Fermilab

December 26, 1978
S. Ohnuma

Effects of Full Quenches and Warm-Cool Cycle on Multipole Contents

The dipole PCA148 has been measured many times with full energy quenches and warm-up, cool-down cycles between measurements. All measurements were made on stand No. 1 and there should be no effect of magnetized strip. The attached table is identical to those in UPC No. 28 in the format. Six measurements, all in the center of the magnet, were used to prepare the table. The design value for the normal sextupole, $6.94\ 10^{-4}$, is the original value. After the magnet #130, the design was changed to increase this value but how much we wanted to have in the center is not known to me.

1st col.	number of poles
2nd col.	average normal and skew field at 1" , in Gauss for the excitation of 10 kG
3rd col.	average and skew, rms deviation
4th col. 5th col.	two largest deviations from the average values
6th col.	design value by S. Snowdon

NOTE (January 11, 1979)

There was a misunderstanding by the writer of this note. The magnet PCA148 went through many cycles of warm-up, cool-down but quenches were all "soft". The magnet with many full-energy quenches was RDA101.

S.O.

*** NTOTAL = 6 ***

design (S. Snowdon)

500 AMPS

4	0.273	0.036	0.043(#1)	-0.053(#6)	
	3.564	0.166	0.177(#6)	-0.252(#3)	
6	7.551	0.450	0.893(#3)	-0.330(#1)	(6.94)
	-0.565	0.066	0.090(#4)	-0.088(#3)	
8	1.182	0.041	0.055(#2)	-0.048(#5)	
	-2.449	0.091	0.151(#6)	-0.114(#5)	
10	4.410	0.074	0.093(#1)	-0.113(#3)	3.19
	0.158	0.106	0.145(#5)	-0.142(#2)	
12	0.729	0.108	0.133(#2)	-0.115(#4)	
	-0.596	0.098	0.080(#6)	-0.134(#2)	
14	3.910	0.075	0.138(#3)	-0.059(#6)	4.65
	-0.079	0.012	0.011(#4)	-0.020(#1)	
16	-0.045	0.334	0.346(#6)	-0.471(#2)	
	1.137	0.096	0.101(#1)	-0.179(#6)	
18	-13.153	0.164	0.196(#6)	-0.292(#3)	-12.2
	0.149	0.098	0.126(#1)	-0.151(#4)	
20	0.074	0.366	0.514(#3)	-0.369(#6)	
	-0.103	0.317	0.449(#2)	-0.267(#1)	
22	4.421	0.166	0.194(#5)	-0.245(#6)	3.73
	0.001	0.158	0.225(#5)	-0.212(#3)	
24	0.333	0.314	0.295(#1)	-0.465(#2)	
	0.094	0.213	0.229(#6)	-0.395(#2)	
26	-0.958	0.185	0.168(#5)	-0.300(#2)	-.83
	0.006	0.138	0.149(#2)	-0.230(#1)	
28	-0.031	0.219	0.117(#5)	-0.444(#1)	
	-0.236	0.218	0.398(#2)	-0.257(#5)	
30	0.015	0.053	0.100(#1)	-0.053(#3)	.07
	-0.396	0.177	0.205(#1)	-0.197(#4)	

1000 AMPS

4	0.646	0.065	0.058(#1)	-0.103(#6)	
	3.686	0.173	0.162(#6)	-0.224(#3)	
6	11.827	0.307	0.569(#3)	-0.289(#2)	(6.94)
	-0.767	0.054	0.096(#4)	-0.046(#3)	
8	1.214	0.033	0.039(#2)	-0.046(#5)	
	-2.878	0.108	0.169(#6)	-0.158(#3)	
10	4.730	0.035	0.062(#5)	-0.044(#6)	3.19
	0.159	0.089	0.124(#4)	-0.131(#2)	
12	0.584	0.126	0.174(#3)	-0.109(#4)	
	-0.767	0.098	0.088(#6)	-0.133(#2)	
14	4.464	0.091	0.143(#3)	-0.133(#5)	4.65
	-0.041	0.056	0.073(#3)	-0.060(#1)	
16	0.088	0.315	0.321(#6)	-0.438(#2)	
	1.086	0.070	0.093(#5)	-0.074(#6)	

18	-13.094	0.205	0.241(#6)	-0.349(#3)	-12.2
	0.053	0.125	0.145(#6)	-0.198(#4)	
20	-0.016	0.387	0.522(#3)	-0.300(#6)	
	-0.001	0.329	0.419(#2)	-0.322(#1)	
22	4.329	0.131	0.179(#3)	-0.205(#6)	3.73
	0.023	0.161	0.177(#4)	-0.201(#3)	
24	0.233	0.341	0.266(#5)	-0.457(#2)	
	0.034	0.190	0.166(#5)	-0.308(#2)	
26	-0.978	0.142	0.144(#4)	-0.218(#2)	-.83
	0.054	0.108	0.125(#6)	-0.155(#5)	
28	0.006	0.132	0.159(#6)	-0.163(#4)	
	-0.157	0.140	0.276(#2)	-0.101(#4)	
30	0.006	0.096	0.104(#5)	-0.121(#3)	.07
	-0.213	0.168	0.216(#2)	-0.236(#6)	
	4000 AMPS				
4	1.140	0.106	0.098(#1)	-0.154(#6)	
	4.178	0.129	0.207(#6)	-0.253(#2)	
6	12.057	0.128	0.204(#3)	-0.170(#2)	(6.94)
	-0.949	0.043	0.081(#4)	-0.037(#1)	
8	1.243	0.036	0.064(#2)	-0.037(#5)	
	-3.264	0.132	0.164(#6)	-0.195(#3)	
10	5.047	0.044	0.079(#3)	-0.054(#4)	3.19
	0.162	0.048	0.067(#4)	-0.057(#2)	
12	0.453	0.166	0.219(#3)	-0.144(#4)	
	-0.915	0.113	0.089(#1)	-0.171(#2)	
14	5.174	0.070	0.090(#3)	-0.065(#6)	4.65
	0.014	0.044	0.044(#4)	-0.050(#6)	
16	0.194	0.313	0.315(#6)	-0.422(#3)	
	1.006	0.084	0.100(#5)	-0.120(#2)	
18	-13.218	0.191	0.257(#6)	-0.331(#3)	-12.2
	-0.008	0.148	0.242(#6)	-0.178(#2)	
20	-0.086	0.386	0.553(#3)	-0.297(#1)	
	0.215	0.350	0.440(#2)	-0.384(#1)	
22	4.411	0.159	0.207(#3)	-0.226(#6)	3.73
	0.042	0.121	0.154(#4)	-0.123(#6)	
24	0.205	0.310	0.277(#1)	-0.413(#3)	
	-0.146	0.195	0.185(#6)	-0.276(#2)	
26	-1.025	0.138	0.151(#4)	-0.174(#3)	-.83
	0.024	0.104	0.143(#6)	-0.088(#5)	
28	-0.026	0.129	0.132(#6)	-0.172(#1)	
	-0.009	0.133	0.230(#2)	-0.163(#5)	
30	0.089	0.091	0.120(#1)	-0.119(#3)	.07
	-0.062	0.109	0.154(#1)	-0.124(#6)	

END OF EXECUTION
CPU TIME: 3.77 ELAPSED TIME: 3:4.55
EXIT