AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8505		
Aircraft Registration	**ZS-RKW**	**Date of Accident**	31 May 2008		**Time of Accident**	1221Z	
Type of Aircraft	Robinson R44 Astro (Helicopter)		**Type of Operation**		Domestic Charter flight		
Pilot-in-command Licence Type		Commercial Pilot	**Age**	52	**Licence Valid**	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	1824.1		Hours on Type	39.14	
Last point of departure	An open field next to North Road in Kroonstad.						
Next point of intended landing	Loubser Park Sports Stadium in Kroonstad.						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On a public road in Kroonstad (GPS Position: S27° 38.913" E027° 13.914).							
Meteorological Information	Surface Wind: 270°/10kts; Temperature: 21°C Visibility: CAVOK						
Number of people on board	1 + 3	**No. of people injured**	1	**No. of people killed**	0		

Synopsis

The pilot, accompanied by three passengers, departed from an open field next to a public road in the City Centre of Kroonstad. The three passengers were members (actors) of a local television production. The pilot stated that after take-off, one of the passengers requested him to turn back to pick up a camera man. He then turned back land the accident occurred during the subsequent landing.

Available video footage taken during the approach and attempted landing assisted the investigator-in-charge with the investigation. The pilot made the statement as the camera approached them that the hydraulic system of the helicopter had failed. The hydraulic system was tested after the accident and was found to be in a serviceable condition.

The pilot was caught off guard when he inadvertently selected the hydraulic switch to the off position instead of selecting the speaker to the on position and was therefore unable to control the aircraft prior to impact.

The pilot and two of the passengers were not injured, the passenger that was seated in the left front seat sustained minor injuries and was taken to hospital. The helicopter sustained substantial damage to the fuselage, main rotor blades, skid gear and tail boom.

Probable Cause

Hydraulic system failure as a result of the pilot inadvertently switching of the hydraulic switch.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Central Lake Trading 254 (PTY) Ltd
Manufacturer : Robinson Helicopter Company
Model : Robinson R44 Astro
Nationality : South African
Registration Marks : ZS-RKW
Place : Kroonstad
Date : 31 May 2008
Time : 1221Z

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 The helicopter was chartered by a promotions company for the South African Broadcasting Company (SABC) to perform promotional work in Kroonstad.

1.1.2 On the morning of 31 May 2008, the aircraft was released to service after completion of a Mandatory Periodic Inspection. A test flight was conducted by the pilot that flew the helicopter during the accident flight. He was not the holder of a test pilot rating at the time.

1.1.3 The pilot that performed the test flight then accompanied the owner of the helicopter (a private pilot) and the owner's wife and departed from Grand Central Aerodrome and flew to Kroonstad where they landed in the centre of town.

1.1.4 The owner of the helicopter then requested the accident pilot to fly three television actors from a local television production from an open area where the helicopter landed in Kroonstad to Loubser Park, a Sports Stadium on the outskirts of town for a promotional show that the actors had to perform.

1.1.5 The pilot stated that, he was accompanied by the three television actors and they took off from an open field in Kroonstad near a Shopping Centre. Shortly after lift-off one of the actors on board requested him to turn back in order to pick up a camera man, who was still on the ground.

1.1.6 He further stated that as he was coming in to land in order to pick up the camera man, a vehicle appeared in front of the helicopter which he tried to avoid, but he collided with this vehicle and crashed on a public road.

1.1.7 Although the pilot stated that he was requested by one of the passengers to go and pick up a camera man, the investigator observed on-site that it was only a four seater helicopter and there would not have been space for an additional person on board the helicopter.

1.1.8 The investigator on-site further observed that the helicopter's tail rotor had made contact with the ground prior to the helicopter colliding with the vehicle.

1.1.9 No proof was found during the investigation that the owner of the helicopter or the pilot had obtained permission from the South African Civil Aviation Authority to land and take-off from the field in Kroonstad.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	1	-
Minor	-	-	-	1
None	1	-	2	1

Note: The people mentioned in the "other" column were the two people who were in the vehicle into which the helicopter collided.

1.3 Damage to Aircraft

1.3.1 The helicopter sustained substantial damage to the main rotor blades, tail boom, tail rotor blades, the skids, the under-surface of the helicopter, the left-hand side of the helicopter, and the left-hand windscreen of the helicopter, on impact with the ground.

Figure 1: A view of the main wreckage

Figure 2: A view of the main wreckage from the opposite side

1.4 Other Damage

1.4.1 During the impact sequence, the helicopter impacted a vehicle which sustained substantial damage.

Figure 3: Indicates the damages that the vehicle sustained.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	52
Licence Number	**********	Licence Type	Commercial Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Cull Rating				
Medical Expiry Date	30 November 2008				
Restrictions	Medical to wear corrective lenses				
Previous Accidents	None				

Flying Experience:

Total Hours	1824.1
Total Past 90 Days	31.14
Total on Type Past 90 Days	31.14
Total on Type	39.14

Note: The pilot was not rated as a test pilot.

1.6 Aircraft Information

1.6.1 **Airframe:**

Type	Robinson R44 Astro Helicopter	
Serial Number	0738	
Manufacturer	Robinson Helicopter Company	
Year of Manufacture	2000	
Total Airframe Hours (At time of Accident)	1854.0	
Last MPI (Hours & Date)	1853.0	31 May 2008
Hours since Last MPI	1.0	
C of A (Issue Date)	10 May 2007	
Currency Fee Expiry Date	09 May 2008	
C of R (Issue Date) (Present owner)	27 February 2007	
Operating Categories	Standard	

Engine:

Type	Textron Lycoming O-540-F135
Serial Number	L-25546-40A
Hours since New	1275.7
Hours since Overhaul	T.B.O not yet reached

1.6.5 **Weight and Balance:**

Item	Weight (lbs)	Arm	Moment
Aircraft Empty Weight	1460	106.2	155052

Pilot (75kg)	165	49.5	8167.5
Forward Passenger(50kg)	110	49.5	5445
Aft Passengers (69kg + 87Kg =156kg)	344	79.5	27348
Fuel (110 lit)	200	106.0	21200
Total take-off weight	**2279**	**94.3**	**214909.7**

The Maximum certified take-off weight for the Robinson R44 Astro helicopter as stipulated in the Pilot Operating Handbook (POH), is 2400lbs (1089Kg). The helicopter was found to be 121 pounds below the certified take-off weight and within the CG limits according to the CG Moment Envelope as stipulated in the pilot's operating handbook.

1.7 Meteorological Information

1.7.1 Weather information obtained from the pilot's questionnaire:

Wind direction	East	Wind speed	5 – 8 Kts	Visibility	Very good
Temperature	22°C	Cloud cover	None	Cloud base	None
Dew point	Unknown				

1.7.2 Official weather information obtained from the South African Weather Services:

1. Weather conditions at the time of the accident.

Surface Analysis

A cold front was on the KZN coast with a trough of low pressure over the interior of the country. Behind the cold front, a high pressure system was moving in over the southern and western part of the country.

Upper Air

At 500hPa, westerly winds were blowing in the Kroonstad area.

2. Weather conditions in the vicinity of the accident

Temperature: 21°C
Dew Point: 06°C
Surface Wind: 270° TN 10 knots
Cloud Covers: SCT clouds at 8000ft.
Visibility: 10Km or more

1.8 Aids to Navigation

1.8.1 The helicopter was equipped with an Airpath C-2400-L4-B Compass and a Garmin 150XL GPS. There were no recorded or reported defects experienced with the navigation equipment.

1.9 Communications

1.9.1 The communication equipment that was installed in the helicopter was a King KY 197A VHF receiver and a NAT AA80-020 Intercom. There were no entries of defects experienced with the communication equipment.

1.9.2 The helicopter was operated outside of controlled airspace. However, the pilot was broadcasting his intentions regarding the flight on the VHF radio frequency 118.7 MHz at the time of the accident.

1.10 Aerodrome Information

The accident did not happen at an aerodrome or in close proximity of an aerodrome. It occurred on a public road in the town of Kroonstad, at the geographical position determined as: S27° 38.913" E 027° 13.914. The elevation of the accident site was 4563 feet Above Mean Sea Level. No proof was found during the investigation that the owner of the helicopter or the pilot had obtained permission from the Civil Aviation Authority to land and take off from the field in Kroonstad.

Figure 5: The red arrow indicates where the accident occurred in the City Centre of Kroonstad.

1.11 Flight Recorders

1.11.1 The helicopter 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 helicopter.

1.12 Wreckage and Impact Information

1.12.1 The helicopter was flying in a southerly direction before the tail rotor impacted with the ground. Ground marks indicate that the tail rotor impacted the ground 12 metres before the helicopter collided with a light delivery vehicle which was travelling on a public road in an easterly direction. The helicopter came to rest on its left-hand side 17 metres past the vehicle facing in a south-easterly direction.

1.12.2 The helicopter sustained substantial damages to the main rotor blades, tail boom, tail rotor blades, the skids, the under-surface of the helicopter, the left-hand side of the helicopter, and the left-hand windscreen of the helicopter, on impact with the ground.

Figure 6: Indicating the wreckage lying on its right-hand side in a public road. The yellow arrow indicates the direction of flight. The photo further shows the aircraft being sprayed with foam after the accident.

1.12.3 The helicopter collided with a vehicle travelling on a road. The vehicle sustained substantial damages to the roof, left-hand door and front windscreen.

1.13 Medical and Pathological Information

1.13.1 The pilot sustained no injuries and was not subjected to a medical examination after the accident.

1.13.2 The three passengers were taken to hospital for a medical examination. Two of the three passengers were released from hospital immediately after the medical examination. The third passenger who had occupied the front left seat, sustained serious injuries to her left hand, arm and leg. The passenger was hospitalised after the accident for 2 days before the passenger was released from hospital.

1.13.3 The driver of the vehicle sustained no injuries. The passenger in the vehicle sustained minor head injuries and was treated by medical staff on the accident site.

1.14 Fire

1.14.1 There was no evidence of fire in flight or after impact.

1.15 Survival Aspects

1.15.1The accident was considered survivable.

The pilot and passengers were secured with three-point safety belts, which did not fail.

The aircraft was a four-seater helicopter. The pilot seat (right front) and the passenger seat behind the pilot did not collapse on impact with the ground.

The left-hand front and aft seat partially collapsed on the left-hand side of the seats.

The cockpit and cabin area sustained minimal damage, which could not cause serious fatal injuries to the occupants.

1.15.2 The vehicle, however, seemed to have absorbed a substantial amount of the helicopter's energy during the impact sequence with the helicopter.

1.16 Tests and Research

1.16.1 The wreckage was recovered after the accident and taken to an approved Aircraft Maintenance Organisation.

The pilot reported after the accident that the hydraulic system had failed, however following a detailed inspection of the hydraulic system, the system/unit appeared undamaged.

The hydraulic system still installed on the airframe of the helicopter was attached to a hydraulic rig. The hydraulic system on the helicopter tested normally. No leaks were found in the hydraulic system and the hydraulic system operated the actuators which is controlled by the cyclic control, without any difficulty.

1.16.2 The engine was not removed from the airframe and was ground run still installed in the airframe after the accident at an approved maintenance facility and operated normally in all respects.

1.16.3 Hydraulic System

(Reference: Pilot Operating Handbook, Section 7, System Description, page 7-7).

Hydraulically-boosted main rotor flight controls eliminate feedback forces at the cyclic and collective. The hydraulic system consists of a pump, three servos, a reservoir, and interconnecting lines. The pump is mounted on and driven by the main rotor gearbox so that hydraulic pressure is maintained in the event of an engine failure. A servo is connected to each of the three push-pull tubes that support the main rotor swash plate. The reservoir is mounted on the steel tube frame behind the main gearbox and includes a filter, pressure relief valve, and pilot-controlled pressure shut-off valve.

A sight glass for pre-flight fluid level checks is incorporated in the reservoir and accessible through the right side upper cowl doors. A vented filler cap is located on top of the reservoir.

The pressure shut-off valve is solenoid-actuated and controlled by the hydraulic switch on the pilot's cyclic. The switch should be left on during helicopter shut-down and start-up except during the hydraulic system check.

1.16.4 Hydraulic system failure

Reference: Pilot Operating Handbook, Section 3, Emergency Procedures, page 3-7.

Hydraulic system failure is indicated by heavy or stiff cyclic and collective controls. Control will be normal except for the increase in stick forces.

1.6.4 Cyclic control stick

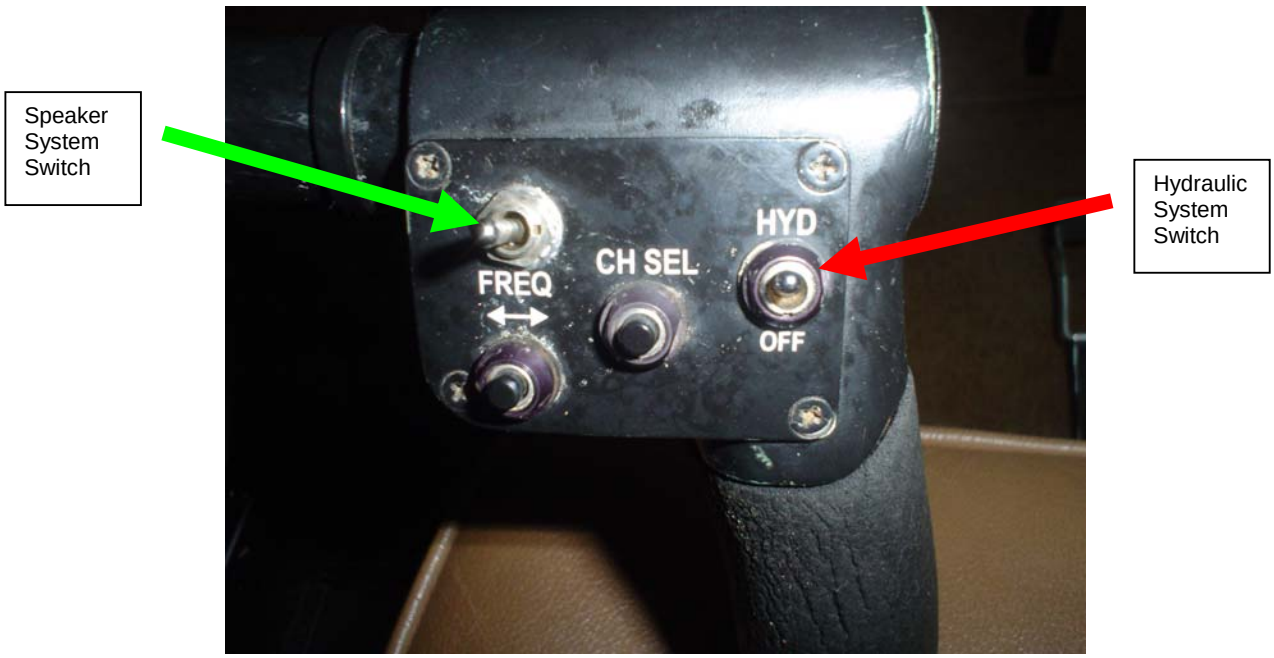

Figure 4: The green arrow indicates to the speaker system switch. The red arrow indicates to the hydraulic switch on the cyclic control stick. Note that the 2 switches look exactly the same.

1.17 Organisational and Management Information

1.17.1 The owner of the helicopter stated that it was a private flight.

1.17.2 According to available information, a promotional company chartered the helicopter on behalf of the local television company from the owner. The owner of the helicopter is the owner of a company that advertises itself as a Charter and Training operator. The promotional company paid the owner of the helicopter money in advance for this flight. This is not in compliance with the Air Services Licensing Act, 1990, Act No 115 of 1990 (ASL) and CAR Part 127.06.1 (Refer paragraph 1.18.3).

1.17.3 According to available records, the Aircraft Maintenance Organisation (AMO) that certified the last MPI on the helicopter prior to the accident was in possession of a valid AMO approval, No.040 with an expiry date of 30 November 2008. The AMO had been audited by the CAA on 20 November 2007 and none of the findings had contributed to the accident.

1.17.4 The last Mandatory Periodic Inspection (MPI) of the helicopter was certified on 31 May 2008 at a total of 1853.0 airframe hours. The release to service certificate was issued on 31 May 2008 with and expiry date of 4 June 2008. The reason for the release to service certificate being only for 4 days is that the helicopter was fitted with a loaner oil pipe, in order to conduct the flight to Kroonstad. During the MPI it was found that the helicopter had an oil leak due to a damaged oil pipe. The oil pipe was replaced by a loaner oil pipe and the helicopter therefore had to go back to the AMO for replacement of the oil pipe.

1.18 Additional Information

1.18.1 The pilot was interviewed 4 days after the accident had occurred. During the interview, the pilot acknowledged that he could not recall the amount of fuel that was on board the helicopter at the time, neither the weight of the passengers that boarded the helicopter. The pilot admitted that he thus did not calculate a weight and balance according to the Pilot Operating Handbook prior to the flight.

1.18.2 Part 91.07.4 of the Civil Aviation Regulations, 1997 pertaining to helicopter landings and take-offs requires the following:

(1) No pilot-in-command of a helicopter shall land at, or take-off from any place unless the place is so situated to permit the helicopter, in the event of an emergency arising during such landing or take-off, to land without undue hazard to persons or property on the surface.

(2) No pilot-in-command of a helicopter shall land on, or take-off from, any building, structure or place situated within 100 metres of any other building or structure, in the area of jurisdiction of a local government, unless such building, structure or place has been approved for the purpose by the Commissioner: Provided that this restriction shall not apply –

(a) to a helicopter landing on, or taking off from, a building, structure or place within an industrial area, a commercial warehouse area or an open farm land which is suitable for such purposes and in respect of which helicopter the pilot-in-command is the holder of a valid commercial or airline transport pilot's licence (helicopter) or, in the case of the holder of a private pilot's licence (helicopter), with the

written permission of the Commissioner, unless specifically prohibited by the local government;

(b) to a helicopter engaged in an emergency medical service operation referred to in Part 138, or undertaking of a flight necessary for the exercising of any power in terms of any law.

(3) A local government may after consultation with the Commissioner, extend the scope of the provisions of sub-regulation (2)(a) to include other places in its area of jurisdiction.

(4) The Commissioner may, in the interests of aviation safety, impose conditions or institute restrictions as to the use of any building, structure or place for the landing or take-off of helicopters, or require special flight procedures to be adopted at, or special routes to be followed to or from, such building, structure or place by helicopters, and the Commissioner may impose different conditions, institute different restrictions or require different special flight procedures to be adopted in respect of different buildings, structures or places.

(5) Nothing in this regulation shall be construed as conferring any right to land at any building, structure or place against the wishes of the owner of, or any other person who has an interest in the building, structure or place or as prejudicing the rights or remedies of any person in respect of any injury to persons or property caused by the helicopter or its occupants.

No proof was found during the investigation that the owner of the helicopter or the pilot had obtained permission from the Civil Aviation Authority to land and take-off from the field in Kroonstad.

1.18.3 Part 127.06.1 of the Civil Aviation Regulates,1997 pertaining Operating certificate requires the following:

The operator of a commercial air transport helicopter shall not operate the helicopter unless such operator is the holder of a valid –

(a) licence issued in terms of the Air Services Licensing Act, 1990, or the International Air Services Act, 1993; and
(b) operating certificate issued in terms of Regulation 127.06.3.

There was no evidence that the owner of the company that owned the helicopter was in possession of a valid Air Operating Certificate at the time of the accident.

1.18.4 Part 127.07.1 of the Civil Aviation Regulations, 1997 pertaining to routes and areas of operation requires the following:

(1) The operator of a commercial air transport helicopter shall ensure that scheduled public air transport service operations are only conducted along such routes for which –
(a) Ground facilities and services, including meteorological services, are provided which are adequate for the planned operation;
(b) Appropriate maps and charts are available; and
(c) Where a single-engine helicopter is used, surfaces are

available which permit a safe forced landing to be executed.

(2) The operator shall ensure that operations are only conducted within such areas and along such routes for which approval or authorisation has been obtained, where required, from the appropriate authority concerned.

(3) The operator shall ensure that –
(a) The performance of the helicopter intended to be used, is adequate to comply with minimum flight altitude requirements; and
(b) The equipment of the helicopter intended to be used, complies with the minimum requirements for the planned operation.

There was no evidence that the owner of the helicopter or the pilot had obtained permission from the Civil Aviation Authority to take-off and land from the field at Kroonstad.

1.18.5 Part 43.02.16 of the Civil Aviation Regulations, 1997 pertaining to test flights requires the following:

(1) After any major repair or major modification to an aircraft, test flights shall, if required by the Commissioner, be carried out on the aircraft under such conditions and in the manner as prescribed in the SA-CATS-GMR.

(2) Only essential crew shall be carried aboard any aircraft undergoing a test flight. In terms of the Civil Aviation Regulations after an MPI a post maintenance test flight must be done by a pilot with a test pilot rating.

A flight test was performed after the MPI, but no official documentation was found confirming that a test flight was performed by a pilot with a test pilot rating.

1.18.6 Part 43.02.15 of the Civil Aviation Regulations, 1997 pertaining to Modifications requires the following:

(1) No person shall, without the prior written approval of the Commissioner, carry out any modifications, including changes to equipment or the installation thereof, which affect, or are likely to affect, the serviceability of the aircraft, or the safety of its occupants or of any other persons or property.
(2) Before the approval of the Commissioner is considered for a modification as referred to in sub-regulation (1), the owner of the aircraft, or any other person who applies for the modification, shall -
(a) furnish the Commissioner with such information, data, calculations, reports on tests, drawings or wiring diagrams relating to the design, and proof of effectiveness or airworthiness of such modification, as the Commissioner may require; and
(b) be accompanied by the appropriate fee as prescribed in Part 187.

(3) Notwithstanding the provisions of sub-regulations (1) and (2), such

modifications as may from time to time be recommended by the manufacturer of the type of aircraft or equipment concerned, may be carried out if the modifications are carried out in accordance with the said manufacturer's recommendations.

During the investigation no records of a modification approval was found for the fitment of the speaker system that was found on board the helicopter.

Figure 7: The arrow indicates the speaker attached to the helicopter.

1.18.7 Video footage of the helicopter accident was obtained and analysed by a team of advisors/experts. They concluded that the helicopter took off normally. The pilot then proceeded to fly a low-level circuit to the right with the intent to perform a flypast for the people on the ground before flying to the stadium. At no stage did it seem that the pilot was coming in to land.

1.18.8 The pilot stated in writing and indicated during an interview, that one of the passengers onboard the helicopter requested him to land again in order to pick up a camera man, who was still on the ground. The passengers, in turn, each provided written statements to the investigator-in-charge wherein they stated that they did not request the pilot to land again after becoming airborne. They indicated that there was no space on board the helicopter for a fifth person, as all four seats on the helicopter were already occupied.

During an interview with the passengers, they also indicated that the pilot did not at any stage give them a safety briefing prior to the flight or during the flight. At no stage did the pilot indicate that there was a problem on board the helicopter.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 Fine weather conditions prevailed in the area of the intended take-off and landing zone, which was located at a pressure altitude of 4563 feet AMSL (Above Mean Sea Level). The temperature was reported to be 21°C and the prevailing wind 270° at 10 knots.

2.2 The owner of the helicopter, the owner's wife and the pilot departed from Grand Central Aerodrome on a flight to Kroonstad. At Kroonstad the pilot was requested by the owner of the helicopter to fly actors from a local television production to a sports stadium on the outskirts of Kroonstad. According to the pilot, after taking off for the flight to the stadium, he was asked by one of the actors to pick up a camera man, who was still on the ground and therefore he was coming in to land when the accident occurred. The actors on the other hand stated that they did not request the pilot to pick up a camera man after taking off, as there was no place on board the helicopter for a fifth person. During an interview with the pilot, he was unable to say which actor requested him to pick up the camera man.

Video footage was obtained from a spectator having filmed the accident. This assisted the investigating team with their investigation. When analysing the video footage it appeared that the helicopter took off normally. The pilot then proceeded to fly a low-level circuit to the right with the intent to perform a flypast for the people on the ground before flying to the stadium.

After the accident the pilot mentions on the video that the hydraulic system had failed. However, the hydraulic system was tested after the accident and was operating normally. Thus there was no evidence of a hydraulic system failure.

It was, however, possible that the pilot wanted to switch on the speaker system (switch being on the cyclic stick) in order to entertain the crowd, but in the process unintentionally switched off the hydraulic switch also installed on the cyclic stick. The two switches looked exactly the same and were unguarded.

When the hydraulics failed, the collective pitch lever lowered the pitch and since the pilot did not expect it as he was flying low and slow he had to try hard to pull on the collective pitch lever. As stated previously in the report when the hydraulic system fails, the cyclic and collective pitch lever will become heavy or stiff.

In the process the throttle which is on the collective pitch lever was rolled to the closed position, while the pilot was trying to pull on the collective pitch lever and as a result the rotor rpm had reduced which resulted in the helicopter losing altitude.

Should the above be the case, it would explain the left-hand roll that the helicopter was performing on the video prior to impact with the vehicle and ground. The pilot was most probably trying to pull on the collective pitch lever because of the low position he found himself in. The unexpected but self-induced hydraulic failure in a critical stage of flight would have meant that the pilot would have had to lean to the left to pull on the collective pitch lever.

However, it does appear from the video footage that the pilot was successful in adjusting the nose attitude of the helicopter in order to cushion the landing.

2.3 Although it did not contribute directly to the accident, it appeared that the flight was per definition a charter flight as money was paid to the so-called “operator” by the promotions company to fly these actors from point A to B. The service provider in this case (operator) was not in compliance with the required Aviation Regulations to perform such a service as the operator did not hold an Air Service Licence or an Air Operating Certificate (AOC). This flight could therefore be classified as an illegal flight/operation, which had a direct consequence on aviation safety and the associated regulations governing it.

2.5 Although the pilot did not perform a weight and balance calculation prior to take-off; the take-off mass and centre of gravity of the helicopter were within the prescribed limits and did not contribute to the accident.

3. CONCLUSION

3.1 Findings

(i) The pilot was the holder of a valid commercial pilot’s licence and had the helicopter type endorsed on his licence.

(ii) The aircraft was found to be serviceable prior to the accident flight, with no defects or malfunctions recorded that could have contributed to the accident or have caused the accident.

(iii) Weather conditions were fine at the time, with a temperature of 21°C and the wind 270° at 10 knots.

(iv) The helicopter mass and centre of gravity were within the prescribed limits.

(v) The pilot also stated that he was requested to pick up a camera man and therefore was coming back to land when the accident occurred. This statement by the pilot is suspect as the helicopter did not have a seating capacity for any additional passenger.

(vi) The hydraulic system was tested after the accident and was operating normally and therefore did not fail.

(vii) The pilot stated on video that the hydraulic system of the helicopter had failed.

(viii) A passenger sustained serious injuries during the accident.

(ix) The helicopter was substantially damaged.

(x) The pilot had inadvertently switched off the hydraulic switch when he attempted to switch on the speaker switch.

(xi) The pilot had transgressed the following CAR: Part 91.07.4; Part 127.06.1; Part 127.07.1; Part 43.02.16; Part 43.02.15.

3.2 Probable Cause/s

3.2.1 Hydraulic system failure as a result of the pilot inadvertently switching off the hydraulic switch.

4. SAFETY RECOMMENDATIONS

4.1 It is recommended that the SACAA should introduce requirements that the hydraulic switch be capped, which would require the guard to be moved before the position of the switch is changed.

4.2 Alternatively, the SACAA should recommend to the manufacturer that the position / location of the hydraulic switch be removed (repositioned) from the cyclic control stick to the centre console. The switch should, if possible, feature the detent switch application (switch controls two circuits but with only an open and closed position, the switch needs to be pulled and then moved over the detent to the opposite position in order to activate the circuit) as can be seen in Figure below (left bottom of the panel HYD SYS, applicable to the Bell 407 type helicopter).

A view of the HYD SYS switch on the Bell 407

Figure 8: A view of the HYD SYS switch located on the overhead console of a Bell 407.

The reasoning behind the repositioning / relocation of the switch is firstly for safety reasons and secondly to allow easy access to the switch for both crew members (two pilots flying, especially during flight training as the tilt/seesaw cyclic stick design does not allow both pilots to manipulate the cyclic control stick simultaneously, and therefore only the pilot/student flying has access to the switch, which should be in the ON position at all times, except during HYD OFF flight training).

5. APPENDICES

5.1 None.

-END-

Report reviewed and amended by Office of the EM:AIID
29 April 2009.