

OPTIMUM AIRSPEED SELECTOR

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The Author (right) with Capt. R. S. Barnaby at the 1948 International Contest at Orebro in Sweden.

This article describes the cross-country airspeed selector which is a simple device that indicates the optimum speed at which a sailplane should be flown between thermals. The unit consists merely of a paper on which velocities are printed in such a way that they appear next to the numbers of the variometer. For a pellet type variometer the airspeed selector is set vertically alongside the red pellet. For a circular face instrument the selector takes the form of a ring set around the glass. Whatever velocity the variometer needle points toward is the correct velocity for the sailplane. The selector is easy to make and use; I have employed it since 1947. It has been described in the *Schweizer Aero Revue** but has not yet been published in English except for a Southern California Soaring Association symposium. This article shows how to make the selector, mentions the theory behind it, and describes its uses and limitations.

On a day with weak thermals and weak downcurrents, a pilot should fly between thermals at a velocity near that for best gliding angle of the sailplane — and thus reach the next thermal as high up as possible and not have to spend too long climbing in it. If the next thermal to be encountered is expected to be strong, the pilot should dive toward it at high velocity in order to reach it as rapidly as possible. (Since it will take him up rapidly, it makes little difference how high up he contacts it.) If the downcurrent in which the pilot happens to find himself is severe, the pilot should again fly fast, in order to get out of the "down" area quickly. Just exactly

how fast to fly under these various conditions is what the airspeed selector is intended to show. Note that the magnitude of the wind is of no concern when considering thermals which move with the air mass. Sometimes maximum speed is not the pilot's only consideration, and so the airspeed selector must not be followed blindly.

Let W = variometer reading

v = horizontal airspeed of the glider

w_t = average rate of climb expected in next thermal (on an average soaring day a pilot can readily estimate w_t to the accuracy required from consideration of thermals already utilized and past experiences)

If the sailplane has performance similar to the Schweizer 1-23D its average cross-country flying speed will be maximum when flown according to the following table:

$W + W_t$ (ft./min.)	v (mph)
000	38
100	45
200	52
300	59
400	65
500	70
600	75
700	80
800	84
900	89
1000	94
1100	97
1200	100
1300	103
1400	105
1500	107
1600	109
1700	110

During flight one actually will use a table of W vs. v ; if $w_t = 0$, (if negligible rate of climb is expected in the

next thermal), the above table reads directly W vs. v . If $w_t = 200$ fpm (if the next rate of climb is to be 200 fpm), the table will read W vs. v if the left column is moved down two lines relative to the right column. Thus one W vs. v table with sliding column will handle any value of w_t .

For $w_t = 000$ fpm		For $w_t = 200$ fpm		For $w_t = 400$ fpm	
W fpm	v mph	W fpm	v mph	W fpm	v mph
000	38	—	38	—	38
100	45	—	45	—	45
200	52	000	52	—	52
300	59	100	59	—	59
400	65	200	65	000	65
500	70	300	70	100	70
600	75	400	75	200	75
700	80	500	80	300	80
800	84	600	84	400	84
900	89	700	89	500	89
1000	94	800	94	600	94
1100	97	900	97	700	97
1200	100	1000	100	800	100
1300	103	1100	103	900	103
1400	105	1200	105	1000	105
1500	107	1300	107	1100	107
1600	109	1400	109	1200	109
1700	110	1500	110	1300	110

This adjustable table can be carried in flight and readily set to the required w_t . Then the pilot has merely to fly at the velocity where W agrees with the variometer. As velocity is changed, W changes too, so getting the proper v is really an iterative process. However, with slight practice the process is one step to the accuracy needed.

It is convenient to utilize the numbers actually on the variometer as the left hand column, and make the right hand " v " column so it can be set alongside. For example, when using a circular faced variometer having a linear scale (a scale with constant

*MacCready, P. B.: "Die beste Streckenflugeschwindigkeit für Segelflugzeuge", *Schweizer Aero Revue*, November, 1949.