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Consolidation of the 400kA magnetic horn power supply for AD antiproton production

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The Antiproton Decelerator (AD) at CERN uses a magnetic horn as a focusing lens to capture particles generated by shooting a proton beam into a target. It is powered by a capacitor bank discharge circuit generating current pulses with an amplitude of 400kA and a duration of 30µs. As part of the ongoing consolidation of the magnetic horn, a test-bench installation was built with an increased peak current to 500kA to test, validate and stress the performance of the new horn. This has been achieved through the upgrade of an existing system developed in the 80's by increasing the size of the capacitor bank and the operating voltage from 6kV to 7kV, by the replacement of ignitron pulsed power switches by stacked solid-state switches with an improved triggering system and by the implementation of a passive snubber circuit for protection against reverse blocking voltages. A newly developed control system monitors the state of the entire magnetic horn installation and allows triggering of the switches only if the installation is in a safe operating condition. This paper describes the work done on the pulsed power supply used to power the horn. First test results are presented for operation up to 500kA.

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