DCA318: Turn to Turn Short Location and Repair

TS-SSC 091-246
S. Delchamps
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This memo describes the procedure used to locate and repair the turn to turn short in coil 15M-50-1017 of magnet DCA318, which was detected during installation of the lead end clamp [1,2].

The short was originally detected while installing the lead end clamp with 15 mils of kapton on the inner surfaces of the collet insulators. The short reappeared during a second installation of the lead end clamp with 10 mils instead of 15 mils of kapton on the insulator surfaces.

The collared coil assembly was taken apart, and coil 1017 was set up for inspection. Examination with a microscope of the outside surface of the coil showed no obvious signs of damage. However, when the inner surface of the coil was examined, it was found that the 19A voltage tap wire had been crushed between the 19A turn and the 18A turn, as shown in Figure 1. This accounted for both the short between the 19A and 18A turns, and the odd behavior of the 19A voltage reported in Reference 2.

The crush occurred because the 19A voltage tap wire had not been routed in the usual manner, on the surface of the preform turn all the way onto the key surface, but rather straight out. This allowed the wire to fall into the uncemented gap between the preform and 18A turns.

The voltage tap wire was removed and replaced. The new wire was rerouted correctly (see Figure 2), and a ~1 inch long piece of 2 mil kapton was placed between the preform and 18A turns near the problem spot. Secomet adhesive was smeared on the turns where the kapton was placed.

After the repair was made, an end clamp assembly was installed on the coil using pieces of other coils. The short did not return. Full electrical measurements including voltage tap readings were taken before the end clamp was installed and with the end clamp in place. These are attached as Appendix 1 and Appendix 2. The coil will undergo impulse testing (ringing) before reinstallation in DCA318.

References

1. Discrepancy Report 327.

2. J. Strait, "Location of turn-to-turn short in DCA318", TS-SSC 91-234, December 12, 1991.

Distribution: R. Bossert, J. Carson, S. Gourlay, W. Koska, G. Pewitt, D. Smith, J. Strait, M. Wake

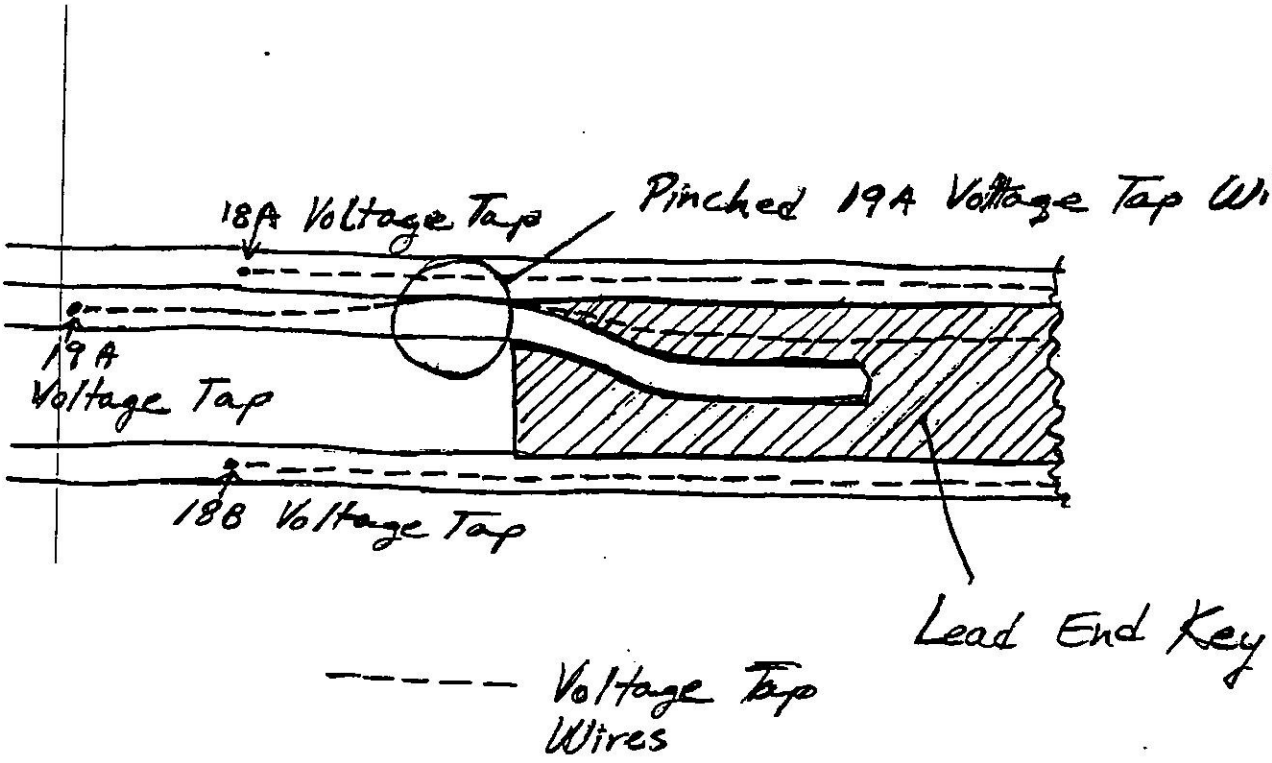
18A Voltage Tap
Pinched 19A Voltage Tap Wire
19A
Voltage Tap
18B Voltage Tap
Lead End Key
Voltage Tap
Wires

FIGURE 1

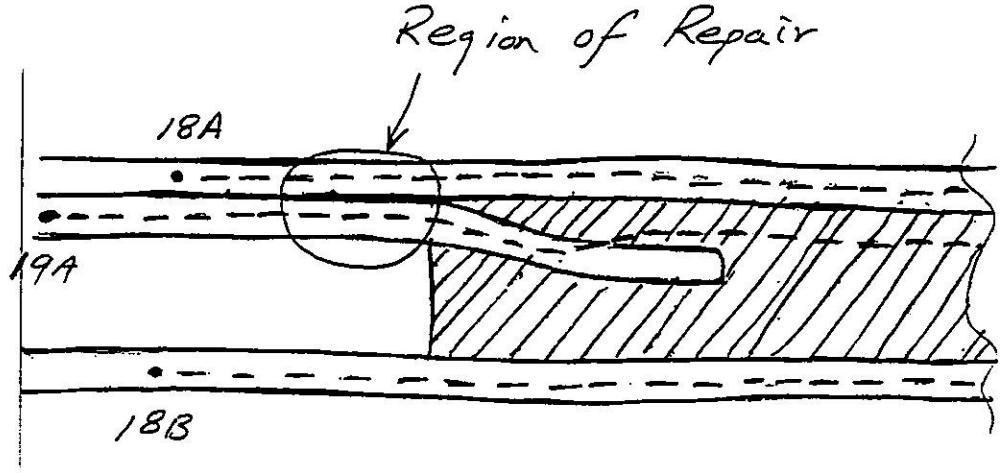

FIGURE 2

APPENDIX 1

DCA 318 15M-50-1017 12/11/91

Res. 1097 mΩ

L_S 3.031 mH

Q 2.08

PRE END CLAMP TEST

	19B TO CA	OA TO 19B
19A	0.39	999.65
19C	25.96	973.85
19D	26.44	973.41
18B	52.09	948.00
18A	52.60	947.45
18C	78.17	921.60
18D	78.59	921.11
17B	104.33	895.79
17A	104.79	895.35
17C	130.40	869.33
17D	130.74	869.07
16B	156.56	843.57
16A	156.97	843.14
16C	182.59	817.16
16D	182.91	816.19
15B	208.77	791.25
15A	209.18	791.02
15C	234.67	768.13
15D	235.21	764.55
14B	260.97	739.16
14A	261.59	738.55
14C	286.97	712.89
14D	287.48	712.19
13B	313.32	686.74
13A	313.89	686.23

Voltage 1.00 TOTAL coil 1.001 V

Amps 1.00

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12/11/91

DCA 318 FM-50-1017 12/16/91

Res 1125 mΩ

Ls 3.01 mH

Q 2.02

Post End clamp Test Can on 7000 P.S.I.G.

19B to OA		OA to 19B	
19A	2.679	999.01	
19C	25.19	971.55	
19D	28.67	971.09	
18B	54.22	945.45	
18A	54.74	945.09	
18C	80.29	919.47	
18D	80.70	919.16	
17B	106.31	893.36	
17A	106.77	892.92	
17C	132.38	867.46	
17D	132.75	867.12	
16B	158.38	841.43	
16A	158.79	840.94	
16C	184.44	815.42	
16D	184.83	815.05	
15B	210.50	789.28	
15A	210.87	788.94	
15C	236.48	763.37	
15D	237.03	762.85	
14B	262.55	737.20	
14A	263.14	736.56	
14C	288.66	711.21	
14D	289.14	710.57	
13B	314.77	685.03	
13A	315.30	684.40	

All voltage Tap Readings are in milli Volts

Voltage 1.00 Total coil .9997 V

Amps 1.00

Technicians S. Lockwood/A. Wendt

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