● Peravia Barograph

(Continued from Previous Page)

mes (Soaring Jan. Feb. 1950).

$$V_{eff} = \frac{V_{th} - W_{th}}{W_s \pm V_s + (V_{th} - W_{th})} V_s$$

Where V_{eff} is the effective average cruising speed and V_s is the speed between thermals, $V_{th} - W_{th}$ is of course the vertical climbing speed in a thermal, V_c, and $W_s \pm V_s$ is the vertical speed of descent between thermals, V_x. With these introduced into Temmes' equation we arrive at:

$$\frac{V_{eff}}{V_s} = \frac{V_c}{V_x + V_c}$$

The quantity $\frac{V_{eff}}{V_s}$ we can call an efficiency factor. It is really the cross-country cruising efficiency. For example if we obtain an efficiency of 50% it means that we are going cross-country at a speed 50% of our speed between thermals. On the right hand side of our efficiency equation one sees a very interesting relation

$$\frac{V_c}{V_x + V_c}$$

This relation is merely the ratio of the climbing speed in a thermal to the sum of the climbing speed and the sinking speed between thermals. Both of the quantities V_c and V_x may be read directly from a Peravia barogram. If this is done with the complete barogram of Dick Johnson's flight and the efficiency plotted during the flight we obtain the curve in Fig. 6. This curve shows a maximum in efficiency of 80% at about the same time that our maximum in thermal strength occurred, See Fig. 5. It is seen that the efficiency curve rises rapidly to a maximum and drops off gradually. As a matter of fact the nearly horizontal portion of the barogram covering the last tedious hour of the flight could not be computed since no distinctive thermals were worked.

Now this study does not tell us what actual cross-country speed was attained during the time of the flight. We know only that Dick averaged about 48 mph. We also know that the wind was very weak. Since his average efficiency was some 55% we can compute that on the average Dick must have cruised his sailplane RJ-5 at about 87 mph between thermals. However this information does not teach us much about the cross-country technique which Dick used. What is really needed to evaluate such a flight is a true airspeed recorder which will record Vs directly on the barogram. Such a device could easily be devised to actuate the control punctures on the Peravia barograph. A small propellor could be geared down to a switch which would be connected in place of the push-button "P" on Fig. 2. The propellor would thus control a puncture on the barogram. If the gear ratio and propellor pitch were properly chosen, the spacing of the punctures could be exactly one mile or a fraction thereof.

This paper was intended to describe a new tool for the study of soaring performance. It is a barograph which costs about twice as much as a conventional design but it is also a barograph which yields more than twice as much useful information. A group of sailplanes fitted with such instruments could collect much valuable data on micrometerology as well as soaring technique.

The Scientific Committee Chairman will be pleased to lend the Peravia catalog to anyone interested in

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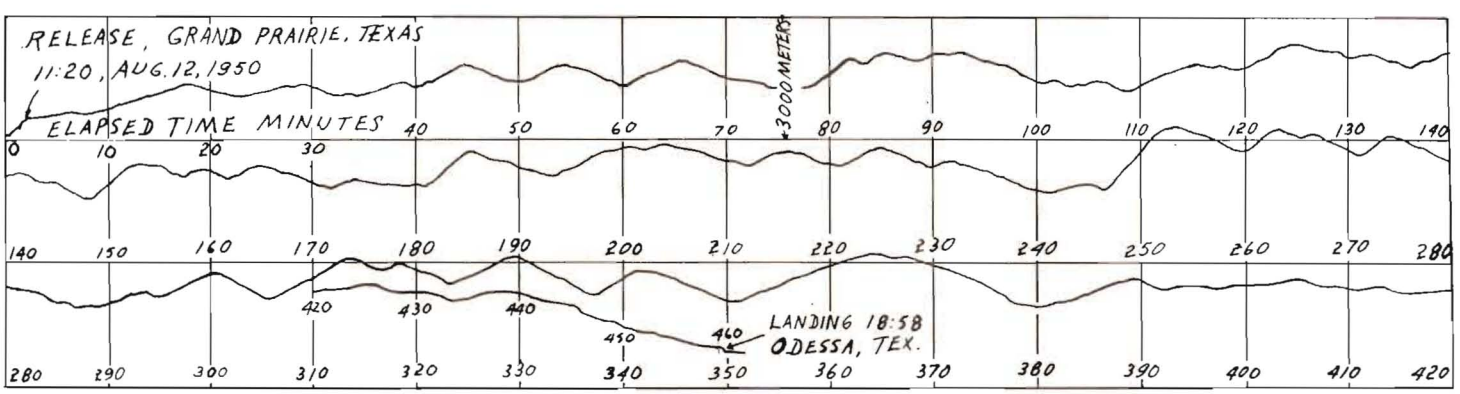

FIG. 4 ABOVE

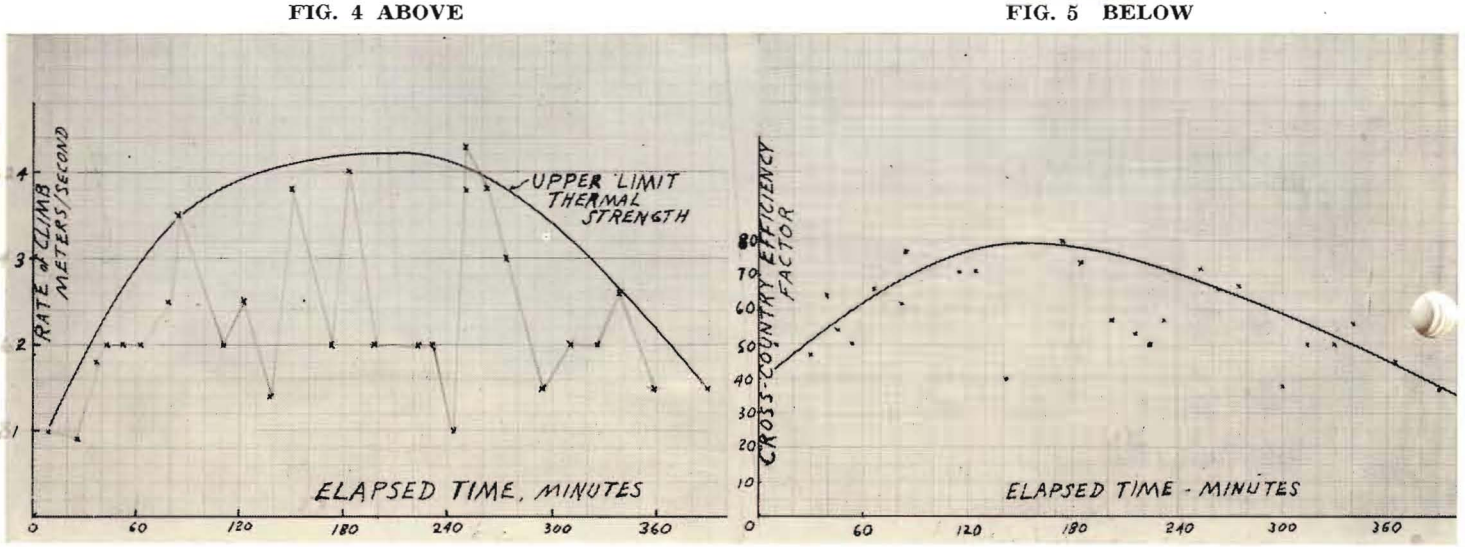

FIG. 5 BELOW