Glider-Tug Performance Studies

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The principle used in this analysis consists of simply adding the thrust horsepower required for towing the glider to that required by the towplane. It might be mentioned here that there is a possible error in this technique,—the turbulence behind the airplane may increase the drag of the glider, or else the glider may possibly fly in such a position behind the plane as to ride on the vortex coming from the plane's wing. Such a coupling may make the drag appear lower than in free air.

Not knowing the effect of the above mentioned factors, the analysis of towing was made by adding the thrust horsepower required for the glider to that of the tug. The horsepower required for four different indicated airspeeds was given for the C-49F tug. From the gross weight and these THP_r's, the sinking speed and L/D were computed. The curves shown in Figure 1 present the measured performance curves for the C-49F.

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In order to extrapolate the measured performance curves to lower speeds, the Oswald performance equation was used

$$V_z = \frac{Vi^3}{841\frac{W}{f}} + \frac{268\frac{W}{b_e^2}}{Vi}$$

f is the equivalent flat plate area of the airplane and b_e is the effective span. By choosing the coordinates of two separated points on the measured sinking speed curve for the C-49F, it is possible to compute the value of f and b_e. For the C-49F, f=27.4 sq. ft. and b_e=92.8 ft. The geometric span of the C-49F is 95.0 ft. It will be seen that the efficiency of the plane $e=\frac{92.8}{95.0}=98\%$ is quite high, indicative of clean aerodynamic design. It is evident that knowing the constants in the performance equation, the sinking speed may be computed for any indicated airspeed in the range of the aircraft. The sinking speed curve in

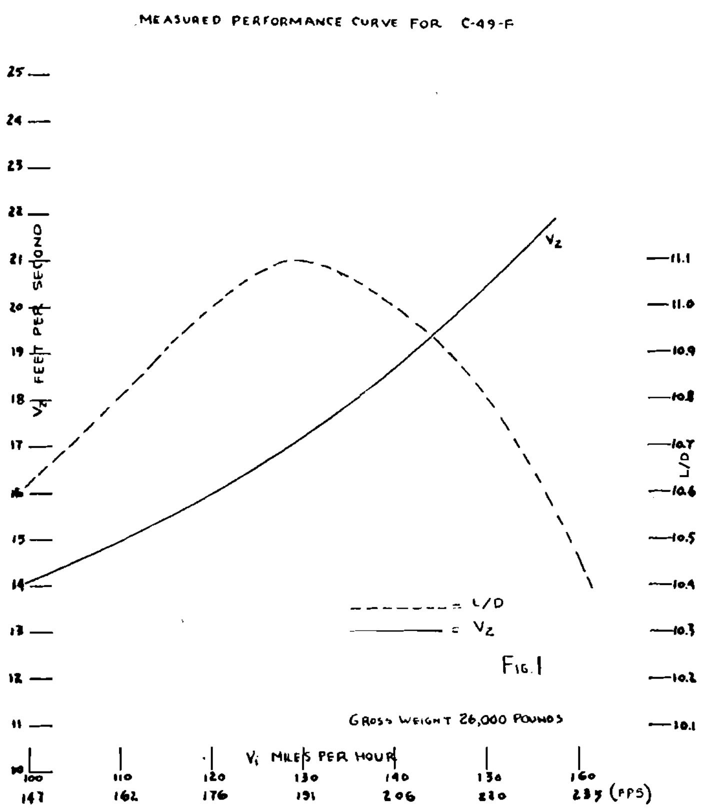

Fig. 1

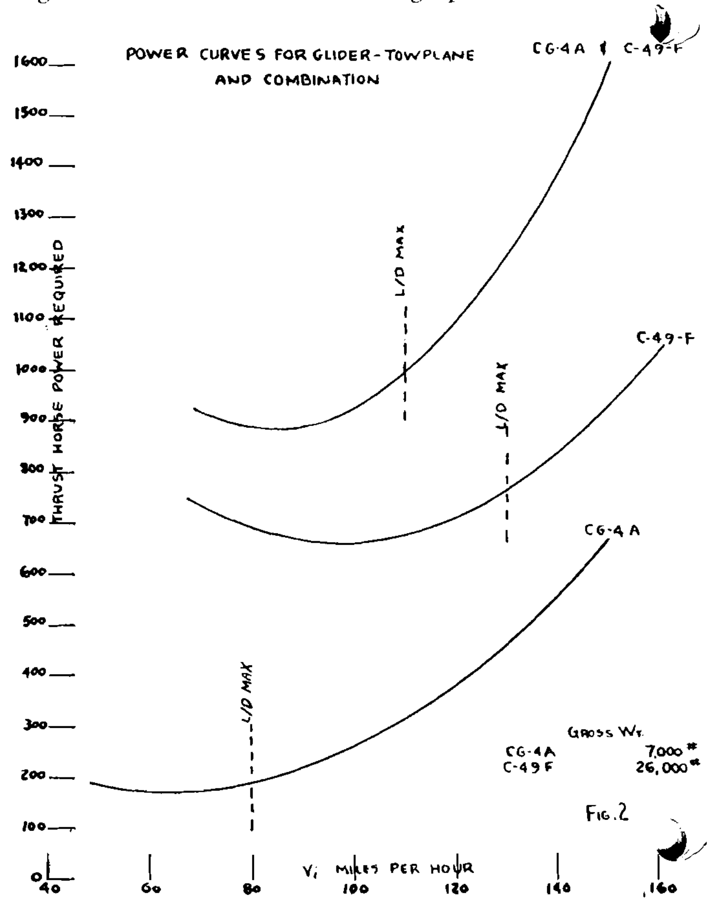

Fig. 2