

Fermilab

TS-SSC 91-051

3/18/91

To: Distribution
From: Jim Strait
Subject: DC0304 coil stress and end force change with cooldown

The attached table compares the DC0304 collar pack and bullet gauge readings before and after cooldown. The attached figures show the temperature profiles at the lead and return ends of the magnet. The room temperature data are taken from the first few readings in CRYOLOG_DC0304_02.BIN just before cooldown began. The 4.3 K data are from CRYOLOG_DC0304_03.BIN and are an average of the data between about 110 and 115 hours on the plots. During magnet assembly, after collaring, 4 of the 16 collar pack gauges were lost. The table shows also the coil stresses measured immediately after keying[1]. The post-keying stresses were quite high, especially on the inner coil and considerable stress-relaxation has occurred. The prestress losses with cooldown, 3.6 kpsi in the inner coil and 1.8 kpsi in the outer coil, are comparatively modest as with respect to other recent long and short 40 mm magnets. The return end force was quite large before cooldown as a result[2] of considerable welding done to the return bonnet to repair vacuum leaks during installation on the test stand. In addition there was a 5000 lbs.increase from cooldown, which is larger than in typical BNL magnets. As a result the end force at 4 K is almost 12000 lbs.

References

- [1] J. Strait, DC0304 collar keying strain gauge data, TS-SSC 91-004, 1/14/91.
- [2] D. Orris, private communication.

Distribution: S.Delchamps, A.Devred, J.DiMarco, S.Gourlay, R.Hanft, W.Koska, J.Kuzminski, M.Lamm, P.Mazur, D.Orris, J.Tompkins, M.Wake, Y.Yu, H.Zheng

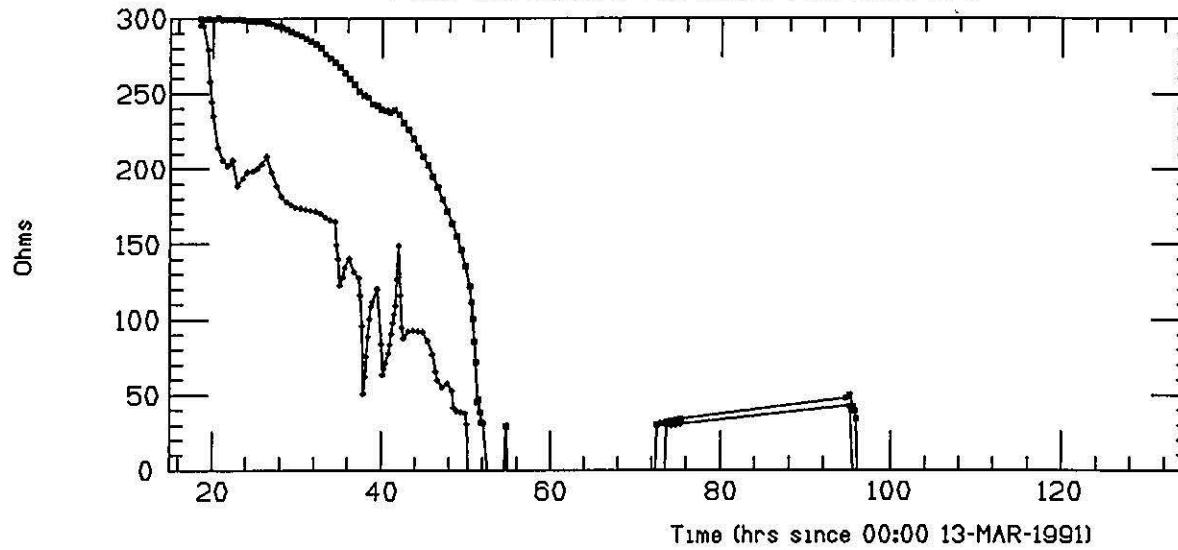
Table I
DC0304 Strain Gauge Readings

Date	T(K)	KTH60	KTH61	KTH66	KTH68	KTH72	KTH74	KTH75	KTH77	KTH78	KTH80	KTH82	KTH86
		Lead End Gauge Pack		Gauge Pack		Outer Quad 4					Return Ed Gauge Pack		Gauge Pack
		Inner Quad 1	Inner Quad 2	Outer Quad 1	Outer Quad 2		Outer Quad 4	Inner Quad 1	Inner Quad 2	Inner Quad 3	Inner Quad 4	Outer Quad 1	Outer Quad 2
12/22/90	300	13.9	11.4	11.4	10.5	7.1	16.1	13.6	11.3	15.9	6.5	10.2	4.5
3/13/91	300	11.4	9.6	10.5	10.0	6.0	13.4	11.1	7.8	11.9	5.7	10.1	4.1
3/17/91	4.4	8.9	5.8	9.0	8.7	3.7	9.0	7.9	4.3	7.8	3.7	8.4	2.0
Cold - Warm		-2.5	-3.8	-1.5	-1.2	-2.3	-4.4	-3.3	-3.5	-4.1	-2.0	-1.7	-2.2

Date	T(K)	KTH88	KTH90	KTH94	KTH96	Sum of Bullets	Avg Inner	Avg Outer
		Bull.1	Bull.2	Bull.3	Bull.4			
12/22/90	300	---	---	---	---	---	13.7	8.4
3/13/91	300	2.4	1.6	1.3	1.5	6.7	10.9	7.7
3/17/91	4.4	1.1	1.5	3.4	5.9	11.9	7.3	5.9
Cold - Warm		-1.3	-0.1	2.1	4.4	5.2	-3.6	-1.8

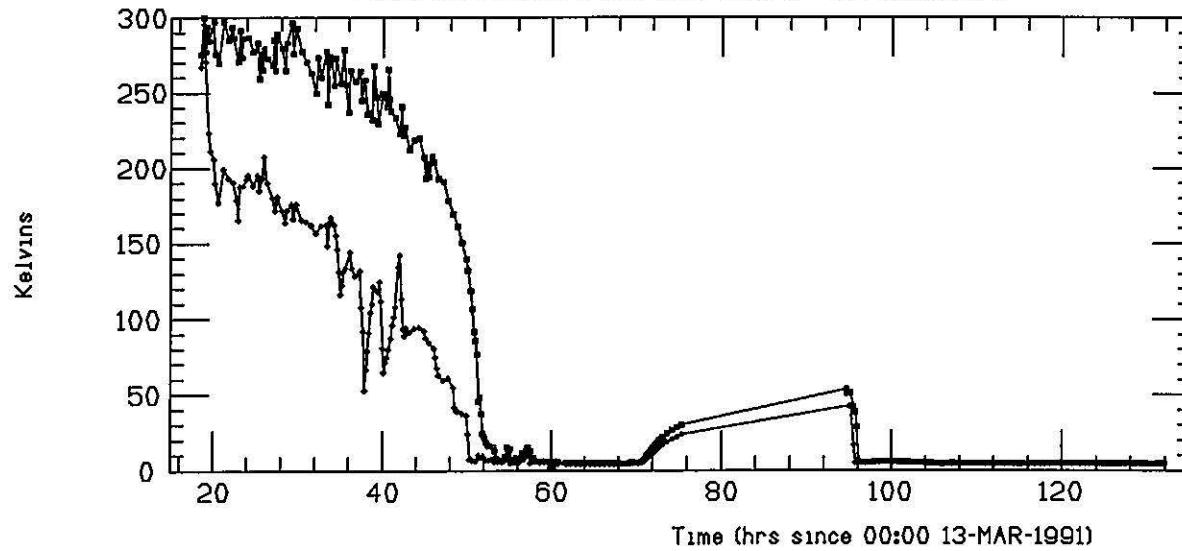
18-MAR-91 12:24:46

Feed and Return Platinum Thermometers



Data File:
cryolog_dc0304_03.bin
First Data Read:
13-MAR-1991 18:31:51
Plot limits:
13-MAR-1991 15:00:00
18-MAR-1991 15:00:00
Reduced plotting - every 3 points
unless dY/Y > 0.050

Feed and Return Carbon Glass Thermometers



Data File:
cryolog_dc0304_03.bin
First Data Read:
13-MAR-1991 18:31:51
Plot limits:
13-MAR-1991 15:00:00
18-MAR-1991 15:00:00
Reduced plotting - every 3 points
unless dY/Y > 0.050

