

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	SIPA 903, G-ATXO	
<b>No &amp; Type of Engines:</b>	1 Continental Motors C90-12F piston engine	
<b>Year of Manufacture:</b>	1951	
<b>Date &amp; Time (UTC):</b>	14 November 2005 at 1610 hrs	
<b>Location:</b>	Sandown Airfield, Isle of Wight	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - None	Passengers - None
<b>Injuries:</b>	Crew - N/A	Passengers - N/A
	Others - 1 (Serious)	
<b>Nature of Damage:</b>	Wing tip, propeller, and engine cowling plus minor damage to two other aircraft	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	57 years	
<b>Commander's Flying Experience:</b>	828 hours (of which 101 were on type) Last 90 days - 18 hours Last 28 days - 5 hours	
<b>Information Source:</b>	AAIB Field Investigation	

**Synopsis**

The aircraft owner was rotating the propeller by hand to introduce a priming charge into the cylinders when the engine started unexpectedly. The aircraft moved forwards, gathered pace, tore the supine owner's clothing and yawed into a hangar where it hit other aircraft. Inside the hangar its propeller struck and injured a person who had seen the 'runaway' aircraft coming towards him and had sought refuge there.

**History of the flight**

The aircraft was standing outside a row of three hangars with its centreline parallel to the hangar doors and the owner was preparing it for flight later that afternoon.

Although the aircraft was fitted with a serviceable electric starter motor, the checklist suggested that the engine should be primed by hand-rotating the propeller. The owner entered the cockpit, checked that the magneto switch was in the OFF position, and pumped the throttle four times to introduce a charge of fuel into the carburettor. He left the throttle set a quarter open, the throttle friction loose, and the mixture in the RICH position. The aircraft was fitted with toe brakes, but no parking brake. Chocks were available near the hangar but the owner did not place chocks in front of the wheels.

The owner then stood directly in front of the aircraft,

and with his hands on opposite blades of the propeller, began to rotate the propeller slowly by hand, in order to introduce the priming charge into the cylinders. As he rotated the propeller, the engine suddenly fired and began to run, and the aircraft began to move forwards. He threw himself to the ground, and the aircraft passed over him, its propeller ripping his jacket and trousers.

The engine speed increased towards what witnesses described as “full power” and the aircraft gathered pace, yawing slowly to the left. Another pilot, who also kept an aircraft at the airfield, was walking in front of the hangars towards the accident aircraft. Realising that he might be at risk from the runaway aircraft, he took refuge in the nearest hangar.

The aircraft continued to accelerate forwards and its left wing struck the door of the middle hangar, causing it to yaw more rapidly to the left, and to enter the third hangar through its open doors. The other pilot had taken refuge standing between the wing and engine of a Luton Minor aircraft in this hangar. The accident aircraft yawed into the hangar and struck two other aircraft, causing further collisions. Its propeller struck the pilot who had sought refuge in the hangar, causing serious injuries to his left hand and thigh.

The engine stopped almost immediately after the collisions. The aircraft owner ran to give assistance to the injured pilot and a third individual, who worked on the airfield and had witnessed events from the far corner of the hangar, summoned the emergency services. The injured pilot was treated by paramedics at the scene and later underwent surgery in hospital.

### **Examination of the accident site**

The site was guarded overnight. The following morning AAIB Inspectors arrived to begin investigations.

The aircraft had not been interfered with before the investigation began.

The aircraft was found as it had come to rest, partly in the hangar and turned through almost 180° from its original direction of travel. The throttle was in the fully OPEN position, the throttle friction was loose, and the magneto switch was OFF. The single magneto switch controlled two magnetos; it was operated with a metal ‘key’, introduced into the switch assembly through a guard. This guard prevented the insertion or removal of the key, unless the switch was in the OFF position. The key was found on the cockpit floor beneath the switch.

### **Aircraft examination**

The aircraft was examined at the accident site and then in an adjacent hangar. The investigation began with an evaluation of the magneto ground (earth) connections. The magnetos generate high tension current which is distributed to the spark plugs in the engine. With the magnetos switched off, a connection to ground is made within the magneto switch, and each magneto is unable to produce energy; then, only an open circuit fault in the ground connection on one or other magneto may cause the engine to run. It was noted that both magnetos were of the ‘impulse’ type which assist spark generation when turning slowly during starting.

One magneto ground connection was established to be sound. A cable, forming part of the other magneto’s ground connection, was tested repeatedly with a portable resistance meter, and appeared to be faulty. The cable and magneto switch were removed to the AAIB premises for further examination; the aircraft was released to its owner for rectification work. The magneto switch was of an unusual type, apparently of WWII military origin and of extremely robust design. No defects were found during the examination of the magneto switch.

Subsequent examination demonstrated that the removed cable was not faulty, but by this time, the aircraft had been dismantled for rebuild, and the opportunity to carry out further investigation had been lost.

### Pilot training

The CAA publishes General Aviation Safety Information Leaflets (GASIL), which are distributed to all aircraft owners and Flying Instructors. Between 2000 and 2005, ten articles on propeller safety were published in GASIL. One article stated:

*'propellers must always be treated as 'live' and potentially dangerous'.*

Another, referring to a previous AAIB investigation, stated:

*'The AAIB note that this is the fifth instance since February 2000 that a propeller being hand swung has caused injury to the person carrying out a hand swing. On three of these occasions the engine was not expected to start. We must always treat a propeller as live and liable to cause injury'.*

Custom and practise within the flying training community is to train pilots to assume that a propeller is always 'live', that is, any time any propeller is rotated by hand, there is a chance that the engine may start. After this accident, the aircraft owner observed that the CAA Light Aircraft Maintenance Schedule (LAMS) suggests that propellers should be rotated by hand, to ensure that an engine's compression appears normal.

### Analysis

The aircraft owner was preparing the aircraft for flight in his usual manner and carrying out the actions specified in the checklist to introduce a priming charge into the

engine. Pilots should treat propellers with respect, and handle them with the assumption that they may be 'live'; that is, the engine may start unintentionally at any time that a propeller is rotated.

In this case, despite having introduced a charge of fuel into the engine, which would make it more likely to start, the owner did not take precautions to address the potential consequences of an unintentional engine start. Had the aircraft been chocked, or another person tasked with applying the aircraft's brakes whilst the priming took place, the aircraft would not have moved. If the throttle friction control had been tightened, this would have prevented the engine accelerating to high speed. An engine cannot run and accelerate to high speed without at least one magneto functioning and so a transient fault in one magneto ground connection must have existed.

### Safety action

The number of accidents involving propeller handling indicates not only that this is a potentially hazardous activity but it also causes real harm. Whilst the publication of articles in GASIL about safe propeller handling should have had a beneficial effect, GASIL is only one means of communicating safety information.

After discussions with the CAA, the AAIB decided not to make a formal safety recommendation to the Authority. The CAA estimated that only 1% of PPL holders would ever need to handle a propeller but the safety issues surrounding propellers are raised at most 'Safety Evening' presentations. Furthermore, the Authority considered that its current 'Good Airmanship' guidance within Safety Sense Leaflet 1 (included in LASORS and available from the Authority's Internet website) represented adequate guidance.

In the context of propeller safety, this leaflet currently states:

*Never attempt to hand swing a propeller (or allow anyone else to swing your propeller) unless you know the proper, safe procedure, and there is a suitably briefed person at the controls, the brakes are ON and/or the wheels are chocked. Check that the area behind the aircraft is clear.*

*Use a CheckList which details the correct sequence for starting the engine. Make sure the brakes are ON (or chocks in place) and that avionics are OFF before starting engine(s).*

The CAA have notified the AAIB that the Leaflet will be revised to include the phrase “**Always** treat propellers or rotors as live”.

### **PPL Training**

AAIB enquiries identified that, whilst the UK National PPL syllabus includes a requirement for training on

propeller safety, the JAR PPL syllabus does not make specific mention of the topic. The recent history of propeller handling accidents and incidents suggests that the JAR PPL syllabus should include training on propeller safety. Therefore, the following Safety Recommendation was made:

#### **Safety Recommendation 2006-057**

The UK Civil Aviation Authority should take forward a recommendation to the Joint Aviation Authorities that they should revise the training syllabus for the JAR Private Pilot’s Licence (Aeroplanes) to include training on all aspects of propeller safety.

### **Further information**

Bulletin readers desiring further information on propellers and their safe handling may wish to read an article on this topic published in the May 2006 edition of ‘Pilot’ magazine.