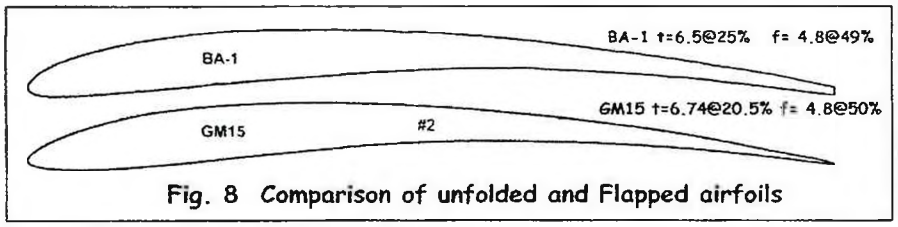

Fig. 8 Comparison of unfolded and Flapped airfoils

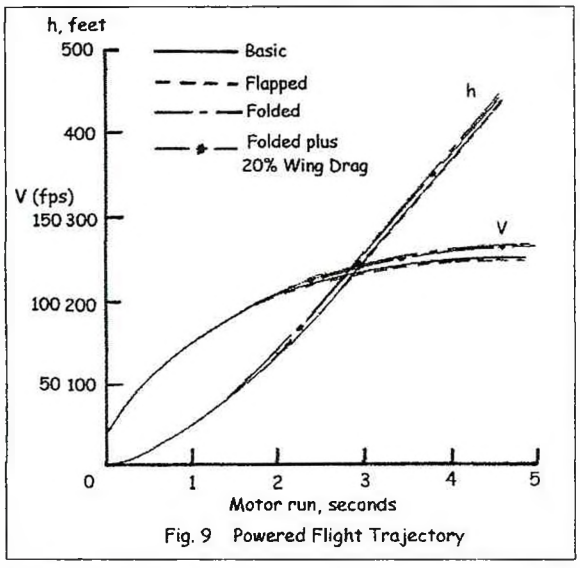

Fig. 9 Powered Flight Trajectory

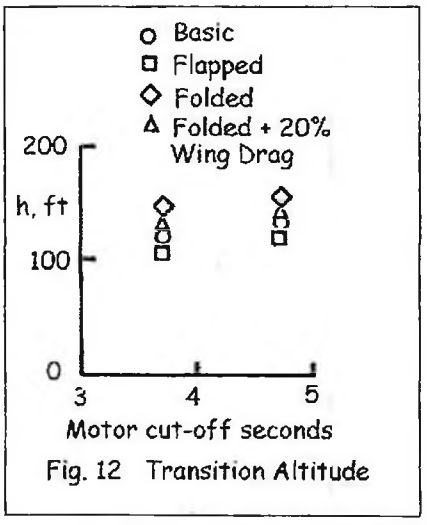

Fig. 12 Transition Altitude

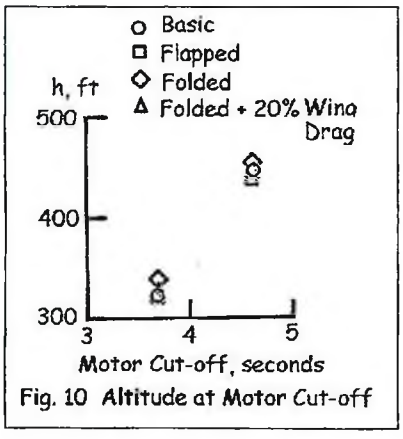

Fig. 10 Altitude at Motor Cut-off

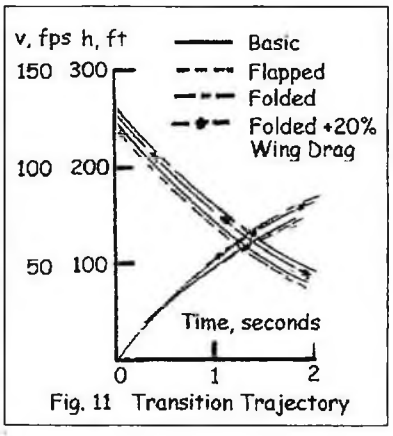

Fig. 11 Transition Trajectory

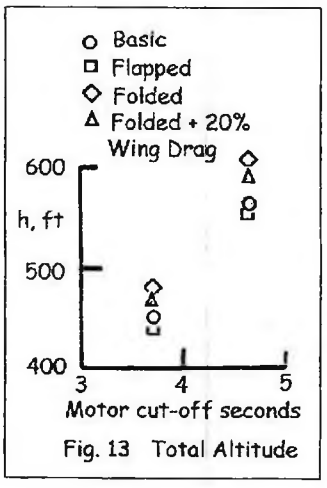

Fig. 13 Total Altitude

flaps down. These airfoils are shown in figure 5.

Aerodynamic data for the above airfoils was obtained from References 4 and 5. Drag at zero lift coefficient versus velocity and wing Reynolds Number shown in figure 6. Included on Figure 6 is the D/q variation for the three wings. The D/q for all other components is the same for all configurations. This data for the non-wing components and the total D/q at zero lift is shown in figure 7.

As mentioned, the glide airfoil for the folded wing is approximated by the flaps down GM-15. Since the wing is open, all configurations now have the same area. Thus the flapped and folded aircraft are essentially the same and have the same glide performance. The flapped airfoil and the open folded airfoil are compared in Fig. 8.

Analysis

Presented in Fig. 9 are the trajectories of the three primary configurations. Presented are velocity and altitude versus motor run for the basic fixed wing, flapped wing and folded wing for two values of wing drag. As mentioned earlier, the largest unknown among the aerodynamic data was the value of the folded wing. To account for this uncertainty the wing drag was increased by 20%. As shown this increase in drag had little effect on either velocity or altitude.

Figure 10 presents the altitude for the various configurations at motor cut-off of 3.7 and 4.6 seconds. These values were chosen to account for the time delay for the sound to reach the timers ear for 4 and 5 second runs respectively. As presented the Folder has a slight advantage in height attained of 10 feet for the 4 second run and 14 feet for the 5 second motor run. Flapped and fixed configurations are at virtually the same altitude.

After motor cut-off the model is in a ballistic decelerating mode similar to an arrow shot vertically into the air. The altitude attained is a function of drag and the velocity of the model at cut-off. The variation of altitude and velocity with time for the four previous configurations is shown in figure 11 for the 5 second motor run. The data for the shorter run is similar.