

AAIB Bulletin No: 10/94

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Category: 1.3

Aircraft Type and Registration: Stinson V-77 Reliant, G-BUCH

No & Type of Engines: 1 Lycoming R-680-E3B piston engine

Year of Manufacture: 1942

Date & Time (UTC): 14 August 1994 at 1545 hrs

Location: Popham Airfield, Hampshire

Type of Flight: Private

Persons on Board: Crew - 1 Passengers - 3

Injuries: Crew - None Passengers - None

Nature of Damage: Destruction of vacuum tank in rear fuselage; damage to fabric covering of rear fuselage

Commander's Licence: Private Pilot's Licence

Commander's Age: 35 years

Commander's Flying Experience: 400 hours (of which 30 were on type)
Last 90 days - N/K
Last 28 days - N/K

Information Source: Aircraft Accident Report Form submitted by the pilot

This vintage aircraft type is equipped with an unusual vacuum operated flap system utilising engine inlet manifold depression to create the flap operating force. The system incorporates a vacuum reservoir situated in the rear fuselage. This is connected by a pipe directly to the inlet manifold.

The pilot reported that he started the engine to taxi to the re-fuelling station, shutting down on arrival. He then re-started, after the previous re-fuelling aircraft had moved away (his aircraft is too heavy to ground-handle manually). Once re-fuelling was complete, he taxied to the flight office and shut down again to enable his passengers to board safely. On attempting to restart the engine, it backfired once before starting. At about this time, the vacuum cylinder in the rear fuselage burst and the fabric covering sustained minor damage.

A visual examination confirmed that the vacuum cylinder had burst in a manner consistent with the effect of excessive internal pressure. The pilot/owner discussed the possible cause with an American specialist having many years of experience with this aircraft type. He suggested that a number of sequential starts with a rich running warm engine might create conditions where fuel vapour or fuel in

the manifold could run down the vacuum pipe and enter the vacuum cylinder. Subsequent backfiring during the final start could ignite this vapour causing rapid expansion and bursting of the tank. Examination of the system and the circumstances of the event do not suggest any other very plausible theory.

The specialist also pointed out that it was not normal practice (and was generally considered inadvisable) to carry out a series of sequential engine starts and shutdowns of radial engine aircraft.