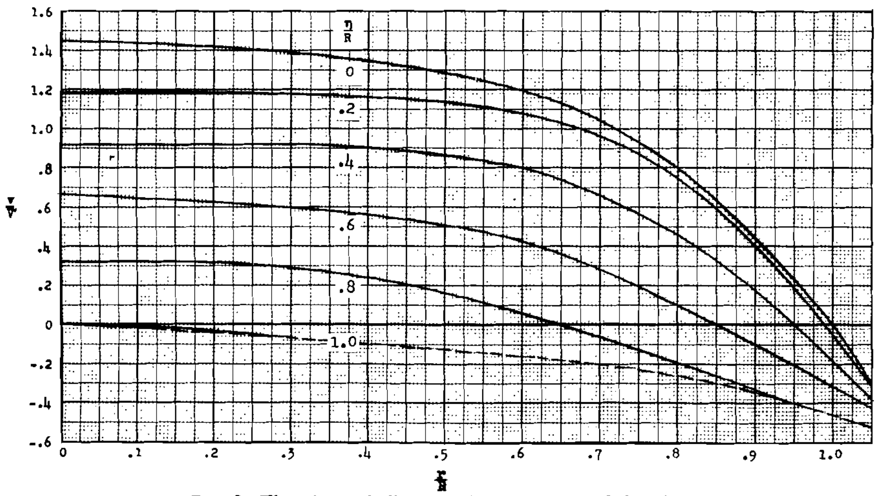

Fig. 3. The thermal diagram (nondimensional form).

Plotted is the value of the vertical velocity component v relative to the vortex core as a function of horizontal radial distance r from the vertical axis of the ring, for constant vertical distances η from the plane of the core axis. The velocity and distance have been nondimensionalized by dividing by V', the velocity of ascent of the shell, and R, the ring radius, respectively. By calculating V' for any value of Γ and R, the vertical velocity distribution can be established for any size or strength thermal for which R/a → 5. The plot shows that the velocity v at the center of the ring ($r = \eta = 0$) is approximately 1.5 times the vertical velocity V' of the shell itself. There is a rather broad region of upward vertical velocities over the central part of the shell and this region extends upward for a considerable distance above the core plane. Near the edges of the shell, the velocity (*relative to the core*, not to the earth) even becomes negative. The velocity relative to earth at each point may be obtained from the figure by adding 1 to the value of v/V'. It will then be found that no measurable negative velocities exist anywhere in or outside the thermal. The dashed line in fig. 3 is the limit or boundary of the moving shell. This plot is of course representative only of thermals for which R/a is approximately 5 since the velocity distribution in a thermal shell depends very much on this ratio. However vortex theory allows us to calculate a similar plot for any thermal provided we know the values of Γ, R, and a, at the altitude we are considering. Generally it is desirable to determine these values at low altitudes since existing theories are capable of estimating the history of the thermal once these initial conditions are known. These values can only come from experimental measurements of actual thermals. This subject is treated in a later section.

The significance of the free thermal is obvious. It is a self-contained source of continuous vertical currents, completely free of any connection with the ground. It allows the relatively concentrated energy of the thermal buoyancy to be spread out over a sufficiently large area that sailplanes can extract it. It also explains the long standing paradox as to how vertical currents can exist in the atmosphere without a continuous air supply from the ground.*

(*Note: Next month, Part 2 of this paper will discuss "Aerodynamics of the Spiral Glide" and "Mechanics of Thermal Flight." Part 3 in the June issue will present an "Analysis and Conclusions."*)

* C. D. Cone, Jr.: "On the Thermal Soaring of Birds (op.cit.).

TORREY PINES MEET

(*Concluded from page 3*)

became the first to begin marginal but continuous cliff soaring in his flat-topped L-K. A dozen others followed his lead and helped create the spectacle that is Torrey Pines for a little over an hour before the wind died enough to liberally sprinkle the beach with sailplanes. It wasn't until closing time for the day, 5:00 P.M., that the last one was towed off, a bit wet from the incoming tide.

Meanwhile, a few pilots had aerotowed for cross-country flights, George Tweed going the farthest, 13 mi. to San Diego State College Airport. Best spot landing of the day was 6 in. by Evan Stover while Rich Egleston had the best bomb drop of 5 ft. 10 in. Larry Bell had the best duration, 1:51 hr. There were no scores for altitude because the light wind kept everyone below 1000 ft.

Sunday found a dry but strong cold front in the area promising unstable air, cumulus clouds and good winds. The first flight had no trouble cliff soaring and it was not long before 23 sailplanes were working the lift area up to 2000 feet high. Occasional thermals would break loose and quickly fill with sailplanes, some high enough to enable the pilots to head inland on cross-country attempts. Sterling Starr profited the most by going 40.7 miles and attaining an altitude of 4,600 feet, enough to insure first place in the final standings. Even so, he returned in time for a few more winch tows to obtain bomb drop and spot landing points. John Williams was able to go 101.8 miles to Brawley from an aero tow. Carlton Kibler had the best spot landing, 2½ in.; Jim Meckoll the best bomb drop, 5 ft. 3 in.; Carl Walters the best duration, 5:21 hr.; and Larry Bell the best two-place distance, 18.4 mi. north along the beach.

The final standings and scores of the competing pilots are given in the accompanying table. First place pilots in each event were awarded trophies as follows:

Meet Champion — Sterling Starr, John J. Montgomery Trophy.

Duration — Kirk Harris, Ryan Trophy, 82.2 points.

Altitude — Sterling Starr, Convair Trophy, 360 points.

Spot Landing — DeVaughn North, Rohr Trophy, 85.2 points.

Bomb Drop — Richfield Egleston, Saron Trophy, 62.3 points.

Distance — John Williams, Solar Trophy, 106.9 points.

Dual Distance — Larry Bell, Essery Trophy, 18.4 points.

Club Participation — Soarcerers, Peterson Trophy, 219.5 points.

Junior Champion — Keith Allen, Helms Trophy, 271.7 points.

A ceramic seagull trophy for second place in overall standings, sponsored by Anna Saudek, was presented to Keith Allen.

So with a kiss from Sterling's queen the meet was brought to a close. AGCSC wishes to thank all of the fine pilots and crews for their friendship, sportsmanship and excellent pilot proficiency as demonstrated in this best of all Torrey Pines meets.