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Design of an RF System for Electron Bernstein Wave Studies in MST[1] J.X. KAUFFOLD, A.H. SELTZMAN, J.K. ANDERSON, P.D. NONN, C.B. FOREST, University of Wisconsin — Motivated by the possibility of current profile control a 5.5GHz RF system for EBW is being developed. The central component is a standard radar Klystron with 1.2MW peak power and 4μs typical pulse length. Meaningful experiments require RF pulse lengths similar to the characteristic electron confinement times in MST necessitating the creation of a power supply providing 80kV at 40A for 10ms. A low inductance IGBT network switches power at 20kHz from an electrolytic capacitor bank into the primary of a three-phase resonant transformer system that is then rectified and filtered. The system uses three magnetically separate transformers with microcrystalline iron cores to provide suitable volt-seconds and low hysteresis losses. Each phase has a secondary with a large leakage inductance and a parallel capacitor providing a boost ratio greater than 60:1 with a physical turns ratio of 13.5:1. A microprocessor feedback control system varies the drive frequency around resonance to regulate the boost ratio and provide a stable output as the storage bank discharges. The completed system will deliver RF to the plasma boundary where coupling to the Bernstein mode and subsequent heating and current drive can occur.

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