PARTIAL FAILURES

The BGA Safety Team discusses priorities and options if your engine loses power but doesn't stop completely

The UK Air Accident Investigation Branch has urged the CAA to rethink how engine failures are taught and emergency procedures are practised. This follows two recent accidents involving partial engine failure after take-off, both resulting in serious injury or fatalities [1,2]. Although they involved single engine piston (SEP) aircraft, there are lessons to be learned by pilots flying TMGs or self-launching sailplanes, and perhaps by pilots of self-sustainers (turbos) climbing away from a field. In all cases, it is apparent that – just as with an aerotow launch [3] – a pre-made plan considering all eventualities is vital to a successful outcome following engine problems.

TOURING MOTOR GLIDERS

Teaching engine emergencies in TMGs is currently usually practised as total engine failure at various stages of flight [4]. Experience from our colleagues in the SEP world indicates that partial engine failure is more likely to produce fatalities [1,5].

The best way to avoid any sort of engine problem in the air is to prevent it happening in the first place. Recent TMG partial engine failure accidents could have been prevented during the ground run if routine checks of RPM had detected inadvertent carburettor heat application or incorrect propeller pitch

setting. The take-off should be abandoned if the acceleration or engine reading are not as expected. It can help to choose a go/no-go decision point before setting off [5].

The way we handle a TMG in an after take-off emergency is likely to differ in some ways from the SEP procedure. The general advice is to maintain a safe speed, land essentially straight ahead with a total engine failure, with some more gentle manoeuvring possible in a TMG compared with a SEP. Airbrakes are very useful in this situation, and turning back to the airfield may be possible in favourable conditions as height is gained.

A partial engine failure can confuse the decision making process [6]. Maintaining a safe speed is the first and most important action. Climbing straight ahead is advisable until enough height is gained to reach a safe landing area should the engine stop completely [7]. Whether the TMG is still slowly climbing, able to fly level, or developing enough thrust to take it to a better landing area should be considered. The pilot should assess whether the failure is likely to become worse – eg if rapidly losing oil pressure the engine may not run much longer. A positive decision should be made, to either land in a field, slowly continue the climb, or continue to an airfield, depending on the pilot's judgement of the problem.

Total engine failures en-route are already covered by the BGA field landing syllabus [8], as the aircraft becomes a glider once the engine is secured by turning off fuel, ignition, and (if necessary) electrics. The most likely cause of partial failure is engine icing, so use of carburettor heat is essential if fitted. Unintentional use of carburettor heat can also cause loss of power. It is possible that the engine will produce enough power to divert to the nearest airfield. On arrival there, deliberately shutting the engine down at height, then carrying out a conventional glide circuit and landing may be the best plan. Hopefully all TMG pilots regularly practise glide circuits.

Engine failures during field landing training are a high risk area covered by the BGA's Conduct of Field Landing Training [9]. Summarising that, the instructor should always plan for an engine failure, partial or otherwise, anytime during the approach or

PREVIOUS 'FLY RIGHT' ARTICLES

- The perils of distraction (Apr/May 19)
- Keeping safe in thermals (June/July 19)
- Why it is good to think ahead (Aug/Sep 19)
- The effects of wind gradient (Oct/Nov 19)
- A fun but safe introduction (Dec 19/Jan 20)
- Stop the drop (Feb/Mar 20)
- Avoiding upset (Apr/May 20)
- Backroom boys (June/July 20)
- Cockpit muddle (Aug/Sep 20)
- Safe rotation (Oct/Nov 20)
- Cockpit remedies (Dec 20/Jan 21)
- COVID currency (Feb/Mar 21)
- Eroded margins (Apr/May 21)
- A good lookout (June/July 21)
- Trouble with turbos (Aug/Sept 21)
- 'Hopefully' is not an option (Oct/Nov 21)
- Act when the launch fails (Dec 21/Jan 22)
- Time to solve a knotty problem (Feb/Mar 22)
- RTFM: Read the flight manual (Apr/May 22)
- Startling events (June/July 22)
- Collision risks (Aug/Sep 22)
- Winter hazards (Oct/Nov 22)
- Swiss cheese (Dec 22/Jan 23)
- An expensive mistake (Feb/Mar 23)
- What's changed? (Apr/May 23)
- Aerotow eventualities (June/July 23)
- Problems with probabilities (Aug/Sept 23)
- Winch nuances (Oct/Nov 23)
- Heart troubles (Dec 23/Jan 24)
- Inadvisable turn (Feb/March 24)

go-around. The risk factor increases steeply below 500ft.

SELF-LAUNCHING SAILPLANES

Many of the issues involving total or partial engine failures in self-launching sailplanes, such as a DG-800, are similar to those of the TMG. There are a couple of important additional considerations. There will be an immediate tendency for the sailplane to pitch up as thrust from the high thrust line is lost. This must be counteracted by the pilot in order to maintain a safe speed. In addition, the extra drag of the extended engine must be taken into account when deciding whether to land ahead, continue climb on reduced power, or to return to an airfield.

Practice engine failures in a SLS are a possible way of eventually inducing real engine failures. Most SLS, including two-seaters, are powered by two-stroke engines. Thus, when the throttle is closed, the supply of oil is drastically reduced. This exercise is better carried out in a TMG with a four-stroke engine.

SELF-SUSTAINING SAILPLANES

The most likely scenarios involving a turbo equipped sailplane are failure to start when required, or a failure to run at full RPM. With older turbos a dive start is required which may consume a considerable amount of height. The start sequence is recommended to be commenced above 1,500ft near an already selected field, with the dive towards the landing area, not away. If it fails to start properly, there may not be time for another attempt. Workload increases rapidly in this situation; the pilot should recognise that. A landing in the selected field with the engine extended may be the best, indeed the only, safe option.

A variation on the engine failure is an inability to retract the engine after it has been shut down. This may be caused by a simple fuse blowing. The pilot should remember that, with air-started turbos at least, a restart may be possible. That might be the difference between landing in a field with the engine extended, and landing at an airfield with the engine extended.

Most of the advice for self-launching sailplanes can be equally applied to self-sustaining sailplanes.

CONCLUSIONS

It is much easier to action a ready-made plan than to formulate a plan during an emergency. The BGA recognised that fact many years ago by introducing 'E' for eventualities into the standard preflight check. It is even more essential for pilots of powered sailplanes to plan for failures as there are likely to be more complicating factors [10]. This applies both to the climb out and the restart situations.

' MAINTAINING A SAFE SPEED IS THE FIRST AND MOST IMPORTANT ACTION '

Instructors should consider introducing partial engine failures in addition to the total engine failures practised during initial training, and subsequent training, for all motor gliders. Maintenance of a safe speed should be the primary consideration.

Paul Whitehead and the BGA safety team

■ The Australian ATSB offers extensive advice about partial engine failures [5], while the CAA's Skyway Code [6] includes guidance on handling a variety of emergencies.

[1] AAIB, Investigation G-CJZU (2022) *https://tinyurl.com/flyright2409*
[2] AAIB, Investigation G-BBSA (2022) *https://tinyurl.com/flyright2410*
[3] *Aerotow options, S&G* (June/July 2023) *https://tinyurl.com/flyright2411*
[4] Engine Failures – time for a training re-vamp? FTN online (1 July 2022) *https://tinyurl.com/flyright2412*
[5] ATSB, Avoidable Accidents No 3 *https://tinyurl.com/flyright2413*
[6] CAA, The Skyway Code, version 4 (2023) *https://tinyurl.com/flyright2414*
[7] *Inadvisable turn, S&G* (Feb/Mar 2024) *https://tinyurl.com/flyright2415*
[8] BGA, Field Landing *https://tinyurl.com/flyright2416*
[9] BGA, Conduct of Field Landing Training (2018) *https://tinyurl.com/flyright2417*
[10] *Trouble with turbos, S&G* (Aug/Sept 2021) *https://tinyurl.com/flyright2418*