

Possible Uses for Powered Gliders in Modern Glider Training

Hans Held

Training Superintendent, Sports Glider Group, Deutscher Aero-Club (DAeC)

Presented at OSTIV Sailplane Development Panel Meeting, Amsterdam, The Netherlands (1975)

In order to demonstrate the capabilities of powered gliders in glider training, the negative aspects of conventional glider training shall be considered briefly. These apply especially to basic training.

Considerable effort in terms of personnel, launching equipment and aircraft is expended to achieve poor efficiency. The dependence on launching aids such as towing winch or towing aircraft complicates flight operations and, with respect to aircraft utilization, yields a poor ratio of actual flying time to the required personnel and total elapsed time.

The limited duration of a flight, which in most instances is determined by the launching mode and cannot always be controlled by the flight instructor, prevents a consistent methodology in flying training and results in prolonged training periods. The best example for this is training with the aid of a towing winch. Airfield circuits will usually yield four to five minutes flying time. If we subtract the take-off and landing operation, only two to three minutes remain for manual flying training! This requires no comment!

The young flying students today are no longer in search of the apparent romance of glider flying. Rather, they are much more fascinated by the engineering aspects and by the possibilities of achieving performance through engineering refinements. The long duration of the training course, its complications and its dependence on many factors are a deterrent for many potential recruits of high qualification.

With respect to cost there appear to be advantages in favour of conventional basic training; however, if an accurate comparison is made it is found soon that appearances are deceiving even in this area. If we relate the entire cost which any club requires for its basic glider training to the actual utilization rate of the required launching equipment and aircraft, we again find poor efficiency. The take-off fees charged by the clubs which are sometimes fairly cheap, are made possible somehow

through subsidies, meaning that they do not cover the actual cost.

Conventional training is further aggravated in areas with dense air traffic. In these areas glider operations – due to the peculiarities of the glider's operational behaviour (not controllable by air traffic control) – are often restricted to ensure the security of commercial or military flying operations. In these cases the only alternative is to move into more remote regions.

In addition, the authorities in some countries demand a quite comprehensive training programme – I shall discuss the special conditions prevailing in the Federal Republic of Germany later – and, therefore, a good training programme on a club basis cannot be carried out successfully in weekend operations.

On the other hand, if glider flying is to remain interesting and viable the training programmes must be improved considerably. They are required under the sports aspect as a basis for achievement and competition. They are necessary as a result of the fact that modern high-performance gliders require considerable pilot skills. And, last not least, they are required in order to ensure the safety of all airborne traffic, considering the increasing traffic density and limited air space. In addition to the necessary know-how a good basic training represents the starting point and a prerequisite for all of these requirements.

On this approach the powered glider in its present development stage can be an important aid which is the subject of the following discussion. I would ask your indulgence for not discussing the engineering and design aspects of this aircraft type (which would be like carrying coal to Newcastle, anyhow) and for discussing primarily the present experience as acquired in my own country.

As soon as the two-seat powered glider had reached a design stage where its many applications became apparent, progressive interests in glider sports started testing its capabilities for glider

training. Systematic experiments carried out in the early '70's by glider schools and member clubs of the Deutscher Aero-Club yielded good results. As a result the authorities were prepared to consent to the powered glider preferential treatment from which primarily the glider sport profited and which was one of the causes for the present development.

But now let us discuss the implementation and the results of such an experiment: in order to obtain conclusive results, the training group and its flight instructor were completely separated from the normal training operations. All the training exercises were prescribed and the instructors were required to maintain training records. The type SF 25 b powered glider was used for this training programme. 25 to 35 take-offs and five to six hours of flying time with the instructor were required in order to advance the students to the solo stage. Re-training on gliders was required prior to the first solo flight, but only because of the government regulations. The following experience has been acquired in this area: in the first flights the students' training exposure limit was about 15 minutes flying time; later on about 20 to 25 minutes were possible. One important feature was that, after reaching initial altitude, all the exercises were flown without engine, and so were all the landings. The longer flight durations and the better pilot skills achieved also had a positive effect on the landings – in spite of the fact that there were fewer landings as in the conventional training course the students somehow appeared to have more self-confidence. The training period could be reduced considerably. The take-off in the powered glider rapidly developed into a preliminary exercise for take-offs towed by aircraft. Unlike the towing winch take-off the climbing flight under engine power appeared more natural to the student, reducing his nervousness considerably which had a positive effect on the subsequent flying exercises. Retraining for gliders and glider towing proceeded smoothly and required only a few take-offs. Even the improved aerodynamic characteristics and the new seating arrangements failed to cause any difficulties. The changing altitudes and distances to the flying field during basic training prevented the students from sticking to the aerodrome circuit. This became apparent especially in the first solo flights where the students first entered the aerodrome circuit at the prescribed altitude and with a flying time of 15 to 20 minutes exceeded the scope of conventional first solo flights.

The continued training programme in gliders as a result of the thorough initial training in the powered glider

yielded a much better flying time ratio. When the experimental training group concluded its training programme it had achieved a lead of more than six months compared to the conventional training group in weekend operations. The success of this experiment, of which I have described only some phases, had the result that my club in 1970 converted its entire basic training to powered gliders. Many other associations and clubs have used our progress reports as a basis for the use and further development of this training scheme for their special requirements. For, in the meantime the utilization potential of the powered glider for training purposes has increased. It has been used in the preparatory phase for flying competitions, and practical navigation exercises as well as long-distance flying training with simulated glider flying have become natural applications today.

Resulting from these programmes I shall now list some information and experience acquired without claiming completeness or absolute applicability in any situation.

Advantages of the Powered Glider in Glider Training

1. Low cost in terms of personnel and equipment; all the auxiliaries otherwise required (towing winch, recovery vehicle, towing aircraft, etc.) are eliminated.
2. The duration, altitude and range of the flights can be predicted and controlled by the instructor in accordance with the student's training level.
3. The exercises can be practiced as intensively as required for the individual situation of the student in question.
4. Considerably greater take-off frequency in group training, no unduly long periods on the ground. Natural type of take-off, unlike a winch take-off. Training is possible outside the range of the highly frequented aerodrome circuits. Longer flying times can be achieved. The weather no longer plays such a dominating role. Winter time flying operations are possible.
5. In the event of air space restrictions it is possible to proceed from the aerodrome to a more remote area for undisturbed training activities.
6. The average cost per flying hour for a powered glider results in a justifiable price, compared to the utilization efficiency. The students can afford this price even if they are youngsters.
7. As a result of easier maintenance conditions a powered glider can be maintained by the club at low cost.

The Following Disadvantages Must be Listed:

1. If the engine is not shut down during training, pure powered flying training will result.
2. The re-training in gliders now required prior to the first solo flight causes an interruption in continuous training.
3. The differences in the aerodynamic characteristics of some widened powered glider types compared to modern gliders are too great, especially while gliding.
4. Control co-ordination, control travel and their effects are poor with some powered glider types.
5. In some powered glider types the instructor cannot reach all the necessary control segments. (The instructor's seat is not identical to the pilot's seat during training.)
6. The engine suffers from high thermic loads (intervals between maximum take-off power and frequent engine shut-down while airborne are very short).
7. Relatively weak engines are overloaded during take-off.
8. The seats in some types are side-by-side – this requires a certain period of adaptation to the seats in gliders which, as a rule, are of the tandem type.

And Now Some Principles Acquired by Experience:

1. Alternating training between powered gliders and gliders should not take place during the basic training phase.
2. Exercises and landings should always be carried out without engine power. The aircraft's operational behaviour will change even if the engine idles.
3. Watch out for the student's saturation during basic training – in most instances, excessively long flights will achieve an adverse result. 15 minutes is long enough to start with.
4. The time saved by the more thorough training in the powered glider compared to conventional training amounts to more than half the time previously required.
5. Much better prerequisites in training for long-distance flights. Navigation exercises carried out in a powered glider with simulated off-field landings will improve the student's self-confidence.

It was mentioned already that a glider pilot in the Federal Republic of Germany participates in regular air traffic and is bound by government regula-

tions with respect to training and examinations. The new qualifying directive for flying personnel requires of the glider pilot in training, among other requirements: 30 hours flying time, of which at least 15 hours must be solo flying. Three take-offs and landings on a strange airfield. One long-distance flight of not less than 50 km. These conditions – and I have mentioned only the most important ones – would be almost impossible to meet unless a powered glider could be used in the training programme. All the training flights with instructor can be carried out in powered gliders, and it is relatively simple for the glider instructor to obtain his instructor license for powered gliders. As a result, there will not be any instructor shortage. The classification of the powered glider as an independent aircraft type, its feasibility for training private pilots as well as glider training instructors, the relatively simple familiarization of private pilots and glider pilots required for the license to fly powered gliders, have contributed greatly toward the break-through of the powered glider. This is demonstrated by the number of powered gliders now registered in the Federal Republic of Germany, which was 519 powered gliders on April 1, 1974, of which 428 are two-seaters. These powered gliders logged 221,697 take-offs in 1973 alone. In the land of Northrhine-Westphalia, for instance, more than 80% of all glider pilot instructors hold an instructor license for powered gliders.

It should be emphasized again that this could be achieved only through the positive co-operation between the air traffic authorities and the Deutscher Aero-Club. The result of these efforts was a generous interpretation of the authorized uses for powered gliders on the part of the authorities. And they have not been disappointed to this date. After some initial troubles which, however, were of a minor nature, the trouble and accident range equilibrated between powered flying, powered glider flying and glider flying.

We know that in many countries the powered glider is considered a powered aircraft subject to the utilization limits of that type. Perhaps this report can contribute toward removing existing reservations so that easier conditions may be granted elsewhere. This paper is devoted to the powered glider in its role as a training system for glider flying. My appreciation goes to those who created the prerequisites with respect to design and engineering and therefore I consider it an honour to be able to report to them today on the success of the aircraft type developed by them from the point of view of glider flying.