# Technical Notes on Ross' Flight to 36,100 Ft. ASL

ON this flight Ross reached a higher altitude than has been achieved by any other sailplane pilot except Klochner who climbed to 37,400' over the Alps. Klochner, however, released at an altitude above 5000 meters ASL and therefore could not claim the absolute altitude record for sailplanes. There is no reason why this altitude cannot be exceeded at Bishop.

The flight of Ross was exceedingly valuable in advancing the understanding of the atmospheric flow over high mountains. Ross in addition to reaching a high altitude, collected the wind data and the temperatures of the air mass at various altitudes. This information is displayed in Figures 1 and 2.

The winds aloft presented in Fig. 1 were taken with a single theodolite. In this method the rate of climb of the balloon is assumed to be that due to its bouyancy. If the balloon goes through regions of strong updrafts errors result in the horizontal wind measurements. Also, since the balloon drifts downwind, the measurement of the winds aloft is not strictly over Bishop. At a climb of 800'/min the balloon was 23 miles downwind of the airport at 27000'. In such violent motions as exist in the Sierra flow the winds aloft change quite rapidly with altitude and with position with respect to the disturbing mountains. In Fig. 1 there can be seen several dips in the wind speed curves, one prominent one occurring at 1200 PST and at an altitude of around 14000'. This dip amounts to about 14 mph. Just below this altitude, at 11000', the vertical velocity of the flow is found from Ross' report to be 16 mph. The question which faces us is whether the anomaly actually exists in the wind profile or if it is merely an error resulting from the single theodolite wind measurement. Here the sailplanists who have contributed to the knowledge of these flows can contribute even more. By means of a drift sight in the rear cockpit, a sailplane observer could measure the wind speed in a region directly above the Owens Valley. From these data and the vertical speeds one could compute the true direction of the streamlines over the mountain. From this computation the question of whether the flow is actually a series of waves or a series of vortices can be solved. One wind speed measurement obtained from Ross' report is shown as a cross in the wind speed curves. This point occurred at the time he had to speed up to 60 mph to recover his position in the vertical current.

Fig. 2 of Ross' paper shows the air mass to be convectively stable; a condition usually required by the wave theories for such flows. However, it will be seen that the temperatures as measured by Ross in the glider are about 2 degrees centigrade higher than those at the other measured points. This rise in temperature may be due to the heating of the general air mass by the sun. (The U. S. Weather Bureau measurements were taken at 0700 PST, whereas the glider flight started at 1500 PST.) Or, the temperature rise may be due to the fact that the sailplane was in air which was continually rising. In any case this fact in itself is a worthwhile contribution to the science of atmospheric flow, and Ross deserves distinction for displaying the initiative to take the data on his record flight. However much more effort of this type must be expended before a rational explanation of the phenomenon can be made.

(Tech. Ed.)

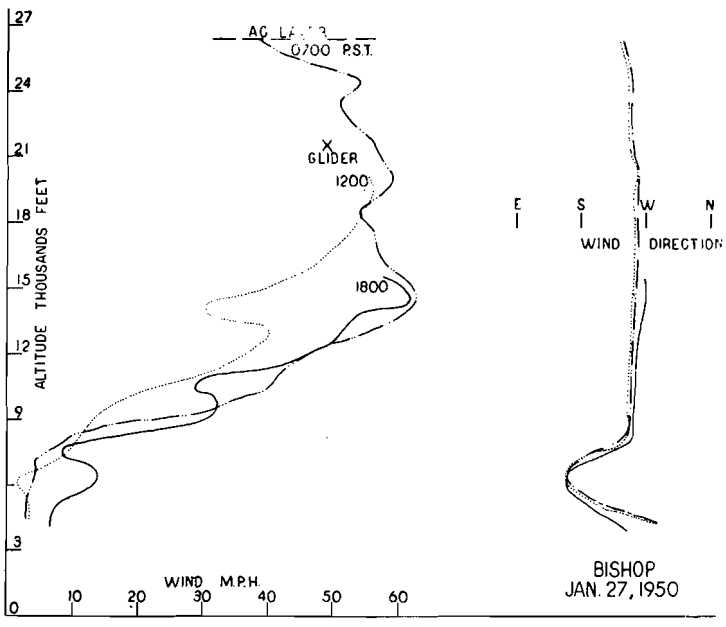


Fig. 1

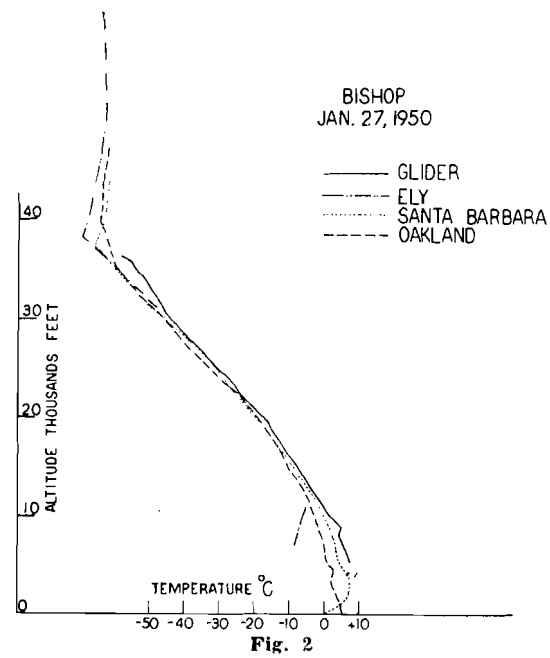


Fig. 2