A DECAMETER TYPE II BURST ASSOCIATED
WITH A BEHIND-THE-LIMB FLARE

(Research Note)

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Abstract. The characteristics of a decameter type II burst associated with a possible behind-the-limb flare are discussed. The burst source had an unusually high velocity. Assuming that the disturbance propagated as an MHD wave, the magnetic field strength at the 40 MHz plasma level is estimated to be 5.6 gauss.

At meter and decameter wavelengths the velocities of type II burst sources usually lie within the range 1000–2000 km s⁻¹ (Kundu, 1965). A small number of type II sources attaining higher velocities have been reported in the literature (Kundu, 1971; Smerd, 1970). We describe here a complex radio event involving a type II source that moved with a higher-than-usual velocity and was associated with a solar proton event. The observations were made with the swept frequency interferometer of the Clark Lake Radio Observatory operated by the University of Maryland. This array consists of sixteen log-periodic antennas, equally spaced on a two mile east-west baseline. The array is swept in frequency over the range 20–65 MHz once per second. This system gives the one-dimensional position and angular size of emissive regions on the Sun nearly simultaneously at all frequencies. The array beam spacing and width are such that only one beam is on the Sun at one time. The angular resolution is about 5' at 60 MHz decreasing to 15' at 20 MHz. A more detailed description of this instrument was given by Erickson and Kuiper (1973).

The event described here occurred on September 1, 1971. The swept frequency interferometer record has been published elsewhere (Sakurai, 1972). The radio burst was accompanied by copious particle emissions and a host of geomagnetic phenomena. Since no flare was observed during the 15 hours preceding the event, the radio burst was most likely related to a behind-the-limb flare. The region concerned must have been McMath region 11482, which crossed the west limb two days earlier and produced several imp. 2 and 3 flares during its disk passage. It was situated at S12 and about 30° behind the limb at the time of the flare.

An intense microwave burst started at 19:26 U.T. at 10 cm-wavelength. A type II burst was reported by the Fort Davis Radio Observatory starting at

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19:34 U.T.; it lasted until 19:48 U.T. and was observed to drift from decimeter to decameter wavelengths. The type II was followed by an intense type IV burst.

At the Clark Lake Radio Observatory a moderately intense type III group was observed at 19:34 U.T., followed by an intense continuum emission. The continuum was short lived; at 60 MHz it faded by 19:48 U.T., at 40 MHz the emission lasted longer, until about 20:06 U.T. For a brief period of time, between 19:43 and 19:48 U.T. a second source became visible in the 25-55 MHz range. By comparing the Clark Lake record with the dynamic spectrum obtained by Maxwell (1972), we were able to identify this short lived source as the type II burst observed at Fort Davis. The east-west motion of the source at 50, 40 and 30 MHz is shown in Figure 1. At 50 MHz the type IV source remained stationary until about 19:43 U.T. At this time the type II source appeared. The type IV

Fig. 1. Positions of the type II-IV continuum and associated type III bursts observed on September 1, 1971, at 50, 40 and 30 MHz. The crosses refer to the continuum emission, filled circles indicate the type III bursts.