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Maximizing MST's inductive capability with a Bp programmable power supply B.E. CHAPMAN, D.J. HOLLY, C.M. JACOBSON, K.J. MCCOLLAM, J.C. MORIN, J.S. SARFF, A. SQUITIERI, UW-Madison — A major goal of the MST program is the advancement of inductive control for the development of both the RFP's fusion potential and, synergistically, the predictive capability of fusion science. This entails programmable power supplies (PPS's) for the Bt and Bp circuits. A Bt PPS is already in place, allowing advanced RFP operation and the production of tokamak plasmas, and a Bp PPS prototype is under construction. To explore some of the new capabilities to be provided by the Bp PPS, the existing Bt PPS has been temporarily connected to the Bp circuit. One key result is new-found access to very low Ip (20 kA) and very low Lundquist number, S (10ˆ4). At this low S, simulation of RFP plasmas with the MHD code NIMROD is readily achievable, and work toward validation of extended MHD models using NIMROD is underway with direct comparisons to these MST plasmas. The full Bp PPS will also provide higher Ip and S than presently possible, allowing MST to produce plasmas with S spanning as much as five orders of magnitude, a dramatic extension of MST's capability. In these initial tests, the PPS has also increased five-fold MST's Ip flattop duration, to about 100 ms. This, coupled with the recently demonstrated PPS ability to drive large-amplitude sinusoidal oscillations in Ip, will allow tests of extended-duration oscillating field current drive, the goal of which is ac sustainment of a quasi-dc plasma current. Work supported by US DOE.

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