Determination OF WIND VELOCITY IN FLIGHT

By Al. Santilli

Brief Explanation: This system of determining wind velocity and direction requires that the pilot fly two straight courses, one directly into the wind between two landmarks and the second straight downwind over the same two landmarks. No manipulation of instruments is necessary so that the full attention can be paid to piloting.

A simple formula which can be worked without paper can immediately give the wind speed after a solution inspection. The wind direction has already been determined as corresponding to the line of flight which permits no lateral drift of the aircraft. This is gotten by experimenting.

Equipment

1. Stopwatch or ordinary watch with large sweep second hand.
2. A reliable air-speed indicator.
3. Slide rule optional.

Procedure

1. While in flight feather ship to normal cruising so as to be able to hold a fairly constant air speed throughout the run.
2. By trial and error assume a course which does not permit lateral drift of the aircraft. This is the wind direction.
3. While on this course select two landmarks upwind and note the time taken to fly from a point directly over the first to a point directly over the second.
4. Travel beyond, make a 180 turn, fly at the same airspeed as before and head back downwind over the same two landmarks again noting the time taken to pass between them.
5. The wind velocity is gotten from the following relation:

$$\frac{\text{wind velocity}}{\text{aircraft airspeed}} = \frac{\text{time on upwind leg} - (\text{time on downwind leg})}{\text{time on upwind leg} + (\text{time on downwind leg})}$$

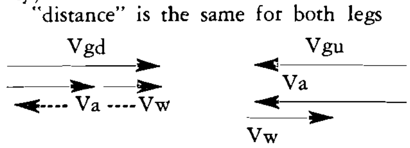
Example

Airspeed—60 m.p.h.
Time for upwind leg—55 sec.
Time for downwind leg—45 sec.
Wind velocity is equal to $\frac{60 \times (55-45)}{(55+45)} = \frac{60 \times 10}{100} = 6$ m.p.h.

With a little training a pilot can perform the addition, subtraction and multiplication in his head while in flight, leaving both hands free for piloting.

PROOF

Va=Aircraft Speed
Vw=Wind Speed
tu=Time to traverse landmarks going upwind
Td=Time to traverse landmarks going downwind
Vgu=Resultant ground velocity on upwind leg
Vgd=Resultant ground Velocity on downwind leg
In general: distance=(time) x (Velocity)
"distance" is the same for both legs



From above Diagram

Vgd=(Va+Vw) Vgu=(Va—Vw)
Vgd td = Vgu tu
(Va+Vw) td = (Va—Vw) tu
TdVa+tdVw = tuVa—tuVu
Vw (tu+td) = Va (tu—td)

Wind Velocity=Vw=Va $\frac{(tu\ \ td)}{(tu-td)}$

"Kirby Kadet" Secondary Glider

The "Kirby Kadet," a product of Slingsby Sailplanes, England, may be the answer to the need for a training ship that may be licensed.

SPECIFICATIONS

All wood Utility training glider, high wing strut braced, single place monoplane.
Fuselage: Hexagonal, plywood covered.
Wing: Two-spar construction, plywood leading edge, fabric covered from leading edge back to trailing edge.
Empenage: All wood fabric covered, cantilver rudder and fin, strut braced horizontal tail plane.
Span: 39 feet.
Chord: 4 ft. 6 in.
Overall length: 21 ft. 3 in.
Wing area: 175.5 sq. ft.
Aspect ratio: 9.
Weight empty: 260 lbs.
Gross weight: 430 lbs.
Wing loading: 2.45 lbs. per sq. ft.
To quote from the Slingsby catalogue:
It has a good performance for this type, and all controls are well balanced and responsive, but not too sensitive. An ideal machine for training purposes; special attention has been given to ease of assembly and dismantling.
The simple, yet robust construction, allows production costs to be cut to a minimum; repairs and the making of replacements are well within the capabilities of club workshops.
The "Kirby Kadet" has been used by all the leading clubs in Great Britain with considerable success.