A SURVEY OF THE SOUTHERN SKY AT 30 Mc/s*

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This paper presents the results of a 30 Mc/s survey of the southern sky using the 210 ft steerable reflector at Parkes, N.S.W. The aerial was fed by a right-handed helix with plane reflector giving a tapered illumination that fell to approximately 10% at the edge of the aperture. The resulting main beam was circular and approximately 11° between half-power points. The aerial measured left-handed circular polarization relative to the direction of propagation.

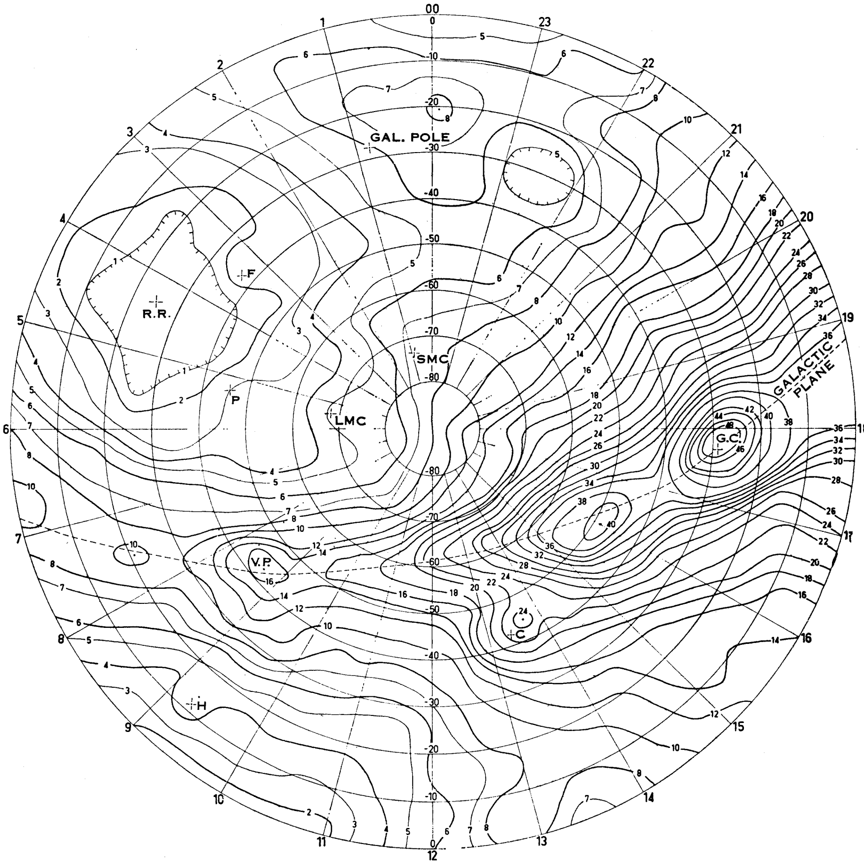

Fig. 1.—30 Mc/s isophotes in equatorial coordinates (epoch 1964). The brightness temperature contour unit is 1800 degK. The point above which all temperatures are measured is at R.A. $04^{\mathrm{h}}\ 20^{\mathrm{m}}$, dec. $-25°$, which is indicated by R.R. in the figure. The positions of the stronger radio sources are marked and identified by their initials: the galactic centre (G.C.), the Vela Puppis region (V.P.), Centaurus A (C), Hydra A (H), Fornax A (F), Pictor A (P), the Large Magellanic Cloud (LMC), and the Small Magellanic Cloud (SMC).

* Manuscript received September 7, 1965.

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The receiver was a cascade amplifier with a noise temperature of less than 100°K and a bandwidth of 2 Mc/s. At this low frequency the main contribution to the total noise of the system was produced by the sky temperature and, with a 2 s time constant, the peak-to-peak noise was about 60 degK. The system was calibrated using the radio source Fornax A, which was assumed to have a flux density of 2700×10^{-26} W m^{-2} (c/s)$^{-1}$ at 30 Mc/s. This value has been derived from a combination of the results of Bolton, Gardner, and Mackey (1964) at 408 Mc/s, of Sheridan (1958) at 85·5 Mc/s, and of Shain (1959) at 19·7 Mc/s. Fornax A gave a main beam brightness temperature T_b of 2300°K when at the centre of the aerial beam.

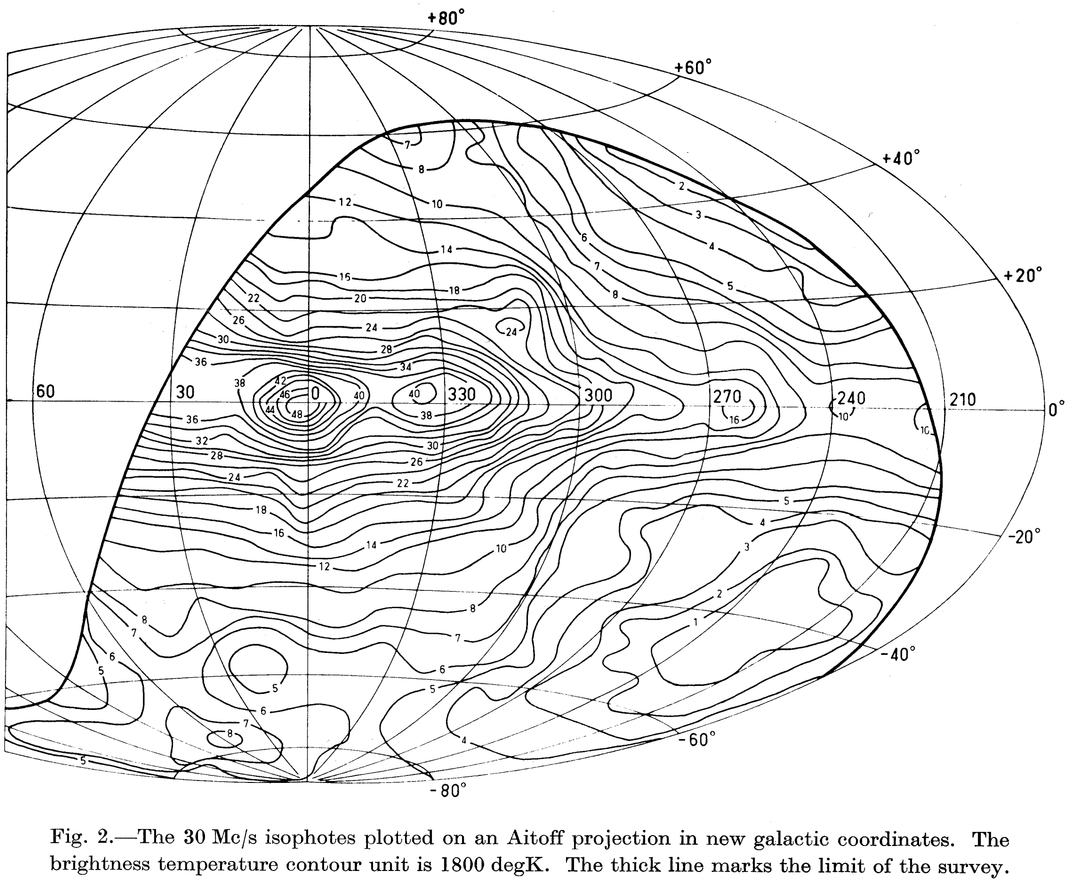

Fig. 2.—The 30 Mc/s isophotes plotted on an Aitoff projection in new galactic coordinates. The brightness temperature contour unit is 1800 degK. The thick line marks the limit of the survey.

The survey, which was carried out in October 1964, covers the sky from the celestial equator to the south celestial pole. The observations were taken by scanning the telescope in azimuth at 16°/min from azimuth 70°, through 180°, to 290° and back again. This process was repeated continuously from 1600 to 0930 hr, Local Solar Time. The zenith distance of the telescope was kept constant at 57° so that the south celestial pole was passed through at the middle of each scan. This point was used as the reference region of the survey. Fornax A, the calibration source, was observed three times during the night to check on the overall sensitivity of the measuring system.

The isophotes are drawn in equatorial coordinates in Figure 1. The brightness temperature contour unit is 1800 degK. The point above which all temperatures are measured is at R.A. $04^{h}\,20^{m}$, Dec. $-25°$. Wielebinski (personal communication) has estimated the absolute brightness temperature at 30 Mc/s of this position to be 14 800°K. The estimated probable error of the measurement of brightness temperature is 1000 degK. In Figure 2, the contours have been redrawn in new galactic coordinates on an Aitoff projection. The thick line marks the limit of the Survey.

References

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Shain, C. A. (1959).—"Paris Symposium on Radio Astronomy." (Ed. R. N. Bracewell.) p. 328. (Stanford Univ. Press.)

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