ACCIDENT

Aircraft Type and Registration:	Evans VP-1 Volksplane, G-BFJJ
No & Type of Engines:	1 Volkswagen 1800 piston engine
Year of Manufacture:	1979
Date & Time (UTC):	20 April 2008 at 1810 hrs
Location:	Near Farley Farm Airfield, Winchester
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Minor) Passengers - N/A
Nature of Damage:	Aircraft sustained substantial damage
Commander's Licence:	Private Pilot's Licence
Commander's Age:	50 years
Commander's Flying Experience:	467 hours (of which 4 were on type) Last 90 days - 5 hours Last 28 days - 2 hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft took off from a farm strip at its maximum authorised weight. It then flew over a small valley and encountered a downdraught. The pilot considered that the aircraft might not clear the far side of the valley so he commenced a forced landing. During the forced landing the right undercarriage leg collapsed and the right wing came into contact with the ground. The aircraft structure failed where the pilot's shoulder harness was attached to the airframe and the pilot sustained minor head injuries.

One Safety Recommendation has been made.

History of the flight

The owner had planned to take the aircraft for a short flight to practise circuits. The weight of the aircraft, including the pilot and sufficient fuel for 40 minutes flight, was 340 kg, its maximum for takeoff. The weather conditions were good with a northerly wind of 10 kt, the temperature was 18ºC and the QFE was 1020 hPa.

Runway 06 was the runway in use at Farley Farm. This was a grass strip 665 m in length. The threshold of Runway 06 was 431 ft amsl and the threshold of reciprocal Runway 24 was 481 ft amsl; there was thus an upslope of approximately 2.25% when using Runway 06.

The aircraft's takeoff was described as normal, with the

aircraft getting airborne well before a marker that is used by local pilots as an acceleration indicator. Once safely airborne, the aircraft turned to the left to join the circuit pattern and, in doing so, flew over a small valley. The pilot reported that the aircraft encountered a significant downdraught whilst crossing the valley and started to descend, despite the airspeed being 70 kt and the engine operating normally at full power. The pilot assessed that he would not be able to clear the far side of the valley safely and commenced a forced landing into a nearby field. During the landing the right main landing gear collapsed and the right wing tip dug into the ground, spinning the aircraft around. As a result of the impact, the top of the bulkhead, which included the rear wing strut carry-through-structure and the attachment for the pilot's restraint harness shoulder straps, failed and detached from the fuselage. The pilot was no longer restrained at the shoulders and, as a consequence, received minor head injuries but he was able to vacate the aircraft normally.

Aircraft description

G-BFJJ is a single engine, low wing monoplane, with two steel bracing struts on each wing (Figure 1). One end of each strut is fixed to the structure of the wing and the other end is connected to the fuselage. The front two bracing struts are connected to a carry-through-structure, which goes through the front of the cockpit, and to which the instrument panel is attached. The rear two bracing struts are connected to an extended bulkhead containing a carry-through-structure, which forms the rear face of the cockpit compartment. The shoulder straps of the pilot's restraint harness are attached to the rear carry-through-structure at the top of this bulkhead.

The aircraft was built from a kit in 1979 and flown regularly until its Permit to Fly expired in 1996. In December 2007, after a change of ownership, the aircraft's Permit to Fly was renewed.

Figure 1

Bracing strut orientation

Comment

Whilst not in place when the aircraft was originally issued with its Permit to Fly, the current design code used for the assessment of new aircraft of this category is CS-VLA. The criteria for emergency landing conditions are described in CS-VLA 561 General, and includes the following:

> *'(a) The aeroplane, although it may be damaged in emergency landing conditions, must be designed as prescribed in this paragraph to protect each occupant under those conditions.*
>
> *(b) The structure must be designed to give each occupant reasonable chances of escaping injury in a minor crash landing when*
>
> *(1) Proper use is made of seat belts and shoulder harnesses; and*
> *(2) The occupant experiences the ultimate inertia forces listed below –*
>
> *Ultimate Inertia Load Factors; Upward 3·0 g, Forward 9·0 g, Sideward 1·5 g.'*

The aircraft was damaged in the emergency landing. It was not possible to accurately determine the inertia loads experienced by the pilot, who was wearing a seat belt and shoulder harness, but it is unlikely they exceeded the specified limits. Due to the failure of the bulkhead to which the shoulder harness was attached, the pilot was no longer restrained at the shoulders, and, as a result, received minor head injuries. Accordingly the following Safety Recommendation is made:

Safety Recommendation 2009-001

It is recommended that the Civil Aviation Authority, in conjunction with the Light Aircraft Association, review the design of the shoulder harness attachment on the Evans VP-1 to ensure that the pilot is adequately restrained in the event of an accident.

Response to Safety Recommendation

The Light Aircraft Association, in consultation with the Civil Aviation Authority, reviewed the design of shoulder harness attachment on the Evans VP-1 and provided the following response:

> *'The Light Aircraft Association have reviewed the design of the shoulder harness attachment on the VP-1 but do not consider that a mandatory design change is appropriate because:*
>
> *1. As a permit to fly aircraft, full compliance with a design code is not required.*
>
> *2. The aircraft type has accommodated a substantial history of successful in-service experience, including in the UK, and shoulder harness issues have not previously been a significant safety issue in influencing the outcome of accidents, when they have occurred.*
>
> *3. In an aircraft of this class and configuration, occupant protection in an accident is inevitably poorer than in a conventional aircraft by virtue of the exposed cockpit and lack of turn-over protection, plus the proximity of the instrument panel to the pilot's face. Due to the latter, even if the shoulder harness had not failed it is considered likely that*

the pilot's harness will inevitably allow forward head motion as the harness 'takes up the slack'. Furthermore, there is a risk that a more effective shoulder harness in conjunction with the rather minimum turn-over protection could actually increase the danger of a head injury in a turn-over accident. A Tipsy Nipper pilot died a few years ago when his head struck the ground in a gentle turn-over accident when he might well have survived if he had been able to slump forward as the aircraft pitched over.

4. *The CS-VLA requirements do not specify that the harness attachments must remain intact following an accident in which major airframe disruption occurs, as in this case. It is common with light aircraft to use the attachments for wing and tail as the harness attachments, on the assumption that normally the airframe is still essentially intact at the instant that the shoulder harness is required to contain the pilot at initial impact.'*