

Fermilab

TS-SSC 91-013

1/22/91

To: J. Carson, W. Koska  
From: Jim Strait  
Subject: More resistance measurements to locate the DC0303 short

The upper-lower splice in DC0303 was broken and further resistance measurements were made to allow a more precise location of the upper-lower short. Four-wire measurements made by powering each half coil separately they gave resistances very close to the original values as shown in Table I. This indicates that the fault is, as suspected, a single upper-lower short. (The resistance shown here were taken with the temperature compensation feature of the Valhalla turned off. Cold air from a nearby door caused significant temperature fluctuations in the meter without effecting the magnet significantly.)

Table I  
Quarter Coil Resistances

<u>Coil</u>	<u>Now</u>	<u>Original</u>
Upper Inner	1.385 $\Omega$	1.386 $\Omega$
Upper Outer	1.894 $\Omega$	1.902 $\Omega$
Lower Outer	1.899 $\Omega$	1.908 $\Omega$
Lower Inner	1.385 $\Omega$	1.390 $\Omega$

The model used to locate the short is shown in Figure 1. The resistance between the upper inner lead and the short was determined to be 0.84 m $\Omega$  by passing current through the upper coil and measuring the voltage between the lower coil and the upper inner lead. Similarly the resistance to the lower inner lead was measured to be 86.92 m $\Omega$ . The sum of these, 87.74 m $\Omega$ , is very close to the resistance of 87.5 m $\Omega$  expected for the inner mid-plane turn assuming a 109 foot length and a cable resistance of 0.803 m $\Omega$ /foot.

These measurements were made with the ohmmeter's the voltage leads attached to the magnet lead where they are normally stripped. To make a more precise location of the short the lower inner lead was stripped as close to the magnet end as possible and the voltage lead attached about 1 inch from the end of the G10 saddle. The resistance from here to the short is 0.53 mW. The two measurements were about 13 inches apart, yielding the resistance of the double lead to be 0.024 m $\Omega$ /inch. The double lead extends about 2 inches into the saddle; the resistance to the short beyond this point is 0.46 mW corresponding to a distance of 6.9 inches, or a distance of 8.9 inches from the end of the saddle. The collar-end clamp boundary is 7.75 inches from the end of the G10 saddle.

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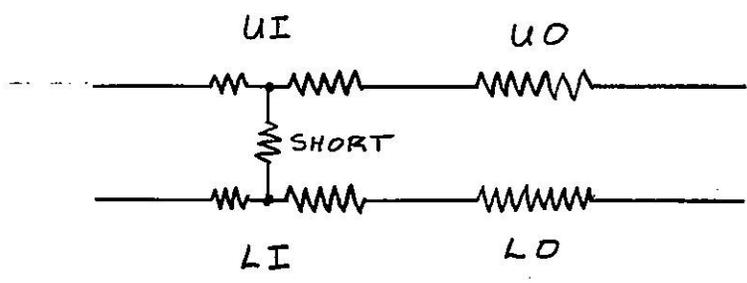


Figure 1