

## HIGH POWER LONG PULSE PERFORMANCE OF THE DIII-D GYROTRON INSTALLATION\*

John Lohr,<sup>†</sup> Y.A. Gorelov,<sup>†</sup> R.W. Callis,<sup>†</sup> H.J. Grunloh,<sup>†</sup> J.J. Peavy,<sup>†</sup> R.I Pinsker,<sup>†</sup>  
D. Ponce,<sup>†</sup> R. Prater,<sup>†</sup> and R.A Ellis<sup>‡</sup>

<sup>†</sup>*General Atomics, P.O. Box 85608, San Diego California, 92186-5608 USA*

<sup>‡</sup>*Princeton Plasma Physics Laboratory, Princeton, New Jersey 08543-0451*

The 110 GHz gyrotron installation on the DIII-D tokamak now comprises six gyrotrons injecting greater than 3.0 MW into the plasma. Three are Gycom tubes nominally producing 750 kW for 2 s pulses and three are CPI production, rated at 1.0 MW for 10 s pulses. One of the CPI tubes, which have CVD diamond output windows, has been tested at 1.0 MW, 5 s pulse length and all three have been tested at 650 kW for 10 s pulses. The pulse lengths for 1 MW operation of these gyrotrons have been limited administratively to 5 s pending additional operational experience with the diamond windows. In addition to the gyrotrons, characterization of the ancillary components, waveguides, dummy loads, polarizers and launchers has been performed. Transmission efficiencies of the waveguide lines have been measured directly, indicating 20% loss in about 100 m line length with eleven miter bends for evacuated 31.75 mm diameter corrugated waveguide. Rapid calorimetric response has been achieved with mode conversion dummy loads, which absorb about 80% of the incident rf power. Initial tests of launcher assemblies capable of scanning the rf beams in two planes have demonstrated a poloidal scan across the tokamak upper half plane in about 2 s, a rate suitable for tracking target features in the plasma. Full feedback control of the gyrotron output power by the plasma control system is being developed.

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