TM-844
1670.00

Fermilab

SHORT SAMPLE TESTS AND TEVATRON MAGNET PERFORMANCE

R.H.Flora

January 22, 1979

The maximum current, as a function of magnetic field, is measured on short samples of the superconducting cable used in Tevatron magnets. The short sample current at 50kG is plotted in Figure 1 for dipoles 53 through 159. The symbols distinquish the part of the magnet in which the cable is used.

Notice that the first 50 dipoles have an inner coil short sample current of 5.7±.3kA. Almost all of these magnets were made from STAY-BRITE wire and were excited to well over 5kA in the "vertical" dewar.

However, the last 50 dipoles have an inner coil short sample current of 5.1±.3kA. The inner coils of most of these magnets were made with EBONOL wire and many of them could not reach 5kA.

Figure 2 is a correlation plot of inner coil short sample currents and "vertical" dewar performance. The short sample current is taken at load field given by: $B=(8.08G/A)(1.164)I$. The data corresponding to the lower inner or upper inner coil is used, which ever is lower. The solid line is the exact ideal predicted by the short sample current. The dashed line is the best prediction of "vertical" dewar current based on the short sample current. There is a significant correlation between the poor "vertical" dewar performance and poor short

sample current.

$$\frac{\left\langle (I_{VD}-\alpha-\beta I_{SS})^2 \right\rangle}{\left\langle (I_{VD}-\langle I_{VD} \rangle)^2 \right\rangle} = 47\%$$

α = .48kA β = .87

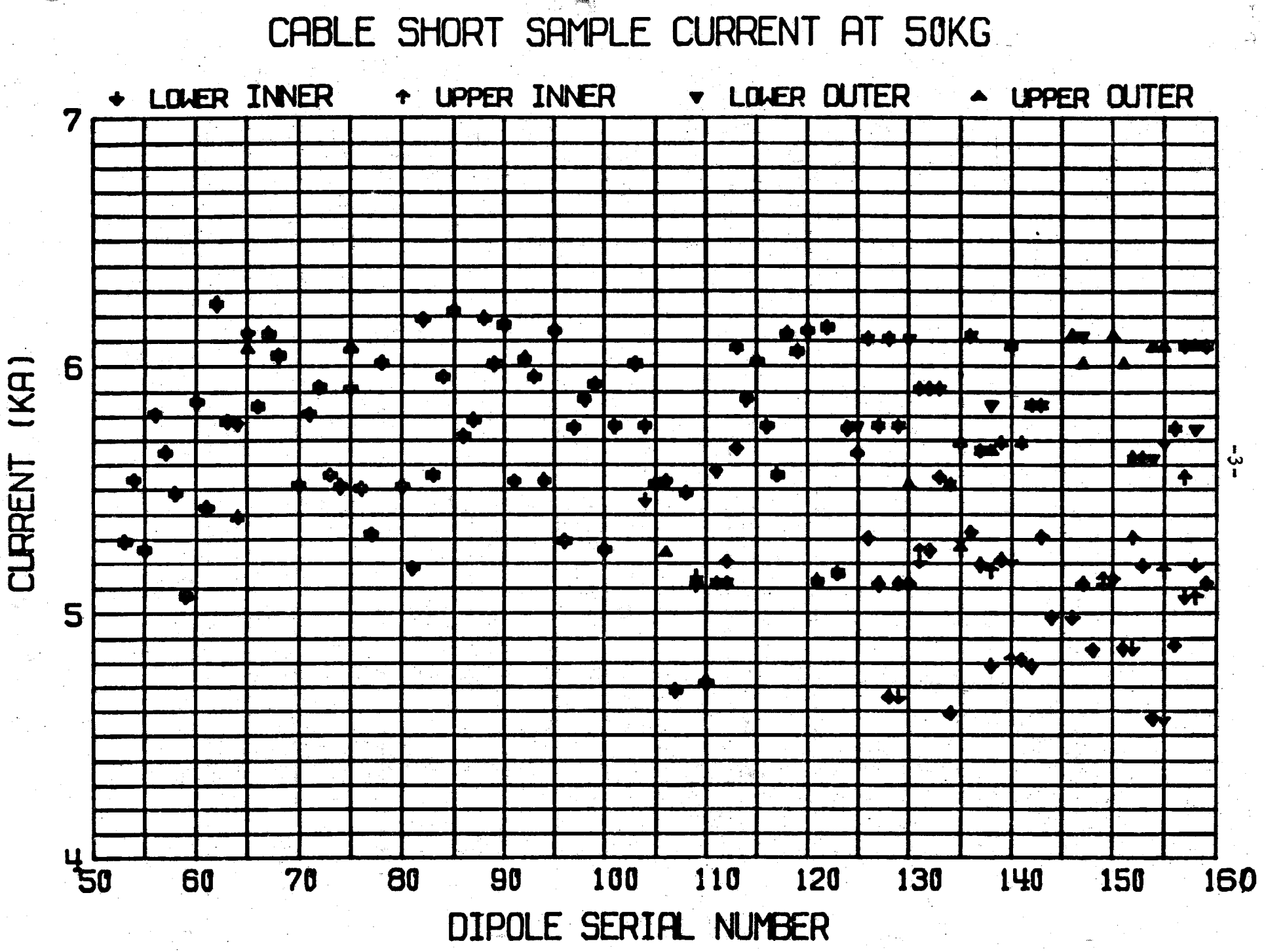
CABLE SHORT SAMPLE CURRENT AT 50KG
LOWER INNER
UPPER INNER
LOWER OUTER
UPPER OUTER
CURRENT (KA)
7
6
5
4
50
60
70
80
90
100
110
120
130
140
150
160
DIPOLE SERIAL NUMBER

Figure 1.

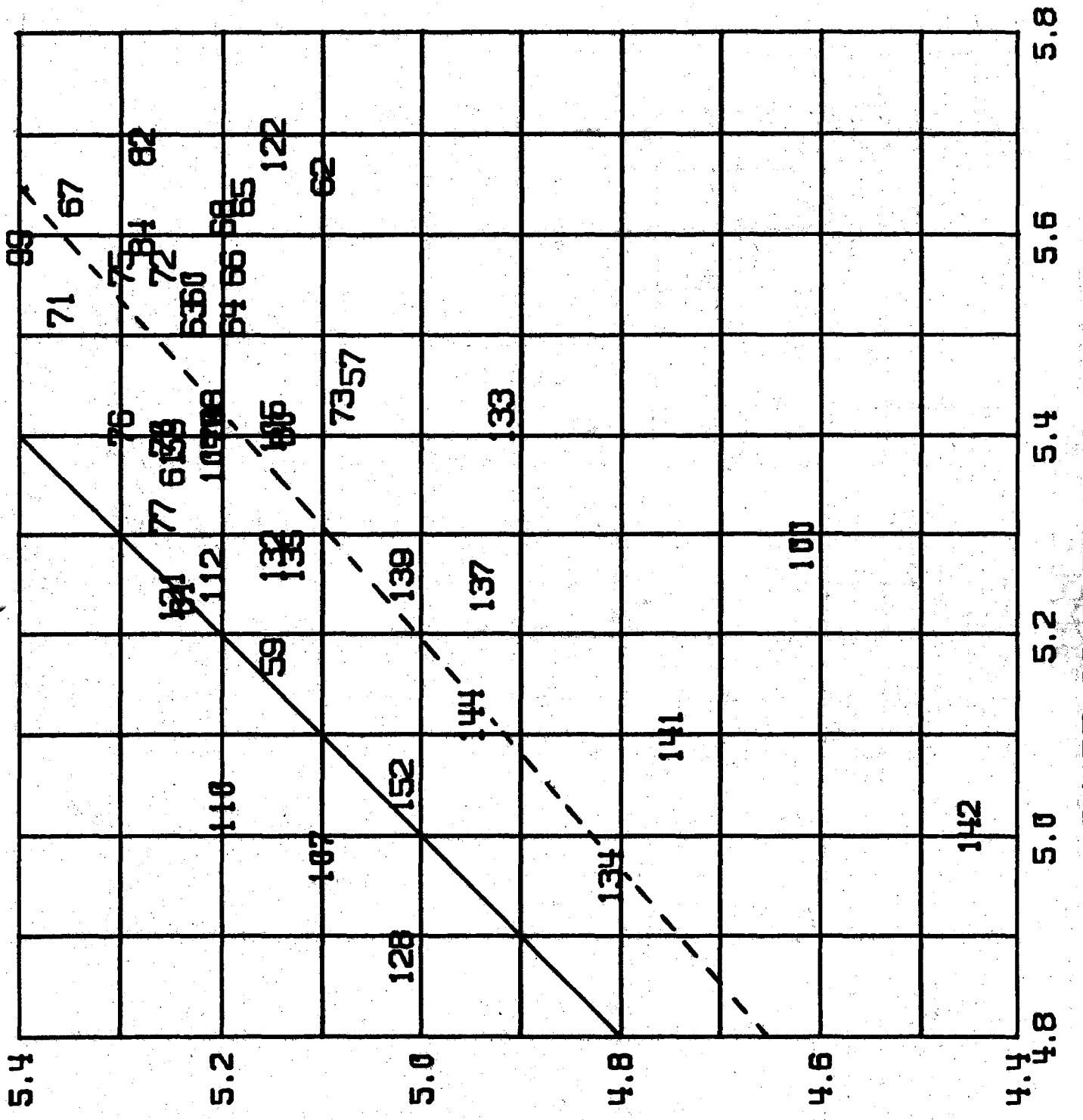
VERTICAL DEWAR CURRENT (KA)
SHORT SAMPLE CURRENT (KA)
5.4
5.2
5.0
4.8
4.6
4.4
5.8
5.6
5.4
5.2
5.0
4.8

Figure 2.