THE TROUBLE WITH TURBOS

The BGA safety team looks at how gliders with retractable engines still have field landing accidents, and what to do to avoid them

RETRACTABLE engines are increasingly popular options for cross-country gliders. They let pilots reach and explore soaring grounds and cross gaps between areas of lift; and, if sufficiently powerful, they allow the glider to be launched independently. They also reduce the likelihood of having to land in a field and the risk and inconvenience that carries.

It's therefore surprising that gliders with retractable engines are slightly more likely than other gliders to suffer serious damage from a field landing accident. Just over 20 per cent of the UK's private glider fleet now has a turbo, self-launching, jet or electric sustainer engine, yet such gliders have in recent years accounted for around 23 per cent of serious field landing accidents to privately-owned gliders, with seven accidents in the past two years alone.

Almost all of these accidents happened because the decision to use the engine was left too late and the engine could not be started in time to avoid an inadequately planned field landing. Sometimes the glide performance was affected by the extended propeller, or the increased workload caused impaired judgement or loss of control.

Glider engines fail – and, perhaps more often, they fail to start. They are generally less developed than motor car engines; they are used less regularly, vibrate more, and have to start under load. Flat or cold batteries may fail to turn them over; and complex starting sequences are easy to get wrong. It's crucial not to depend upon them, and to plan for their failure – as attributed to record-breaking US pilot Jerry Kaufman [1]:

Plan A is to land in that field; Plan B is the engine actually works and I motor away.

Even if the engine is running, its reliability should never be depended upon.

Performance and familiarity

To operate the engine with efficiency and ease, time taken to understand systems and practice procedures will be well spent. If the switches and controls are unhelpfully positioned, additional labelling can help, and some pilots create checklists to ensure that all steps occur in the right order. If there are start-up actions that you can carry out early, this can reduce pressure later. It's valuable to know how critical the airspeed and throttle setting are to starting the engine, to be familiar with its operating characteristics and idiosyncrasies, and to identify things you

might get wrong under pressure.

It's also useful to measure some practical characteristics. How long does it take, and how much height is normally lost, to get the engine running? How much for a second attempt, and to put the engine away? What rate of climb should you expect? What is the typical fuel or energy consumption – and, particularly for electric motors, how long can you run without overheating? If the engine stops – and perhaps can't be retracted – how does a windmilling or static propeller affect the glider's handling, performance and stall characteristics? Tests within range of your home airfield can provide the answers.

Planning for a field landing and starting an engine both add to your workload which, if the engine is needed, is already likely to be high. Bear in mind therefore that your own performance is likely to be affected. Most stall/spin accidents occur through stress and distraction, and engine noise and vibration will usually mask any pre-stall buffet.

Defining your limits

You should decide in advance the minimum height at which to begin attempting to use your engine. Start from the field and work upwards.

- By what height do you want to be focusing exclusively upon landing into your selected field? Remember that the glider's handling and performance could be affected by an extended propeller, and that you might have drifted out of position during the failed engine start.
- How much height do you need in practice to extend and attempt to start the engine and restore manoeuvring speed if it fails? Bear in mind your own performance under pressure, the scope for fumbling the starting sequence and dithering if it doesn't start first time; and that since the engine was needed, you could be in sinking air.

This will let you calculate the absolute minimum height to consider starting the engine; your glider flight manual may give helpful guidance. In addition:

- How long do you need to prepare the glider for landing? After a failed engine start, it's not uncommon for pilots to forget to lower the wheel. Lowering the undercarriage before extending the engine will reinforce to yourself that Plan A is to land in the field.
- How long do you need to select a suitable field? You're unlikely to do this successfully while starting the engine, and need to consider options lest the engine fail during climb-out. Many accidents stem from rushed field selection and poor circuit planning.

Now rearrange these into the order in which you'll need to perform them, imagine yourself doing so and the workload involved and, if it feels uncomfortable, add some margin for error. Try it at altitude and see whether it all works. This can be practised with an instructor in a motor-glider, with simulated operating drills and the engine adjusted to produce realistic descent rates. Simulated engine failures can be very realistic and instructive. Many clubs offer such training as an introduction to retractable engines.

Make sure you service the engine regularly and check the fuel, etc, before flight. It's good practice to check that the engine will start before setting off on task, while within range of the home airfield. Remain familiar with the operation of the engine; and stick firmly to your height minima.

When others ask how a glider can fly without an engine, we often explain that it's one less thing to go wrong. Retractable engines can and do let us down, often at critical stages of flight, and we need to plan for that.

Tim Freegarde and the BGA safety team

Gliders with retractable engines, like the ASG 32 El pictured above, are increasingly popular options and reduce the likelihood of a landout. However, Plan A should always be to land in a field, with Plan B being that the engine works and you can motor away (Schleicher)

RETRACTABLE ENGINES CAN AND DO FAIL, OFTEN AT CRITICAL STAGES OF FLIGHT AND WE NEED TO PLAN FOR THAT

■ For more information about operating gliders with retractable engines, read Eric Greenwell's comprehensive guide [1] and section 13 of the BGA's Managing Flying Risk [2]. The BGA's *Adventurous Soaring* video covers aspects of flight preparation.

[1] E Greenwell, A Guide to Self-Launching Sailplane Operation (2014) *https://tinyurl.com/flyright2121*
[2] BGA Managing Flying Risk, section 13 *https://tinyurl.com/flyright2122*
[3] BGA Adventurous Soaring (2019) *https://tinyurl.com/flyright2123*

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