

# Pitts S-2A, G-BKWI

## AAIB Bulletin No: 2/97 Ref: EW/C96/8/4 Category: 1.3

<b>Aircraft Type and Registration:</b>	Pitts S-2A, G-BKWI
<b>No &amp; Type of Engines:</b>	1 Lycoming AEIO-360-A1E piston engine
<b>Year of Manufacture:</b>	1982
<b>Date &amp; Time (UTC):</b>	10 August 1996 at 1445 hrs
<b>Location:</b>	Bramford, near Ipswich, Suffolk
<b>Type of Flight:</b>	Private
<b>Persons on Board:</b>	Crew - One - Passengers - One
<b>Injuries:</b>	Crew - Serious - Passengers - Serious
<b>Nature of Damage:</b>	Aircraft destroyed
<b>Commander's Licence:</b>	Private Pilot's Licence
<b>Commander's Age:</b>	50 years
<b>Commander's Flying Experience:</b>	700 hours (of which 100 hours were on type) Last 90 days - 15 hours Last 28 days - 6 hours
<b>Information Source:</b>	AAIB Field Investigation

## History of the flight

The owner had owned G-BKWI for approximately one month and, since then, had flown it on several occasions. Normally, he kept the aircraft at his private airstrip and often used it to fly to Earls Colne Airfield. On the day of the accident, he arrived at Earls Colne at 1050 hrs after a solo flight from his airstrip. He refuelled G-BKWI and met with a friend for a prearranged flight; the friend was also a qualified private pilot. With the owner in the rear seat of the aircraft, they took off at 1208 hrs. Staying in the local area, they carried out some aerobatics but no spinning; the aircraft was fully serviceable during this flight and they landed back at Earls Colne at 1249 hrs. The aircraft was refuelled once more resulting in an estimated fuel load of 17 to 18 gallons. After lunch, they took off for another flight at 1433 hrs; the two occupants were in the same seats as on the previous flight. They flew towards the coast and the aircraft appeared fully serviceable as it levelled at Flight Level (FL) 70. After a short period in the cruise, the pilot decided to fly to Ipswich Airport for a visit.

In the descent towards Ipswich the owner, who was handling the aircraft, decided to take the opportunity to carry out a 3-turn spin. At approximately 4,500 feet amsl, he warned his passenger and commenced the manoeuvre. He retarded the throttle and decreased the speed to around 60 mph before applying full left rudder while simultaneously bringing the control column fully back. He had the impression that the aircraft did not enter the spin as crisply as normal, and that the engine speed was slightly higher than the normal flight idle. He checked that the throttle was fully retarded but did not notice the engine power indications. After three turns, he commenced the standard recovery; with the throttle fully back, he applied full opposite (right) rudder and moved the stick smartly forward to just beyond the neutral position. The aircraft continued to spin to the left and the manoeuvre noticeably became more flat. He moved the control column fully forward and then, to ensure that there was no out-spin aileron, he released the control column; concurrent with this, he applied left rudder. His intention was then to bring the control column fully back to re-establish the original spin. However, the spin continued to go flatter and he does not believe that he had moved the control column from the central position before G-BKWI impacted the top of a copse of trees. During his recollection of events, the pilot made the point that he found it very difficult to be sure of his exact actions, or if they were in the correct chronological order.

The passenger's recollection is that the pilot warned him of his intention to spin the aircraft and that the spin was commenced as G-BKWI approached 4,000 feet amsl; he remembered that the pilot declared his intention to recover at 2,000 feet. The passenger had not previously experienced many spins and was uncomfortable during the manoeuvre. However, he can remember that the aircraft was spinning to the left and that the throttle lever was fully retarded, the control column fully back and full left rudder applied. As the aircraft descended through 2,000 feet, he expressed his unease to the pilot and can recall that the pilot stated that he was trying to recover but was having problems. The passenger moved his feet and hands well clear of the controls and can remember watching the control movements. The throttle lever remained fully retarded but the control column and rudder moved to various positions; he can remember seeing full right rudder applied and can also remember seeing the rudder and control column in neutral positions. He is certain that the aircraft maintained a left turn and that the spin became noticeably 'flatter'. Additionally, he was aware of positive 'G' pushing him to the right of the cockpit.

Following the impact, two witnesses quickly appeared on the scene; one of these had already alerted the emergency services. They found the occupants of the aircraft still in the cockpits and it was apparent that the front seat passenger was the most seriously injured. Shortly afterwards, the fire service arrived, confirmed that the aircraft was safe and rendered first aid. When the ambulance service arrived, the rear seat occupant was quickly extricated from G-BKWI. The recovery of the front seat passenger was slower because of his more serious injuries. Both personnel were airlifted to hospital.

### **Crash site**

The trees into which the aircraft descended was a small but dense copse in an area of mainly open arable land. The pattern of damage to the aircraft and to the trees showed that the aircraft had been descending almost vertically, rotating and banking to the left as it met the tops of the trees. The rate of descent had been slowed by its passage through the branches and the right wing had been the first to strike the ground, further attenuating the impact. All of the components of the full aerobatics-type harness had remained intact.

The pattern of damage to the propeller showed that it was rotating at impact and the damage was consistent with a low power setting. Examination of the aircraft structure and of the flying

controlsshowed that G-BKWI had been structurally intact at its first contactwith the trees; the flight control system was confirmed as intactand operating correctly. A number of cushioning devices, usedby the pilot to elevate his seating position in the rear cockpit,were recovered from the site but it was not possible to deducewhether or not these might have been in a position to interferewith the extremities of the control range.

### **Subsequent enquiries**

The logbooks showed that the aircraft had accumulated some 294hours since its manufacture in 1982 and it appeared to have beenwell maintained.

At the time of the accident, the pilot estimated that he had 16gallons of fuel on board. The pilot had undertaken a course oftraining on a Pitts S-2B aircraft in the USA some years previously;this training included flat, inverted and accelerated spins. Additionally, he had completed some solo spinning in GBKWIA few days before the accident. On that occasion, he consideredthe entry, spin and recovery as normal. Prior to any spinning,he would use a 'Rule of Thumb' to confirm that the centre of gravitywas within limits; with 2 occupants, he assessed that the fuelquantity needed to be  $\frac{3}{4}$ full or less. Maximum fuel quantity is 24 gallons.

Although the pilot had used his 'Rule of Thumb' system prior tocommencing the spin, subsequent calculations revealed that thecentre of gravity of G-BKWI was beyond the forward limit for aerobatics;the aircraft weight was just below the upper limit. A forwardcentre of gravity would normally result in the aircraft beingreluctant to enter a spin but generally means an easier recovery. However, the Pitts S-2A has previously exhibited some difficultiesin recovering from a spin with a forward centre of gravity. ACAA test pilot has reported that he has investigated a reportfrom an experienced aerobatics pilot who had difficulty recoveringfrom a Pitts aircraft loaded to its forward limit; the aerobaticspilot was only able to recover using non-standard procedures andhis actions were confirmed as necessary when the CAA test pilotflew the same manoeuvre using the same conditions. However, withthe aircraft loaded within the Flight Manual limits, the standardrecovery actions were effective.

During the investigation, it was noted that the most recent Weightand Balance Report had some errors relating to the 'Arm' of boththe pilot and the baggage; these errors had been transcribed fromprevious Weight and Balance Reports. However, this latest report,dated 14 July 1996, had not been received by the pilot prior tothe accident. Additionally, the Weight and Balance graphs withinthe Flight Manual were accurate.