Shock initiation sensitivity and Hugoniot-based equation of state of Composition-B obtained using in situ electromagnetic gauging L. LEE GIBSON, DANA DATTELBAUM, BRIAN BARTRAM, STEPHEN SHEFFIELD, RICHARD GUSTAVSEN, Los Alamos National Laboratory, CAROLINE HANDEL, Atomic Weapons Establishment, SHOCK AND DETONATION PHYSICS TEAM, EXPLOSIVES MODELLING TEAM — Composition-B (Comp-B) is a solid cast explosive comprised of 59.5 wt % cyclotrimethylene-trinitramine (RDX), 39.5 wt% 2,4,6-trinitrotoluene (TNT), and 1 wt% wax. Its initial density depends on formulation method and as a result, the detonation properties of Comp-B have generally been studied at densities of 1.69 g/cm$^3$ and 1.72 g/cm$^3$. The shock initiation sensitivity (Pop-plot) of Comp-B has been reported previously; obtained using both explosively-driven wedge tests and embedded manganin gauge techniques. We describe the results of a series of gas-gun-driven plate-impact initiation experiments on Comp-B ($\rho_0$ =1.72 g/cm$^3$) using embedded electromagnetic gauges to obtain in situ particle velocity wave profiles at 10 Lagrangian positions in each experiment. From the wave profiles, an unreacted Hugoniot locus, the run-distance-to-detonation, and initiation waveforms are obtained in each experiment. The results indicate that Comp-B at $\rho_0$ =1.72 g/cm$^3$ is more sensitive than reported previously. Comparisons are made of the new Hugoniot states with an earlier Hugoniot-based EOS. Measurements of the detonation wave profile using photonic Doppler velocimetry are also presented and discussed in the context of ZND detonation theory.

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