Letters to the Editor

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A SOLID STATE AMPLIFIER FOR RECORDING APT CLOUD PICTURES

The India Meteorological Department is using modified Mufax recorder (Datar and Joseph 1971) for reception of APT cloud pictures from the polar orbiting satellites. Subsequent to the fabrication of the APT recorders using electro-sensitive paper by the department, development of a suitable amplifier was undertaken and is reported in the present note.

The FM signal transmitted by the satellite is received by a VHF APT receiver. The video output of the receiver is a 2.4 kHz signal whose output varies from 2.5 to 0 volts as the FM deviation of the received signal changes. In the satellite cloud pictures the variation of brightness from dark to white is directly related to the FM deviation. The amplifier should respond linearly to the changes in the output voltage of the receiver. The circuit diagram of the system is at Fig. 1.

The first stage is a frequency selective amplifier using integrated circuit SSD 741. A twin T-network tuned for 2.4 kHz is used in the feedback path of the operational amplifier to obtain the frequency selective properties. The amplified signal is fed to the driver stage of the power amplifier through an emitter follower. The power amplifier consists of a driver stage BCI78 and two transistors AC107 and AC168, connected in a complementary symmetrical output state, give an output of 250 mW. The output is taken through a step up transformer for driving the next stage, the reversal unit. In this circuit, following Datar and Joseph (1971), the rectified power output, using a selenium bridge rectifier, is used to drive a power transistor ECP 055 and the recorder (helix and blade) is connected across the collector and emitter of the power transistor. With maximum input signal to the transistor, it offers low resistance compared with that of facsimile paper between the helix and blade and there-

Fig. 1. Schematic circuit diagram
fore no current flows through paper. With minimum input voltage, reverse happens. When clouds are present, the d.c. output from the rectifier is maximum which is sufficient to cut-off the transistor and therefore no current flows through the paper which appears white. In cloud-free areas, signal strength being less, d.c. output of rectifier is also minimum. Transistor is not cut-off and maximum current flows through the paper which appears black.

The amplifier described above requires three power supplies, viz., 15 V, ±12 V & −60 V.

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The amplifier, designed for use with the APT receivers is simple in construction and for adjustments use is made of indigenously available components. It has dynamic range which is better than the amplifier in use. As a result of this there is an improvement in the picture quality. It gives four out of possible shades of grey transmitted as calibration steps with the NOAA APT pictures. As the amplifier uses solid state components, the stability is improved.

Reference

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LOW LEVEL CONVERGENCE RELATED TO FORMATION OF LOW CLOUDS IN MONSOON SEASON

Various authors in their studies of occurrence of low clouds/fog over Begumpet, Palam and Calcutta have suggested that the horizontal convergence in the surface layer has a positive influence on the formation of fog/low clouds. Natarajan (1962) studied the conditions for occurrence of fog or stratus clouds during the winter (1960-61) over Begumpet and inferred that given other well known favourable conditions, horizontal convergence in the surface layer had a positive influence on the formation of fog or low stratus clouds. Gangopadhyaya and George (1959) had also suggested that horizontal convergence in the surface layer was an additional factor which favoured the formation of radiation fog or stratus cloud at the Dum Dum in the winter season. An attempt has been made in this note to extend this approach to the study of the incidence of low stratus clouds in the southwest monsoon over Dundigal Airfield, Hyderabad.

2. During the monsoon months, June to September, the drifting of low stratus clouds from a westerly direction in the early morning hours is a frequent occurrence and a source of aviation hazard at this airfield. Forecasting the occurrence of those clouds and issue of timely warnings to aircraft is therefore an operational necessity. To meet this challenge a search for an objective or semi-objective method of prediction has been undertaken and this note relates to one aspect of the study.

3. The hourly current weather observations recorded at the Dundigal Airfield Meteorological Observatory during the monsoon months of 1974, 1975 and 1976 have been used in this study. Out of the total number of 366 days significant amounts of low clouds (4/8 or more) occurred over the airfield in the morning hours on 178 days. These drifted over the airfield between 00 GMT and 02 GMT and lifted up or dissipated by 0400 GMT except during active monsoon conditions, when they persisted, much longer.

4. Values of horizontal convergence of wind over Hyderabad and adjoining areas were computed by Bellamy's triangle method as modified by Graham. Winds at 3000 ft a.s.l. in respect of Nagpur, Gadag and Gannavaram based on 1200 GMT observations of the previous day were made use of and the values of convergence obtained were assumed to apply with a fair degree of validity over the local area. When wind observations were not available the values were approximated from the streamlines on upper wind charts. A scatter diagram (Fig.1) was prepared with convergence value on the X-axis and wind direction on the Y-axis. It is seen that the probability of occurrence of low clouds increases when there is convergence at 3000 ft a.s.l. With convergence value more than $3 \times 10^{-7}$/hour and wind direction between 240° and 340° the probability of occurrence of low clouds is 83 per cent. On the other extreme, with a divergence value of $3 \times 10^{-7}$/hour or more the probability of occurrence of low clouds falls to 30 per cent. The result, though encouraging, is not adequate for operational forecasting which needs an objective prediction technique which could indicate 100 per cent probability of no low clouds on some days and 100 per cent probability of low clouds on some other days with only a small number of marginal days in between the two extremes.