

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Pitts S-12 Special, G-PXII	
<b>No &amp; Type of Engines:</b>	1 Ivchenko Vedeneyev M-14P piston engine	
<b>Year of Manufacture:</b>	2006	
<b>Date &amp; Time (UTC):</b>	14 May 2009 at 1205 hrs	
<b>Location:</b>	White Waltham Airfield, Berkshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - 1 (Serious)	Passengers - N/A
<b>Nature of Damage:</b>	Fuselage, wings and engine cowling damaged; landing gear and propeller destroyed	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	37 years	
<b>Commander's Flying Experience:</b>	747 hours (of which 25 were on type) Last 90 days - 33 hours Last 28 days - 11 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

The aircraft failed to complete a 'cobra' aerobatic manoeuvre, possibly as a result of slow engine acceleration in the climb and subsequently impacted the ground.

## History of the flight

The pilot was practicing an aerobatic 'flat sequence' over the airfield, intended for performance below 1,000 ft agl. Actual meteorological conditions included scattered cloud above 2,700 ft and a light wind from the north east. Witnesses saw the aircraft pitch up almost vertically before entering what was described by most as a stall turn and by others as a wingover, near the apex of which the engine was heard to "cough". After exiting

the manoeuvre with its nose pointing downwards the aircraft pitched up to an approximately level attitude. The flight path remained downwards, however, and the aircraft struck the ground with a high rate of descent. It bounced, leaving behind parts of the landing gear, propeller and engine cowlings, before coming to rest upright near the threshold of the grass Runway 29, approximately 250 m southeast of the initial impact. There was no fire and the fuselage was substantially intact but the pilot, who was wearing a seven-point harness and helmet, sustained serious injuries.

### **Information provided by the pilot**

The pilot described himself as a full-time display pilot with considerable knowledge of aerobatics including at low level. He stated that he held an ‘unlimited’ level display authorisation and had experience in several Pitts types and other aircraft powered by the Ivchenko M14. Interviewed several months after the occurrence, he could not recall the flight but concluded that during the manoeuvre described by witnesses, he was probably attempting a figure that he referred to as a “cobra”. This involved slowing the aircraft to below approximately 80 mph using idle power, then applying full throttle while pitching the aircraft nose-up to achieve a near vertical attitude for a short period. Recovery would be affected by pitching nose-down and flying out of the manoeuvre as the aircraft accelerated.

The pilot commented that if control was lost at the apex of a cobra manoeuvre with full power applied, the aircraft tended to roll and yaw to the right and sometimes pitched inverted. He added that when applying full power rapidly from idle the engine might respond slowly and that a momentary lack of power in the climbing phase of the manoeuvre would make it harder to complete successfully. He usually aimed to enter the manoeuvre at between 750 ft and 850 ft but had done so at 600 ft in training.

### **Additional information**

The AAIB contacted other pilots, including a co-owner of the accident aircraft, who had conducted this manoeuvre in aircraft powered by the M14 engine. They concurred that the engine could be slow to respond to rapid opening of the throttle and stated that they would normally conduct the manoeuvre at a minimum height of 600 ft, much of which would be required to affect a recovery if control was lost at its apex.

The co-owner commented that at high engine power the ailerons of the Pitts S-12 had insufficient authority to maintain roll control of the aircraft if forward airspeed fell below 40 mph, which might occur rapidly if insufficient power was available in the climbing phase of a cobra manoeuvre. He added, however, that witness reports of the aircraft being almost vertical indicated that full power had been available at some point in the manoeuvre because insufficient pitch control would have been available without it.

One witness stated that the aircraft entered the manoeuvre at a height of approximately 300 ft but the lack of any onboard or radar recording meant that there was no means of assessing it accurately. Other witnesses did not offer an opinion.

### **Analysis**

Witness statements were consistent with the aircraft failing to complete a cobra manoeuvre in a manner characteristic of loss of control at its apex. Slow engine response to rapid throttle opening probably caused an unexpectedly rapid loss of airspeed which, when full power was achieved, resulted in insufficient flight control authority. The aircraft did not return to a safe flight path in the height remaining.

### **Comment**

All of the pilots consulted during the investigation, including the accident pilot, emphasised the importance of entering a manoeuvre at a height from which recovery was possible in the event of failure to complete it as planned. The British Aerobatic Association refers on its website to Safety Sense Leaflet 19 – ‘*Aerobatics*’, published by the Civil Aviation Authority, which considers this issue. The leaflet states in its summary ‘*start with sufficient height to give plenty of margin if things go wrong*’.