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Per H.F. Carroll, Chief, Special Br. NR 3-4-66

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GMS

LA - 304-A

April 25, 1946

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BeO TAMPER REFLECTIONS AND DISTRIBUTIONS

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Tamper reflection and distribution measurements of the type described in LA 304 have been made for a BeO tamper surrounding the d-d source as described in that report.

The BeO tamper was assembled from pressed BeO blocks ranging in density from about 2.05 to 2.15 grams/cc. Fig. 1 shows the assembly of the tamper to approximate a hollow sphere of outer diameter 18" or 19". The inner surface was a sphere of diameter 7-1/16". Appropriate holes passed through the tamper to accommodate the beam tube, cooling tube, and monitor tube (see LA 304). Measurements were made with 25, 28 and 37 detectors in the square radial holes indicated in Fig. 1. The 25 and 28 detectors were spiral chambers (LA 420, W. C. Bright) of approximately 1" diameter, and of 1" length. The 25 was Cd covered. The 37 chamber was the smaller type, 3/8" OD and 19/64" in length. The one-inch-square hole in which measurements were made was filled in around the small chamber with BeO plugs.

The multiplication, M , has been defined as the counting rate at a given distance from the source in the tamper divided by the counting rate at the same location with the bare source. The quantity M is plotted against distance between source and center of detector for the three detectors in Fig. 2 and 3. The vertical line at 9 cm indicates the inner surface of the tamper.

Comparison of BeO with U (LA 304) shows that the two tampers produce about the same multiplication, M , as measured by a 28 detector at the inner surface of the tampers. The more rapid decrease of intensity with increasing radius in the case of U indicates larger effective capture (inelastic scattering) for these neutrons than exists in the BeO. It is interesting

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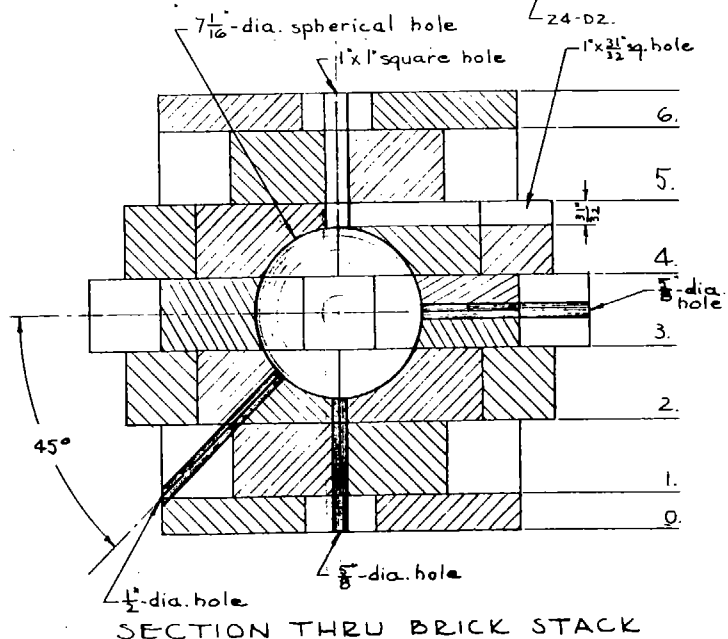
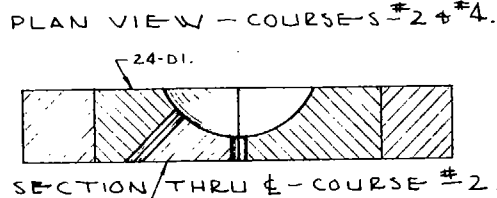
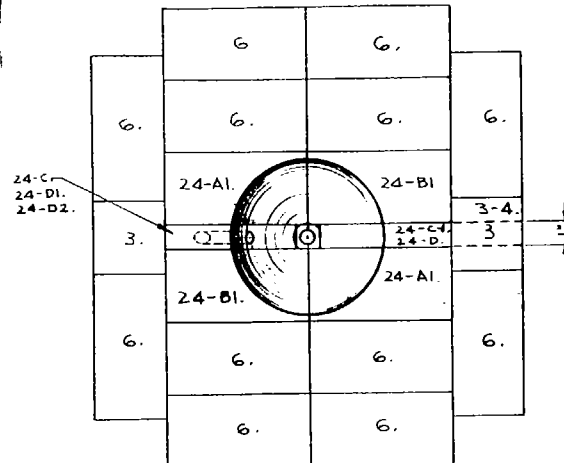
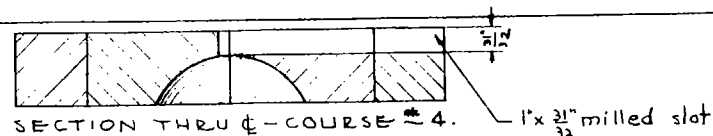
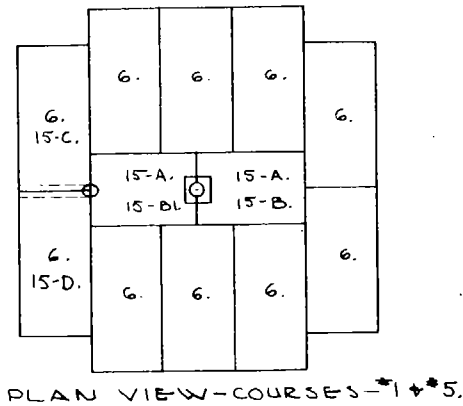
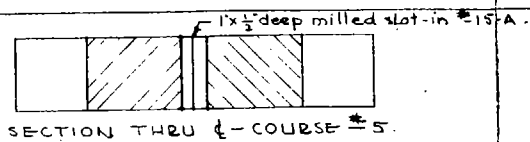
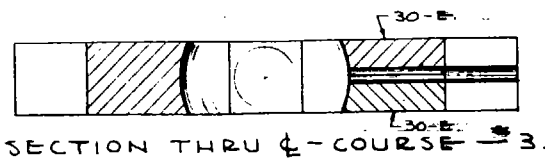
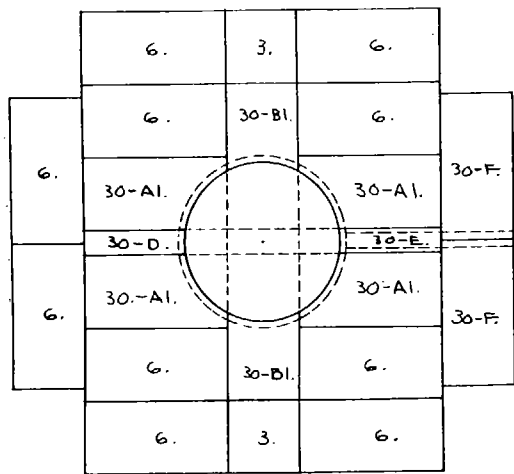
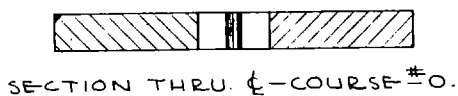
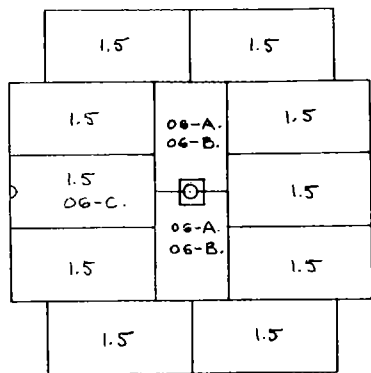
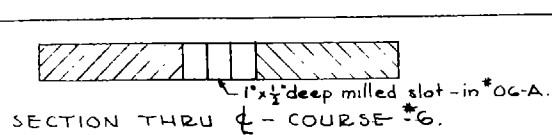
to notice the similarity between BeO and C for a 28 detector both with regard to the shape of the distribution in the tamper and the absolute values of M. However, the comparisons with a 25 detector look very different. Carbon reached a maximum value for M of about 7 and U of 6.75. The 25 M values were no higher than this for any of the other tampers measured for d-d neutrons. With the exception of carbon, where M rose to a value of 9 for the RaB source, the values were no higher for the RaBe and RaB sources. The BeO maximum of 29 is outstanding, to say the least. The M for a 37 detector (threshold ≈ 400 Kv) is not different from that for a 28 detector. This indicates a high density of neutrons of energy lower than 400 Kev. Further investigation of this problem has been made using the modulation method to measure the mean life of the neutrons in the tamper and is reported by K. Kupferberg in LA 530.

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BRICK SIZES			
SYMBOL	COURSE NO.	DESCRIPTION	NO. U.S.A.
G.	1,3,4,5	3" x 3" x 6"	52
3.	2,3,4	3" x 3" x 3"	5
1.5	0,6	1 1/2" x 3" x 6"	19
06-A	6	1 1/2" x 3" x 4 1/2" - 1/2" deep milled slot	2
06-B	0	1 1/2" x 3" x 4 1/2" - 3/8" dia. half-hole	2
06-C	0	1 1/2" x 3" x 6" - 45° 1/2" dia.	1
15-A	5	3" x 3" x 4 1/2" - 1/2" deep milled slot	2
15-B	1	3" x 3" x 4 1/2" - 3/8" dia. half-hole	1
15-B1	1	3" x 3" x 4 1/2" - 45° 1/2" dia.	1
15-C	1	3" x 3" x 6" - 45° 1/2" dia. half-hole	1
15-D	1	Same as 15-C except opposite-hand	1
#24-A1	2,4	3" x 3" x 6" - spherical surface	4
#24-B1	2,4	3" x 3" x 6"	4
24-C	4	1" x 3" x 3/2" - spher. surface	1
24-D	2	1" x 3" x 6"	1
24-D1	2	1" thick - odd shape - 1/2" dia.	1
24-D2	2	1" dia. half-holes - 1/2" dia. and 3/8" dia. half-holes	1
#30-A1	3	3" x 3" x 6" - spherical surface	4
#30-B1	3	3" x 3" x 6"	2
30-D	3	1" x 3" x 6"	1
30-E	3	1" x 1 1/2" x 6" - 3/8" dia. half-hole - spher.	2
30-F	3	3" x 3" x 6" - 5" dia. half-hole	2
24-C1	4	1" x 3/2" x 3/2" - spher. surface	1
3-4	4	3" x 3" x 3" - 1" x 1/2" deep milled slot	1
TOTAL			118

*-These bricks to be reworked from similar units used with ϕ sphere - includes only 2 of #30-A1.

SCALE - ONE-QUARTER FULL SIZE

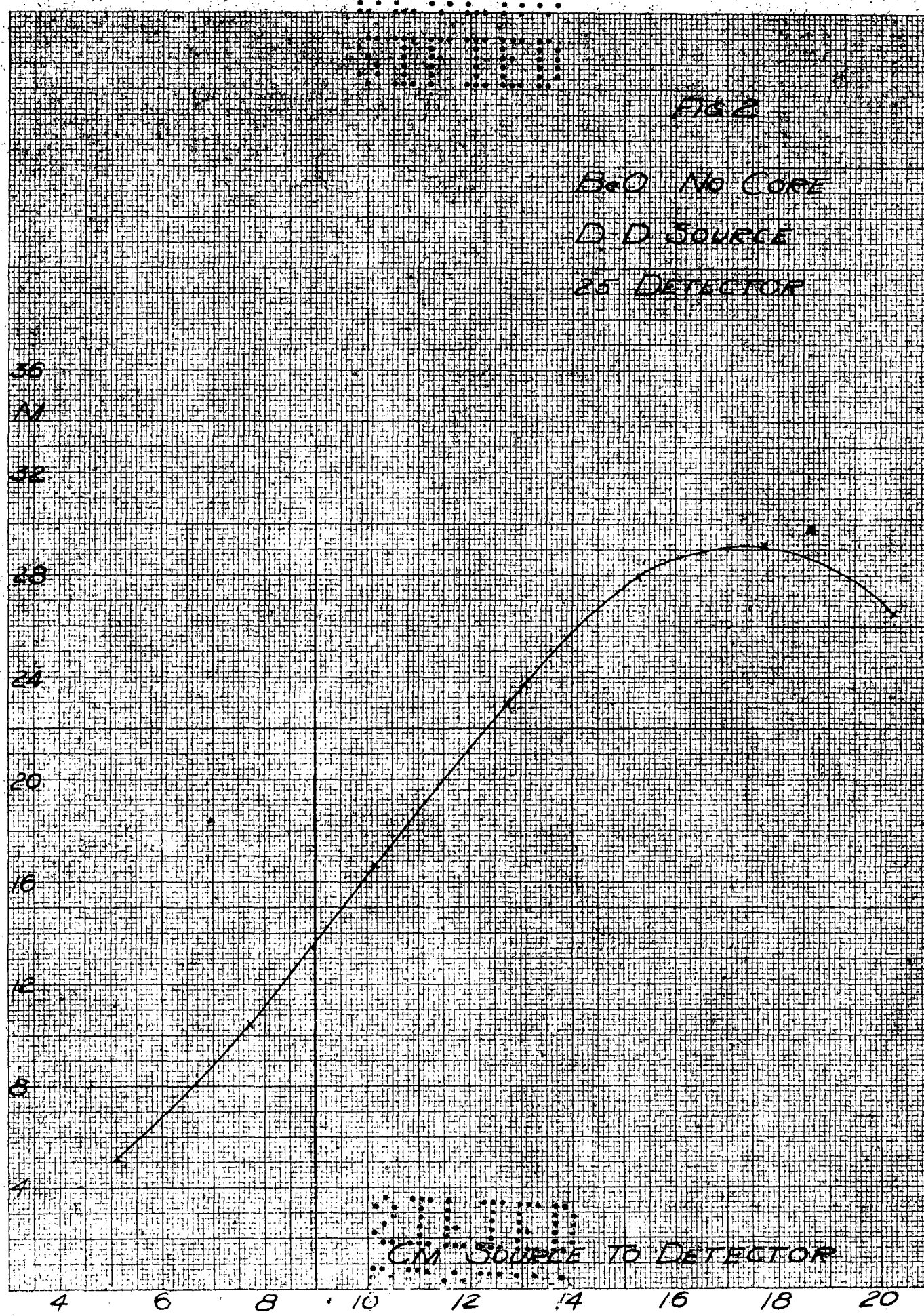
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SPACE 132-3-371-100-215 D.O.M.

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FIG 2

BaO No CORE
D-D SOURCE
25 DETECTOR



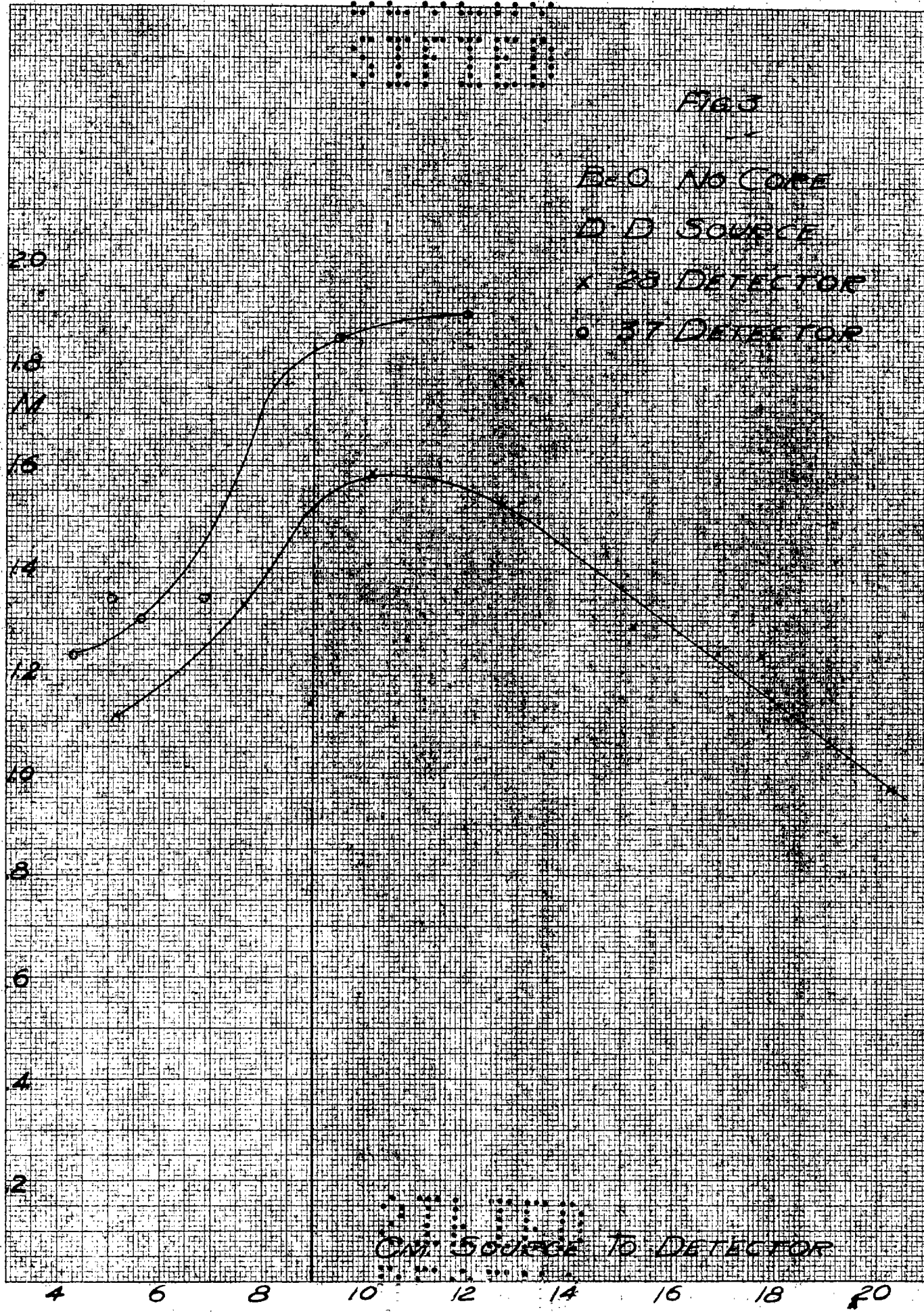
SECRET
CM SOURCE TO DETECTOR

KEUFFEL & ESSER CO., N. Y. NO. 359-14
Millimeters, 5 mm. lines centered, cm. line heavy.
MADE IN U.S.A.

SECRET

FIG 3

B=0 NO CORE
D-D SOURCE
x 28 DETECTOR
o 37 DETECTOR



CM SOURCE TO DETECTOR

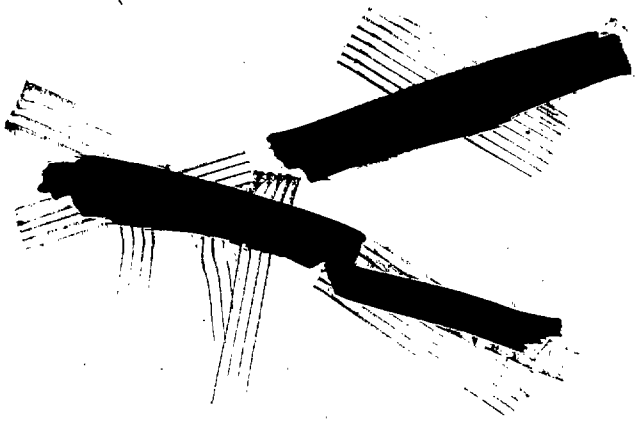
KEUFFEL & ESSER CO., N. Y. NO. 359-14
Millimeters, 3/16" lines spaced, cm. lines heavy.
MADE IN U. S. A.

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