this number is still further reduced. By assuming a mean spectral index of $-1 \cdot 0$, a rough estimate of the 18 Mc/s source population can be obtained from the source density figures derived from Mills's 100 Mc/s survey[5]. The predicted density of sources having an 18 Mc/s flux greater than 10^{-23} W/m²/c.p.s. is only about two per steradian in the portion of the sky traversed by Jupiter during the 1961 apparition. While scintillation may affect somewhat the amplitudes of the Jovian bursts, it seems unlikely to alter in an essential way the orders of magnitude that are involved.

As a result of these discrepancies we have been led to conclude that our observations do not lend support to the occultation theory of the Jovian radio outbursts.

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Frequency Drift and Time Profile of 200 Mc/s Bursts of Type III and the Electron Temperature of the Corona

THE most prominent feature of solar bursts of spectral type III is their frequency drift from higher to lower frequencies. Wild[1] has determined the drift velocity in the frequency region of 70–130 Mc/s, but until now there have been no satisfactory determinations of the drift rate on higher frequencies.

We therefore undertook to determine the frequency drift velocity of type III bursts from high-resolution swept frequency observations made in the 205–230 Mc/s range at the Oslo Solar Observatory between the middle of 1961 and late 1962.

Fig. 1 gives a histogram showing the distribution of bursts of different drift velocities. The curve has a maximum around -40 Mc/s² and a tail which extends to roughly -150 Mc/s². It is noteworthy that no bursts were observed with frequency drift velocities less than -20 Mc/s². The total number of bursts which were included in the analysis amounted to 68. The mean drift velocity as calculated from the histogram is $\mathrm{d}f/\mathrm{d}t = -60 \pm 10$ Mc/s².

In his observing range, Wild[1] found that the frequency drift velocity was approximately proportional to the frequency, and was given by $\mathrm{d}f/\mathrm{d}t = -f/k$, where k was a constant which varied from one burst to the next one. The mean value of k determined from 10 bursts was $4 \cdot 5$ sec. Inserting our observed mean value of $\mathrm{d}f/\mathrm{d}t$ in Wild's empirical equation, and using 215 mc/s as the centre frequency of the observing range, we find $k = 3 \cdot 6 \pm 0 \cdot 6$. This is relatively near the value found by Wild, but indicates that k decreases with increasing frequency. It is interesting to note that the observed variation of k agrees closely with that expected for an exciting disturbance propagating at constant speed in a corona in which the electron density follows Newkirk's[2] model for an active region.

The time profiles of the bursts in our observational material have been found from photometer tracings along the time axis of the records. For this purpose only distinct bursts, in which the maximum intensity did not saturate the records, were selected. The mean time profile of the bursts was slightly asymmetrical, and had a rising part which was steeper than the decaying portion.

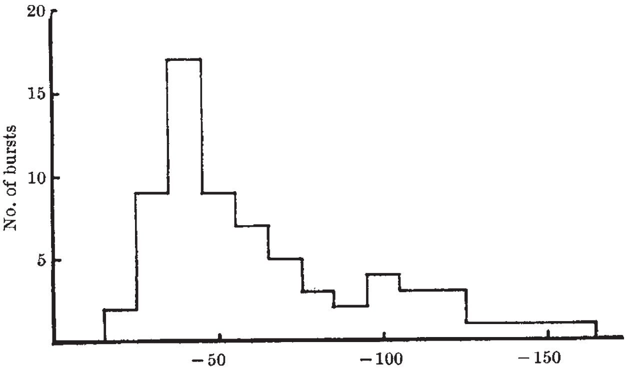

Fig. 1. Distribution of bursts of different frequency drift velocities

We now adopt the conventional model of type III bursts. The bursts are generated by a disturbance travelling at high speed through the corona, exciting oscillations with frequencies which are determined by the plasma frequencies at the appropriate heights. The oscillations are damped by collisions between electrons and ions. The time profile as observed on a single frequency can then be calculated in the manner outlined by de Jager[3]. The factors of importance for the calculated profile are the frequency drift velocity, the band-width of the excited oscillations and the collision frequency between electrons and ions. Using a frequency drift of -60 Mc/s², we found excellent agreement between the observed and the calculated time profile for a half-power band-width of 28 Mc/s and a collision frequency of 8 per sec. The large band-width agrees with the impression we get from a visual inspection of the records. The natural band-width of electron oscillations in the solar corona seems to be small, and it is therefore reasonable to suppose that the observed band-width is determined by the dimensions of the exciting disturbance. Using Newkirk's model of the variation of electron density with height in an active region, we find from our observations that the depth of the exciting disturbance at a height of $1 \cdot 15\ R_{\odot}$ is about $0 \cdot 05\ R_{\odot}$.

From a similar analysis of the time profiles of type III bursts observed by Weiss and Sheridan[4] at 40 Mc/s we find evidence for an expansion of the exciting disturbance as it travels out through the corona. If the disturbance is assumed to be a cloud of particles, expansion would occur if the particles were ejected with an initial velocity dispersion.

When the electron density and the collision frequency are known, the electron temperature can be determined. The value of 8 per sec for the collision frequency gives $2 \cdot 1 \times 10^6$ deg. K for the electron temperature at the height of $1 \cdot 15\ R_{\odot}$. This is in good agreement with a streamer temperature of $2 \cdot 3 \times 10^6$ deg. K as found by Hepburn[5] from optical eclipse observations.

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