Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Qualification of a multi-diagnostic detonator-output characterization procedure utilizing PMMA witness blocks MATTHEW BISS, MICHAEL MURPHY, MARK LIEBER, Los Alamos National Laboratory — Experiments were conducted in an effort to qualify a multi-diagnostic characterization procedure for the performance output of a detonator when fired into a poly(methyl methacrylate) (PMMA) witness block. A suite of optical diagnostics were utilized in combination to both bound the shock wave interaction state at the detonator/PMMA interface and characterize the nature of the shock wave decay in PMMA. The diagnostics included the Shock Wave Image Framing Technique (SWIFT), a photocathode tube streak camera, and photonic Doppler velocimetry (PDV). High-precision, optically clear witness blocks permitted dynamic flow visualization of the shock wave in PMMA via focused shadowgraphy. SWIFT- and streak-imaging diagnostics captured the spatiotemporally evolving shock wave, providing a two-dimensional temporally discrete image set and a one-dimensional temporally continuous image, respectively. PDV provided the temporal velocity history of the detonator output along the detonator axis. Through combination of the results obtained, a bound was able to be placed on the interface condition and a more-physical profile representing the shock wave decay in PMMA for an exploding-bridgewire detonator was achieved.

Matthew Biss
Los Alamos National Laboratory

Date submitted: 23 Feb 2017 Electronic form version 1.4