



FIELD MEASUREMENTS ON 3-FT B2 REFERENCE MAGNET

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The magnetic field at a point inside the gap of a 3-ft B2 reference magnet has been measured as a function of current. A NMR probe was used to sense the field up to approximately 8.6 kG. In addition, a Hall probe was used to sense the field up to 19.6 kG (the maximum output of the Transrex power supply was reached at this field).

The NMR probe was located at a point near the center of the magnet well inside the gap (14 in. from the lead end of the magnet). The Hall probe was positioned near the NMR probe. Before any measurements were made the magnet (which was powered in series with a 20-ft B2 magnet) was pulsed several times to 6800 A. The data are shown in the table below. A correction has been made to the Hall probe data by taking the difference between the NMR and Hall probe measurements at the 7-kG level.\* Linearity curves for the Hall probe were not available; however, the Hall elements as supplied by the F. W. Bell Company are typically linear to within  $\pm 0.1\%$  over the range 0 to 30 kG. Two separate data sets were taken, labeled below as runs 1 and 2. The accuracy of the field measurements is  $\pm 0.1\%$ . The current is accurate to  $\pm 0.05\%$ .

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\*The per cent difference at this field was 0.44.

Table. Field at a Point Inside 3-Ft B2 Reference Magnet.

| Current<br>(A) | Run | NMR Field<br>(kG) | Hall Field<br>(kG) |
|----------------|-----|-------------------|--------------------|
| 0              |     | --                | 0.010              |
| 101.2          | (2) | --                | 0.402              |
| 499.7          | 1   | 1.961             | --                 |
| 506.5          | 2   | --                | 1.984              |
| 700.5          | 1   | 2.746             | --                 |
| 800.1          | 1   | 3.139             | --                 |
| 900.1          | 1   | 3.530             | --                 |
| 996.2          | 2   | --                | 3.904              |
| 1000.4         | 1   | 3.927             | --                 |
| 1200.6         | 1   | 4.715             | --                 |
| 1502.5         | 2   | --                | 5.897              |
| 1800.3         | 1   | 7.064             | 7.064              |
| 1999.0         | 2   | --                | 7.840              |
| 1999.8         | 2   | 7.8416            | 7.841              |
| 2201.3         | 1   | 8.632             | 8.637              |
| 2201.4         | 2   | 8.634             | 8.635              |
| 2400.0         | 1   | --                | 9.414              |
| 2499.0         | 2   | --                | 9.802              |
| 2500.0         | 1   | --                | 9.805              |
| 2600.3         | 1   | --                | 10.198             |
| 2819.5         | 1   | --                | 11.063             |
| 2996.5         | 1   | --                | 11.748             |
| 3001.0         | 2   | --                | 11.769             |
| 3202.0         | 1   | --                | 12.562             |
| 3507.0         | 1   | --                | 13.731             |
| 3529.2         | 2   | --                | 13.827             |
| 3997.5         | 2   | --                | 15.579             |
| 4000.0         | 1   | --                | 15.595             |
| 4489.2         | 2   | --                | 17.255             |
| 4496.0         | 1   | --                | 17.289             |
| 4995.0         | 1   | --                | 18.769             |
| 4997.7         | 2   | --                | 18.755             |
| 5350.0         | 2   | --                | 19.683             |

Equipment List

Magnet: B2 · 3 · 7, Series Inductance 0.425 mH, Q = 1.370 at 1 kHz;  
ALPHA NMR Gaussmeter Model 3193, NAL #9086; F. W. Bell Gaussmeter  
Model 811AR, NAL #10864; F. W. Bell Hall Probe Model HTL8-0618  
Serial #78772 with extension cable Serial #78772; magnet measurements  
group standard shunt 100 A/mV; DVM (to read shunt) DANA Model 5900,  
NAL #12837.