

# Lawrence Berkeley National Laboratory

## Recent Work

### Title

MEASUREMENTS OF SMC<sub>05</sub> BLOCKS - 1ST SHIPMENT

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## ENGINEERING NOTE

SLO601

M 5938

1 OF 5

AUTHOR

J. CHIN / E. HOWER

DEPARTMENT

LOCATION

DATE

6/23/82

PROGRAM - PROJECT - JOB

SLF - WIGGLER / BEAM LINE II

WIGGLER - SM<sub>CO5</sub> BLOCKS

TITLE

MEASUREMENTS OF SM<sub>CO5</sub> BLOCKS - 1<sup>ST</sup> SHIPMENT

## MAGNETIC MOMENT READINGS:

MAGNETIC MOMENT		READINGS:					
MV READING	QUANTITY	MV READING	QUANTITY	MV READING	QUANTITY		
946	1	969	7	992	0		
947	0	970	13	993	2		
948	0	971	5				
949	0	972	10	Σ	134		
950	0	973	3				
951	0	974	2				
952	0	975	3				
953	0	976	5				
954	0	977	7				
955	1	978	8				
956	0	979	9				
957	1	980	9	Σ =	134	(6/23/82)	(J. CHIN)
958	2	981	1	$\bar{x}$ =	971.86		
959	1	982	2	$s$ =	8.17		
960	4	983	0	MV TOTAL =	130229		
961	6	984	0				
962	4	985	0				
963	3	986	2				
964	3	987	0				
965	2	<del>988</del>	1				
966	7	989	1				
967	2	990	1				
968	5	991	1				

J. CHIN.

SL 0601

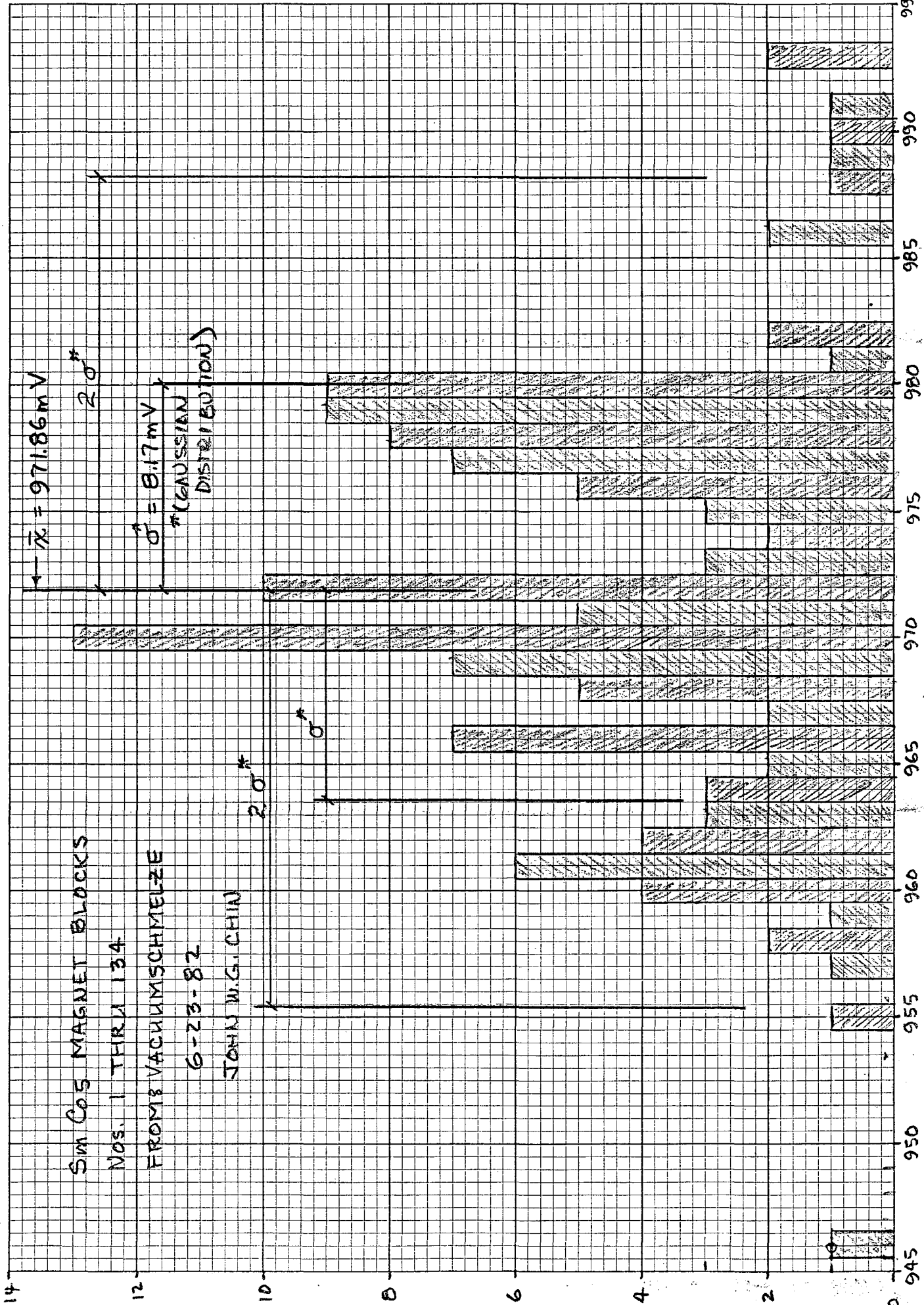
M 5938

6/23/82 405 995

SQUARE 10 X 10 TO THE INCH AS-0806-GT

GRAPHIC PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York

Printed in U.S.A.



SIM COS MAGNET BLOCKS

Nos. 1 THRU 134

FROM: VACUUMSCHMELZE

6-23-82

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AUTHOR

J. CHIN / E. HOYER

DEPARTMENT

LOCATION

DATE

6/23/82

MAGNETIC MOMENT VARIATION:ALLOWABLE: ( $\pm 2.50\%$ )

$$(971.86)(0.975) = \underline{947.6}$$

$$(971.86)(1.025) = \underline{996.1}$$

ACTUAL VARIATION:

$$946 - 993 \quad (1 \text{ JUST OUT OF TOLERANCE})$$

MAGNETIC MOMENT:

FOR HALBACH

$$M_1 = B_1 - H_1$$

$$M_1 = \frac{V_{\text{OUT}} (\text{VOLTS})}{\sqrt{\text{cm}^3}} \frac{\tau (\text{SEC})}{N (\text{TURNS})} \text{RM} \left( 1 + \left( \frac{1}{2} \right)^2 \right)^{\frac{3}{2}}$$

FOR:

$$V = 0.10023 \text{ mV}$$

$$N = 49$$

$$\tau = 10.0929 \times 10^{-3} \text{ sec}$$

$$V = (1.1176 \text{ cm}) (5.080 \text{ cm}) (5.334 \text{ cm}) = 30.283 \text{ cm}^3$$

( $\pm 1.67\%$ )

$$M_1 = 0.9528 \text{ V}_{\text{OUT}} (\text{VOLTS}) \quad (\text{TESLAS}) \quad (\pm 1.67\%)$$

NOMINAL VALUE FOR BLOCKS:

$$M_1 = (0.9528)(0.97186) = \underline{0.926 \text{ TESLAS}} \quad (\pm 1.67\%)$$

PERMEABILITY :

FROM NUOVO'S DATA: (SEE PAGE 5)

$$\mu = \frac{(9.6 \text{ TES})}{7.35 \frac{\text{KA}}{\text{cm}}} \left( \frac{2.023 \text{K}}{e^{-14}} \right) \left( \frac{10^4}{\text{TES}} \right) \left( \frac{\text{KA}}{10\%} \right) \left( \frac{1\text{H}}{2.54 \text{cm}} \right)$$

$$= \underline{1.039}$$

COEXISTIVE FORCES & REMNANT FIELD

PER HALBACH :

$$B = B_r + \mu H \quad ; \quad H_c = -B_r / \mu$$

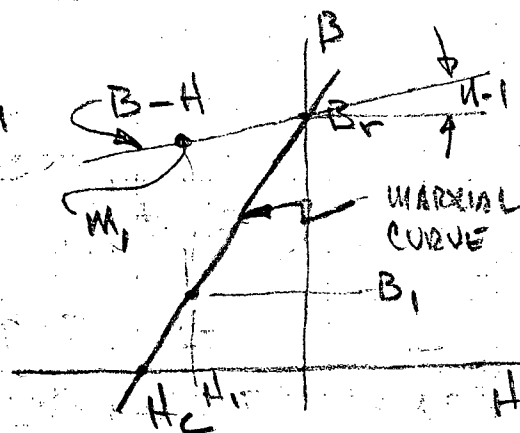
$$M_1 = B_1 - H_1$$

$$= B_1 - \left( \frac{B_1 - B_r}{\mu} \right)$$

$$M_1 = \frac{B_r}{\mu} + B_1 \left( 1 - \frac{1}{\mu} \right)$$

$$B_r = M_1 \mu - B_1 \left( 1 - \frac{1}{\mu} \right)$$

$$H_c = -\frac{B_r}{\mu} = - \left( M_1 - B_1 \left( 1 - \frac{1}{\mu} \right) \right)$$

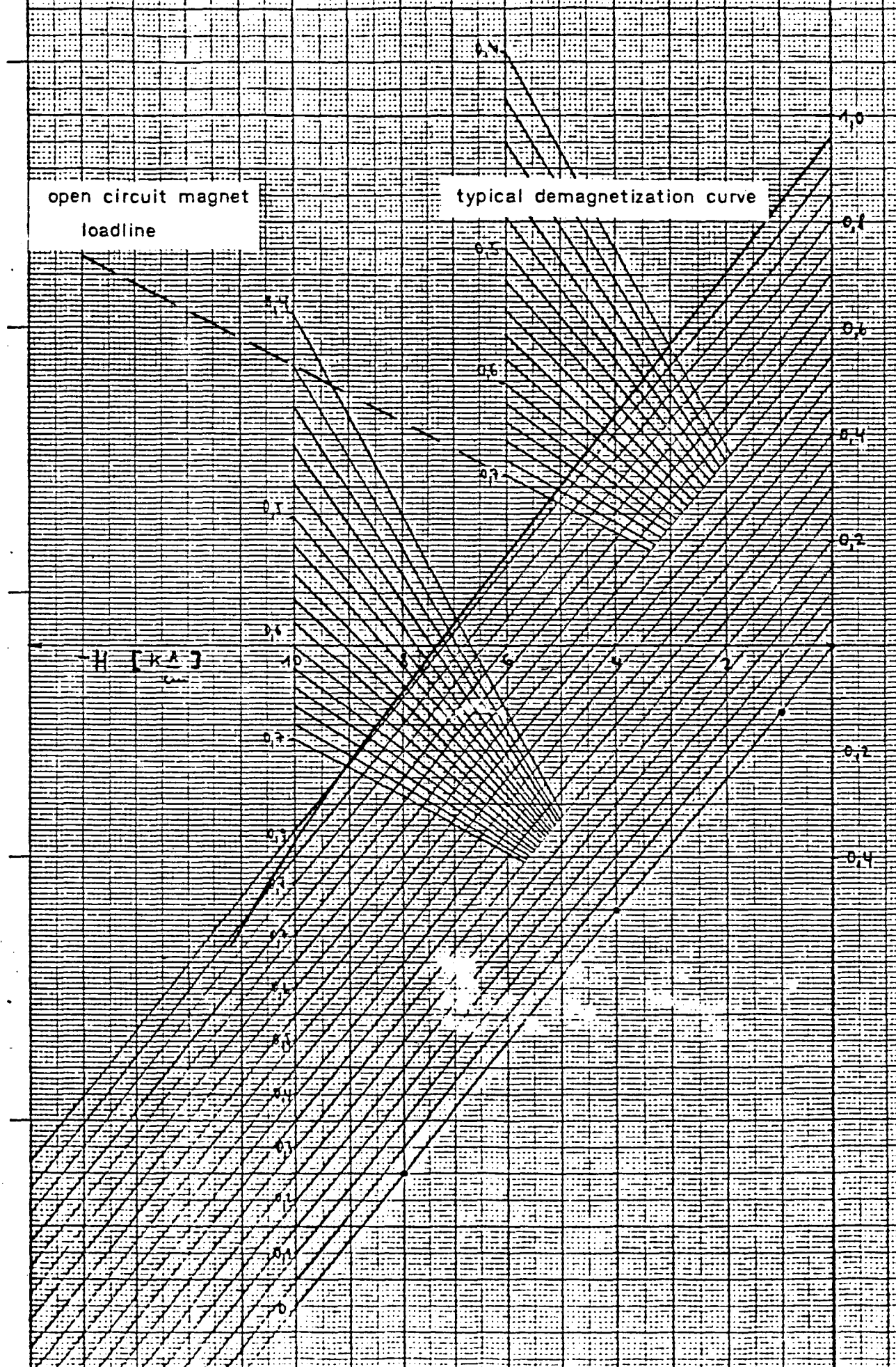
THE AVERAGE SURFACE FIELD ( $B_1$ ) IS  $\sim .2$  TES

$$B_r = (.926 \text{ TES}) (1.039) - .2 \text{ TES} \left( 1 - \frac{1}{1.039} \right)$$

$$= \underline{0.956 \text{ TES}} \quad (\pm 1.67\%)$$

$$H_c = - \left( .926 - (.2) \left( 1 - \frac{1}{1.039} \right) \right)$$

$$= \underline{-0.919 \text{ TES}} \rightarrow \underline{9190 \text{ OERSTEDS}} \quad (\text{LOOKS GOOD})$$





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