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Diagnosing 50kV hydrogen neutral beam characteristics¹ M.D. NORBERG, J.K. ANDERSON, D.J. DEN HARTOG, S. MUNARETTO, S. OLIVA, Univ of Wisconsin, Madison, D. CRAIG, Wheaton College — The 50 kV hydrogen diagnostic neutral beam on MST facilitates charge-exchange spectroscopy measurements of impurity ions and core-localized magnetic field measurements through the motional Stark effect. Interpretation of these measurements requires good knowledge of the beam energy components and divergence. The characteristics of this neutral beam are now time dependent and sub-optimal for sufficient signal-to-noise discrimination in spectroscopic measurements. In particular, the 1/3 energy component is comparable to the primary energy component at the beginning of the beam pulse and the beam current is not steady. Design considerations for test stand diagnostics including Doppler-shift spectroscopy to quantify molecular and impurity species, optical beam profile measurements with filtering to address outgassing and impurity sources, and calorimetry are presented. The test stand will facilitate optimization of the beam fueling, current, and voltage to restore the beam operation to specification. Of particular concern are reliable formation of an arc in the ion source, plasma temperature, outgassing, and neutralization.

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