TS-SSC 90-031

MAGNETIC MEASUREMENTS OF SSC 1 METER DIPOLES DS0308 AND DS0309

Michael J. Lamm

June 12, 1990

TEST OBJECTIVES

I. ROOM TEMPERATURE

-COMPARE LAB 2 MEASUREMENTS WITH MOLE MEASUREMENTS IN IB1, FUNCTION OF LONGITUDINAL POSITION

II. COLD MEASUREMENTS

-FUNCTION OF POSITION, CURRENT

-COMPARE WITH ROOM TEMPERATURE

-STUDY EFFECT OF THERMAL CYCLE

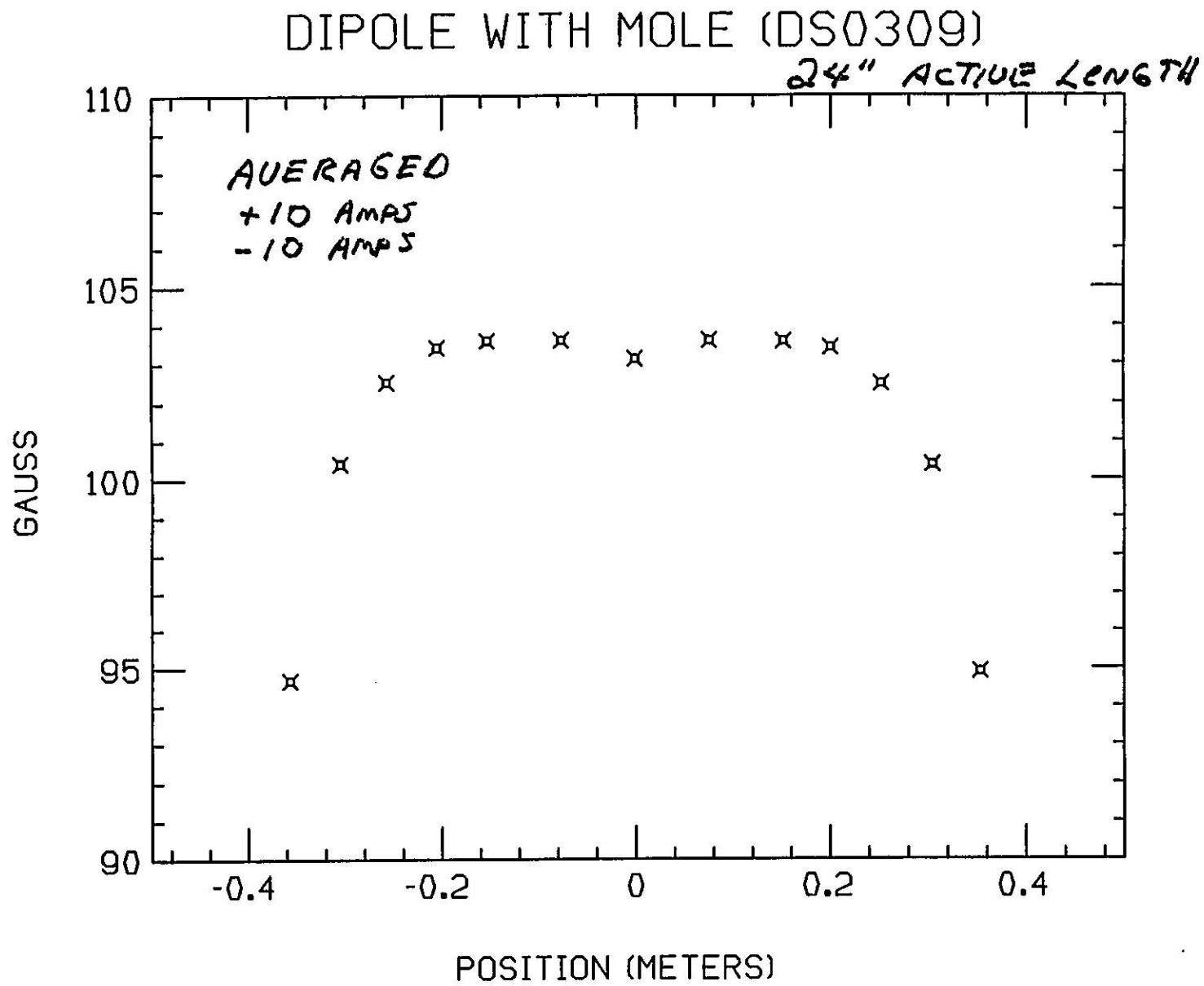
TEST FACILITY
SUPERCONDUCTING MAGNET R&D LABORATORY (LAB2)

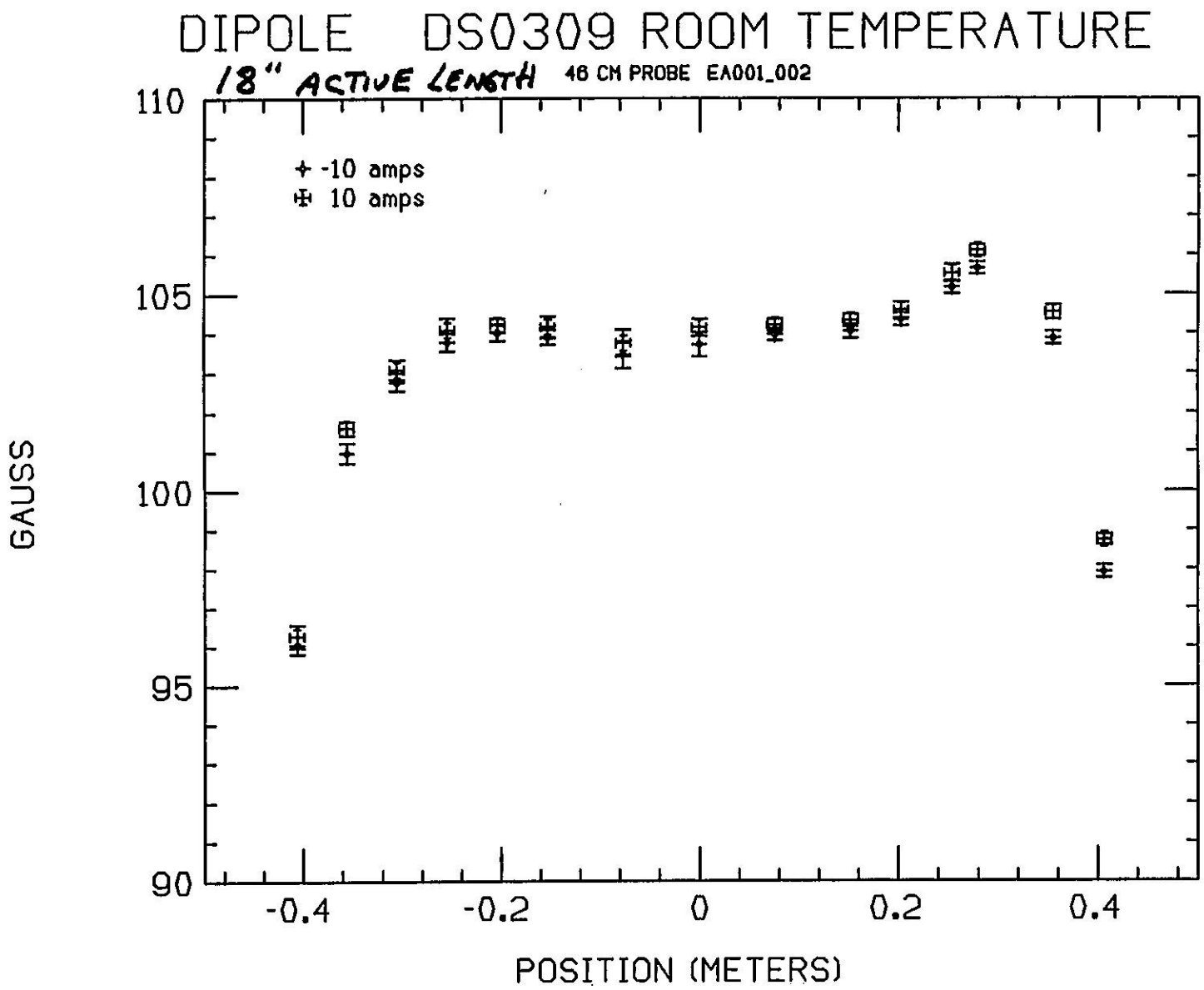
3 Vertical Dewars (Longest 3.6 Meters)
- Temperature Range 3.2 K to 4.35 K
- Instrumented with Pressure Transducers, Liquid Level Gauges, and Thermometers

Power Supplies 3 Transrex 500-5
- Up to 20,000 A

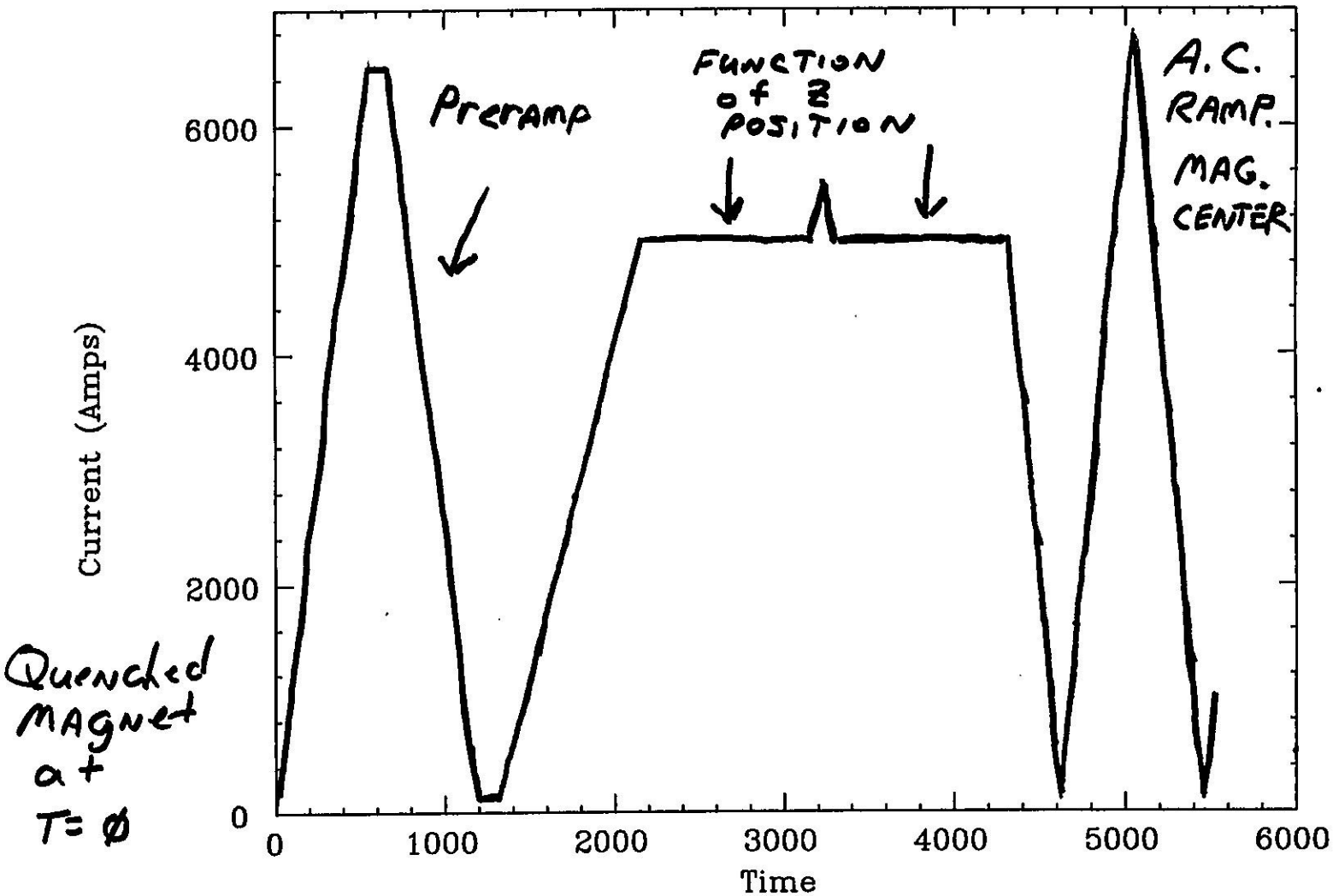
Data Acquisiton
- Micro-Vax
- CAMAC Based

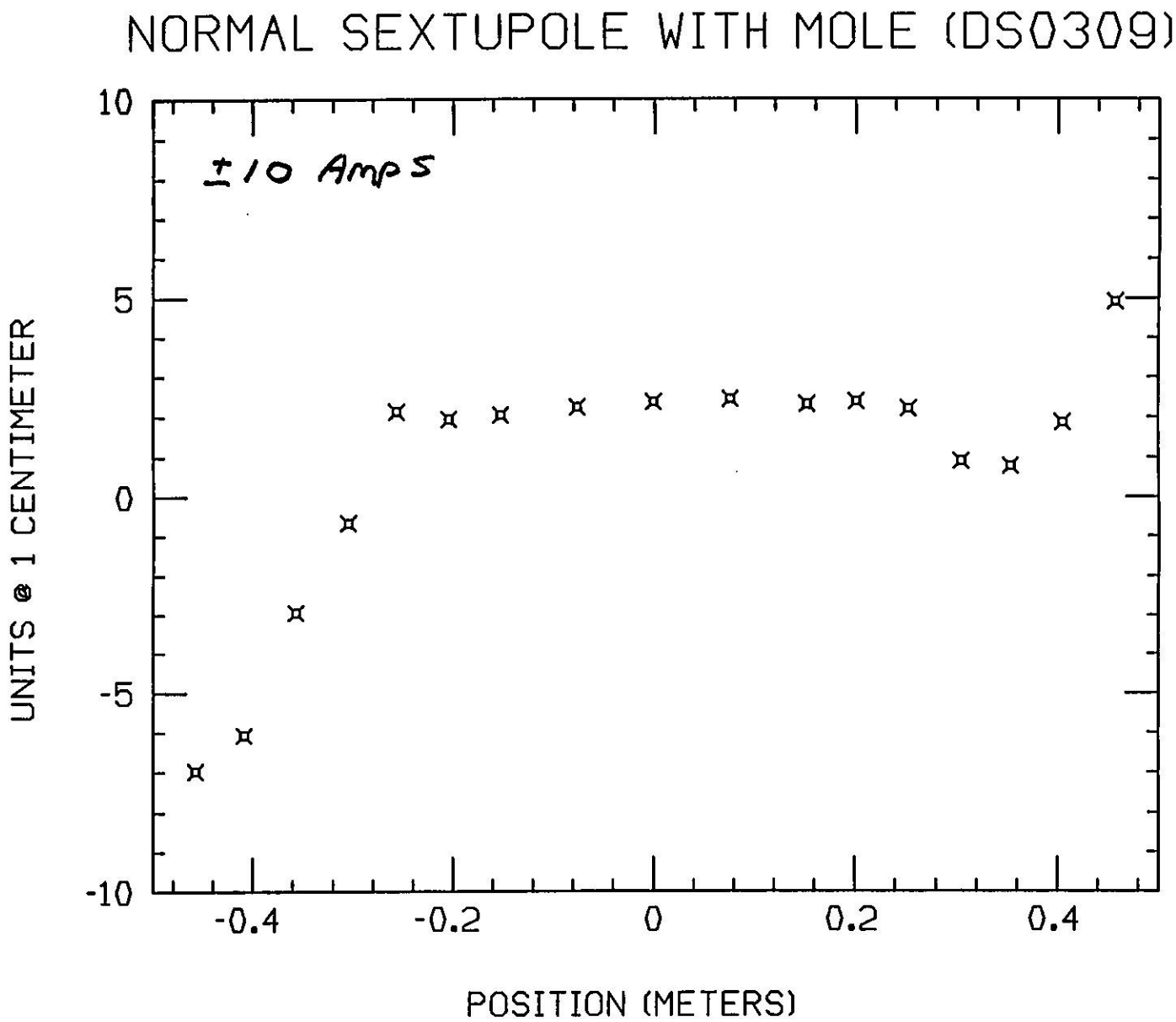
Magnetic Measurement System
- Multiple Winding Morgan Coil 1cm Radius
- In Anti-Cryostat Inserted in Magnet Bore
- V/F Converter Based Measuring System
- Maximum Data Acquisition Rate 3 Hz


DIPOLE WITH MOLE (DS0309)
24" ACTIVE LENGTH
AVERAGED
+10 AMPS
-10 AMPS
110
105
100
95
90
GAUSS
-0.4
-0.2
0
0.2
0.4
POSITION (METERS)


DIPOLE DS0309 ROOM TEMPERATURE
18" ACTIVE LENGTH
46 CM PROBE EA001_002
-10 amps
10 amps
GAUSS
110
105
100
95
90
-0.4
-0.2
0
0.2
0.4
POSITION (METERS)

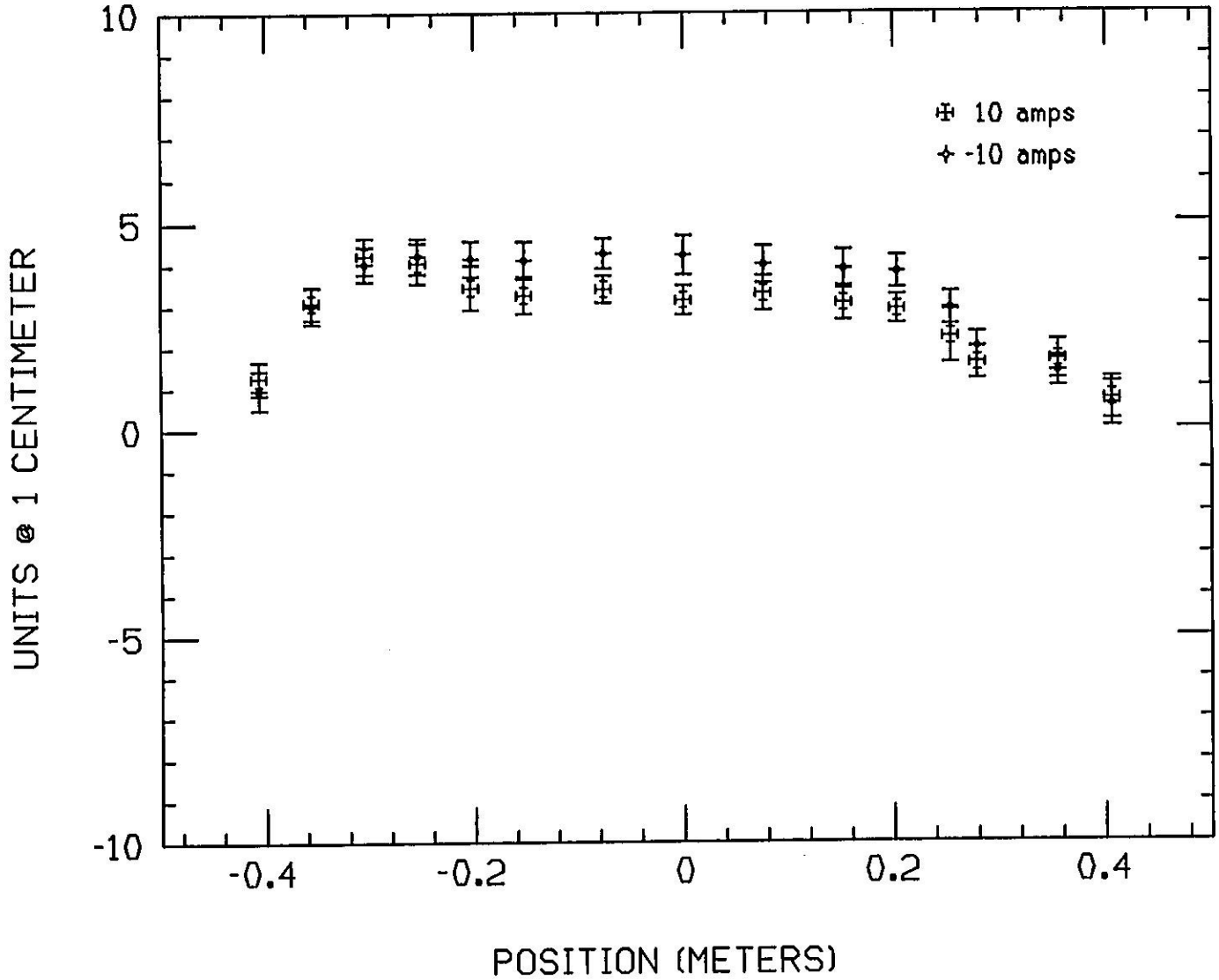
Waveform for Magnetic Measurements




NORMAL SEXTUPOLE WITH MOLE (DS0309)
±10 Amps
10
5
0
-5
-10
UNITS @ 1 CENTIMETER
-0.4
-0.2
0
0.2
0.4
POSITION (METERS)

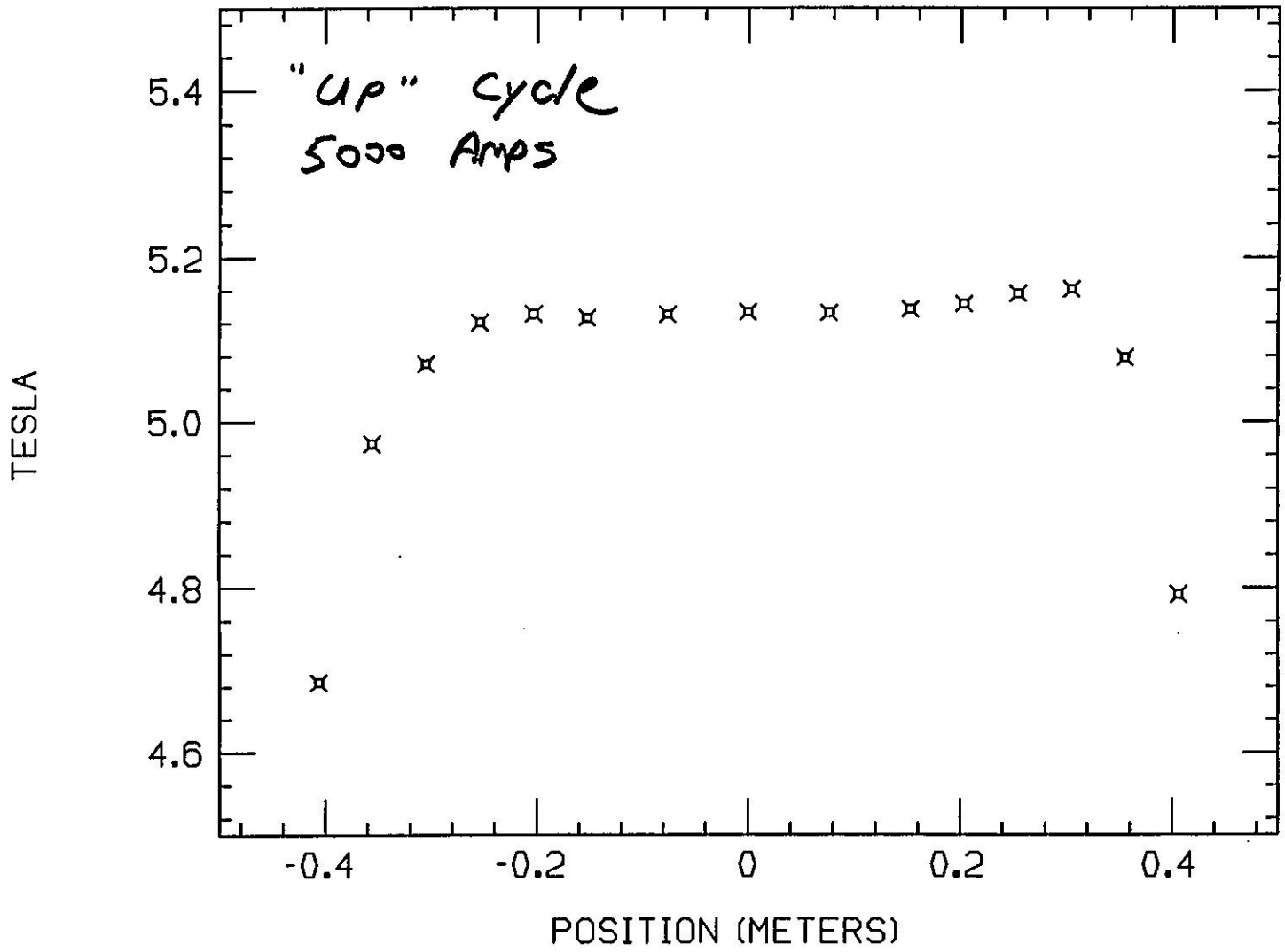
NORMAL SEXTUPOLE DS0309 ROOM TEMPERATURE

46 CM PROBE EA001-EA002



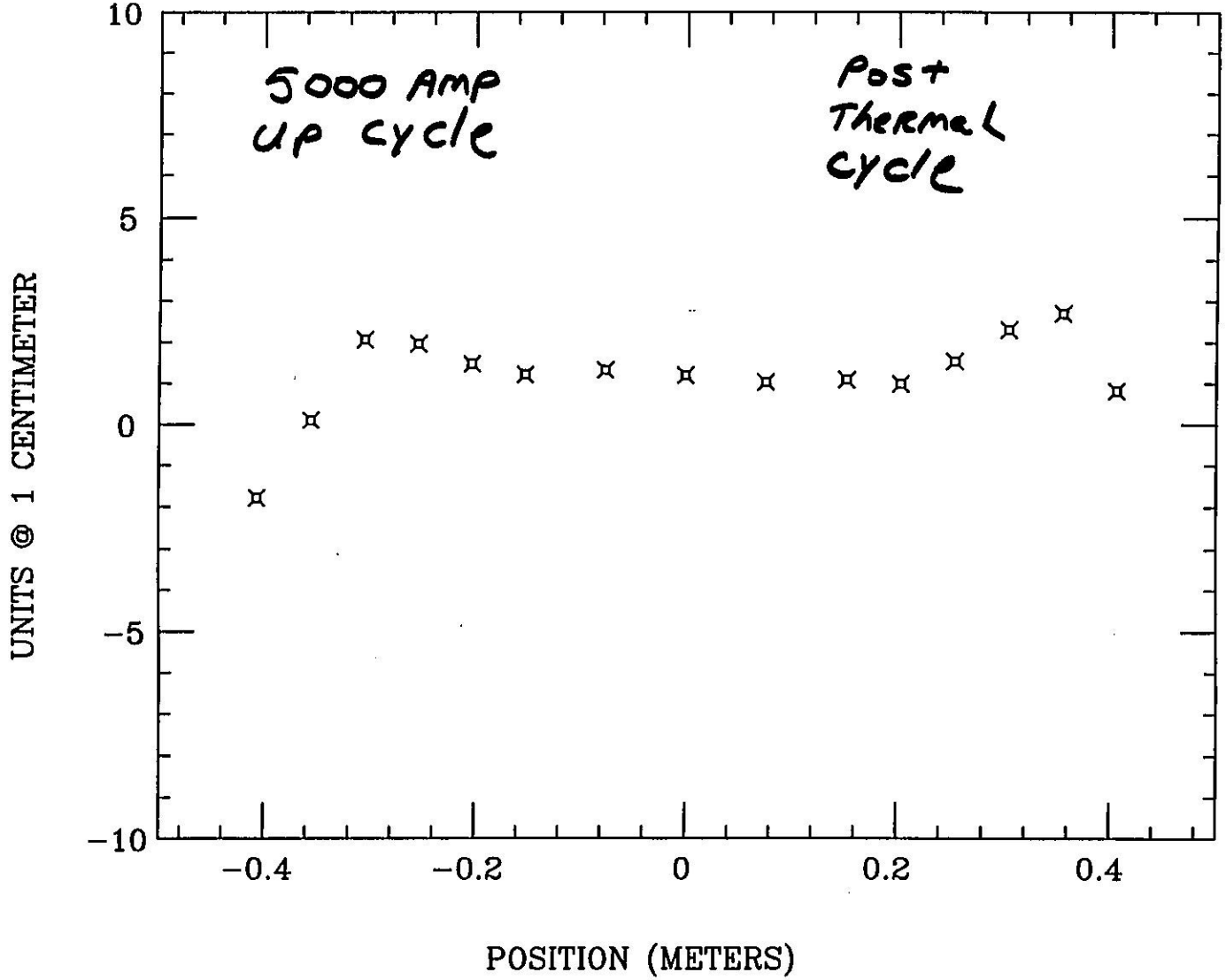
DIPOLE DS0309

46 CM DS0309.EA009



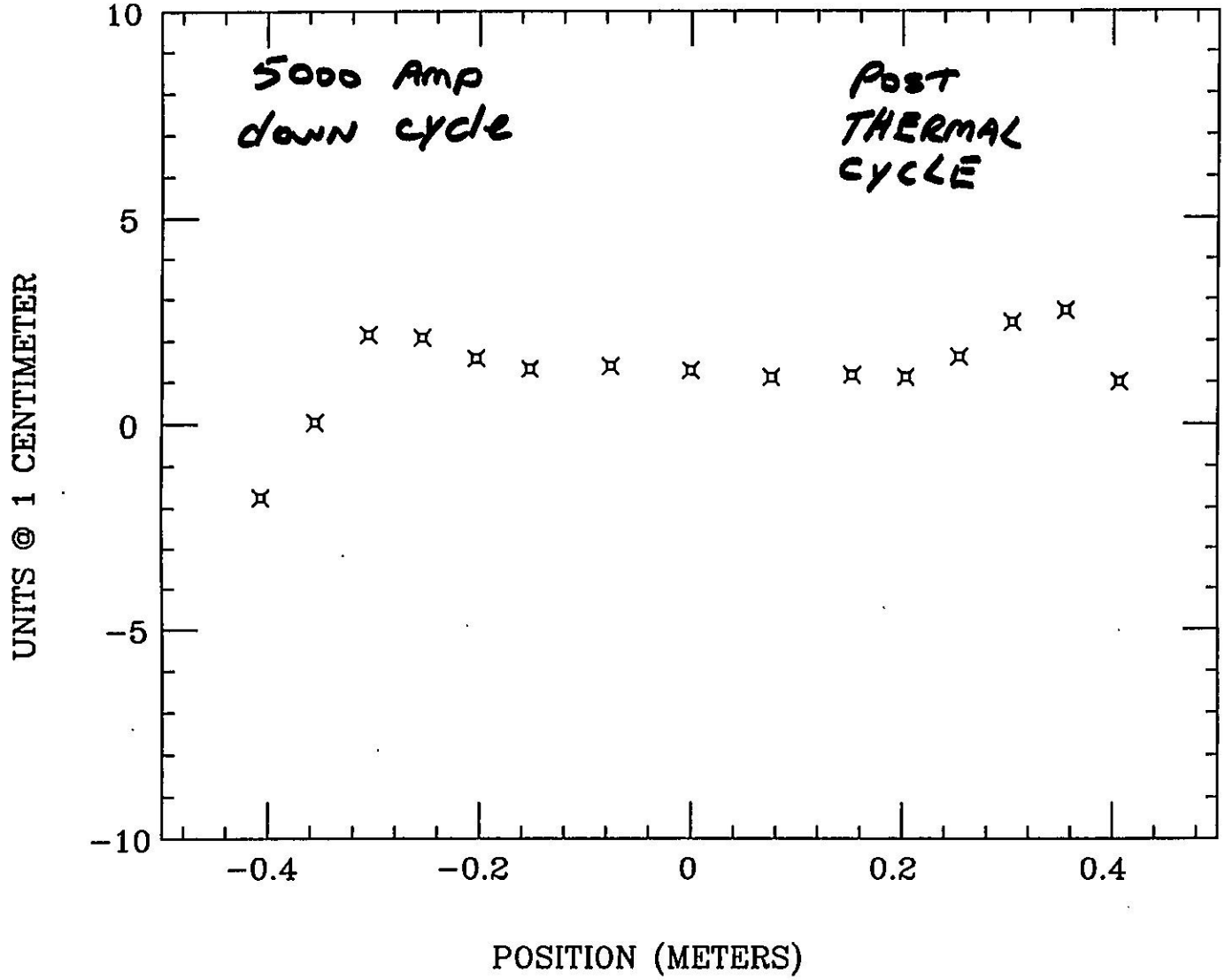
NORMAL SEXTUPOLE DS0309

46 CM PROBE DS0309.EA009



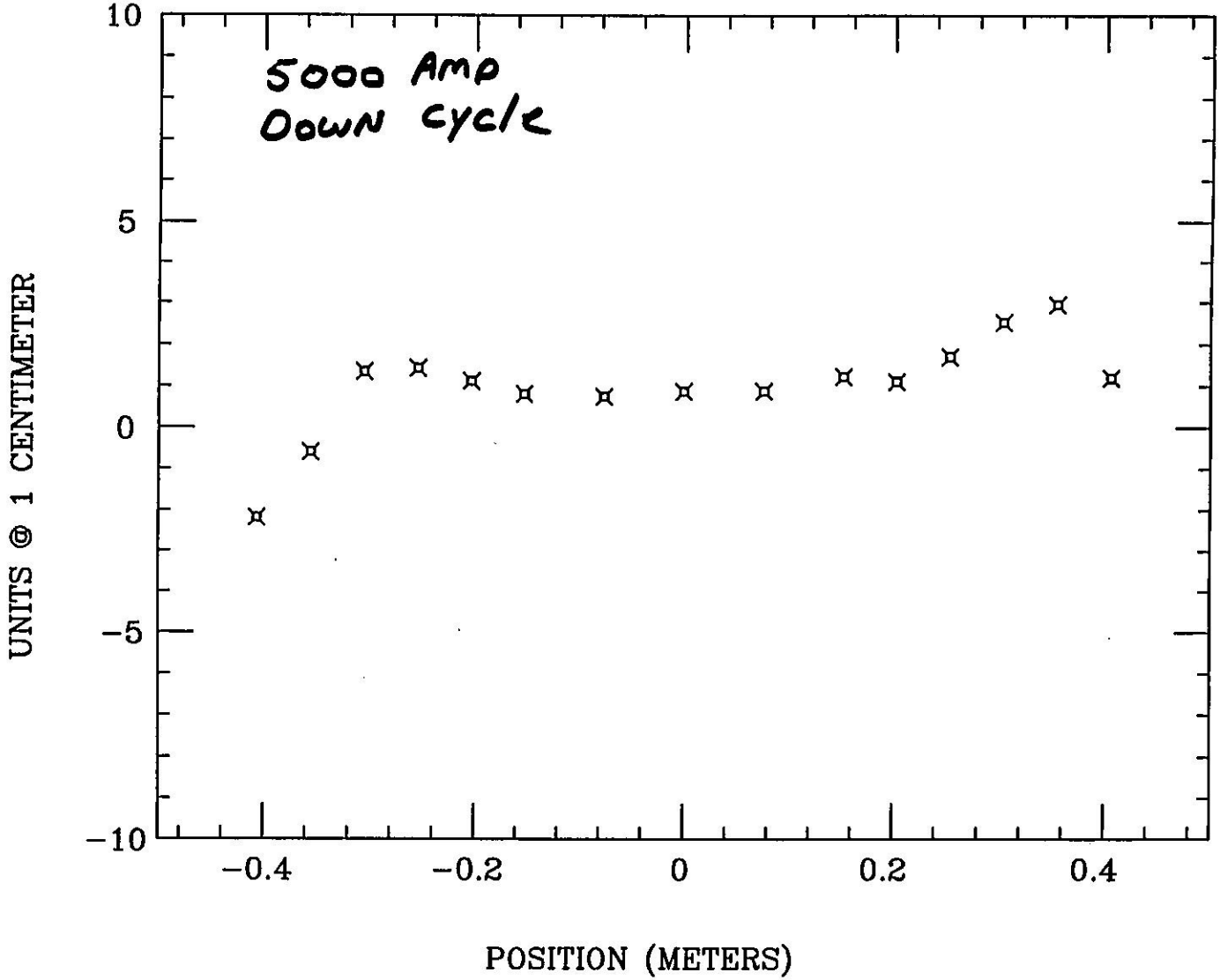
NORMAL SEXTUPOLE DS0309

46 CM PROBE DS0309.EA010



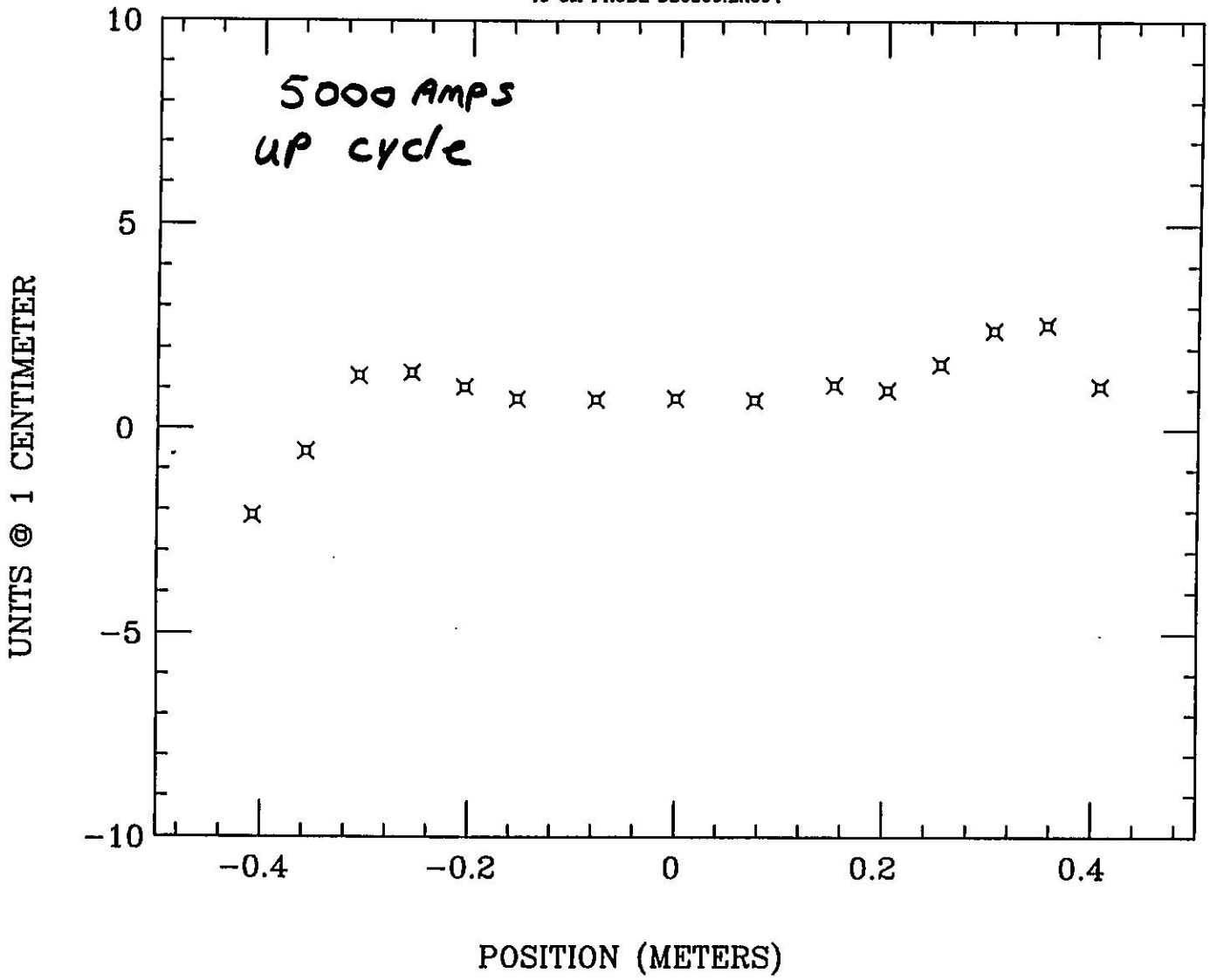
NORMAL SEXTUPOLE DS0309

46 CM PROBE DS0309.EA005



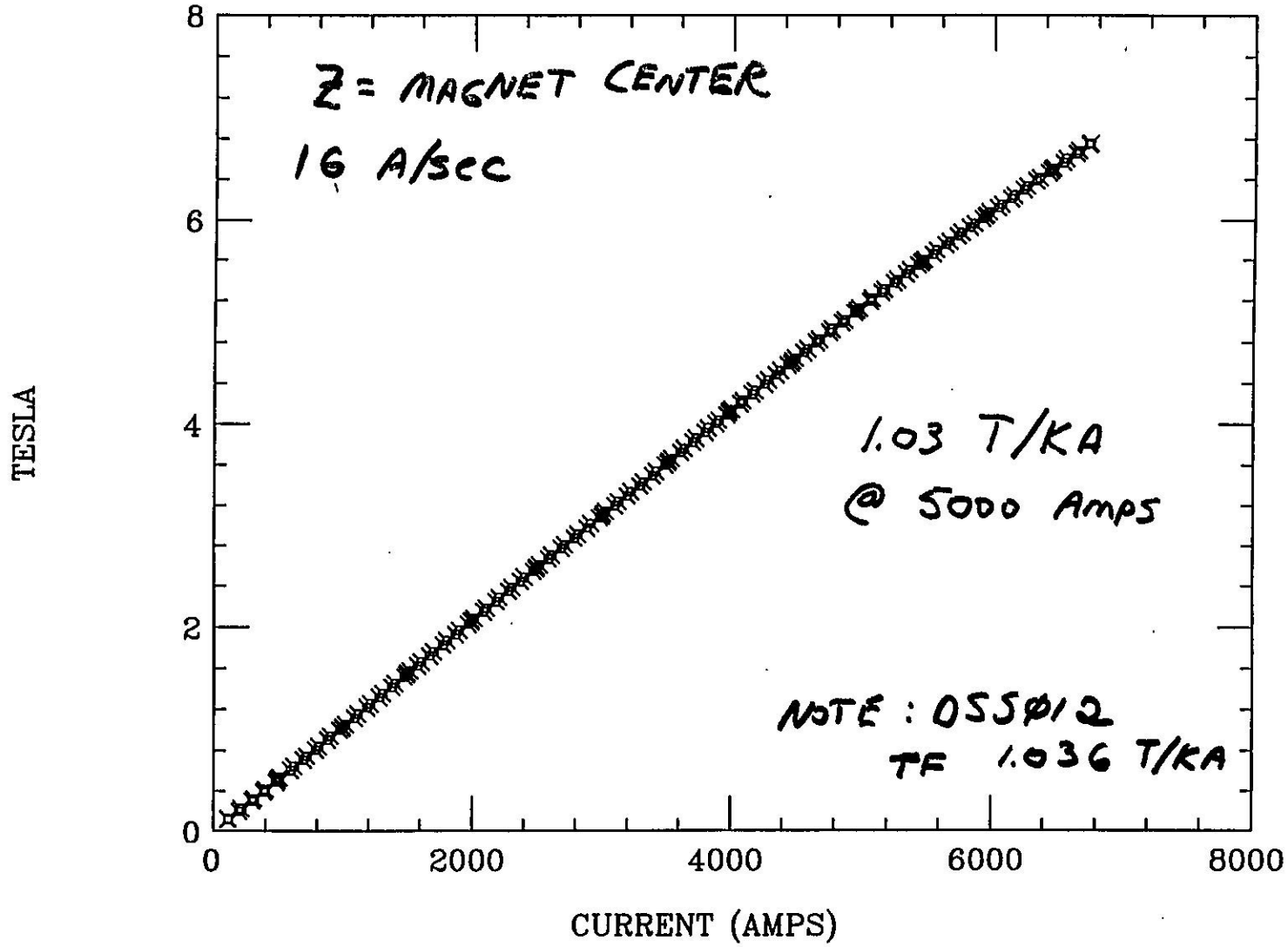
NORMAL SEXTUPOLE DS0309

46 CM PROBE DS0309.EA004



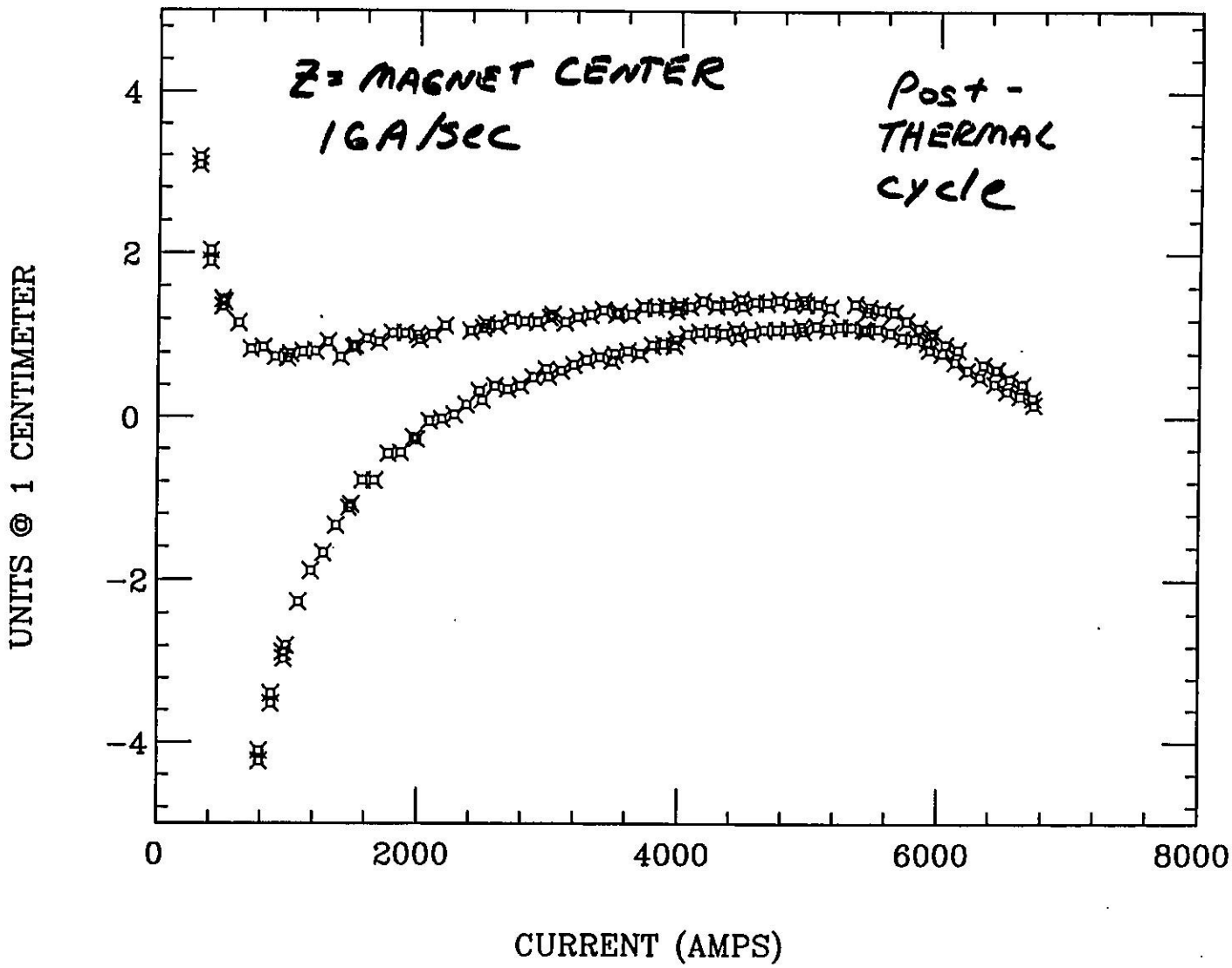
DIPOLE DS0309

46 CM PROBE DS0309.EA011



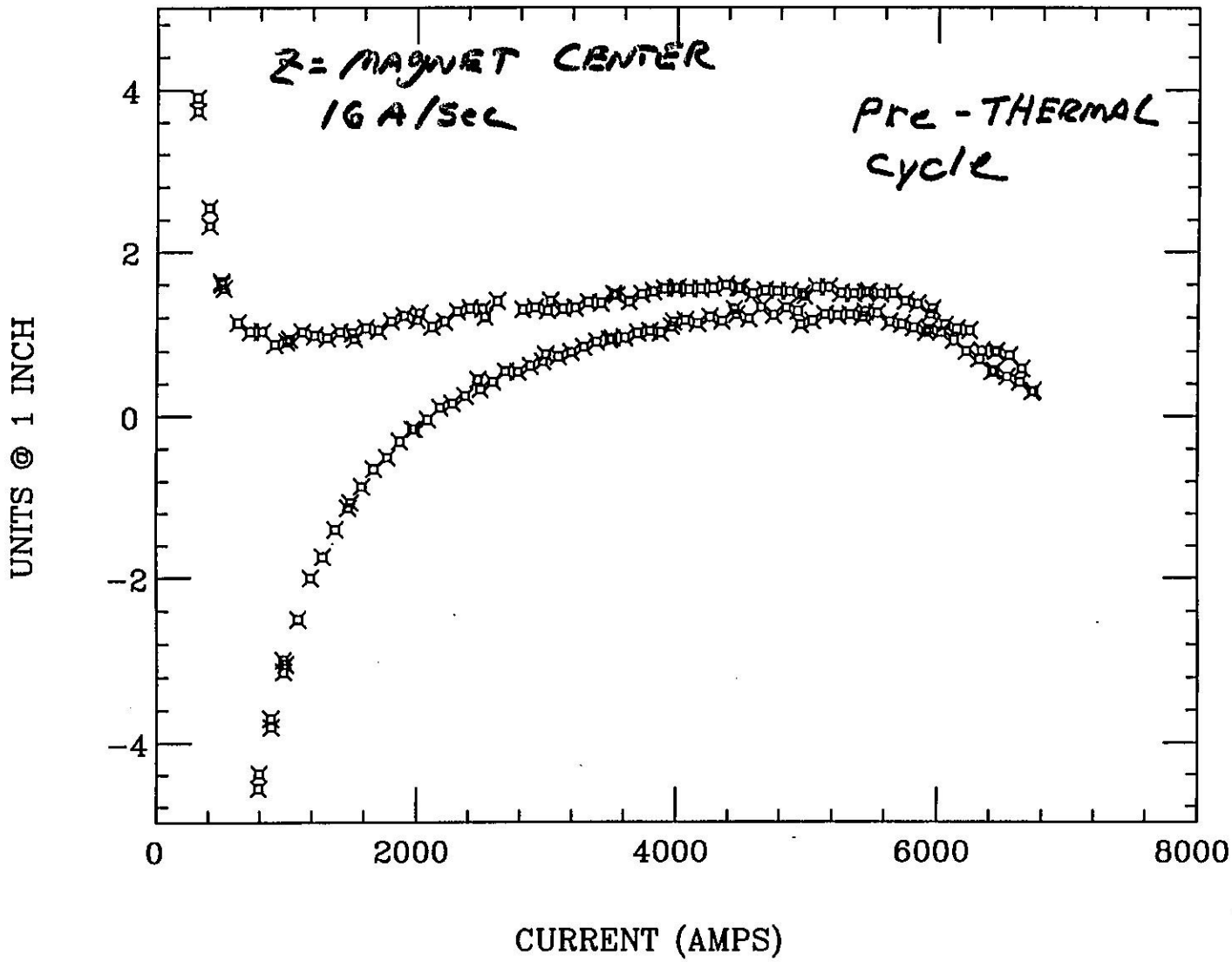
NORMAL SEXTUPOLE DS0309

46 CM PROBE DS0309.EA011



NORMAL SEXTUPOLE DS0309

46 CM PROBE DS0308.EA007



DS0309 MEASURED GEOMETRIC MULTIPOLES (AT 5000 AMPS)

TRANSFER FUNCTION 1.03 TESLA/KAMP

MULTIPOLE UNITS @ 1 CM	SKEW	NORMAL
QUADRUPOLE	-0.13	-1.2
SEXTUPOLE	-0.07	+1.3
OCTAPOLE	+0.35	-0.10
DECAPOLE	-0.07	-0.56
12-POLE	-0.16	+ .03
18-POLE	-0.03	-0.03
20-POLE	-0.04	-0.03

CONCLUSIONS

I. ROOM TEMPERATURE

-CROSS CALIBRATION OF MOLE AND LAB2 SYSTEM

II. COLD MEASUREMENTS

-MEASURED GEOMETRIC MULTIPOLES ARE SMALL, LARGEST IS NORMAL SEXTUPOLE
-TRANSFER FUNCTION AGREES WITH ROOM TEMPERATURE
-SEXTUPOLE HYSTERESIS HAS AN INTERESTING SHAPE
-THERMAL CYCLE HAS A MINIMAL EFFECT ON HARMONICS