

## **OPERATION OF A LARGE-AREA REFLEX TRIODE ON A MODULAR PULSED POWER GENERATOR\***

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The SATURN pulsed-power machine is normally operated in negative polarity using up to 3 cathodes and 4 anodes to drive three electron-beam diodes in parallel. A large-area, reflex triode for <1MV x-ray production is being tested on SATURN. The first shots with a reflex triode load used convolutes to connect the lines to a tri-axial feed with two cathodes and one anode. A new configuration for SATURN does not use convolutes and drives the reflex triode directly, allowing simplified diagnostic access to both cathodes and the anode and significantly reduces current lost between the MITLs and the triode. Current probes have been mounted in the upper and lower cathodes and in the anode to measure the triode currents. Two vacuum voltmeters were mounted in field-free regions above and below the triode to separately measure the upper and lower cathode voltages. A circuit model of SATURN, from the water transmission lines, to the reflex triode load has been developed. It is able to reproduce the measured triode voltage and current waveforms with good fidelity. The generator current is adjusted by charging only a subset of SATURN's 36 marx banks. Using 17 banks, the measured upper/lower currents and voltages were 1.2MA/1.2MA and 290kV/340kV at the time of peak x-ray emission. The triode electron beams strike a thin tantalum anode to produce Bremsstrahlung x-rays. Radiation dose, dose-rate and imaging diagnostics monitor the triode performance. These data will be presented. Particle-In-Cell code simulations of electron transport from the MITL plates through the tri-axial feed lines to the triode load region predict efficient transport of the available current. Efforts are underway to increase the current while maintaining fixed voltages.

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