inverter performance was good without any attendance during all the flights. The inverter was further tested with different loads in the laboratory and the results are presented in Table 1. The output a.c. power was computed assuming the lamps to be pure resistive loads. It failed to operate at higher load (160 watt) due to poor condition of the battery.

The waveforms at the emitters of the two transistors and the output monitored on a BEL Oscilloscope are presented in Fig. 3. Those at the bases

Instruments Section,
Meteorological Office, Poona
28 November 1973

Texas Instruments Inc.

REFERENCE
1903

PROBABILITIES OF FORTNIGHTLY RAINFALL DURING THE CROP GROWING SEASON IN RAICHUR REGION

In the field of agriculture, water is an indispensible factor. The source of water may be either rainfall or wells, tanks and canals. The climate in Raichur District is semi-arid and the agriculture here depends mostly on rainfall. The crops are more often subjected to too little moisture rather than excess of it.

In view of the importance of the rainfall in the agriculture of the region, precise knowledge of the amount of rainfall that can be expected and the limits within which this amount varies will go a long way in helping farmers to plan their agricultural operations. No doubt, the average rainfall in a region during crop growing season can be easily calculated, but it will not be of much help unless the probabilities of getting the minimum amounts of rainfall during different fortnights of the season can be predicted. This information will help the farmer to estimate the amount of water that he has to supplement from other sources.

The present investigation is taken up (6) to analyse the rainfall data for assessing the variability in rainfall over a period of years according to standard fortnights during the crop growing season and (6) to estimate the probabilities of getting the selected amount of rainfall during the different crop growing fortnights.

of the transistors were identical to those at the emitters. No significant changes in the waveforms could be observed with and without load. However these waveforms do not generally affect the performance of most of the instruments, (see Ref.).

The inverter can be used to operate a wide variety of recorders which operate at 220 volts and draws less than 60 watts of power.

6. The author wishes to thank Sri George Alexander, Director (Instruments) and Shri O. Chacko for their interest in the work and encouragement

N.V. IYER

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2. The daily rainfall data of Raichur for a period of sixtyfive years (1901 to 1965) were collected from India Meteorological Department, Poona. The data were analysed statistically. First, the total rainfall according to standard and weeks then according to standard fortnights were found out. The fortnightly rainfall totals from May to November, which is the main crop growing season in the Raichur region were considered. The mean, standard deviation, coefficient of variation, measures of skewness and kurtosis were calculated for the above fortnightly periods.

Wherever the data were skewed, the technique suggested by Manning (1950) was used to normalise the data.

3. The study of mean, minimum and maximum rainfall of the Raichur region during the different standard fortnights of the period 30 April to 25 November during 1901-1965 reveals that there is considerable variation in rainfall. The least coefficient of variability for the fortnight 11 to 24 June, 25 June to 8 July and 17 to 30 September shows less variability of rainfall compared to other fortnights. The highest coefficient of variability for the fortnight 29 October to 11 November shows that the occurrence of rainfall is least consistent. Hence the probabilities of rainfall for that period are not reliable.

The percentage probabilities of getting selected levels of rainfall (Table 1) during the standard fortnights of the crop growing season were calculated
### Table 1

<table>
<thead>
<tr>
<th>Selected level of rainfall (inch)</th>
<th>28 May</th>
<th>11 Jun</th>
<th>25 Jun</th>
<th>9 Jul</th>
<th>23 Jul</th>
<th>6 Aug</th>
<th>20 Aug</th>
<th>3 Sep</th>
<th>17 Sep</th>
<th>1 Oct</th>
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<tbody>
<tr>
<td>0-5</td>
<td>81.86</td>
<td>77.34</td>
<td>85.54</td>
<td>83.40</td>
<td>77.64</td>
<td>81.50</td>
<td>77.64</td>
<td>81.33</td>
<td>91.31</td>
<td>72.91</td>
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<td>55.17</td>
<td>58.32</td>
<td>72.57</td>
<td>68.08</td>
<td>71.90</td>
<td>67.36</td>
<td>68.79</td>
<td>70.19</td>
<td>83.15</td>
<td>57.93</td>
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<td>2</td>
<td>16.83</td>
<td>29.12</td>
<td>48.40</td>
<td>40.90</td>
<td>50.40</td>
<td>42.07</td>
<td>59.48</td>
<td>50.80</td>
<td>65.17</td>
<td>35.20</td>
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<tr>
<td>3</td>
<td>3.93</td>
<td>13.00</td>
<td>29.00</td>
<td>21.77</td>
<td>34.83</td>
<td>24.51</td>
<td>35.57</td>
<td>35.20</td>
<td>48.01</td>
<td>20.61</td>
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<tr>
<td>4</td>
<td>0.59</td>
<td>5.05</td>
<td>16.85</td>
<td>10.93</td>
<td>22.96</td>
<td>13.35</td>
<td>23.81</td>
<td>23.89</td>
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<td>1.92</td>
<td>9.34</td>
<td>5.16</td>
<td>14.16</td>
<td>6.68</td>
<td>16.39</td>
<td>16.87</td>
<td>22.96</td>
<td>6.30</td>
</tr>
<tr>
<td>6</td>
<td>9.10</td>
<td>3.59</td>
<td>9.68</td>
<td>10.20</td>
<td>15.15</td>
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<td>3.45</td>
<td>4.09</td>
<td>5.94</td>
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<tr>
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</tbody>
</table>

using normal probability table (Snedecor and Cochran 1968). The probabilities give guidance to farmers to plan their agricultural operations with confidence. If the water requirements of a crop during different stages of its growth are known, the knowledge of probabilities will help them to select the suitable planting period and also to supplement the shortage in water requirements for improved production.

H. M. THIMMARAYAPPA

B. N. KRISHNAIAH SETTY

### References

- Manning, H. L.

- Snedecor, G. W. and Cochran, W. G.

### AN EXPLORATORY STUDY BY RADAR OF THE EFFECT OF SEEDING TWO MARITIME CUMULUS CLOUDS

Following enunciation and demonstration by Woodbeck et al. (1963, 1967) of the effect of seeding humid air over sea by massive doses of giant hygroscopic nuclei, a case study was undertaken at Bombay towards the end of 1973 monsoon season for exploring the effect of salt seeding on maritime cumulus using radar facility. This study formed a part of the programme of Poona cloud seeding experiment (Krishna et al. 1974).

The X-band, BEL weather radar of the Meteorological Office, Bombay airport and the S-band surveillance radar (ASR-3, CA-3100) of the airport Air Traffic Control, made available with the generous cooperation of the respective authorities, were used for the study. Seeding was performed...