For any one mirror, the signal received was a short train of small pulses of light—one pulse per revolution of the satellite. A 12-in. aperture Cassegrainian telescope was set up on an M-33 radar mounting which could be driven so that the telescope was pointed continuously at the satellite. A pulse-operated camera was used with the telescope, or alternatively the light pulses could be made to fall on the cathode of a photomultiplier tube. The electronic equipment was triggered by the resulting pulses, and produced records of the time of occurrence of the pulses. From such data it was possible to show that soon after launch, the spin rate was about 3 rps and the axis of spin was oriented close to the perpendicular to the plane of the ecliptic.

To obtain sufficient time resolution with the incoming signal, the photomultiplier output was continuously displayed on a cathode ray tube with a long persistence screen. Whenever a pulse was received of an amplitude sufficient to operate the triggering circuit, a drive pulse was passed to a camera which photographed the trace still persisting on the cathode ray tube screen.

Measurements of Radio Sources in the 3C Catalogue. D. J. CRAMPIN, D. S. HEESCHEN, I. I. K. PAULINY-TOOTH, AND C. M. WADE, *National Radio Astronomy Observatory*.—The new 300-ft paraboloidal antenna of the National Radio Astronomy Observatory is being used to make measurements of the positions and flux densities of all the sources in the 3C list (Edge, D. O., Shakeshaft, J. R., McAdam, W. B., Baldwin, J. E., and Archer, S., *Mem. Roy. Astron. Soc.* **68**, 37, 1959) at frequencies of 750 and 1400 Mc/sec. (The beamwidth at these frequencies is 18'5 and 10'0, respectively.) At 1400 Mc/sec, a source with a flux density of about $0.3 \times 10^{-26} \text{ W m}^{-2} \text{ cps}^{-1}$ gives a signal equal to the peak-to-peak noise level. For a source with a spectral index of 1, this corresponds to a flux density of about $3 \times 10^{-26} \text{ W m}^{-2} \text{ cps}^{-1}$ at the frequency of the 3C survey (159 Mc/sec). Since the lower flux limit of the 3C catalogue is $8 \times 10^{-26} \text{ W m}^{-2} \text{ cps}^{-1}$, all sources included in it should be observable.

These expectations have been confirmed by the observations made so far. Sources at the lower flux limit of the 3C list can be detected easily and their positions can be measured with an accuracy better than $\pm 2'$ in declination and $\pm 2''$ in right ascension. It should therefore be possible in the present program to improve the accuracy in the declinations of the positions given in the 3C list, to remove ambiguities due to possible lobe shifts, and to obtain spectral indices for a large number of sources.

The present results have confirmed the general reliability of the 3C catalogue. About 20% of the sources in the 3C list are shown as "possibly lobe-shifted"; about 30% of the sources observed so far are in lobe-shifted positions. Some sources, such as 3C 398, have been resolved into two or more components, and in a number of others, the brightness distribution has been found to be asymmetrical.

Algorithm for the Rigorous Determination of Differential Astrometric Data. HEINRICH EICHHORN, *Van Vleck Observatory* AND WILLIAM H. JEFFERYS, III, *Yale University Observatory*.—The traditional method for determining parallaxes, mass ratios, and the like from long-focus photographs is the reduction of the measurements by dependences, which has the obvious advantage that the amount of computation necessary is kept to a minimum. With high-speed electronic computers available, this can no longer be the decisive factor for continued use of the method in view of its disadvantages: Errors in the (measured or recorded) positions of the reference stars are propagated (in the proportion of the corresponding dependence) to the "dependence center"; the detection of errors and checking the computations is difficult as there are no residuals from the reference stars; proper weighting is difficult for the same reason.

We have therefore adopted the reduction procedure described below and programmed it for an IBM 1620.

From the equations provided by the measurements, we set up a system in the following unknowns: position and proper motion and additional unknowns (parallax) where indicated for every star which was measured, and linear plate constants for every plate. In order to make the matrix of the system nonsingular, we assume in addition that the sum of the proper motions is zero (in both coordinates) and that the proper motions are in no way systematic, i.e., $\sum \mu = 0$, $\sum \mu x = 0$, $\sum \mu y = 0$. This system is solved by successive approximations. Weights for the individual plates and individual stars are computed from the residuals from the first iteration and used in the consecutive iterations.

The increase in weight achieved by this mode of reduction as compared to the dependence method is over an order of magnitude for the proper motions and about 50% for the parallaxes, from identical measurements.

Our reduction procedure also yields very accurate relative positions of the reference stars, which are important if series of plates, taken at different telescopes, are to be used in a single combined solution.