Figure 5 for the C-49F was computed by this method. All other curves for this plane were derived from the extrapolated sinking speed curve.

The thrust horsepower required for the CG-4A glider was obtained in a similar manner to that used for the tug, except that in this case, the horsepower required was obtained from drag measurements. On the conventional CG-4A glider with tactical landing gear, the drag was measured for speeds between 110-150 MPH indicated. By the same mathematical procedure as used on the C-49F, the flat plate area $f = 27.3$ sq. ft. and $b_e = 47.2$ ft. The fact that the Oswald efficiency factor of the CG-4A is only $\frac{47.2}{83.7} = 56.5\%$ is of considerable interest and merits further analysis. Such a poor effective span is indicative of an adverse distribution of lift on the wing.

The various CG-4A curves in Figures 2 and 5 were obtained by extrapolation, using the Oswald performance equation and the constants f and b_e determined from the measured data.

In Figure 2 are shown the separate THP_r curves for the C-49F and the CG-4A. The addition of the THP_r of the CG-4A to that of the C-49F at the same speed yields the power required for the glider-tug combination. As mentioned before, some error may be introduced by this addition, but the results will nevertheless be useful for towing studies. There are a number of salient points in the curves. First, it should be noted that minimum power for the glider occurs at 60 MPH, for the C-49F at 100 MPH and for the combination at 85 MPH. Likewise, the speed at which L/D max for the combination occurs is at a speed somewhat lower than that for the C-49F alone. For most economical cruising, the tow should therefore fly at 110 MPH indicated airspeed.

A comparison of the sinking speed curves in Figure 5 shows quite clearly how poor the aerodynamics of the Waco CG-4A glider are. The C-49F, in spite of a wing loading four times that of the glider and the added drag of its engine nacelles, has a minimum sink almost the same as the CG-4A. Furthermore, at higher speeds the sinking speed of the CG-4A is many times that of the C-49F. It would be interesting to speculate on the possibilities of a cargo glider possessing the aerodynamic properties of the C-49F. The beneficial effect on the performance of the composite aircraft of the good characteristics of the C-49F are seen by comparing the L/D curves of the three aircraft. At best L/D the combination has an L/D of 9.75 compared to 7.75 for the CG-4A. Any economic

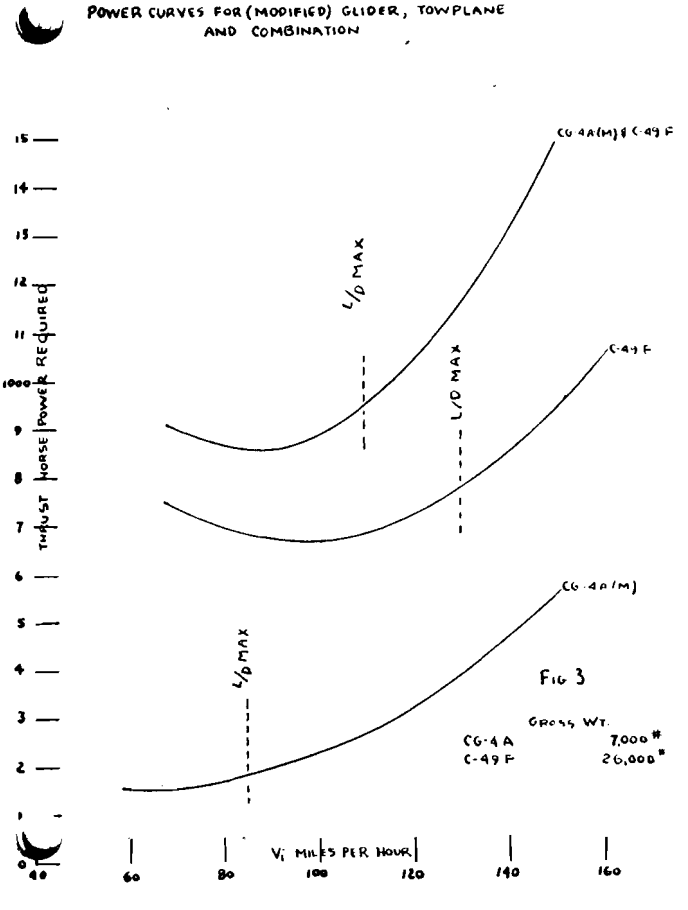

Fig 3

Gross Wt.
CG-4A 7,000 #
C-49 F 26,000 #

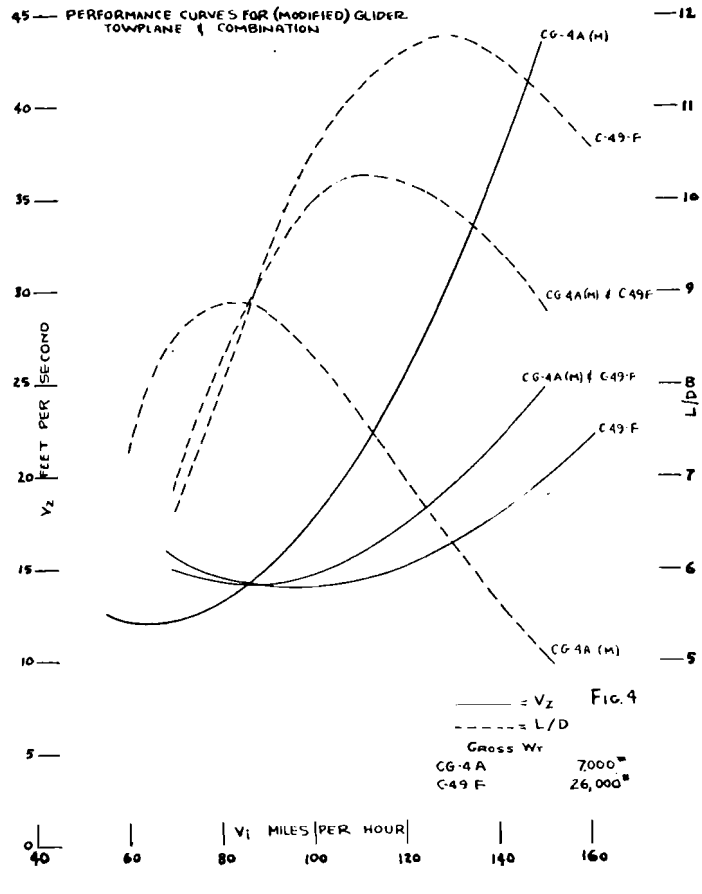

Fig. 4