

THE LAMPF LINE D FAST DEFLECTOR SYSTEM

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The Weapons Neutron Research Facility at LAMPF is served by Beam Line D. Operation of this facility is designed to take only a small portion of the total LAMPF beam and may operate in one of two possible modes. Line D may take up to one whole 500- μ s beam pulse out of ten, or it may take a 5 μ s "back porch" off of each LAMPF beam pulse. Two separate beam-deflection systems are used to accommodate these two modes of operation.

In the first of these two modes, a 32-turn, 2.5-kG, 0.53-m long, laminated-iron magnet is used to deflect entire LAMPF beam pulses into Line D. This is accomplished by pulsing the magnet to 500 A at rates up to 12 Hz. A closed-loop control system is employed to regulate the magnet current to $\pm 0.1\%$ during the beam pulse.

The system known as the fast kicker takes the last 5 μ s of each beam pulse using a 1.09-m, 1.25-kG ferrite magnet which is pulsed at up to 7000 A, 120 Hz. The magnet is driven by a 2- Ω , 6-section, pulse-forming network producing a 12- μ s wide pulse with a 1- μ s rise and fall time and less than 0.2% ripple across the flat top. The dc charge on the line is actively controlled by a closed-loop, hard-tube demand charge system which may be preset to a desired charge level, or which may be programmed on a pulse-to-pulse basis to different charge levels.

A method of synthesizing such a pulse-forming network with minimum numbers of sections, minimum ripple and desired pulse shape has been determined along with practical construction techniques required to produce the desired pulse and to handle the high average powers involved. Actual quantitative and qualitative test data have been measured.