

IMPLEMENTATION OF THE UNIVERSITY OF MISSOURI TERA-WATT TEST
STAND AND THE STUDY OF A LARGE, MULTICHANNELING, LASER
TRIGGERED GAS SWITCH

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ABSTRACT

The University of Missouri Terawatt Test Stand is one of the world's largest university operated pulsed power facilities. It was developed and implemented, for a fraction of similar facilities cost, under the supervision of the author. The test stand was routinely operated at up to 200 kA at approximately 200 ns FWHM and 600 kV into appropriate loads. The test stand provides a valuable resource for pulsed power experimentation in areas ranging from component evaluation to wire array physics.

The laboratory's original initiative was to research 2.5 MV laser triggered gas switches. Experiments were conducted in voltage ranges from 800 kV to 2.5 MV, with peak currents of over 175 kA, using air and SF₆ as fill gases. These parameters, along with electrode type, configuration, and size were varied to experimentally understand multichanneling and low inductance configurations for large laser triggered gas switches. This effort discovered that for very low impedance gas switching, avenues of drastic redesign of existing switches must be explored as opposed to modest design changes to meet stringent impedance requirements for future inertial confinement fusion programs. From this initiative, novel results were obtained that may be utilized for the future design of large, low inductance gas switches.