plotted on the figure. The path predicted by the trochoid equations was then plotted on the same figure using the constants measured from the experimental path. The exact correlation is evident. Equally exact correlation is not obtainable when comparing several loops, and is of course not to be expected considering the limited accuracy of the experimental recording method. The angles from which the bird's image is recorded introduce considerable error in the experimental path as the bird's position varies much from the directly overhead position. In addition, the bird is gaining altitude during the entire recording so that the scale of the record is decreasing with time and the path constants are also changing with altitude. Thus no more than two or three successive loops can be reasonably used to determine the agreement. The valuable fact is that individual loops closely approximate the trochoidal path predicted by the theory.

If at the time of the recording a line is made representing the bird's wing span in the scale of the recording, and if the type of bird is known, considerable information can be gained from the plot. The distances on the plot can be measured in any arbitrary units, say centimeters, and then using the scale factor given by the known wing span of the particular type of bird, these distances can be converted to actual distances in feet. Thus we can determine r, the radius of turn in the thermal by direct measurement of the half-width of the path. Then measuring the value x_1 corresponding to $\phi = 2\pi$, we can solve equation (18) for the ratio W'/V'. By counting the number of time ticks between $\phi = 0$ and $\phi = 2\pi$ we have the elapsed time Δt during which the center of the shell has traveled the distance x_1, whence $W' = x_1/\Delta t$. Then we obtain the circling speed by $V_c = (V_c/W') \cdot W'$. Finally, if we assume that Vc is essentially the bird's aerodynamic velocity, we may calculate its lift coefficient. This has been done for the path of figure 8B which is that of a Cheel with wing span of 4 feet, and wing loading of 0.55 lb./ft.^{2} as recorded by Hankin*. The path shows that the bird is making circles 71.4 feet in radius, the wind velocity is 4.9 miles per hour, the circling speed is 21.8 miles per hour, and the lift coefficient is 0.52. These calculated values are interesting in that the low wind speed is favorable to the formation of large thermals and indeed the large radius of turn indicates that the thermal is considerably larger than those normally used by the Cheels, where the turn radius is only 35 to 40 feet.

(*Note: Next month, Part 3 of this paper will present an "Analysis and Conclusions."*)

* E. H. Hankin (op.cit.).

NEW POST FOR BARNABY

Cap. Ralph S. Barnaby, USN (Ret.), Honorary Vice President and Director of SSA, has recently been named Manager of Project Development of The Franklin Institute Laboratories for Research and Development. He was formerly Principal Engineer in the Operations Analysis Laboratory of the Institute.

Photo by H. Schwing

The Sagitta sailplane, recently test flown in Holland. Designed by Piet Alsema for the Standard Class, it has a span of 15 meters (49.3 ft.), AR of 18.8, wing area of 129 sq. ft., empty weight of 467 lb., gross weight of 705 lb., wing loading of 5.4 lb./sq. ft., min. sink of 2 ft./sec., and max. L/D of "well over 30."