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**EBW Heating Experiment in the Madison Symmetric Torus**[1] J.K. ANDERSON, M. CENGHER, W.A. COX, C.B. FOREST, S.M. MCMAHON, University of Wisconsin-Madison — A heating and current drive system based on the electron Bernstein wave (EBW) is being constructed on the Madison Symmetric Torus. The EBW may facilitate auxiliary heating and current drive in the overdense RFP plasma where ECCD is inaccessible, and may improve stability to tearing modes by supplying the appropriate parallel current. The first step in the experiment is operational and supplies a 10 msec, 120 kW pulse of 3.6 GHz rf power to the plasma edge. Measurements of reflected power can be as low as 20%, in agreement with coupling measurements made at low power for this antenna. Successful operation at this level validates the technical design for a higher power (300 kW) system based on the same type of antenna (S-band waveguide grill), vacuum windows, and rf sources (75 kW traveling wave tube amplifiers). It has been empirically determined that a dielectric antenna cover is necessary for high power operation. With no cover, plasma from the turbulent edge travels into the antenna resulting in poor coupling and transmission line failure. Experiments show that power handling of the antenna is sensitive to the antenna position, edge plasma conditions, and specific features of the dielectric antenna cover. Although not expected to have a significant effect at this power level ($P_{EBW} << P_{\Omega}$), data from x-ray and other distribution function diagnostics may show faint signs of heating and are compared to predictions from Fokker-Planck computations.

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