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Non-Inductive Startup Via a Plasma Gun DC Helicity Source on the Pegasus Experiment[1] N.W. EIDIETIS, G. FIKSEL, R.J. FONCK, G.D. GARSTKA, E.A. UNTERBERG, G.R. WINZ, University of Wisconsin-Madison — Developing a non-inductive startup technique is important for the ultralow-A Pegasus ST experiment, and the ST concept in general. Two low impurity, high I ($\sim$1 kA) plasma guns have been installed in the lower divertor region of Pegasus to test toroidal current drive via DC helicity injection during plasma startup. Aided by a high magnetic stacking factor, the dual gun array provides a toroidal current of 15-20 kA. A transition from discrete helical current streams to a uniform reconnected plasma is observed, with a doubling of the net toroidal current. Relaxation to a tokamak-like plasma state was not observed at this low current, but is expected as the net current is raised to provide a poloidal field greater than the vacuum vertical field. Experimental attempts to attain a relaxed tokamak-like configuration are concentrating on optimizing a 2-3 gun assembly at very low field strengths. Design requirements are presented for a 12 gun array to be installed in Pegasus next year, which is projected to provide $I_p > 0.1$ MA.

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