

COMMONWEALTH OF AUSTRALIA-BUREAU OF AIR SAFETY INVESTIGATION
 AIRCRAFT ACCIDENT INVESTIGATION SUMMARY REPORT

REFERENCE NO.
 SI/792/1037

1. LOCATION OF OCCURRENCE

3.5 Km south-southwest of Marulan, NSW

Elevation:
 2072 feet

Date: 30.4.79

Time: 1620 hours

Zone: EST

2. THE AIRCRAFT

Make and Model: Piper PA32R-300

Registration: VH-WKJ

Certificate of Airworthiness: Date of Issue 18.3.77

Certificate of Registration Issued to:

Operator:

Degree of Damage to Aircraft:
 Destroyed

Other Property Damaged:
 Nil

Defects discovered:

1. Fatigue cracking of lower right stabilator skin
2. Cracking of plastic stabilator tips
3. Dry rudder hinge bearing

3. THE FLIGHT

Departure Point: Camden

Time of departure: 1555 hours

Destination: Narooma

Purpose of flight: Travel

Class of Operation: Private

4. THE CREW

Name	Status	Age	Class of Licence	Hours on Type	Total Hours	Degree of Injury
	Pilot	35	Commercial	94	6296	Fatal

5. OTHER PERSONS (ALL PASSENGERS AND PERSONS INJURED ON GROUND)

Name	Status	Degree of Injury
	Passenger	Fatal

6. RELEVANT EVENTS

The owner of the aircraft held a private pilot licence but he had not completed the required navigational training for the removal of an area restriction endorsed on the licence. Therefore, when he wished to travel he would engage the services of a commercial pilot to fly his aircraft and be carried as a passenger.

The pilot, who was frequently engaged to fly VH-WKJ, contacted the Canberra Briefing Office by telephone at 1248 hours and submitted details for a flight under the Instrument Flight Rules (IFR) from Narooma to Camden and return. He held a current Class One instrument rating for single engine aircraft and VH-WKJ was equipped and approved for operations under IFR. At 1424 hours, the pilot established radio contact with Sydney Flight Service Centre and reported departure from Narooma. The flight then proceeded to Camden without known incident, terminating at about 1535 hours.

The return from Camden had been planned via Marulan at 6000 feet altitude, then to Moruya at 5500 feet and finally to Narooma below 5000 feet. At 1546 hours, when the aircraft taxied, an airways clearance through the controlled airspace surrounding Sydney was not available. The pilot was therefore instructed to proceed outside controlled airspace. This was acknowledged.

Weather conditions at Camden were fine, with only three oktas of cumulus at 3500 feet. However, cloud increased to the south and, in the vicinity of Marulan, there was overcast cumulus and stratocumulus. The base of this cloud was about 650 to 1000 feet above the terrain, the tops were up to an altitude of 10,000 feet and light drizzle was falling. Wind conditions were light and there was no thunderstorm activity.

VH-WKJ departed Camden at 1555 hours and three minutes later the pilot established radio watch with Sydney Flight Service Centre on 121.1 MHz. He reported on climb to 6000 feet, outside controlled airspace and estimating Marulan at 1619 hours. Shortly afterwards, the pilot was instructed to transfer to 121.2 MHz at 1605 hours. This was acknowledged but the instruction was not carried out and the pilot was still transmitting on 121.1 MHz when he made his next radio call at 1618:23 hours. This was a position report; at Marulan at 1619 hours at 6000 feet, on descent to 5500 feet and estimating arrival over Moruya at 1653 hours. This call conflicted with the transmissions of other aircraft and so the pilot was told to standby. At 1618:52 hours, he was instructed to go ahead and he repeated his position report. This was not clearly received and so the pilot was instructed to transfer to 124.6 MHz and repeat his report. The last transmission received from VH-WKJ was an acknowledgement of this instruction.

The attention of persons on the ground, just to the south of Marulan township, was attracted by hearing abnormal aircraft noises. They then heard a loud sound as the main wreckage of VH-WKJ struck the ground. Those persons in the immediate vicinity of the accident site observed pieces of the aircraft continue to fall from the low cloud base for some time after the main impact.

6. RELEVANT EVENTS (Cont'd)

A trajectory analysis, based on the wreckage distribution and wind velocities, indicated that the aircraft had virtually instantaneously broken apart at an altitude of approximately 3700 feet. At breakup, it had been on a westerly course, at a speed of about 150 knots and in a 40 degree nose-down attitude. Examination of the wreckage found evidence of three pre-existing defects. Two of these, a dry rudder hinge bearing and cracks in the plastic stabilator tips, were minor in nature and had not significantly affected the aircraft's airworthiness. The third defect was a spanwise fatigue crack, approximately 400mm long, in the lower skin of the right stabilator, just aft of the rivetted joint between the skin and the main spar.

The crack had multiple origins and had slowly grown over a significant period of time, as indicated by fretting products and corrosion in association with the crack. As the crack was on the lower surface of the stabilator and the stabilator was mounted low on the tail of the aircraft, it would not have been visible at normal eye-level.

In association with the crack, there was a small crease or 'joggle' in the skin panel. This had permitted abnormal flexing of the skin under in-flight aerodynamic loads, which had caused the initiation and growth of the fatigue crack. Laboratory testing of an identical stabilator in which a cut was made to duplicate the fatigue crack, indicated that the crack would not have significantly affected the structural characteristics of the stabilator. Nevertheless, reverse bending failures of the skin at the ends of the fatigue crack were consistent with rapid vertical movement of the skin panel behind the crack, probably under aerodynamic loads.


It is probable that fatigue cracking had propagated to a critical length at which the skin panel, lacking forward support, had moved sufficiently to disrupt the airflow around the right stabilator. The increased speed of the aircraft as it was descending from 6000 feet and the increased download that would have to be applied to the stabilator to level the aircraft at 5500 feet possibly contributed to the panel movement. As the panel moved up and down it would have caused rapid changes in aircraft pitch forces and pitch control behaviour. Control of the aircraft would have been lost and was probably not recoverable because of the rapidly increasing skin failure. Eventually, the right stabilator partially failed in first upward and then downward bending. The resultant nose-down pitch of the aircraft had caused a sequence of failures and separations of both wings, both stabilators and the rudder and fin.

Because aerodynamic forces are essentially symmetrical, it is improbable that they caused the isolated joggle in the lower right stabilator skin. An inspection of the stabilator and the aircraft maintenance records found no evidence of structural re-work having been carried out on the component since manufacture. Tests conducted on an identical stabilator in an attempt to induce a joggle similar to that found on VH-WKJ indicated that it was not possible to do so on an assembled component without causing significant damage to other sections of the stabilator.

7. RELEVANT FACTORS

1. A small crease or "joggle" was present in the skin on the lower surface of the stabilator. The crease most probably occurred during manufacture.
2. A fatigue crack, which progressively increased in length, developed in the crease.
3. Although the crack was not located in an easily visible position it should have been detectable in previous routine maintenance and pre-flight inspections.

Approved for publication under the provisions of Air Navigation Regulation 283(1)


(P.E. Choquenot) Director

Date:

19.5.83