



Lawrence Berkeley Laboratory

UNIVERSITY OF CALIFORNIA

Engineering & Technical
Services Division

For Reference

Not to be taken from this room



LBID-490
c.1

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor the Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or the Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or the Regents of the University of California.

ENGINEERING NOTEMME BOOK
NO. 591

FILE NO.

MT 310

PAGE

1 of 5

SUBJECT

1978 Measurements of PEP Dipole Magnets (Steering)
34B500 and 58B500

NAME

D.H. Nelson

DATE

February 10, 1982

INTRODUCTION

The purpose of this report is to document measurements made of 18 PEP injection line steering magnets in October, 1978.

TEST PLAN

According to Magnetic Measurements Engineering (MME) Job Sheet 7809, MME agreed to make the following measurements:

Measure $\int B dl$ vs I one of each type, i.e., 34B500 and 58B500.

Measure $\int B dl$ @ I (15 GeV) each magnet.

Accuracy required: $\pm 0.5\%$ (15 GeV quantities)

TEST EQUIPMENT

Table I lists the equipment used for these tests.

<u>Device</u>	<u>Identification</u>	<u>Notes</u>
Coil	L-36	nw = 7.69 (turn cm)
Flux Standard	SLFS 41	$\phi = 0.02149$ (Wb)
Integrator	Mod '71 S/N 3	R = 42.2 k Ω , C = 0.1 μ F
Voltmeter	Keithley Model 177	S/N 10444
Power Supply	Harrison	AEC No. 127629
Shunt	L & N	S/N 792989
Voltmeter	Keithley Model 177	S/N 10450

TABLE I Test Equipment

ENGINEERING NOTE

SUBJECT

1978 Measurements of PEP Dipole Magnets (Steering)
34B500 and 58B500

NAME

D.H. Nelson

DATE

February 10, 1982

PROCEDURE

According to sketchy notes in the data book (MME Data Book No. 591), Ed Cyr and Don Nelson did the following:

1. established magnet history by cycling magnet current: 0A, 26A, 0A.
2. set magnet current and recorded shunt potential
3. flipped integral coil on magnet center line and recorded changes in integrator output potential
4. measured and recorded changes in integrator output potential due to pulsing the flux standard
5. computed integral of magnetic induction ($\int B dx$), magnetic current (I) and normalized induction integral ($\int B dx / I$) for each set of measurements
6. plotted results

RESULTS

Figures 1 and 2 summarize the test results. Both figures show $\int B dx$ and $\int B dx / I$ for selected values of magnet current up to $I = 26$ Amperes. Measurements were made after establishing history. The solid curves correspond to data recorded when the magnet current is increased from 0A. The dashed curves correspond to data recorded when magnet current was decreased from 26 A.

Figure 1 represents the twelve magnets with 34 mm gaps, i.e., 34B500 - BV2, BV3, BV6, BV7, BH1 and BH2.

Figure 2 represents the six magnets with 58 mm gaps, i.e., 58B500 - BV1, BV4 and BV5.

This work was supported by the U. S. Dept. of Energy under Contract
DE-AC03-76SF00098.

PEP INJECTION-LINE STEERING MAGNETS, 34B-500 INTEGRAL MAGNETIZATION ON APERTURE \mathcal{C}

DATA: '78 OCT. 10-12 DHN, EAC
DRAWN: '78 OCT. 13 DHN
ASSY DRWG.: SA-204-230-07
ENG NOTE: M 5096

0.08

FIGURE 1

0.06

MAGNETIC
INDUCTION
INTEGRAL,
 $\int B_z dl$

NORMALIZED
INTEGRAL,
 $\int B_z dl / I$

0.04 (Tesla-meters)

$(10^{-3}$ Tesla-meters)
Ampere

0.02

LEGEND

CURRENT SET FROM	MAGNET S/N 1-2	AVERAGE S/N 1-12
26A	○	△
0A	x	▽

MAGNET CURRENT (Amperes)

0 0.00

10

20

26

3.50

3.25

3.00

12 X 10 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

PEP INJECTION-LINE STEERING MAGNETS, 58 B-500

INTEGRAL MAGNETIZATION ON APERTURE C

DATA: '78 OCT. 10-12 DHN, EAC

DRAWN: '78 OCT. 13 DHN

ASSY. DRWG.: SA-209-232-06

0.08

MAGNETIC
INDUCTION
INTEGRAL,

$$\int B_z dl$$

(Tesla-meters)

FIGURE 2

0.05

0.04

0.02

3.40

3.20

3.00

NORMALIZED

INTEGRAL,

$$\int B_z dl / I$$

(10^{-3} Tesla-meter
Ampere)

LEGEND

CURRENT SET FROM	MAGNET S/N 14	MAGNET S/N 18	AVERAGE S/N 13-18
26A	○	□	△
0A	x	+	▽

MAGNET CURRENT, I (Amperes)

0 0.00

10

20

26

ENGINEERING NOTEMME BOOK
NO. 591FILE NO.
MT 310PAGE
5 of 5

SUBJECT

1978 Measurements of PEP Dipole Magnets (Steering)
34B500 and 58B500NAME
D.H. NelsonDATE
February 10, 1982Distribution

R.T. Avery
R. Bell (SLAC)
K. Brown (SLAC)
J. Cobb (SLAC)
C.G. Dols
J.H. Dorst
T. Elioff
M.I. Green
K. Halbach
E.C. Hartwig/L.J. Wagner/W.H. Deuser
R.M. Main
J.M. Peterson
J. Rees (SLAC)
R.M. Reimers
J. Truher (SLAC)
Electronics Engineering Master File
Magnetic Measurements Engineering (4)
T. Martin (SLAC)

This report was done with support from the Department of Energy. Any conclusions or opinions expressed in this report represent solely those of the author(s) and not necessarily those of The Regents of the University of California, the Lawrence Berkeley Laboratory or the Department of Energy.

Reference to a company or product name does not imply approval or recommendation of the product by the University of California or the U.S. Department of Energy to the exclusion of others that may be suitable.

TECHNICAL INFORMATION DEPARTMENT
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA 94720