

# LONG WAVE RADIATION OF POSSIBLE CELESTIAL ORIGIN

By Grote Reber

A limited number of observations at 520kc last year produced small residuals at night which were far above thermal noise and apparently could not be attributed to atmospherics. Also some meager theory existed which indicated that a celestial radio wave of low frequency might penetrate the ionosphere by travelling along the earth's magnetic field rather like a railway train on a track provided the field be nearly vertical as at Hobart.

To examine these matters a quiet valley was located about 30 miles north of Hobart. Two parallel east-west wires were hung across the valley about 1000 feet apart in a north-south direction. The south wire is 3660 feet long and the north one 3920 feet long. The antennas form the center 2200 feet of each of these wires and are about 300 feet above the valley. Thus each wire consists of two horizontal half wave dipoles in phase. The relative phase between the two wires is adjusted by means of delay coils in series with the buried feed lines. Thus it is possible to swing a maximum of the antenna pattern about  $40^{\circ}$  north or south of the zenith. A null may be adjusted to any position in the north-zenith-south plane.

Observations were started on 12th of August and immediately produced strong night time residuals with the antenna beam pointed straight up. During the day the apparent antenna temperature is about  $10^3$  degrees. A rise begins about 5pm and continues to 10pm when the maximum temperature is on the order of  $10^5$  degrees. Then a slow decrease sets in and continues steadily thru all the early morning hours until the antenna temperature is on the order of  $10^4$  degrees just before dawn. Immediately after dawn there is a rapid

decrease to about  $300^{\circ}$  minimum temperature at 8am and then a gradual rise to the steady daytime value by 10am.

Direction finding tests showed the daytime radiation to be arriving from a rather large diffuse region about  $40^{\circ}$  south of the zenith. This daytime source may or may not persist at night. The night time source is much smaller and probably at about  $30^{\circ}$  north of the zenith.

When a polar black out occurs the night time source is extinguished and the level falls to near daytime values. Superimposed on the night records frequently are medium size swells with a random period of a half hour or more. The cause of these ~~swells~~ is unknown but may be associated with the aurora. Whether or not either the day or night sources are of celestial origin is presently unknown. If so, it can best be shown by a sidereal component. The observations are continuing.