between the 1000-mb and 500-mb levels should be found out from the tephigram and then the value of the Index can be readily obtained against this difference. It is seen from the graph that the critical condition is expected when the difference of potential temperatures in degrees absolute between these levels is 11 or less.

The results obtained are summarised in Tables 1 and 2. Table 1 gives the number of days on which the value of the Index was greater than or equal to 19. Table 2 gives the distribution of weather phenomena which occurred on days when the Index was greater than 19.

It will be seen from Table 1 that on approximately 59 per cent of the days in the premonsoon months the value of the Index exceeded the critical value. The analysis of the occurrence of thunderstorms as shown in Table 2 points out that only on approximately 26 per cent of the days on which the Index exceeded 19, either thundery conditions or actual thunderstorms occurred. Another fact which is brought out is the occurrence of thunderstorms on days on which the Index was less than 19 (37 per cent of the total number of thundery days). However a large number of these storms were in association with phenomena, other than of local origin, such as the movement of active western disturbances over the areas concerned.

It has not been possible to study the cases of clear air turbulence due to lack of available data on the subject.

It may thus be concluded that the theory in its present state fails to predict the occurrence of thunderstorms in a large number of cases. This may be due to the following reasons—

(1) Various assumptions made while deriving the critical conditions for the upturning in the atmosphere may not be entirely valid when applied to large scale instability phenomena like thunderstorms.

(2) It has been assumed that the 500 mb temperature remains unaltered except in cases where the air mass has appreciably changed since the previous sounding. But this is not borne out by actual radiosonde soundings. It is seen that approximately on 40 per cent of the days the difference in temperatures at 500-mb level between the morning and the evening ascents is more than 4°C. It is not known how many of these differences are due to instrumental errors. However, in cases where changes of air mass have really occurred up to the 500 mb, the values of the Index based on the morning tephigrams would not be appropriate to the afternoon conditions.

(3) According to Ramalingam (1960) the moisture seems to play apparently a minor part so far as the initiation of the thunderstorms is concerned. It is, however, felt that along with the critical number, if due consideration is given to the humidity in the lower levels, the theory might yield positive results in a greater number of cases.

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September 5, 1960

REFERENCE

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SHEAR WIND CALCULATOR

In most of the forecasting offices, the shear wind vector is worked out and used in medium range forecasting. The shear wind is taken as the shear of the wind at 2000/3000 ft a.s.l. in relation to the wind at 15000/20000 ft at the same station.

The process of working out the shear wind component, in most of the forecasting offices, is presently, by the straight-forward method. The vectors of the 2000-ft and
20000-ft levels are plotted on plain paper with the help of the protractor and the resultant component measured by shifting the pottractor and keeping it approximately to the same true direction as originally kept and the bearing of resultant vector read out. This method is reasonably accurate within 10°/20°. The vector points are then erased and that of another station plotted and worked out. The time taken normally for working out shear wind for all pibal stations in and near India is about 60/80 minutes. To facilitate the above, a simple and ready shear wind calculator is suggested and explained below.

A thin perspex sheet (12" × 12"), unglazed on one side, is mounted on a wooden board, with a polar diagram placed between the perspex and board. In the middle of the frame (and the polar diagram) a slot is made to carrying an inch* graduated (from the middle) perspex scale A (12°), so that it rotates freely. This scale has on it a light parallel scale B linked by a two aluminium strip sleeves. The second scale is graduated from one side. The simple gadget is now ready for use. The vectors (X, Y) of the 2000 and 20000 ft are marked by using the scale A (scale: 10 kt=1°). Then the scales are turned round so that the parallel scale B is positioned to read the distance XY, and at the same time the direction of the shear wind component is read off by the bearing of scale A. By this method, it is felt that the time taken for working the data for all stations will be reduced by 60-75 per cent.

Some improvements to make the equipment quicker in operation are—

1. The scale B to have a small knob at the middle to facilitate its movements.
2. On underside of the scale B, slots are made so that it can be pulled close to the scale A.
3. Provision of a cursor line arrangement on scale B, so that the distance XY can be read out by shifting of the cursor line.

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December 4, 1960

*The scale can be made in metric units