SUMMARY

The data relate to a counting rate of $10^6$ counts per minute from 60 sq. meters of plastic scintillators under a Galena shielding of 3 M.W.E. at Chacaltaya. Geomagnetic cut off rigidity in the vertical is 13.2 Bv. The counting rate refers essentially to secondary mu-mesons. The counts integrated over successive one minute intervals are used for the analysis. Atmospheric pressure readings from a digital servo-barometer are simultaneously recorded at one minute interval. Data have been analysed for the period from November 1965 to June 1966.

The data are subjected to power spectrum analysis following the well known method given by Blackman and Tukey, having spectral window from 1 to 30 cycles per hour and an analysis period for successive 3 hours.

Fluctuations of the cosmic ray intensity are found to occur in the range of frequencies 6 to 30 cycles per hour. These fluctuations have average amplitude of about 0.04%. Taking the data as a whole, fluctuations occur most prominently at the frequencies of 16 and 27 cycles per hour corresponding to a period of 225 and 130 second. These have been established at the confidence limits of 99%.
For individual 3 hour periods the prominent peaks occur at one or more frequencies within the range and are not always at 16 or 27 cycles per hour. Moreover, there are some three hourly periods when all frequencies seem to be active, and the average power level in the entire spectrum is raised. There are then no peaks indicative of activity at particular frequencies.

Pioneer 6 measurements in the magnetosheath field at a distance of about 10 earth radii from the centre of the earth on the sunlight side gives a power spectrum with prominent peaks in the range of 6 to 30 cycles per hour (Ness et al 1966). At the same time at Chacaltaya, data show peaks which correspond in an approximate way, but not identically. Pioneer 6 results of the fluctuations of the interplanetary magnetic field over a 3 hour period show prominent peaks in the spectral range 6 to 30 cycles per hour (Ness et al 1966). These roughly correspond with the peaks simultaneously observed in the meson intensity but are not at identical frequencies.

High level of geomagnetic disturbance as characterised by Kp is associated with a low average power of the fluctuations in cosmic ray intensity in the 6 to 30 cycles per hour range. However, during this time prominent peaks appear at the frequencies of 9, 17 and 28 cycles per hour.
Low level of geomagnetic activity corresponding to small Kp is characterised by a high average power in the spectral range 6 to 30 cycles per hour and a prominent frequency only at 27 cycles per hour. When a major Forbush decrease occurs in cosmic rays, even though Kp is high at the time of onset, the average power in the cosmic ray fluctuations in the range of 6 to 30 cycles is always high.

The dependence on the geomagnetic activity of PC 4 micropulsations is similar to the dependence on geomagnetic activity of cosmic ray oscillations i.e. for high Kp the occurrence of PC 4 is less (Troilskaya and Gul'elmi 1967) and the average power of cosmic ray oscillations decreases. Study of velocity fields at the solar photosphere reveal that oscillatory motions with periods of 200 to 400 seconds are present (Howard 1967). The sun seems to be constantly active in this range of periodicities (De Jagar 1965).

Thus, it is possible that the main driving force for the cosmic ray oscillations in the range of 6 to 30 CPH arises on the sun. When the magnetic field lines connecting the sun and the earth are relatively undisturbed with few magnetic-field irregularities, the solar excitation gets communicated from these fields without attenuation. But, when the magnetic field lines have irregularities, they provide a preferential passage for transmission of certain frequencies and not others. So,
the fluctuations of the energy density impinging on the magnetosphere could be the means through which the periodicities are generated in the geomagnetic field, thereby producing cosmic ray fluctuations by the change of geomagnetic cut-off rigidity.