Estimation of the Shock to Detonation Region Inside an Energetic Material[1] ERIK WEMLINGER, DAVID STOWE, SEAN TREADWAY, CHRISTOPHER CZECH, JOHN COGAR, Corvid Technologies, 145 Overhill Drive, Mooresville, NC 28117 — A series of six tests were conducted investigating shock-to-detonation transition (SDT) in cylindrical samples of Composition B (CompB). A 40mm (1.57 in) powder gun was used to launch 1.905 cm (0.75 in) diameter spherical steel fragments at a mean velocity of 1519.73 m/s (4986 ft/s) into the CompB. For each test 9 piezoelectric pins were placed 1.27 cm (0.5 in) below the surface of the CompB and situated to form a plane that bisects the CompB sample. The pins were positioned such that 8 were along the side of the cylinder with the 9th pin opposite the impact location of the cylinder. The 9 pins were used to record the detonation wave time of arrival (TOA). Using the piezoelectric pin TOA a basic kinematic equation can be written for the velocity between the start of the detonation wave and the TOA at the pin. A system of 4 equations is used to solve for the location in the plane, the velocity, and time when the detonation wave initiated. This approach was used for each of the 126 unique combinations of piezoelectric pins to estimate a region where the SDT transition occurred.

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