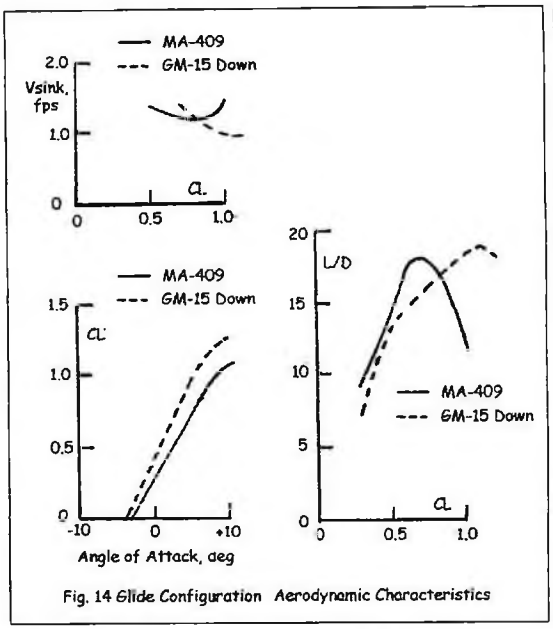

Fig. 14 Glide Configuration Aerodynamic Characteristics

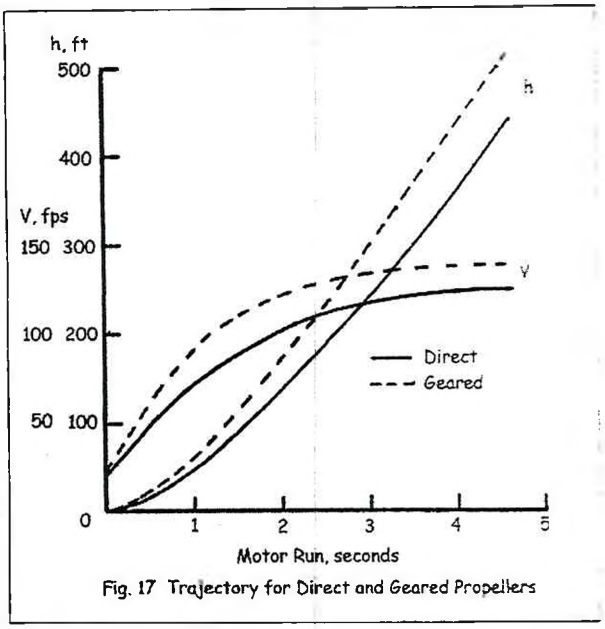

Fig. 17 Trajectory for Direct and Geared Propellers

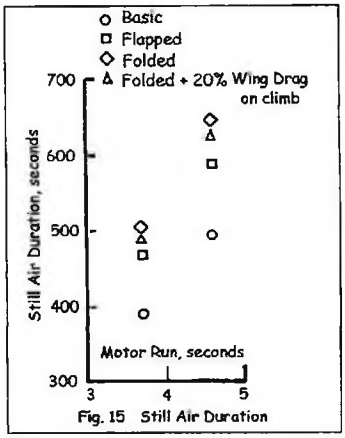

Fig. 15 Still Air Duration

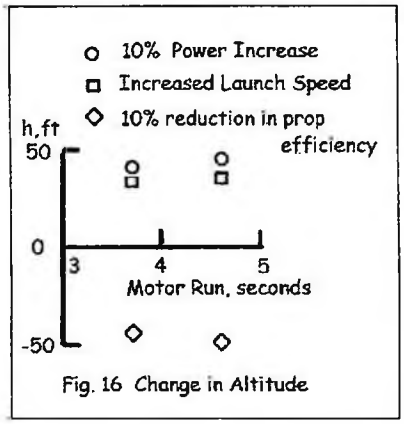

Fig. 16 Change in Altitude

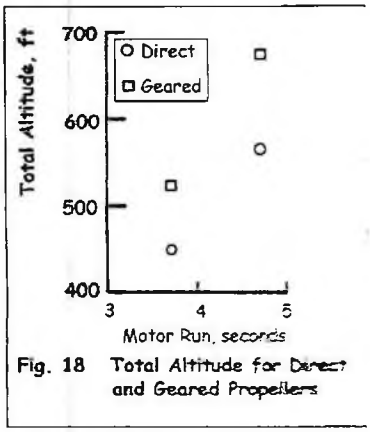

Fig. 18 Total Altitude for Direct and Geared Propellers

The cruise run time is likely to vary between models and individual fliers. Some models may transition quickly and some fliers may wish to transition earlier or later than others. Correspondence from Michael Achterberg noted that there was a significant time between fixed and folded wing models. This difference was on the order of 1 second. Achterberg stated that the folders were transitioning at approximately 1.7 second and the fixed at 1 second. Using the 1.7 second delay and the data presented in Figure 11b gives a velocity of 55 fps for the point of transition. The actual time of transition varies between configurations and has been used to determine the altitude gained in transition; this altitude gain is presented in Figure 12 for the various configurations.

Total altitude is shown in Figure 13. The folder has an advantage between 20 to 32 feet at 4 second motor run. At 5 seconds the altitude advantage is between 26 to 43 feet. The difference in altitude is due to the uncertainty in folded wing drag.

The altitude gains of the folder are significant, but these gains are far too small to account for the observed performance gains achievable by the variable wing geometry models over that of the fixed model. As stated earlier, the airfoil of the folded model in glide mode (unfolded wing), is very similar to the GM-15 in the glide position. This section is highly cambered and has excellent aerodynamic characteristics.

The glide lift, and lift to drag characteristics for both the fixed MA-409 and flaps-down GM-15 are shown in Figure 14. Also presented is the sink speed of both fixed and flapped configurations. It is assumed that the folder has the same characteristics as the flapped configuration.

Of primary importance is the reduction of sink speed from approximately 1.15 to 0.95 fps when comparing the basic fixed airframe to either of the variable geometry airframes. Using the sink speeds and the altitudes presented in Figure 14, still air times can be calculated and are presented in Figure 15. The large advantage of the variable geometry models is primarily due to the 20 percent reduction in glide sink speed.

The folded wing aircraft clearly has a large advantage over the fixed wing model and a slight advantage over the flapped model. The advantage over the flapped model is due to the reduced drag in the climb and might be reduced by small drag reductions. This large reduction in sink speed was noted by Gil Morris in Reference 6.

The previously discussed simulation has shown the superiority of the folder over both fixed and flapped configurations. Flight observations have often shown that the flapped configuration is superior in many instances.