



Readers are encouraged to share their aviation experiences in order to alert others to the potential pitfalls. Please send your experiences to Peter Singleton, Editor, *Vector/CAA News*, Civil Aviation Authority, P O Box 31-441, Lower Hutt, or email publications@caa.govt.nz.

Cautionary Tales on Starting

Incident One

It was a cold morning, and although the aircraft, a Cessna 150 Aerobat, had a starter motor, I decided to prime the engine. I had read an article recently about a priming method to achieve an easy start.

The procedure was: Brakes on, fuel on, give three pumps on the throttle to activate the accelerator pump and deliver fuel to the intake manifold, then mixture to idle cutoff, ignition off, throttle closed. Then pull the prop through by hand. On the second pull of the prop the engine fired once, and the propeller blade caught the first and second fingers of my right hand with a glancing blow. Ouch!! Minimal injury, just a slight cut and later a ridge across the bone which disappeared after a few weeks.

Further enquiries revealed that the previous week the engine had fired when a pilot had rotated the prop from vertical to horizontal prior to hauling the plane out of the hangar. He hadn't reported this incident to the engineer.

I reported it, and it was found that there was a faulty earth from one magneto. I was brought up on hand-propping Tiger Moths, and I should have shown more respect for the sharp metal prop of the Aerobat!

Lessons Learnt

Don't try that again. Always treat the prop as **live**. Use the starter. Always report defects – it may help some fellow pilot to avoid injury.

Thanks to David Pottinger for sharing this experience. The following incident highlights another hazard.

Incident Two

Following an engineering inspection, the pilot of the Cessna 182 carried out an engine run-up before taxiing to the fuel pumps and refuelling the aircraft.

After refuelling, the aircraft was taxied back to the hangar to collect the aircraft logbooks and other paperwork.

When leaving for home a few minutes later, the pilot was unable to get the still-hot engine to start and climbed out of the machine to discuss this problem with the engineer.

At this point clouds of black smoke were observed coming from



the engine, and the engineer almost qualified for the Olympics with his sprint for the fire extinguisher, which was promptly discharged into the engine compartment.

Fortunately, because the engine had been cleaned at the inspection, the only fire damage was to a length of "Scat" tubing between the carburettor and the hot air source for 'carb heat'. This was replaced, soot in the engine bay cleaned off, and a thorough inspection for further damage was carried out. None was found.

The engine was run up and the aircraft released to service.

The pilot advised that, prior to the unsuccessful start attempt, he 'pumped' the throttle several times, as was his habit.

Although this procedure is a well-recognised cause of engine induction fires, it is still practised by a significant number of pilots.

Had the fire occurred when the engine was greasy, and had no fire extinguisher been available, the outcome may well have been the loss of a valuable aircraft.

Correct Priming Technique

*A comprehensive article on primers and priming technique was published in **Vector** 1999, Issue 4. The key points are repeated here.*

A primer system is used on aircraft engines to introduce a small amount of atomised fuel into the engine to improve cold starting. It is a stand-alone system and is not part of the carburettor.

The priming system consists of a fuel pump, discharge nozzles, and interconnecting plumbing. There are two types of systems in use. One type uses a small, manually operated fuel pump located in the cockpit. The other type uses the aircraft electric

boost pump to provide fuel pressure to the discharge nozzles. The electric primer system also incorporates an electrically operated valve to control the fuel flow to the nozzles. The discharge nozzles and plumbing (normally one-eighth-inch tubing) are the same for both systems. Most small aircraft use a manual primer system, while large or multi-engine aircraft may have electric primer systems.

The discharge nozzles of the priming system have a small discharge orifice, which causes the fuel to atomise much like the nozzle on a spray bottle of window cleaner. The nozzles are usually located in the cylinder head in front of the intake valve.

Priming techniques vary among aircraft; it is important, therefore, to determine the best method for the aircraft that you fly regularly. The engine may not require priming on every start, depending on the ambient temperature and the engine temperature.



Manual primer system, on a Piper Tomahawk.



Electric priming system, on a Piper Seneca (buttons top middle).

Priming With the Throttle

Some pilots – even instructors – say that they pump the throttle a few times when starting a stubborn, cold engine. This is **not a recommended practice**. Aircraft engines generally have up-draught or horizontal-draught induction systems, which means that air and fuel must flow upward or horizontally through the carburettor and the induction tubes on their way to the cylinders. If the fuel is not completely picked up by the air and taken into the cylinders, it will drain away from the cylinders and back into the induction system, where it may form puddles of raw fuel.

The fuel is especially likely to ‘drop out’ or fail to mix with the air stream if it is introduced in a coarse, heavy stream rather than a fine, atomised mist. Compare the results of using the “spray” and “stream” nozzle settings on a window cleaner spray bottle. With the nozzle set in the “spray” position, the cleaner is dispersed in a fine mist and does not run off as easily as with the coarse “stream” setting.

The fuel that is discharged from the acceleration system of the carburettor when the throttle is pumped is a coarse, heavy stream – not a fine mist. It is very likely to run down the inside of the induction tubes and form puddles. The primer nozzles are very important, because they atomise the fuel. It is possible to form puddles even when using the primer system, so do not over-prime. If you do create puddles of fuel in the induction system and the engine backfires during starting, the fuel can ignite or even explode. This is called an induction system fire and can result in serious injury or damage.

Even if you’ve had success ‘priming’ with the throttle, it’s only a matter of time until an induction system fire occurs and spoils your whole day.

Don’t be afraid to try different priming techniques to discover what works best for your aircraft. Just remember that there are only two universal rules for priming:

- Less is best, and
- Do not attempt to prime the engine with the throttle. ■

Raglan Aerodrome

After complaints from pilots about persons and animals using the Raglan aerodrome, the CAA made enquiries with the aerodrome operator, Waikato District Council (WDC), as to the current status of the aerodrome.

The WDC advised that it is Public Reserve Land, and while the aerodrome is the major function, it is not the only reason that the public may use the area. Many persons use the aerodrome to access the harbour beach on foot. Vehicular access is prohibited unless specific council approval has been obtained, and the gate is kept padlocked at all times.

Warning signs have been erected by the WDC at several locations around the perimeter. These state that persons using the aerodrome should check carefully for aircraft taking off and approaching to land.

The WDC also requires that animals to be kept on a lead while crossing the reserve, and that the area is crossed without delay.

Raglan is becoming increasingly popular as a destination for pilots and holiday-makers alike. Skydiving, scenic flights (both fixed-wing aircraft and helicopters), and flight training take place at the aerodrome. The WDC wish to remind pilots that a nominal landing fee of five dollars is payable at the Camp Office 50 metres from the aerodrome. Pilots are invited to leave comments at this office regarding any problems they may have had with using the aerodrome.

As Raglan aerodrome is available for the public to carry out recreational activities other than aviation, it is strongly recommended that pilots using the aerodrome be **extra vigilant** and maintain a good lookout for people and animals in the landing and takeoff areas.