



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8439	
Aircraft Registration	ZS-RJW	Date of Accident	13 February 2008		Time of Accident	1335Z
Type of Aircraft	Alouette III (Helicopter)		Type of Operation	Private		
Pilot-in-command Licence Type		Commercial	Age	28	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	1 519.6		Hours on Type	352.4
Last point of departure		Overberg Fire & Rescue Station				
Next point of intended landing		Overberg Fire & Rescue Station				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
1km to the West of the Overberg Fire & Rescue Station (GPS position: South 34° 32.186 East 020° 02.934)						
Meteorological Information		Surface wind; 110°/5kt, Temperature; 25°C, Visibility; >10km				
Number of people on board	2 + 1	No. of people injured	0	No. of people killed	0	
Synopsis						
<p>The pilot, accompanied by a crew member and a passenger, took off from the Overberg Fire Station helipad following replacement of the rescue hoist head that had been installed on the helicopter. The purpose of the flight was to perform a function test on the operation of the hoist.</p> <p>After take-off at a height of approximately 400 feet AGL (above ground level) the pilot was informed by the hoist operator, who was seated in the left front seat that was turned around to face the hoist, that there was something wrong with the left aft cabin door, which was stowed in the open position as required during hoisting operations. Within a split second following his statement, the aft cabin sliding door flapped up and collided with the main rotor blades.</p> <p>The pilot managed to execute a forced landing in an open field straight ahead, following a severe in-flight vibration due to main rotor blade damage. On touch-down, the main rotor blades impacted with the tail boom as well as the tail rotor drive shaft. Nobody was injured in the accident.</p>						
Probable Cause						
<p>The accident was attributed to the failure of the maintenance crew to have latched the door properly in its bottom rail.</p>						
IARC Date				Release Date		



AIRCRAFT ACCIDENT REPORT

Name of Owner : J.A. Campbell
Operator : Overberg Fire & Rescue Services
Manufacturer : Sud Aviation
Model : Alouette III
Nationality : South African
Registration Marks : ZS-RJW
Place : Bredasdorp
Date : 13 February 2008
Time : 1335Z

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 interests 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 given without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight:

1.1.1 On 12 February 2008 an Aircraft Maintenance Engineer (AME) and his assistant travelled from Port Elizabeth to Bredasdorp to perform some non-scheduled maintenance on the helicopter ZS-RJW. The maintenance required was a general inspection and lubrication of the helicopter, as well as the fitment of a serviceable tail rotor head. They were also required to change the rescue hoist head, as the operator had been experiencing intermittent creeping of the hoist from time to time, under no load conditions.

- 1.1.2 After replacing the tail rotor head, a discussion followed between the AME, the pilot and the hoist operator on whether the rescue hoist head should be replaced, whereupon consensus was reached to fit the replacement hoist head. Following completion of this task, the pilot took off to test the serviceability of the yaw pedals, as he had complained that they were sticky. The yaw pedal problem was rectified. He then landed back on the fire station helipad, whereupon the hoist operator got on board the helicopter in order to perform a functional test on the operation of the rescue hoist.
- 1.1.3 Following their return, the AME was informed that the hoist was not operating at the correct speed, and he was requested to reinstall the original hoist head. While the AME was busy replacing the hoist head, he requested his assistant to re-grease the tail rotor head that they had just replaced. In order to gain access to the grease gun that was stowed in the lubrication bin in the left-hand baggage compartment of the helicopter, the assistant had to close the left cabin sliding door, which was blocking his access to the baggage compartment door. The assistant then closed the sliding door by sliding it forward, without ensuring that the floor hatch was in position (up and latched). The floor hatch is a section of the left aft floor structure of the helicopter that gets folded away during hoisting operations. The floor hatch also contains the lower sliding door guide rail assembly.
- 1.1.4 In order to continue with the task of fitting the hoist head, the AME again opened the aft sliding door, ensuring that the lower door brackets were correctly located in the bottom rail. Once he had completed the hoist head installation, his assistant again closed the aft sliding door to stow the grease gun in the lubrication bin that was stowed in the left aft baggage compartment. The AME then requested the pilot to inspect the hoist head installation, whereupon he packed up all his tooling equipment, and proceed on his journey back to Port Elizabeth.
- 1.1.5 The pilot, accompanied by a crew member (hoist operator) and a passenger, then took off from the Overberg Fire Station helipad on a local flight to perform a functional test on the operation of the rescue hoist.
- 1.1.6 Prior to take-off, the left aft sliding door that was configured in the open position as required for hoisting had the sliding door lock mechanism in position. Following take-off at a height of approximately 400 feet AGL (above ground level) the hoist operator, who was seated in the left front seat facing aft (seat turned around) alerted the pilot that something was wrong with the sliding door. Within a split

second following his statement, the door was projected/flapped upwards and impacted with the main rotor blades.

- 1.1.7 The pilot managed to execute a roll-on forced landing in an open field straight ahead, following a severe in-flight vibration due to main rotor blade damage. On touch-down the main rotor blades impacted with the tail boom as well as the tail rotor drive shaft. Nobody was injured in the accident.
- 1.1.8 Following the accident, the AME was contacted and was informed of the circumstances, whereupon he turned around and went to the accident site. During a discussion between the pilot and the maintenance engineer, it became apparent that the left aft sliding door had been opened while the rescue hoist was replaced with the hoist floor hatch being in the hoist position (vertical down position), as can be seen in Photo 1, below on this page. This resulted in the door becoming dislodged from the bottom guide rail, however, it was still secure in the top guide rail. Prior to the flight, the pilot had performed a walk-around, pre-flight inspection of the helicopter, as this was his second flight of the day, which consisted of a visual inspection of the helicopter. He didn't notice that the door was not properly latched in the bottom rail, nor had the AME checked the status of the door following completion of his and his assistant's task.

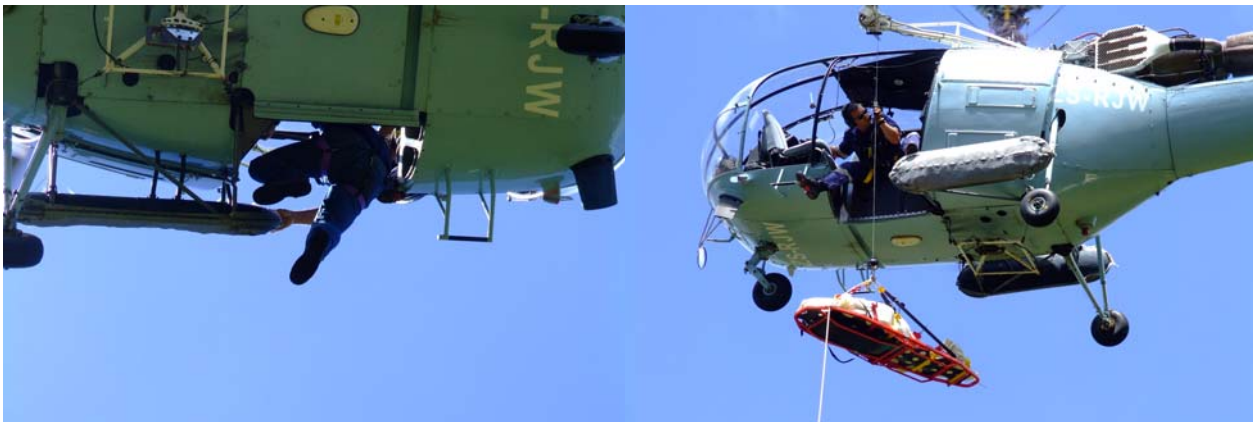


Photo 1. A view of the helicopter from below and from the side with the floor hatch in the hoisting configuration.

1.2 Injuries to Persons:

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

1.3 Damage to Aircraft:

1.3.1 Damage to the helicopter was substantial when the left aft cabin door impacted with the main rotor blades.

1.4 Other Damage:

1.4.1 No other damage was caused.

1.5 Personnel Information:

1.5.1 Pilot-in-command:

Nationality	South African	Gender	Male	Age	28
Licence Number	*****	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instrument Rating, Undersling/Winch Rating, Cull/Livestock Rating				
Medical Expiry Date	31 January 2009				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	1 519.6
Total Past 90 Days	58.7
Total on Type Past 90 Days	1.3
Total on Type	352.4

1.5.2 Aircraft Maintenance Engineer:

Nationality	South African	Gender	Male	Age	48
Licence Number	*****	Licence Type	AME (A & C)		
Licence valid	Yes	Type Endorsed	Yes		
Expiry Date	17 May 2008				

1.6 Aircraft Information:**Airframe:**

Type	Alouette III	
Serial Number	1928	
Manufacturer	Sud Aviation	
Year of Manufacture	1969	
Total Airframe Hours (At time of Accident)	5 893.8	
Last MPI (Hours & Date)	5 834.2	9 November 2007
Hours since Last MPI	59.6	
C of A (Issue Date)	26 August 1998	
C of A (Currency Fee Expiry Date)	25 August 2008	
C of R (Issue Date) (Present owner)	3 November 2004	
Operating Categories	Standard	

Engine:

Type	Turbomeca Artouste IIIB
Serial Number	1031
Hours since New	2 888.3
Hours since Overhaul	1 028.0

1.7 Meteorological Information:

1.7.1 Weather information was obtained from the pilot's questionnaire:

Wind direction	110°	Wind speed	5 knots	Visibility	>10km
Temperature	25°C	Cloud cover	Scattered	Cloud base	3 000'
Dew point	Unknown				

1.8 Aids to Navigation:

1.8.1 Navigational aids were not considered to be a factor in this flight, as it was a local flight with a maximum intended distance of operation of 2nm from the point of take-off. There were no reported defects with any of the navigational equipment on

board the helicopter at the time of the flight.

1.9 Communications:

1.9.1 The helicopter was equipped with a VHF radio. The pilot had broadcasted his intentions on the VHF frequency 124.8 MHz once airborne from the fire station helipad. The pilot did not broadcast any distress or Mayday call at the time of the accident.

1.10 Aerodrome Information:

1.10.1 A forced landing was performed in an open field following the accident. No aerodrome or aerodrome infrastructure was involved. The forced landing was performed at a geographical position determined to be at South 34° 32.186' East 020° 02.934.

1.11 Flight Recorders:

1.11.1 The helicopter was not equipped with the Flight Data Recorder (FDR) or a Cockpit Voice Recorder (CVR), nor was it required by regulation to be fitted to this helicopter type.

1.12 Wreckage and Impact Information:

1.12.1 The pilot executed a roll-on forced landing in an open field in a westerly direction (take-off direction) following the detachment of the left sliding door in-flight and subsequent main rotor blade impact. On touch-down the main rotor blades struck the tail rotor drive shaft fairing, as well as the tail rotor drive shaft.

1.13 Medical and Pathological Information:

1.13.1 None of the occupants on board the helicopter were injured in the accident.

1.14 Fire:

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

1.15 Survival Aspects:

1.15.1 Nobody was injured in the accident, following an uneventful roll-on forced landing. All the occupants on board were properly restrained by making use of the helicopter-equipped safety harnesses. There was no deformation or damage caused to the cabin/cockpit area.

1.16 Tests and Research:

1.16.1 None.

1.17 Organisational and Management Information:

1.17.1 The helicopter was on contract with the Overberg Fire & Rescue Unit and was based at the Bredasdorp Fire Station helipad. The primary application of the helicopter was for fire-fighting and fire prevention. It was also equipped with a rescue hoist and a cargo sling to assist in rescue operations, should the need arise.

1.17.2 The helicopter was maintained by Aircraft Maintenance Organisation (AMO) No. 151, which was in possession of a valid AMO Approval that was issued by the CAA. At the time of the accident the AMO had dispatched maintenance personnel to Bredasdorp to perform non-scheduled maintenance on the helicopter, including replacing the tail rotor head and the rescue hoist head that was fitted to the helicopter. The AMO Operations Manual provided for non-scheduled maintenance to be performed away from base.

1.18 Additional Information:

1.18.1 Left aft Cabin Door

In order to open the left aft cabin door, it is required to be unlatched at the door handle, whereupon the door opens by sliding it backwards. The door consists of two roller-type brackets at the top and two teflon brackets that slide into the bottom rail. The door assembly can be unlatched at the two bottom brackets by removing the safety pins of which there are one in each bracket, (as can be seen in Figure 1 on the next page of this report) and rotating the knob on the bracket through 90°. The door then in fact hangs on the top two brackets. In Photo 2 below, the deflection of the door with the bottom two brackets unlatched, can be seen in relation to the main rotor blades. The primary reason for the design was to allow for a stretcher (maximum two) to be placed in the aft cabin area, should the helicopter be utilized in the medivac configuration with the doors close.

During hoisting operations the helicopter is flown with the door in the open position, which is latched to ensure that it does not move forward, as the bottom two brackets will have no support (rail) as the floor hatch is required to be stowed in the hoisting configuration (unlatched vertical down). On the aft firewall in the area of the door latch (to lock the left sliding door in the open position as required for hoisting) a placard was installed with the following text: DANGER: "Do not close the sliding door without first closing the hatch".



Photo 2. View of aft left sliding door deflected upwards towards the main rotor blades.

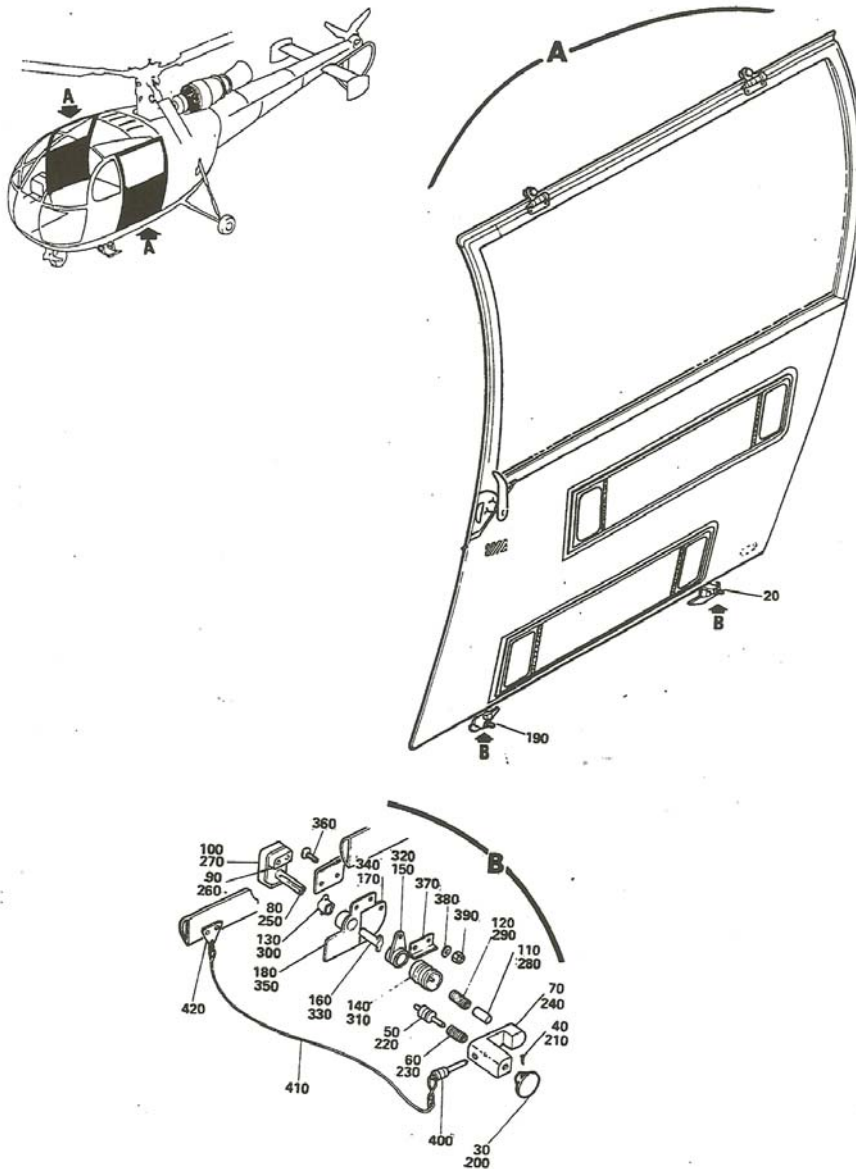


Figure 1. A view of the door assembly with the bottom bracket in detail.

1.18.2 Civil Aviation Regulations of 1997

Part 91.02.8 (4) The pilot-in-command of an aircraft shall –

- (a) ensure that the pre-flight inspection has been carried out, and that the checklists, and where applicable, the flight deck procedures and other instructions regarding the operation of the aircraft, the limitations contained in the aircraft flight manual referred to in Regulation 91.03.2, or equivalent

certification document, are fully complied with at the appropriate times during a flight;

Part 91.03.2 Aircraft Flight Manual:

- (1) The owner or operator of an aircraft shall keep a current approved aircraft flight manual for each aircraft of which he or she is the owner or operator.
- (2) The flight crew members of the aircraft shall, on each flight, operate such aircraft in accordance with the aircraft flight manual, unless an unforeseen emergency dictates otherwise.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None

2. ANALYSIS

2.1 The helicopter was subjected to non-scheduled maintenance by personnel that had to travel from Port Elizabeth to Bredasdorp. The maintenance team consisted of two members, namely a licenced AME and an assistant. Apart from replacing the tail rotor head, they had to change the rescue hoist head as well. Following completion of these tasks, the pilot performed a functional test flight, which included a test of the rescue hoist. The hoist was not functioning satisfactorily and it was requested that the original hoist head be re-installed again. While the AME changed the hoist head, he requested his assistant to again grease the tail rotor head that they had just replaced. Following completion of this task, the assistant again stowed the grease gun in the lubrication bin that was kept in the left-hand baggage compartment.

2.2 In order for the assistant to gain access to the baggage compartment, he had to close the left cabin sliding door, however, at the time the floor hatch was in the hoist position, and therefore no bottom guide rail was in position to support the two lower door brackets. He then had to open the baggage door, stow the grease gun in the lubrication bin and close the baggage door (by means of two latches) again. He then pushed the left sliding door backwards, towards the open position as he found

it, without paying attention to the status of the two lower brackets, ensuring that they were properly in the bottom guide rail. It should be noted that the door could easily be slid to the open or close position, without having the two bottom door brackets secure in the guide rail.

- 2.3 After the required maintenance tasks were completed, the AME failed to perform a proper after-maintenance inspection, even though he knew that his assistant had to stow the grease gun that he had used to grease the tail rotor in the baggage compartment. Why the floor hatch was left in the hoisting position (down position) during maintenance, could only be attributed to one reason. With the floor hatch down, it is possible for the person changing the hoist head to stand much closer than with it closed or in the up-position. The floor hatch was never unlatched from the hoist position during the maintenance process, which should be considered as a latent failure and in contrast to the placard requirement. A lack of supervision and complacency by the AME and his assistant resulted in the sliding door not being properly secured. The fact that they still had to travel back to Port Elizabeth following the non-schedule maintenance, should also be considered as a factor; as they were most probably in a hurry to finish the task. This was evident from the fact that the AME was already on the road, back to Port Elizabeth when the accident occurred.
- 2.4 The fact that the maintenance personnel failed to ensure that the sliding door was properly secured, still did not constitute an accident. There was a second and third line of defence in place that also failed to detect the status of the sliding door, that being the pilot as well as the hoist operator. They were both well aware of the fact that maintenance was performed; by replacing the hoist head, as the intended flight (accident flight) was with the specific intent to perform a function check on the rescue hoist and its operation. Performing a visual inspection following maintenance intervention does allow for substantial room for error, as was the case in this accident. The fact that the door, helicopter fuselage and the lower door brackets were painted in the same colour scheme should be regarded as a significant factor in this accident, as there was no 'special focus' on the lower door brackets. The brackets could have been painted in a highly fluorescent colour or had special placards in place, on the door above the brackets, that required personnel to ensure that the door has been properly secured in the bottom guide rail prior to flight or the operation thereof.

3. CONCLUSION

3.1 Findings

- (i) The pilot was the holder of a valid commercial (helicopter) pilot's licence and had the aircraft type endorsed on his licence.
- (ii) The helicopter was subjected to non-scheduled maintenance that was performed at an outstation (away from base).
- (iii) The accident flight was the second flight of the day, following replacement of the rescue hoist head (second hoist head change) on the helicopter by maintenance personnel.
- (iv) During the replacement of the hoist, the left-hand aft cabin door was moved forward with no floor guide to support it, due to the fact that the floor hatch was in the hoist (unlatched vertically-down) position. This was in contrast to the warning placard that was installed on the aft cabin wall.
- (v) The maintenance engineer failed to perform a proper after-maintenance inspection of the aircraft, knowing that his assistant had opened the left-hand baggage door to stow the grease gun in the baggage hold.
- (vi) The pilot performed a walk-around inspection of the helicopter prior to the accident flight, where he had only visually inspected the helicopter, knowing that maintenance work had just been performed.
- (vii) The second crew member on this flight, referred to as the hoist operator, also failed to ensure that the left sliding door was properly latched, knowing that he was going to test the functionality of the hoist during the intended flight.
- (viii) There was a placard in place on the aft cabin wall (on the left-hand side), warning people that the floor hatch should be up before the sliding door is moved.
- (ix) The location of the placard on the aft cabin wall, warning people that the floor hatch needs to be in the closed position prior to moving the sliding door,

failed as a proactive measure in this accident.

- (x) The hoist operator did indicate to the pilot shortly after take-off that there was something wrong with the sliding door. However, his observation did not prevent the accident as the door swung up into the rotors, seconds later.

3.2 Probable Cause/s

- (i) The accident was attributed to the failure of the maintenance crew to properly latch the door in its bottom rail.

3.3 Contributory Factor/s:

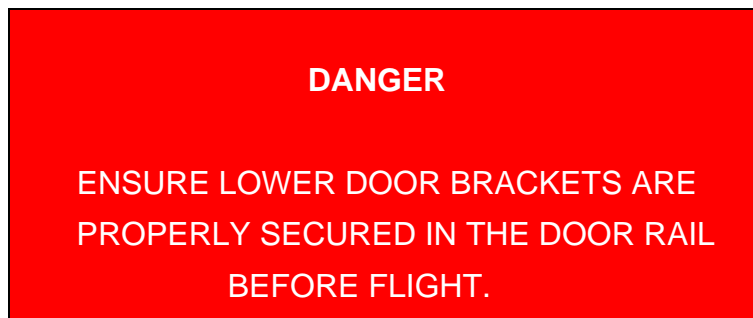
- (i) Failure by the pilot to conduct a proper pre-flight inspection.
- (ii) Being the second flight of the day, the pilot's pre-flight inspection consisted only of a visual inspection/walk-around of the helicopter. At no time had he physically checked/felt if the doors/hatches were properly secured/latched.
- (iii) Lack of supervision by the AME as well as the pilot-in-command, following maintenance.
- (iv) The fact that the two bottom door brackets knobs were painted in the same colour scheme as the rest of the door and the fuselage made it difficult to see that the door was not properly secured prior to flight.

4. SAFETY RECOMMENDATIONS

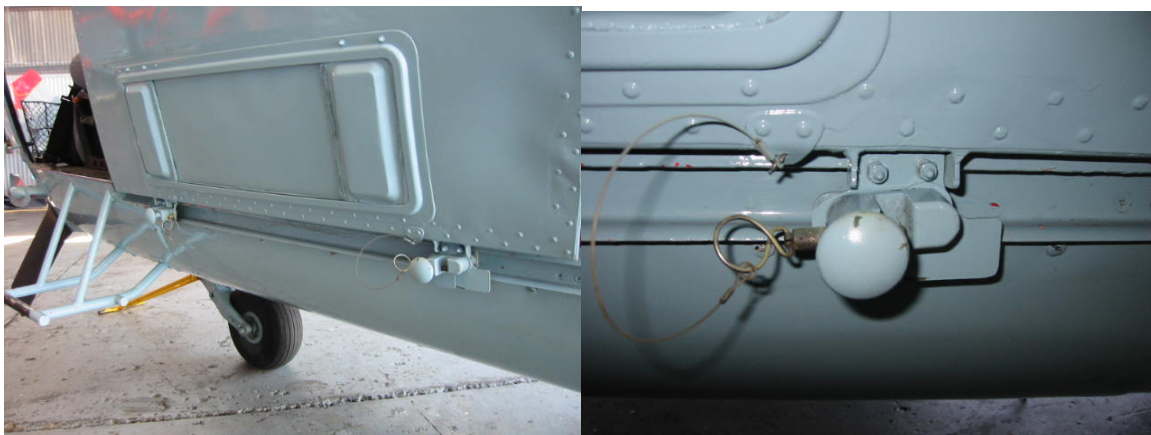
- 4.1 It is recommended that the CAA, Airworthiness Department issue a MAN (Mandatory Advisory Notice) calling for additional placard/s to be fitted to both sliding doors on the Alouette III type helicopter registered on the SA Register.

Two placards should be positioned on the left as well as the right cabin sliding doors, one above each of the lower door brackets (two brackets per door). The sample showed below should be used as a guideline to the content of such a

placard, with the writing in white and the background in red.



- 4.2 It is recommended that the CAA, Airworthiness Department issue a MAN (Mandatory Advisory Notice) calling for the lower sliding door bracket knobs to be painted in a high fluorescent colour (example: orange, yellow, red) to make the bracket/s more visible during pre-flight and maintenance inspections. With the bracket being the same colour as the door and fuselage the margin for error is just so much higher as can be seen in the photos below.



(a) Sliding door in close position, brackets in rail.

(b) A close-up view of the lower door bracket.

- 4.3 It is recommended that the CAA, Airworthiness Department issue a MAN (Mandatory Advisory Notice) calling for additional placards with the same wording “DANGER: Do not close the sliding door without first closing the hatch” to be installed in a more visible location. It is recommended that these additional placards be installed in close proximity to the sliding door handle, on both sides of the door. The location of the current placard should also be retained.

5. APPENDICES

5.1 There are no appendices to this report.

-END-

Report reviewed and amended by the Advisory Safety Panel
24 February 2009.