A MODIFIED SATELLITE CLOUD PICTURE RECORDER FOR RECEPTION OF A.P.T. PICTURES FROM NOAA SATELLITES

The ESSA series of satellites transmitted cloud cover pictures of the earth taken in the visible light with vidicon cameras at 240 scans per minute. The pictures obtained filled the entire width of the chart producing a picture of 8" width. With the introduction of NOAA series of satellites, cloud pictures in both visible and infra-red regions are being transmitted at 48 scans per minute in the time multiplexed mode. This has resulted in smaller pictures covering only about 1/3rd of the width of the paper. At night when the visible pictures are not available, only part of the useful area of the recorder chart is used. From the operational point of view an enlarged picture is considered desirable. Vossler (1968) accomplished this by doubling the helix speed to 96 RPM and suppressing the alternate lines by an electronic blanking circuit. Agnihotri et al. (1975) used a simple mechanical method for obtaining the enlarged pictures. They used a helix speed of 48 RPM and instead of using a 360° helix used a 1/3 helix (i.e., helix of 180° wound on a non-conducting former). This results in a contact between the helix and the blade for half the period of the scan and produces either visible or infra-red picture as required at double the normal size.

2. In the present design the gear box of the recorder described by Agnihotri et al. (1975) was modified to get a helix speed of 96 RPM. The details of the gear box are given in Fig. 1. The
motor speed of 96 RPM was derived from the 720 RPM motor by reduction using two pairs of gears with ratios of 1/3 and 2/3. The gear train for the paper pulling roller is changed suitably to get 0.265 RPM for the roller giving a chart speed of 0.96 inch/minute.

The gear box was simplified as a speed of rotation of 240 RPM is no longer required since ESSA-8 has become non-operational. From the shaft rotating at 96 RPM a rotation of 48 RPM is obtained using two gears with a ratio of 1/3. A bakelite cam with a semi-circular brass plate fixed on it was mounted on the 48 RPM shaft. Two spring loaded contacts were placed on the metallic portion of the cam in such a way that these are connected for half rotation of the cam. These details are shown in Fig. 1(b). Thus the signal circuit is broken on alternate rotations of the helix thereby blanking the alternate lines. The mechanical method used for blanking the alternate lines has produced the same result as obtained by Author S. Vossler(1963) by using an electronic circuit. A large condenser is placed across the contact points to suppress transients which may affect other R.F. equipments in use.
3. Fig. 2 (b) shows a set of pictures taken with this recorder. A marked improvement in resolution is seen as compared to the expanded picture received earlier Fig. 2 (a). The seven synchronisation pulses before each scan are clearly discriminated and also at the end of both IR and visible pictures, the voltage calibration steps transmitted by the satellite, are clearly seen. Of the available 5 steps transmitted by the satellite, the present recorder can record four steps. Some further improvement in resolution is possible if the diameter of the helix is increased from the present 2.0 inches.

4. The modified system is being tried on a regular basis at New Delhi since May 1976 and is working quite satisfactorily.

5. It is pleasure to thank Shri S. Kumar, Director, Satellite Meteorology for his keen interest in this work.

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SEASONAL VARIATIONS OF THE EQUATORIAL MESOSPHERIC CIRCULATIONS INDICES AT THUMBA

1. As part of the Indo-Soviet collaborative meteorological rocket sounding programme, regular weekly M-100 rocket soundings are being conducted from Thumba (08°32' N, 76°52' E) since December 1970. From November 1972 onwards piggy back chaff payloads (fibre glass and copper) were incorporated with the routine M-100 rocket soundings monthly once each corresponding to the middle of the month to obtain the upper winds in the equatorial mesospheric region upto 80 km. The winds and the diffusion coefficient measurements obtained from these chaff cloud experiments have been reported earlier (Narayanan & Fedynskii 1973, Narayanan et al. 1976 and Narayanan & Sivadasan 1976). The present study deals with the mesospheric circulation indices for the layers 60-70 km centred at 65 km called \( M_L \) CI and 70-80 km centred at 75 km called \( M_u \) CI and their seasonal variations in relation to SCI-Stratospheric Circulation Index (Average wind in the layer 40-50 km). The results thus obtained are compared with CIRA Model 1972 for 10°N. (see Ref., 2. Average monthly wind, zonal and meridional for the layers 60-70 km and 70-80 km were computed and designated \( M_L \) CI and \( M_u \) CI respectively and plotted to study the seasonal variations in a manner reported by Cisneros (1973). As the Thumba mesopause was found to be at a lower altitude by 5 km, the definition of MCI is modified slightly from the usual conventional type explained by Webb (1966).

3 (a). Zonal circulation index — Figs. 1, 2(a) & 2(b) present the average annual zonal stratospheric circulation index SCI, \( M_L \) CI and \( M_u \) CI respectively. Figs. 3 (a) & 3 (b) present Thumba monthly zonal and meridional SCI, \( M_L \) CI and \( M_u \) CI. The zonal \( M_L \) CI are predominantly westerlies (positive) and maximum 40-45 mps during the equinox period April and October. The zonal \( M_u \) CI are predominantly easterlies (negative). Two maxima 40 mps are seen during February and May but no regular seasonal variation is noticed in \( M_u \) CI as in the case of \( M_L \) CI and SCI. The early winter experiences the extreme positive (westerlies) \( M_u \) CI values 30-35 mps. The seasonal easterly reversal of SCI is seen reflected in SCI also. When SCI and \( M_L \) CI show the same phase, the reversal of \( M_u \) CI takes place much earlier about 2 months in 1973 and 3 months in 1974. The \( M_u \) CI values