A MODEL FOR NEAR SURFACE, PRESHOCK AIR TEMPERATURES

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The existence of a shock precursor was first noted during the Buster-Jangle test series nearly 30 years ago. On subsequent tests of UPSHOT-KNOTHOLE and TEAPOT, greatly enhanced damage to drag sensitive targets was correlated with the existence of shock precursors. The cause of the enhanced damage was increased dynamic pressure which was most likely caused by pre-shock heating of the air near ground level and the subsequent dust entrainment by the shock.

Attempts to measure the preshock environments and correlate them in order to allow accurate predictions, led one author to write, "The results appear to be incompatible; and, with the exception of TUMBLER SHOTS 3 and 4, it is doubtful whether any of the measurements made result in useful data. We have developed a relatively simple model which correlates well with measured pre-shock environments over desert, concrete and asphalt surfaces. The model uses the thermal radiative output and the height of burst
of the detonation to calculate the time history of the temperature of the air at any ground range and height above the surface. The model is compared with data from experiments covering a wide range of yields and
heights of burst.

The model has been excerised to produce contours of the importance of thermal effects as a function of yield (from 1 Kt to 2 Mt) and height of burst (from 0 to several km). It predicts the onset of precursor formation and correlates well with the intensity of the precursors.