

A THERMAL RADIATION SIMULATOR DEVELOPMENT PROGRAM

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A thermal radiation simulator (TRS) has been developed for field tests of military equipment. The TRS can produce a thermal radiation pulse of 250 joules/cm² (60 cal/cm²) over an area as large as 370 m². The TRS has been used in conjunction with large high explosive tests to produce synergistic thermal and blast loads on aircraft, shelters, missiles, and other military hardware. Practical limitations to flux and fluence levels generated by the TRS are 418 watts/cm² (100 cal/cm²-sec) and 250 joules/cm² (60 cal/cm²) respectively. The thermal radiation pulse is produced by the rapid combustion of aluminum and oxygen. During large TRS burns, 200 kg of finely divided Al powder are burned in less than 200 milliseconds. Thirty-four percent of the reaction's energy is released as light with a spectrum roughly equivalent to that produced by a 40000K black body radiator. TRS units have been constructed and tested that produce peak power outputs of 8×10^8 watts (1.9×10^{11} cal/sec) and radiant energy outputs of 2×10^9 joules (4.8×10^8). Waveforms generated by the TRS are similar to those of nuclear bursts and can be adjusted to simulate weapon yields from 1 KT to 1MT.