of 21 in the magnitude range 8.0–11.5, and 12 out of 31 in the magnitude range 6.0–11.5 are metallic-line stars. These figures represent 29 and 39%, respectively, of stars with equivalent K-line types, as compared with 15% for stars in the neighborhood of the sun.

2. Axial rotation appears to be less at high galactic latitudes. Eighteen normal A0-A7 V galactic-pole stars in the magnitude range 8.0–11.5 have a mean $v \sin i$ of 85 km/sec, as compared with 138 km/sec for 99 A0-A7 V stars in the neighborhood of the sun. This result is only tentative, however, because of the small sample and the low dispersion employed.

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Orientation and Units of Length in Aztec and Mayan Pyramids. CHARLES H. SMILEY, *Brown University*.—Early in 1957, the orientations of six pyramids near Mexico City were determined, principally by noting a time when the sun was in the plane of a particular wall. The small differences among some of the individual azimuths indicated an orderly progression, probably associated with the dates of construction.

Recalling that the Aztec and Mayan number systems apparently did not include fractions, it appeared likely that the principal dimensions of pyramids would represent integral numbers of units of length. Several pyramids were measured, and the ratio of two dimensions of a single pyramid was expanded in a continued fraction and successive convergents evaluated. The assumption that the unit of length lay between six and thirty inches was often enough to allow a unique determination of the unit. For four of the pyramids near Mexico City a unit about 11.2 inches appeared probable.

The work was later continued at Monte Alban and Mitla, and in December 1959 was extended to thirteen Mayan pyramids in Yucatan, particularly at Chichen Itza and Uxmal. In the latter work, improved methods of determining azimuths were used. When a definitive correlation between the Mayan and the Christian calendars is determined, the significance of the orientations should be clear, and probably conversely.

Fine-Structure of Jupiter's 20-Megacycle Noise Storms. HARLAN J. SMITH, BARRY M. LASKER, AND JAMES N. DOUGLAS, *Yale Observatory*.—A 10-channel comb-filter dynamic spectrum analyzer at Yale Bethany Observing Station employs 17-kc bandwidth channels spaced at approximately 100-kc intervals, centered on 22 Mc; recording is at three speeds, including one with resolution times up to 0.01 sec. Analysis of several strong Jupiter storms from March through May of this year has given

some detailed information on the nature of the elemental bursts which appear to compose most, if not all, of the Jupiter storms.

The bursts have characteristic profiles usually triangular in outline, total durations averaging about 0.7 sec with peak energies of the order of 10^{-21} w m⁻² cps⁻¹ and a pronounced tendency to come in groups. An individual burst seems to be rather sharply tuned, having a half-power bandwidth typically of the order of 2 Mc. For the entire frequency range over which it can be heard, a burst is simultaneous within the power of our equipment to measure. The bursts which comprise the groups normally have the same amplitude-frequency distribution, so that the entire group shows no pronounced drift with time. We have one clear-cut instance of a burst-group drifting from high to low frequency at a rate of about $\frac{1}{2}$ Mc/minute; even here the individual bursts composing the group had no drift.

The possibility that ionospheric scintillation produces at least some of the apparent burst structure cannot be ruled out at present.

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The Utilization of High-Altitude Balloons for Astronomical Observation Stations. JAMES R. SMITH, *Raven Industries, Inc., South Dakota*.—On several recent projects high-altitude plastic balloons have been used to carry telescopes and other astronomical equipment. The ability of such balloons to serve as stratospheric observation stations is reviewed.

Currently, maximum payloads of 2500 to 3500 lb are being lifted successfully. By using the largest balloons available, such loads can be carried to altitudes in excess of 100 000 ft. It is suggested that smaller balloons (perhaps 2 million cubic ft rather than 10 million cubic ft) will serve reliably to carry astronomical loads to 80 000 ft without coming unduly near the prove limits of balloon operation.

A major limitation to the utilization of balloon-borne equipment has been the fact that surface wind conditions are often too strong to permit launchings at will. Encouragement is seen in the report from Holloman Air Force Base in southern New Mexico. Here local wind effects have been studied for a number of years, and satisfactory balloon launching conditions are believed to exist on more than 80% of all days.

Problems of stability, orientation and control during flight are being successfully overcome by newly developed instrumentation. It may be expected that serious efforts to develop a balloon observatory will result in a tool whose availability for use may be closely comparable to that of a terrestrial observatory. The direct and indirect costs of working from