Fermilab

TS-SSC 91-057
4/2/91

To: DSA322 Traveler
From: Jim Strait
Subject: Location of coil-to-collar short in DSA322 (4th assembly)

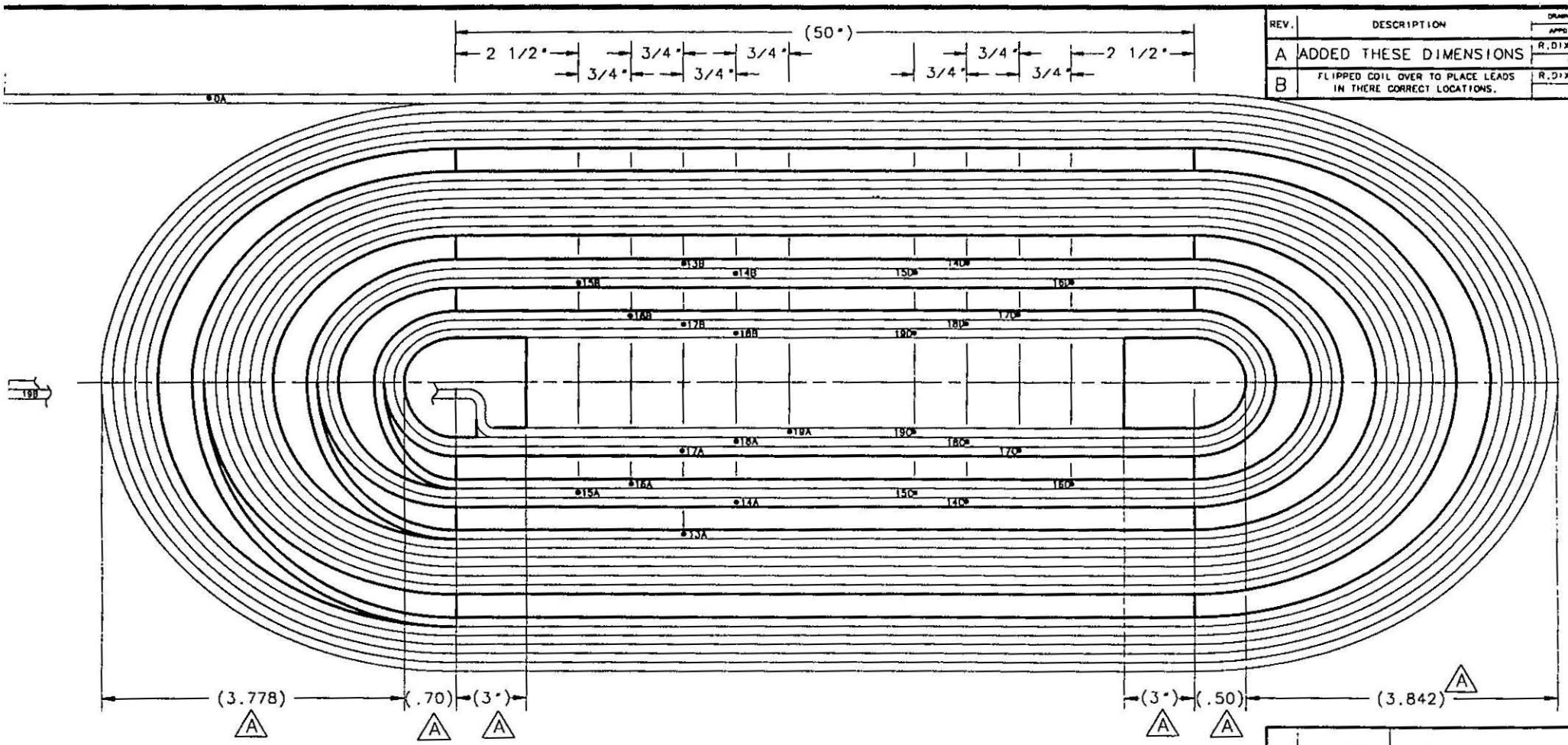
During the fourth keying of DSA322 on 3/28/91 a coil-to-collar short occurred. The short appeared with a failure of the pre-keying hi-pot at 3.5 kV resulting in a coil-to-ground resistance of 2.9 KΩ. In this note I document the resistance measurements used to determine the location of the short.

The four quarter coils had not been soldered together, so direct resistance measurements showed that the short was in the upper inner coil (1M-50-107). A Valhalla 4-wire ohmmeter was set up to pass 0.1 A through the upper inner coil. The total coil resistance was measured to be 104.4 mΩ, the resistance from the pole turn lead to the short was measured to be 12.9 mΩ and the resistance from the mid-plane lead to the short was measured to be 91.5 mΩ. The sum of the resistances from the leads to the short equals the total coil resistance and the total resistance matches that in the Traveler. These indicate that there is only one short to the collars.

Because DSA322 is a practice magnets there are no voltage taps. However, it is wound from the same reel of cable as 1M-50-117 (part of DSA325) which happened to be available on an assembly table. The Traveler value of the coil resistance is essentially the same as that for the DSA322 coil and voltage tap resistance measurements in the coil 117 Traveler suggested that the coil 107 short was between the positions of taps 17C and 17D. (See Figure 1.) To make this more precise, a set of resistance measurements were made with the same meter on the two coils using a 1 A excitation. The measurements are summarized below.

	DSA322 Coil 107	DSA325 Coil 117
R(total)	104.25 mΩ	104.54 mΩ
R(19B-short)	12.84 mΩ	
R(19B-17C)		12.62 mΩ
R(19B-17D)		13.04 mΩ

The coil 107 resistance to the short is almost exactly half way between the coil 117 resistances to taps 17C and 17D. However, taps 17C and 17D are only about 0.25 inch inside the collared portion of the coil (see Fig. 1), so the fact that the resistance gives a position that lies between these two taps indicates that the short must be at or very near the end of the collared coil in the turn just above the pole-most wedge.



REV.	DESCRIPTION	DRAWN / APPD
A	ADDED THESE DIMENSIONS	R.DIXON
B	FLIPPED COIL OVER TO PLACE LEADS IN THERE CORRECT LOCATIONS.	R.DIXON

NOTE:

1. VOLTAGE TAP WIRES FOR TAPS 0A, 19B, AND THE HALF COIL TAP ARE #22 AWG TEFLON INSULATED.
2. THE REMAINING VOLTAGE TAP WIRES ARE #32 AWG TEFLON INSULATED.
3. TAP WIRES WITH THE SAME NUMBER AT EACH END SHOULD FORM A TWISTED PAIR (A-B AND C-D).
4. VOLTAGE TAP WIRE SHOULD FOLLOW THE CABLE TO WHICH THEY ARE SOLDERED UNTIL THEY MEET AND ARE TWISTED WITH THEIR "MATE".
5. COIL AS VIEWED FROM INSIDE.

Figure 1

ITEM	PART NO.	DESCRIPTION OR SIZE
	PARTS LIST	

UNLESS OTHERWISE SPECIFIED			ORIGINATOR	STRAIT/KOSKA
.XX	.XXX	ANGLES	DRAWN	R.DIXON
±	±	±	CHECKED	
1 BREAK ALL SHARP EDGES .02 MAX.			APPROVED	
2 DO NOT SCALE DRAWING.			USED ON	
3 DIMENSIONS BASED UPON ANSI Y14.5M-1982				
4. MAX. ALL MACH. SURFACES			MATERIAL	

FERMI NATIONAL ACCELERATOR LABORA
UNITED STATES DEPARTMENT OF ENERGY

DSA3XX
VOLTAGE TAPS
INNER COIL

SCALE	FILMED	DRAWING NUMBER
NONE		0102-MB-263907