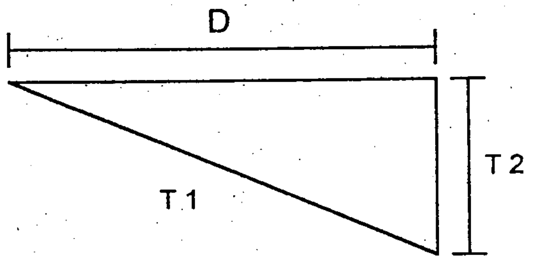
SPEED TO FLY

In the early days of cross-country gliding it was thought that the best speed to fly was the speed for the glider's maximum L/D.

Dr Paul McCready proved this to be incorrect. Most cross-country flights consist of a series of climbs in thermals and glides between them. McCready calculated that as the thermal strength increased, it paid to fly faster than the best glide angle speed.

He showed that for every thermal strength there is an optimum speed to fly between thermals to give the fastest average speed.



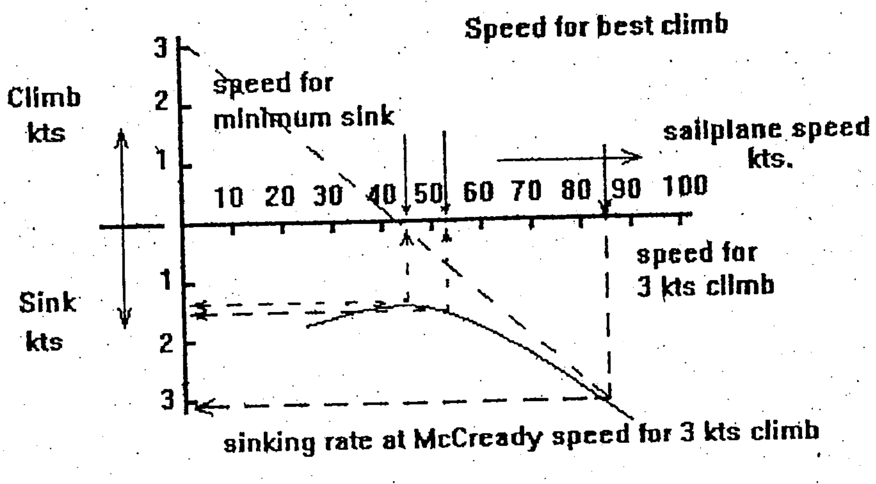
D = Distance

T 1 = Time covering distance

T 2 = Time to regain height

Average speed is $\frac{D}{T1 + T2}$

The performance curve of a sailplane provides the basic information for the McCready system of flying. Each type has its own performance curve, McCready speeds to fly and resultant average speeds.

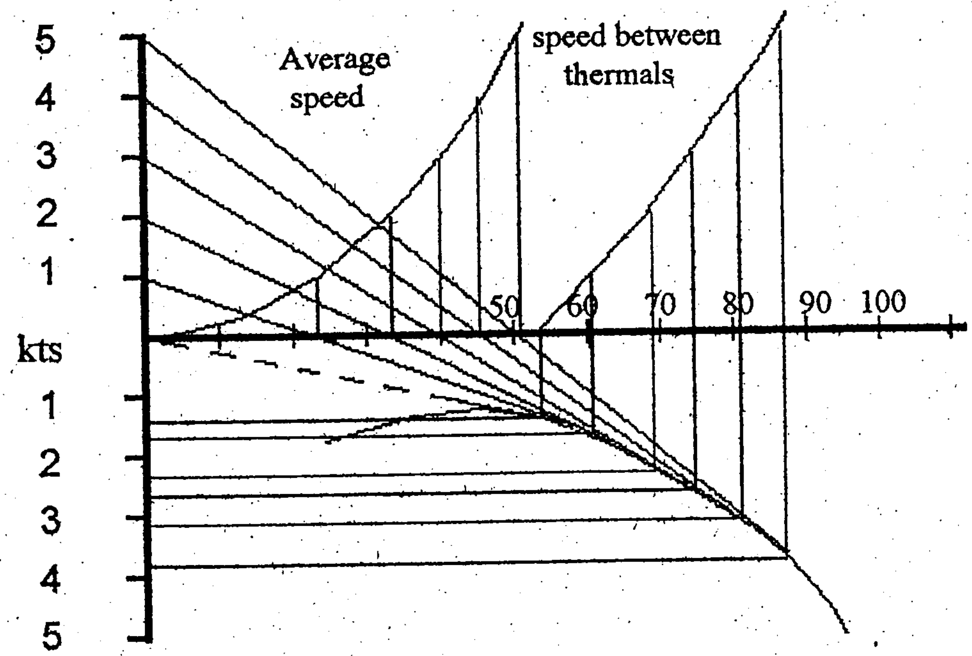


By drawing tangents to the curve form above the zero, the speed to use between thermals may be found at the point of contact between the tangent and the curve. The average speed which results from the application of this system will be given by the intersection of the tangent and the axis of the graph.

By drawing in a number of such tangents form different lift values, two curves may be established.

1 Speed to fly between thermals.

2 Average speed achieved.



These curves represent the optimum speed to fly between thermals, and the average speed that will result from their application. It is often useful to have these speeds tabulated for use in flight planning as well.

This information should be kept handy when flight planning as the speeds may be used to calculate:

1 Allowance for wind drift.

2 Average ground speed.

From this, the time for the task may then be calculated. Each type has its own performance curve, and resultant speeds to fly and average speeds. Below is a table of average speeds for a number of different types.

Achieved Climb in Knots

Type	Kg's	1	2	3	4	5	6	7	8
Blanik	473	30	45	54	63	68	74	78	83
Twin Astir	530	41	61	76	87	96	104	109	114
	620	46	67	82	96	106	113	120	125
Pilatus	350	37	54	65	72	80	85	91	96
Libelle	277	39	56	67	76	84	91	96	100
Astir CS	350	41	61	74	83	91	96	102	105
ASW 19	336	41	61	74	83	91	99	106	111
Cirrus	309	37	56	68	78	87	93	98	104
	391	41	60	74	84	93	100	106	111
ASW 20	345	43	65	78	89	98	106	113	117
Kestrel 17	365	41	61	76	87	95	104	110	115
ASW 17	506	48	69	83	93	102	109	117	122

Achieved Speed in Kilometres per Hour

From the table, the performance capabilites of various types may be compared. Also, it shows that with winds in excess of 20 knots, tasks are rarely practical, except with a good tailwind component.

How do we apply the McCready system to our everyday flying? And what speed ring setting should we be using? These two questions are passed around gilders very often.

How do we apply the McCready system to our everyday flying?

If everyone fly's in the same thermals and has the same speed ring setting, we should all have the same times. Not so. From the previous diagram you can see that if you can move the tangent up the scale, and fly at the same speed, your cross-country speed increase is much greater than by moving the tangent down the polar curve.

SPEED TO FLY

By moving the tangent upwards, ie increasing the average rate of climb, will reduce the time not cruising. This is partially dependant on thermal strength, but can be improved by the pilot in several ways:

- By rapid centring and recentring when the thermal moves,
- By accurate tight circling,
- By use of only the strong thermals
- By leaving the thermal when the climb rate deteriorates.

All the above should be practiced around the field when ever you fly. This is not only to win competitions. On a day with five hours of soaring, 61 kph will complete a 305 K task. 59 kph means outlanding 5 km short of your goal.

<u>What speed ring setting should we be using?</u>

The following table is for 6 knot average climb in a Pirat glider.

Speed Ring Setting	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Achieved Speed kph	82	82	81	77	74	70	66
% Below Optimum	-	-	1	6	10	15	20

Small changes in speed ring setting from the optimum have little effect. However, for a 6 knot climb rate, a ring setting of 2 knots or lower gives a significant reduction in cross-country speed.

The next table is for a 3 knot average climb.

Speed Ring Setting	**3**	**2**	**1**	**0**
Achieved Speed kph	60	59	57	55
% Below Optimum	-	2	5	8

Therefore high average climb rate is most important.

Precise maintenance of the theoretically correct interthermal speed is not critical.

When good climbs are expected, dont leave the ring setting on 0. If you set about half the anticipated climb rate you will achieve most of the benefit. Always set the ring for the next thermal. If conditions ahead are deteriorating, set the ring back to 0 to increase your search area.

Source: Temora Cross Country Course 1993