APPENDIX D — TRANSITION TO MOTORGLIDERS

INTRODUCTION

Pilots progressing to sustainer engine (turbo), self-launching, or other motorgliders should obtain a thorough dual checkout in a similar glider before attempting solo flight. Pilots have had difficulty with these glider types, and the procedures in this appendix should normally be performed in a two-seat motorglider, but if none is available they should be performed solo. This Appendix has been prepared to provide guidelines for pilots transitioning to a sustainer engine, self-launching or other motor glider.
Many of the older models have complicated starting procedures and can distract the pilot from the task of safely flying the 'plane. In addition, most of these sailplanes have poor performance when the engine is deployed but not operating. A series of flights and exercises have been devised therefore, to assist pilots to safely convert into their motorized sailplane. The pilot must become familiar with handling the aircraft under these emergency conditions before attempting a flight solo with the engine on. The initial airfield selected for this training should have a fairly long runway (4000 to 5000 feet) and have many off-field landing options close by. Learning on too short a runway will be difficult. This Appendix has been prepared to provide guidelines for pilots transitioning to a sustainer engine, self-launching or other motorized glider. It is hoped these guidelines will help pilots convert safely into engine takeoffs and emergency landings when first flying their new motorized glider.

GENERAL GUIDELINES

- Before using the engine for the first time, the pilot should become thoroughly competent at flying the glider without using the motor. This will require a number of soaring flights, launching usually by aerotow, during which the characteristics of the glider can be explored and mastered.

- Takeoff performance in a self-launching glider can be greatly affected by weight, slope of the runway, length/wetness of the grass, hard runway surface, wheel brake, density altitude, bugs on wings, etc. Before takeoff under the glider's own power, a physical landmark for a lift-off decision point must be selected to allow a safe abort. If not airborne by this point the takeoff must be aborted.

- Never attempt to deploy the engine and start it in the circuit. It is recommended that when planning to deploy and start the engine, circle over your selected landing field. Climb away while circling over the field until certain the engine is performing well.

- Do not deploy the engine in flight unless you have picked out a landable and reachable field with the engine out but not operating. Should the engine not start, you will need the field in short order.

- Once the engine is deployed and does not start by 800 feet agl do not continue to attempt a start or try to store the engine unless this is an automatic (one-button) action. Shift your concentration to completing an abbreviated circuit and landing with the engine extended. The downwind, diagonal and base legs will have to be much closer than normal to the intended landing area.

TRANSITION FLIGHTS

Training and checkouts in a two-seat glider

If a suitable two-seat glider with powerful airbrakes is available the pilot should first practice:

- Circuits with the airbrakes open sufficiently to simulate an open and windmilling motorglider engine producing a large amount of drag,

- Full airbrake landings, and

- The stall and speed recovery exercises described below.

The first stage is to permit the pilot to become familiar with the motorglider's performance and handling without the engine deployed, using another more familiar glider and launch method. This may take several flights. The preference for training and checkouts is with an instructor in a dual motorglider with similar performance to the solo motorglider. If a qualified motorglider instructor is not available then the pilot should perform a self-checkout in his motorglider after completing the above exercises satisfactorily in the two-seat (non-motor) glider.

Motorglider engine handling practice on the ground

The next stage will be to practice deploying, starting/stopping, and retracting the engine while on the ground. Some engines have very complicated procedures that require a checklist to ensure correct completion. Before moving on to the following stage, these skills must be mastered.

Motorglider handling practice with windmilling engine

The next series of flights are with the motorglider and will explore the glider's handling with the engine deployed but with a windmilling propeller. The aim is to simulate a launch failure on takeoff at a safe height, e.g. 3000 feet agl, and to determine the minimum safe height above ground that is needed to complete a turn back to the airfield. Using a familiar launch method, climb to a safe altitude for upper air work. Deploy the engine and complete the following two stages of exercises with a windmilling propeller:

- Perform a few stalls from a climbing attitude (simulating a normal climb with the engine operating). Recover from the stall to a normal gliding attitude and airspeed

as required for the windmilling prop condition, and note the height lost. Note also the time taken to regain speed. Repeat a few times trying to recover with minimum height loss and minimum time to recover to a safe speed. To become fully comfortable with the stall characteristics, repeat this exercise on extra flights.

- The second stage for these practice exercises also involves the windmilling propeller (except with sustainer engines where an engine failure on climb-out will not be simulated). The exercise should be repeated several times to become fully comfortable with the maneuver. Dive to gain speed to above that for a normal climb (the pilot's handbook recommended climb speed). Transition into the normal climb attitude by pulling up. When the speed reduces to the recommended minimum climb speed, assume that the engine fails suddenly. Note the height and time. From this **simulated climb** recover promptly to an exaggerated nose-down attitude to regain a suitable approach speed as fast as possible. Note the height lost in this maneuver and the time taken to reach a safe maneuvering or approach speed. Only when this speed has been reached perform a 180-degree turn to simulate a return to the takeoff runway. Once on the reciprocal heading with wings level, note the height lost and the total time taken since the assumed engine failure to complete the maneuver. A height loss of 500 to 700 feet and 10 to 15 seconds is not uncommon.

** It is doubly important to recognize that **an engine failure low to the ground will require a landing straight ahead**, and that there is a dangerous height zone within which it is very important to lower the nose as quickly as possible to maintain airspeed. At the same time, if the nose is lowered too much, it may be difficult to avoid a very heavy landing. Pilots should therefore practice recoveries to simulate this situation, noting the minimum height required to regain adequate speed suitable for an immediate normal held-off landing with the engine wind milling. Repeat the exercise for a 10-knot headwind, noting the time taken to reach the higher approach speed and total height lost. This will allow calculation of the absolute minimum height above ground that would be required to return to the airfield and to complete an engine windmilling, downwind landing following an engine failure on the climb out. Below this height the pilot *must* land the glider straight ahead.

Motorglider landing practice with windmilling engine

The next series of exercises are to practice landings with the propeller windmilling. Be prepared to execute an abbreviated circuit as the rate of descent will be high and the approach path much steeper than normal. Once the pilot is comfortable with landing and judging the circuit with the engine windmilling, the exercises can move on to the takeoff (if solo training) practice stage.

Motorglider takeoffs

Practice the takeoff and be prepared for trim changes created by the propeller thrust. Engine speed control will be important and the climb angle with the more powerful engines may be impressive! For older self-launching gliders note that the takeoff run may be somewhat longer and the climb-out angle lower than for other launch methods, and this will depend of course on the engine power and propeller thrust plus effects of hard surface or grass, density altitude, etc. Therefore obstacle clearance on a short runway could be difficult. Takeoffs must be practiced first on a long runway before attempting shorter field takeoffs and landings. Be prepared for launch interruptions on takeoff and have your **O**ptions predetermined as part of the pre-launch CISTRSC-O, and the glider and the pilot's personal pre-takeoff checklists.

Lastly, partial loss of engine power or thrust must be treated as an engine failure, and a safe speed recovered before turns are attempted. If the glider is below the absolute minimum height above ground required to return to the airfield, the glider must never be maneuvered into a 180 degree turn, but a field ahead should be used for an emergency landing with the windmilling prop.