engine, all metal, low-wing monoplane of semi-monocoque construction with two side-by-side seats. The aircraft is powered by a 100 horse power (75 kW) Rotax engine which drives a 3-bladed Warp drive propeller. The aircraft features a sliding canopy, large fuel tanks, and standard equipment including a glass cockpit. The aircraft is equipped with a full-colour EFIS system which integrates flying needs including primary flight data, engine condition monitoring (ECM), which is typically used in collecting, and storing a number of parameters from an aircraft engine and later analysing the data to ensure that there is no abnormal activity, GPS moving map, as well as full autopilot and communications integration. The aircraft is equipped with a Magnum 601 ballistic parachute that can be used in the event of loss of control, failure of the aircraft structure, or other in-flight emergencies, which would in this case assist in lowering the aircraft safely to the ground, assuring minimal, if any, injuries or casualties among the occupants. It is activated by pulling the lever inside the cockpit, and will deploy in just a few seconds.

So what it does is to slow the aircraft down and at the same time increase lift resulting in a very slow nose down attitude decent. With the parachute deployed, the pilot would still have full control over the aircraft and can steer it in at any direction. Aircraft braking is controlled on both main wheels with a hand actuator situated in the center console. Elevator trim is electrically controlled by buttons on the control stick. Wing flaps are electrically controlled by a rocker switch located on the instrument panel or control stick. The landing gear is a tricycle landing gear with a sprung steel steerable nose wheel. The main landing gear uses a single continuous fiberglass spring section. The aircraft braking system is single hydraulic system acting on both wheels of the main landing gear through disk brakes. The aircraft was solely intended for recreational and cross-country flying. Aerobatic operations are prohibited and the aircraft is primarily considered suitable for pilot training. The aircraft is ONLY approved for visual flight rules (VFR) operations with terrain visual contact at all times. Figure 2 and 3 show the aircraft layout dimension and the cabin.



Figures 2/3: Sling 2 dimension and the cockpit

Airframe:

Type	Sling 2
Serial Number	088
Manufacturer	The Aircraft Factory (PTY) Ltd
Service ceiling	12 000 feet

Maximum take-off weight	1540 lb	
Empty weight	814 lb	
Date of Manufacture	1212	
Total Airframe Hours (At time of Accident)	1 682.1	
Last Annual (Hours & Date)	1 641.56	31 July 2014
Total Hours Flown	40.54	
Authority to fly (Issue Date)	02 September 2014	
Authority to fly (Expiry Date)	01 September 2015	
C of R (Issue Date) (Present owner)	05 December 2013	
Recommended fuel used	91 Octane Mogas and Avgas LL 100	
Fuel used	Avgas LL 100	
Operating Categories	Standard Part 141	

*****NOTE: The aircraft maintenance organisation (AMO) that performed the last maintenance on the aircraft prior to the accident flight was in possession of a valid AMO approval certificate No1244. All relevant aircraft documentation such as the certificate of registration “C of R”, the authority to fly and the mass and balance certificates were inspected during the investigation and were valid. The aircraft maintenance documentation such as airframe logbooks, engines logbooks and the propeller log books were obtained from the AMO and inspected. All maintenance entries made in the logbooks were appropriately certified in terms of applicable regulations.

Engine:

Type	Bombadier Rotax-GMBH
Serial Number	4417069
Hours since New	1 641.56
Hours since Overhaul	TBO not reached

Propeller:

Type	Warp drive
Serial Number	T13988
Hours since New	793.91
Hours since Overhaul	TBO not reached

1.7 Meteorological Information:

1.7.1 The pilot reported CAVOK weather conditions at the time of the flight.

1.8 Aids to Navigation:

1.8.1 The aircraft was fitted with an electronic flying instrument system (IFIS) screen and was operating efficiently before the mishap.

1.9 Communications:

1.9.1 The aircraft was equipped with a very high frequency (VHF radio. There was no problem with communication between the pilot and Cape Town control tower before take-off.

1.10 Aerodrome Information:

1.10.1 The accident happened during a forced landing on a farm at GPS co-ordinates determined to be South 32° 50.45.0´ East 025° 48 .25.0´ at an elevation of approximately 1 782 AMSL.

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 was it required by the regulation to be fitted to this aircraft type.

1.12 Wreckage and Impact Information:

1.12.1 Following the in-flight mishap and subsequent unsuccessful forced landing on the farm, the aircraft suffered substantial damage to the wings, landing gear, and the lower cowling. The aircraft nose strut collapsed because of this and the propeller struck the ground. See figures 4, 5 and 6 below.

Figure 4: The aircraft in a nose low position

Figure 5/6: Damaged main landing gear with the nose wheel visible

1.13 Medical and Pathological Information:

1.13.1 None.

1.14 Fire:

1.14.1 No fire was reported.

1.15 Survival Aspects:

1.15.1 The accident was considered to be survivable.

1.16 Tests and Research:

1.16.1 In-flight fire is one of the most unsafe situations that crew can be faced with. Without decisive intervention by the crew, a fire on board an aircraft can lead to a catastrophic loss of the aircraft within a very short space of time. Once a fire has become established, it is unlikely that the crew will be able to extinguish it. To stand a chance of survival once the fire is spotted, the aircraft must land as soon as possible. An assessment of the aircraft at the site was carried out. The wings were dismantled to enable an easy recovery to the manufacturer's facility for investigation. The aircraft was defueled and the wings were then pulled apart followed by a successful recovery on a trailer to the manufacturer's facility at FATA. All access panels were removed and a detailed inspection of the wiring by the engineers from the manufacturer under the auspices of AIID investigating team commenced. No evidence of cable arcing or sooting were detected.

1.16.2 The investigation of the electronic engine logs saved in the engine control unit (ECU) system revealed that, immediately prior to the accident the various sensors on the engine (S/n 4417069) all failed three times to default values as a consequence of three consecutive voltage drops of the aircraft engine electrical system. Warning lamps appeared during the three engine failures occasioned by the voltage drops. The aircraft engine was restarted 3 times, shown in figure 7, where the voltage falls below 10 volts, the ECU is programmed to shut down and to re-synchronise, lanes A and B. The first engine shut down (figure 7) was at 1 659 hr 2 minutes, at which time the throttle position was at 60%. The voltage dropped below 10 volts and the engine revolutions per minutes (RPM) dropped to 802. The engine was thereupon restarted by the pilot and it continued thereafter to run until the final engine shut down.

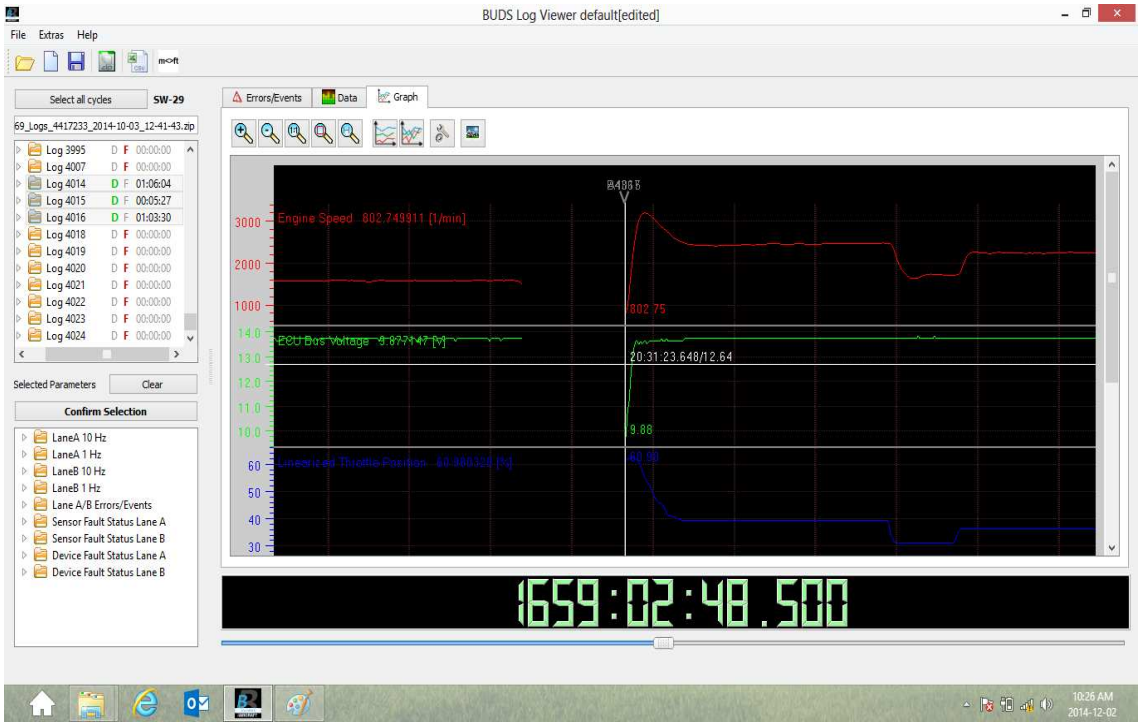


Figure 7: First engine shut down

1.16.3 The second ECU voltage drop as shown in figure 8 took place at 1 659 hr 8 minutes, at which time the voltage had dropped to 5.52 volts with a throttle position of 85.59% and the engine revving at 4 411 RPM. Although the engine did not cut entirely on this occasion, the warning lights flashed.

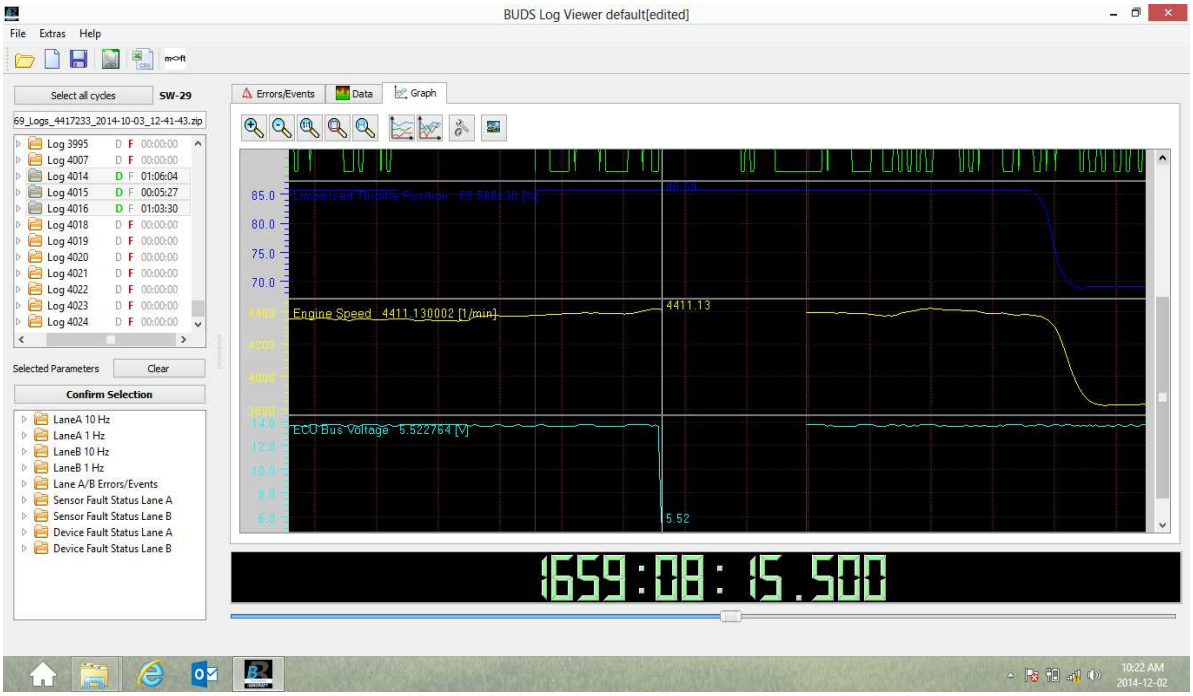


Figure 8: Second voltage drop

1.16.4 The third and final time was when the engine cut out and could not be restarted at 1 660 hr 11 minutes, at which time all engine sensors failed (figure 9). During this time, the engine RPM read 3 333 with a throttle position of 25.47%.

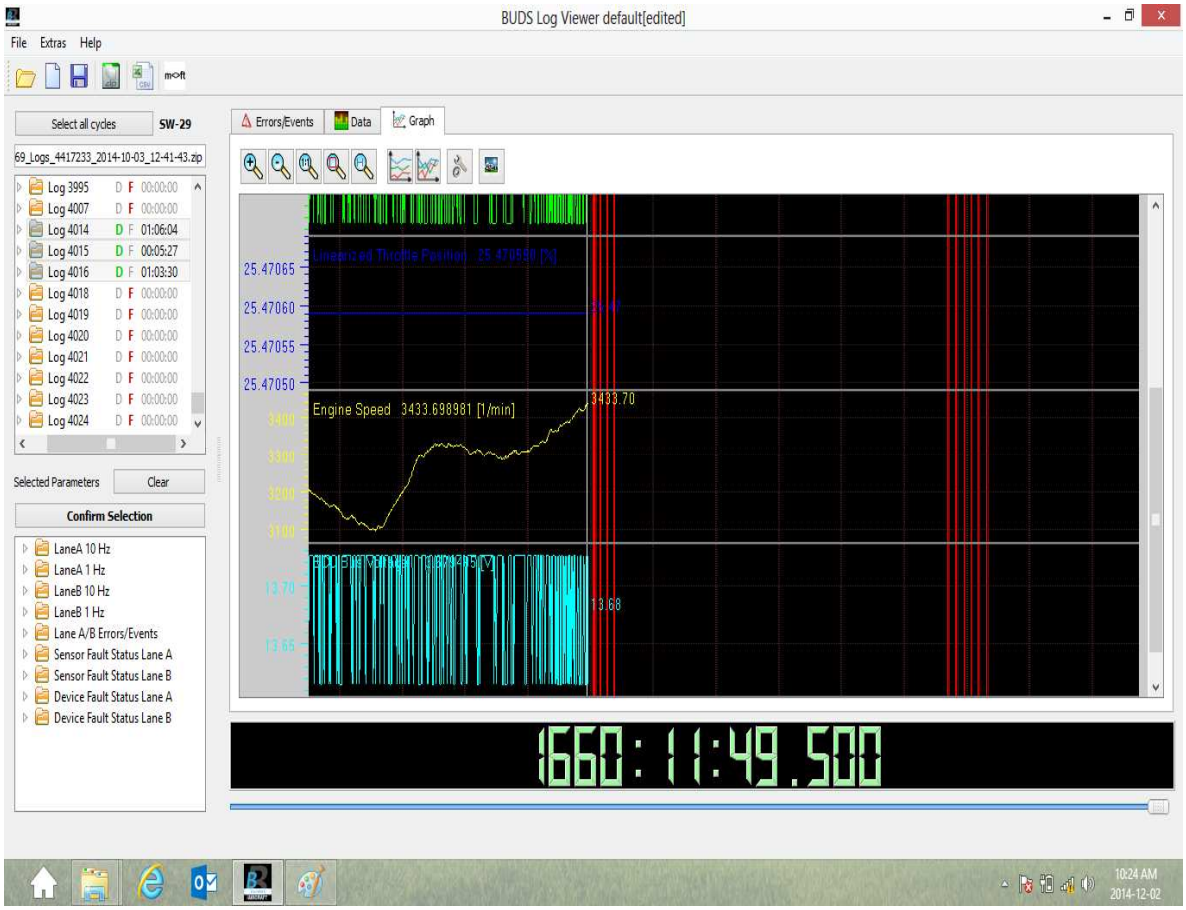


Figure 9: Failure of all sensors

1.16.4 As illustrated in Figure 10, both manifold pressure sensors had, during this time, also ceased reading due to the low voltage. The failure of both these sensors alone led to immediate engine shutdown. Figure 11 shows in the BUDS program that all the sensors had failed to their default value.

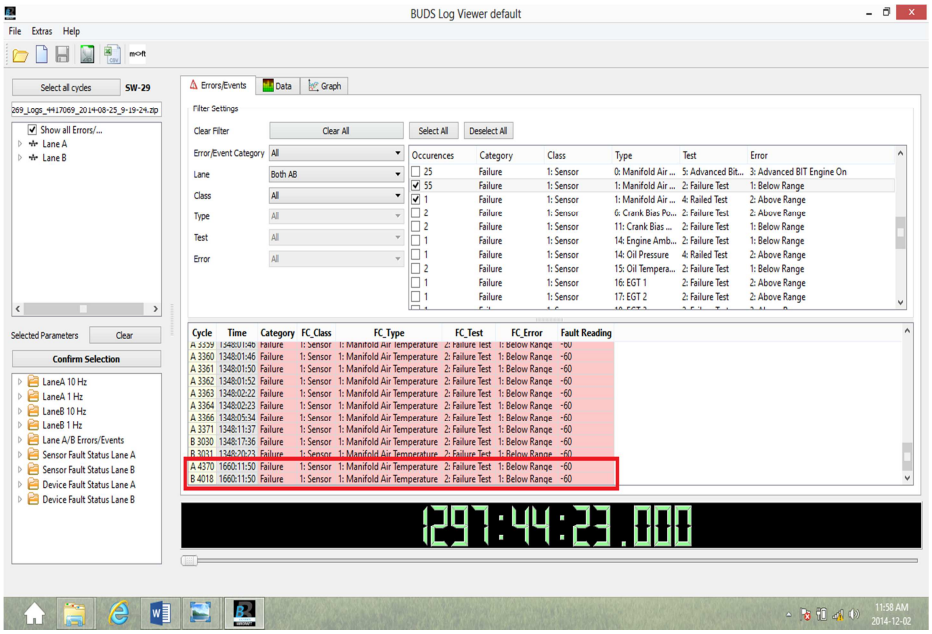


Figure 10: Illustration of sensor failure

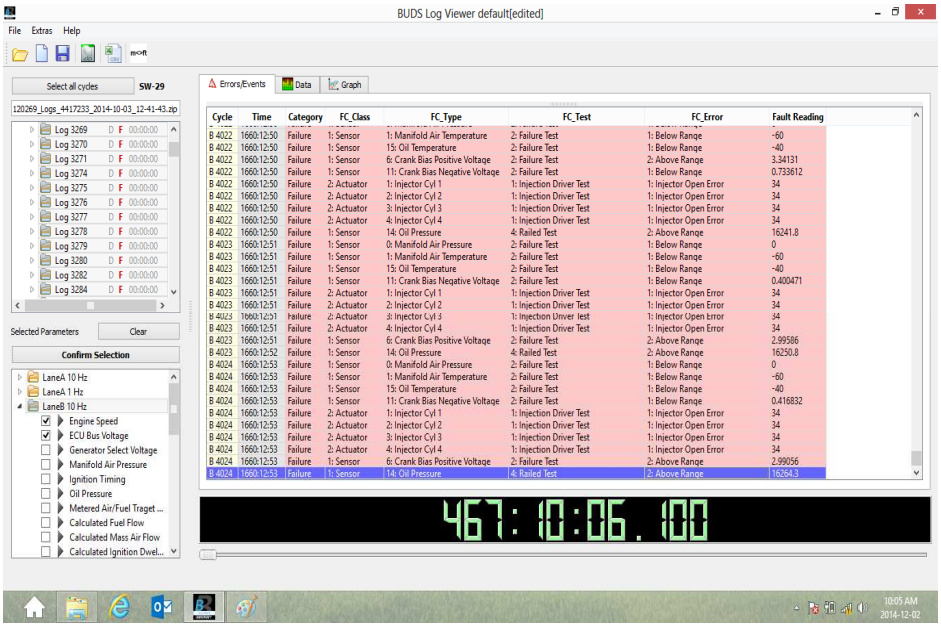


Figure 11: Sensor failure to default value.

1.16.6 The cause of the engine failure in each case, however, was the loss of voltage to the ECU. The investigation of the charging system showed that regulator B on the fuse box had completely melted. This indicates an overvoltage condition, ultimately leading to total electrical failure. The engineer accordingly removed the ignition housing from the engine to inspect the stator (which is housed inside the ignition housing, submerged in oil) for signs of damage. Signs of burning on the stator were observed on the coils as shown on Figures 12 below.

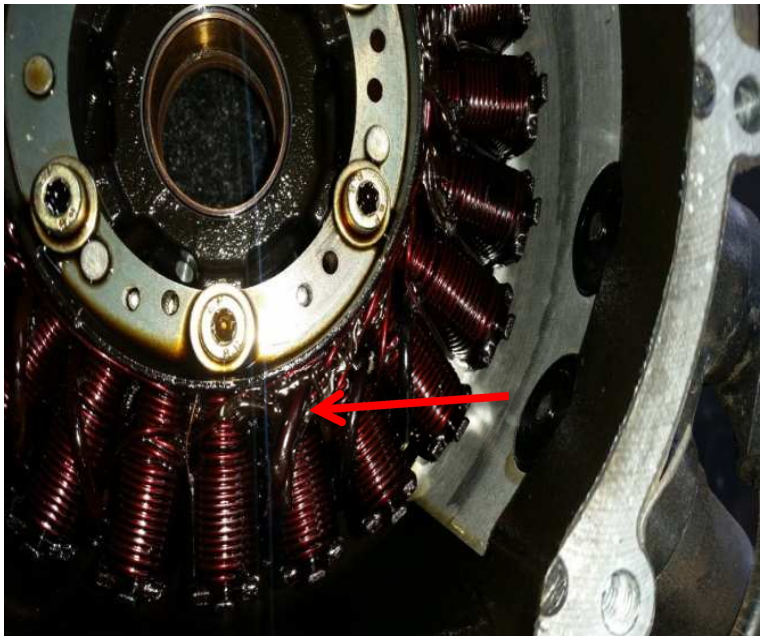


Figure 12: Burnt stator with evidence of melting on the copper wires

1.16.7 The investigation concluded that the burning on the ignition stator coils resulted in melting of the insulation around the copper wires, leading to short circuiting and a persistent overvoltage condition. The overvoltage condition led to the failure of the regulator, causing a total electrical failure and subsequent engine stoppage. Further inspection of the stator pickups showed that they had come into contact with and rubbed against the flywheel housing. It would appear that this rubbing caused heat build-up which in turn resulted in the melting of the stator coils referred to above. Figure 14 shows signs of the stator pickups rubbing against the flywheel housing.

Figure 13: The flywheel housing

1.17 Organizational and Management Information:

1.17.1 This was a private flight.

1.17.2 The AMO that performed the annual inspection on the aircraft was in possession of a valid AMO approval certificate No 1244.

1.18 Additional Information:

1.18.1 None.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None

1 ANALYSIS:

2.1 The available information revealed that fine weather conditions prevailed in the area at the time of the occurrence. It was therefore concluded that weather was not a contributory factor to the accident. According to available records the pilot was the holder of a private pilot licence and had logged a total of 168.8 flight hours of which 124.3 hours was on type (Sling 2 aircraft). The pilot medical was valid and he was fit to commence with flying activities at the time of the occurrence. The flight conditions were suitable for his experience level and the flight was also correctly authorized. Available aircraft technical documentation showed that the aircraft had been maintained under an approved continuous care inspection maintenance programme and was furthermore properly maintained in accordance with (IAW) the manufacture's approved procedures.

2.2 The aircraft took off from FAPE bound for FATA on a training flight under visual meteorological conditions. En-route the pilot experienced an inflight upset where upon the aircraft engine stopped followed by an unsuccessful forced landing on a privately owned farm, Thorn Groove area in the Cacadu district municipality. A detailed inspection and tests established that the immediate cause of the engine failure was the failure of the electrical system which supplied the engine ECU. Without at least 10 volts of power to the ECU, the ECU will no longer control the various engine senders and systems. The electrical failure was caused by the failure of the voltage regulator owing to a persistent overvoltage condition. This overvoltage condition was caused by a melting of the insulation in the stator coils and overheating caused by the rubbing of the stator pickup on the flywheel housing. According to the AMO, the misalignment of the stator pickup caused it to rub on the flywheel housing and it hence the originating cause of the engine failure.

3. CONCLUSION:

3.1 Findings:

3.1.1 The pilot was a holder of a valid private pilot's licence and had the aircraft type endorsed in his logbook.

3.1.2 The pilot's medical certificate was valid with no restrictions.

3.1.3 The flight was operated as a general aviation flight under VFR rules.

3.1.4 Fine weathers condition prevailed at the time and the weather was not considered to have any bearing on the accident.

3.1.5 The aircraft was in possession of a valid authority to fly at the time of the accident.

3.1.6 The AMO that performed the annual maintenance inspection on the aircraft prior to the accident flight was in possession of a valid AMO approval certificate No 1244.

3.1.7 The accident was considered survivable.

3.2 Probable Cause/s:

3.2.1 Unsuccessful forced landing following the engine stoppage inflight.

3.3 Contributory factor:

3.3.1 Electrical system failure.

4. SAFETY RECOMMENDATIONS:

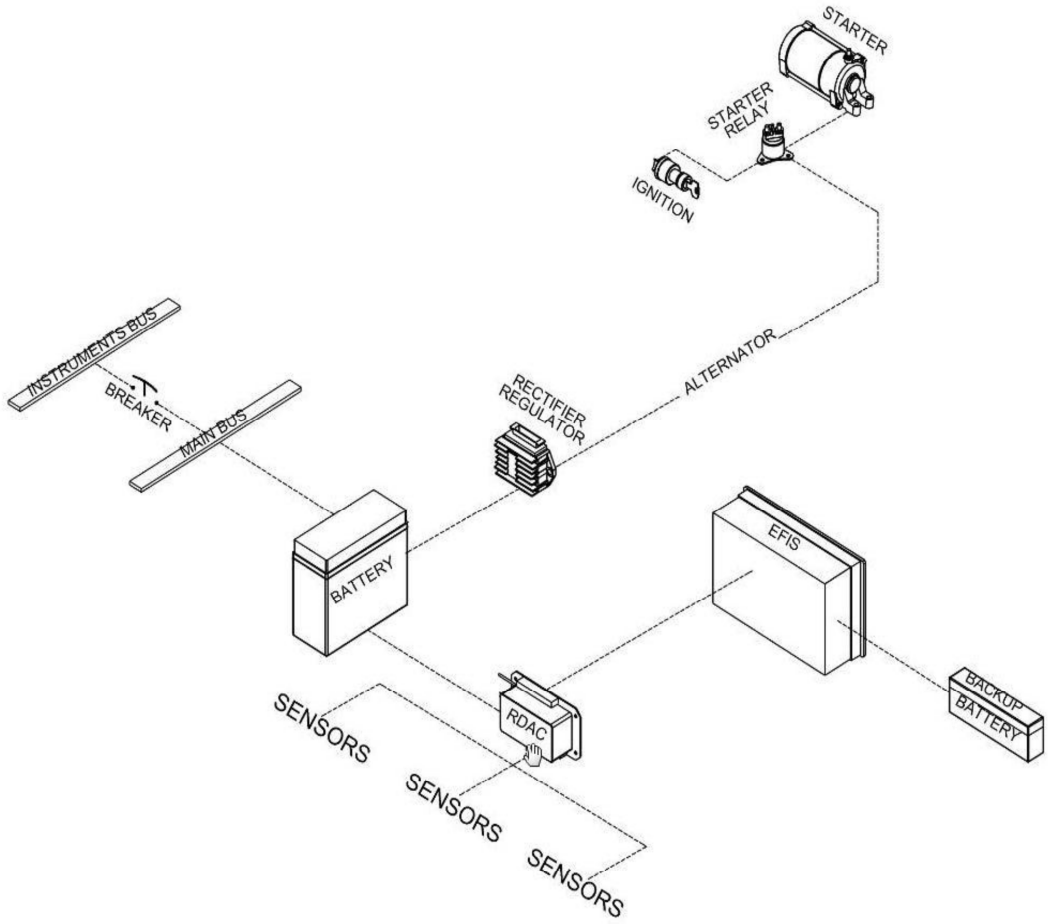
4.1 None.

5. APPENDICES:

5.1 Sling 2 aircraft electrical description and warnings:

This aircraft's electrical system consists of a 12 Volt DC circuit. An 18 Ah lead acid battery provides the energy necessary to start the engine and acts as an emergency standby supply of electrical power for electrical components in case of generator malfunction. The MGL Voyager has a 3 Ah back-up battery which charges from the Voyager backup battery connection terminals.

A single-phase generator connected to a regulator/rectifier supplies DC power to the bus bar and recharges the battery. The positive end of the rectifier is connected to the primary bus through a 50 Amp circuit fuse mounted on the firewall. A red warning light on the instrument panel will turn on indicating to the pilot that the generator is not operating. Circuit protection is through resettable breakers or fuses located on the lower right side of the instrument panel. Below is a Sling 2 aircraft electrical system.



5.2 Pilot operating handbook on-board emergency drills.

3. EMERGENCY PROCEDURES

3.1 Introduction

This section provides checklists and amplified procedures for coping with various emergencies that may arise.

Emergencies caused by aircraft or engine malfunction are extremely rare if proper pre-flight inspections and maintenance are practiced. However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

In case of emergency the pilot should remember the following priorities –

1 Keep control of and continue flying the aircraft
2 Analyze the situation
3 Apply applicable procedures
4 Inform air traffic control of the situation if time and conditions permit it

3.2 Engine related emergencies

3.2.1 Engine failure during take-off run

1. Throttle - reduce to idle
2. Ignition - switch off
3. Brakes - apply as needed
4. Magnetos: - off
5. Alternator and master switches - off

With airplane under control –

6. Fuel selector valve - off
7. Electric fuel pump - off

3.2.2 Engine failure immediately after take-off

1. Speed - check
2. Find a suitable place on the ground to land safely. The landing should be planned straight ahead with only small changes in direction not exceeding 45 degrees to either side
3. Flaps - as needed (plan to land as slowly as possible)
4. Throttle - as needed

At touch down

5. Magnetos - switch off
6. Ignition - switch off
7. Fuel selector valve - switch off
4. Electric fuel pump - off

3.2.3 Engine irregularities in flight

3.2.3.1 Irregular engine rpm

1. Check throttle position
2. Check engine gauges
3. Check both fuel quantity gauges – if one low, change to other only (not both)
4. Turn carburetor heating on
5. Turn electric fuel pump on

If engine continues to run irregularly

6. Change fuel selector valve to tank not in use

If engine continues to run irregularly

7. Land as soon as possible

> **NOTE**
> If one fuel tank is empty and fuel selector is set to "Both" it is possible that the engine will be starved of fuel. In such circumstances turn the selector valve to the fuller tank

3.2.3.2 Low fuel pressure (0.15 bar or less)

1. Check fuel quantity indicator
2. Switch electric fuel pump on

If fuel pressure remains low

3. Change fuel selector valve to tank not in use or to fuller tank if valve is set to "Both"
4. Decease throttle setting if viable to do so

If fuel pressure remains low

5. Land as soon as possible

3.2.3.3 Low oil pressure (0.8 bar or less)

1. Check oil temperature

If oil temperature is high or increasing

2. Set throttle to a setting which gives an aircraft speed of 70KIAS (most efficient speed)

If oil pressure remains low or temperature remains high or increasing

3. Land as soon as possible and remain vigilant for impending engine fault

3.2.4 In-flight engine restarting

1. Electric fuel pump	- on
2. Fuel selector	- switch to unused / fuller fuel tank
3. Throttle	- set to middle position
4. Master and alternator switches	- check on
5. Magnetos	- check on
6. Starter	- switch on

If engine should fail to restart

8. Apply forced landing without engine power procedure

3.3 Smoke and fire

3.3.1 Fire on ground at engine starting

1. Starter	- keep in starting position
2. Fuel selector	- close
3. Throttle	- full power
4. Ignition	- switch off

5. Leave the airplane
6. Extinguish fire by fire extinguisher or call for a fire-brigade if you cannot do it.

3.3.2 Fire on ground with engine running

1. Heating	- close
2. Fuel selector	- close
3. Throttle	- full power
4. Magnetos	- switch off

5. Leave the airplane.
6. Extinguish fire by fire extinguisher or call for a fire-brigade if you cannot do it.

3.3.3 Fire during take-off

1. Speed	- 70 knots
2. Heating	- close
3. Fuel selector	- close
4. Throttle	- full power
5. Magnetos	- switch off

6. Land and stop the airplane
7. Leave the airplane
8. Extinguish fire by fire extinguisher or call for a fire-brigade if you cannot do it.

3.3.4 Fire in flight

1. Heating	- close
2. Fuel selector	- close
4. Throttle	- full power
5. Magnetos	- switch off after the fuel in carburetors is consumed and engine shut down

6. Choose of area - heading to the nearest airport or choose emergency landing area
7. Emergency landing - perform according to 6.5.1
8. Leave the airplane
9. Extinguish fire by fire extinguisher or call for a fire-brigade if you cannot do it.

NOTE
Estimated time to pump fuel out of carburetors is 30 seconds

WARNING
Do not attempt to re-start the engine!

3.3.5 Fire in the cockpit

1. Master switch - switch off
2. Heating - close
3. Use the fire extinguisher

3.4 Landing Emergencies

Emergency landings are generally carried out in the case of engine failure and the engine cannot be re-started. Other reasons for an emergency landing may, however, arise.

3.4.1 Engine-off emergency landing

1. Speed - apply best glide speed of 70 KIAS
2. Trim - trim for best glide speed
3. Landing location - locate most suitable landing location, free of obstacles and preferably into wind
4. Safety harness - tighten
5. Engine restart - if time permits and if appropriate attempt to identify reason for engine failure and attempt restart
6. Flaps - extend as needed
7. Safety harness - tighten
8. Communications - report your location to third parties if possible
9. Passenger - brief passenger

Immediately before touchdown-

10. Fuel selector - shut off
11. Magnetos - switch off
12. Master and alternator switches - switch off
13. Electric fuel pump - Switch off

3.4.2 Precautionary landing

A precautionary landing is generally carried out in the cases where the pilot may be disorientated, the aircraft has no fuel reserve or possibly in bad weather conditions.

1. Choose landing area, determine wind direction
2. Report your intention to land and land area location if a COMM is installed in the airplane
3. Perform low-altitude passage into wind over the right-hand side of the chosen area with flaps extended as needed and thoroughly inspect the landing area.
4. Perform circle pattern.
5. Perform approach at increased idling with flaps fully extended.
6. Reduce power to idle when flying over the runway threshold and touch-down at the very beginning of the chosen area.
7. After stopping the airplane switch off all switches, shut off the fuel selector, lock the airplane and seek for assistance.

NOTE
Watch the chosen area steadily during precautionary landing.

3.4.3 Landing with a flat tire

1. If the main landing gear is damaged, perform touch-down at the lowest practicable speed with aircraft slightly banked towards good tyre. Keep flat tyre off the ground just above or very lightly on the ground until minimum speed possible, while maintaining directional stability during landing run.
2. If the nose wheel is damaged perform touch-down at the lowest practicable speed and hold the nose wheel above the ground by means of the elevator control as long as possible.

3.5 Recovery from unintentional spin

WARNING
Intentional spins are prohibited!

The aircraft is unlikely to enter an unintentional spin unless extreme inputs are effected.

Unintentional spin recovery technique:

1. Throttle	- idle
2. Lateral control	- ailerons neutralized
3. Rudder pedals	- full rudder in direction opposite to spin
4. Rudder pedals	- neutralize rudder immediately when rotation stops
5. Longitudinal control	- neutralize stick or push forward if necessary to lower nose, then recover from dive ensuring V_{NE} and G limitations are not exceeded

3.6 Other emergencies

3.6.1 Vibration

If any forced aircraft vibrations appear:

1. Set engine speed to such power rating where the vibrations are lowest.
2. Land on the nearest airfield or to perform a precautionary landing according to 6.5.2.

3.6.2 Carburettor icing

Carburetor icing is evidenced through a decrease in engine power and an increase of engine temperatures.

To recover the engine power, the following procedure is recommended:

1. Speed - 75 knots
2. Throttle - set to 1/3 of power
3. If possible, leave the icing area
4. Increase the engine power gradually up to cruise conditions after 1 – 2 minutes.

If you fail to recover the engine power, land on the nearest airfield (if possible) or depending on the circumstances, perform a precautionary landing according to 6.5.2.