Aviation Safety Investigation Report 199600452

Gippsland Aeronautic Pty Ltd GA-8

07 February 1996

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Aviation Safety Investigation Report

199600452

The Bureau did not conduct an on scene investigation of this occurrence. The information presented below was obtained from information supplied to the Bureau.

Occurrence Number: 199600452 **Occurrence Type:** Accident
Location: 3km S Latrobe Valley, Aerodrome
State: VIC **Inv Category:** 4
Date: Wednesday 07 February 1996
Time: 1845 hours **Time Zone** ESuT
Highest Injury Level: Minor
Injuries:

	Fatal	Serious	Minor	None	Total
Crew	0	0	1	0	1
Ground	0	0	0	0	0
Passenger	0	0	0	0	0
Total	**0**	**0**	**1**	**0**	**1**

Aircraft Manufacturer: Gippsland Aeronautic Pty Ltd
Aircraft Model: GA-8
Aircraft Registration: VH-PTR **Serial Number:**
Type of Operation: Miscellaneous Test
Damage to Aircraft: Destroyed
Departure Point: Latrobe Valley Vic
Departure Time: 1745 ESuT
Destination: Latrobe Valley Vic

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	Private	100.0	6500

Approved for Release: Wednesday, January 22, 1997

Factual information.

The prototype GA-8 aircraft was undertaking test flying from the manufacturer's facility at the Latrobe Valley airfield. The test flying was scheduled by the designer under the provisions of a permit to fly approved by the Civil Aviation Safety Authority. For a series of spin tests the aircraft was fitted with fixed and jettisonable ballast, a jettisonable pilot's door, and a tail mounted anti-spin parachute attached to a long lanyard.

On this flight the aircraft was set up at 9,000 feet above ground level with full power, flaps fully down, an extreme aft centre of gravity (C of G) and maximum all up weight. The test pilot, who was the only occupant, applied full left rudder and full right aileron to initiate a spin. After the aircraft entered a spin to the left the pilot applied standard control inputs to effect a recovery to normal flight. The aircraft did not respond and at 6,500 feet, 13 seconds after the spin commenced, the pilot jettisoned the ballast and deployed the anti-spin parachute. The aircraft still did not respond and at about 32 seconds into the spin, at 5,200 feet, the pilot initiated release of the jettisonable door, released his harness, baled out, and was clear of the aircraft as it passed through 3,600 feet. At 1,800 feet the aircraft was observed to stop spinning. Fifty seconds after the commencement of the spin, the aircraft dived into the ground and was destroyed. The pilot sustained minor injuries during his landing.

A video camera was mounted in the cockpit to record the pilots actions and comments. This also recorded some of the data presented on the instrument panel and some of the view out of the front windscreen. Most of the record from the video survived the impact and was able to provide a comprehensive record of the flight. Further information was gained from a flight data acquisition unit fitted to the aircraft and from a ground based video camera which recorded the spin sequence. Later in the investigation the second prototype aircraft was flown and provided additional information.

The aircraft had been spun approximately 60 times prior to this flight. The spins had started with the aircraft set up with low weight and optimal C of G and had progressed to this flight which was conducted at the most critical weight and C of G configuration required for certification.

The spinning flight immediately prior to the accident flight was conducted at a slightly lower weight and at a not so critical C of G. The pilot was not able to recover from the spin on this flight until he had dumped the ballast and deployed the anti-spin parachute. The manufacturers investigation determined that the pilot had been slow to apply the correct control inputs, and the elevator control rigging did not allow full down movement of the elevator. The control cables were reset to ensure that the elevators were able to operate to the stops. After the accident there was not sufficient data available to show whether these corrective actions were effective in restoring full elevator control during a spin, although ground checks had shown full and adequate movement was available.

The investigation into the accident determined that inadequacies in the design of the fin and rudder, and in the rudder control system, had combined with the airflow blanking effect of the horizontal stabiliser, the elevators, and the slab sided fuselage, to preclude adequate spin recovery.

The fin and rudder were assessed as having insufficient area outside of the blanking flow when the aircraft was spinning. The manufacturer has since extended the chord and height of the fin to increase the area outside of that which is blanked during a spin.

The rudder has been extended in chord and lowered in position relative to the tailplane. The fin has been increased in height thereby increasing its aspect ratio. A ventral fin has been fitted to the underside of the fuselage. These measures should increase the effectiveness of the empennage.

The second prototype aircraft was initially flown with essentially the same empennage as the accident aircraft. After some flights on the second aircraft the rudder hinge moment was found to be inadequate. This factor had been masked in tests on the accident aircraft by the use of bungies in the nose wheel steering system. Installation of springs in the nose wheel steering system of the second aircraft showed up the hinge moment inadequacy which the manufacturer has corrected in the redesign of the rudder system.

Analysis of the accident data, and of subsequent test flights, has raised some doubts as to the effectiveness of the application of the elevator control during critical spin recovery. Tests are continuing in an endeavour to assess whether or not there is a problem in this area.

After the accident a review of literature concerning the effectiveness of anti-spin parachute installations was undertaken. This disclosed that the use of a parachute on a long lanyard to pitch the aircraft out of a spin has been rejected in favour of stopping the rotation through use of a larger parachute with no lanyard and short risers.

Analysis.

This was a prototype aircraft and some deficiencies and/or problems during testing are to be expected.

With this particular aircraft the fact that the inadequate rudder hinge moment was masked throughout flight testing meant that the inadequate rudder performance during critical spin recovery was not clearly detected until it combined with other factors to become critical. These other factors included an ineffective anti-spin parachute, extensive blanking of the fin and rudder, and flight at the extremes of the weight and C of G envelope.

It is not known what , if any, effect the previous rerigging of the elevator controls had on this flight.

Significant factors.

1. The rudder and fin effectiveness was inadequate for the spin test being undertaken.

2. The anti-spin protection systems were ineffective.

3. The aircraft was not able to be recovered from an intentional spin.