

Serious Incident

Aircraft Type and Registration:	BN2T Islander, G-BSWR
No & Type of Engines:	2 Allison 250-B17C turboprop engines
Year of Manufacture:	1991 (Serial no: 2245)
Date & Time (UTC):	16 August 2023 at 0955 hrs
Location:	Private airstrip, Tandragee, County Armagh
Type of Flight:	Emergency Services Operations
Persons on Board:	Crew – 1 Passengers – 2
Injuries:	Crew – None Passengers – None
Nature of Damage:	Rudder trim tab disconnected, minor damage to rudder skin and trim tab attachment structure.
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	58 years
Commander's Flying Experience:	7,992 hours (of which 3,618 were on type) Last 90 days – 55 hours Last 28 days – 13 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft made an uneventful landing after the rudder trim tab separated from its control rod. The missing bolt was not recovered so the investigation could not ascertain a definitive cause.

History of the flight

The pilot was flying VFR at approximately 1,500 ft when the aircraft and rudder pedals started shaking violently. He said he had been airborne approximately 1.5 hours and whilst yaw control was difficult, the aircraft was still controllable. The shaking continued irrespective of the force he applied to the rudder pedals, and it became worse when the speed was reduced. A rear-seat observer looked out of his 'bubble' window and estimated that the top of the vertical stabiliser was moving side-to-side approximately 30 to 40 cm.

The pilot was unsure about the aircraft's structural integrity, so he declared an emergency and diverted to a known private airstrip about 5 nm away. The landing was uneventful, but the aircraft was described to be 'severely shaking'.

Aircraft examination

Visual examination found that the rudder trim tab was not connected to its control rod (Figure 1). The two items are normally connected using a bolt, nut and split pin, but none of these components were recovered. The bearing in the control rod eye-end was reported to be free to rotate, and it was deemed to be acceptable for further flight.



Figure 1

Photographs taken after the aircraft landed showing the rudder trim tab bolt missing

Minor damage was found on the rudder skin and trim tab attachment structure, and this was assessed by the aircraft manufacturer before the aircraft flew to the operator's maintenance facility at Aldergrove. The aircraft was subsequently repaired in accordance with a manufacturer's bespoke repair scheme.

Other information

The aircraft manufacturer said that they did not believe that loss of the bolt could cause a catastrophic failure. They were not aware of any previous occurrences.

The operator reported that the bolt was last installed in May 2023 when an independent check confirmed that the split pin was fitted.

Analysis

There are two scenarios that could explain the missing bolt:

1. The bolt failed in flight and the broken parts were lost.
2. The split pin was not fitted, failed, or fell out. This allowed the nut to work loose.

The aircraft operator reported that the eye-end bearing was found to be free to rotate so it is unclear where sufficient loads could originate to cause the bolt to fail in flight.

The operator said that the bolt was last disturbed in May 2023, approximately 54 flying hours before the serious incident. They said the bolted joint was subject to an independent visual check to ensure correct assembly and no anomalies were apparent.

Conclusion

The aircraft and rudder pedals started to shake violently. The pilot completed a successful landing and the bolt that normally joins the trim tab to its operating rod was found to be missing. The missing components were not recovered so the investigation could not provide a definitive explanation as to the root cause.