R.F. Note #86

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8/20/82

THE K800 ANODE P.S.

Aydin was supposed to deliver our 1.2 MW P.S. in Sept. of 1981. Since we were unprepared to make the phase III on site tests, we did not try to hurry them. But we are finally prepared to make these tests, so in a series of telephone calls we learned the following:

1. All of the people originally involved in the design and construction of the P.S. are no longer with Aydin.

2. We have not received any written verification of phase I tests.

3. The crowbar tests that they have made showed that the crowbar would not meet the specifications by a large magrin.

So it seemed appropriate to visit Aydin and find out what the situation actually is and to try to expedite delivery so that we can finish phase III tests during September, as some of the equipment to make these tests are borrowed from LBL and is to be returned by Oct. 1, 1982.

The Situation as of 8/16/82

All the components exist, and in appearance, at least, exhibit a high degree of professionalism. From the technician who worked on this P.S. since its construction started, I learned that the mechanical layout of the output circuitry had been completly redone after its initial construction, and that the logic circuitry for controls had been redone twice.

Oscilloscope pictures of the short circuit current showed a rise to 800 amps in 3 μs, at which time the crowbar fired and the current then decayed to zero exponentially with a time constant of 12 μs and would leave a 1/32 inch hole in 3/4 mil aluminum foil. This meant that the indusctance between the crowbar and the short was 30 μh.

Phase I high current low voltage tests were presumably made at an uncertain time in the past by engineers who are no longer with the Company. They were unable to find any written verification of these test results and agreed that the tests must be repeated.

Another problem is that 3 of the 9 3600 pf/30kV Spraque capacitors failed and can't be replaced until 9/10/82.

Work done on 8/16/82 and 8/17/82

It was determined that the 2.5 ohm 1KW output resistors contributed 8 μH to the output inductance. They were replaced with non-inductive resistors and a phone call to the Carborundum Corp. illicited the information that properly rated non-inductive resistors could be purchased with a delivery schedule of 5 weeks.

The routing of the bus bars on one of the output channels was modified to minimize inductance and on the afternoon of 8/17/82 a crowbar test was made showing the current rising to 3250 amps in 2 μs at which time the crobar fired and then the current decayed on a 3 μs time constant, consistent with an inductance of 7.5 μh. The puncture hole in the foil was about 10 mils. This geometry resulted in satisfactory crowbar operation.

However, because of the higher transient currents a new problem developed. Whereas before this modification the crowbar indicators performed properly, i.e., a short on channel 1 gave an indication of a channel 1 short and no indication on the other channels, now channels 2 and 3 gave a short indication, but not channel 1.

Conclusions

Aydin must redo the output circuitry so that its performance on all 3 channels is as good as the test results showed it could be. They must correct the indication problem, acquire and install new capacitors and non-inductive 2.5Ω /1KW resistors. They are to repeat the high current phase I tests and let us know when they are prepared to let us witness the phase II tests.