SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/3/2/8890		
Aircraft Registration	ZS-OPH	**Date of Accident**	1 February 2011		**Time of Accident**	1119Z	
Type of Aircraft	GIPPSLAND GA-200C		**Type of Operation**		Crop Spraying		
Pilot-in-command Licence Type	Commercial		**Age**	26	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	**Total Flying Hours**		631,0		**Hours on Type**	50,8	
Last point of departure	Bethlehem Aerodrome (FABM), Northern Cape						
Next point of intended landing	Ladybrand Aerodrome (FALB), Northern Cape						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On a private farm at Ladybrand at GPS-Coordinates: (S29º 06.082, E027º 36.527)							
Meteorological Information	Wind direction: Calm; Visibility: clear; Temperature: 25ºC; Cloud cover: 1/8; Cloud base: 3 000ft						
Number of people on board	1 + 0	**No. of people injured**	1	**No. of people killed**	0		

Synopsis

The pilot took off from Bethlehem aerodrome to perform crop spraying, with the intention of landing at Ladybrand aerodrome afterwards.

On the second-last spray run, he pulled up and executed a left turn. During the turn, the engine lost power, and the aircraft stalled, went into a flat spin and struck the ground.

The aeroplane was destroyed and the pilot sustained serious injuries during the accident sequence. The engine was recovered for further investigation purpose. The test found no anomalies and was satisfactory.

The investigation found that the spin condition at low height contributed to the aircraft accident.

Probable Cause

Failed to maintain flying speed

IARC Date		Release Date	

SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Occurrence Investigation**
Telephone number: **011-545-1000**
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Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Orsmond Aerial Spray
Manufacturer : Gippsland Aeronautics (Pty) Ltd
Model : GA-200C
Nationality : South African
Registration Marks : ZS-OPH
Place : A farm near Ladybrand (S29º 06.082, E027º 36.527)
Date : 1 February 2011
Time : 1119Z

All times given in this report is 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 accidents 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 1 February 2011, the pilot took off from Bethlehem aerodrome to perform crop spraying, with the intention of landing at Ladybrand aerodrome afterwards.

1.1.2 On the second-last spray run, he pulled up to execute a left turn. During the turn, the engine lost power. The aircraft stalled and went into a flat spin from which the pilot could not recover, and it struck the ground, ending up on its belly. According to the pilot, the engine regained power moments before impact.

1.1.3 The crash site coordinates were S29º 06.082, E027º 36.527 at an elevation of 5288ft. The wreckage was recovered from the accident site and the engine was taken for component inspection and tests by the approved aircraft maintenance organisation (AMO).

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: The damage to ZS-OPH.

1.4 Other Damage

1.4.1 A small section of the crop field was damaged by the impact of the aircraft during the accident sequence. There was no contamination from fuel spillage.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	26
Licence Number	0272278128	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night Flight, Tug Pilot and Single-Engine Piston				
Medical Expiry Date	31 August 2011				
Restrictions	None				
Previous Accidents	None				

Flying Experience

Total Hours	631,0
Total Past 90 Days	187,3
Total on Type Past 90 Days	19,5
Total on Type	50,8

1.5.1 On the day of the accident, the pilot flew the aircraft for 5,8 hours performing crop-spraying exercise. He did not have an agricultural rating endorsed on his licence. The pilot accumulated over 35 hours of agricultural operation within a period of seven days between 25 January and 1 February 2011.

1.5.2 The pilot flew a variety of aircraft on crop-spraying exercises, but used the accident aircraft infrequently. In the month leading up to the crash, he flew a total of 119,8 hours, of which 12,9 hours were on the accident aircraft. During the seven days before the crash, he flew 50 hours, of which 10,4 were on the accident aircraft. At the time of the crash, he had a total of 36,4 hours of solo flight on this aircraft type.

1.6 Aircraft Information

Airframe

Type	Gippsland GA-200	
Serial Number	200C0043	
Manufacturer	Gippsland Aeronautics	
Date of Manufacture	2000	
Total Airframe Hours (At time of Accident)	1 627,4	
Last MPI (Date & Hours)	19 May 2010	1 580,3
Hours since Last Annual Inspection	47,1	
C of A (Issue Date)	18 October 2011	
C of A (expiry date)	17 October 2012	
C of R (Issue Date) (Present owner)	15 December 2000	
Operating Categories	Standard Part 135	

1.6.1 The Gippsland GA200 Fatman is a single-engine, two-seater agricultural aircraft produced by the Australian manufacturer Gippsland Aeronautics. The undercarriage assembly consists of non-retractable main landing gear and a tail wheel. The main landing gear is mounted on tubular steel struts with rubber cord shock-absorption and hydraulic dampers. Cable cutters are fitted to the landing gear legs and windscreen.

1.6.2 Flying controls are conventional and cable-actuated. Single-slotted trailing-edge wing flaps can be deployed to tighten the turn radius during agricultural operations. The take-off setting is 15° and the maximum is 38°. To avoid pitch trim changes, an interconnect system applies bias to the elevator trim spring when the flaps are extended. There is a fixed tab on the rudder.

1.6.3 The aircraft documentation (certificate of registration, certificate of authority to fly, and mass & balance certificate) were studied and reviewed, and was found valid at the time of the accident. The aircraft was still new when imported from Australia on 20 September 2000. The SACAA registered it on 15 December 2000.

1.6.4 The aircraft logbooks and maintenance documentation were studied, both the owner and AMO had complied with all the modifications and service instructions published by the manufacturer through the service bulletins. The aircraft was involved in a low-flying accident on 13 February 2001 while performing crop spraying. The aircraft was duly repaired, and after an airworthy inspection was certified to fly again by the Regulator on 18 July 2001. It had 110,8 airframe hours

at the time.

Engine

Type	TEXTRON Lycoming OI-540-K1A5
Serial Number	L-11450-48
Hours since New	5 875,4
Hours since Overhaul	47,1

1.6.5 The aircraft is equipped with one 224kW (300 horsepower) Textron Lycoming IO-540-K1A5 flat-six engine with an oil capacity of 11,4ℓ (3 US gallons).The aircraft had initially been fitted with an engine of the same model with the serial number L-27207-48A. After the first accident, this engine was taken for shock load inspection at 114,7 hours and refitted afterwards.

1.6.6 The engine was replaced on 15 November 2004 at 1 302,2 airframe hours due to metal contamination. The second engine – L-11450-48 – had 5 596,6 hours at the time it was fitted to ZS-OPH. The pilot reported that he experienced a loss of engine power. He also said that just before the impact the engine had regained power.

Propeller

Type	Hartzell (HC-C2YR-1BF/ F8475R)
Serial Number	CH 34015B
Hours since New	1577,4
Hours since Overhaul	159,5

1.6.7 The aircraft was fitted with a two-blade, constant-speed metal propeller, which provided the aircraft with an additional 22kW (30 horsepower). The aircraft had initially been equipped with another propeller: serial number: CH 34013 B. After the low-flying accident described in 1.6.4, the propeller was replaced with the above propeller after an overhaul maintenance inspection.

Weight and balance

Basic Empty Weight	856 kg
Pilot	100 kg
Fuel on board	208 kg
Fertiliser	753 kg
Maximum Take-off weight	1917kg

Note: The maximum take-off weight for this aircraft is 1996kg. The aircraft was within the take-off weight limitation.

1.6.8 The aircraft can be loaded to a maximum weight of 1 524kg. If operating in accordance with the provisions of the Agricultural Operations Supplement, however, no limitations are required by Civil Aviation Regulations. Large weights are carried only in the hopper. (*See Ref: B01-01-36 Amendment 1*)

1.6.9 Fuel is kept in the integral tank of each wing. These have a combined usable capacity of 200ℓ (53 US gallons). There is a 14ℓ (3,7 US gallon) header tank in the front of the fuselage. During investigation, approximately 50ℓ (13 US Gallon) of fuel was found in each tank. According to available evidence, the fuel quantity was

sufficient for the planned flight. A total of 290ℓ (76.7 US gallon) of fuel was uplifted on the day of the accident at Ladybrand aerodrome.

The aircraft is equipped with a 1 050ℓ (277 US gallon) hopper in the forward fuselage. After the accident, the hopper was found at low-level of capacity. There was no damage to the hopper during the accident sequence. The weight of the aircraft was found to be 1028 kg after the accident, which was within limits of the maximum recommended weight of 1996 kg.

1.7 Meteorological Information

1.7.1 The following weather conditions at the time and place of the accident were obtained from the pilot's questionnaire.

Wind direction	Calm	Wind speed	60kt	Visibility	CAVOK
Temperature	25ºC	Cloud cover	1/8	Cloud base	3 000ft
Dew point	Unknown				

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 the equipment prior to the flight.

1.9 Communications

1.9.1 The aircraft was equipped with one VHF radio approved by the Regulator. It had no recorded defects before the flight.

1.10 Aerodrome Information

1.10.1 The accident did not occur on or near an aerodrome.

1.10.2 The accident occurred on a farm at the GPS co-ordinates (S29º 06.082, E027º 36.527).

1.11 Flight Recorders

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

1.12 Wreckage and Impact Information

1.12.1 The site at which the accident occurred was a crop-cultivating field. The field has GPS co-ordinates readings (S29º 06.082, E027º 36.527) and a field elevation of 5288ft.

Refer to the picture below for the view of the accident site (Figure 2)

Figure 2: The aircraft after it came to rest in the field.

Wreckage

1.12.2 The aircraft struck the ground at a shallow angle and a low speed. The wreckage pattern indicated that the aircraft had stalled and spun in. The aircraft entered a flat spin to the left while the pilot was turning left after the loss of engine power.

Figure 3: The damage to the left side of the aircraft.

1.12.3 The impact damaged the nose, wings, cockpit, aft fuselage and undercarriage. The rudder, horizontal stabiliser and elevators were also damaged. The force of the impact caused the landing gear to inflict additional damage to the wings.

Figure 4: The right side of the aircraft after the accident.

1.12.4 The aircraft was in a flat, left spin when it struck the ground. The impact pushed the engine to the right, and bent the propeller slightly. The damage to the propeller indicated that the engine had power and the propeller was turning on impact.

Figure 5: Damage to nose section.

Figure 6: One of the propeller blades after the accident.

1.12.5 The throttle control was found in the ‘open’ position, the mixture control lever was set to ‘rich’ and the propeller control lever was set to ‘fine’.

1.12.6 The airframe parts and engine were still intact with the main wreckage.

1.13 Medical and Pathological Information

1.13.5 The pilot sustained serious injuries.

1.13.6 The pilot’s medical certificate was valid at the time of the accident.

1.14 Fire

1.14.1 There was no pre- or post-impact fire.

1.15 Survival Aspects

1.15.5 The accident was considered survivable. The pilot sustained serious injuries due to the force with which the aircraft struck the ground sever impact forces experienced by the aircraft during impact with the ground.

1.15.6 The aircraft was equipped with shoulder harness and they fail during the accident sequence.

1.16 Tests and Research

Inspection

1.16.5 The engine was recovered by an approved AMO for further investigation.

1.16.6 The engine was dismantled and all components were accounted for. There was no evidence of any engine component failure that could have contributed to a loss of engine power.

1.16.7 There was no evidence of any restriction or blockage to the fuel supply lines.

1.17 Organisational and Management Information

1.17.1 The pilot operated the aircraft in an agricultural operational capacity and was registered under a crop-spraying organisation.

1.17.2 The last annual inspection (AI) was conducted by AMO No. 149, which was in possession of a valid approval certificate, on 19 May 2010.

1.17.3 The operator did not monitor the operations as per the duty list and schedule as stipulated in Part 135 (Air transport operations: small aeroplane).

1.18 Additional Information

1.18.5 Loss of engine power

(*Excerpted and adapted from en.wikipedia.org/wiki/loss of engine in reciprocation [aircraft])*

"In general, loss of power in reciprocating engine can be the result of fuel starvation or fuel exhaustion. Fuel starvation occurs due to fuel supply contamination in the float chamber or float needle valve, float chamber venting, false air intake due to a defective carburettor flange, engine temperature being too low, or too lean carburettor jetting due to conditions prevailing in the intake silencer)."

1.18.6 Characteristics of a stall/spin:

Reference: Advisory Circular 9/25/00: *Spin recognition, prevention, and recovery*

"Certificated, light, single-engine airplanes must meet specific criteria regarding stall and spin behavior. Many types of airplane will only spin if the pilot simultaneously yaws and stalls the airplane (intentionally or unintentionally). Under these circumstances, one wing tends to stall more deeply than the other. The wing that stalls first will drop, increasing its angle of attack and deepening the stall.

"Both wings must be stalled for a spin to occur. The other wing will rise, decreasing its angle of attack, and the aircraft will yaw towards the more deeply stalled wing. The difference in lift between the two wings causes the aircraft to roll, and the difference in drag causes the aircraft to yaw.

"One common scenario that can lead to an unintentional spin is an uncoordinated turn towards the runway during the landing sequence. The pilot who is overshooting the turn to final approach may be tempted to apply rudder to increase the rate of turn. The result is twofold: the nose of the airplane drops below the horizon and the bank angle increases. Reacting to these unintended changes, the pilot may then begin to pull the elevator control aft (thus increasing the angle of attack) while applying opposite aileron to decrease bank angle.

"Taken to its extreme, this can result in an uncoordinated turn with sufficient angle of attack to cause the aircraft to stall. This is called a cross-control stall, and is very dangerous if it happens at low altitude where the pilot has little time to recover. In order to avoid this scenario, pilots are taught the importance of always making coordinated turns."

1.18.3 Stalls during manoeuvres

(*Reference:* Air Pilot's Manual: Flying Training – Volume 1)

"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 airflow 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 2g in a 60° banked turn or dive recovery."

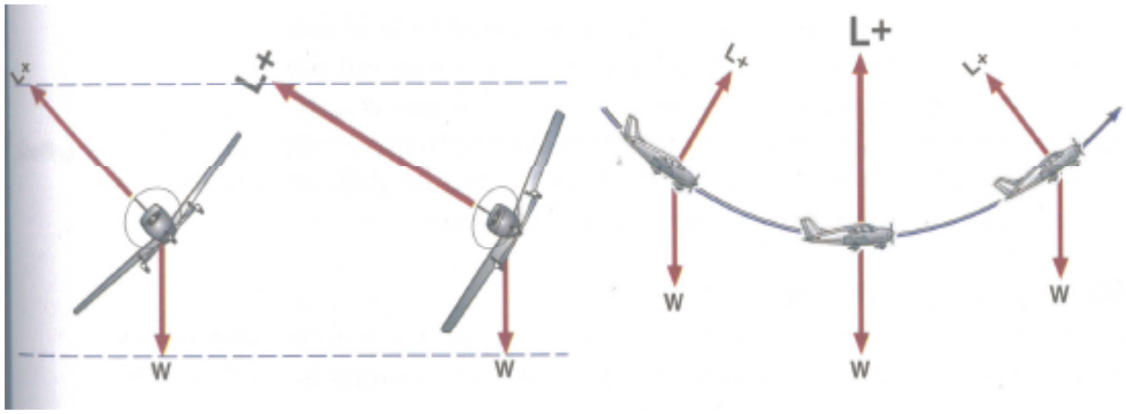

Figure 7: Increased wing loading (G-factor) means increased stall speed

1.18.4 Flat spin characteristics

(*Reference:* Aircraft Accident Investigation *2nd Edition by Richard H. Wood and Robert W. Sweginnis*)

"A flat spin is characterized by a near level pitch and roll attitude with the spin axis near the center of gravity (CG) of the airplane. Recovery from a flat spin may be extremely difficult and, in some cases, impossible. One of the factors that encourage a normal spin to transition into a flat spin is power. Aircraft with propellers in front are destabilizing in pitch. In other words, location of the propeller forward of the aircraft's CG will cause changes in pitch to be exaggerated. At high angle of attack, the air passing through the propeller arc is deflected downward, resulting in an upwards force.

"The nose will be pitched up as power is increased and pitched down as power is decreased. This force is forward of the CG, in virtually all airplanes of the same configuration, pulling the power to idle is normally the first step in the recommended spin recovery procedure. Failure to pull the power 'off' may hold the nose in an unusually high attitude, precluding from the spin.

1.18.5 Spin recovery

"For recovery from an inadvertent or intentional spin, the following procedure is used:

- *Retard throttle to idle position.*
- *Apply full rudder opposite to the direction of rotation.*
- *After one-fourth turn, push the control column forward of neutral in a brisk motion.*
- *As the rotation stops, neutralise rudder and make a smooth recovery from the resultant dive.*
- *Application of aileron in the direction of the spin will greatly increase the rotation rate and subsequently delay the recovery. The ailerons should be held in a neutral position throughout the spin and the recovery.*
- *Intentional spins with flaps extended are prohibited."*

1.18.6 The wreckage pattern is indicative of an aircraft after having stalled and spun into the ground.

The damage that the aircraft sustained exhibited the wreckage pattern of a spinning aircraft as illustrated in *Aircraft Accident Investigation* (Second Edition) by Richard H. Wood and Robert W. Sweginnis.

- Engine pushed to the right (as viewed from the rear).
- Compression damage to the trailing edge root of the left (down going) wing
- Compression damage to the aft fuselage on the right windward side
- Tension to the trailing edge root of the right up-going wing
- Compression to the leading edge root of the right (up-going) wing
- Impact damage to trailing edge wingtip of the right (up-going) wing
- Compression damage to the leading edge of the right (up-going) wing
- Damage to the aft cockpit caused by the tensile stress.

Refer to figure 8 below.

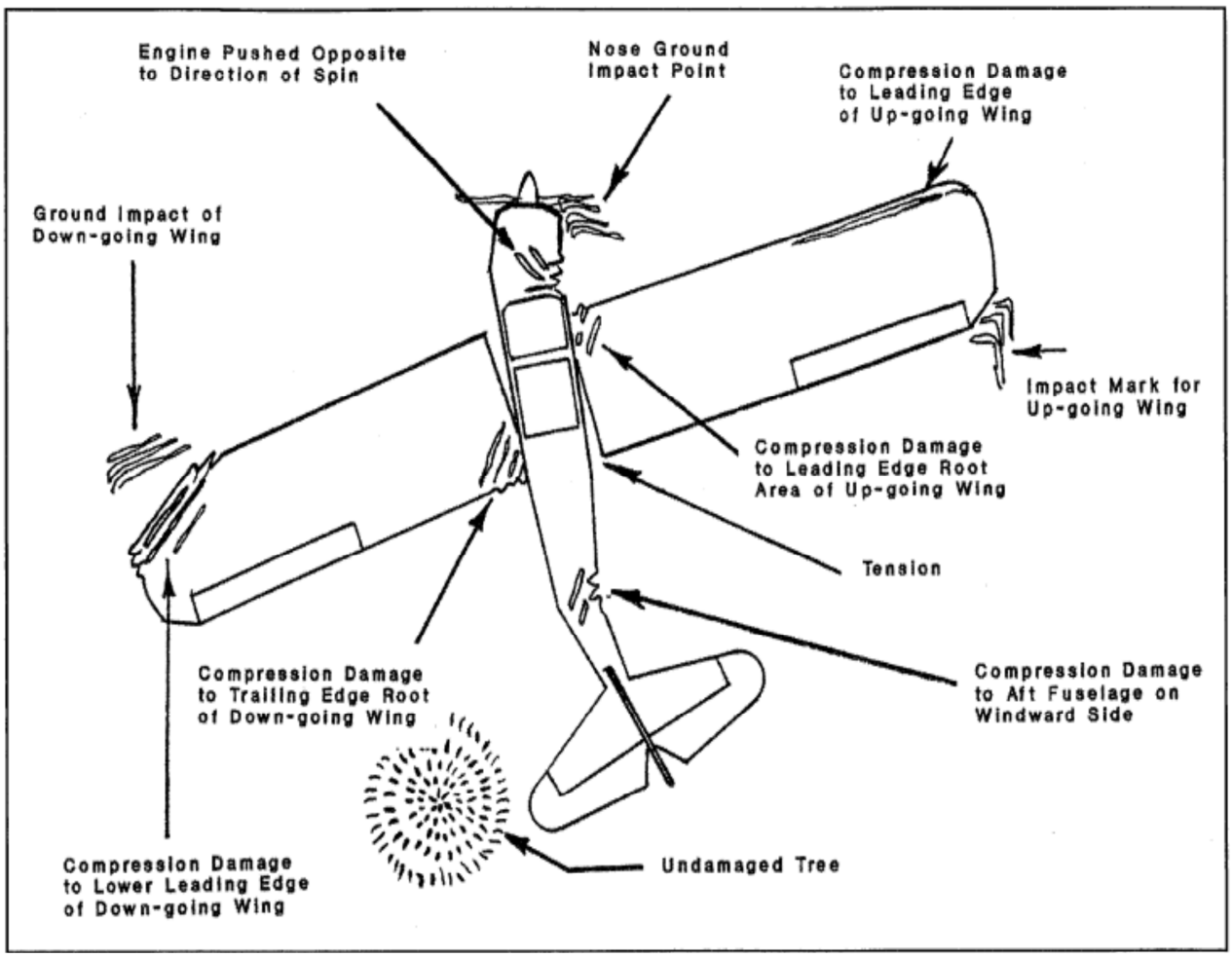

Figure 8: Wreckage pattern of a stall/spin accident.

1.18.7 Fatigue

Information extracted from FAA
Information extracted from: FAA: Fatigue in aviation: issue OK-07-193

"Fatigue also referred to as tiredness, exhaustion, lethargy, and listlessness, describes a physical and/or mental state of being tired and weak. Although physical and mental fatigues are different, the two often exist together – if a person is physically exhausted for long enough, they will also be mentally tired. When somebody experiences physical fatigue, it means they cannot continue functioning at their normal levels of physical ability. Mental fatigue, however, it is more slanted towards feeling sleepy and being unable to concentrate properly.

"Fatigue is a symptom, rather than a sign. A symptom is something the patient feels and describes, such as a headache or dizziness, while a sign is something the doctor can detect without talking to the patient, such as a rash. Fatigue is a non-specific symptom, i.e. it may have several possible causes."

1.18.8 Flight duration limitations

(Excerpted from Civil Aviation Regulations 135.02.9)

"FLIGHT TIME AND DUTY PERIOD SCHEME

"CAR 135.02.9 requires each operator to establish a scheme for the administration of flight time and duty periods. Operators are reminded that they bear sole responsibility for such schemes being in full compliance with any Acts, Laws and Regulations that are external to the South African Civil Aviation Regulations, notwithstanding any approvals given by the SACAA.

1. General

Time spent on flight watch or home reserve may also be deemed to be part of a rest period as provided in section 8(2) (e) of this technical standard.

2. Maximum flight time

(1) An operator may not allow nor may a flight crew member exceed the following maximum flight times –

(a) 10 hours during any duty period of which a maximum of eight hours may be consecutive, except that single-pilot night VFR or IFR operations in an aeroplane without a serviceable autopilot are restricted to 8 hours in a duty period;

(b) during the preceding seven days –

(i) for a single-pilot operation, 35 hours;

(ii) for a multi-pilot operation, 40 hours; and

(iii) for mixed single- and multi-pilot operations, 37.5 hours;

(c) during the preceding thirty days –

(i) for a single-pilot operation, 100 hours;

(ii) for a multi-pilot operation, 120 hours; and

(iii) for mixed single- and multi-pilot operations, 110 hours;

(d) 300 during the preceding 90 days; or

(e) 1 000 hours during the preceding 365 days.

(2) If a flight crew member expects his or her projected cumulative flight hours for a particular operation to exceed the appropriate limit, the flight crew member shall inform the operator accordingly.

Part 91.02.3 Crew member responsibilities

(3) No person shall act as a flight crew member of an aircraft if, prior to each flight, the expected flight time exceeds, or is likely to exceed, the permissible aggregate of:

(a) for all flying

(i) for pilots not subject to an approved flight time and duty period scheme, 10 hours within a 24-our period;

(ii) 400 hours, during the preceding 90 days;

(iii) 700 hours, during the preceding six months; or

(iv) 1 000 hours, during the preceding 12 months.

(b) in the case of flight instructors conducting ab initio or any training towards an initial rating or license, six hours within one calendar day: Provided that, for the purposes of computing flight time in meeting the limitation referred to in paragraph

(a)(i), each flight hour spent in such training shall be deemed to be one and one-half (1½) hours' flight time…"

1.18.9 Rich mixture conditions

1.19 Useful or Effective Investigation Technique

1.19.1 None

2 ANALYSIS

2.1 The Gippsland GA-200C is designed for agricultural operation and can be loaded to a maximum weight of 1 524kg unless operating in accordance with the provisions of the Agricultural Operations Supplement. The pilot was the sole occupant during the flight.

This allowed the aircraft to carry more load for both the fuel quantity and crop –spray mixture. The hopper was at low level of capacity at the time of the accident and 100ℓ of fuel remained after the accident. Therefore, the weight and balance was not considered a contributing factor to the accident.

2.2 The pilot reported fine weather conditions and was not considered a contributory factor to the accident.

2.3 The pilot flew the aircraft for 5,8 hours on the day of the accident. He mentioned that the accident occurred on his second-last spray run. Crop spraying involves constant low-level, precision flying that demands a great deal of concentration at all times. The pilot exceeded the maximum flight time of 35 hours per seven days' operation – stipulated in Part 135.02.09 – by 15 hours. He also exceeded the 10-hour daily limit on two consecutive days over a seven-day period. It is the investigator's opinion that the pilot was overtired prior to the accident yet was reluctant to stop as he had nearly finished his task.

2.4 Although the pilot had many hours' experience on other crop-sprayers, he did not have a great deal of experience on the accident aircraft. Indeed, the accident flight was his longest flight to date on this aircraft type.

2.5 The pilot reported a loss of engine power followed by a flat spin prior to the accident. He also stated that moments before impact the engine-regained power. Loss of power can lead to the development of a stall and spin. In the subsequent test, however, the engine and its components functioned properly. Moreover, witness marks and damage on the propeller and evidence from the engine investigation indicated that at the time of the accident, all the cylinders had compression, the propeller was turning, and the engine was operating.

2.6 The aircraft features single slotted, trailing-edge wing flaps that can be deployed to help tighten the turn radius. The flaps increase the wing area and allow the airflow through the slots. This airflow over the wing helps to maintain lift and allow manoeuvring at low flight speed. After the accident, the aircraft was found with the flaps positioned at normal flight operation settings.

2.7 According to the pilot, he pulled up to execute a left turn. It is the investigator's opinion that the pilot went into the turn too low and executed an uncoordinated turn in which he do not deploy the wing flap to help tighten the turn radius. The aircraft stalled as he attempted to tighten the turn and struck the ground due to its low height.

2.8 As described in 1.18.2 above, the pilot might have overshot the correct position for the turn, and then applied rudder to increase the rate of turn without deploying the flaps to tighten the radius. This would have caused the nose of the aeroplane to drop and the bank angle to increase, setting up the classic conditions for a stall. Moreover, the pilot was conducting crop-spraying flying at a low height. Therefore, the aircraft stalled and spun into the ground due to low height.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was the holder of a valid commercial licence.

3.1.2 The flight pilot was licensed and medically fit but not qualified for the flight operation in accordance with existing regulations.

3.1.3 The pilot did not have an agricultural rating endorsed on his license at the time of the accident.

3.1.4 The pilot did not comply with the flight and duty time regulations.

3.1.5 The pilot's degraded performance was consistent with fatigue, but there was insufficient evidence to determine if it had contributed to the accident.

3.1.6 The operator did not comply with CAR: Part 135.02.9.

3.1.7 The aircraft had a valid certificate of airworthiness and certificate of registration.

3.1.8 The aircraft was designed for agricultural operations.

3.1.9 At the time of the accident, the aircraft was carrying sufficient fuel.

3.1.10 The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.

3.1.11 All control surfaces were accounted for, and all damage to the aircraft was attributable to the severe impact forces.

3.1.12 Propeller blade damage and twist was consistent with the engine producing power on impact.

3.1.13 The weight and balance of the aircraft was below the maximum allowable limits.

3.1.14 The weather, which was fine, did not contribute to the accident.

3.1.15 There was insufficient height to recover from the stall.

3.2 Probable Cause/s

3.2.1 Failure to maintain flying speed

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 None