

RADIATION SHIELDING DESIGN AND PERFORMANCE EXPERIENCE WITH A
HIGH POWER ELECTRON LINEAR ACCELERATOR

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Unique radiation shielding problems for personnel protection have been created by the advanced Test Accelerator, ATA₄, a 50MeV electron linear accelerator with peak currents of 10 A, pulse durations of 30 to 50 nsec and pulse repetition rates of 10 per second.

Beam losses occur generally along the entire accelerator structure producing radiation with quite different spectra depending upon loss locations and accelerator structures.

The x-rays produced by the scattered electrons have a low average energy while those produced by the primary beam are high. These facts have created a unique shielding problem.

Nearly 200 penetrations in the shield roof, for pulse power, control and diagnostic systems are each special case problems. Radiation leakage through these penetrations does not necessarily follow the attenuation values suggested in the literature. Attenuation factors are often greater than current literature would suggest.

Equations and actual attenuation data are shown together with the experimental techniques used for the measurements.

Experience with wide dynamic range x-ray monitors designed specifically for intense x-ray measurements is presented. Dose rates have been determined for both radiation areas and areas normally occupied by operations and maintenance personnel.