conventional D.C. amplifier having a maximum full scale sensitivity of 10^{-11} ampere, followed by a four-tube feedback-type electronic integrator. A switch is provided so that a Brown recording meter can be used directly with the D.C. amplifier or, alternatively, can be used to record the output of the integrator. A synchronous motor-driven timer provides the integration time interval of 117 seconds.

The apparatus is relatively simple, having only 15 tubes and costs less than \$400 for parts. It can compare bright stars with very faint ones, since the gain controls on the D.C. amplifier control the integrator also. The precision of measurement is approximately that to be expected from the statistical uncertainty. The measures are recorded permanently by a Brown potentiometer.

This integrator-type amplifier has been used during the spring of 1954 with the 82-inch telescope of the McDonald Observatory in three color observations of stars in the globular cluster, M 3. The faintest star measured has $V = 20.5$, $B = 21.1$. This light intensity, with the 82-inch telescope, corresponds approximately to photographic magnitude 23 with the 200-inch telescope and the results are comparable with those obtained by Baum with a pulse counter. So far as the apparatus is concerned, even fainter stars, perhaps as faint as $V = 21$ or $B = 22$, could have been measured, but the results would not have been reliable because of the considerable probability of interference from fainter stars not recorded even on the 200-inch photograph which was used as a map.

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Joy, Alfred H. The binary system, AE Aquarii.

Measures of 100 Mount Wilson spectrograms of AE Aquarii indicate that this peculiar variable star is a binary system composed of a small hot star with variable emission lines of H , He , and $Ca II$ (H and K), 20 Å in width, but no absorption lines, and a dKo star with strong absorption lines and sharp emission lines of H and $Ca II$.

The radial velocities of the late-type star have a large range and show a constant period, 0.701024 days. The γ velocity is -52.6 km/sec. The orbit is nearly circular. Since the velocities do not fit the usual curves of elliptic motion, two solutions have been made; one, using observations near conjunctions yields $K_1 = 200$ km/sec, $a_1 \sin i = 1,930,000$ km; the other, using observations near

elongations, yields $K_1 = 151$ km/sec, $a_1 \sin i = 1,460,000$ km.

From the velocities obtained by rough measurement of the wide bright lines of the hot star, $K = 146$ km/sec, $\gamma = -37$ km/sec, and $a \sin i = 1,400,000$ km.

The corresponding minimum masses for the two solutions are $1.7 \odot$ or $0.97 \odot$ for the hot star and $1.30 \odot$ or $0.94 \odot$ for the Ko star, respectively.

The difference in the γ velocities of the two components may be, in part at least, the result of relativity shift of the lines of the small hot star.

The peculiar velocity curve from the absorption lines may be explained by a heating or reflection effect of the radiation of the hot star falling upon the nearer hemisphere of the cool star and shifting the point of maximum illumination toward the center of gravity of the pair. If the star keeps the same face toward the primary, this point would have a smaller linear velocity than the geometrical center as seen at elongations. Under these circumstances a rotation of the Ko star faster than the orbital period would affect the velocities in the same direction.

Using the well-known relations between stellar temperature, radius, and luminosity, and taking $T = 5000^\circ$ and $R = 0.9 \odot$, a visual absolute magnitude $+6.0$ is found for the Ko star. The spectrograms indicate that the hot star is much the fainter of the two, visually. Taking $M_v = +7.0$ and $T = 20,000^\circ$, based on the intensity of the continuous spectrum at $\lambda 3500$, for this subdwarf star, its radius is found to be $0.08 \odot$.

Further photometric observations are needed to clarify the relationship between the rapid and irregular light changes and the spectrographic peculiarities.

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Keller, Geoffrey. The theoretical relation between scintillation and shadow bands.

Direct quantitative photographic photometry of stellar shadow bands is difficult since even the brightest stars do not provide enough light for an exposure short enough to stop the motion. An alternative method is therefore suggested in which the light of a star is observed with a photocell which can record intensity fluctuations in such a way that their r.m.s. deviations from the mean can be measured, at individual frequencies and when integrated over all frequencies. During the measurements the objective of the telescope