23.04.10 Tentative Optical Identification of the Radio Sources VRO 22.17.01 and VRO 26.02.07. LOUTUS PATAK, Department of Astronomy, Indiana University - The NRAO 300' telescope positions of the 39 previously uncataloged radio sources newly listed in the Vermillion River Observatory's 22' - 27' declination scan (Mendrek, J. J., Nickel, Yang and Staff, A. J. 75, 168, 1970) were examined on the Palomar sky survey prints using a computer plotted overlay technique. Thirty-four of the sources are in fields of apparently stellar objects, while those in the group which are not near the plane of the Galaxy are being studied further. Sources VRO 23.02.01 and 23.09.05 are located near non-spherical objects which may yet be stellar (e.g., a close binary). The field for VRO 22.00.01 contains both stars and galaxies. The source is near an elliptical galaxy but the galaxy is not within the probable error in the radio position. The source VRO 26.02.02 coincides with a wispy object which may be a faint galaxy seen edge on. Its location near a bright star makes observation of its detailed structure difficult. The source VRO 22.17.01 is near a diffuse object which appears to connect to two condensations. The computer program used in this work plots the location of the radio source relative to bright stars whose location is within 2° of the source. These plots are on the scale of the Palomar prints and provide quick, accurate locations. This program was based on work by F. R. Festin and C. D. S. Yorke at the University of Texas at Austin. I am grateful to the VRO staff for a pre-publication copy of their catalog.

23.05.07 The Emission-Line Spectrum of N 49, a Supernova Remnant in the Large Magellanic Cloud. D. R. OSTERBROCK and R. E. DOPPEL, Washburn Observatory - Spectrograms of the nebula N 49 were obtained at CTT0, using the 60-inch telescope and image-tube spectrometer at a dispersion of approximately 195 A/mm. The plates were calibrated for spectrophotometric measurements, but the present paper describes only the line identifications and their preliminary qualitative interpretation. Typical nebular emission lines of H I, [O III J], [O III J], [N II J], [He I J] and [S II J] are strong and indicate a relatively low average level of ionization. The lines of multiply λ6562, 4711, 4067 and 6731 are also present, while [Fe II J], λλλλ2287, 4441, 5199, 5562, 4815, 4934, 4644 of multiplets (1P) and (3P) are also present, while [Fe II J], λλλλ2287, 4441, 5199, 5562, 4815, 4934, 4644 of multiplets (1P), (3P), (1D) and (2D) are relatively strong. The λλλλ3869, 3968 are first reported by Benize, and in addition N [I J], λλλλ2026, 6548, 6562, 4571 (seen as a wide blend at our dispersion) indicate the presence of a large region in which H I is mostly neutral but T is comparable in order of magnitude with the temperature in typical H II regions. This agreement qualitatively with the predictions of some supernova remnants, and is incompatible with ionization models.

23.06.01 A Flux Density Scale for Microwave Frequencies. William A. Bent, Univ. of Mass. - Accurate flux density measurements of the thermal radio source 3C454.3 have been made at centimeter wavelengths relative to the KVP absolute flux density scale based on Can A and at millimeter wavelengths relative to absolute brightness temperature measurements of Jupiter and Saturn. The absolute spectrum of 3C454.3 thus defined has the form:

\[ S = 26.8 - 5.6 \log (\nu \text{GHz}) \text{ for } \nu > 7 \text{ GHz}, \]

and ties together two formerly independent flux density scales. With an accuracy of about 3%, this spectrum of 3C454.3 can be used to calibrate antennas having beamwidths between 1 and 6 minutes of arc at microwave frequencies above 7 GHz where other methods of absolute calibration are much less accurate.

23.07.09 The Linear Polarization of Cassiopeia A at Wavelengths of 9.8 and 11.1 cm. G. S. DOWNS, Jet Propulsion Laboratory, and A. R. THOMPSON, Stanford University - Observations of the brightness distribution of the linearly polarized component of the radiation of Cassiopeia A have been made using interferometers at Stanford and at the NRAO. The Stanford observations were made at a wavelength of 9.8 cm and provided a synthesized beamwidth of 1.6' x 2.7'. The observations with the NRAO interferometer were made at 11.1 cm and provided a beamwidth of 8.1' x 9.3'. Because the increments in the antenna spacing of the NRAO interferometer are greater than the critical interval for Cassiopeia A, a small part of the brightness distribution at 11.1 cm wavelength is missing. The polarization of Cassiopeia A is concentrated in the main ring of the source but is irregular in distribution with the largest concentration in the northeast. The maximum polarized brightness at 11.1 cm wavelength corresponds to a degree of polarization of approximately 5%. A comparison with published results at other wavelengths shows that Faraday depolarization reduces the polarized radiation to half the intrinsic value at a wavelength of approximately 7.5 cm. The mean values of the rotation of the position angle of the polarization vary more rapidly as a function of λ² at wavelengths shorter than 6 cm at longer ones. These data appear to be best interpreted in terms of a nonlinear rotation with λ² which occurs within the source together with a linear component of about -36 radians m⁻² which may be attributed to the interstellar medium. The rotation and depolarization within the source can be explained by a model with a radial magnetic field and a thermal electron density of 2 cm⁻³.

23.09.10 A Possible Mechanism for Energy Release in Quasars and Seyfert Nuclei. JOHN D. MATHER, N.R.A.D. - The dense star cluster model of compact energetic objects is examined for new ramifications. It is found that if a fraction of the cluster members are white dwarfs or neutron stars with large magnetic fields, collisions with the atmospheres of evolved giants and/or normal stars will lead to a magnetic energy of the cluster to energetic particles and radiation. The electric fields associated with the δw/δt which occurs when the magnetic objects impinge upon an atmosphere are very large, giving rise to copious pair production. The colliding objects may encounter each other repeated, rather than only once as in Colgate's theory, thus greatly prolonging the life of the quasar. Mutual collisions of objects with large magnetic fields are also considered. The coincident radiation of gravitational waves and electromagnetic pulses is discussed. If the various evolutionary processes give rise to a background interstellar gas having density 10⁻¹⁰ cm⁻³, the short wavelength variability of objects such as 0287 and 3C454.3 can also be explained.

23.10.10 A Physical Model of Line Formation in QBO's, J. D. Scargle, Lick Obs., and C. B. Tarter, Lawrence Livermore Laboratory, U. of California, Berkeley - We assume that the center of the QBO is a point mass (M) of luminosity L, surrounded by an envelope of clouds (total mass <M). The ionization and temperature structure are calculated (Tarter, in preparation) with a code which also calculates as a function of radius the outward force due to