SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Occurrence Investigation** Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9151		
Aircraft Registration	**ZS-UHI**	**Date of Accident**	5 March 2013		**Time of Accident**	1500Z	
Type of Aircraft	Taylor monoplane (aeroplane)		**Type of Operation**		Private		
Pilot-in-command Licence Type		Airline Transport Pilot	**Age**	32	**Licence Valid**	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	4 794,7		Hours on Type	1,2	
Last point of departure	Wonderboom aerodrome (FAWB), Gauteng						
Next point of intended landing	Panorama aerodrome, Gauteng						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
At Panorama cemetery at GPS coordinates S26˚20,320´E028˚04,110´at an elevation of 4 965 feet above mean sea level (AMSL).							
Meteorological Information	Wind direction: 320˚; Wind speed: 6 knots; Clouds: Clear skies; Visibility: 10 kilometres; Temperature: 22 ˚C; Dew point 12 ˚C.						
Number of people on board	1 + 0	**No. of people injured**	1	**No. of people killed**	0		

Synopsis

A Taylor monoplane aircraft (ZS-UHI, serial number DH1) with a certified pilot on board, departed from Wonderboom aerodrome (FAWB) on a private flight under visual flight rules (VFR) bound for Panorama aerodrome. En route to Panorama aerodrome the pilot noticed an airspeed indication error. The pilot joined the active circuit at Panorama airfield, and while turning from base leg onto final approach, the aircraft entered a spin. The pilot was unable to recover from the spin due to insufficient height. The aircraft collided with a barbed wire fence that encloses the cemetery, then hit the ground before coming to a halt inside the cemetery. The aircraft sustained substantial damage and the pilot was seriously injured.

Probable Cause

Failure to maintain aircraft flying speed/stall

Contributing factor/s:

12.5 Improper maintenance

(i) Incorrect airspeed indicator reading misled the pilot.

(ii) Incorrect installation of the static line.

IARC Date		Release Date	

SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Occurrence Investigation**
Telephone number: **011-545-1000**
E-mail address of originator:

Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : B R Wardle
Manufacturer : D L Hocking
Model : Taylor Monoplane
Nationality : South Africa
Registration Marks : ZS-UHI
Place : At the local cemetery near Panorama aerodrome
Date : 5 March 2013
Time : 1500Z

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:

1. FACTUAL INFORMATION

1.1 History of flight

1.1.1 The pilot, who held an airline transport pilot's licence (ATPL), departed from FAWB aerodrome with the intention of taking the aircraft to Panorama aerodrome after an annual inspection had been certified. Before the flight, the pilot verified that all aircraft documentation was completed and correct and no defects were outstanding. The pilot commenced with the acceptance checks on the aircraft and all was found to be satisfactory. The aircraft was filled to the maximum capacity with aviation gasoline (Avgas 100LL).

1.1.2 The aircraft was started and taxied to the holding point of runway 29, where pre-departure checks were carried out. Another aircraft, a Piper Cherokee ZS-CET, also bound for Panorama aerodrome, was behind ZS-UHI and both pilots agreed to follow each other to Panorama with ZS-UHI as the lead aircraft. The controller gave clearance for take-off to both of them, one after another which they both acknowledged.

1.1.3 ZS-UHI's pilot took off first as planned, followed by ZS-CET, and all was normal. According to the ZS-UHI pilot, take-off and climb was uneventful; however, during the cruise he was getting a speed of approximately 10 to 15 kts higher than expected, according to what the previous owner had told him. The pilot contacted ZS-CET's pilot and requested him to join ZS-UHI in order to form a formation flight with the intention to confirm the correct airspeed on ZS-UHI.

1.1.4 During the formation flight, ZS-CET's ASI indicated 78 knots and ZS-UHI's read 99 knots, meaning that ZS-UHI's reading was 21 knots more than that of ZS-CET when Panorama aerodrome runway 01 was in sight. On final approach to runway 01, the pilot extended full flaps and reduced the aircraft's speed to 65 knots indicated airspeed. As the aircraft was approaching, the left wing dropped and the aircraft simultaneously entered into a developed spin. The pilot tried to recover from the condition, but was unsuccessful, and the aircraft struck a barbed wire fence enclosing Panorama cemetery before hitting the ground.

1.1.5 Two eyewitnesses in the vicinity of the cemetery at the time, rushed to the accident site and evacuated the pilot from the wreckage. The aircraft was destroyed during the accident sequence and the pilot was seriously injured. The emergency medical services (EMS) were immediately notified of the occurrence by one of the witnesses and they quickly drove to the site and offered some assistance. The pilot was stabilised on the scene and later transported to a local hospital by ambulance for medical attention.

1.1.6 The accident occurred during daylight conditions within Panorama cemetery at a geographical position of S26˚20,320′ E028˚04,110′ at an elevation of 4 965 feet above AMSL.

1.2 Injuries to persons

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

1.3 Damage to aircraft

1.3.1 The aircraft was destroyed during the accident sequence.

Figure 1: View of the aircraft as found at the accident site

1.4 Other damage

1.4.1 Damage was limited to the barbed wire fence enclosing the cemetery.

Figure 2: Damaged barbed wire fence

1.5 Personnel information

Nationality	South African	Gender	Male	Age	32
Licence Number	0270470412	Licence Type	Airline Transport		
Licence valid	Yes	Type Endorsed	No		
Ratings	Test Pilot Rating Class 2, Instrument Rating (A) and Night Rating				
Medical Expiry Date	30/09/2013				
Restrictions	None				
Previous Accidents	Nil				

NOTE: *According to CATS* 61.28.1(4) *A Class II Test Pilot Rating holder may be pilot-in-command (PIC) of an experimental, prototype aircraft up to 2 700 kg.*

Flying experience

Total Hours	4 794,7
Total Past 90 Days	21,3
Total on Type Past 90 Days	1,2
Total on Type	1,2

1.6 Aircraft Information

Description

The Taylor JT1 (monoplane) is an all-wood, cantilever, low-wing, single-seat aircraft of robust design and construction. It is of the 'tail-dragger' configuration and

powered by a Revmaster Volkswagen (VW) 1700S engine.

Figure 3: Photo of ZS-UHI found on the internet

Airframe

Type	Taylor Monoplane	
Serial Number	DH1	
Manufacturer	D L Hocking	
Date of Manufacture	1980	
Empty Weight	450 lbs	
Maximum take-off weight	700 lbs	
Total Airframe Hours (At time of Accident)	152,9	
Last Annual Inspection (Date & Hours)	01/02/2013	152,15
Hours since Last Annual Inspection	0,75	
Authority to fly (Issue Date)	2013/02/15	
C of R (Issue Date) (Present owner)	2013/02/13	
Recommended fuel type used	Avgas 100LL	
Operating Categories	Part 24	

Engine

Type	Revmaster/Volkswagen 1700S
Serial Number	A2107
Hours since New	152,15
Hours since Overhaul	TBO not reached

TBO- Not reached be included

NOTE: The aircraft engine had no data plate. The aircraft logbook does not show any entry for overhaul.

Propeller

Type	D L Hocking
Serial Number	5836
Hours since New	152,15
Hours since Overhaul	Unknown

NOTE: The aircraft logbook does not show any entry concerning the propeller overhaul.

1.6.1 According to the available information, the aircraft was built by the first owner in 1980. The last annual inspection that was performed on the aircraft on 1 February 2013 was carried out by a CAA-approved person at 152.15 hours.

1.6.2 Pitot static maintenance

Aircraft logbook entries dated 16 August 2009 showed the replacement of the pitot static line on the aircraft. After the installation, tests were carried out and the pitot static system was found to be working correctly. The aircraft was then certified airworthy by an approved person and was released to service. On 15 September 2011, an annual inspection was carried out on the aircraft and the pitot static line was again checked and tested in accordance with (IAW) GMR/3 Part 43.02.9. The aircraft was then released to service on 17 September 2011.

1.7 Meteorological information

1.7.1 Weather information as obtained from an official weather report from the South African Weather Service:

Wind direction	320˚	Wind speed	6 knots	Visibility	10 kilometres
Temperature	22 ˚C	Cloud cover	Few	Cloud base	3 500 feet
Dew point	12 ˚C				

1.8 Aids to navigation

1.8.1 The aircraft was equipped with a GPS and no defects were reported prior to the accident.

1.9 Communications

1.9.1 The aircraft was fitted with a two-way communication radio. The pilot contacted Wonderboom ATC for taxi and take-off clearances with no difficulties. No defects with the communication radio were reported prior to the accident.

1.10 Aerodrome Information

1.10.1 The accident happened during daylight conditions at the local cemetery at GPS co-ordinates S 26°20’320 E 028°04’110, elevation 4 965 feet AMSL.

1.11 Flight recorders

1.11.1 The aircraft was not fitted with a cockpit voice recorder (CVR) or a flight data

recorder (FDR), and neither was required by regulations to be fitted to this type of aircraft.

1.12 Wreckage and impact information

1.12.1 The aircraft collided with a barbed wire fence enclosing the cemetery and subsequently struck the ground in a nose-down attitude before coming to a halt.

The following were found:

- The aircraft wings and the landing gear were extensively damaged.
- Flight control surfaces were accounted for and flight control cable continuity and pre-impact control integrity could be established at the accident site.
- There was no evidence of any flight control problem or jamming. The cabin area was substantially damaged.
- The instrument panel was found three metres west of the main wreckage.
- The engine broke away during the impact sequence and came to rest seven metres west of the main wreckage.
- The fuel tank ruptured during the impact sequence, and there was a strong smell of aviation fuel at the accident site. The tank was found three metres west of the main wreckage. See Figure 4.

Figure 4: View of the wreckage distribution

1.13 Medical and pathological information

1.13.1 The pilot sustained serious head injuries and was taken to hospital.

1.14 Fire

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

1.15 Survival aspects

1.15.1 The accident was considered survivable. The pilot was secured by an aircraft shoulder harness. The safety harness kept the pilot restrained during the impact sequence.

1.15.2 The evacuation of the pilot was conducted by two witnesses. The pilot was stabilised at the scene and later transported to hospital by ambulance. He sustained serious injuries.

1.16 Tests and research

1.16.1 On-site investigation of the wreckage revealed that all of the structural damage was consistent with impact in a nose-down attitude, and no evidence was found to suggest that there had been any pre-impact failure of the primary structure.

Examination of the propeller did not reveal any pre-impact mechanical anomalies. In addition, the propeller exhibited chord-wise scratching marks and torsional damage indicative of the engine producing power at impact. See Figure 5.

Figure 5: View of the propeller and witness marks on it

1.16.2 Investigation of the pitot tubes revealed no anomalies. They were well secured to the airframe and were free from foreign object dirt (FOD). The aircraft's flexible static hose, which connects the static tube to the airspeed indicator, was found to have been kinked, thus trapping the static pressure within the system and contributing to the faulty airspeed indicator reading.

Figure 6: View of the incorrectly installed static line

1.17 Organisational and management information

1.17.1 The aircraft was operated privately.

1.17.2 The last annual inspection that was carried out on the aircraft prior to the accident was certified at 152,15 hours on 1 February 2013 by an approved person accredited by the CAA.

1.18. Additional information

1.18.1 Airspeed indicator

Description

Reference: Pilot's Handbook of Aeronautical Knowledge Chapter 2 (6–9).

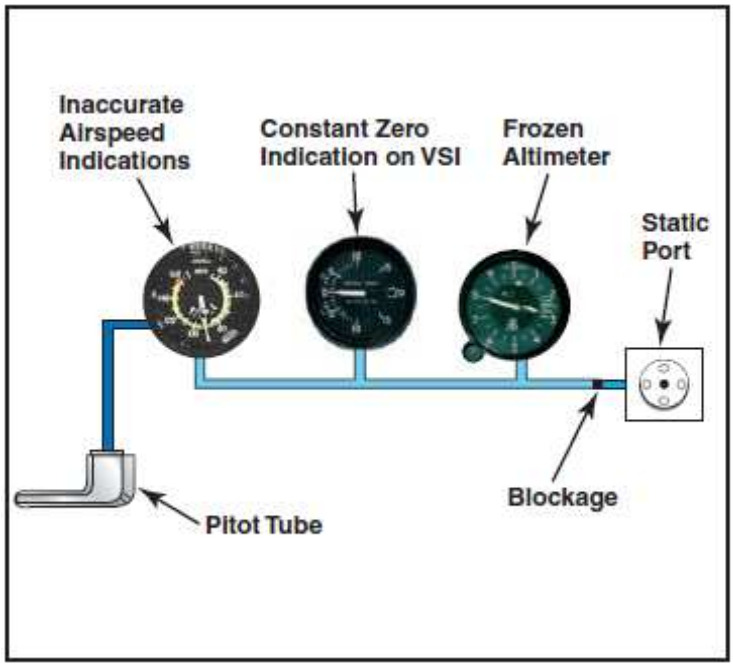
The air speed indicator is a sensitive, differential pressure gauge which measures and shows promptly the difference between the pitot or impact pressure, and static pressure, the undisturbed atmospheric pressure at level flight. These two pressures will be equal when the airplane is parked on the ground in calm air. When the airplane moves through the air, the pressure on the pitot line becomes greater than the pressure in the static lines. This difference in pressure is registered by the airspeed pointer on the face of the instrument, which is calibrated in miles per hour,

knots or both.

Blockage of the pitot-static system:

Errors almost always indicate blockage of the pitot tube, the static port, or both. Blockage may be caused by moisture, dirt, or even insects. During pre-flight pilots need to make sure the pitot tube cover is removed. A blocked pitot tube affects the accuracy of only the airspeed indicator. However, the blockage of the static system not only affects the airspeed indicator but can also cause errors in the altimeter and vertical airspeed indicator.

Blocked Static system:
If the static system becomes blocked but the pitot tube remains clear, the airspeed indicator continues to operate; however, it is inaccurate. Airspeed indications are slower than the actual speed when the static ports become blocked, because the trapped static pressure is higher than normal for that altitude. When operating at lower altitude, a faster than actual airspeed is displayed due to a relatively low static pressure trapped in the system.



Pitot-static system and instruments

1.18.2 Spins

Reference: The Air Pilot's Manual Volume 1: Flying Training

A developed spin
A spin is a condition of stalled flight in which the aeroplane describes a spiral descent. As well as the aeroplane being in a stalled condition, one wing is producing more lift than the other (caused by a roll at low speed). Greater drag from the stalled lower wing results in further yaw, roll, etc.

In a spin the aircraft is:

- *stalled, rolling, yawing, pitching, side slipping and rapidly losing height*

Recognition of a spin

- *steep nose-down attitude*
- *continuous rotation*
- *buffeting*
- *constant low airspeed*
- *rapid loss of height*

1.18.3 Stalls during manoeuvres

Reference: Air Pilot's Manual Volume 1: Flying Training

To turn or pull out of a dive, the wings must produce more lift. This is achieved by the pilot using back pressure on the control column to increase the angle of attack. The relative air flow striking the wings at a greater angle causes the stalling angle to be reached at a higher indicated airspeed. For example, the stalling speed increases by 7% at 30° bank angle and by 40% when p ulling 2 g in a 60° banked turn or dive recovery.

1.19 Useful or effective investigation techniques

1.19.1 None.

2. ANALYSIS

2.1 The pilot held a valid ATPL as well as a valid aviation medical certificate that was issued by a CAA-accredited medical examiner. The pilot had 4 794,7 total flight hours and 1,2 hours on this aircraft type, but was not rated on the aircraft type. He was therefore still not familiar with the aircraft.

2.2 Prior to the flight an annual inspection was carried out on the aircraft, whereafter the pilot took off on a flight to Panorama aerodrome. During the take-off run the airspeed indicator would have indicated a faster than actual speed, due to a relatively low static pressure trapped in the system which caused an over-reading of the airspeed indicator. The pilot may have interpreted this as the aircraft having more airspeed for take-off, but everything else seemed normal. During the cruise the pilot contacted the other aircraft as he felt his aircraft was not flying at the speed indicated on the airspeed indicator. The discrepancy of about 21 knots was confirmed by the pilot in the accompanying aircraft. The investigation revealed a kinked flexible hose on the static line which caused the airspeed indicator thus to over-read by 21 knots.

2.3 When the static line is blocked, the airspeed indicator will over-read during descent. If the airspeed indicator over-reads and the pilot is unaware of the static blockage, he reduces the speed, the angle of attack will increase and the aircraft will subsequently stall.

2.4 On the base leg as the aircraft was turning on to final approach for runway 01 at Panorama aerodrome with flaps fully extended the pilot reduced the aircraft speed to 65 knots indicated airspeed, which actually was 44 knots considering the 21 knots over-read. As ZS-UHI was below the stalling speed, the aircraft stalled. The

left wing then dropped and the aircraft entered into a spin. The pilot tried to recover from the condition but was unsuccessful, and the aircraft struck a barbed wire fence that enclosed the Panorama cemetery before hitting the ground.

2.4 Investigation of the static line showed poor routing of the flexible hoses with a kink, and no clamps securing them, which can be attributed to poor maintenance practices.

2.5 Fine weather conditions prevailed in the area at the time of the flight and were therefore not considered to have any bearing on the accident.

3. CONCLUSION

3.1 Findings

(i) The pilot held a valid ATPL, without the aircraft type being endorsed in his logbook.

(ii) The pilot held a class 2 test pilot rating.

(iii) The pilot's medical certificate was valid, with no restrictions at the time of the accident.

(iv) The aircraft had a valid authority to fly at the time of the accident.

(v) The aircraft logbook shows that the aircraft was mostly maintained by its owners.

(vi) During the investigation it was discovered that the airspeed indicator was over-reading due to a kinked flexible hose on the static line.

(vii) Weather conditions at the time of the accident were fine.

(viii) The accident occurred in daylight conditions.

3.2 Probable cause/s

7.26 Failure to maintain aircraft flying speed/stall

3.3 Contributing factor/s

12.5 Improper maintenance

(i) Incorrect airspeed indicator reading misled the pilot.

(ii) Incorrect installation of the static line.

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 Airspeed indicator and altimeter system test and inspection procedure document.
5.2 SA CATS (South African Civil Aviation Technical Standards) part 61.28.01.

Appendix 5.1
Airspeed indicator and altimeter system test and inspection procedure document.

Appendix 5.2SA CATS(South African Civil Aviation Technical Standards) part 61.28.01

Appendix 5.1
Airspeed indicator and altimeter system test and inspection procedure document.

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43.02.9 AIRSPEED INDICATOR AND ALTIMETER SYSTEM TEST AND INSPECTIONS [43.02.7]

1. Test and inspections

The test and inspection referred to in Regulation 43.02.9(a) are the following:

(1) The pitot static pressure system test to be performed annually

(a) Ensure freedom from entrapped moisture and restrictions.

(b) Ensure the leakage is within the following established tolerances:

(i) For un pressurised aeroplanes, evacuate the pitot static pressure system to a pressure differential of approximately 1 inch of mercury or to a reading, on the altimeter, 1 000 feet above the aircraft elevation at the time of the test. Without additional application of pressure, the loss of indicated altitude must not exceed 100 feet on the altimeter over a period of 1 minute.

(ii) For pressurised aeroplanes, evacuate the pitot static pressure system until a pressure differential equivalent of the maximum cabin differential for which the aeroplane is type certificated is achieved. Without additional application of pressure, the loss of indicated altitude must not exceed 2 per cent of the equivalent altitude of the maximum cabin differential pressure or 100 feet, whichever is the greater, over a period o 1 minute.

(c) Determine that the pitot head/s and static ports heater/s, if installed, are operative.

(d) Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the pitot head/s, static pressure system and true ambient static air pressure for any flight condition.

(2) The airspeed indicator(s) and altimeter(s) test to be performed annually

1

(a) When tests are conducted with the temperature substantially different from an ambient temperature of approximately 25 degrees Celsius, allowance must be made for the variation from the specified condition.

(b) Airspeed indicator/s and Altimeter/s test must be carried out by an appropriately rated aircraft maintenance organisation, approved under Part 145, in accordance with following:

(i) Airspeed indicators:

(aa) For aircraft flown under IFR, pitot system tests for the airspeed indicator must be tested in accordance with the manufacturer's instructions.

(bb) For aircraft flown under VFR only, pitot system tests for the airspeed indicator must be tested in accordance with the manufacturer's instructions.

*Apply sufficient pressure to an annually calibrated airspeed indicator test box at the pitot head to cause the airspeed indicator 150 knots, or up to the maximum air speed red line for aircraft that cannot reach 150 knots air speed.

- After one minute, the leakage should not exceed 10 knots, or 7% of the lower speed tested.
- Should the aircraft's speed indicator not read the same airspeed as the airspeed indicator in the test box, the allowable tolerance to ensure that the aircraft's airspeed indicator is accurate is indicated in table 5 below.

Warning: Do not apply suction to the pitot head.

(ii) Altimeters:

(aa) <u>Scale Error</u>
The altimeter must, With the barometric pressure scale at 1013,25 mill bars (1 Hecto

2

Pascal = 1 mill bar), be subjected successively to pressures corresponding to the altitude listed in table 1 up to the maximum normally expected operating altitude of the aircraft in which the altimeter is to be installed.

The reduction in pressure must be made at a rate not exceeding 2 000 feet per minute to within approximately 200 feet of the test point.

The test point must be approached at a rate compatible with the test equipment.

The altimeter must be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken.

The error at all test points must not exceed the tolerances listed in Table 1.

(bb) Hysteresis

The hysteresis test must begin not more than 15 minutes after the altimeter's initial exposure to the upper limit of the scale error tests prescribed in subparagraph (2) (a) and the hysteresis test must commence while the altimeter is at this pressure.

Pressure must be increased at a rate simulating a decent in altitude at the rate of 500 to 2 000 feet per minute until within 3 000 feet of the first test point (50 percent of maximum altitude)

Test point must then be approached at a rate of approximately 3 000 feet per minute.

The altimeter must be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken.

After the reading has been taken, the pressure must be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is rescued.

The altimeter must be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken.

After the reading has been taken, the pressure must be increased further, in the same manner as before, until atmospheric pressure is reached.

The reading of the altimeter at either of the two test points may not differ by more than the tolerance specified in Table 2 from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in subparagraph (b) (i).

(cc) After effect

Not more than 5 minutes after the completion of the hysteresis test prescribed in subparagraph (b) (ii), the reading of the altimeter, corrected for any change in atmospheric pressure, may not differ from the original atmospheric pressure reading by more than the tolerance in Table 2.

(dd) Friction

The altimeter must be subjected to a steady rate of decrease of pressure approximating 750 feet per minute. At each altitude listed in

Table 3, the change in reading of the pointers after vibration may not exceed the corresponding tolerance listed in Table 3.

(ee) Case Leak

The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18 000 feet, may not change the altimeter reading by more than the tolerance shown in Table 2 during an interval of 1 minute.

(ff) Barometric Scale Error

At constant atmospheric pressure, the barometric pressure scale must be set each of the pressure, falling within its range of adjustment that are listed in Table 4, and must cause the pointer to indicate the equivalent altitude shown in Table 4 with a tolerance of 250 feet

(iii) Airspeed indicators and altimeters which are of the air data computer type with associated computing system, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer that are acceptable to the Commissioner.

(3) **The automatic pressure altitude reporting equipment and ATC transponder system integration test**

(a) Conduct each test in accordance with paragraph (b).

(b) Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points to ensure the altitude reporting equipment altimeters and ATC transponders perform their intended functions as installed in the aircraft.

5

(c) The difference between the automatic reporting output and the altitude displayed at the altimeter may not exceed 125 feet.

(d) All mercury barometers used for the testing of altimeters are to be periodically checked/calibrated as often as deemed necessary by the manufacturer, or every 2 years by ICAO standards, whichever is shorted, or as required by the Commissioner.

Table 1: Scale error

Altitude	Equivalent pressure (millibars)	Tolerance ± (feet)	Altitude	Equivalent Pressure (millibars)	Tolerance ± (feet)
- 1 000	1050.36	20	14 000	595.21	100
0	1013.25	20	16 000	549.12	110
500	995.06	20	18 000	505.98	120
1 000	977.15	20	20 000	465.62	130
1 500	959.51	25	22 000	427.89	140
2 000	942.10	30	25 000	376.01	155
3 000	908.10	30	30 000	300.87	180
4 000	875.09	35	35 000	238.43	205
6 000	811.97	40	40 000	187.53	230
8 000	752.61	60	45 000	147.47	255
10 000	696.12	80	50 000	115.98	280
12 000	644.38	90			

Table 2: Test tolerance

Test	Tolerance ± (feet)
Case Leak Test	100
Hysteresis Test First test point (50% of maximum altitude)	75
Second test point (40% of maximum altitude)	75
After effect test	30

Appendix 5.2
SA CATS(South African Civil Aviation Technical Standards) part 61.28.01

61.28.1

REQUIREMENTS FOR CLASS II TEST PILOT RATING

Until new Subpart 61.28 comes into force, the following provisions for a Class II test pilot rating shall apply:

1. No person shall act as test pilot of an aircraft unless he is the holder of a valid pilot licence with a test pilot's rating as prescribed in regulation 3.16D of the Air Navigation Regulations of 1976 (ANR).

2. Test flights may only be performed by suitably rated pilots; this means rated on the aircraft within a class or on type and rated as a test pilot.

3. The applicant for a Class II Test Pilot Rating shall satisfy the Commissioner that he or she has adequate knowledge of test flying techniques. A written recommendation to that effect from a qualified Test Pilot Class I will constitute compliance with this requirement. (See also the provisions of subregulation 3.16D(2) of the ANR.)

4. A Class II Test Pilot Rating holder may be pilot-in-command (PIC) of an experimental, prototype aircraft up to 2 700 kg.

5. A test flight will be required as stipulated below. Note that a systems acceptance flight, as defined below, is not a test flight and therefore the PIC does not require a test pilot rating. However, he must be rated as PIC for the class and type of aircraft. All test flights must be done in line with the manufacturer's requirements or in line with the requirements of AIC 63.2.

6. The following definitions will apply to prevent any ambiguity:

   (a) *"test flight"* means a flight for the purpose of the issuing, validation or rendering effective of a certificate of airworthiness for such aircraft.

   (b) *"import test flight"* means a flight for the purpose of the initial validation or rendering effective of a certificate of airworthiness for an aircraft imported into the Republic as prescribed by the Commissioner.

   (c) *"experimental/prototype test flight"* means a flight for the purpose of experimental, development or investigative test flying for the issuing of an initial certificate of airworthiness for such aircraft.

   (d) *"maintenance test flight"* means a flight for the purpose of the validation or rendering effective of a certificate of airworthiness for such aircraft previously issued by the South African Civil Aviation Authority.

   (e) *"test flight requirement"* means that a test flight must be carried out prior to the initial issuing of a certificate of airworthiness or for the validation or rendering effective of a certificate of airworthiness or after any maintenance, adjustments or repair likely to affect the flying characteristics of the aircraft and as stipulated in the maintenance manual and/or as prescribed by the Commissioner.

   (f) *"systems acceptance flight"* means a flight for the purpose of testing the operation or effective functioning of a system of an aircraft that does not affect the flying characteristics of the aircraft.

7.

Exemption from these requirements must be obtained as per the provisions of regulation 11.04.1, should compliance not be possible.

8.

The holders of private pilot licences or microlight pilot licences with a test pilot rating are reminded that they may not act as PIC for remuneration. Only suitably rated CPL and ATPL holders are permitted to be remunerated for flying duties.

9.

Application for a Class II Test Pilot Rating shall be made on Form CA 61-27-3.