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E-20 Beam Catcher Position and Skew

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Subject E-20 Beam Catcher Position and Skew

Observations and Conclusion

The study aimed at finding the optimum radial position of the beam catcher/dump and the effect of skew on the radiation levels in the F superperiod.

The machine was set up in the following configuration:

1. A beam transition blow up was induced and the beam lost ΔCBM was measured as the difference between CBM at 200 msec and CBM at 240 msec.

2. The beam was dumped in the machine at 300 msec by turning the rf off.

3. The Ring Loss Radiation Monitors RLRM were used to measure the amount of radiation around the machine.

4. The RLRM signals were bracketed by two windows; one around transition 200-240 msec and the other being the total cycle from 40 msec to 10 msec before T_0 of the next cycle.

5. Data were collected vs. beam catcher position and skew.

Observations:

1. The 5%. loss around transition measured in (1) above by ΔCBM, proved quite unreliable that it rendered that portion of the data useless.

2. Figure 1 shows the total RLRM plotted against the radial catcher position. Two graphs are shown: the dotted data is the ΣRLRM-BKGround normalized to the circulating beam at 200 msec and,the continuous represents the same total subtracting the E-20 and F2 which bracket the catcher area and receive the backward and forward scattering respectively. Based on this, it appears that the catcher at 900 mils reduced the radiation load around the machine by a factor of two.

3. Similar plots are done for each superperiod A through L. It appears that most restricting apertures in the machine are shadowed by the catcher at 600-700 mils. Two bumps appear in L and A unexpectedly. These will have to wait further studies to unravel their origin.

4. Skew studies were carried out using 4 short radiation monitors that were placed downstream of F1, F2, F4, and F6 respectively. The catcher ends were skewed around the 900 mils position. A positive skew implies a stationary upstream at 900 mils and the downstream moved further outwards. The reverse constitutes the downstream held fixed and upstream moved radially outwards.

The data for negative skew was not useful, the positive skew was plotted (Figure 3), normalized to a beam intensity of 3×10^{12}. Some minima appear in F1, 2, and 6 but the effects are not pronounced. Further studies are needed.

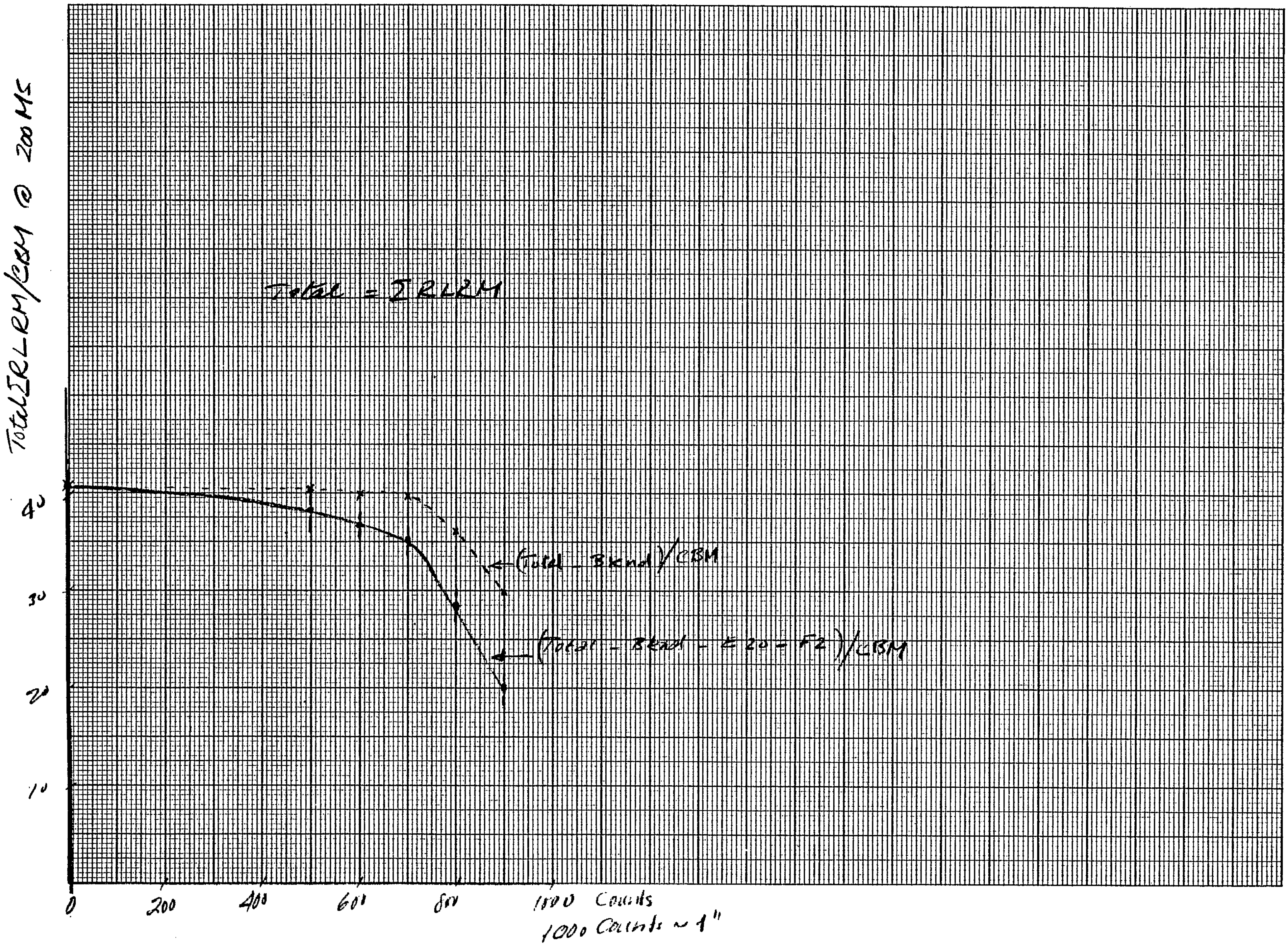
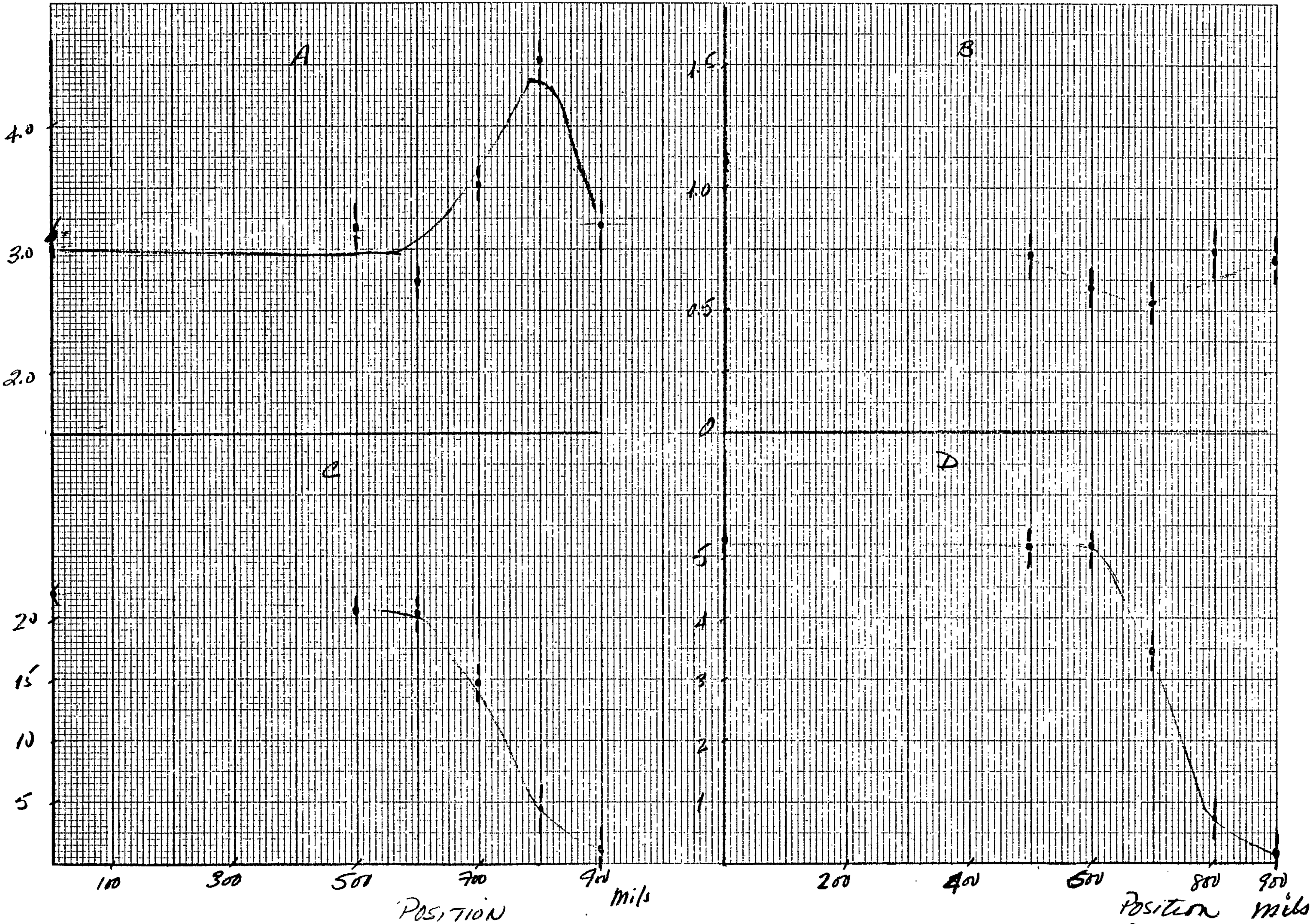
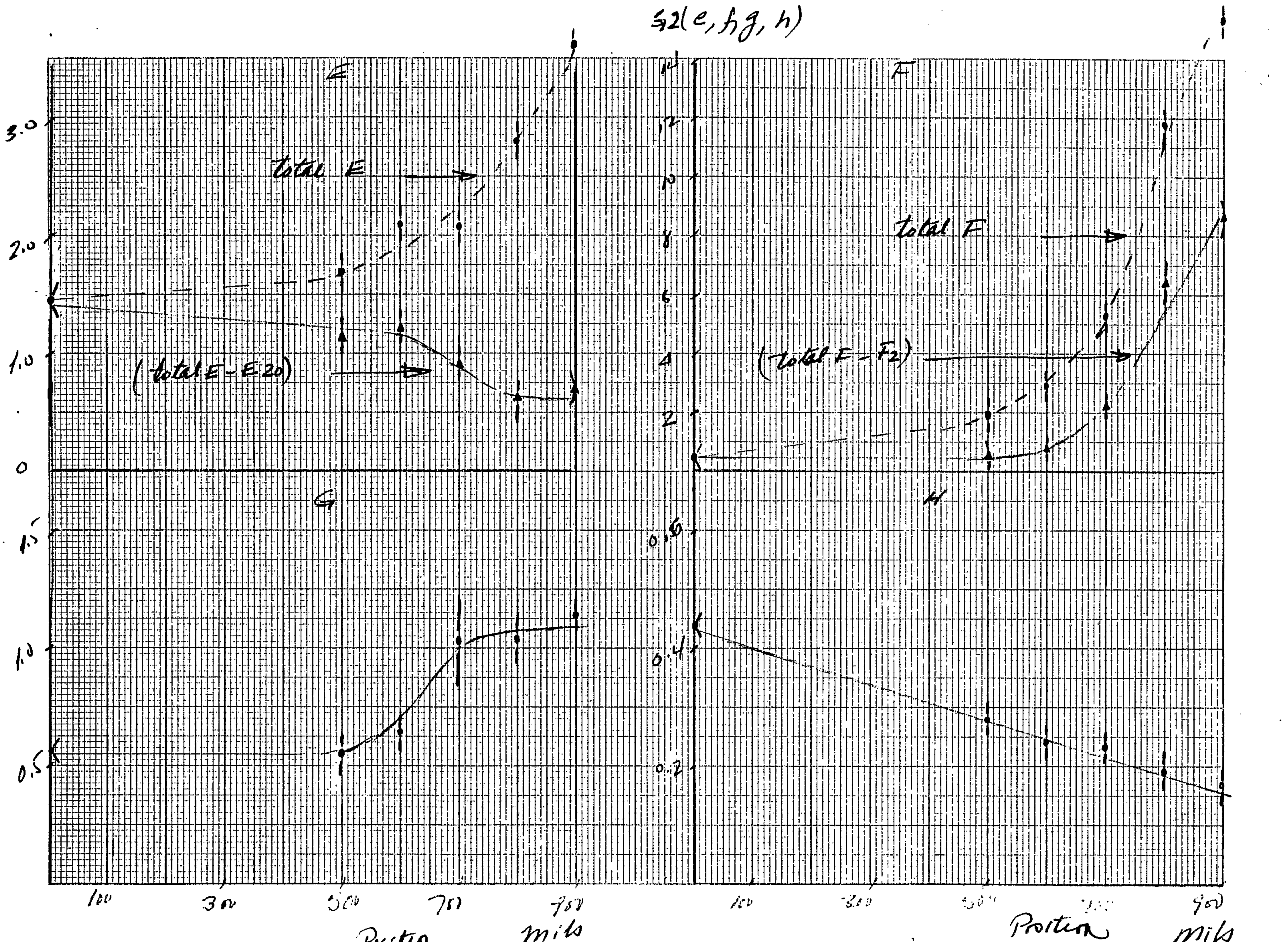

Total ΣRLRM/CBM @ 200 Ms
Total = ΣRLRM
(Total - Bknd)/CBM
(Total - Bknd - E20 - F2)/CBM
40
30
20
10
0
200
400
600
800
1000 Counts
1000 Counts ~ 1"

FIG 2 (a, b, c, d)


A
B
C
D
4.0
3.0
2.0
1.5
1.0
0.5
0
20
15
10
5
4
3
2
1
100
300
500
700
900
mils
POSITION
200
400
600
800
900
Position mils



S2(e, f, g, h)
E
F
G
H
total E
(total E - E20)
total F
(total F - F2)
3.0
2.0
1.0
0
1.5
1.0
0.5
12
10
8
6
4
2
0.6
0.4
0.2
100
300
500
700
900
Position
mils

figure 7(i, j, k, l)

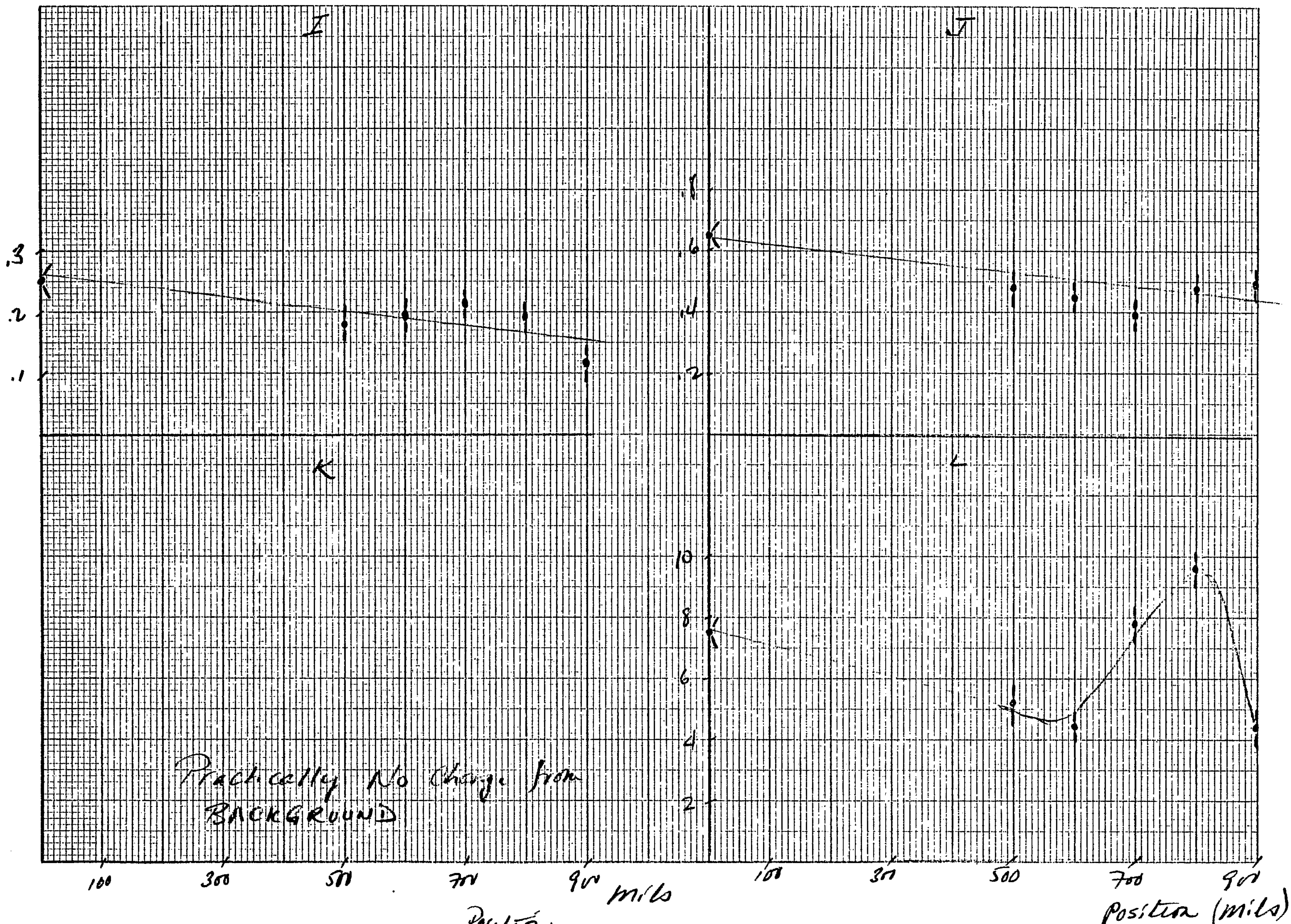


Figure 3(a, b, c, d)