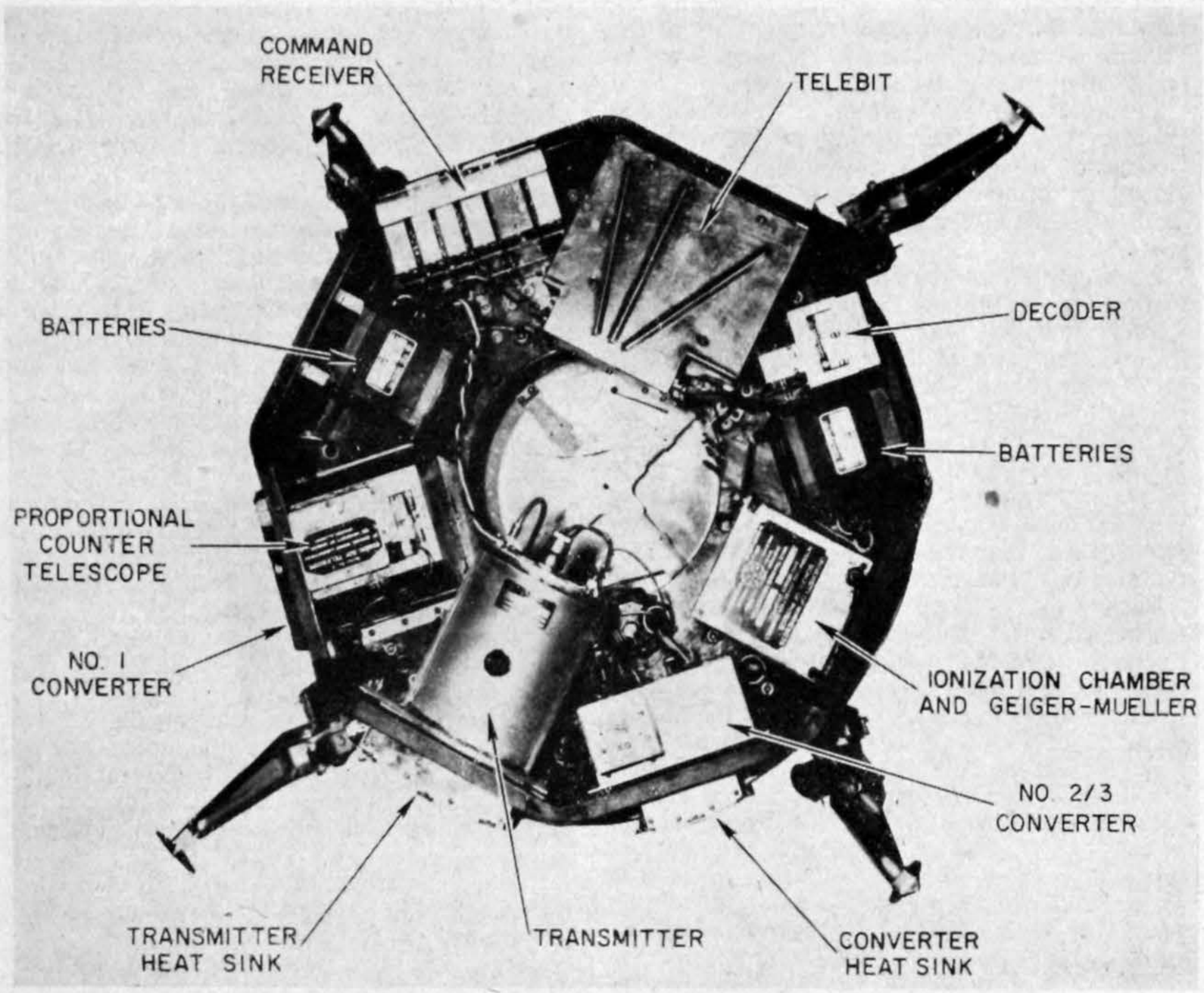
SHORTER REPORTS *(Continued)*



Top of apparatus platform within "Pioneer V." The magnetometer, meteoric dust detector and aspect [sensing device are on the reverse side

Equipment of "Pioneer V"

SOME of the equipment inside the American "Pioneer V" satellite, to the successful launching of which we referred last week, is shown in the first of the accompanying illustrations.

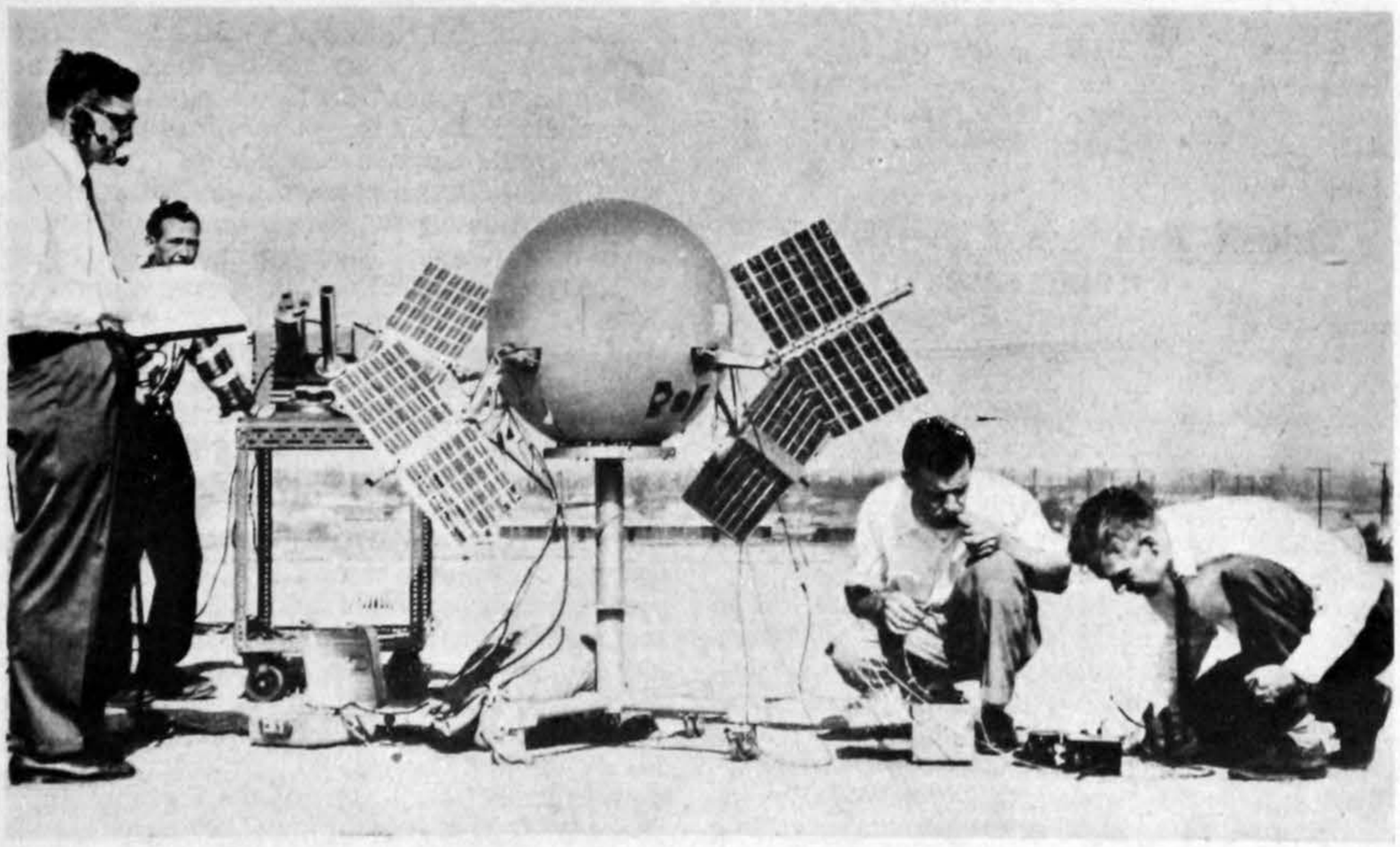
The experiments being undertaken while the probe is in orbit include the measurement of high-energy, or "hard," radiation, particularly that proceeding from the sun. These investigations are of particular importance because no previous probe has had an orbit so close to the sun. The counter consists of six argon gas cylinders ranged round a seventh cylinder, the complete assembly measuring about 2in square. Inbound particles ionise the gas in one or more cylinders according to their energy and produce proportional electrical impulses. This device weighs 5 lb. It has been developed by the University of Chicago.

An ionisation chamber and Geiger-Mueller tube are carried to measure the total ionisation flux encountered. They are particularly sensitive to medium-energy radiation. These instruments were supplied by the University of Minnesota. Together the instruments weigh about 2 lb and are contained in a box 4in square.

A micrometeorite device was developed for the probe by the U.S. Air Force Cambridge Research Centre. Its purpose is to measure the number and momentum of meteoric dust particles striking the probe. The entire unit weighs less than 1 lb and consists of a diaphragm, about twice the size of a playing card, mounted on the skin of the probe, and an internal microphone. The sound of impact is translated into electrical impulses for transmission to earth.

The search-coil magnetometer in the probe was developed by Space Technology Laboratories, Los Angeles, California, and weighs 1 lb. The same organisation developed the 8 oz. photocell aspect indicator which detects the attitude of the probe relative to the sun, initiating an electrical pulse when looking directly at it. These "fixes" on the sun will be of value in studying information from the magnetometer and radiation counter. The magnetometer, micrometeorite electronics and aspect detector are mounted on the reverse side of the platform illustrated.

Some details of the radio equipment in the probe were given in our March 18 issue and it will be recalled that information is stored between transmissions, this taking place in the "telebit" seen in one of the accompanying illustrations. The second illustration shows tests in progress on the silicon solar cells used for charging the internal batteries, the "paddle wheels" containing the cells being here attached to a mock-up of the actual probe.



"Paddlewheel" arrangement of solar cells attached to mock-up of satellite for output tests

Miniature Potentiometric Recorder

A PANEL cut-out of only 9⅝in by 8¾in is required for the new "Hi-Speed" miniature self-balancing potentiometric recorder of Control Instruments, Ltd., Tower Building, Liverpool, 3, a member of the Vernon Engineering Group. These reduced dimensions, combined with an overall case size of 10¾in by 10in by 12in deep, are stated to be the result of simplifications in mechanical and electrical design, including the electronic self-balancing system. The recorder compares the voltage signal from a transducer with an internal stabilised d.c. reference potential developed in a potentiometer circuit, and any error is converted into approximately sine wave alternating current by a vibrating reed chopper followed by a centre-tapped toroidal transformer. After amplification in a four-stage, high-gain amplifier, the signal is applied to one phase of a two-phase motor, having its second phase fed with a constant reference voltage from the mains. Since the signal voltage leads or lags the mains reference, according to the sense of the original error, the motor rotates in the appropriate direction to restore balance by adjusting the potentiometer, and in so doing drives the recorder pen. The calibrated chart width is 6in.

[Reply Card No. E5322]

Capacitive Transducer System

WE witnessed recently a demonstration of a capacitive transducer and probe assembly introduced by Racal Instruments, Ltd., Bracknell, Berks, for counting and batching, level control, speed measurement, vibration analysis and similar applications. In the counting application demonstrated, the probe and transducer are placed in proximity to a toothed wheel on a rotating shaft and by sensing the variation of capacitance caused by the passage of the teeth, the transducer frequency-modulates the output of a 1·2 Mc/s oscillator in the supply unit. A discriminator produces a d.c. voltage directly proportional to the changing capacitance, this taking the form of pulses which are amplified in the supply unit for counting. At the demonstration the supply unit fed directly into a Racal digital frequency meter. With this system satisfactory operation is obtained whether the object under test is of conducting or non-conducting material, which may be in the form of solid, liquid or a powder. We were informed that adequate responses have been obtained when detecting changes of capacitance due to painted stripes on a revolving shaft. The probe and transducer assembly measures 2⅛in long and ⅞in in diameter, and weighs 1¼ oz. Dimensions of the supply unit are 4in by 3in by 2in.

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