

the magnetic potential M , of a point⁴ with polar co-ordinates r, θ with reference to a charged sphere such as the one in the earth's interior, is given by

$$M = \frac{Qwa^2 \cos \theta}{5cr^2}$$

where a is the radius of the sphere (the core), and c is the velocity of light. But $M = Hr$ in which H is the average value of the computed earth's magnetic field. Hence

$$Q = \frac{6cHr^3}{wa^2 \cos \theta}$$

and substituting appropriate values for a point near the core's pole, we have $Q = 2.5 \times 10^{14}$, and not 4.5×10^5 coulombs as is commonly assumed.

Again Petrucci⁵ has shown that the earth's charge is a variable quantity, and that it changes directly as the atmospheric potential gradient. But since the latter may vary from one to four times its basic value in the course of a day, we may conclude that the earth's charge also varies from one to four times the above value. It is important to note that there will be a strong electrostatic field at the surface of the earth's internal core of Q divided by the square of the core's radius, namely, 6×10^8 volts per cm. which must undergo a similar periodic variation in magnitude.

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October 8, 1945.

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2. Elsasser, W. M., *Phys. Rev.*, 1939, 55, 497. See also Haalck, H., *Gerl. Beit. z. Geof.*, 1938, 52, 3-4, 243-69. and Vestine, E. H., *Bull. Internat. U. of Geod. & Geoph.*, 1940, 11, 354-59.
3. Jeffreys, H., *The Earth*, II Edition, 1929, Chap. 7.
4. Swann, W. F. G., *Encyc. Brit.*, 1943, 21, 965.
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NEW ULTRA-VIOLET BANDS OF MERCURY IODIDE

THE ultra-violet bands ascribed to the mercury iodide molecule by various investigators were recorded in a previous paper¹ dealing with the analysis of two of these band-systems. Further investigations using transformer and high-frequency oscillator discharges through mercury iodide vapour reveal the existence of three new systems which have not been reported previously. They lie in the regions λ 2550-2500, λ 2435-2385 and λ 2345-2300, and may be designated as F_1 , F_2 , F_3 -systems respectively. F_1 comprises of about twenty red degraded bands some of which have intense and sharp edges towards the violet. F_2 consists of a succession of closely spaced bands degraded to the red with the interval between successive bands diminishing towards the region of longer wave-lengths. F_3 has the resemblance of the brief system of mercury bromide analysed previously² and consists of about fifteen diffuse and mostly headless bands. The analysis of these systems and their correlation with the

other known bands of the HgI molecule will be dealt with in detail elsewhere.

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November 28, 1945.

1. Rao, Sastry and Krishnamurthy, *Int. Jour. Phy.*, 1944, 18, 323.
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OSCILLOGRAMS OF VALVE CHARACTERISTICS

IN the course of a study of the dynamic transfer characteristics of radio valves, by means of the cathode-ray oscillograph, a few interesting features were observed, which are described herein. In this method the signal input (50 C.P.S. and 1,000 C.P.S. sine wave in our case) is applied to the control grid and to the X-plates of the oscillograph, while the anode output is applied to the Y-plates.

It is in general recognised that the dynamic ($e_g = ip$) characteristics become looped or closed curves, if the load impedance has a



FIG. 1

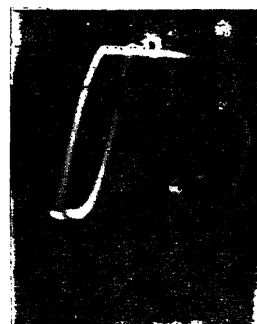


FIG. 2



FIG. 3



FIG. 4



FIG. 5

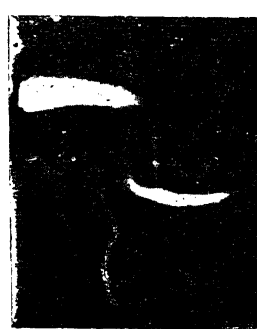


FIG. 6