UCRL 8161

UNIVERSITY OF CALIFORNIA

Radiation Laboratory

BERKELEY, CALIFORNIA

DISCLAIMER

UCRL-8161

RADIATION LABORATORY - UNIVERSITY OF CALIFORNIA - BERKELEY

ENGINEERING NOTE

JOB NUMBER 4310-11 | FILE NO MT-68 | PAGE 1/7

SUBJECT: BEVATRON H MAGNET
18 x 36 8" Gap

NAME: L. G. Ratner

DATE: November 11, 1957

Magnetic measurements were made on this magnet (Assembly Drawing UCRL 9A1103) on October 31 and November 1. Flux density at the center, median plane was measured with a nuclear fluxmeter whose accuracy is of the order of ± 0.02%. Longitudinal and transverse profiles were measured with a Rawson-Lush rotating coil gaussmeter (rated accuracy ± 1.0% of full scale). The results of the longitudinal and transverse runs were plotted as a percent of central field versus position (pages 6, 7). High field runs were plotted as flux density versus position (pages 4, 5). Flux density versus magnet current is plotted on page two. The high field magnetization was plotted separately, page 3, in order to show magnet efficiency in this region.

Current and voltages were also measured and are shown in the following table.

P_{in} (PSI)	P_{out} (PSI)	ΔP	
81	32	49	at flow board
74	55	19	at magnet

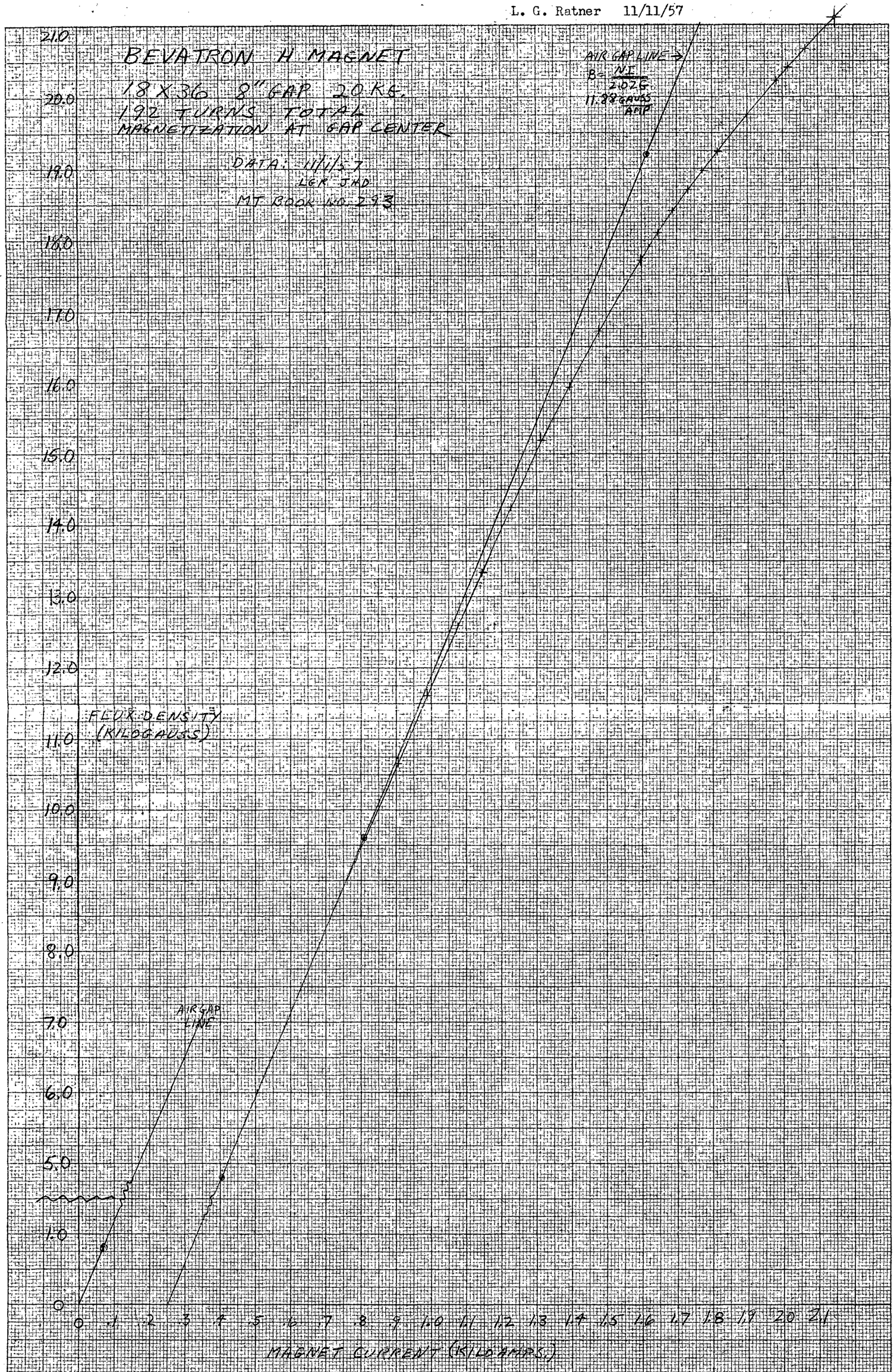
E (volts)	I (amps)	Power (KW)
24.4	328.6	8.0
69.3	917.6	63.6
82.3	1086.3	89.4
95.4	1252.2	119.5
109.1	1420.9	155.0
123.0	1588.8	195.4
137.8	1756.3	242.0
158	1997.2	315.6

water temperature outlet 38-1/2° C

Initial Distribution:

Magnet Test Group (3)
E. Lofgren (3)
K. Lou (1)
G. Lambertson (1)
H. Heckman (1)
W. Dudziak (1)
L. Agnew (1)

RL-398.



1700 1800 1900 2000 2100

MAGNET CURRENT (AMPS)

BEVATRON H MAGNET
18 X 36 8" GAP 20KG
192 TURNS TOTAL
DATE: 1/11/57
MT BOOK NO. 293

← AIR GAP LINE
$B = \frac{NI}{2.02G}$

	AIR GAP	TOTAL	PER CENT EFFICIENCY
	1767.7	2140	83.0
	1725.6	2032	84.9%
	1685.5	1941	86.7 %
	1641.4	1856	88.4 %
	1599.3	1774.5	90.0 %
	1557.2	1702	91.5 %

21
20.5
20
19.5
19
18.5
18

B_o

FLUX DENSITY (KILOGAUSS)

I

INCHES FROM TIP EDGE ALONG LONG AXIS

BEVATRON H MAGNET
18 × 36 8" GAP 20 KG
DWG NO. LO40323A, 9A1103, 9A1123
192 TURNS TOTAL
1999 AMPS 158 VOLTS
B_0 WITH NMR

B IN FRINGING FIELD
WITH RAWSON GAUSSMETER

DATA 10/31/57
BY LGR & JHD

MID PLANE FLUX DENSITY (KILOGAUSS)

× 10

BEYOND $X' = 15$ INCHES FROM MAGNET CENTER
($X = 23$ INCHES FROM BEAM ORBIT)

$$B = \frac{1.056 \times 10^{13}}{(X')^{6.5}}$$

B GAUSS
X' INCHES FROM CENTER

CALCULATED VALUES EQUAL MEASURED VALUES WITHIN ONE GAUSS
FIELD DROPS TO 10 GAUSS AT 72" FROM MAGNET CENTER

BEVATRON H MAGNET

MID PLANE FLUX DENSITY VS POSITION

LO 40323 A
9A 1103
9A 1123

B_o = 20.32 KILO GAUSS
I = 1999 AMPS

CENTRAL FIELD & TO 6 INCHES FROM EDGE WITH NMR.
FRINGING FIELD WITH RAWSON ROTATING COIL GAUSSMETER
DATA 11/1/57
BY LGR & JHD.

HALF SCALE

Y INCHES FROM TIP EDGE

X INCHES FROM CENTER LINE

APPROX COIL LOCATION

COIL CONDUCTORS MAKE TWO BENDS IN THIS REGION

COIL IS ABOVE & BELOW MID PLANE IN THIS REGION

POLE TIP 18 x 36 8 INCH GAP

ENG. NOTE 4310-11 MIT-1 P.6/7
L.G. RATNER 11/11/57

BEVATRON H MAGNET
18X36 8" GAP 20KG
192 TURNS TOTAL

+ B_0 = 20,326 GAUSS 1999.2 AMPS
○ B_0 = 16,993 GAUSS 1509.1 AMPS
Δ B_0 = 12,043 GAUSS 1026.9 AMPS

DATA: 11/6/57 LGR 2ND
HT BOOK NO. 293

Y

INCHES FROM TIP
EDGE ALONG LONG
AXIS

+15
+10
+5
0
-5
-10
-15
-20
-25
-30

0 10 20 30 40 50 60 70 80 90 100

B

MID PLANE FLUX DENSITY
% OF CENTRAL FIELD

℄ RUNS ALONG
LONG AXIS

RUNS ALONG
LONG AXIS
8" FROM ℄

X10 8" FROM ℄
+ ⊕ X10 Δ ℄

BEVATRON H MAGNET
18X36 8" GAP 20 RG
192 TURNS TOTAL

+ B_0 = 20,326 GAUSS 1999.2 AMPS.
⊙ B_0 = 16,993 GAUSS 1509.1 AMPS.
△ B_0 = 12,043 GAUSS 1026.7 AMPS.

DATA: 11/1/57 LGR JHD
MT BOOK NO. 293