

4.2.5 Horn Magnetic Field Monitor

The magnetic field of Horns 1 and 2 will be monitored by a set of three pickup coils (Bdot coils) in each horn. These will be inserted and mounted through ports located at the "neck" of each horn. The coils will be spaced with a 120 degree azimuth separation around the horn: one coil located at top of horn and the other two located toward the bottom 120 degrees from the top one.

The coil assembly, **Figure 4.2-16**, will consist of 8 turns of 0.010" stainless steel wire wound on a zirconia ceramic structure. The ceramic mount will have grooves ground onto the end to locate the wire. Staggered 1/16" holes will be drilled into the upper body of the mount to secure the wire coils. The holes will be drilled after a "green" firing of the zirconia which will then undergo the final firing.

The voltage induced in the coil by the pulsing of the horn will be readout by an instrumentation amplifier into either a sample and hold synchronized to the current pulse timing or a peak sensing circuit. The required accuracy of 0.3% has been demonstrated on a prototype coil during testing of the horn 1 prototype. Modulation of the prototype coil signal with the horn cooling water temperature was observed due to thermoelectric voltage generation at the silver solder joints between the stainless steel coil and its stainless feedthrough/mount. The production coil will be welded to the feedthrough using stainless steel. It is believed that this will eliminate the thermoelectric caused modulation. It has been demonstrated that a baseline subtraction using a pedestal read ~1ms after the end of the current pulse corrects for the modulation. Such a subtraction will be employed as a fallback if modulation is observed in the production coil. The coil may also be used for timing synchronization by measuring the time of the peak of the coil pickup.

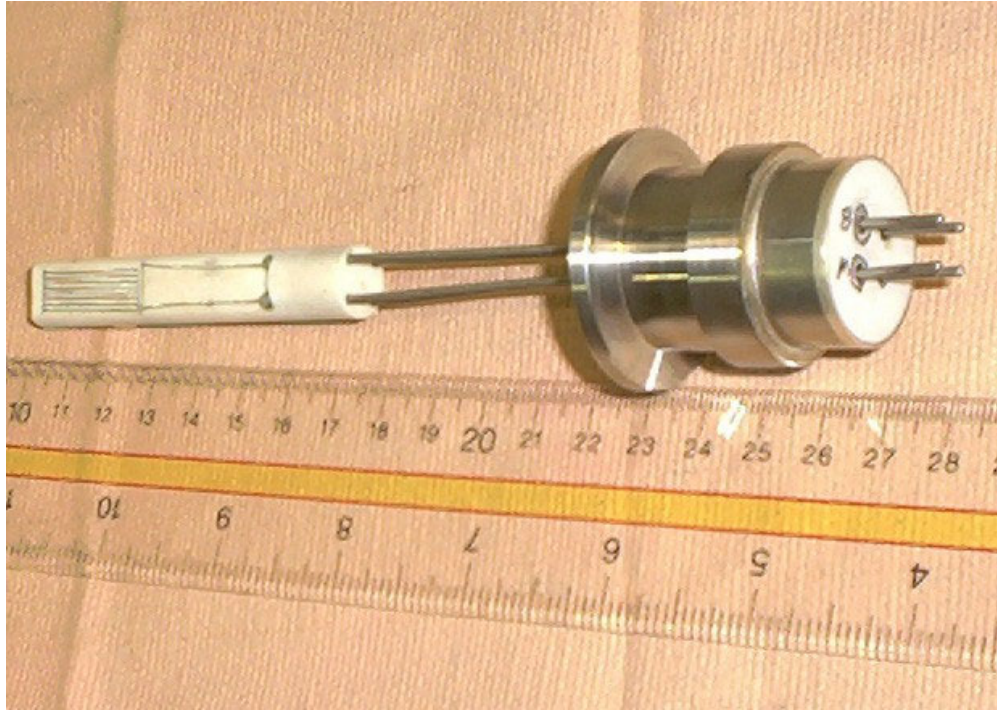


Figure 4.2-16 The prototype horn magnetic field monitoring probe.