BNL-104157-2014-TECH

AGS.SN281;BNL-104157-2014-IR

Measurement of C-5 and A-4 Eddy Current Correctors

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April 1993

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USDOE Office of Science (SC)

DISCLAIMER

Date of Report: April 21, 1993 **Number:** 281

AGS STUDIES REPORT

Date(s) of Study: April 8, 1993 **Time(s):** 2:00 a.m. - 5:00 a.m.

Experimenter(s): C. Whalen

Reported By: E. Bleser

Subject: Measurement of C-5 and A-4 Eddy Current Correctors

EXPERIMENT

Orbits of a normal Booster beam were recorded at 31, 48, 75, and 127 milliseconds. The field and B-dot were also recorded at these times. Then a relay was operated to open the eddy current correction coil on magnet A-4 and the orbits were remeasured. Then magnet A-4 was restored, the sextupole correction coil on the C-5 injection magnet was opened, and the orbits were remeasured. All the data was taken at a ramp rate of about 70 Gauss/millisecond.

RESULTS

Figure 1 shows the data for the 31 ms case. The difference orbit does not average to zero, which is somewhat strange. Figure 2 shows the difference orbits for 31, 48, and 75 ms. They have been shifted to an average value of zero and then scaled by the measured field strength. They give good agreement and fairly nice orbits for a tune of about 4.8. The amplitude at 31 ms (2100 Gauss) is about $\pm$ 3 mm.

In Figure 3, we have added to Figure 2 the negative of the difference orbit at 127 ms and scaled it arbitrarily to fit. The magnet is ramping down here so the effect should change sign as it does. The overall agreement is quite satisfying.

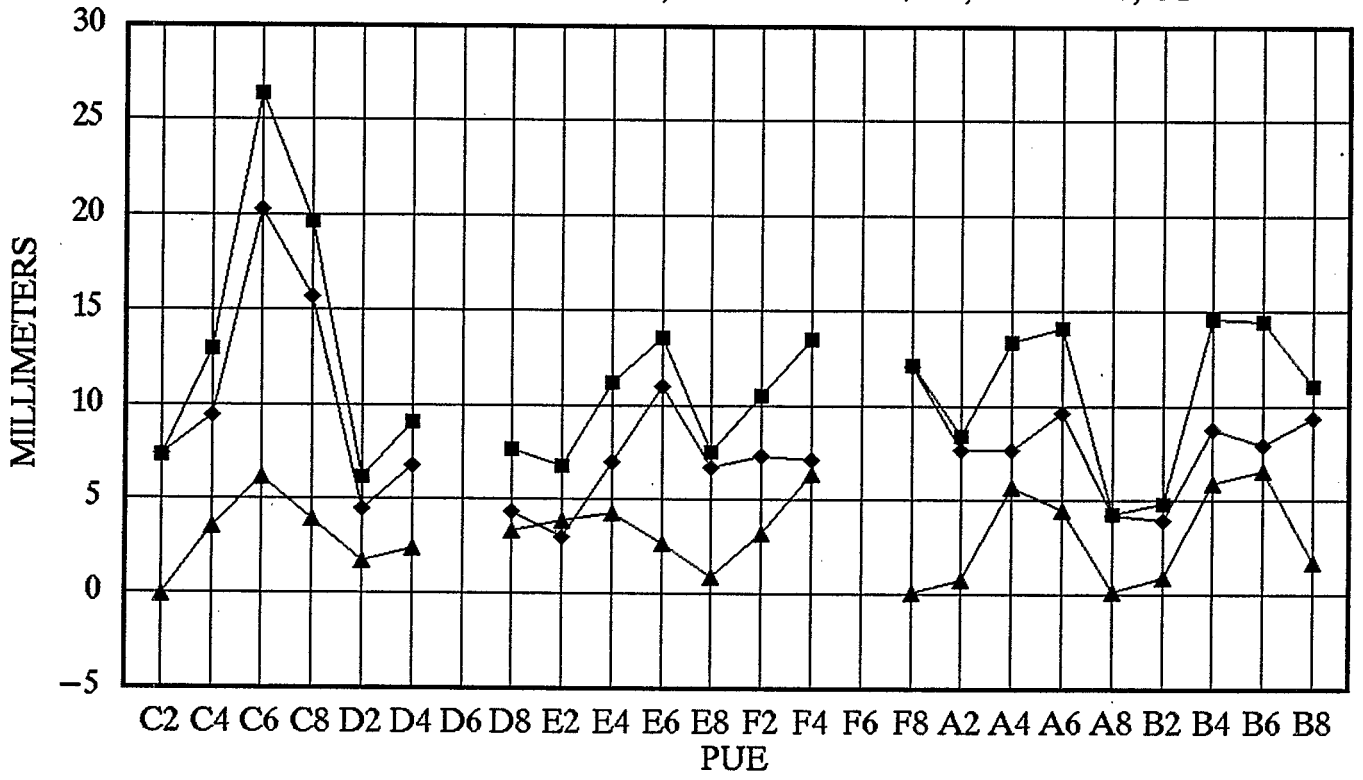
Figure 4 shows the results of opening up the C-5 eddy current correction circuit. Except for some PUEs that were acting up, all the difference orbits fall within a range of $\pm$ a quarter of a millimeter. If no errors were made in the experiment, we can conclude that the dipole component of the C-5 sextupole correction system is very small.

ANALYSES

A 3 mm orbit amplitude at a main field of 2100 Gauss implies the eddy current correction system produces a field of 3 Gauss at 70 G/ms. This number will be compared to the expected value in a future note.

EDDY CURRENT DATA – 4/8/93

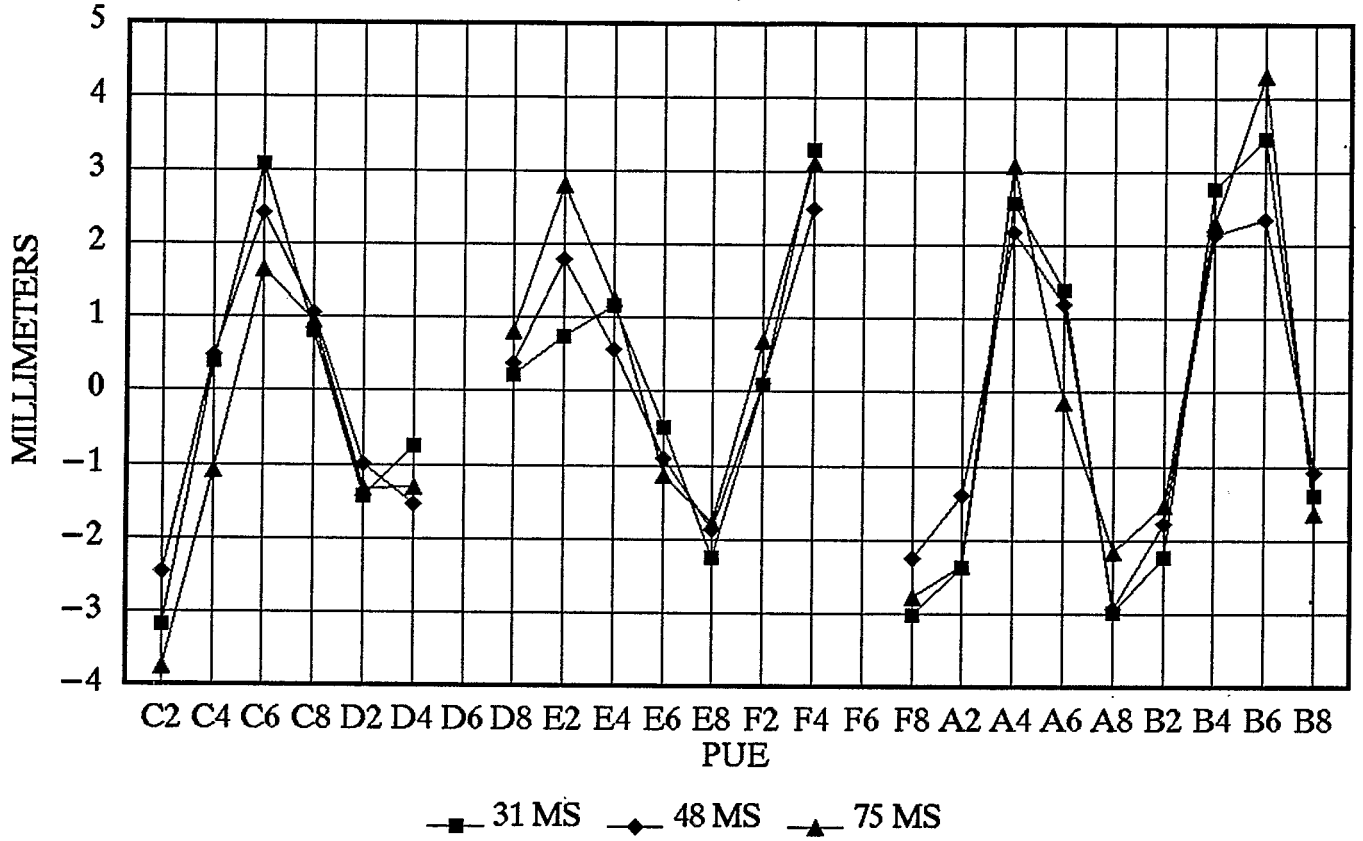
B = 542.5 + CALIBRATE; B–DOT = 70 G/MS; T = 31 MS; U1



C:\ORB\APR8.WK3; P1
4/20/93

A4 EDDY CURRENT CORRECTION – 4/8/93

DIFFERENCE ORBITS, A4 OFF, 48 & 75 MS SCALED BY FIELD



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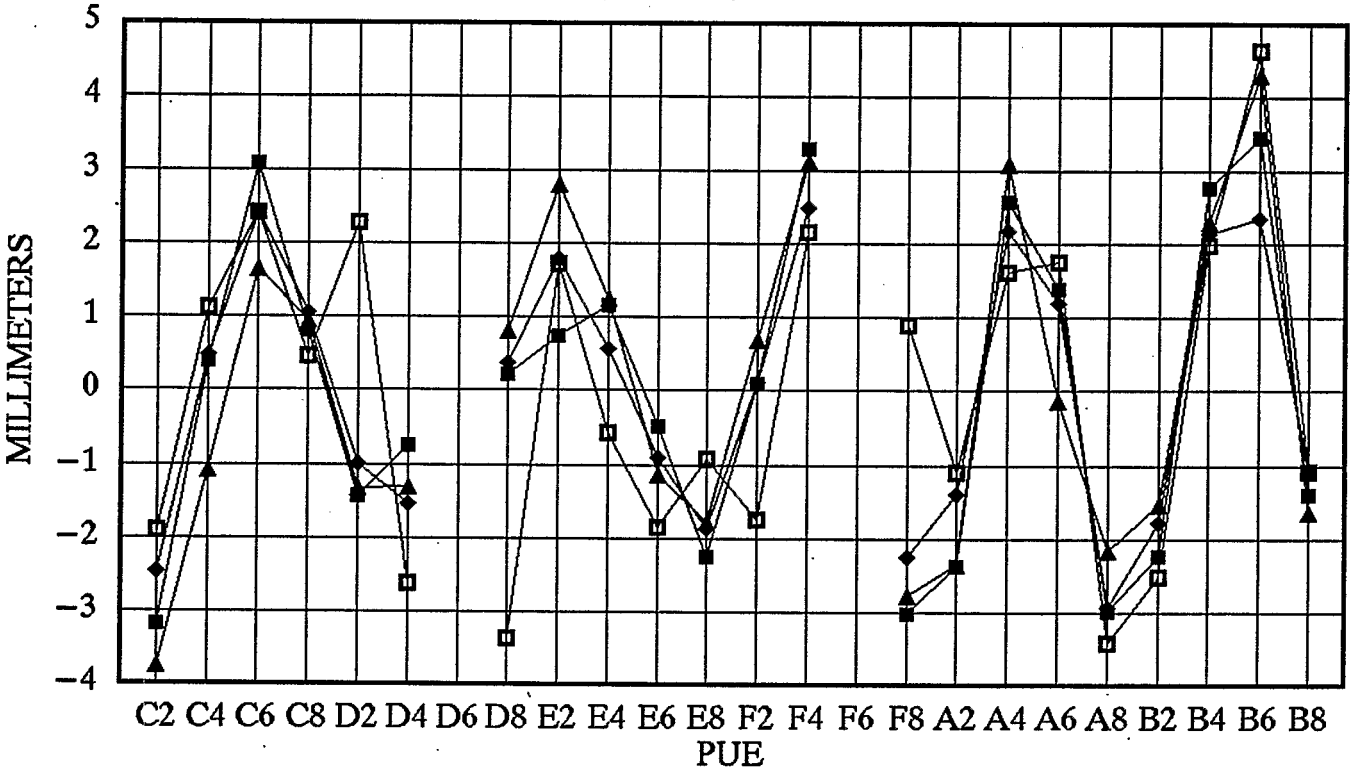
4/20/93

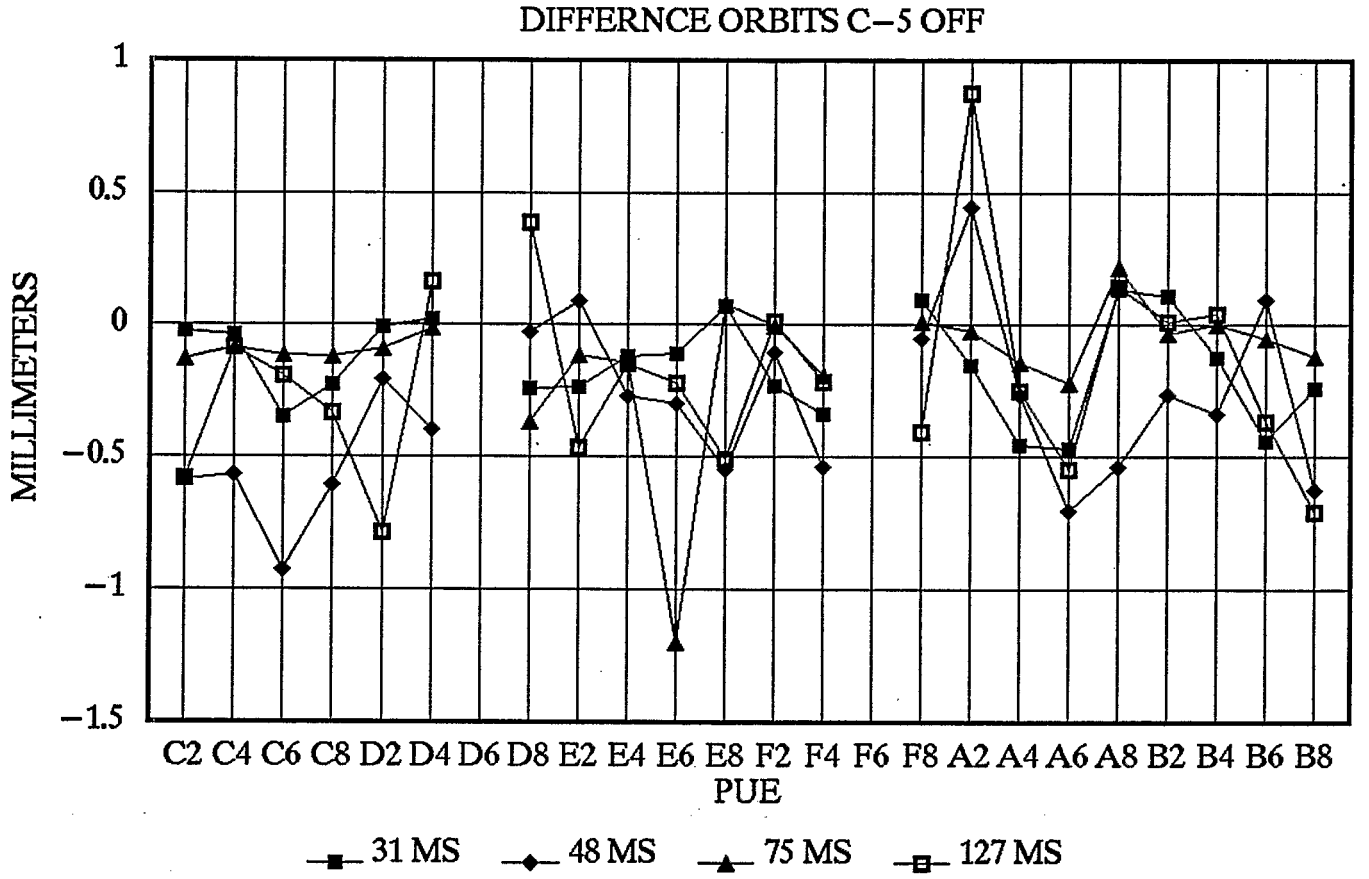
A4 EDDY CURRENT CORRECTION – 4/8/93

DIFFERENCE ORBITS, A4 OFF, 48 & 75 MS SCALED BY FIELD



C:\ORB\APR8.WK3; P3. 127 MS SCALED BY EYEBALL
4/20/93

C5 EDDY CURRENT CORRECTION – 4/8/93



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4/20/93