UPC 008

Fermilab

September 11, 1978

To: Sector Test Group
From: S. Ohnuma
Subject: Field Quality of Dipoles in the Tunnel

Since the primary purpose of the sector test is to transport the beam to A17, the field quality of dipoles may not be as important as for the circulating beam. Nevertheless, I thought you might be interested to know what kind of magnets you are using. I have tried to find as much information as possible from the measurement group and this is the summary of my finding. I must confess that the net result does not seem to be very useful except to show how much we do not know. Of 20 dipoles, four have never been measured. They are all E22 type (E22-23, 17, 7, and 18).

1. Transfer Function (NMR measurement at 2,000 amps)

The average of 23 dipoles (from #55 to #99) is

T. F. = 9.969 (G/amp) , rms = 0.014

RAD99(A12-2): 9.996	PAB85(12-3): 9.958	PAB71(12-4): 9.961
PAD77(12-5) : 9.969	PAB81(13-2): 9.957	PAB88(13-3): 9.956
RAB60(14-2) : 9.973	PAB63(14-3): 9.987	PAB59(14-4): 9.963
PAB69(14-5) : 9.954	PAB67(15-2): 9.959	RCB68(15-3): 9.970
PAC55(15-4) : 9.974	PAB65(15-5): 9.974	

2. Vertical Plane

A positive value of the angle indicates that the field is pointing towrd the wall. The magnet must then be rotated such that the wall side is up and the aisle side is down. The resolution of

the stepping motor corresponds to 0.018°. Judging from the scatterings of measured values, one must conclude that the uncertainties could be as large as 0.1°. Angles are given in degrees.

RAD99 (12-2)	500A	1,000A	2,000A	4,000A	
	0.221	0.197	0.183	0.180	
PAB85 (12-3)	500A	1,000A	4,000A		
	0.234	0.234	0.252		
PAB71 (12-4)	500A	1,000A	4,000A		
	0.144	0.126	0.126		
PAD77 (12-5)	500A	1,000A	2,000A	3,000A	
	0.324	0.324	0.342	0.342	
PAB81 (13-2)	500A	1,000A	2,000A	4,000A	
	0.306	0.306	0.288	0.306	
PAB88 (13-3)	500A	1,000A	4,000A		
	0.373	0.380	0.385		
	0.465	0.469			
PAB86 (13-4)	500A	1,000A	4,000A		
	0.424	0.405	0.401		
PAB66 (13-5)	500A	1,000A	2,000A	3,000A	4,000A
	-.036	-.054	-.036	-.036	-.036
	+.054				
	+.018				
RAB60 (14-2)	500A	1,000A	4,000A		
	0.235	0.204	0.200		
PAB63 (14-3)	1,000A	2,000A	3,000A	4,000A	
	-.522	-.540	-.540	-.522	
PAB59 (14-4)	500A	1,000A	2,000A	3,000A	4,000A
	-.090	-.072	-.090	-.090	-.072
PAB69 (14-5)	500A	1,000A	4,000A		
	0.75	0.75	0.73		
PAB67 (15-2)	0.180 (flat from 500A to 4,000A)				
RCB68 (15-3)	500A	1,000A	2,000A	3,000A	4,000A
	0.540	0.540	0.522	0.522	0.522
	0.504				

PAC55 (15-4) 0.072 (flat from 1,000A to 4,000A)

PAB65 (15-5)	500A	1,000A	2,000A	3,000A	4,000A
	0.018	0.	0.018	0.018	0.036

3. $\int B\, d\ell$ (relative, stretched wire measurement)

The percentage difference is relative to the value at 2,000A.

	.5kA	1kA	1.5kA	2.5kA	3kA	3.5kA	4kA
RAD99 (12-2)	-.07	-.08	-.13	+.02	-.07	+.02	-.05
PAB85 (12-3)	-.08	+.10	+.09	+.01	0.	+.02	-.05
	-.02	+.12	+.09	-.01	0.	+.02	-.02
PAB71 (12-4)	+.18	-.04	-.03	-.01	-.02	+.02	-.04
	-.10	+.03	+.06	0.	-.04	0.	-.04
PAD77 (12-5)	-.13	-.10	+.03	-.06	-.07	-.05	-.07
	-.10	-.03	+.05	-.05	-.03	0.	-.07
PAB81 (13-2)	-.13	+.05	-.03	+.03	-.01	-.02	-.09
	+.05	-.13	-.06	-.04	-.05	-.03	-.09
PAB88 (13-3)	-.12	-.01	-.01	+.01	-.01	-.03	-.08
	-.11	+.05	-.09	+.01	+.01	-.02	-.08
PAB86 (13-4)	+.22	-.10	+.14	+.01	+.03	+.01	-.03
	-.08	+.18	+.05	-.05	-.07	-.03	-.11
PAB66 (13-5)	+.27	+.08	-.22	+.09	+.04	+.14	+.01
	-.36	-.06	-.07	+.02	-.09	-.08	-.12
	-.19	+.24	-.04	+.13	+.05	+.06	+.06
RAB60 (14-2)	+.01	-.06	+.02	+.01	0.	-.01	-.02
	+.02	+.05	+.14	+.02	0.	-.01	-.05
PAB63 (14-3)	-.20	-.27	-.11	+.02	-.12	-.13	-.20
	-.09	-.10	-.05	+.10	-.04	-.07	-.13
	-.11	+.11	-.17	+.05	-.08	-.04	-.14
PAB59 (14-4)	-.09	+.04	-.09	+.04	+.01	+.03	-.05
	-.16	+.09	-.04	+.01	-.05	-.03	-.10
PAB69 (14-5)	+.06	+.02	-.22	-.22	+.01	-.16	-.15
	+.16	0.	+.36	+.23	+.07	+.16	+.06
PAB67 (15-2)	-.11	-.04	+.05	-.01	-.02	+.01	-.04
	-.16	-.04	+.06	+.01	-.01	+.03	-.05

		.5kA	1kA	1.5kA	2.5kA	3kA	3.5kA	4kA
RCB68	(15-3)	-.26	-.06	-.11	-.03	-.08	-.04	-.13
		-.30	-.05	-.21	-.08	-.07	-.10	-.15
PAC55	(15-4)	+.08	-.04	-.03	0.	-.03	-.02	-.08
		+.23	-.11	-.02	0.	-.03	-.02	-.08
PAB65	(15-5)	-.18	-.13	-.02	+.03	-.04	0.	-.07
		+.25	-.09	-.05	-.01	-.06	-.02	-.08
		-.12	-.14	-.04	+.03	-.04	+.01	-.09

4. Nonlinear Components

It is unfortunate that nonlinear components were measured only at the center region of each dipole. This is no longer the case starting from #101. Since the end contribution is very large and there is no reason to suspect that the end for dipoles #55 to #99 is different from the end for dipoles beyond #101, I have included the average end contribution (average of 9 dipoles, #101, 102, 103, 104, 105, 107, 111, 113,and 114) in this note. ~~Comparing the body contribution:~~ The end contribution is alarmingly large. Since the fluctuation from magnet to magnet is also large, the table here may not be very useful. It may simply give us the order-of-magnitude idea of the nonlinearities.

Values given here are

$$(\Delta B_y/B_o) \quad , \quad (1/B_o)(\partial B_y/\partial x) \quad , \quad (B_x/B_o), \quad (1/B_o)(\partial B_x/\partial x)$$

all on the median plane (y = 0) and at x = -1", -.5", +.5" and +1". The first two are normal field and the last two are skew contributions. The first and the third quantities are dimensionless; the unit of the second and the fourth is 1/cm. It is assumed that the center of the measuring coil was off from the center of the cold bore. To find this offset, it is assumed (somewhat arbitrarily) that the normal 16-pole and the skew 16-pole components are entirely due to the shifted normal 18-pole field. Components higher than 18-pole are entirely ignored. By comparing the center coordinates (relative to the measuring coil center) of the same magnet at different current values, one can see that this assumption is more or less justified.

cc: T. Collins
D. Edwards
L. Teng
A. Tollestrup
Magnet Measurement Group

Center of the cold bore relative to the center of the measurement coil

12-2

			x	y
NOMINAL CURRENT: 500 AMPS			-0.0546 CM	0.1885 CM
-1.0"	-0.1915E-03	0.2670E-02	0.3728E-04	-0.6248E-05
-0.5"	0.1401E-03	-0.2583E-03	-0.3791E-06	-0.2152E-04
0.5"	0.1664E-03	0.2993E-03	0.6003E-04	0.8374E-04
1.0"	-0.8717E-04	-0.2602E-02	0.2317E-03	0.1788E-03
NOMINAL CURRENT: 1000 AMPS			-0.0345 CM	0.1974 CM
-1.0"	0.3138E-03	0.2198E-02	0.6464E-04	-0.9388E-04
-0.5"	0.2574E-03	-0.4365E-03	-0.6043E-05	-0.2060E-04
0.5"	0.2412E-03	0.4372E-03	0.6819E-04	0.8772E-04
1.0"	0.3283E-03	-0.2147E-02	0.2515E-03	0.2135E-03
NOMINAL CURRENT: 1500 AMPS			-0.0295 CM	0.2023 CM
-1.0"	0.4416E-03	0.2025E-02	0.9495E-04	-0.1078E-03
-0.5"	0.2783E-03	-0.4720E-03	0.9358E-05	-0.3250E-04
0.5"	0.2588E-03	0.4704E-03	0.5656E-04	0.8126E-04
1.0"	0.4601E-03	-0.1952E-02	0.2371E-03	0.2176E-03
NOMINAL CURRENT: 2000 AMPS			-0.0288 CM	0.2011 CM
-1.0"	0.5008E-03	0.1954E-02	0.5792E-04	-0.9501E-04
-0.5"	0.2933E-03	-0.4876E-03	-0.1033E-04	-0.1777E-04
0.5"	0.2465E-03	0.4629E-03	0.7304E-04	0.8919E-04
1.0"	0.4584E-03	-0.1912E-02	0.2476E-03	0.1949E-03
NOMINAL CURRENT: 3000 AMPS			-0.0250 CM	0.2020 CM
-1.0"	0.4649E-03	0.1957E-02	0.5744E-04	-0.1100E-03
-0.5"	0.2768E-03	-0.4685E-03	-0.1510E-04	-0.1500E-04
0.5"	0.2437E-03	0.4553E-03	0.7576E-04	0.8868E-04
1.0"	0.4614E-03	-0.1879E-02	0.2427E-03	0.1818E-03
NOMINAL CURRENT: 4000 AMPS			-0.0244 CM	0.2021 CM
-1.0"	0.4108E-03	0.1991E-02	0.3971E-04	-0.1082E-03
-0.5"	0.2621E-03	-0.4441E-03	-0.2462E-04	-0.7318E-05
0.5"	0.2249E-03	0.4284E-03	0.8580E-04	0.9667E-04
1.0"	0.4023E-03	-0.1910E-02	0.2652E-03	0.1972E-03

12-3

NOMINAL CURRENT: 200 AMPS -0.0130 CM 0.1902 CM

-1.0"	-0.2265E-02	0.3634E-02	-0.7643E-05	-0.8132E-04
-0.5"	-0.4760E-03	0.6682E-03	-0.6434E-04	0.4522E-05
0.5"	-0.3888E-03	-0.5581E-03	0.1500E-03	0.1284E-03
1.0"	-0.1950E-02	-0.3381E-02	0.1991E-03	-0.1599E-03

NOMINAL CURRENT: 500 AMPS -0.0192 CM 0.1897 CM

-1.0"	-0.7048E-03	0.2509E-02	0.3027E-04	-0.1001E-03
-0.5"	-0.6300E-04	0.2703E-04	-0.4338E-04	-0.6862E-05
0.5"	0.2936E-04	0.8433E-04	0.8343E-04	0.4334E-04
1.0"	-0.3598E-03	-0.2222E-02	-0.2114E-04	-0.3072E-03

NOMINAL CURRENT: 1000 AMPS -0.0164 CM 0.1896 CM

-1.0"	-0.1430E-03	0.2120E-02	-0.3713E-05	-0.2845E-04
-0.5"	0.7499E-04	-0.1935E-03	-0.4479E-04	-0.2803E-05
0.5"	0.1678E-03	0.3084E-03	0.7645E-04	0.3171E-04
1.0"	0.2438E-03	-0.1713E-02	-0.5804E-04	-0.3499E-03

NOMINAL CURRENT: 1500 AMPS -0.0155 CM 0.1915 CM

-1.0"	0.2010E-05	0.2005E-02	-0.1227E-04	-0.2469E-04
-0.5"	0.1082E-03	-0.2482E-03	-0.4767E-04	0.7074E-06
0.5"	0.2002E-03	0.3615E-03	0.7683E-04	0.3128E-04
1.0"	0.3885E-03	-0.1591E-02	-0.5359E-04	-0.3370E-03

NOMINAL CURRENT: 2000 AMPS -0.0154 CM 0.1890 CM

-1.0"	0.4551E-04	0.1975E-02	-0.2330E-05	-0.4372E-04
-0.5"	0.1188E-03	-0.2654E-03	-0.4724E-04	-0.4073E-06
0.5"	0.2119E-03	0.3804E-03	0.7197E-04	0.2304E-04
1.0"	0.4424E-03	-0.1544E-02	-0.8125E-04	-0.3688E-03

NOMINAL CURRENT: 3000 AMPS -0.0141 CM 0.1904 CM

-1.0"	0.2193E-04	0.2006E-02	-0.2320E-04	-0.2456E-04
-0.5"	0.1132E-03	-0.2570E-03	-0.5506E-04	0.5818E-05
0.5"	0.2072E-03	0.3749E-03	0.8040E-04	0.2985E-04
1.0"	0.4344E-03	-0.1548E-02	-0.6376E-04	-0.3614E-03

NOMINAL CURRENT: 4000 AMPS -0.0121 CM 0.1891 CM

-1.0"	-0.3769E-04	0.2042E-02	-0.3856E-04	-0.1715E-04
-0.5"	0.9393E-04	-0.2305E-03	-0.6312E-04	0.1138E-04
0.5"	0.1948E-03	0.3533E-03	0.8970E-04	0.3707E-04
1.0"	0.3888E-03	-0.1576E-02	-0.4715E-04	-0.3586E-03

PA071 M12-4

NOMINAL CURRENT: 200 AMPS 0.0911 CM 0.2222 CM

-1.0"	-0.2411E-02	0.3989E-02	0.6151E-03	-0.9448E-03
-0.5"	-0.4364E-03	0.7030E-03	-0.3324E-04	-0.1660E-03
0.5"	-0.5755E-03	-0.7377E-03	0.2642E-03	0.2194E-03
1.0"	-0.2306E-02	-0.3442E-02	0.4248E-03	-0.5541E-04

NOMINAL CURRENT: 500 AMPS 0.0787 CM 0.2028 CM

-1.0"	-0.6689E-03	0.2785E-02	0.2894E-03	-0.5666E-03
-0.5"	0.1723E-04	-0.1961E-04	-0.1095E-03	-0.6809E-04
0.5"	-0.8563E-04	-0.1894E-04	0.2374E-03	0.1395E-03
1.0"	-0.6228E-03	-0.2407E-02	0.1261E-03	-0.4903E-03

NOMINAL CURRENT: 1000 AMPS 0.0787 CM 0.1971 CM

-1.0"	-0.1068E-03	0.2249E-02	0.3314E-03	-0.5979E-03
-0.5"	0.1279E-03	-0.2266E-03	-0.8845E-04	-0.8134E-04
0.5"	0.1032E-03	0.2489E-03	0.2122E-03	0.1206E-03
1.0"	0.7791E-04	-0.1852E-02	0.8988E-04	-0.4769E-03

NOMINAL CURRENT: 1500 AMPS 0.0830 CM 0.1950 CM

-1.0"	0.5549E-04	0.2075E-02	0.2991E-03	-0.6008E-03
-0.5"	0.1574E-03	-0.2797E-03	-0.1045E-03	-0.6478E-04
0.5"	0.1352E-03	0.2989E-03	0.2225E-03	0.1287E-03
1.0"	0.2213E-03	-0.1715E-02	0.1165E-03	-0.4534E-03

NOMINAL CURRENT: 2000 AMPS 0.0825 CM 0.1939 CM

-1.0"	0.1326E-03	0.2016E-02	0.2754E-03	-0.5794E-03
-0.5"	0.1778E-03	-0.3076E-03	-0.1122E-03	-0.5751E-04
0.5"	0.1416E-03	0.3144E-03	0.2309E-03	0.1361E-03
1.0"	0.2555E-03	-0.1699E-02	0.1331E-03	-0.4500E-03

NOMINAL CURRENT: 3000 AMPS 0.0832 CM 0.1923 CM

-1.0"	0.1473E-03	0.1993E-02	0.2536E-03	-0.5628E-03
-0.5"	0.1773E-03	-0.3104E-03	-0.1197E-03	-0.4983E-04
0.5"	0.1480E-03	0.3231E-03	0.2362E-03	0.1399E-03
1.0"	0.2852E-03	-0.1670E-02	0.1417E-03	-0.4500E-03

NEXT CASE

PA677 A12-5

NOMINAL CURRENT: 200 AMPS -0.0251 CM 0.2059 CM

-1.0"	-0.1992E-02	0.3628E-02	0.5201E-03	-0.5366E-03
-0.5"	-0.4067E-03	0.5119E-03	0.1053E-03	-0.1721E-03
0.5"	-0.1353E-03	-0.2216E-03	-0.3123E-04	-0.7395E-04
1.0"	-0.1200E-02	-0.3098E-02	-0.3149E-03	-0.4180E-03

NOMINAL CURRENT: 500 AMPS -0.0217 CM 0.1957 CM

-1.0"	-0.5252E-03	0.2695E-02	0.4489E-03	-0.4338E-03
-0.5"	0.1106E-04	-0.1107E-03	0.9211E-04	-0.1520E-03
0.5"	0.2349E-03	0.3619E-03	-0.4196E-04	-0.8153E-04
1.0"	0.2494E-03	-0.2004E-02	-0.3027E-03	-0.3651E-03

NOMINAL CURRENT: 1000 AMPS -0.0173 CM 0.2030 CM

-1.0"	0.3588E-04	0.2059E-02	0.4014E-03	-0.3968E-03
-0.5"	0.1211E-03	-0.2953E-03	0.7799E-04	-0.1362E-03
0.5"	0.3534E-03	0.5475E-03	-0.2524E-04	-0.5669E-04
1.0"	0.7983E-03	-0.1411E-02	-0.1830E-03	-0.1806E-03

NOMINAL CURRENT: 1500 AMPS -0.0167 CM 0.1915 CM

-1.0"	0.1705E-03	0.1977E-02	0.4076E-03	-0.3895E-03
-0.5"	0.1557E-03	-0.3494E-03	0.8113E-04	-0.1393E-03
0.5"	0.3825E-03	0.6019E-03	-0.3207E-04	-0.6393E-04
1.0"	0.9792E-03	-0.1209E-02	-0.2180E-03	-0.2389E-03

NOMINAL CURRENT: 2000 AMPS -0.0146 CM 0.1915 CM

-1.0"	0.2042E-03	0.1933E-02	0.3969E-03	-0.3876E-03
-0.5"	0.1593E-03	-0.3605E-03	0.7720E-04	-0.1346E-03
0.5"	0.4005E-03	0.6252E-03	-0.2820E-04	-0.5905E-04
1.0"	0.1045E-02	-0.1147E-02	-0.1955E-03	-0.2043E-03

NOMINAL CURRENT: 3000 AMPS -0.0138 CM 0.1886 CM

-1.0"	0.1662E-03	0.1969E-02	0.3617E-03	-0.3456E-03
-0.5"	0.1489E-03	-0.3455E-03	0.6475E-04	-0.1253E-03
0.5"	0.3920E-03	0.6129E-03	-0.1567E-04	-0.5120E-04
1.0"	0.1027E-02	-0.1146E-02	-0.1969E-03	-0.2566E-03

NOMINAL CURRENT: 4000 AMPS -0.0125 CM 0.1842 CM

-1.0"	0.1079E-03	0.2007E-02	0.3231E-03	-0.3053E-03
-0.5"	0.1312E-03	-0.3204E-03	0.5111E-04	-0.1140E-03
0.5"	0.3791E-03	0.5916E-03	-0.2615E-06	-0.3684E-04
1.0"	0.9929E-03	-0.1146E-02	-0.1691E-03	-0.2646E-03

PA831 A13-2

NOMINAL CURRENT: 200 AMPS -0.0310 CM 0.1958 CM

-1.0"	-0.1826E-02	0.3806E-02	0.3361E-03	-0.4237E-03
-0.5"	-0.3295E-03	0.4353E-03	0.7475E-04	-0.8442E-04
0.5"	-0.2947E-03	-0.3801E-03	-0.4904E-04	0.1087E-05
1.0"	-0.1658E-02	-0.3645E-02	0.1993E-03	0.5458E-03

NOMINAL CURRENT: 500 AMPS -0.0254 CM 0.2003 CM

-1.0"	-0.1842E-03	0.2427E-02	0.3105E-03	-0.3507E-03
-0.5"	0.9127E-04	-0.2046E-03	0.6485E-04	-0.9299E-04
0.5"	0.8644E-04	0.2002E-03	0.3278E-04	0.9527E-04
1.0"	-0.2227E-03	-0.2500E-02	0.3844E-03	0.5596E-03

NOMINAL CURRENT: 1000 AMPS -0.0235 CM 0.1934 CM

-1.0"	0.4732E-03	0.1722E-02	0.2970E-03	-0.3079E-03
-0.5"	0.2317E-03	-0.4311E-03	0.6270E-04	-0.9636E-04
0.5"	0.2267E-03	0.4209E-03	0.4831E-04	0.1031E-03
1.0"	0.4292E-03	-0.1786E-02	0.3439E-03	0.4132E-03

NOMINAL CURRENT: 1500 AMPS -0.0234 CM 0.1926 CM

-1.0"	0.6412E-03	0.1507E-02	0.3010E-03	-0.3018E-03
-0.5"	0.2629E-03	-0.4824E-03	0.6400E-04	-0.9976E-04
0.5"	0.2556E-03	0.4681E-03	0.5221E-04	0.1050E-03
1.0"	0.5865E-03	-0.1578E-02	0.3193E-03	0.3390E-03

NOMINAL CURRENT: 2000 AMPS -0.0223 CM 0.1915 CM

-1.0"	0.6886E-03	0.1433E-02	0.2914E-03	-0.2873E-03
-0.5"	0.2701E-03	-0.4940E-03	0.6255E-04	-0.9812E-04
0.5"	0.2594E-03	0.4760E-03	0.5563E-04	0.1083E-03
1.0"	0.6232E-03	-0.1513E-02	0.3261E-03	0.3403E-03

NOMINAL CURRENT: 3000 AMPS -0.0211 CM 0.1901 CM

-1.0"	0.6906E-03	0.1402E-02	0.2642E-03	-0.2802E-03
-0.5"	0.2660E-03	-0.4893E-03	0.4766E-04	-0.8683E-04
0.5"	0.2555E-03	0.4689E-03	0.6998E-04	0.1178E-03
1.0"	0.6163E-03	-0.1494E-02	0.3407E-03	0.3236E-03

NOMINAL CURRENT: 4000 AMPS -0.0204 CM 0.1887 CM

-1.0"	0.6437E-03	0.1410E-02	0.2374E-03	-0.2799E-03
-0.5"	0.2493E-03	-0.4650E-03	0.3137E-04	-0.7449E-04
0.5"	0.2416E-03	0.4456E-03	0.8528E-04	0.1287E-03
1.0"	0.5702E-03	-0.1507E-02	0.3677E-03	0.3313E-03

NEXT CASE

A13-3

NOMINAL CURRENT: 200 AMPS -0.0484 CM 0.2275 CM

-1.0"	-0.1293E-02	0.3132E-02	-0.1860E-03	-0.1210E-04
-0.5"	-0.1985E-03	0.2622E-03	-0.1721E-03	0.6831E-04
0.5"	-0.2157E-03	-0.2086E-03	0.2686E-03	0.1982E-03
1.0"	-0.9959E-03	-0.2588E-02	0.3294E-03	-0.2314E-03

NOMINAL CURRENT: 500 AMPS -0.0447 CM 0.2366 CM

-1.0"	0.1959E-03	0.1933E-02	-0.3724E-03	0.2266E-03
-0.5"	0.1570E-03	-0.3320E-03	-0.1896E-03	0.1222E-03
0.5"	0.2546E-03	0.4720E-03	0.2570E-03	0.2033E-03
1.0"	0.7123E-03	-0.1308E-02	0.3687E-03	-0.1497E-03

NOMINAL CURRENT: 1000 AMPS -0.0372 CM 0.2329 CM

-1.0"	0.7660E-03	0.1381E-02	-0.4182E-03	0.2390E-03
-0.5"	0.2756E-03	-0.5358E-03	-0.2027E-03	0.1436E-03
0.5"	0.3997E-03	0.6922E-03	0.2589E-03	0.2089E-03
1.0"	0.1300E-02	-0.8045E-03	0.4151E-03	-0.5575E-04

NOMINAL CURRENT: 1500 AMPS -0.0358 CM 0.2307 CM

-1.0"	0.9076E-03	0.1214E-02	-0.4502E-03	0.2597E-03
-0.5"	0.2957E-03	-0.5806E-03	-0.2115E-03	0.1563E-03
0.5"	0.4471E-03	0.7597E-03	0.2577E-03	0.2044E-03
1.0"	0.1493E-02	-0.6283E-03	0.4022E-03	-0.6977E-04

NOMINAL CURRENT: 2000 AMPS -0.0350 CM 0.2315 CM

-1.0"	0.9607E-03	0.1155E-02	-0.4559E-03	0.2624E-03
-0.5"	0.3059E-03	-0.5978E-03	-0.2125E-03	0.1587E-03
0.5"	0.4554E-03	0.7730E-03	0.2589E-03	0.2069E-03
1.0"	0.1528E-02	-0.5994E-03	0.4106E-03	-0.5882E-04

NOMINAL CURRENT: 3000 AMPS -0.0325 CM 0.2295 CM

-1.0"	0.9556E-03	0.1138E-02	-0.4790E-03	0.2683E-03
-0.5"	0.2996E-03	-0.5911E-03	-0.2240E-03	0.1685E-03
0.5"	0.4548E-03	0.7721E-03	0.2704E-03	0.2168E-03
1.0"	0.1540E-02	-0.5679E-03	0.4370E-03	-0.4436E-04

NOMINAL CURRENT: 4000 AMPS -0.0310 CM 0.2279 CM

-1.0"	0.9046E-03	0.1165E-02	-0.5042E-03	0.2792E-03
-0.5"	0.2837E-03	-0.5673E-03	-0.2356E-03	0.1783E-03
0.5"	0.4398E-03	0.7490E-03	0.2811E-03	0.2245E-03
1.0"	0.1489E-02	-0.5999E-03	0.4551E-03	-0.4083E-04

MM886 A13-4

NOMINAL CURRENT: 200 AMPS 0.0461 CM 0.2117 CM

-1.0"	-0.1617E-02	0.3406E-02	-0.1149E-03	-0.3670E-03
-0.5"	-0.3061E-03	0.3760E-03	-0.2146E-03	0.1081E-03
0.5"	-0.2229E-03	-0.2767E-03	0.2323E-03	0.1443E-03
1.0"	-0.1244E-02	-0.2962E-02	0.2249E-03	-0.2649E-03

NOMINAL CURRENT: 500 AMPS 0.0415 CM 0.2024 CM

-1.0"	-0.1377E-03	0.2165E-02	-0.2464E-03	-0.1800E-03
-0.5"	0.3950E-04	-0.2103E-03	-0.2265E-03	0.1396E-03
0.5"	0.2814E-03	0.4374E-03	0.2288E-03	0.1433E-03
1.0"	0.5489E-03	-0.1616E-02	0.2438E-03	-0.2073E-03

NOMINAL CURRENT: 1000 AMPS 0.0388 CM 0.2050 CM

-1.0"	0.4390E-03	0.1585E-02	-0.3425E-03	-0.7784E-04
-0.5"	0.1567E-03	-0.4160E-03	-0.2462E-03	0.1683E-03
0.5"	0.4480E-03	0.6853E-03	0.2416E-03	0.1583E-03
1.0"	0.1233E-02	-0.9890E-03	0.3049E-03	-0.1264E-03

NOMINAL CURRENT: 1500 AMPS 0.0360 CM 0.2001 CM

-1.0"	0.5846E-03	0.1430E-02	-0.3725E-03	-0.2000E-04
-0.5"	0.1837E-03	-0.4652E-03	-0.2460E-03	0.1727E-03
0.5"	0.4868E-03	0.7432E-03	0.2357E-03	0.1490E-03
1.0"	0.1398E-02	-0.8325E-03	0.2679E-03	-0.1756E-03

NOMINAL CURRENT: 2000 AMPS 0.0352 CM 0.1995 CM

-1.0"	0.6218E-03	0.1373E-02	-0.3819E-03	-0.8443E-05
-0.5"	0.1869E-03	-0.4747E-03	-0.2472E-03	0.1753E-03
0.5"	0.5007E-03	0.7626E-03	0.2349E-03	0.1471E-03
1.0"	0.1458E-02	-0.7691E-03	0.2591E-03	-0.1889E-03

NOMINAL CURRENT: 3000 AMPS 0.0351 CM 0.1969 CM

-1.0"	0.5968E-03	0.1358E-02	-0.4107E-03	0.7620E-05
-0.5"	0.1720E-03	-0.4585E-03	-0.2583E-03	0.1860E-03
0.5"	0.4994E-03	0.7562E-03	0.2459E-03	0.1575E-03
1.0"	0.1456E-02	-0.7502E-03	0.2930E-03	-0.1563E-03

NOMINAL CURRENT: 4000 AMPS 0.0346 CM 0.1943 CM

-1.0"	0.5572E-03	0.1360E-02	-0.4357E-03	0.2708E-04
-0.5"	0.1564E-03	-0.4372E-03	-0.2681E-03	0.1942E-03
0.5"	0.4909E-03	0.7409E-03	0.2560E-03	0.1651E-03
1.0"	0.1431E-02	-0.7474E-03	0.3077E-03	-0.1608E-03

04366 A13-5

NOMINAL CURRENT: 200 AMPS -0.0411 CM 0.2008 CM

-1.0"	-0.2077E-02	0.3651E-02	-0.6923E-03	0.1468E-03
-0.5"	-0.4724E-03	0.5608E-03	-0.4031E-03	0.2847E-03
0.5"	-0.1337E-03	-0.2505E-03	0.4429E-03	0.3098E-03
1.0"	-0.1335E-02	-0.3398E-02	0.5025E-03	-0.4341E-03

NOMINAL CURRENT: 500 AMPS -0.0349 CM 0.2021 CM

-1.0"	-0.4580E-03	0.2449E-02	-0.6539E-03	0.2023E-03
-0.5"	-0.2711E-04	-0.1013E-03	-0.3589E-03	0.2632E-03
0.5"	0.2725E-03	0.3824E-03	0.3572E-03	0.2359E-03
1.0"	0.2706E-03	-0.2071E-02	0.3916E-03	-0.3437E-03

NOMINAL CURRENT: 1000 AMPS -0.0333 CM 0.1931 CM

-1.0"	0.5614E-04	0.1942E-02	-0.6591E-03	0.2163E-03
-0.5"	0.8880E-04	-0.2818E-03	-0.3568E-03	0.2649E-03
0.5"	0.3670E-03	0.5456E-03	0.3463E-03	0.2285E-03
1.0"	0.7757E-03	-0.1495E-02	0.3929E-03	-0.3048E-03

NOMINAL CURRENT: 1500 AMPS -0.0316 CM 0.1941 CM

-1.0"	0.1983E-03	0.1798E-02	-0.6684E-03	0.2259E-03
-0.5"	0.1181E-03	-0.3315E-03	-0.3588E-03	0.2679E-03
0.5"	0.4009E-03	0.5967E-03	0.3458E-03	0.2294E-03
1.0"	0.9166E-03	-0.1365E-02	0.4126E-03	-0.2590E-03

NOMINAL CURRENT: 2000 AMPS -0.0280 CM 0.1909 CM

-1.0"	0.2490E-03	0.1714E-02	-0.6744E-03	0.2309E-03
-0.5"	0.1230E-03	-0.3434E-03	-0.3629E-03	0.2716E-03
0.5"	0.4119E-03	0.6138E-03	0.3499E-03	0.2342E-03
1.0"	0.9895E-03	-0.1253E-02	0.4347E-03	-0.2269E-03

NOMINAL CURRENT: 3000 AMPS -0.0293 CM 0.1854 CM

-1.0"	0.2020E-03	0.1750E-02	-0.7088E-03	0.2586E-03
-0.5"	0.1089E-03	-0.3249E-03	-0.3752E-03	0.2816E-03
0.5"	0.4065E-03	0.6048E-03	0.3625E-03	0.2458E-03
1.0"	9.1000E-02	-0.1192E-02	0.4557E-03	-0.2391E-03

NOMINAL CURRENT: 4000 AMPS -0.0296 CM 0.1778 CM

-1.0"	0.1223E-03	0.1824E-02	-0.7844E-03	0.3350E-03
-0.5"	0.8507E-04	-0.2962E-03	-0.4008E-03	0.3039E-03
0.5"	0.4028E-03	0.5879E-03	0.3851E-03	0.2627E-03
1.0"	0.9556E-03	-0.1246E-02	0.4956E-03	-0.2348E-03

PP 6.0 A14-2

NOMINAL CURRENT: 200 AMPS 0.0324 CM 0.1510 CM

-1.0"	-0.3367E-02	0.4783E-02	-0.1312E-02	0.6852E-03
-0.5"	-0.7305E-03	0.1066E-02	-0.6197E-03	0.4794E-03
0.5"	-0.6707E-03	-0.1014E-02	0.6453E-03	0.4958E-03
1.0"	-0.3300E-02	-0.4883E-02	0.1223E-02	0.4072E-03

NOMINAL CURRENT: 500 AMPS 0.0321 CM 0.1614 CM

-1.0"	-0.1604E-02	0.3513E-02	-0.1070E-02	0.4256E-03
-0.5"	-0.2378E-03	0.3442E-03	-0.5535E-03	0.4097E-03
0.5"	-0.2728E-03	-0.3820E-03	0.6044E-03	0.4767E-03
1.0"	-0.1768E-02	-0.3734E-02	0.1186E-02	0.4381E-03

NOMINAL CURRENT: 1000 AMPS 0.0337 CM 0.1619 CM

-1.0"	-0.8771E-03	0.2822E-02	-0.9778E-03	0.2954E-03
-0.5"	-0.7133E-04	0.8360E-04	-0.5367E-03	0.3887E-03
0.5"	-0.1281E-03	-0.1475E-03	0.5941E-03	0.4770E-03
1.0"	-0.1124E-02	-0.3123E-02	0.1235E-02	0.5718E-03

NOMINAL CURRENT: 1500 AMPS 0.0329 CM 0.1622 CM

-1.0"	-0.6858E-03	0.2630E-02	-0.9696E-03	0.2732E-03
-0.5"	-0.3058E-04	0.1769E-04	-0.5377E-03	0.3887E-03
0.5"	-0.9353E-04	-0.9123E-04	0.5975E-03	0.4841E-03
1.0"	-0.9623E-03	-0.2959E-02	0.1268E-02	0.6235E-03

NOMINAL CURRENT: 2000 AMPS 0.0353 CM 0.1642 CM

-1.0"	-0.6330E-03	0.2562E-02	-0.9837E-03	0.2876E-03
-0.5"	-0.2067E-04	0.1743E-05	-0.5408E-03	0.3931E-03
0.5"	-0.8522E-04	-0.7761E-04	0.6003E-03	0.4892E-03
1.0"	-0.9180E-03	-0.2902E-02	0.1293E-02	0.6618E-03

NOMINAL CURRENT: 3000 AMPS 0.0356 CM 0.1632 CM

-1.0"	-0.6251E-03	0.2532E-02	-0.1022E-02	0.3079E-03
-0.5"	-0.2111E-04	0.4625E-05	-0.5578E-03	0.4078E-03
0.5"	-0.9580E-04	-0.9046E-04	0.6149E-03	0.5010E-03
1.0"	-0.9394E-03	-0.2894E-02	0.1332E-02	0.6960E-03

NOMINAL CURRENT: 4000 AMPS 0.0365 CM 0.1590 CM

-1.0"	-0.6507E-03	0.2526E-02	-0.1053E-02	0.2959E-03
-0.5"	-0.3081E-04	0.2092E-04	-0.5803E-03	0.4238E-03
0.5"	-0.1114E-03	-0.1127E-03	0.6380E-03	0.5194E-03
1.0"	-0.9844E-03	-0.2906E-02	0.1385E-02	0.7312E-03

PAB63 A14-3

NOMINAL CURRENT: 500 AMPS -0.0975 CM 0.1930 CM

-1.0"	0.5070E-03	0.1432E-02	0.5005E-04	-0.4454E-03
-0.5"	0.1972E-03	-0.4099E-03	-0.1245E-03	0.4197E-04
0.5"	0.2727E-03	0.4736E-03	0.2442E-03	0.2652E-03
1.0"	0.7269E-03	-0.1218E-02	0.7330E-03	0.5325E-03

NOMINAL CURRENT: 1000 AMPS -0.0935 CM 0.1937 CM

-1.0"	0.9738E-03	0.9622E-03	0.6935E-04	-0.3800E-03
-0.5"	0.2992E-03	-0.5735E-03	-0.9921E-04	0.1870E-04
0.5"	0.3831E-03	0.6511E-03	0.2398E-03	0.2673E-03
1.0"	0.1238E-02	-0.7029E-03	0.7238E-03	0.5120E-03

NOMINAL CURRENT: 2000 AMPS -0.0925 CM 0.1906 CM

-1.0"	0.1146E-02	0.7872E-03	0.5247E-04	-0.3318E-03
-0.5"	0.3327E-03	-0.6312E-03	-0.9481E-04	0.1776E-04
0.5"	0.4250E-03	0.7174E-03	0.2388E-03	0.2678E-03
1.0"	0.1417E-02	-0.5532E-03	0.7222E-03	0.5093E-03

NOMINAL CURRENT: 3000 AMPS -0.0926 CM 0.1880 CM

-1.0"	0.1136E-02	0.7803E-03	0.2121E-04	-0.3018E-03
-0.5"	0.3275E-03	-0.6228E-03	-0.1037E-03	0.2727E-04
0.5"	0.4175E-03	0.7076E-03	0.2464E-03	0.2733E-03
1.0"	0.1397E-02	-0.5635E-03	0.7337E-03	0.5086E-03

NOMINAL CURRENT: 4000 AMPS -0.0943 CM 0.1879 CM

-1.0"	0.1100E-02	0.8074E-03	-0.2649E-04	-0.2658E-03
-0.5"	0.3172E-03	-0.6076E-03	-0.1205E-03	0.4414E-04
0.5"	0.4064E-03	0.6881E-03	0.2573E-03	0.2807E-03
1.0"	0.1341E-02	-0.6216E-03	0.7527E-03	0.5127E-03

PR259 A14-4

NOMINAL CURRENT: 500 AMPS 0.0361 CM 0.1713 CM

-1.0"	-0.1330E-03	0.2014E-02	-0.1079E-02	0.5997E-03
-0.5"	0.2200E-04	-0.1764E-03	-0.4878E-03	0.3975E-03
0.5"	0.2670E-03	0.4519E-03	0.4599E-03	0.3204E-03
1.0"	0.7391E-03	-0.1199E-02	0.6048E-03	-0.2687E-03

NOMINAL CURRENT: 1000 AMPS 0.0447 CM 0.1768 CM

-1.0"	0.3450E-03	0.1505E-02	-0.1054E-02	0.5742E-03
-0.5"	0.1216E-03	-0.3401E-03	-0.4755E-03	0.3911E-03
0.5"	0.3681E-03	0.6084E-03	0.4408E-03	0.3085E-03
1.0"	0.1177E-02	-0.7640E-03	0.6234E-03	-0.1530E-03

NOMINAL CURRENT: 1500 AMPS 0.0479 CM 0.1783 CM

-1.0"	0.4571E-03	0.1381E-02	-0.1062E-02	0.5693E-03
-0.5"	0.1410E-03	-0.3787E-03	-0.4808E-03	0.3961E-03
0.5"	0.4028E-03	0.6539E-03	0.4418E-03	0.3083E-03
1.0"	0.1292E-02	-0.6752E-03	0.6398E-03	-0.1118E-03

NOMINAL CURRENT: 2000 AMPS 0.0501 CM 0.1773 CM

-1.0"	0.4816E-03	0.1343E-02	-0.1080E-02	0.5758E-03
-0.5"	0.1423E-03	-0.3858E-03	-0.4893E-03	0.4031E-03
0.5"	0.4155E-03	0.6682E-03	0.4499E-03	0.3155E-03
1.0"	0.1332E-02	-0.6389E-03	0.6684E-03	-0.7720E-04

NOMINAL CURRENT: 3000 AMPS 0.0521 CM 0.1748 CM

-1.0"	0.4457E-03	0.1362E-02	-0.1136E-02	0.6060E-03
-0.5"	0.1282E-03	-0.3709E-03	-0.5152E-03	0.4243E-03
0.5"	0.4189E-03	0.6654E-03	0.4744E-03	0.3337E-03
1.0"	0.1323E-02	-0.6590E-03	0.7082E-03	-0.7740E-04

NOMINAL CURRENT: 4000 AMPS 0.0528 CM 0.1738 CM

-1.0"	0.4775E-03	0.1368E-02	-0.1312E-02	0.7283E-03
-0.5"	0.1557E-03	-0.3838E-03	-0.5857E-03	0.4863E-03
0.5"	0.3658E-03	0.6111E-03	0.5380E-03	0.3840E-03
1.0"	0.1190E-02	-0.7223E-03	0.8282E-03	-0.5179E-04

PH669 A14-5

NOMINAL CURRENT: 200 AMPS 0.0186 CM 0.1554 CM

-1.0"	-0.1851E-02	0.2887E-02	0.1378E-03	-0.1038E-03
-0.5"	-0.4574E-03	0.6020E-03	0.1165E-03	-0.1711E-04
0.5"	-0.4425E-03	-0.5991E-03	-0.3073E-03	-0.2784E-03
1.0"	-0.1647E-02	-0.2407E-02	-0.4970E-03	0.1483E-03

NOMINAL CURRENT: 500 AMPS 0.0170 CM 0.1341 CM

-1.0"	-0.5623E-03	0.2061E-02	-0.9742E-04	0.9492E-04
-0.5"	-0.9841E-04	0.4362E-04	0.2118E-04	0.5947E-04
0.5"	-0.5101E-04	-0.3903E-04	-0.2264E-03	-0.2327E-03
1.0"	-0.3993E-03	-0.1722E-02	-0.4781E-03	-0.9146E-04

NOMINAL CURRENT: 1000 AMPS 0.0176 CM 0.1288 CM

-1.0"	-0.4099E-04	0.1637E-02	-0.1513E-03	0.1598E-03
-0.5"	0.2827E-04	-0.1593E-03	0.6134E-05	0.7354E-04
0.5"	0.7359E-04	0.1451E-03	-0.2082E-03	-0.2181E-03
1.0"	0.1451E-04	-0.1490E-02	-0.4750E-03	-0.1636E-03

NOMINAL CURRENT: 1500 AMPS 0.0201 CM 0.1249 CM

-1.0"	0.1237E-03	0.1478E-02	-0.1213E-03	0.1268E-03
-0.5"	0.6224E-04	-0.2172E-03	0.1245E-04	0.6431E-04
0.5"	0.1102E-03	0.2007E-03	-0.2073E-03	-0.2151E-03
1.0"	0.1561E-03	-0.1381E-02	-0.4678E-03	-0.1570E-03

NOMINAL CURRENT: 2000 AMPS 0.0208 CM 0.1203 CM

-1.0"	0.1355E-03	0.1473E-02	-0.1437E-03	0.1546E-03
-0.5"	0.6159E-04	-0.2223E-03	0.4506E-05	0.7010E-04
0.5"	0.1196E-03	0.2102E-03	-0.2009E-03	-0.2123E-03
1.0"	0.1797E-03	-0.1375E-02	-0.4730E-03	-0.1911E-03

NOMINAL CURRENT: 3000 AMPS 0.0226 CM 0.1202 CM

-1.0"	0.1203E-03	0.1476E-02	-0.1556E-03	0.1700E-03
-0.5"	0.5430E-04	-0.2146E-03	-0.4424E-07	0.7271E-04
0.5"	0.1187E-03	0.2055E-03	-0.1925E-03	-0.2043E-03
1.0"	0.1651E-03	-0.1396E-02	-0.4620E-03	-0.2055E-03

NOMINAL CURRENT: 4000 AMPS 0.0250 CM 0.1190 CM

-1.0"	0.9617E-04	0.1455E-02	-0.1715E-03	0.1802E-03
-0.5"	0.3991E-04	-0.1975E-03	-0.7890E-05	0.7761E-04
0.5"	0.1146E-03	0.1935E-03	-0.1800E-03	-0.1930E-03
1.0"	0.1372E-03	-0.1415E-02	-0.4344E-03	-0.1936E-03

PAD67 A15-2

NOMINAL CURRENT: 200 AMPS -0.0285 CM 0.2175 CM

-1.0"	-0.1551E-02	0.3357E-02	0.3330E-03	-0.3320E-03
-0.5"	-0.2698E-03	0.3274E-03	0.5719E-04	-0.1119E-03
0.5"	-0.1056E-03	-0.1419E-03	0.1811E-04	-0.1517E-05
1.0"	-0.9704E-03	-0.2823E-02	-0.1692E-03	-0.4256E-03

NOMINAL CURRENT: 500 AMPS -0.0229 CM 0.2026 CM

-1.0"	-0.6366E-03	0.2575E-02	0.1713E-03	-0.1247E-03
-0.5"	-0.1072E-03	-0.3948E-04	0.3755E-04	-0.6443E-04
0.5"	0.3534E-03	0.4713E-03	-0.1755E-04	-0.4478E-04
1.0"	0.6442E-03	-0.1592E-02	-0.2647E-03	-0.4678E-03

NOMINAL CURRENT: 1000 AMPS -0.0121 CM 0.2089 CM

-1.0"	-0.7057E-04	0.1935E-02	0.1143E-03	-0.9288E-04
-0.5"	-0.6108E-05	-0.2305E-03	0.2602E-04	-0.4189E-04
0.5"	0.5297E-03	0.7236E-03	-0.2525E-04	-0.5870E-04
1.0"	0.1325E-02	-0.9890E-03	-0.2817E-03	-0.4385E-03

NOMINAL CURRENT: 1500 AMPS -0.0123 CM 0.1985 CM

-1.0"	0.8469E-04	0.1803E-02	0.1111E-03	-0.7345E-04
-0.5"	0.2737E-04	-0.2868E-03	0.3043E-04	-0.4294E-04
0.5"	0.5644E-03	0.7790E-03	-0.3303E-04	-0.6466E-04
1.0"	0.1481E-02	-0.8526E-03	-0.2965E-03	-0.4459E-03

NOMINAL CURRENT: 2000 AMPS -0.0106 CM 0.2023 CM

-1.0"	0.1287E-03	0.1750E-02	0.9419E-04	-0.6451E-04
-0.5"	0.3590E-04	-0.3019E-03	0.2503E-04	-0.3622E-04
0.5"	0.5785E-03	0.8016E-03	-0.2738E-04	-0.5954E-04
1.0"	0.1553E-02	-0.7661E-03	-0.2956E-03	-0.4693E-03

NOMINAL CURRENT: 3000 AMPS -0.0114 CM 0.1913 CM

-1.0"	0.5204E-04	0.1850E-02	0.3505E-04	-0.4680E-05
-0.5"	0.1397E-04	-0.2783E-03	0.2695E-05	-0.1941E-04
0.5"	0.5896E-03	0.8111E-03	-0.7814E-05	-0.5370E-04
1.0"	0.1576E-02	-0.7858E-03	-0.3268E-03	-0.5941E-03

NOMINAL CURRENT: 4000 AMPS -0.0033 CM 0.2037 CM

-1.0"	0.1001E-04	0.1790E-02	-0.1491E-04	0.1004E-04
-0.5"	-0.1159E-04	-0.2485E-03	-0.1503E-04	0.1980E-05
0.5"	0.5865E-03	0.7890E-03	0.8657E-06	-0.4436E-04
1.0"	0.1506E-02	-0.8512E-03	-0.2495E-03	-0.4422E-03

MCB68 A15-3

NOMINAL CURRENT: 200 AMPS -0.1115 CM 0.2170 CM

-1.0"	-0.2483E-02	0.3741E-02	0.3213E-03	-0.1161E-03
-0.5"	-0.6127E-03	0.7842E-03	0.1039E-03	-0.1402E-03
0.5"	-0.3862E-03	-0.6045E-03	-0.1685E-04	0.9901E-05
1.0"	-0.2010E-02	-0.3518E-02	-0.3433E-04	-0.1227E-03

NOMINAL CURRENT: 500 AMPS -0.1024 CM 0.2176 CM

-1.0"	-0.6347E-03	0.2336E-02	0.4055E-03	-0.2848E-03
-0.5"	-0.1260E-03	0.3209E-04	0.1153E-03	-0.1539E-03
0.5"	0.1520E-03	0.2125E-03	0.6948E-05	0.4967E-04
1.0"	0.5262E-05	-0.2010E-02	0.8491E-04	0.1593E-04

NOMINAL CURRENT: 2000 AMPS -0.0963 CM 0.2098 CM

-1.0"	-0.1255E-03	0.1988E-02	0.4101E-03	-0.3804E-03
-0.5"	0.6796E-05	-0.1771E-03	0.9227E-04	-0.1399E-03
0.5"	0.3004E-03	0.4543E-03	0.3413E-04	0.7531E-04
1.0"	0.6784E-03	-0.1401E-02	0.1631E-03	0.8392E-04

NOMINAL CURRENT: 3000 AMPS -0.0922 CM 0.2095 CM

-1.0"	-0.1803E-03	0.2114E-02	0.3454E-03	-0.3237E-03
-0.5"	0.7843E-05	-0.1696E-03	0.7491E-04	-0.1181E-03
0.5"	0.2893E-03	0.4425E-03	0.4244E-04	0.7779E-04
1.0"	0.6297E-03	-0.1482E-02	0.1486E-03	0.2818E-04

NOMINAL CURRENT: 4000 AMPS -0.0895 CM 0.2195 CM

-1.0"	-0.2340E-03	0.2129E-02	0.3038E-03	-0.3287E-03
-0.5"	-0.9103E-05	-0.1437E-03	0.5423E-04	-0.9656E-04
0.5"	0.2679E-03	0.4094E-03	0.5291E-04	0.8425E-04
1.0"	0.5533E-03	-0.1520E-02	0.1778E-03	0.6523E-04

PAC55 A15-4

NOMINAL CURRENT: 500 AMPS -0.0188 CM 0.1825 CM

-1.0"	0.3474E-03	0.1338E-02	-0.3477E-03	-0.4927E-04
-0.5"	0.1296E-03	-0.3139E-03	-0.2161E-03	0.1707E-03
0.5"	0.2727E-03	0.4613E-03	0.2160E-03	0.1723E-03
1.0"	0.7739E-03	-0.1015E-02	0.3977E-03	0.8214E-04

NOMINAL CURRENT: 1000 AMPS -0.0191 CM 0.1877 CM

-1.0"	0.8388E-03	0.9412E-03	-0.5895E-03	0.1465E-03
-0.5"	0.2440E-03	-0.4994E-03	-0.3012E-03	0.2505E-03
0.5"	0.3801E-03	0.6335E-03	0.3043E-03	0.2570E-03
1.0"	0.1200E-02	-0.7201E-03	0.6394E-03	0.2519E-03

NOMINAL CURRENT: 1500 AMPS -0.0188 CM 0.1893 CM

-1.0"	0.9313E-03	0.8542E-03	-0.6448E-03	0.2055E-03
-0.5"	0.2619E-03	-0.5309E-03	-0.3147E-03	0.2668E-03
0.5"	0.3973E-03	0.6620E-03	0.3181E-03	0.2735E-03
1.0"	0.1273E-02	-0.6699E-03	0.6900E-03	0.2972E-03

NOMINAL CURRENT: 2000 AMPS -0.0185 CM 0.1675 CM

-1.0"	0.9881E-03	0.7452E-03	-0.6057E-03	0.1568E-03
-0.5"	0.2661E-03	-0.5391E-03	-0.3078E-03	0.2565E-03
0.5"	0.3987E-03	0.6671E-03	0.3112E-03	0.2632E-03
1.0"	0.1316E-02	-0.5776E-03	0.6513E-03	0.2490E-03

NOMINAL CURRENT: 3000 AMPS -0.0181 CM 0.1905 CM

-1.0"	0.9310E-03	0.8603E-03	-0.7070E-03	0.2721E-03
-0.5"	0.2612E-03	-0.5287E-03	-0.3325E-03	0.2847E-03
0.5"	0.3873E-03	0.6495E-03	0.3374E-03	0.2930E-03
1.0"	0.1234E-02	-0.7199E-03	0.7409E-03	0.3242E-03

NOMINAL CURRENT: 4000 AMPS -0.0150 CM 0.1899 CM

-1.0"	0.8943E-03	0.8933E-03	-0.7382E-03	0.2941E-03
-0.5"	0.2530E-03	-0.5133E-03	-0.3444E-03	0.2957E-03
0.5"	0.3726E-03	0.6288E-03	0.3469E-03	0.3001E-03
1.0"	0.1183E-02	-0.7599E-03	0.7600E-03	0.3326E-03

Contribution from the end field, average of nine dipoles (#101, 102, 103, 104, 105, 107, 111, 113, 114)

NOMINAL CURRENT: 200 AMPS

-1.0"	-0.1316E-02	0.1184E-02	-0.2460E-04	0.7311E-04
-0.5"	-0.3028E-03	0.4826E-03	0.1896E-04	0.5268E-05
0.5"	-0.2893E-03	-0.4818E-03	-0.5743E-04	-0.5714E-04
1.0"	-0.1347E-02	-0.1279E-02	-0.1622E-03	-0.1285E-03

NOMINAL CURRENT: 500 AMPS

-1.0"	-0.1325E-02	0.1180E-02	-0.1114E-04	0.5787E-04
-0.5"	-0.3035E-03	0.4888E-03	0.1965E-04	-0.8957E-07
0.5"	-0.3031E-03	-0.4958E-03	-0.5080E-04	-0.5155E-04
1.0"	-0.1359E-02	-0.1237E-02	-0.1426E-03	-0.1052E-03

NOMINAL CURRENT: 1000 AMPS

-1.0"	-0.1322E-02	0.1174E-02	-0.2920E-05	0.4996E-04
-0.5"	-0.3020E-03	0.4891E-03	0.2139E-04	-0.3014E-05
0.5"	-0.3070E-03	-0.4989E-03	-0.5064E-04	-0.5115E-04
1.0"	-0.1359E-02	-0.1221E-02	-0.1376E-03	-0.9347E-04

NOMINAL CURRENT: 2000 AMPS

-1.0"	-0.1320E-02	0.1164E-02	0.1450E-05	0.4844E-04
-0.5"	-0.3024E-03	0.4895E-03	0.2304E-04	-0.5045E-05
0.5"	-0.3065E-03	-0.4980E-03	-0.5132E-04	-0.5165E-04
1.0"	-0.1351E-02	-0.1203E-02	-0.1370E-03	-0.8889E-04

NOMINAL CURRENT: 3000 AMPS

-1.0"	-0.1328E-02	0.1173E-02	0.5030E-05	0.4616E-04
-0.5"	-0.3045E-03	0.4921E-03	0.2444E-04	-0.6361E-05
0.5"	-0.3058E-03	-0.4974E-03	-0.5279E-04	-0.5304E-04
1.0"	-0.1347E-02	-0.1197E-02	-0.1399E-03	-0.8885E-04

NOMINAL CURRENT: 4000 AMPS

-1.0"	-0.1343E-02	0.1179E-02	-0.6500E-05	0.3524E-04
-0.5"	-0.3114E-03	0.4978E-03	0.1111E-04	-0.3828E-06
0.5"	-0.2979E-03	-0.4901E-03	-0.2989E-04	-0.3012E-04
1.0"	-0.1325E-02	-0.1180E-02	-0.7487E-04	-0.4066E-04

PAB65 A15-5

NOMINAL CURRENT: 500 AMPS -0.0420 CM 0.2123 CM

-1.0"	-0.3070E-03	0.2179E-02	0.2105E-04	-0.2415E-03
-0.5"	-0.3283E-04	-0.1234E-03	-0.8824E-04	0.2209E-04
0.5"	0.3075E-03	0.4531E-03	0.1614E-03	0.1596E-03
1.0"	0.6066E-03	-0.1578E-02	0.4411E-03	0.3002E-03

NOMINAL CURRENT: 1000 AMPS -0.0377 CM 0.2152 CM

-1.0"	0.3470E-03	0.1648E-02	0.7187E-04	-0.2940E-03
-0.5"	0.1283E-03	-0.3746E-03	-0.7691E-04	0.4826E-05
0.5"	0.4592E-03	0.6955E-03	0.1622E-03	0.1558E-03
1.0"	0.1245E-02	-0.1041E-02	0.3996E-03	0.2179E-03

NOMINAL CURRENT: 1500 AMPS -0.0355 CM 0.2178 CM

-1.0"	0.4770E-03	0.1569E-02	0.8115E-04	-0.3277E-03
-0.5"	0.1625E-03	-0.4271E-03	-0.8292E-04	0.5229E-05
0.5"	0.4858E-03	0.7427E-03	0.1747E-03	0.1683E-03
1.0"	0.1372E-02	-0.9379E-03	0.4409E-03	0.2602E-03

NOMINAL CURRENT: 2000 AMPS -0.0366 CM 0.2158 CM

-1.0"	0.5247E-03	0.1541E-02	0.7074E-04	-0.3024E-03
-0.5"	0.1757E-03	-0.4454E-03	-0.8315E-04	0.5959E-05
0.5"	0.4896E-03	0.7537E-03	0.1686E-03	0.1544E-03
1.0"	0.1404E-02	-0.9108E-03	0.3739E-03	0.1524E-03

NOMINAL CURRENT: 3000 AMPS -0.0323 CM 0.2192 CM

-1.0"	0.5148E-03	0.1541E-02	0.3694E-04	-0.3088E-03
-0.5"	0.1716E-03	-0.4388E-03	-0.1042E-03	0.2237E-04
0.5"	0.4830E-03	0.7456E-03	0.1921E-03	0.1770E-03
1.0"	0.1392E-02	-0.9075E-03	0.4523E-03	0.2356E-03

NOMINAL CURRENT: 4000 AMPS -0.0344 CM 0.2144 CM

-1.0"	0.4536E-03	0.1526E-02	-0.4559E-04	-0.2023E-03
-0.5"	0.1389E-03	-0.4024E-03	-0.1196E-03	0.4388E-04
0.5"	0.4862E-03	0.7405E-03	0.1956E-03	0.1724E-03
1.0"	0.1402E-02	-0.8778E-03	0.4139E-03	0.1520E-03