

## Letters To The Editor

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### AN UNUSUALLY HIGH NOR'WESTER RADAR CLOUD

A high power 3-cm meteorological radar has recently been installed at Dum Dum airport. This radar has a peak power of 250 KW and a beam width of  $1^{\circ}2$  in both planes. In addition to PPI and RHI there is provision for obtaining Range Elevation Indication also by automatically sweeping the aerial from 0 to  $90^{\circ}$  in any selected azimuth.

On 18 June 1958, the radar screen was full of echoes from large *Cu* and *Cb* clouds about 100 km around Dum Dum airfield. As early as at 0900 IST there appeared a squall line echo extending from  $315^{\circ}$  N in the northwest to  $101^{\circ}$  N in the northeast at a distance of about 150 km from station. The line as a whole was seen to move towards the station. The Observatory at Dum Dum airport recorded a NE'ly squall of moderate intensity at 1315 IST.

The thunderstorm activity in the region persisted for a considerable time even after the occurrence of the thundersquall and the *Cb* cells were noticed on the 'scope' even up to 2100 IST.

Some interesting radarscope pictures indicating the vertical structures of nor'westers are shown in Fig. 1. Fig. 1 (a) shows the REI picture at 1250 IST of the main thunderstorm cell at  $065^{\circ}$  azimuth. The column of the main cell is seen at 28-40 km away, but the anvil top is seen to extend right overhead. In fact, the length of the top was more than 100 km. The maximum calculated height of the echo was about 23 km. Fig. 1(b) shows the REI scope of the

thunderstorm cell at  $068^{\circ}$  azimuth at 1303 IST. The base of the cell is seen to have approached much nearer. The height of the cell was about 22 km. While the main column is fairly compact the top of the echoes shows fibrous structure. Fig. 1(c) shows another section of the thunderstorm cell at  $032^{\circ}$  N at 1315 IST just at the time of occurrence of the thundersquall at the station. The computed height of the cell was 23 km. There was no precipitation over the station during the squall as can be seen from Fig 1(c). The Observatory at Dum Dum airport recorded occasional rain from 1325 to 1530 IST. The main thunderstorm cell then moved away from the station towards southwest. Fig. 1(d) shows the situation towards southwest at 1423 IST. It is seen that the thunderstorm became less active and the height was reduced to 18 km. The picture shows two cells separated by a distance of about 10 km looking like two columns.

The synoptic situation on the day under report was favourable for the occurrence of thunderstorms or thundersquall at Calcutta and neighbourhood. The surface charts at 0530, 0830 and 1130 IST indicated extension of the monsoon trough to Gangetic West Bengal and East Pakistan. The pressure change chart showed rapid fall of pressure over this area and the corrected change chart indicated the monsoon condition to intensify over the area. The radiosonde ascent at 0530 IST at Dum Dum airport showed convective instability. One could, therefore, expect thunderstorm activity in the neighbourhood of Calcutta.

Even accounting for the effect of the beam width of the radar, the height of the top of the radar cloud as obtained on this day was abnormally high. It is known that the

reflectivity of the ice particles is much less than that of water droplets but from the nature and intensity of echo it appears that they were mostly from within the cell upto a great height. Thus the important question arises whether supercooled water droplets exist up to 23 km or so. This phenomenon of existence of supercooled water droplets up to as high as 23 km is unusual. The maximum height of radar clouds so far observed at Dum Dum airport is of the order of 15 km. It is well known that the height of the visual cloud is much more than that of the radar cloud. Therefore in this particular case the maximum height of the visual cloud must

have been 25 km or so. The reason for the occurrence of such unusually high *Cb* cloud is not understood. The maximum height of cloud top as reported by the in-flight aircraft is of the order of 55,000 ft (17 km).

This observed phenomenon is important from the meteorological as well as aviation points of view specially in connection with the flight of jet aircraft over this region.

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September 10, 1958.*

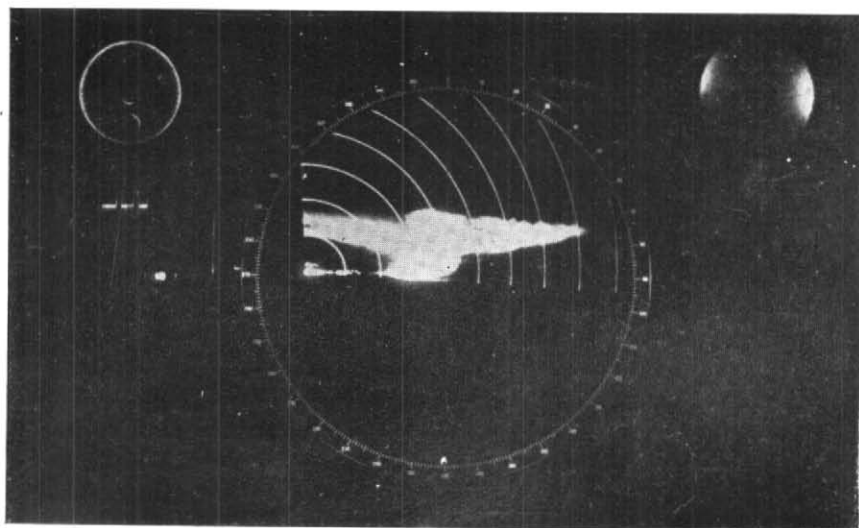


Fig. 1 (a)—1250 IST

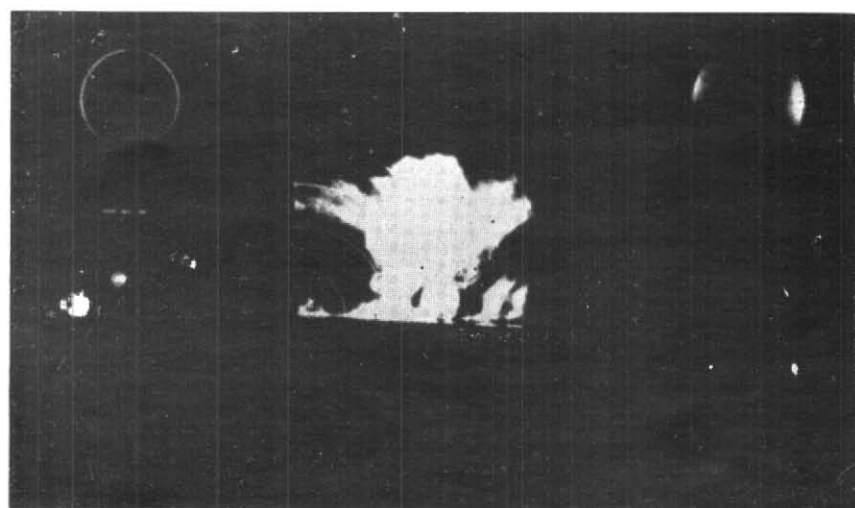
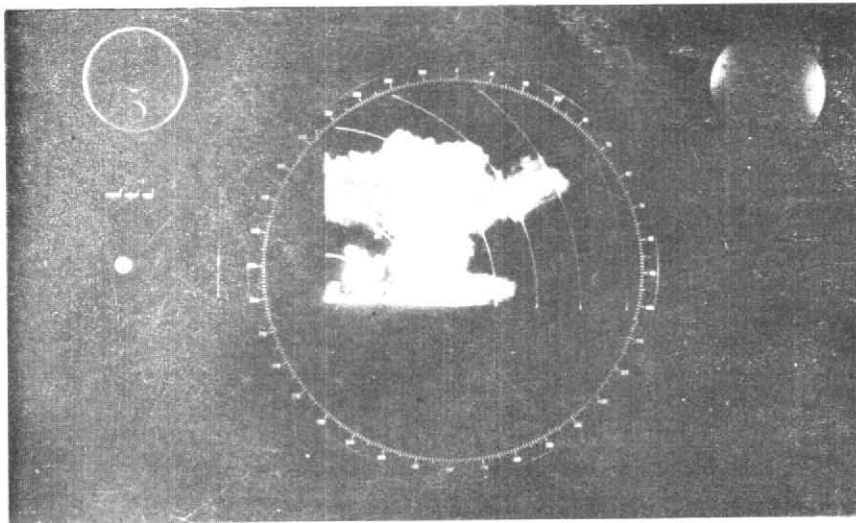


Fig. 1 (b)—1303 IST

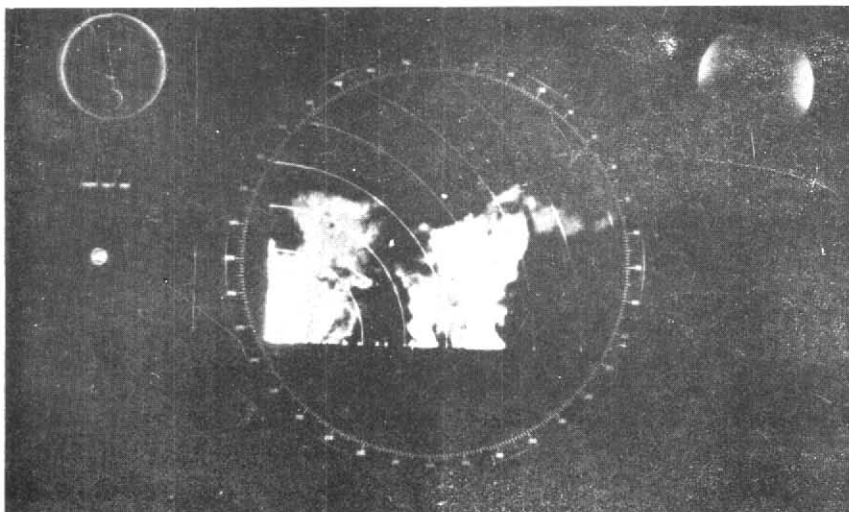
Figs. 1 (a) and 1 (b). Radarscope pictures as obtained at Dum Dum airport on 18 June 1958  
Figures in the left and right bottom corners indicate azimuth in °N  
and range rings in km respectively



032°

5 km

Fig. 1 (c)—1315 IST



244°

5 km

Fig. 1 (d)—1423 IST

Figs. 1 (c) and 1 (d). Radarscope pictures as obtained at Dum Dum airport on 18 June 1958

Figures in the left and right bottom corners indicate azimuth in °N  
and range rings in km respectively