

## **PRACTICAL EXPERIENCES WITH THE SIX GYROTRON SYSTEM ON THE DIII-D TOKAMAK\***

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The gyrotron installation on the DIII-D tokamak now comprises six 110 GHz gyrotrons in the 1 MW class, three manufactured by CPI and three by Gycom. Two tetrode rectifier/modulator/regulator power supplies were constructed to provide power for the CPI gyrotrons and a second system uses three mod/reg tetrodes connected in parallel and fed by a dual tetrode mod/reg to power the Gycom tubes. The windowless evacuated transmission lines are up to 100 m in length, with 80% transmission efficiency. Engineering solutions were developed in specific problematic areas encountered in the development of this complex system, including: Gyrotron instability; high voltage circuit instability; gyrotron conditioning; rf beam forming and coupling to waveguide; output window vacuum seals; material control; launcher mechanics and diagnosis; polarizer mechanics; dummy loads; power measurements; polarization measurements; cooling; calorimetry; and operating controls. The system is in routine operation in support of tokamak experiments, with peak generated power of about 5 MW at 2 s. pulse length and about 3 MW for 5 s. pulses. This presentation focuses on practical lessons learned in the development and operation of these systems.

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