SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigation Division** Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/1037		
Aircraft Registration	ZU-NTC	**Date of Accident**	24 January 2014		**Time of Accident**	1300Z	
Type of Aircraft	RV 7A Amateur-build aeroplane		**Type of Operation**		Private (flying club)		
Pilot-in-command Licence Type	PPL		**Age**	62	**Licence Valid**	Valid	
Pilot-in-command Flying Experience	Total Flying Hours		315		Hours on Type	27.6	
Last point of departure	Cape Town International Airport (FACT), Western Cape						
Next point of intended landing	Cape Town International Airport (FACT),-Western Cape						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
FACT Runway 01 at GPS co-ordinates: S 33º58'45", E018º36'21"							
Meteorological Information	Wind direction: 220ºC, temperature: 25, wind speed: 15 kts, visibility: CAVOK Cloud base: 030, cloud cover: SCT030						
Number of people on board	1+0	**No. of people injured**	0		**No. of people killed**	0	

Synopsis

The pilot was engaged in a formation flight with the other members of the Cape Town Flying Club. During landing on runway 01 the aircraft encountered a gust of wind prior to touchdown. The aircraft experienced a hard landing on both nose landing gear and left main landing gear.

The nose landing gear collapsed and the propeller struck the ground. The aircraft was stopped by the pilot and then moved off the runway by the airport fire and rescue team that was dispatched by the ATC. The aircraft sustained substantial damage to the nose landing gear and propeller. The pilot did not sustain any injuries during the accident sequence.

The investigation revealed that the cause of the accident was indicative of a hard landing.

Probable Cause

Pilot lost control of the aircraft and made a hard landing with nose gear first due to a wind gust.

Contributory factor
Poor handling technique.

ASP Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner : Robin Cross Aviation (PTY) LTD

Name of Operator : Robin Cross Aviation (PTY) LTD
Manufacturer : Van's Aircraft
Model : RV-7A
Nationality : South African
Registration Marks : ZU-NTC
Place : FACT Runway 01 at GPS: (S 33º58'45", E018º36'21")
Date : 24 January 2014
Time : 1315Z

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 An aircraft with a pilot as the sole occupant was engaged in a scenic flight, flying in formation with the other members of the Cape Town Flying Club. The pilot stated that during landing at the final approach the aircraft experienced a bumpy crosswind at 16 knots.

1.1.2 The pilot attempted to stabilise the aircraft by applying left wing down and forgot to flare the aircraft for landing. Both the nose and left main landing gear impacted the runway and bounced. During bounce, the nose gear collapsed and the propeller struck the runway surface and was damaged.

1.1.3 The aircraft came to a complete stop and the pilot disembarked unassisted. The aircraft came to rest at approximately 20 metres from the impact point at S33º58'45", E018º36'21" with a field elevation of 151 ft AMSL.

1.1.4 The airport fire and rescue were dispatched to the point of the accident and assisted in moving the aircraft off the runway for other air traffic. The aircraft was later towed to one of the operator's hangars.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft sustained substantial damage

Figure 1: Damaged aircraft

1.4 Other Damage

1.4.1 None

1.5 Personnel Information

Nationality	British	Gender	Male	Age	62
Licence Number	0272235177	Licence Type	PPL		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night, single engine piston				
Medical Expiry Date	31 December 2014				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience

Total Hours	315,0
Total Past 90 Days	51,5
Total on Type Past 90 Days	27,6
Total on Type	27,6

1.6 Aircraft Information

Airframe:

Type	RV-7A	
Serial Number	72958	
Manufacturer	Van's Aircraft	
Date of Manufacture	2010	
Total Airframe Hours (At time of Accident)	787,7	
Last Annual Inspection (Date & Hours)	703	11 December 2013
Hours since Last Annual Inspection	84,7	
A.T.F. (Issue Date)	12 December 2013	
A.T.F. (Expiry Date)	11 December 2014	
C of R (Issue Date) (Present owner)	23 March 2012	
Operating Categories	Part 24	

Engine:

Type	RCA Lycoming 0-360-A1A
Serial Number	110201
Hours since New	787,7
Hours since Overhaul	T.B.O not yet reached

Propeller:

Type	Unknown
Serial Number	Unknown
Hours since New	787,7
Hours since Overhaul	Unknown

Weight and balance

1.6.1 The aircraft weight and balance were within the limits at the time of the accident. There was enough fuel of the correct grade.

1.6.2 There was no reported defect prior to flight.

1.7 Meteorological Information

1.7.1 Weather report as obtained from the South African Weather Service

Wind direction	220	Wind speed	15 kts	Visibility	CAVOK
Temperature	25	Cloud cover	SCT030	Cloud base	030
Dew point	13				

1.7.2 Meteorological report as obtained from the pilot

Wind direction	330	Wind speed	15 kts	Visibility	9999
Temperature	25	Cloud cover	SCT030	Cloud base	030
Dew point					

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with the standard factory-fitted navigational equipment approved by the Regulator. There were no recorded defects to navigational equipment prior to flight.

1.9 Communications

1.9.1 The aircraft was equipped with one VHF (Very High Frequency) radio approved by the Regulator. There were no recorded defects regarding the communication equipment prior to flight.

1.10 Aerodrome Information

Aerodrome Location	Cape Town South Africa	
Aerodrome Co-ordinates	S 33°58 ′10″, E 018°35 ′50″	
Aerodrome Elevation	151ft	
Runway Designations	01/19	16/34
Runway Dimensions	10,502 ft	5,581 ft
Runway Used	01	
Runway Surface	Tar	
Approach Facilities	Yes	

Figure 2: Google Earth view of Cape Town International Airport

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder or a cockpit voice recorder. Neither recorder was required by the relevant aviation regulations.

1.12 Wreckage and Impact Information

1.12.1 The aircraft landed hard with the nose wheel first and collapsed. Due to the aircraft nose gear damage, the propeller struck the runway and was damaged. The aircraft skidded for approximately 16,4 ft on the nose strut and came to rest next to the left side of the runway.

Figure 3: View of nose gear damage

Figure 4: View of propeller damage

1.12.2 The aircraft sustained damage to the nose gear and the propeller. All damage was accounted for and was attributed to high impact forces.

1.13 Medical and Pathological Information

1.13.1 None

1.14 Fire

1.14.1 There was no post or pre-impact fire during the accident sequence.

1.15 Survival Aspects

1.15.1 The aircraft is equipped with a shoulder harness and the pilot was making use of it during flight. The shoulder and harness did not fail during the accident sequence.

1.16 Tests and Research

1.16.1 The pilot reported that the aircraft encountered a gust of wind that led to the accident. The nose landing gear is designed to support the aircraft during landing after most of the load has been absorbed by the main landing gear and to guide the aircraft during taxiing. Should the nose landing gear absorb more aircraft load during landing, it is subjected to an unusual weight that puts it at risk of being damaged.

The following information was extracted from the Air Pilot's Manual Volume 1.

Wind gust

Wind gust is the maximum wind speed measured during a specified time period. The Meteorological Society defines a wind gust as a sudden brief increase in the speed of the wind. More specifically, the National Digital Forecast Database defines a wind gust as the maximum 3-second wind speed (in knots) forecast to occur within a 2-minute interval at a height of 10 meters (~32,8 feet).

If there are wind gusts you should increase your approach speed. A good rule of thumb is to add 50% of the wind gust speed to your approach. As we approach the ground, the wind direction will slow and back a few degrees. This is due to the friction close to the Earth's surface. Backing means that the direction of the wind will move anti-clockwise. If the wind is coming from your right when landing, it will be more aligned to the runway just before touchdown. If, however, the wind is blowing from your left, the crosswind will be greater on touchdown.

Crosswind strength

The crosswind component on a runway can be estimated from the wind strength and the angle that the wind direction makes with the runway.

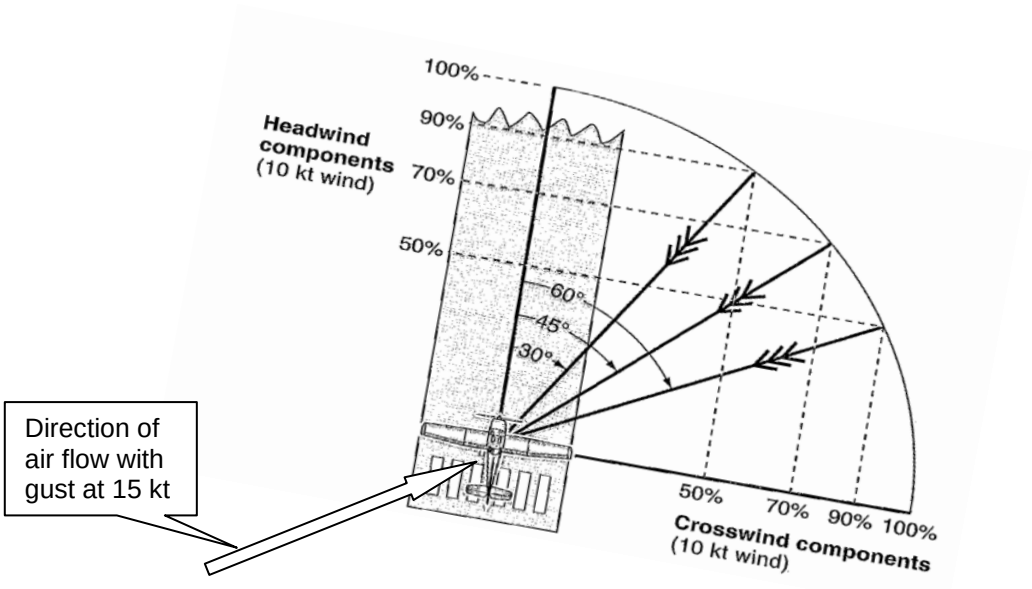

Figure 5: Estimating the crosswind component

As a rough guide:

- *A wind 30° off the runway heading has a crosswind component of ½ the wind strength*
- *A wind 45° off the runway heading has a crosswind component of ¾ the wind strength*
- *A wind 60° off the runway heading has a crosswind component of ⅞ the wind strength (nearly all);*
- *A wind 90° off the runway is all crosswind*

The following information was extracted from the Pilot's Operating Handbook:

Maximum demonstrated crosswind velocity:

- *Take off - 20kts*
- *Landing - 15kts*

Note: *A demonstrated crosswind velocity is a velocity that a test pilot appointed by the manufacturer was able to demonstrate a safe landing.*

1.16.2 The aircraft was recovered to the owner's workshop and repairs were made to the nose gear strut. The engine was subjected to a propeller strike inspection and a new propeller was fitted to the aircraft.

1.17 Organisational and Management Information

1.17.1 The organisation was a flying club operating as non type certified aircraft.

1.18 Additional Information

1.18.1 The following information was extracted from the Air Pilot's Manual Volume 1:

Common faults during the landing

Every pilot learns how to land through experience. It is inevitable that many landings will be far from perfect, but progress will be made when you can recognise faults and correct them. Three very common faults are the balloon (when the aeroplane moves away from the ground before touchdown), the bounced landing (when it moves away from the ground after touchdown, perhaps after several touchdowns) and rounding out too high.

An inexperienced pilot should consider an immediate go-around following a bounce. With experience, however, a successful recovery from a bounce can be made (provided that the runway length is adequate) by relaxing the back pressure and adding power if necessary to reposition the aeroplane suitably to recommence the landing. Avoid pushing the nose down as a second bounced landing may result. Avoid a second touchdown on the nose wheel – a series of Kangaroo hops down the runway is not a desirable way to land an aeroplane! Prior to touchdown, make sure that the aeroplane is in the correct nose-high attitude (even if it is the second touchdown).

Note: the more experienced you become, the less likely you are to find yourself bouncing, ballooning or rounding out too high. It is part of the average student pilot's lot to become somewhat of an expert at recovering from misjudged landings, but this phase will not last too long.

Crosswind Landing

When landing in a strong crosswind, use the minimum flap setting required for the field length. Although the crab or combination method of drift correction may be used, the wing low method gives the best control. After touchdown, hold a straight course with the steerable nose wheel and occasional braking if necessary.

Crosswind landings and the loss of directional control on the ground because of the improper use of the controls are the leading problem areas.

Crosswind Procedure:

- Turn onto final approach and establish a crab to maintain the extended runway centerline alignment.
- Transition to a slip at about 30- to 50-feet AGL.
- Aggressively maintain lateral alignment with the ailerons and longitudinal alignment with the rudder.
- Flare to a "level flight" attitude at about 5- to 10-feet AGL. Maintain this attitude until the airplane begins to sink while keeping lateral and longitudinal alignment.
- Touchdown on the upwind wheel and maintain ailerons into the wind.
- If flaps are used, retract them (not the gear) once on the ground.
- If the approach or landing is not working out, perform a go-around maneuver.

Landing

Figure 6: Landing approach stages

A good landing begins with a good approach (see below). Before the final approach is begun, the pilot performs a landing checklist to ensure that critical items such as fuel flow, landing gear down, and carburetor heat on are not forgotten. Flaps are used for most landings because they permit a lower approach speed and a steeper angle of descent. This gives the pilot a better view of the landing area. The airspeed and rate of descent are stabilized, and the airplane is aligned with the runway centerline as the final approach is begun.

Things that go wrong

There is not a pilot who has not bounced on landing. This is caused by too high rate of descent or not holding off sufficiently. A small bounce can be recovered from, but if the pilot pushes forward the control stick, the outcome will be damage or destruction of the nose wheel. If in doubt, go about.

The wheel barrow landing method

If you want to remain on good terms with your flying club don't ever wheelbarrow. If you bounce, NEVER put the nose down to try to hold it onto the ground. The aircraft‘s nose cannot carry the weight on first touch-down. It is likely to be broken off.

1.18.2 The recommended approach landing speed is 90 mph and 80 mph on final landing touch down. The pilot had a landing speed of 79 mph during the gust wind conditions at low height.

Information is extracted from: Van’s Aircraft RV-7A, POH N313P, Page 11, 4/7/2007 edition.

LANDING Procedures

a) Approach speed 90 mph
b) Flaps 20 deg.
c) Prop control full rpm
d) Engine 1800 rpm
e) 80 mph final
f) 40 deg flaps

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 The pilot was qualified and licensed for the flight in accordance with existing regulations.

2.2 The pilot stated that the aircraft encountered a gusty wind during a crosswind landing. The reported crosswind speed was 15 knots at 220 degree. On the light aircraft the reported crosswind does have an effect on aircraft performance characteristics.

2.2 The pilot also mentioned that he forgot to flare the aircraft while concentrating more on correcting the aircraft stability after encountering the wind gust (refer to **Figure 6**). The pilot allowed the aircraft nose wheel to impact first followed by the left main gear. The nose landing gear is not designed carry the aircraft weight during the first touchdown. It is design to support the aircraft after landing first with main landing gear and steering it while taxiing. If the nose landing gear is subjected to more weight, it will collapse, causing damage (accident).

2.3 The crosswind component chart shows that the crosswind effect on the aircraft was greater with regard to the speed induced during landing. This will cause the aircraft

to bounce and loss of directional control. If the pilot chooses the wheelbarrow method to prevent the aircraft from bouncing, the nose wheel will collapse due to overload and stress.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was licensed and qualified for the flight in accordance with existing regulations.

3.1.2 The pilot did not have enough experience to make landings in gusty conditions.

3.1.3 The pilot was a foreign national and held a South African licence which he had attained in accordance with existing regulations.

3.1.4 The aircraft was equipped and certified for the flight in accordance with existing regulations.

3.1.5 The reported weather conditions revealed possibilities of gusty wind conditions. A crosswind of 15 knots affects a light aircraft more than a big aircraft.

3.1.6 The gusty conditions were sufficient to cause loss of stability on the type of aircraft in question.

3.2 Probable Cause/s

3.2.1 The pilot lost control of the aircraft and made a hard landing with the nose gear first due to a gust.

3.3 Contributory Factor/s

3.3.1 Poor handling technique.

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 None