Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Novel Circuits for Energizing Manganin Stress Gauges DOUGLAS TASKER, Los Alamos Natl Lab — This paper describes the design, manufacture and testing of novel MOSFET pulsed constant current supplies for low impedance Manganin stress gauges. The design emphasis has been on high accuracy, low noise, simple, low cost, disposable supplies that can be used to energize multiple gauges in explosive or shock experiments. Manganin gauges used to measure stresses in detonating explosive experiments have typical resistances of 50 mΩ and are energized with pulsed currents of 50 A. Conventional pulsed current supplies for these gauges are high voltage devices with outputs as high as 500 V. Common problems with the use of high voltage supplies at explosive firing sites are: erroneous signals caused by ground loops; overdrive of oscilloscopes on gauge failure; gauge signal crosstalk; cost; and errors due to finite and changing source impedances. To correct these issues a novel MOSFET circuit was designed and will be described. It is an 18-V circuit, powered by 9-V alkaline batteries, and features an optically isolated trigger, and single-point grounding. These circuits have been successfully tested at the Los Alamos National Laboratory and selected explosive tests will be described together with their results. LA-UR-15-20613.

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Date submitted: 02 Feb 2015 Electronic form version 1.4