

**FAILURE OF FEEDTHROUGHS OPERATED AT A LOW-IMPEDANCE POINT  
ON DIII-D \***

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Since the restart of RF operations on DIII-D, the emphasis for the four-strap long-pulse antenna arrays at the  $0^\circ$  and  $180^\circ$  toroidal port locations has been on high-frequency operation at about 116 MHz. Prior to 2000 these antennas were operated primarily in the frequency range of 82 MHz to 90 MHz. One motivation for increasing the frequency is to maximize the plasma loading during advanced tokamak discharges. One drawback at the higher frequency is that the vacuum feedthroughs are then located near a current maximum. The antennas were designed to cover a 2:1 frequency range from 60 MHz to 120 MHz, so the feedthrough is of necessity located at a current maximum for some frequency. With the feedthrough as close to the antenna as possible, this occurs at the upper end of the frequency range. Evidence indicates that in two recent incidents a feedthrough on each antenna failed by cracking of the alumina insulator as the result of a sustained arc at the feedthrough location. These arcs were indistinguishable from normal operation with the present arc protection circuitry. In both cases the arc at the feedthrough was preceded by an arc at a high-voltage point in the antenna. Details of the arc protection topology will be presented along with recent implemented and planned changes to the circuitry in order to detect and limit such arcs in the future.

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