

GASCI

General Aviation Safety Council of Ireland



GASCI - Propellor Safety - notes on hand starting

Propellers are dangerous; awareness and constant vigilance around props is vital to reduce risks.

Almost all aircraft manufactured today are equipped with electric starters; while this is big step forward, pilots and engineers still occasionally need to turn propellers by hand.

Some aircraft may need to be 'primed' by turning the prop by hand, others may need to have the prop moved by hand (rotax 'burp') to get an accurate oil reading; some older, vintage aircraft may not have an engine-driven electrical system and so need to be started by hand.

The practice of hand-propping is one that needs great care and proper training. DO NOT attempt to Hand-Start an engine that is fundamentally impractical to start by hand – eg those with multi-blade props or engines with a reduction gearbox such as most Rotax and most Jet-A diesel engines.

NEVER ask someone you do not know and/or trust to have had proper training and experience to hand-swing your prop.



Impulse Couplings

If your engine has magnetos, it's important to know if your engine has just one impulse coupling (primarily on the left side), two impulse couplings, or none at all. Pulling through an engine with an impulse coupling produces an audible "click" every time. If you have one impulse, you should start the engine on the appropriate (usually left) mag only and then switch to both after it is running. (Most electric start switches automatically do this while the key is in the 'start' position). This will avoid kick-backs during starting.

Hand-propping safety precautions:

- Two people familiar with the aircraft and with hand-propping techniques should be involved in the process. If you are solo, then the aircraft must be tied down to something solid with the wheels chocked.
 - The person touching the propeller blades should direct all activity.
 - The other person should be seated at the controls with the brakes set. This person must be familiar with the plane's controls!

- The ground surface near the propeller should be stable and free of loose gravel, wet grass, mud, oil, ice, snow, and debris.
- Your clothing should be free of scarves, loose sleeves, or anything else that could get caught on the propeller.
- Ensure the fuel system is turned on and the throttle is set for a normal start.
- The ignition magneto switch should be checked and confirmed to be in the off position. Note that Ignition switches only ground the magnetos. If the switch is corroded, or a ground wire is compromised in any way, the engine could be ready to fire even with the switch off (Always treat engines as live).
- The person doing the hand-propping should face the descending blade squarely and should stand slightly less than an arm's length away from the blade. If this person is too far away, they will likely be unbalanced and awkwardly positioned during hand-propping.
- Anytime you turn the propeller, expect that the engine could start. Avoid pulling an engine through in a hangar. If you must move a prop, eg to reposition it to get a towbar attached, turn it backwards so you will not trip the impulse coupling.

Once all proper safety precautions have been taken, you're ready to start.

1. The person at the propeller calls out the commands, **"Fuel on. Magnetos off. Throttle set. Brakes ON."**
2. The person in the cockpit makes sure the fuel is on the magnetos are off, the throttle is closed, and the brakes are set. Once all are confirmed, the person in the cockpit repeats, **"Fuel on. Magnetos off. Throttle set. Brakes ON."**
3. The person by the propeller pulls the propeller through to prime the engine and says, **"Brakes ON, Contact."**
4. The person in the cockpit confirms the brakes are set and turns on the ignition to the appropriate magneto, then repeats back, **"Brakes ON, Contact."**
5. The person by the propeller swings the propeller by forcing the blade downward rapidly while being sure not to wrap his or her fingers around the blade. If the propeller kicks back in the opposite direction, it can cause sharp pain in the fingers if they're wrapped around the propeller.
6. If the engine doesn't start, do not reposition the propeller for another attempt until you are certain the magneto switch is off.
7. When the engine starts, remove the wheel chocks (if used) safely and carefully; set the throttle to idle and approach the chocks from the rear of the propeller – never from the front or from the side.