HIGH-POWER radar equipment has been installed in the 45-ft. diameter radio telescope at the Royal Radar Establishment, Malvern, to make radar observations of the Russian Earth satellites and rockets. A radar echo from the rocket of the first satellite was detected on October 30, at a distance of 864 miles (750 nautical miles). The rocket was then east of Iceland and at a height of about 220 miles. A wave-length of 10 cm. was used, and the radio telescope has a narrow beam of about half a degree. Using predictions supplied by H.M. Nautical Almanac Office, the radio telescope was set in the direction of the path of the rocket. A strong radar echo was observed as the rocket passed through the field of view of the radio telescope.

Ministry of Supply.

ROCKET OF THE FIRST EARTH SATELLITE

THE rocket accompanying the first Russian Earth satellite was widely observed in Ireland during October 11–16, owing to the favourable situation of the orbit. More than twenty photographs have been received and measured at Dunsink Observatory, and are consistent with a height of 430 km. The tracks show marked variations of brightness with a period of about one minute, due to rotation of the rocket (Figs. 1 and 2).

Further visual observations indicate that the rocket passed approximately centrally over Ireland on October 26d. 18h. 44m.

The combined observations lead to an orbital period of 95m. 53s. at October 11·23d., decreasing uniformly by 4·13s. a day to 94m. 49s. at October 26·78d. The corresponding decrease in semi-major axis is 3·4 km. a day. The precession of the node is approximately 3·3° a day.

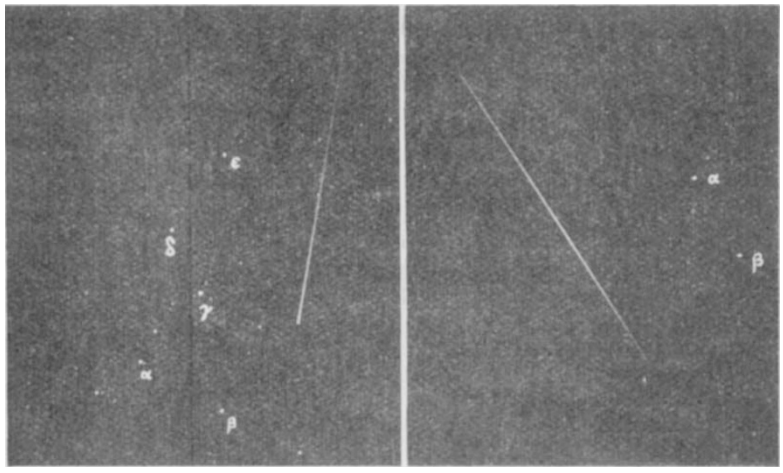

Fig. 1 Fig. 2

Fig. 1. Track of first Russian rocket rising on the north-north-west, close to Cassiopeia, on October 13, 05h. 24m. 20s.–05h. 24m. 50s. U.T.

Fig. 2. Track of first Russian rocket setting toward the south-east, close to Castor and Pollux (α and β Gemini), on October 13, 05h. 25m. 10s.–05h. 25m. 40s. U.T. Miniature camera photographs, both taken by P. Murphy, Dunsink Observatory

RADIO PICTURES OF THE SUN

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C.S.I.R.O. Radiophysics Laboratory, Sydney

WE have recently put into operation an instrument which gives pictures of the Sun in the 'light' of 21-cm. radio waves.

The extension of knowledge concerning the exterior of the Sun has to a great extent followed the introduction of special techniques which have enabled us to see progressively higher levels in the solar atmosphere. Thus the photosphere and sunspots are seen in white light. The spectroheliograph gave the first comprehensive picture of the chromosphere with its prominences, flares and plages. Above this lies the corona, which was known from eclipse observations, but which has only in the past few decades been regularly observable using Lyot's coronograph. Even now the corona is observable optically only beyond the limb, and the problem of observing the corona in front of the disk of the Sun may well be insoluble optically.

With the discovery of radio emission from the Sun and the recognition that this emission must, at suitable wave-lengths, originate in the corona, it became possible in principle to obtain pictures of the corona over the disk. But to get a detailed picture of the Sun, which is only $\frac{1}{2}°$ in diameter, the angular resolution required appeared prohibitive. Over the years, information was obtained by devious methods, by circumstantial evidence based on the correlation between sunspots and radio emission, through eclipse observations, and, most effectively, by regular day-by-day observations using knife-edge beams only a few minutes of arc in width.

These have demonstrated that the radio sun at decimetre wave-lengths shows a background due to thermal emission from the bulk of the lower corona, together with bright patches which last for periods of the order of months, and are related in some way to optically active regions. The current hypothesis concerning the cause of the bright patches is that they are due to thermal emission from unusually dense and hot regions in the corona.