

**Aviation Safety Investigation Report  
199503131**

**Cessna Aircraft Company  
Skyhawk**

**22 September 1995**

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**Occurrence Number:** 199503131                      **Occurrence Type:** Accident  
**Location:** 12 km SE Dunkeld  
**State:** VIC    **Inv Category:** 3  
**Date:** Friday 22 September 1995  
**Time:** 1240 hours                                  **Time Zone** EST  
**Highest Injury Level:** Fatal  
**Injuries:**

	Fatal	Serious	Minor	None	Total
Crew	1	0	0	0	1
Ground	0	0	0	0	0
Passenger	1	0	0	0	1
<b>Total</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>

**Aircraft Manufacturer:** Cessna Aircraft Company  
**Aircraft Model:** 172N  
**Aircraft Registration:** VH-NAX    **Serial Number:** 172-71874  
**Type of Operation:** Commercial    Powerline/Pipeline Patrol  
**Damage to Aircraft:** Destroyed  
**Departure Point:** Hamilton Vic.  
**Departure Time:** 1000 EST  
**Destination:** Hamilton Vic.

**Crew Details:**

		<b>Hours on</b>	
<b>Role</b>	<b>Class of Licence</b>	<b>Type</b>	<b>Hours Total</b>
Pilot-In-Command	Commercial	800.0	1276

**Approved for Release:** Tuesday, November 26, 1996

## 1. FACTUAL INFORMATION

### 1.1 Sequence of events

The aircraft was on a powerline inspection flight. It was crewed by a pilot employed by the operator of the aircraft and by an observer from the power supply company. The purpose of the flight was to enable the observer to identify obstructions in the form of trees and branches potentially too close to the powerlines and constituting a fire hazard, and to assess the condition of the conductor and associated items.

To enable the observer to inspect a powerline such aircraft are flown 150 feet above ground level, at 70 knots, with flaps extended 10 degrees. The aircraft is tracked down the left side of the powerline to give the observer in the right seat a good view of the line.

Shortly before the aircraft crashed, it was observed flying along a spurline. It was at this time flying essentially downwind. Some minutes later, the wife of a nearby farmer who had been listening to the approaching aircraft realised that she could no longer hear the engine. Her husband located the wrecked aircraft in a paddock and initiated an emergency response. There were no witnesses to the accident. Neither the pilot nor the observer survived the impact.

### 1.2 Wreckage and impact information

The aircraft had impacted the ground in a nose-down attitude of approximately 45 degrees. The right wing was down approximately 30 degrees relative to the horizon. The wreckage trail was short, indicative of low forward speed at impact. The disposition of the wreckage indicated that the aircraft had been rotating to the right before impact.

Wreckage analysis disclosed no pre-impact faults. The aircraft had sufficient fuel for the flight and had been properly maintained. There were no pre-existing defects recorded on the maintenance release. The pilot had updated personal, company and aircraft records at the completion of the previous day's flying.

### 1.3 Pilot details

The pilot commenced flying training in 1987. He obtained his commercial pilot licence in December 1991, an instructor rating in May 1992, and a command instrument rating in July 1993. His logbook recorded that while flying as an instructor he had instructed student pilots on the causes of stalling and on stall recovery techniques. He had flown a total of 1,276 hours.

He commenced his training in powerline inspection flying techniques on 19 July 1994. After eight hours instruction over five flights, he was assessed as having met the required standard. Accordingly, he was approved to conduct powerline inspection flying for a period of 12 months. At the time of the accident he had conducted 209 powerline inspection flights totalling 462 hours. The latest check for revalidation of his powerline inspection flying approval, carried out on 13 July 1995, was valid for one year and was therefore valid at the time of the accident.

The pilot had ferried the aircraft from Moorabbin to Hamilton three days prior to the accident. Including the ferry time, he had flown for four hours, two hours and three hours respectively, on the three days prior to the accident. On the day of the accident he flew for just under three hours. The aircraft was one of two that were conducting powerline inspections out of Hamilton aerodrome. The pilot of the second aircraft advised that the crews had a quiet night and were well rested before commencing the day's operation.

The pilot held a valid medical certificate. The post-mortem examination did not disclose any medical factors that may have contributed to the accident.

#### 1.4 Meteorological information

The property owner advised that the weather at the time of the accident was fine with a light breeze from the northwest. This was consistent with the forecast issued by the Bureau of Meteorology which had predicted a 15-knot breeze for the area. Weather was not considered to have been a factor in the accident.

#### 1.5 Roll and cut manoeuvre

If an observer does not get a clear view of an obstruction, then the aircraft is required to fly a specific manoeuvre to give the observer a better view. The manoeuvre is called a 'roll and cut'. When the aircraft is flying on the left of the line and the observer calls 'roll' the pilot rolls the aircraft to the right to cross the powerline at 45 degrees. This enables the observer to look back down the line at the obstruction. If after crossing the line, the observer requires a further look at the obstruction, he calls 'cut'. The pilot then continues the right turn until the aircraft has turned through 270 degrees from the original heading. The aircraft is then rolled wings-level to cross the line at right angles, giving the observer a clear view of the obstruction to the right as the aircraft passes over the line. After crossing the line, a 270-degree left turn is made to re-position the aircraft to continue the inspection.

The wreckage was located in a paddock with the wreckage trail aligned nearly at right angles to and under the powerline that was being inspected. In the paddock there was one line of scrub before the accident site and one tree after the accident site that might have been subject to a cut and roll inspection manoeuvre. Due to the lack of witnesses to the accident the investigation was unable to determine what manoeuvre was being carried out prior to the loss of control which preceded the accident.

The power supply company advised that in the year before the accident, some 56,000 km of line was patrolled, finding 27,514 trees that needed attention. This would mean that to verify the hazard, at the very least one cut and roll is required for approximately every two kilometres flown.

#### 1.6 Powerline inspection: flight parameters

The aircraft operator and the power supply company determined the optimum height for inspection of powerlines to be 150 feet above ground level and the optimum speed to be 70 knots. It is the pilots responsibility to maintain these parameters. The height of the power poles varies between 25 feet and 40 feet. There was evidence that, on occasions, powerline inspection aircraft had been observed to fly lower than 150 feet. Some pilots had commented that occasionally the observers asked for the aircraft to be flown at a lower height. The pilots considered that this might have been due to difficulty observing powerlines in certain conditions of sun and light and to the difference in visual acuity between individual observers. The power supply company did not have standards for, and did not require a check of, the observer's visual acuity. When the observer completed his training two years before the accident his visual acuity was obviously acceptable. However, there was no ongoing program to check and detect any deterioration that may have occurred since that time.

### 1.7 In-flight incapacitation

Post-mortem examination disclosed that the observer suffered from asthma and had advanced heart degeneration.

Microscopic examination of his lungs showed changes in keeping with asthma. However, no macroscopic findings were seen that would have indicated he had suffered a severe asthma attack.

The post-mortem examination showed significant coronary artery disease with a 75 per cent stenosis of the left anterior descending coronary artery. Expert pathological opinion was that an individual with significant coronary artery disease may have an episode of myocardial ischaemia leading to severe pain or change in conscious state. However, the physical reaction could be expected to be benign, resulting in slumping of the body. The observers sit with the seat at the limit of its aft travel to enable them to use their maps clear of interference with the control column and to give the best view through the right window. It is unlikely that control interference would occur due to a body slumping while the seat was in the aft position. It could not be determined if the observer suffered any form of incapacitation in the period immediately before the accident.

Neither the observer's family nor his employer was aware of his medical condition. The employer did not require the observers to meet a minimum medical standard.

### 1.8 Flight path simulation

A flight was undertaken to simulate the inspection of the spur line that was being inspected immediately prior to the accident. The flight was conducted by the operator's manager of powerline flying and conformed to the required parameters of height, speed, and configuration. The flight was watched by some persons who saw the accident flight, shortly before the accident, and by some who had watched other powerline inspection flights. They said that they had seen many flights, including the accident flight, operated either more slowly and/or at a lower height and/or with greater bank angles, than those demonstrated during the simulation flight.

## 2. ANALYSIS.

The accident probably occurred when control of the aircraft was lost while it was flying at a height too low for the pilot to apply effective stall/spin recovery techniques. The sequence of events that led to the loss of control could not be established because there were no witnesses to the manoeuvres that preceded the accident. However, there was evidence that some powerline inspection flights had not complied with the operator's height, speed, and angle of bank requirements. This may indicate that some of the pilots had become complacent and had a lowered awareness of the dangers of flying low and slow and lacked appreciation of the importance of strictly adhering to the operator's flight parameters.

Although the observer was suffering from a medical condition which may have led to his becoming disabled, there was no evidence that this had occurred. Had an episode occurred it could have resulted in severe pain or collapse. Either could well have been distracting to the pilot. It is unlikely that the onset would have been of such severity as to cause involuntary limb and body movements that may have interfered with the flight controls, leading to loss of control of the aircraft.

### 3. CONCLUSIONS

#### 3.1 Findings

1. The aircraft was properly certificated and maintained, held sufficient fuel for the flight, and was serviceable at the start of the flight.
2. The pilot was properly licensed and had been properly trained and checked for conducting low-level powerline flights.
3. Some powerline inspection flights had been observed to deviate from the required flight parameters.
4. The power supply company did not have minimum medical standards for its observers.
5. The observer had a medical condition that may have incapacitated him.

#### 3.2 Significant factor

1. Control of the aircraft was lost at a height from which the pilot was unable to recover.

### 4. SAFETY ACTION

4.1 Immediately after the accident the power supply company suspended flying and, with the operator, assisted in the conduct of the investigation. When it became apparent that the operator's flight parameters were not always being observed, the operator instituted a campaign to improve pilot awareness and discipline. When flying recommenced, the observers advised that there was a marked difference in the way the pilots manoeuvred the aircraft.

4.2 Both the powerline company and the aircraft operator conducted a major reassessment of the operation. They have decided to:

- (a) fit four-piece crew restraint harnesses to all aircraft;
- (b) supply crash helmets for both the pilots and observers, and require that they be worn;
- (c) require observers to meet a minimum medical standard; and
- (d) initiate crew resource management training for pilots and observers, with emphasis on safety awareness.

4.3 Before the accident the operator and power supply company commenced experimenting with the use of differential video imaging and infra-red detectors to aid in the identification of hazardous trees. When implemented, this system is expected to reduce the need for continuous roll and cut manoeuvres. The optimum height above ground level for this system has been determined to be approximately 250 feet which should improve the margin of safety.