

It is evident that the sailplane will climb most efficiently when the craft hovers over the slope; in other words $V = V_i$ and $\theta = 90^\circ$.

Then the condition for maximum altitude is that the climb rate of the glider be zero and $v = v_s$ or

$$\frac{V_i h}{\pi r} = \frac{f}{841W} V_i^3 + 268 \frac{W}{b_e^2} \frac{1}{V} \quad \text{Equation 2}$$

$$r = \frac{h}{\pi} \frac{V_i^2}{f} + \frac{268W}{b_e^2 V_i^2}$$

In order to determine the maximum altitude, "r," the derivative $\frac{dr}{dV_i}$ is set equal to zero, resulting in

$$r_{\max} = \frac{h}{\pi} \sqrt{\frac{841 b_e^2}{268 f}} \quad \text{Equation 3}$$

$$V_i = \sqrt[4]{268 \frac{W^2}{b_e^2 f} \cdot 841} \quad \text{Equation 4}$$

In order to render the form of the above equations more amenable to computation, the parasite loading will be expressed in terms of the maximum $\frac{L}{D}$ by

$$\left(\frac{L}{D}\right)_{\max} = \sqrt{\frac{\pi}{2}} \sqrt{\frac{AR_e}{C_{Dp}}}$$

where

$$C_{Dp} = \frac{f}{s} \left(\frac{L}{D}\right)_{\max} = \frac{\pi}{4} \frac{b_e^2}{f}$$

Using these relations, the following equations result

$$V_i = \frac{1}{b_e} \sqrt[4]{268 \times 841 W^2 \left(\frac{L}{D}\right)_{\max}^2}$$

$$r_{\max} = \frac{h}{\pi} \left(\frac{L}{D}\right)_{\max}$$

It might interest the reader to compute the maximum altitude the glider (Schweizer) mentioned in a previous

example could attain over the Wurtsboro ridge. The $\left(\frac{L}{D}\right)_{\max}$ of the sailplane is 23.5. The maximum altitude is then

$$r(\max.) = \frac{1060}{\pi} 23.5 = 7920 \text{ ft.}$$

The indicated airspeed of the glider hovering over the ridge at this altitude would be

$$V_i = \frac{1}{b_e} \sqrt[4]{268 \times 841 \frac{4W^2}{\pi} \left(\frac{L}{D}\right)_{\max}^2} = \frac{70.8 \text{ f.p.s.}}{(48 \text{ m.p.h.})}$$

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WARREN J. MERBOTH

Golden C No. 5



On July 27, 1942, the altitude leg of the Golden C Award was made by Warren J. Merboth, at Twenty-nine Palms, California. The barograph was calibrated by a committee, Parker Leonard, Jay Buxton, Vic Saudek, Gus Rasper and Ben Shupack. That is, Vic Saudek and Gus Rasper did the calibration; the rest of us gave them moral support. Then Bob Stanley gave his approval to the official altitude of 10,820 feet above point of release. Warren turned in his distance requirement with a flight of 202 miles during the 1939 contest.

Warren's own account of his Golden C Altitude flight follows:

"I took off in a Schweizer two-place July 27, 1942 at 3:15 P.M. on a double airplane tow. Larry Creighton was in the other Schweizer on the tow, and as prearranged we were going to attempt our 'Golden C' altitude flights together. Three minutes after take-off and at 700 feet we encountered strong vertical movement. I, being on the short line of the double tow, released first and began to climb rapidly at from 10 to 15 ft./sec. At 4,000 feet I was able to widen my circles to about 500 feet in diameter. At 8,000 feet the thermal dissipated and another was soon found which carried me to my peak altitude of 11,600 feet above take-off. Several attempts were made to enter the cloud base at this altitude but each time the thermal would break up about 500 feet below the cloud base. Maximum altitude was reached in 30 minutes where I cruised for one hour to get away from the ground temperature of 130° . Maximum indicated rate of climb was 68 ft./sec.

"I believe this to be the ideal location for future altitude records for at times the ceiling is at 17,000 to 20,000 feet. Ed Laine reached 16,400 feet without even trying."