Glider pilot training and the role of the powered trainer

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Introduction

Although gliding is a most attractive sport, the problem of training glider pilots quickly and efficiently has not been solved and this has seriously restricted the expansion of the gliding movement and has discouraged many educational and industrial concerns from giving active support to the gliding movement.

In a gliding club it is not unusual to lose up to twenty per cent of the trained pilots each year because they develop other interests, get married or move their job. The average member remains active in a club for about five years and therefore the club is constantly under pressure to train new members to replace them. Since the club has to undertake this amount of training, the opportunities for solo launching and soaring are restricted and consequently, in some cases, the trained pilots become frustrated and lose interest.

Therefore for the expansion of a gliding club it is necessary to improve both the efficiency of the training and to increase the opportunities for solo flying.

Problems of training glider pilots

The significant difference between the glider and a normal light aircraft is the much lower flying speed of the glider. This makes it particularly susceptical to the effects of rising and sinking air, turbulence and wind-gradients. As a result of these effects, the pilot must be much more flexible with his planning for the circuit and landing and above all, he must be taught to think ahead and anticipate his next action. Whenever possible the glider pilot must be given instruction and experience flying in the extreme conditions he may meet later in his career, for example in high winds and turbulent, unstable conditions.

Launches and landings present no particular problems compared with those of the light aircraft, but the aileron and rudder co-ordination is more important in gliding.

The other vital requirement for the glider pilot is a greater awareness and appreciation of the approach to the stall since the glider is usually flying and circling at low speeds and often at low altitudes.

Once the general handling technique for a glider has been mastered, soaring and cross country flying are largely a matter of further experience and of developing accuracy and judgement.

Present methods of training

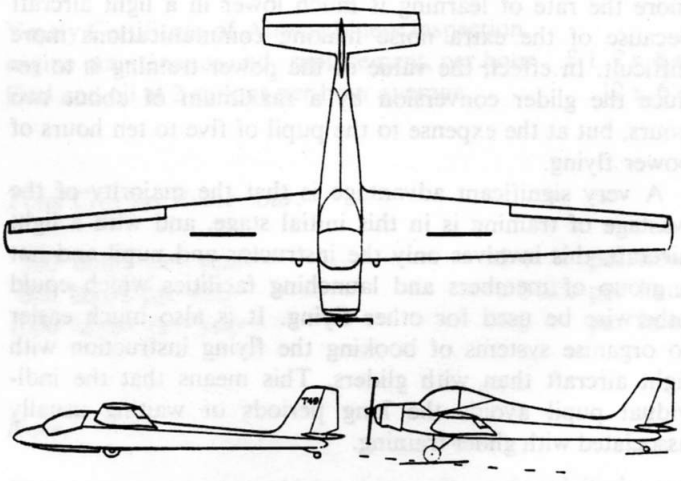
While the quality of the training is always the most important consideration, the cost, effort and capacity of each method must be compared to appreciate their advantages and disadvantages. Often the method is predetermined by the operating conditions at the site — the alternatives might be uneconomic or even unsafe.

1. Winch and motor car launching

These methods of launching training gliders are relatively inexpensive but require a large site with a minimum of interference from other aircraft. The flights are sometimes rather short for initial training but provide ideal practice for circuit planning and the approach and landing. A great advantage is that launching can be continued economically even when the launch height is restricted by low cloud.

The major disadvantage ist the difficulty in large scale operation and the rather low utilisation of both the instructors and the gliders because of the time consuming ground handling and the delays caused by human errors and mechanical faults at the winch.

Unless soaring is possible, it is unusual to achieve an average of more than three or four flights per operating hour with each two-seater. Allowing for a group of five pupils per glider, this means that each pupil can receive no more than five minutes flying instruction per hour spent manhandling the glider.



SPECIFICATION: Normal Category (non-aerobatic)
Engine: Rolls-Royce C-90 Continental with self-starter
Empty weight: 1,100 lb
Maximum a.u.w.: 1,560 lb
Stalling speed: 34 knots
Rate of climb: over 1,000 ft./min
Gliding angle: (engine stopped) 1:18 at 45 knots
Fuel consumption cruising: 2 gallons per hour
Basic airframe: modified Slingsby T-49

2. Aerotow launching

Aerotowing has the great advantage of requiring less ground handling and of being more flexible. The launch height can be varied so that short or long flights can be made to suit the stage of training. In soaring conditions some soaring can be almost guaranteed from each launch. For efficient and rapid training at the circuit-planning stage, short flights are desirable and aerotowing is, therefore, expensive.

Large scale operations become more difficult because of the need to provide both instructors and tow plane pilots for the continuous launching of several two seaters and all the solo machines. In an active large gliding centre like Lasham, for example, this would require at least two tow planes flying six to eight hours per day for every day of the week. This would involve three or four tow pilots flying for four hours each day. Unless some form of subsidy ist available either in money, paid tow pilots, or aircraft, it is doubtful if aerotow launching can be kept cheap enough to be attractive for a large organisation. It is of course, ideal for advanced training when the aim is to achieve soaring flights and it is also attractive for the smaller club or group operating from an active airfield.

3. Basic training in a light aircraft

This method usually involves five to ten hours of dual instruction in a light aircraft, primarily to learn the general handling and co-ordination of the controls and the landing. The glider training is then a conversion course with an emphasis on co-ordination in turns, stalling and spinning, circuit-planning and the use of the airbrakes. Usually the circuit-planning and the use of the airbrakes can be introduced after the first glider flight, but fifteen to twenty flights are still needed to complete the conversion. Because of the inexperience of the pupil, changing from the light aircraft to the glider is quite a large step and therefore the saving in training time is often less than might be expected. Furthermore the rate of learning is much lower in a light aircraft because of the extra noise making communications more difficult. In effect, the value of the power training is to reduce the glider conversion by a maximum of about two hours, but at the expense to the pupil of five to ten hours of power flying.

A very significant advantage is that the majority of the wastage of training is in this initial stage, and with a light aircraft, this involves only the instructor and pupil and not a group of members and launching facilities which could otherwise be used for other flying. It is also much easier to organise systems of booking the flying instruction with light aircraft than with gliders. This means that the individual pupil avoids the long periods of waiting usually associated with glider training.

The Powered Trainer

The ideal machine for training pilots is a powered aircraft, and for glider pilots, it should be one with similar handling and flying characteristics to a modern glider. It is clear that it is worthwhile considering a special machine for this purpose and that one solution would be to develop it from an existing two seater glider. However, it need not have such a good gliding angle if the engine could be left running and adjusted to give a more gradual descent. Powerful airbrakes are essential, so that realistic glider circuits and approaches could be taught. It is also vital to provide good all round visibility, so that the trainer can safely join gliders in thermals and so that excessive taxying and turning is not required to ensure that it is all clear before taking off on a busy gliding site.

The engine must be economical, reliable, easy starting and tolerant to slow running. Since the aircraft will require a normal Certificate of Airworthiness for club training purposes, a tried and proven aero engine is desirable. In many cases the difference in weight between engines of sixty-five and one hundred horse power is almost negligible and the improvement in take-off and climb would make the machine much more attractive to fly and able to operate safely from small fields in adverse conditions. The importance of a good rate of climb for low-speed aircraft is not always fully appreciated. Whereas three or four hundred feet per minute (two metres per second) may seem perfectly adequate in good conditions or for an aircraft flying at sixty knots or more, at lower speeds the effects of flying into turbulence or sinking air can leave the machine unable to climb away for a much longer time and this could be extremely embarrassing in hilly country.

Since the majority of the flying would be short circuit flights for training, a normal aircraft undercarriage would be required to avoid the need for assistance during taxying and take-off.

Self Launching Gliders

There is obviously a demand for both solo and two seater self launching gliders for general soaring and cross country flying. These present the designer with some interesting problems and a compromise must be made between designing for the best gliding performance and providing enough power for a satisfactory take-off and climb. However, for serious training involving up to one hundred flights per day, a marginal climbing performance is hardly acceptable and the aircraft would need to be simple and rugged.

There is no doubt that there will be a growing demand for these machines, both from the large numbers of gliding enthusiasts who can no longer afford the time for normal club gliding, and for those pilots living in places where gliding is impractical because of the lack of safe landing areas. Many tropical countries offer wonderful soaring conditions, which could be exploited by the individual enthusiast owning a self launching glider.

Summary of Advantages of a 'Powered Trainer'.

1. Better continuity of instruction than with a glider.

Normally with gliding instruction the first one or two flights each day are spent in revision. Just as the pupil is beginning to make progress, it is time to stop and take the next person or only a small percentage of the helpers would have a chance of flying each day. With a powered trainer

a much larger number of consecutive flights could be made in the time taken to do two or three glider flights and this would lead to much more rapid progress in learning.

2. Flexibility.

Useful and economic training could be continued even when the cloud base or other restrictions limit the ceiling for flying. The length of each flight can be varied by the instructor to suit the pupil regardless of the soaring conditions or the time of day. It would be economic to move the trainer to another airfield or soaring site for the day to relieve the launching facilities and congestion at a busy soaring site.

3. Utilisation.

One powered trainer could do the work of at least two gliders with a saving in instructor working hours and consequently cost.

4. Better solo gliding facilities possible.

At present on many gliding sites almost half the available launches are used for dual training and the solo flying is very restricted. A powered trainer would relieve the launching facilities of the majority of this burden and so increase the amount of solo flying possible. If the site was small or congested, the powered trainer could be flown to another airfield and this would benefit both the pupils and the solo flying at the gliding site.

5. Ease of operation.

No elaborate equipment and no helpers are needed to operate and therefore it becomes more practical to arrange the training into sessions which could be booked in advance and to start flying when only the instructor and pupil are present. A very large number of the keenest and most able pupils are unable to spare enough time to attend all day regularly and as a result many are forced to give up during training or take a much longer time than normal to reach a competent standard.

At present, the Youth Organisations give very little active support to the gliding movement because it can only cater for very small groups of beginners. The ease of operating powered trainers offers an almost unlimited expansion of training facilities without the need for additional gliding sites. Most of this additional training could be done on existing airfields without interfering with the normal club activities.

6. Improved advanced training.

In most countries, it is impractical to give every pilot instruction in cross country flying because of the likelyhood of a landing away from the gliding site and the waste of the rest of the days. Flying with a powered trainer or a self launching glider, proper training in thermalling, hill and wave flying, navigation and selecting fields and making field landings could all be done on even a poor soaring day. This would enable the pilots to be trained to a much higher standard of proficiency in far less time and the risk of costly accidents would be greatly reduced.

7. Cost.

The cost of gliding and particularly of learning to glide has been rising steadily for many years. In England it is, at present, almost exactly the same as for power flying. For most people, the cost in terms of time spent travelling to and from the gliding site makes gliding far too expensive to consider seriously and, therefore, many able and competent young people are discouraged when they calculate the time and money they will have to spend learning to glide by the present methods.

With good utilisation, the cost of operating a powered trainer or self launching glider is bound to be less than for the normal light aircraft. The saving in instructors salaries, if the instruction is given on a professional basis, could make the cost less than for either winch or all aerotow glider training.

Estimates of Operating Costs.

Initial cost of powered trainer	£ 3200

Yearly costs

Depreciation over five years	£ 640
Insurance as a club trainer at 10 %	£ 320
	£ 960

Hourly Running Costs.

Yearly Certificate of Airworthiness inspection, engine maintenance and replacement, per hour	£ 1 7 s 6 d
Fuel and oil at 2 gallons per hour average	12 s 6 d

Total Cost per flying hour.

500 hours per year	£ 4 per hour
800 hours per year	£ 3 4 s per hour
1000 hours per year	£ 3 per hour

Note.

Fuel comsumption would be drastically reduced if the engine was stopped during soaring flights and on these occasions, there would be an additional saving of about a pound per hour on engine maintenance.

The depreciation of 20 % is intended to allow for the possibility of the rising cost of aircraft in the future.

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