

BOOK39R

Notes:

"Density Expr. Series I ~ 20 ^{kyU}/unit" on front

"I Series I ~20 ^{kyU}/unit" on spine

Blank pages: inside front cover sheet, 2, 4-9, 30, 42, 43, 73, 74, 86, 90, 120

The following pages have 1 photo attached to each page: 22, 37, 40, 50, 56, 57, 59, 63, 64, 70, 72, 78, 80, 92, 94, 96, 104, 108, 110, 114, 118, 124, 126, 132, 134, 138, 140, 142, 144, 146, 148, 150

The following pages have 2 photos attached to each page: page opposite page 1, 20, 58, 62, 66, 68, 76, 82, 84, 88, 112, 122

Others:

- page 93 has 1 graph sheet attached
- page 98 has 1 photo and 1 graph sheet attached
- page 127 has 1 graph attached
- page 128 has 1 graph attached
- page 130 has 1 graph attached
- inside back cover has 1 (8.5x11) graph sheet attached

Scanned by:

Sheila Finch

RSICC /Oak Ridge National Lab.

August 10, 1999

$V_0 = 68.3363 \text{ in}^3$

THE PAPER USED IN THIS BOOK WILL
GIVE COMPLETE WRITING SATISFACTION.
IT WAS SELECTED FROM MANY PAPERS
FOR ITS FINE WRITING LEDGER SURFACE

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No. 168 BLANK BOOK

JOURNAL

SINGLE ENTRY LEDGER

DOUBLE ENTRY LEDGER

RECORD

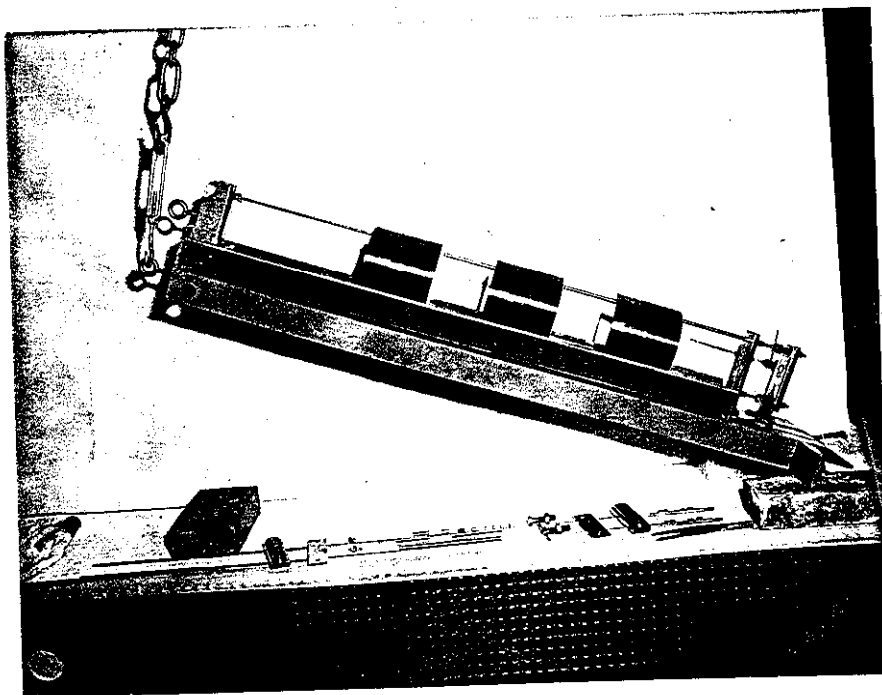
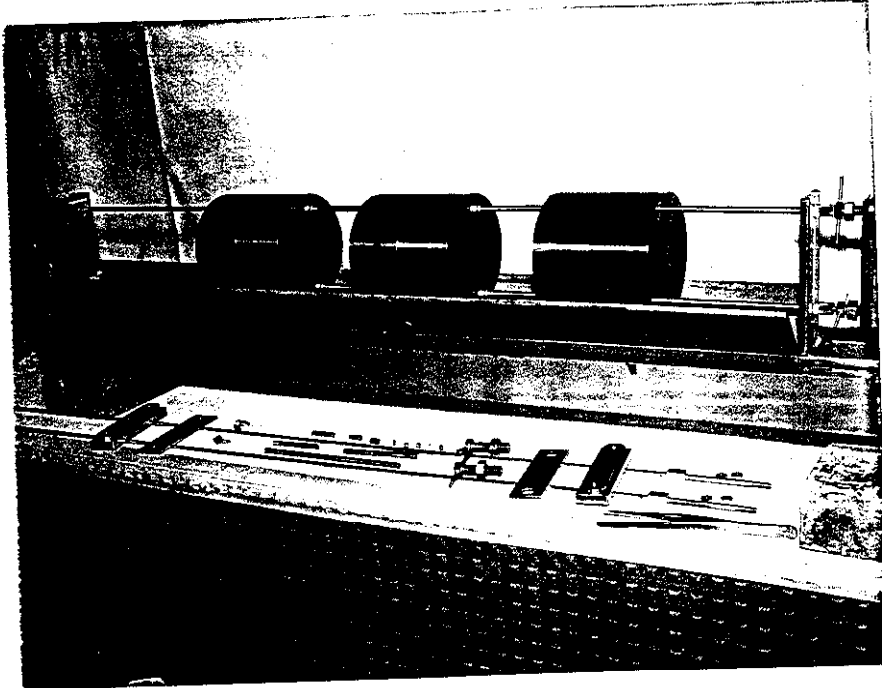
WITHOUT

U N I T S

IN 150 AND 300 PAGES

M A D E I N T H E U . S . A .

TO REORDER THIS BOOK, SPECIFY
NUMBER, RULING AND THICKNESS
AS INDICATED ON BACKBONE OF BOOK



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TINKER TOY EXPERIMENTS

SERIES 1 - ~20 Kg Units

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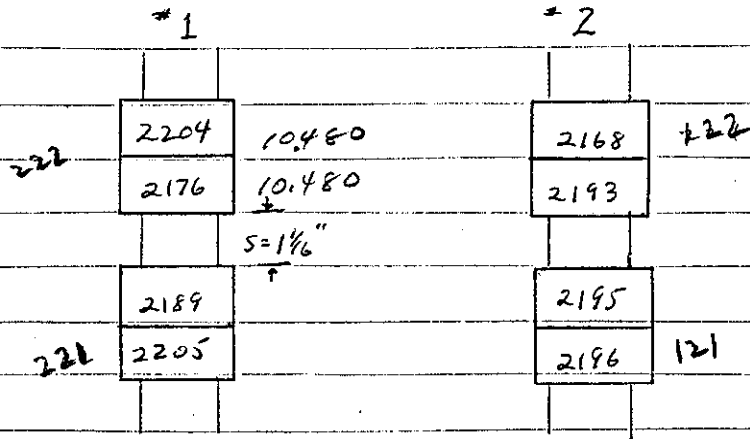
| Exp | No. of units | Experiment | Summary p. | p. |
|------|--------------|---|------------|-----|
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Exps 64 - see Vol IV p 100

cc
JH

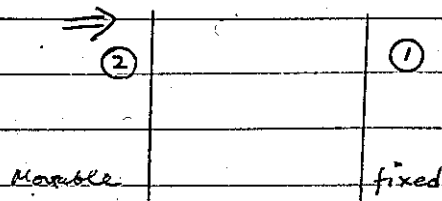
TINKER TOY EXPERIMENTS - Series 1, ~20 kg U/unit

Subassemblies:



Expr. 1

Preliminary safety test - bringing two subassemblies to
 $STS = 1 \frac{1}{16}''$ on split table.



Instrument Check on 11-7-62 Source 10 mc.

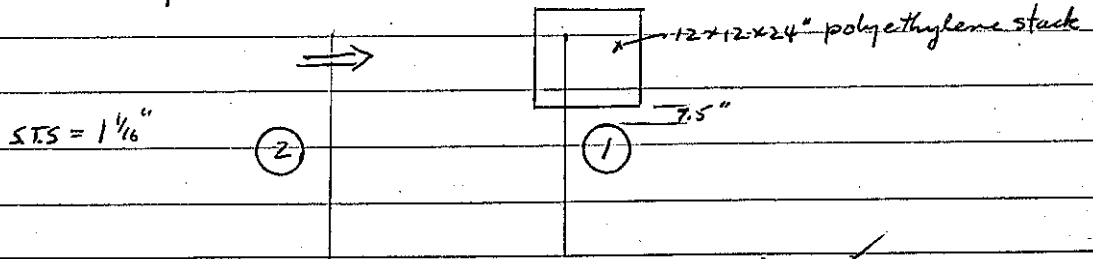
| | | | | | |
|------|-----------------------|-------------|------------|-----------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-12}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-12}$ | Meter Trip | OK | | |
| IC-3 | Response | | JH | | |
| IC-4 | Response | Calibration | | Source | M-229 |
| CRM | | Meter Trip | | | |

$\frac{92}{54}$

| | C_3 | M^{-1} | C_4 | M^{-1} | Table pos. (in) |
|--------|-------|----------|-------|----------|-----------------|
| Begin. | 350 | 1.0 | 1300 | 1.0 | 54 |
| | 370 | .95 | 1360 | .96 | 30 |
| | 380 | 1.0 | 1360 | .96 | 16 |
| | 430 | .81 | 1450 | .90 | 10 (545) |
| | 420 | .83 | 1490 | .87 | 7 (462) |
| | 440 | .80 | 1470 | .88 | 4 (335) |
| | 540 | .65 | 1700 | .76 | 2 (215) |
| | 670 | .52 | 1830 | .71 | 1 (122) |
| | 750 | .46 | 2260 | .58 | 0 |

Expr 2.

Preliminary safety test - evaluate presence of personnel in placing two subassemblies on fixed table.



Instrument Check on 11-8-62 Source 10 mc

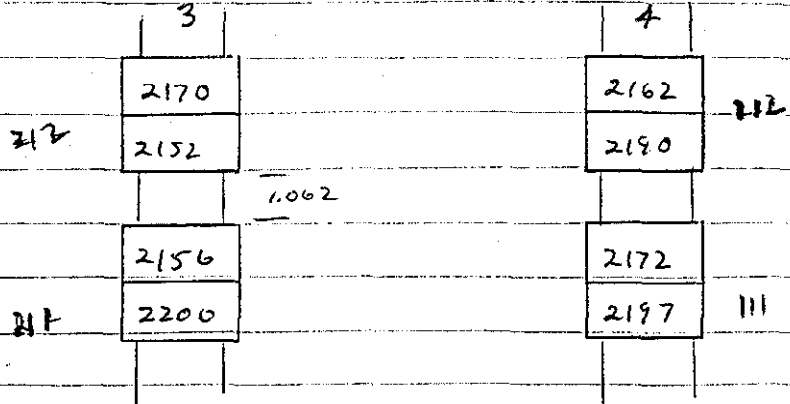
| | | | | | |
|------|-----------------------|-------------|------------|-----------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | Response | Calibration | ✓ | | |
| IC-4 | | Calibration | | Source | M-229 |
| CRM | | Meter Trip | | clock | 2286 |

| | C_3 | M^{-1} | C_4 | M^{-1} | Table pos. |
|--------|-------|----------|-------|----------|------------|
| Begin. | 120 | 1.0 | 1400 | 1.0 | 54 in. |
| | 260 | 0.46 | 2130 | 0.66 | 0 |

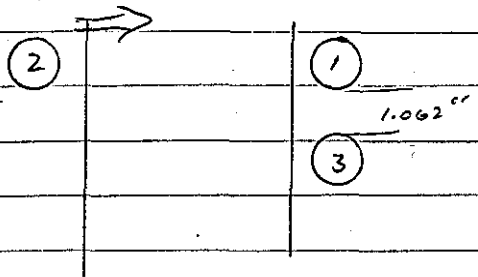
CC
JW

Expt 3

Subassemblies:



Add subassembly 3 to fixed table.

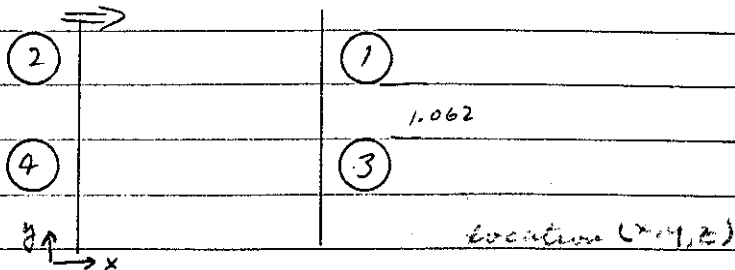


| 2 min counts | C_3 | M_3^{-1} | C_4 | M_4^{-1} | Table pos. (cm) |
|--------------|-------|------------|-------|------------|-------------------|
| Begin | 480 | 1.0 | 2260 | | 54 |
| | 550 | | 2440 | | 10 ⁵⁴⁵ |
| | 640 | | 2630 | | 7 ⁴⁶² |
| | 680 | | 2850 | | 4 ³³⁹ |
| | 800 | | 3240 | | 2 ²¹⁵ |
| | 940 | | 3730 | | 1 ¹²⁷ |
| | 1120 | .43 | 4640 | 0.49 | 0 |

CC
JH

Exp. 4

add 4th subassembly to moveable table:



Instrument Check on 11-9-62 Source 10 mc

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Motor Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Motor Trip | OK | | |
| IC-3 | Response | Calibration | JIT | Source | M-229 |
| IC-4 | | Calibration | | | Inst. respond to source. |
| CRM | | Motor Trip | | | |

| | C_3 | M_3^{-1} | C_4 | M_4^{-1} | Table pos. |
|------|-------|------------|-------|------------|------------|
| Brp. | 520 | 1.0 | 4230 | 1.0 | 54 |
| | 680 | .76 | 4910 | .86 | 10 |
| | 730 | .71 | 5250 | .81 | 7 |
| | 970 | .54 | 6790 | .62 | 4 |
| | 1430 | .36 | 9780 | .43 | 2 |
| | 2290 | .23 | 15110 | .28 | 1 |
| | 5650 | .042 | 30730 | .11 | 0 |

11-9-62

Expt. 5

 $\frac{CC}{JH}$

Decreased distance between east west faces from 1.06 to 1.00 in.

| | C_3 | M_3^{-1} | C_4 | M_4^{-1} | Table pos |
|-------|-------|------------|-------|------------|-----------|
| Bkgs. | 530 | | 4350 | .85 | 54 |
| | 670 | .79 | 5140 | .79 | 10 |
| | 710 | .75 | 5530 | .63 | 7 |
| | 960 | .55 | 6910 | .92 | 4 |
| | 1440 | .37 | 10450 | .42 | 2 |
| | 2520 | .21 | 16440 | .26 | 1 |
| | 6920 | .076 | 43490 | .10 | 0 |

Expt. 6

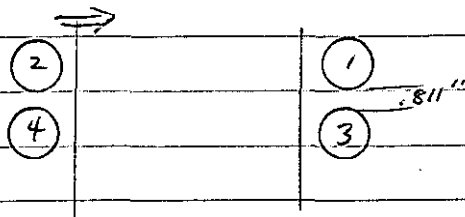
S.T.S. = .965 in. in all directions

| | C_3 | M_3^{-1} | C_4 | M_4^{-1} | Table pos |
|-------|-------|------------|-------|------------|-----------|
| Bkgs. | 600 | 1.0 | 4610 | 1.0 | 54 |
| | 650 | .92 | 5400 | .85 | 10 |
| | 720 | .83 | 5910 | .78 | 7 |
| | 1000 | .60 | 7510 | .61 | 4 |
| | 1660 | .36 | 11240 | .41 | 2 |
| | 2840 | .21 | 18680 | .25 | 1 |
| | 10590 | .057 | 67930 | .07 | 0 |

CC
JH

Expt. 7.

Expts. 4 and 6 extrapolate to an S.T.S. of $\sim 8''$. Spacing between units and subassemblies set to 0.811 in.



Instrument Check on 11-14-62 Source 10 mc δ

| | | | | | |
|------|----------------------|-------------|------------|-----------|----------------------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | <i>respond</i> | Calibration | JH | Source | M-229 |
| IC-4 | | Calibration | | | <i>instr. respond to source.</i> |
| CRM | | Meter Trip | | | |

| | C_3 | M_3' | C_4 | M_4' | Table pos. |
|---------------|-------|--------|--------------------------|--------|------------|
| <i>Begin.</i> | 650 | .80 | 6440 | 1.0 | 54 |
| | 790 | | 6790 | | 16 |
| | 850 | .76 | 7700 | .84 | 10 |
| | 1000 | .65 | 8220 10600 | .78 | 7 |
| | 1390 | .46 | 10600 | .61 | 4 |
| | 2450 | .25 | 17820 | .36 | 2 |
| | 5970 | .11 | 39520 | .16 | 1 |

Extrapolate to critical at ~ 3 in.

Critical at 5.16 rev.

Period 4.96 rev. change $\sim .002''$

~ 115 rev

CC
JH

Expr 8

East-west plane spacing increased to 0.84 in.
 Crit at 4.80 revs.
 period at 4.60 revs. ~ 110 sec

Expr. 9

East-west plane spacing increased to 0.934 in.
 critical at 3.25 revs.

Expr 10

Instrument Check on 11-15-62 Source 10 mc. 8

| | | | | | |
|------|-----------------------|-------------|------------|--------------------------|----|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 9 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | Response | Calibration | JH | Source M-229 | |
| IC-4 | Response | Calibration | | Insta. respond to source | |
| CRM | | Meter Trip | | | |

Reset spacing on units to 0.865 in.

Crit at 2.4 revs.
 period at 2.0 revs. ~ 78 sec

CC
JH

Expr. 11

Reset spacing to 0.901 in.

Instrument Check on 11-16-62 Source 10mc γ

| | | | | | |
|------|----------------------|-------------|------------|-----------|---------------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | <i>Respad</i> | Calibration | JH | | M-229 |
| IC-4 | | Calibration | | | instr. response to source |
| CRM | | Meter Trip | | | |

Slightly subcritical when together.
negative period \Rightarrow $\sim 7 \mu\text{sec}$

Expr. 12

Changed East-West spacing to 0.875

 ~ 10.8 sec negative period.

Expr. 13

Changed spacing to 0.888 in.

Critical with slight pos. period.

Period = ~ 131 sec

Critical at 0.8 revs.

Expr. 14

Changed East-West spacing to 0.900 in.

Critical at 0.7 revs.

Period at 0 revs. = ~ 306 sec.

November 19, 1962

C. Cross

J.T. Re-Measured spacing on subassemblies 2 and 4 : 0.893 in.
 " " " " 1 and 3 : 0.888 in.
 " " N-S faces 0.900 in. 883 see bottom of p 20
 " " E-W faces 0.900 in.

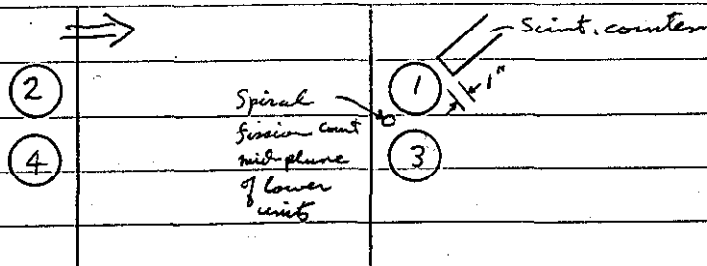
Expt. 15

Instrument Check on 11-19-62 Source 10 mcd

| | | | | | |
|------|---------------------|------------|------------|-----------|-----------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | 3×10^{-11} | Water Trip | OK | Fast Trip | OK |
| IC-2 | 3×10^{-11} | | OK | | |
| IC-3 | Respond | | JN | | 11-2-29 |
| IC-4 | | | | | Instr. Respond. |
| CRM | | | | | |

Just critical. $k=1$.

Expt. 16



Effect of placing counters as shown above. \Rightarrow period = ~ 435 sec.

CC.
J.H.

11-20-62

Expr. 17

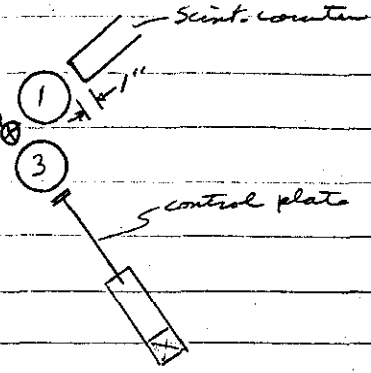
Evaluate worth of control and counter.

20

2

4

Two fission counters
located in mid-
plane of upper
and lower units



Instrument Check on 11-20-62 Source 10 mc

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | | | |
| IC-3 | Expanded | Calibration | JH | | M-229 |
| IC-4 | | Calibration | | | Distrib. Response Source |
| CRM | | Meter Trip | | | |

plate in period = 190 sec.
plate out " = 325
just critical at .55 revs
plate in Period 575 sec

East-West & North South planes set to .905 - slightly subcritical
East-West " " " " " " .902 slightly "

G.C.
JTH
JH
D.M.

Exp. 18

Rossi- α measurement

East west plane spacing 0.888

North South plane spacing 0.902

Correction: .885

see below

Preliminary Check on 11-21-62

- Room 113 Pressure Differential 1"
- Red Light On and Personnel Check C.C.
- Scrams and Bldg. Alarm Reset JH
- Source Inserted JH
- Safety Withdrawn JH
- Controls JH
- ~~Reflector Water~~
- ~~Moderator Water~~

Instrument Check on 11-21-62 Source 10 mc γ

| | | | | | |
|------|----------------------|-------------|------------|-----------|----------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | <u>Respond</u> | Calibration | | | M-229 |
| IC-4 | | Calibration | | | Dista. Respond |
| CRM | | Meter Trip | | | |

log reading: .05 on Red .13 on Blue.

12-7-62 Remove subassembly 4 and measured distance between subassemblies 1 and 2 - Reading $\left\{ \begin{array}{l} 0.890 \text{ at bottom} \\ 0.880 \text{ at top.} \end{array} \right.$

12-7-62 Assembly Photographed.

Expt. 19

Set spacing on N-S Plane at 0.880.

" " " E-W Plane at 0.880

Spacing on (2) and (4) 0.893 ; on (1) and (3) 0.898

Instrument Check on 12-10-62 Source 10 mc. X

| | | | | | |
|------|----------------------|-------------|------------|-----------|-----------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | 73×10^{-11} | Meter Trip | OK | Fast Trip | OK |
| IC-2 | 73×10^{-11} | Meter Trip | OK | | |
| IC-3 | | Calibration | JH | | Source M-229 |
| IC-4 | | Calibration | | | Insta. respond. |
| CRM | | Meter Trip | | | |

11⁰⁰ AM Critical with ~100 sec. period.

11¹⁵ AM Set E-W plane at 0.890 in.

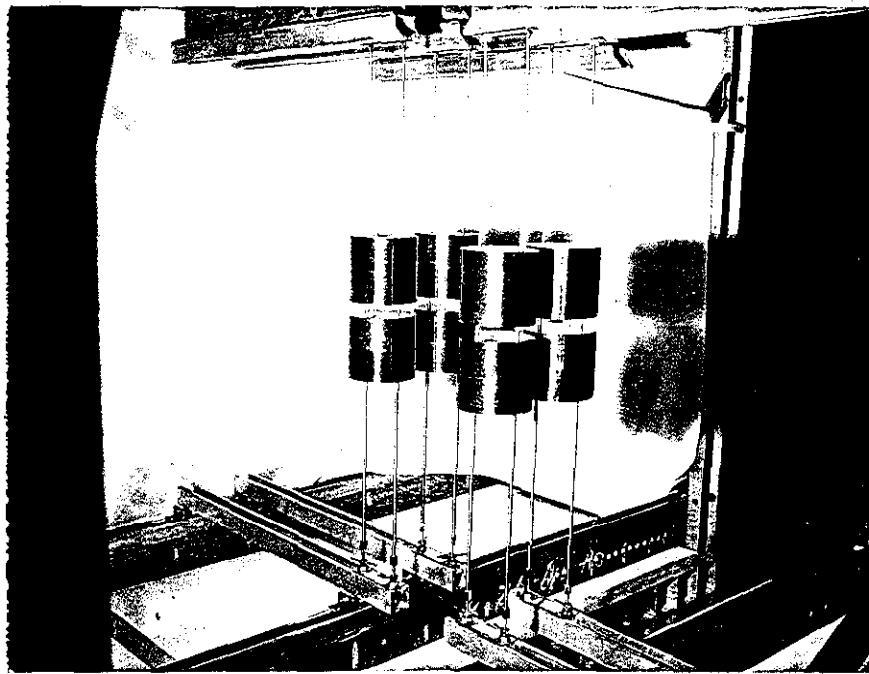
11²⁰ AM Subcritical.

11³⁵ AM Set E-W plane at 0.885 in.

slightly subcritical; neg period. 230 sec.

Summary of critical condition for 8 unit array $0.885 \pm .005$

Expr 19



Average wt of units was 20.960 Kg U

Surface to surface separation of units:

Vertical spacing between units on subassembly 1 = 0.898

" " " " " " 2 = 0.893

" " " " " " 3 = 0.898

" " " " " " 4 = 0.893

Spacing between units in E-W direction = 0.880

" " " " N-S " = 0.880

Effective value for S.T.S. between units 0.885 ± 0.005 in.

Second Set of 20 kg units.
 approximately 150 g⁰/unit less than first set.

Subassemblies

| # 1 | | | # 2 | | |
|-------|------|--------------|------|--------------|-------|
| (222) | 2173 | 10428 | 2169 | 10403 | (22) |
| | 2161 | <u>10365</u> | 2157 | <u>10400</u> | |
| | | 20.793 | | 20.803 | |
| (221) | 2191 | 10360 | 2198 | 10395 | (121) |
| | 2202 | <u>10445</u> | 2164 | <u>10408</u> | |
| | | 20.805 | | 20.803 | |

| # 3 | | | # 4 | | |
|-------|------|--------------|------|--------------|-------|
| (212) | 2171 | 10311 | 2163 | 10353 | (112) |
| | 2178 | <u>10493</u> | 2197 | <u>10455</u> | |
| | | 20.804 | | 20.808 | |
| | 2189 | 10486 | 2195 | 10483 | |
| (211) | 2188 | <u>10318</u> | 2174 | <u>10322</u> | (111) |
| | | 20.804 | | 20.805 | |

Expt 20.

2nd set of ~20 kg units - (see p. 23.) Unreflected.Instrument Check on 12/11/62 Source 10 mc X

| | | | | | |
|------|----------------------|-------------|------------|------------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | | OK | | |
| IC-3 | Response | Calibration | JH | Source | M-227 |
| IC-4 | | Calibration | | Inst. Resp | OK |
| CRM | | Meter Trip | | | |

Spacing set at 0.875 in.

Slightly subcritical: neg. period ~110 sec.

Changed spacing on E-W plane to 0.870 in.

Measured 392 sec neg period.

Conclusion: Effective value of S.T.S. = 0.873 ± 0.005 in.

(23)

Expt. 21

Po-210 measurement on array as built in Expt 20.

Instrument Check on 12-12-62 Source 10 mc

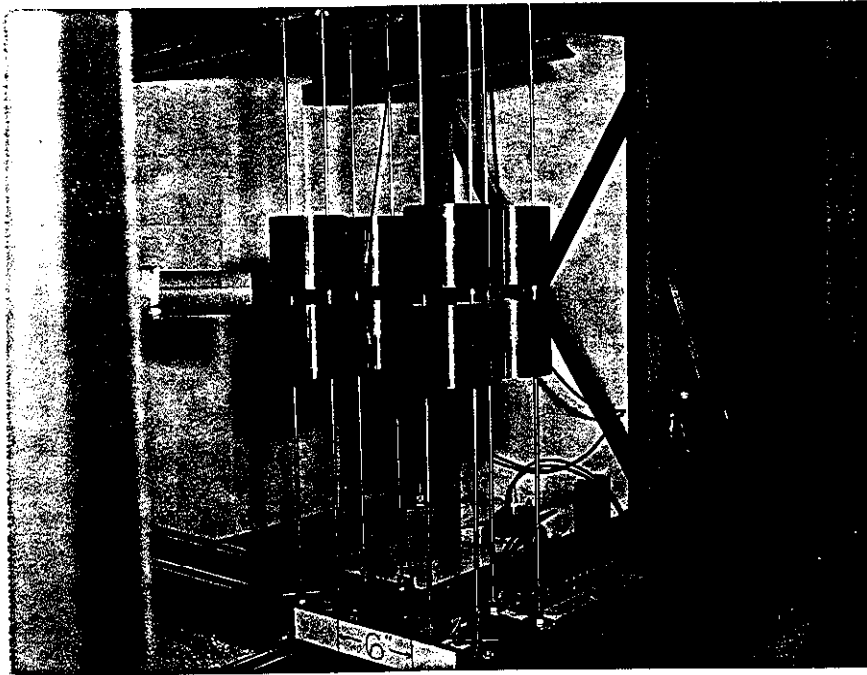
| | | | | | |
|------|-------------------------|-------------|------------|--------------------------|---------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3.5 \times 10^{-11}$ | Meter Trip | OK | Source | M-229 |
| IC-3 | Respond | Calibration | JH | Dist. response to source | OK |
| IC-4 | | Calibration | | | |
| JRM | | Meter Trip | | Clock | 2313 at start |

Run begun at ~ 11⁰⁵ AM

Dist. Readings: IC-1 5 on 3×10^{-10} scale
 IC-1 24 on 3×10^{-10} "
 IC-3 .028
 IC-4 .28

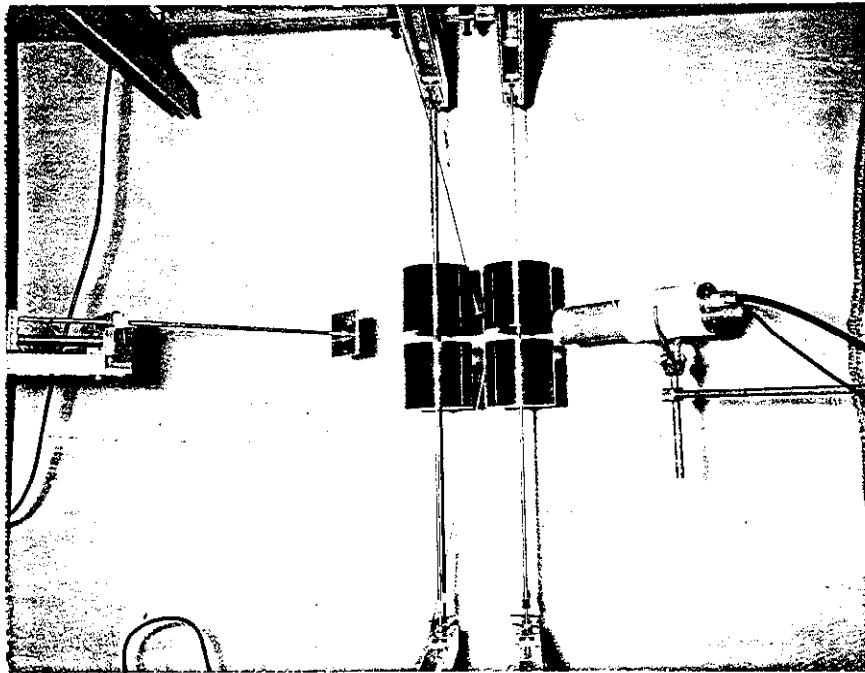
| Decay | Error | Counts in P+2 | Bq. Ratio | time | TPS |
|-------|-------|---------------|-----------|--------|------|
| .8208 | 1.01 | 7906 | .24 | 310 m. | 3000 |

View from
N-E corner



Photos taken on 12-13-62

VIEW from
South side
of fixed
Table



Exp 22

Repeat Exps. 21 at higher powers

| | | | |
|---|----------------------|-----------------------|----------------------|
| Instrument Check on <u>12-13-62</u> Source <u>10 mc 8</u> | | | |
| PM-1 | Low Trip | OK | Alarm Trip <u>OK</u> |
| PM-2 | | | Alarm Trip <u>OK</u> |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip <u>OK</u> | Fast Trip <u>OK</u> |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip <u>OK</u> | clock |
| IC-3 | Response | Calibration <u>JN</u> | Source <u>M-229</u> |
| IC-4 | | Calibration | Dusts |
| CRM | Meter Trip | | |

Low level trips on Photomultiplier tripped when tables 16" apart and other instruments indicate difficulty. Readjusted low level trip points.

Begin run at $1.2 \mu\text{m}$

Dusts readings: IC-1 43 on 10×10^{-10} scale
 IC-2 8.2 on 10×10^{-10} scale
 IC-3 .49
 IC-4 1.7

A-1

$1.4 \mu\text{m}$ Low level Photomultiplier trip again.

2⁰⁰ By-pass RM.

A-2 3⁰⁰ Start again. Critical with tables separated 0.6 rev. = .008

4⁰⁰ Shut down.

| | Decay | Error | Counts Pt 2 | Bygs Ratio | time | TPS |
|----|-------|-------|-------------|------------|------|------|
| A1 | .8444 | 1.98 | 4254 | 5.8 | 30 | 7000 |
| A2 | .8295 | 1.51 | 7287 | 5.5 | 50 | 7000 |
| A2 | .8300 | 1.42 | 10000 | 5.54 | 75 | 7000 |

Expt 22

Continue exploration of peak to background ratio

Array same as Expt 21

Instrument Check on 12-17-62 Source 10 me f

| | | | | |
|------|-----------------------|-------------|------------|-----------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | OK | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-11}$ | Water Trip | Fast Trip | OK |
| IC-2 | $> 2 \times 10^{-4}$ | Water Trip | Clock | |
| IC-3 | Response | Calibration | M = 229 | Source |
| IC-4 | Response | Calibration | JH | Instr. resp to Source |
| CRM | Water Trip | | | |

8⁴⁵ AM Critical: table separation $\sim 5^+$ = .000

Begin run 8⁴⁵ AM at Instr. readings

IC-1 42 on 10×10^{-10} scale

IC-2 8.2 on 10×10^{-10} scale

IC-3 .53 and IC-4 1.1

By Ratio $\sim 8/1$

Step at 9²⁵ AM:

Begin at 9³² AM with Instr. readings

IC-1 29 (3×10^{-9})

IC-2 56 (3×10^{-9})

IC-3 1.16

IC-4 2.4

By Ratio $\sim 4/1$

Start count 9³⁸

Stop at 10⁵⁴ AM.

Start at 11^{AM} with Instr. Readings

3rd run

IC-1 5.9 (3×10^{-10})

IC-2 1.2 (3×10^{-8})

IC-3 0.28 (10×10^{-10})

IC-4 0.50

Pkg ratio ~ 16/1

Stop at 3⁰⁵ PM.

Summary:

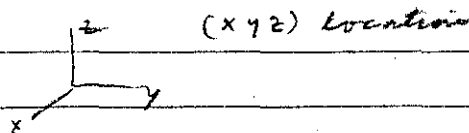
| | Decay | Error | Counts in P+2 | B _g ratio | time | TPS |
|----|-------|-------|---------------|----------------------|------|-----------------------|
| 1. | 8306 | 1.87 | 8381 | 3.6 | 50 | 10 ⁴ |
| 2. | 8321 | 1.56 | 11830 | 3.6 | 75 | 10 ⁴ |
| 3 | .8289 | 1.33 | 7332 | 11.8 | 150 | 4.3 × 10 ³ |
| | .8283 | 1.2 | 9622 | 11.7 | 200 | " |
| | .8254 | 1.1 | 11841 | 11.7 | 250 | " |

27 unit array of ~20kg units

Subassemblies

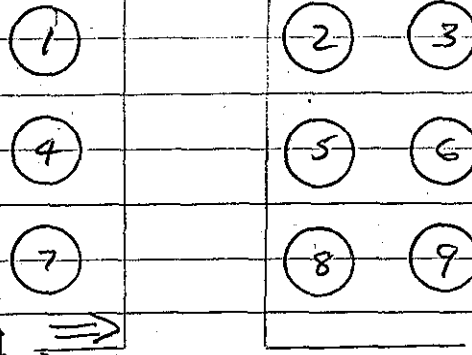
| 1 | | 2 | | 3 | |
|--------------------|----------------|--------------------|----------------|--------------------|----------------|
| 311 | | 312 | | 313 | |
| 2186 | 10.365 | 2152 ³² | 10.469 | 2178 ³² | 10.493 |
| 2194 | 10.507 | 2166 | 10.422 | 2187 | 10.386 |
| 211 | 20.872 2467 | 212 | 20.891 2461 | 213 | 20.879 2470 |
| 2170 ³¹ | 10.491 | 2158 | 10.469 | 2169 ³¹ | 10.403 |
| 2182 | 10.392 | 2177 | 10.424 | 2204 ¹¹ | 10.480 |
| 111 | 20.883 2455 | 112 | 20.893 2287 | 113 | 20.883 2457 |
| 2162 ⁴¹ | 10.519 | 2173 ¹¹ | 10.428 | 2171 ³¹ | 10.311 |
| 2160 | 10.340 | 2155 | 10.462 | 2201 | 10.544 |
| | 20.859 2288 | | 20.890 2468 | | 20.855 2463 |

| 4 | | 5 | | 6 | |
|--------------------|----------------|--------------------|----------------|--------------------|----------------|
| 321 | | 322 | | 323 | |
| 2159 | 10.380 | 2196 ²⁴ | 10.479 | 2179 | 10.495 |
| 2156 ³³ | 10.498 | 2153 | 10.420 | 2192 | 10.385 |
| 221 | 20.828 2457 | 222 | 20.879 2472 | 223 | 20.880 2451 |
| 2184 | 10.404 | 2197 ²² | 10.455 | 2164 ²⁴ | 10.408 |
| 2195 ⁴³ | 10.483 | 2202 ¹⁴ | 10.445 | 2176 ¹² | 10.480 |
| 121 | 20.887 2464 | 122 | 20.890 2462 | 123 | 20.888 2289 |
| 2161 ¹² | 10.365 | 2193 ²² | 10.473 | 2175 | 10.371 |
| 2172 ⁴³ | 10.506 | 2185 | 10.427 | 2180 | 10.501 |
| | 20.877 2454 | | 20.900 2474 | | 20.872 2456 |



| | 3 3 1 | | 8 | | 9 | | | |
|-------|---|---------------------------------|-------|--|---------------------------------|-------|--|---------------------------------|
| 113 | 2165 2191 ¹³ | 10.412 10.360 20.772 2460 | 213 | 2190 ⁴⁸ 2200 ³⁴ | 10.443 10.461 20.904 2469 | x 313 | 2163 ⁴¹ 2203 | 10.353 10.515 20.868 2466 |
| 112 | 231 2168 ²¹ 2198 ²³ | 10.490 10.395 20.885 2473 | x 212 | 232 2181 2205 ¹⁴ | 10.422 10.486 20.908 2471 | x 312 | 2189 ³³ 2157 ²² | 10.486 10.400 20.886 2451 |
| (111) | 131 2199 2174 ⁴⁴ | 10.523 10.322 20.845 2458 | 211 | 132 2154 2167 | 10.454 10.439 20.893 2290 | x 311 | 133 2183 2188 ³⁴ | 10.527 10.318 20.845 2452 |

Total: 563.686 Kg u. or 525.355 Kg U₂₃₅
 ave of 20.872 KgU/unit or 19.457 KgU₂₃₅/unit.



Surface to Surface separation for initial try is 2.750 " ± .005"

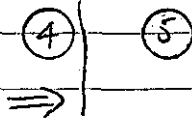
Expr 23

Begin Assembly of 27 unit array - Units described on pp 31, 32.

Surface-to-surface separation $2.750 \pm .005$ "

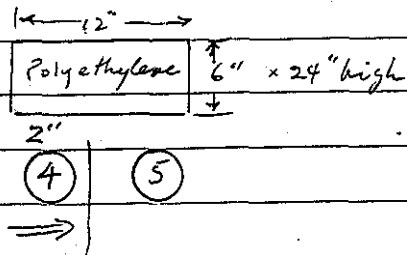
Instrument Check on 12-17-62 Source 10 mc. X

| | | | | | |
|------|----------------------|-------------|------------|---------------------------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Motor Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Motor Trip | OK | Clock | 2330 |
| IC-3 | Response | Calibration | JN | Source | M-229 |
| IC-4 | | Calibration | | Instn. response to source | |
| CRM | | Motor Trip | | | |



| 2 min Counts | C_3 | H_3^{-1} | C_4 | H_4^{-1} | Position |
|--------------|-------|------------|-------|------------|----------|
| Bkgs. | 670 | | 2590 | | 54" |
| | 790 | .85 | 2690 | .86 | 0 |

Effect of Polyethylene
Stack near
Two assemblies

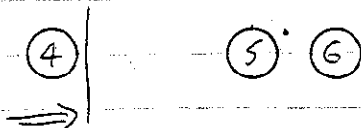


| C_3 | H_3^{-1} | C_4 | H_4^{-1} | Pos. |
|-------|------------|-------|------------|------|
| 670 | | 2740 | | 54" |
| 650 | >1 | 2980 | .87 | 0 |

5.005"

Expt 23 (cont'd.)

Add subassembly 6



Instrument Check on 12-18-62 Source 10mc X

| | | | | | |
|------|-----------------------|-------------|------------|--------------------------|-------|
| FM-1 | Low Trip | OK | Alarm Trip | OK | |
| FM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Motor Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Motor Trip | OK | Clock | 2333 |
| IC-3 | Response | Calibration | JH | 1. Source | M-229 |
| IC-4 | | | | Inst. response to source | |
| CRM | Motor Trip | | | | |

| 2 min. counts | C_3 | M_3' | C_4 | M_4' | Position |
|---------------|-------|--------|-------|--------|----------|
| 8 kgs. | 1390 | | 3740 | | 54 |
| | 1560 | .89 | 4040 | .92 | 0 |

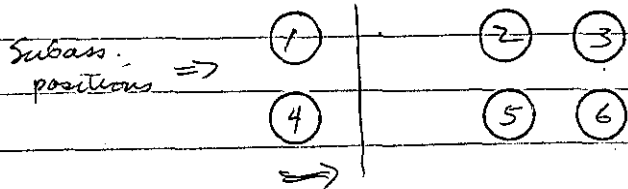
Placed subassembly 3 in position 1

| | | | | |
|------|-----|-----|-----|---|
| 1700 | .82 | 456 | .80 | 0 |
|------|-----|-----|-----|---|

Placed subass. 2 in position 1

" " 3 in " 2

| | | | | |
|------|-----|------|-----|---|
| 2300 | .60 | 6060 | .61 | 0 |
|------|-----|------|-----|---|

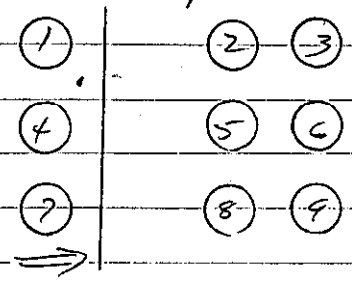


| | | | | | |
|----------|------|-----|------|-----|---|
| mult. => | 3120 | .44 | 8420 | .43 | 0 |
|----------|------|-----|------|-----|---|

12/19/62

Expt 23 (cont'd.)

Subassemblies 7, 8, and 9 placed on tables



Instrument Check on 12-19-62 Source 10mc

| | | | | | |
|------|----------------------|------------|------------|----------------------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Motor Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | | OK | clock | 2338 |
| IC-3 | Respond | | JT | Source | m-229 |
| IC-4 | | | | Instn. respond to S. | |
| CRM | | | | | |

| C_3 | M_3^{-1} | C_4 | M_4^{-1} | Position |
|-------|------------|-------|------------|----------|
| 14280 | .097 | 39270 | .095 | 0 |

changed spacing to $2 \frac{21}{32}$

| | | | | |
|-------|------|-------|------|---|
| 23390 | .059 | 63530 | .089 | 0 |
|-------|------|-------|------|---|

Expt 23 (cont'd.)

Moved E-W planes in 0.010"

Instrument Check on 12-20-62 sources + 10 mV ✓

| | | | | | |
|------|-----------------------|-------------|------------|-----------------------------|-------|
| PM-1 | Low Trip | ok | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | ok | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | clock | 2339 |
| IC-3 | respond | Calibration | JT | Source | M-229 |
| IC-4 | | Calibration | | Instr. respond to N source. | |
| CRM | | Meter Trip | | | |

| 2 min. Counts | C_3 | M_3^{-1} | C_4 | M_4^{-1} | Position |
|--------------------|-------|------------|-------|------------|----------|
| | 4310 | | 14710 | | 54 |
| 9 ⁰³ AM | 25090 | .055 | 69020 | .054 | 0 |

1⁴⁵ PM Changed spacing to 2.56³ (2^{9/16})

| | | |
|-------|--------|---|
| 59780 | 163230 | 0 |
|-------|--------|---|

2¹⁰ PM Changed E-W spacing by 0.100 in. (Reduced.) 2.46³

| | | |
|--------|--------|---|
| 153170 | 411530 | 0 |
|--------|--------|---|

2⁴⁰ PM Changed E-W spacing by 0.100 in. now 2.36³

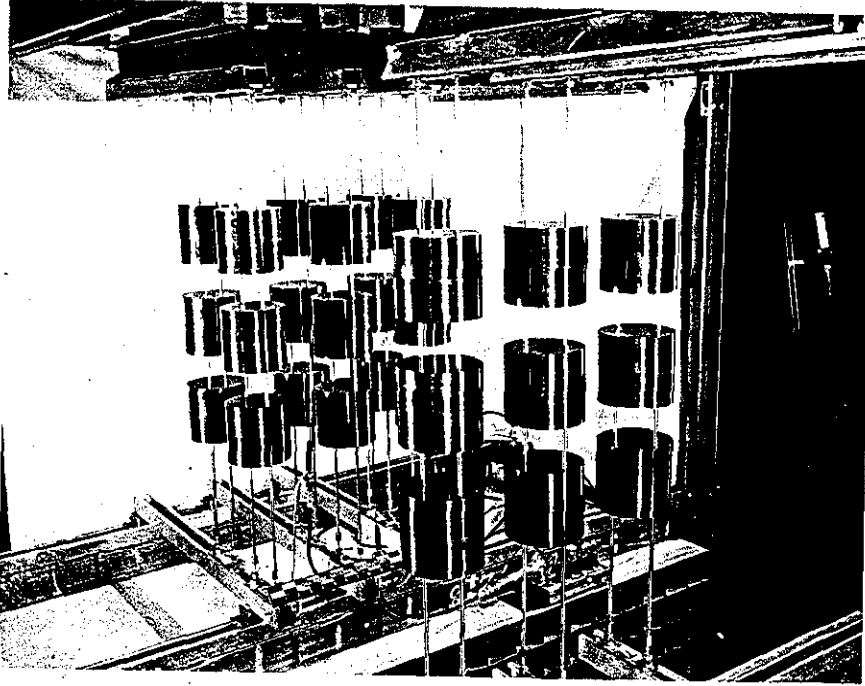
Critical with positive period ~ 98 sec.
 Just critical with tables separated 0.050"

EXPA 23

27 units

0.877 ^{psi}/_{unit}

TS 2505"



Expt 23 (cont'd)

Have changed spacing to 2.500 in.
 (Transferred IC-3 to west assembly area)

Instrument Check on 12-20-62 Source 10 mc

| | | | | | |
|----|-----------------------|-------------|------------|---------------------------|-------|
| -1 | Low Trip | OK | Alarm Trip | OK | |
| -2 | | | Alarm Trip | OK | |
| -1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| -2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| -3 | port | Calibration | JIT | Clock | 2342 |
| -4 | Response | Calibration | | Source | M-229 |
| M | | Meter Trip | | Instr. Response to Source | |

Critical with tables separated 0.015 in (1.88 rows)

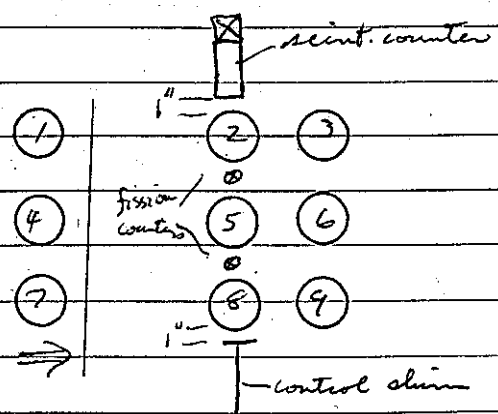
Period with tables closed ~ 60 sec (pos).

pm changed spacing in E-W planes to 2.520"

Critical with tables closed; slightly positive. Period ~ 722 sec.

Take SFS. at crit. to be 2.505 ± 0.005 in.

Wired counters for Rossi-K measurements



Critical with tables together - Pos. period ~ 104 sec.

" " " separated ~~rows~~ by 0.050"

Expt 23 contd.

Changed spacing to 2.535" on E-W planes

Arrangement same as on p 37.

Critical with tables together and pos. period ~ 2.98 sec.

just critical at 1.0 rev. ~ 0.030" separation of tables.

EXP # 24

12-27-62

Purpose: Rossi & Measurements with
27 units, Same AS Previous EXP

9¹⁵ Started Run AT .7 Revolution table Sep.

IC-2 5×10^{-10}

IC-4 $.8 \times 10^{-10}$

4⁰⁵ .7 Revolution table Sep

APPROX level

IC-2 4×10^{-10}

IC-4 $.7 \times 10^{-10}$

Shut Down

Instrument Check on 12-28-62 Source ^{60}Co

| | | | | |
|------|----------------------|----|------------|----|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | Motor Trip | ✓ | Fast Trip | ✓ |
| IC-2 | Motor Trip | ✓ | | ✓ |
| IC-3 | Calibration | | | |
| IC-4 | Response Calibration | | | |
| CRM | Motor Trip | | | |

EXP # 24

12-28-62

Same AS EXP # 24

table Sep .75 Rev Dial Ind 83.8

IC-2 4.8×10^{-10}

IC-4 9×10^{-10}

Note

Dial Indicator Reads .726 with tables Apart

12-28-62

Exp # 24 cont

3⁰⁰ PM

IC-2 5.5×10^{-10}
 IC-4 1×10^{-9}

table Sep .015" ON Dial Indicator AS
 Read through window with telescope
 Shut Down

array photographed on 12/29/62 one color and one black & white
 Exp # 25

Purpose: to measure effect of steel plate and
 concrete floor.

Instrument Check on 1-2-63 Source 10 mc

| | | | | | |
|---|-----------------------|-------------|------------|-----------|----------|
| 1 | Low Trip | OK | Alarm Trip | OK | |
| 2 | | | Alarm Trip | OK | |
| 3 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| 4 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| 5 | out | Calibration | | Clock | 4358 |
| 6 | Respond | Calibration | JA | Source | M-229 |
| | | Meter Trip | | Instro. | respond. |

Part 1. Measure negative period as a function of separation.

8³⁰ AM

System slightly subcritical with tubes together and scintillation
 counter removed

| Count | Dial Indicator | Tube position | Period |
|-------|----------------|---------------|-----------|
| 0 | 0.499 | 0 | 578.1 neg |
| 1 | 0.474 | .025 | 323.7 |
| 2 | 0.418 | .081 | 99.6 |
| 3 | 0.361 | .138 | 67.1 |
| 5 | 0.234 | .265 | 57.5 |

rt

Expts (cont'd.)

Part 2

1"-thick steel plate in vertical plane parallel to and
30.5 in. from south face of array.

$R > 1$ at zero tube separation: pos. period 269.5

$R = 1$ at 0.019 in. tube separation. (≈ 0.9 revs.)

Part 3. Added minimum of 6"-thick paraffin + polyethylene
 $\approx 30"$ behind steel plate - simulate floor.

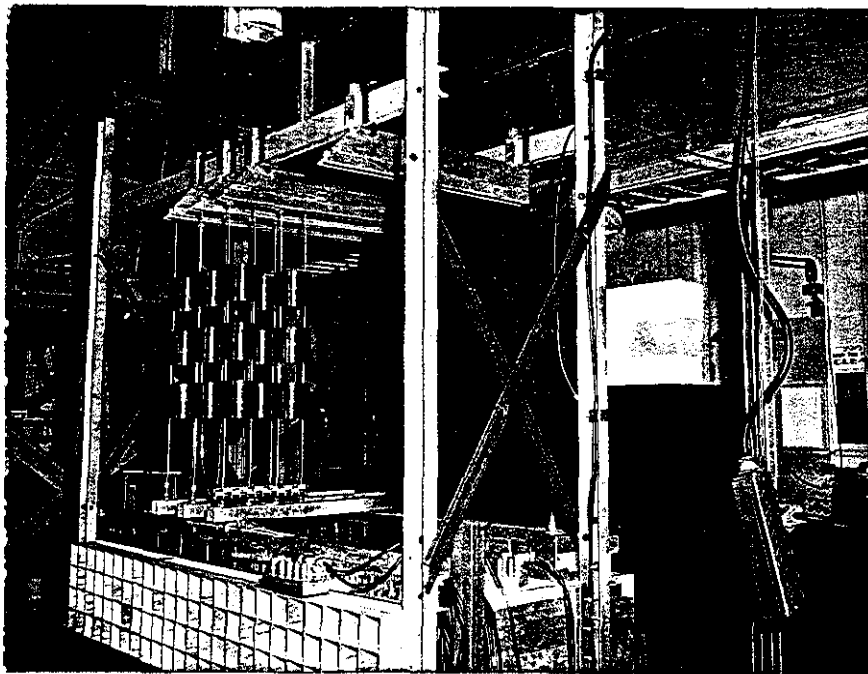
$R > 1$ at zero tube separation: pos. period

$R = 1$ at 0.021 in. tube separation. (≈ 0.9 revs) 269.5

Part 4. Removed steel plate and (paraffin + polyethylene) and
have added scintillation counter

$R > 1$ at zero tube separation; pos. period 363.7

$R = 1$ at ≈ 0.02



Expt 26

1-2-63

3:27 PM

Have removed all counters and returned to status of experiment 23.

N-S and E-W spacings set at 2.515 in.

Vertical spacing " " 2.500 in.

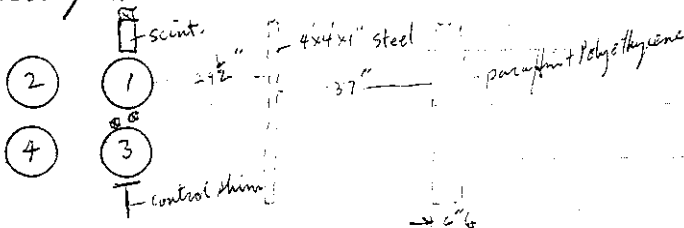
Critical with tables separated 0.008 in.

} compare
with p 37.

Expt. 27

Repeat Rossi- α measurement on 8-unit base array.

Uniform spacing set at $0.881 \pm .005$ in.



Instrument Check on 1-3-63 Source 10 mc 8

| | | | | | |
|------|----------------------|-------------|------------|----------------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Motor Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Motor Trip | OK | | |
| IC-3 | mt | Calibration | | Clock | 2362 |
| IC-4 | Respond | Calibration | JT | Source | M-229 |
| CRM | | Motor Trip | | Instr. respond | |

1:30 AM System with $R \leq 1$

1:35 PM Have added counters and control shim. Changed E-W spacing to 0.885.

Critical with ~ 280 sec per. period when shim is all the way in.
 Start Rossi- α at 2:36 PM. Bkgd. ratio $\sim 10/1$

Instrument readings

| | | |
|------|-----|-------------------------|
| IC-1 | 2.7 | (3×10^{-60}) |
| IC-2 | 7.8 | (3×10^{-60}) |
| IC-4 | 2.9 | |

Stop 4:45 PM.

Decay $\sim .880$

Expt 27 (cont'd)

1-4-63

Determine effect of $4 \times 4 \times 1$ " steel plate suspended parallel to South face at a distance of $29\frac{1}{2}$ " (min. 6" thick paraffin + polyethy 37" behind).

Instrument Check on 1-4-63 Source 10 mc δ

| | | | | | |
|------|-----------------------|-------------|------------|-----------------|-------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | clock | |
| IC-4 | Responds | Calibration | TA | Source | M-229 |
| CRM | | Meter Trip | | Instr. responds | |

Begin run at $8\frac{45}{AM}$

Bkgrd rate ~

Instr. readings IC-1 0.9 (10×10^{-10})IC-2 7.1 (3×10^{-10})

IC-4 3.5

Critical with tables separated 0.022 in.

Shut down $11\frac{0}{AM}$.

Decay ~ 870

Expt. 28

Eight ~20 kg U units in cubic array surrounded
by 1/2" thick paraffin as a reflector.

critical S.T.S is 1.250"

Instrument Check on 1-7-63 Source 10 mc K

| | | | | | |
|------|----------------------|-------------|------------|-----------|----------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | > 3×10^{-4} | Meter Trip | OK | Test Trip | OK |
| IC-2 | > 3×10^{-4} | Meter Trip | OK | | |
| IC-3 | | Calibration | | | |
| IC-4 | Responds | Calibration | JH | Source | M-229 |
| CRM | | Meter Trip | | Instr. | respond. |

1/2" paraffin on 5 sides (no top)

System is critical with tables separated 0.25"

Note exchanged source M-229 for M-43 (M-229 to K-25 via RL)
1-8-63 Expt. 28 (cont'd) changed spacing to 1.50 in.; 1/2" Paraffin refl.

Instrument Check on 1-8-63 Source 10 mc K

| | | | | | |
|------|----------------------|-------------|------------|-----------|-------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | > 3×10^{-4} | Meter Trip | OK | Test Trip | OK |
| IC-2 | > 3×10^{-4} | Meter Trip | OK | | |
| IC-3 | | Calibration | | Clock | |
| IC-4 | Responds | Calibration | JH | Source | M-43 |
| CRM | | Meter Trip | | Instr. | respond to source |

K < L by more than 1. -

Expt 28 (cont'd)

1-8-63

2:00 PM Changed E-W spacing to $1\frac{3}{8}$ " Box same size.
Subcritical: neg. period ~ 60 sec.

1-9-63 Expt 28 (cont'd)

Instrument Check on 1-9-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | |
| IC-4 | Response | Calibration | FA | Source | M-43 |
| CRM | | Meter Trip | | | Quies. response. |

changed spacing to $1\frac{7}{16}$ "

Critical with ~ 130 sec. pos. period.

R=1 with tables separated by 0.040 in.

Summary

add 0.010" to $1\frac{7}{16}$ " for just critical value.
This is for positive period and minor cracks in reflector (top).

S.T.S. = $1.448 \pm .005$ in.

Inside dimensions of box 11.956×11.376 in.

$V_0 = 68.3363$
 $V_1 = 203.269$ } $\Rightarrow F = 0.33616 \Rightarrow S = 1.424$ *calculated*

1-11-63

Exp 29

JH
C.C.8 unit array with 1" paraffin reflector
S.T.S. set at 1.98"Instrument Check on 1-11-63 Source 10 mc

| | | | | | |
|------|----------------------|-------------|------------|-----------|-------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | |
| IC-4 | Responds | Calibration | JH | | M-43 |
| CRM | | Meter Trip | | | response ok |

3⁴⁰/PM Critical with tables separated 4.1 revs.

1-14-63

Instrument Check on 1-14-63 Source 10 mc

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | check list ✓ |
| IC-4 | Responds | Calibration | JH | | M-43 |
| CRM | | Meter Trip | | | response ok |

8⁴⁵/AM Rechecked spacing E-W plane (1.98") readjusted
separation on movable table - critical at 10.35 revs.10²⁰/AM changed E-W spacing to 2.055" critical at 8.3 revs.

1-15-63

Expt. 29 (cont'd)

JH
C.C.

Changed spacing to 2250" - 1" paraffin reflector
 Instrument Check on 1-15-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Water Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Water Trip | OK | | |
| IC-3 | | Calibration | | | check list ✓ |
| IC-4 | Responds | Calibration | JH | | 11-43 |
| CRM | | Meter Trip | | | Response OK. |

8⁵⁰/ Subcritical by more than #1. - Paraffin reflector
 box has openings.

11³⁰/AM Adjusted box - $k < 1$ with neg. period of ~ 105 sec.

1²⁵/AM have added small pieces of paraffin along 4 corners
 of N + S faces (makes top and bottom reflector 15.5"
 long in N-S direction).

$k < 1$ with neg period ~ 478 sec.

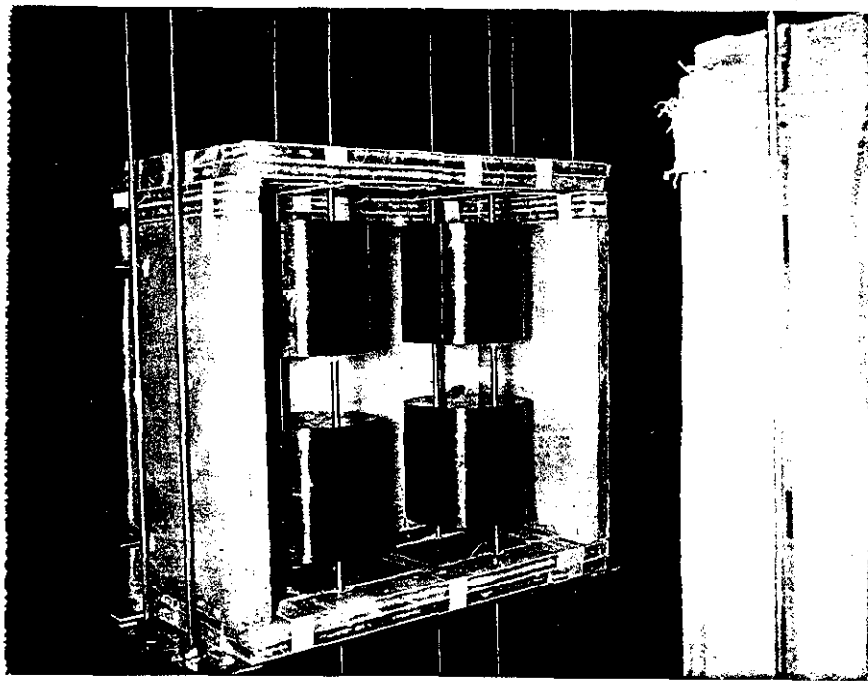
For $k = 1$ take S.T.S. to be $2.248 \pm .005$ " with 1"
 paraffin reflector.

1-16-63

Summary of Expt. 29

8 units with 19. Kg^{235}
critical with 1"-thick paraffin reflector
when S.T.S. is $2.248 \pm .005$ in.

Inside dimensions of paraffin box are
13.556" square
by 12.976" high.



Expr 30.

8 units in 3"-thick paraffin reflector S.F.S. set to 3.720"

Instrument Check on 1-18-63 Source 10 mc Y

| | | | | | |
|------|-----------------------|-------------|------------|-----------|---------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | check list ✓ |
| IC-3 | | Calibration | | | 11-43 |
| IC-4 | Responds | Calibration | JIT | | Instn respond |
| CRM | | Meter Trip | | | |

Critical with tables separated 1.97" (22.2 revs)

Positive period of 30.2 sec at 21.6 revs.

Instrument Check on 1-21-63 Source 10 mc Y

| | | | | | |
|------|-----------------------|-------------|------------|-----------|---------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | check list ✓ |
| IC-3 | | Calibration | | | 11-43 |
| IC-4 | Responds | Calibration | JIT | | Instn respond |
| CRM | | Meter Trip | | | |

Removed 1-in reflector - thickness now 2"0

critical at 0.550" sep. (8.8 revs).

Expt. 30 cont'd
8 units - 2 paraffin reflector - reset spacing to 4.0625"

1-22-63

Instrument Check on 1-22-63 Source 10 mcd

| | | | | | |
|------|-----------------------|-------------|------------|---------------|----|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | check list | ✓ |
| IC-4 | Responds | Calibration | JTT | M-43 | |
| CRM | | Meter Trip | | Quota respond | |

critical at 1.240" separation (tables 15.9 rows).

1-24-63

Reset spacing to 4.5625" - Extrapolated spacing is 4.55.

Instrument Check on 1-24-63 Source 10 mcd

| | | | | | |
|------|-----------------------|-------------|------------|---------------|----|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | check list | ✓ |
| IC-4 | Responds | Calibration | JTT | M-43 | |
| CRM | | Meter Trip | | Quota respond | |

3:17 pm Array subcritical by more than a dollar. 280 sec period (reg)

3:29 pm added $\frac{1}{2}$ " paraffin to top
array subcritical ~ 80 sec reg period.

Result of experiment is in right direction since spacing exceeds extrapolated value by .0125"

Expr 30 cont'd.

STS. $4\frac{9}{16}'' = 4.5625''$

8-units, three sides and bottom have 3"-thick paraffin refl.

top and south side " 6"-thick " "

Instrument Check on 1-25-63 Source 10 mc 8

1-25-63

| | | | | | |
|------|----------------------|-------------|------------|---------------|----|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | Check list | ✓ |
| IC-4 | Responds | Calibration | SW | OK-43 | |
| CRM | | Meter Trip | | Notes respond | |

Array slightly subcritical, negative period of ≈ 127 sec.

If this array were completely reflected by 6-in. of paraffin it would be slightly supercritical by $\approx 50\%$. Estimate of required spacing was $4.60''$ (6" paraffin) and result of experiment is in the right direction. Cf. p 57.

59 (reg)

1-28-63

Type 30

JTB
cc.

Units, 3" paraffin reflector, STS at 4.500 in.

Instrument Check on 1-28-63 Source 10 me δ

| | | | | | |
|------|----------------------|--------------|------------|-----------|-------------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | check list \checkmark |
| IC-4 | Responds | Calibration? | JL | | M-43 |
| GRM | | Meter Trip | | | Insts. respond |

9¹²/_{AM} Critical with tables separated 3.5 revs \equiv 0.175"
Top reflector very loosely fit.

9³⁹ Reset reflector on bottom and top
Critical with tables sep. 2.6 revs. \equiv .122"

10 AM Critical with tables sep. 2.7 revs \equiv .128"
Positive period " " 1.5 revs. \approx 6.70 sec. \equiv .066
AS = .062

11 AM Critical with tables sep 2.6 revs .122
 \approx 52 sec Positive Period " " 1.0 rev .032
.070

Epp 31

8 units, 6" paraffin reflector: S.T.S. 4.5937"

Instrument Check on 1-29-63 Source 10 meV

| | | | | | |
|------|----------------------|-------------|------------|-----------|-----------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | M-43 |
| IC-3 | | Calibration | | | Direct response |
| IC-4 | Responds | Calibration | ? JH | | check list ✓ |
| CRM | | Meter Trip | | | |

4PM Critical with tables sep. 7.9 revs ≈ 0.500 in
 ≈ 50.6 pos. period " " " 7.0 revs. ≈ 0.430 in

1-30-63 Reset spacing to 4.781 in

Instrument Check on 1-30-63 Source 10 meV

| | | | | | |
|------|----------------------|-------------|------------|-----------|------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2381 |
| IC-3 | | Calibration | | | M-43 |
| IC-4 | Responds | Calibration | ? JH | | Direct response. |
| CRM | | Meter Trip | | | check list |

Subcritical ≈ 80 sec. neg. period.

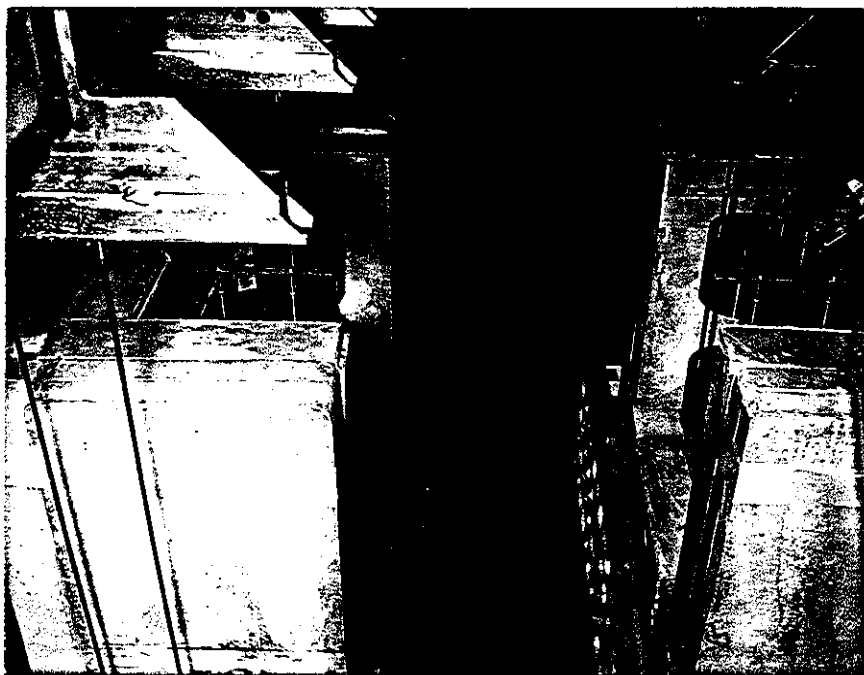
1-30-63

Expt. 31 cont'd.

^{3^o} Reset spacing to 4.78875" (4²⁷/₃₂")

R=1 tables together.





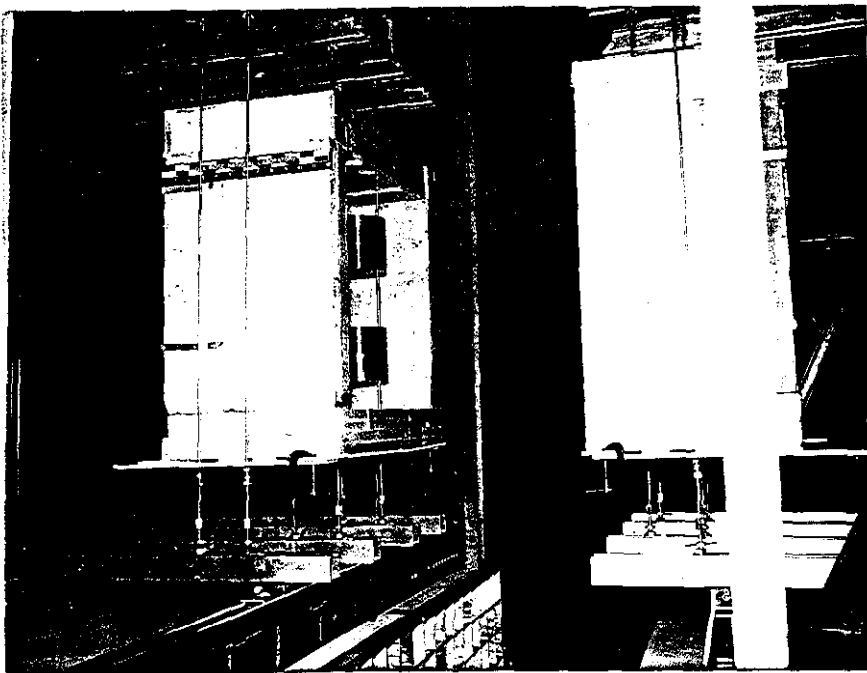
Expt 31

Summary: 8 units

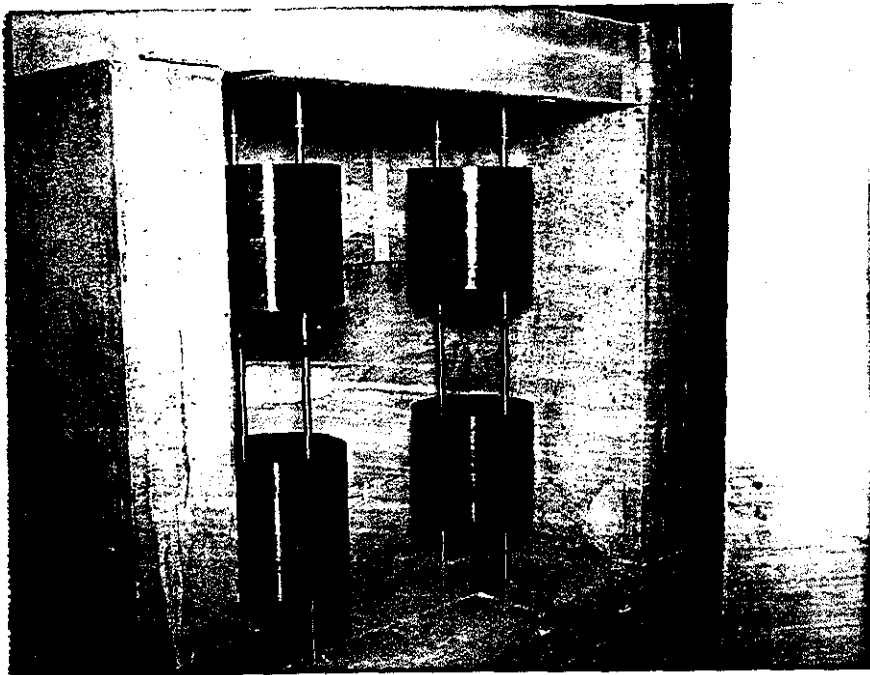
20.960 Kg U/unit

6" thick paraffin reflector

STS = 4.719 ± 0.005 in.



Expt. 32 →



Feb. 4, 1983

Expt. 32

8 units; 3" paraffin - STS $4\frac{17}{32}$ "
 Instrument Check on 2-4-63 Source 10 mcX

| | | | | |
|------|----------------------|-------------|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Clock 2382 |
| IC-3 | | Calibration | o | M-43 |
| IC-4 | Responds | Calibration | FW | Inst. resp. |
| CRM | | Meter Trip | | Check list ✓ |

Subcritical R=1 neg period ~ 164 sec.

2²⁵/_{PM}

Slight crack $\sim \frac{1}{4}$ " on west face.

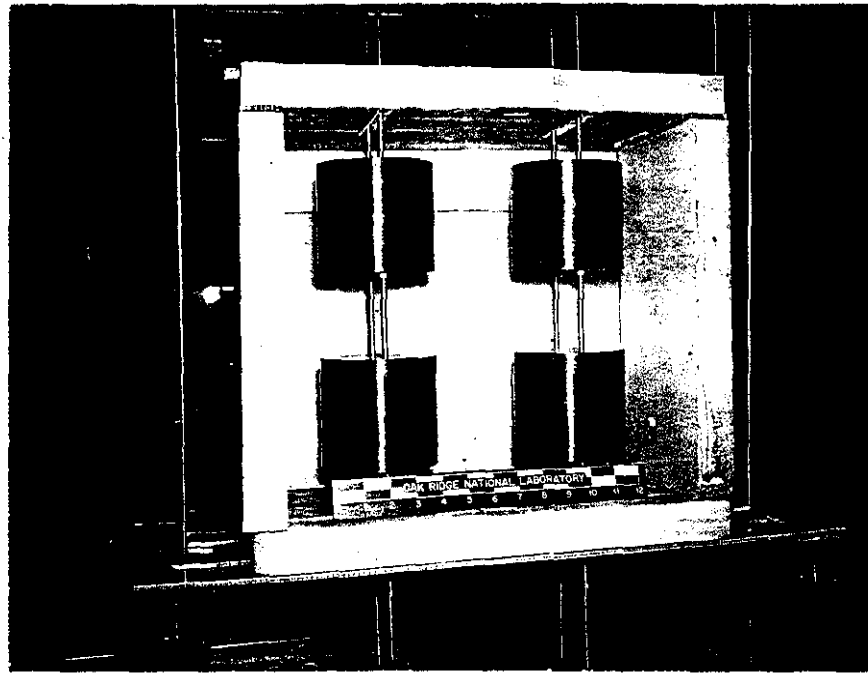
2³³/_{PM}

Corrected gap in reflector; also found STS between units on
 movable half slightly greater than $4\frac{17}{32}$ - have reset to $4\frac{17}{32}$.

R=1

Summary: 8 units 20.960 kgU/unit
 3-in-thick paraffin reflector
 S.T.S. = 4.531 ± 0.005

cf: Expt 30 pp 51-54.



Expt 33 ⇒

Expt. 33

8 units, $1\frac{1}{2}$ "-thick paraffin reflector; STS 3.0625"Instrument Check on 2-5-63 Source 10 mc γ

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | Clock 2383 |
| IC-3 | | Calibration | OK | | M-43 |
| IC-4 | Responds | Calibration | OK | | Inst. Resp. |
| CRM | | Meter Trip | | | Check list <input checked="" type="checkbox"/> |

2^{35} Critical with tables separated by 7.71 revs. 0.485 in. 11.84
 ≈ 76 sec. positive period @ 72 revs. (.445 in) Δ STS = .040 in.

2-6-63 Reset spacing to 3.234" ($3\frac{1}{4}$)Instrument Check on 2-6-63 Source 10 mc γ

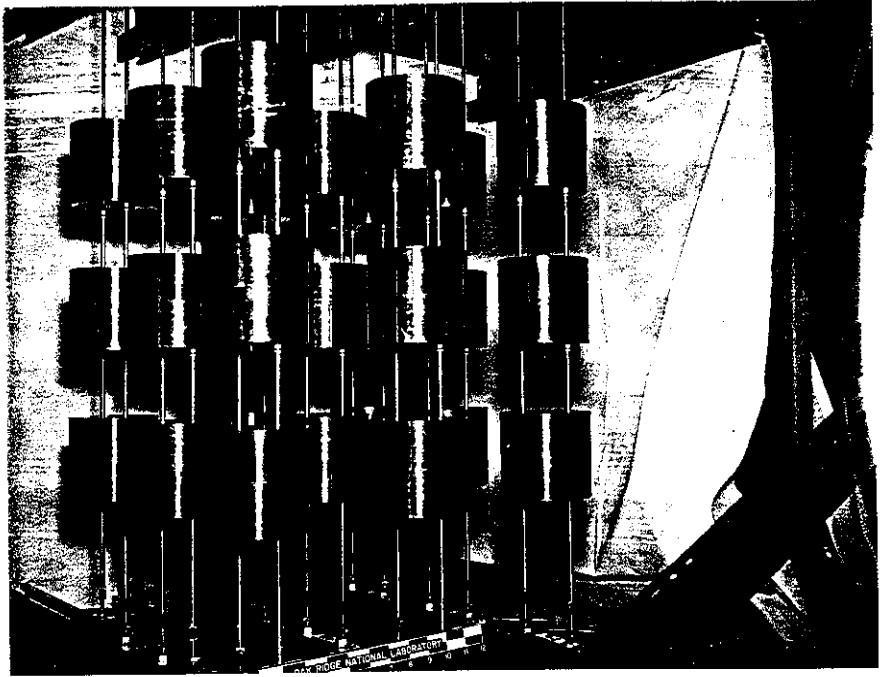
| | | | | | |
|------|-----------------------|-------------|------------|-----------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | M-43 |
| IC-4 | Responds | Calibration | OK | | Check list <input checked="" type="checkbox"/> |
| CRM | | Meter Trip | | | |

12^{53} pm R₁ Gap between reflector $\approx 1/16$ "

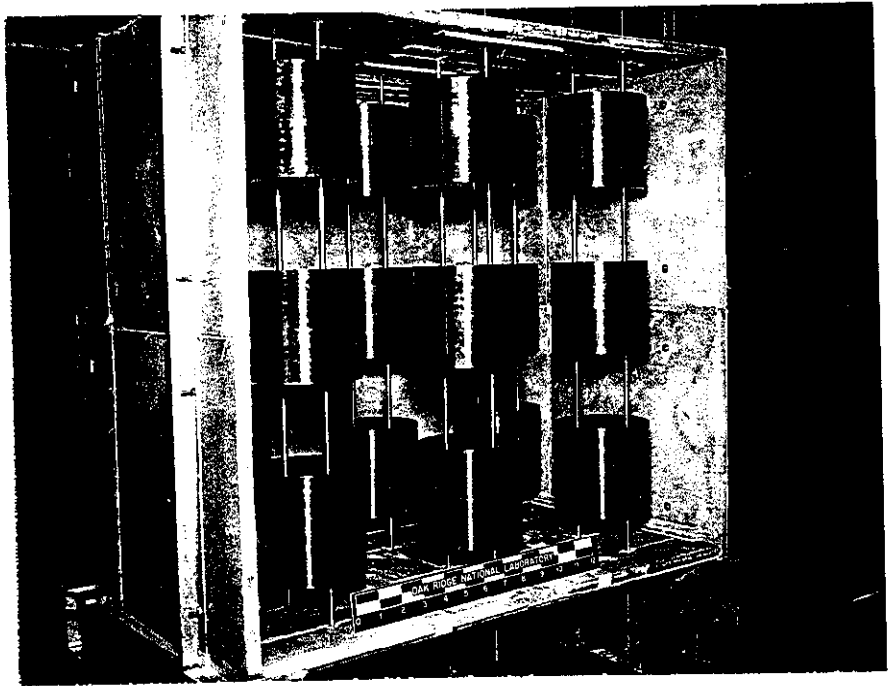
1^{23} pm R₂ neg. period ≈ 101 sec.

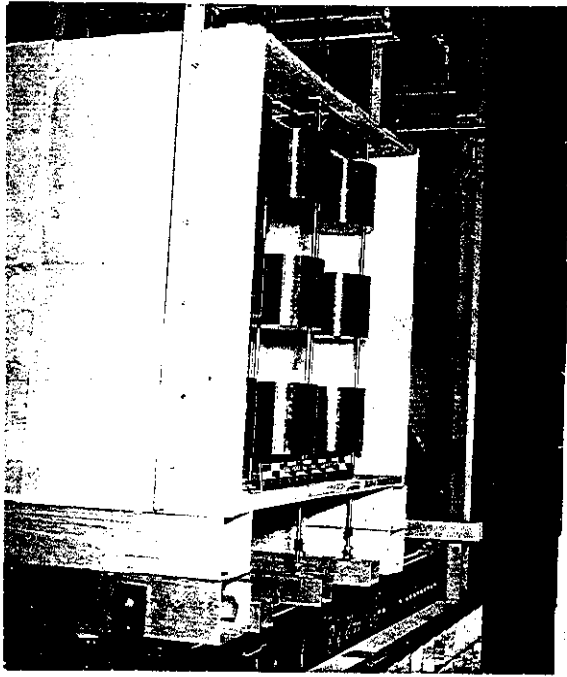
Summary: 8 units; 20.960 kg/unit
 $1\frac{1}{2}$ "-thick paraffin reflector
 STS = 3.231 ± 0.005 in.

Expr 34 =>



1/2" paraffin Reflector





Expt. 34

27 units, 1/2" paraffin reflector - S.T.S. = 3.3905" (Estimate 3.365")

Instrument Check on 1-11-63 Source 10 mc

| | | | | | |
|------|----------------------|-------------|------------|------------|------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Clock | 2384 |
| IC-3 | | Calibration | | M-43 | |
| IC-4 | Responds | Calibration | JIT | check list | ✓ |
| CRM | | Meter Trip | | | |

11/2 pm Five sides in place, no top, $R < 1$ multiplication ~ 5 ; $\ln N = 0.018$
top and base $\sim 1/4$ " too wide.

2/2 pm Complete reflector: $R < 1$ neg period ~ 89 sec. Bottom reflector
 $\sim 3/16$ " too close.

1-12-63 Reset spacing to 3.375"
Instrument Check on 1-12-63 Source 10 mc

| | | | | | |
|------|----------------------|-------------|------------|---------------|------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Clock | 2385 |
| IC-3 | | Calibration | | M-43 | |
| IC-4 | Responds | Calibration | JIT | Inst. Respond | |
| CRM | | Meter Trip | | check list | ✓ |

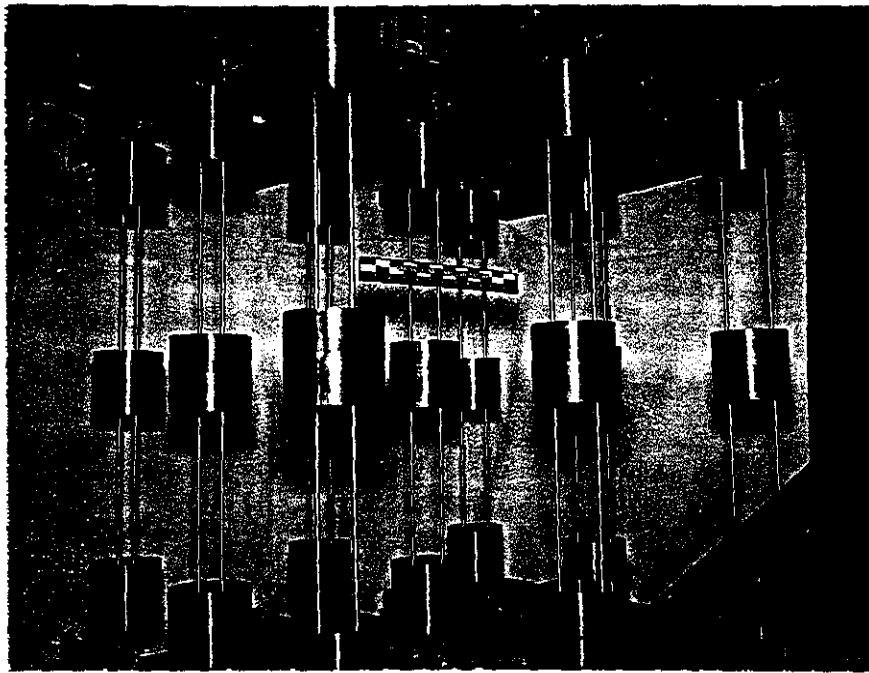
148/1 pm $R < 1$, neg period ~ 84 sec.

2 1/2 pm Adjusted spacing between units in N-S plane (10 units too large)
closed crack in bottom reflector.

$R < 1$ neg period ~ 98 sec.

unit arrangement
on pp 31, 32

| | |
|---------|-------------------------------|
| Summary | 27 units, 20.877 kg/unit |
| | 1/2" paraffin reflector |
| | S.T.S. = 3.365 \pm 0.005 in |



original
attempt 9.72"

Original Estimate of STS was 9.718"

Critical STS 7.538" see p.70.

Expt 35

27 units ; 6" paraffin reflector S.T.S = 9.720"

Instrument Check on 2-18-63 Source 10 mc /

9.72"

| | | | | |
|------|----------------------|-----|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | OK | | Clock 2386 |
| IC-3 | | | | M-43 |
| IC-4 | Responds | JIT | | check list ✓ |
| CRM | Meter Trip | | | |

Top reflector incomplete between table halves

Last 1" on bottom reflector $k < 1$, ~~M-3~~

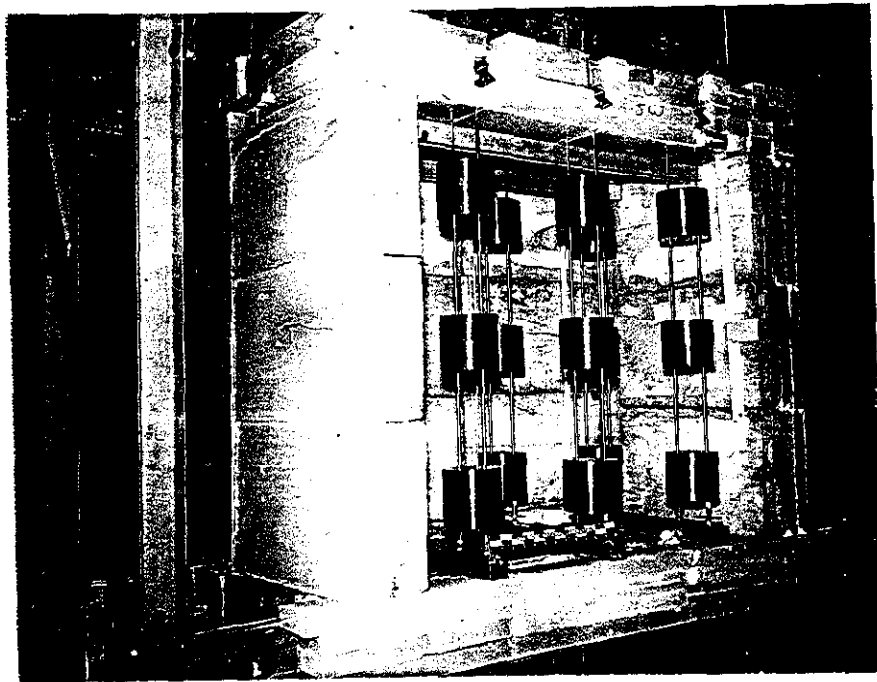
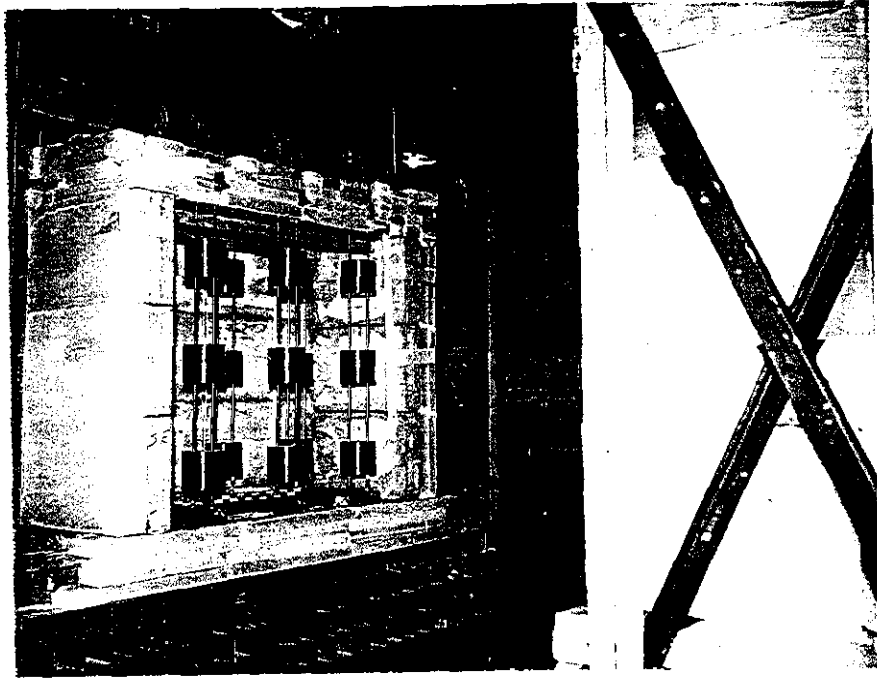
Instrument Check on 2-20-63 Source 10 mc /

| | | | | |
|------|----------------------|---------------|------------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip OK | | |
| IC-3 | | | | check list |
| IC-4 | Responds | JIT | | M-43 |
| CRM | Meter Trip | | | |

Reset Spacing to 4.5"

$k < 1$ M ~ 2

66



Exper 35 cont'd.

Instrument Check on 2-25-63 Source 10mc

| | | | | | |
|------|----------------------|-------------|------------|-----------|----|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | |
| IC-4 | Responds | Calibration | JTT | | |
| CRM | | Meter Trip | | | |

Spacing reset to 9"

8:40 AM Top reflector incomplete - checking alignment + possible critical.

8:50 AM Together $K < 1$

10:00 AM Top completed $K < 1$

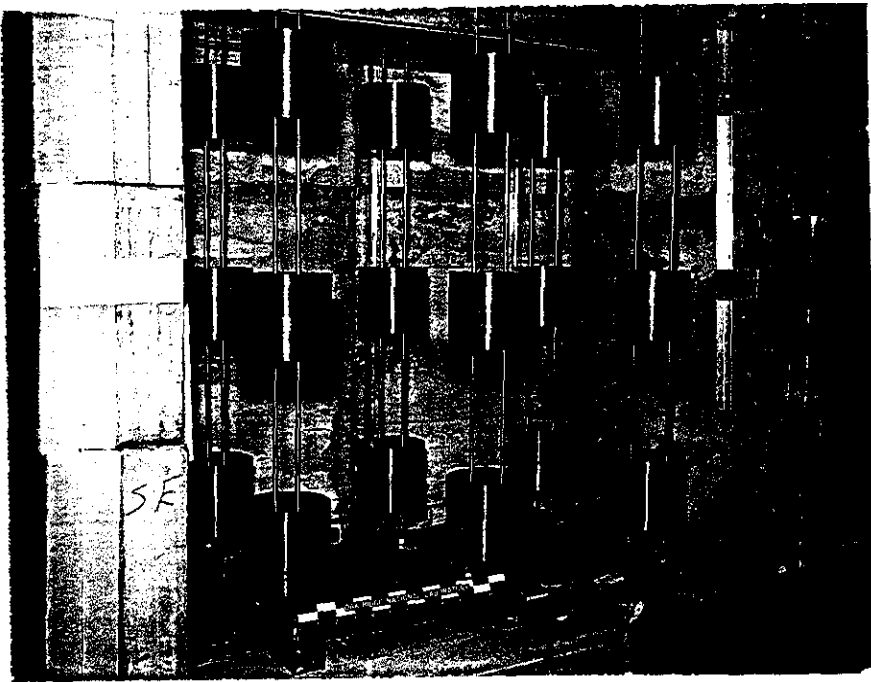
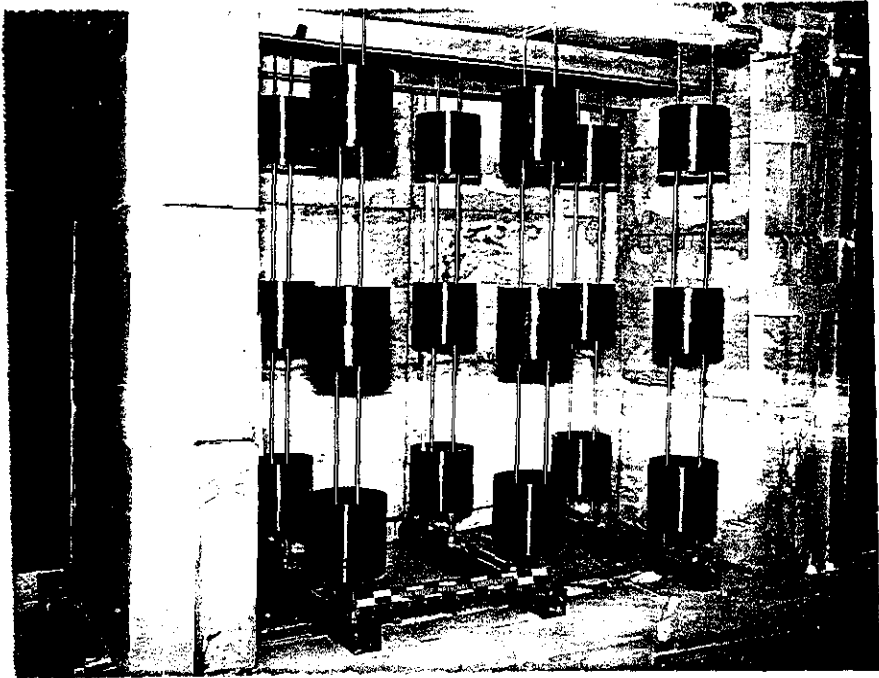
2-26-63

Reset spacing to $7 \frac{3}{4}$ "

Instrument Check on 2-26-63 Source 10mc

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | |
| IC-3 | | Calibration | | | Large Source |
| IC-4 | Responds | Calibration | JTT | | check list |
| CRM | | Meter Trip | | | |

Partial 3"-thick Paraffin reflector $K < 1$, $M = 2$.



Exp. 35 cont'd

2/27/63

27 units, 6" paraffin reflector STS = 7.750"

Instrument Check on 2-27-63 Source 10 mc ✓

| | | | | |
|------|----------------------|-------------|------------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | |
| IC-3 | | Calibration | | Clock 2391 |
| IC-4 | Response | Calibration | JH | M-43 |
| CRM | | Meter Trip | | Check list |

10¹⁵ R < 1 M ~ 410²⁵ Have moved E-W planes an average of 1/16" closer.

R < 1 M ~ 4

2/28/63

Reset spacing to 7.500"

Instrument Check on 2-28-63 Source 10 mc ✓

| | | | | |
|------|----------------------|-------------|------------|--------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | |
| IC-3 | # | Calibration | | Clock |
| IC-4 | Response | Calibration | JH | M-43 |
| CRM | | Meter Trip | | Inst. check list ✓ |

11 AM With 3" reflector on 6"-thick base M ~ 4

2 PM With 6" reflector, $k \geq 1$ positive period when together within 1 mil ~ 293 sec.

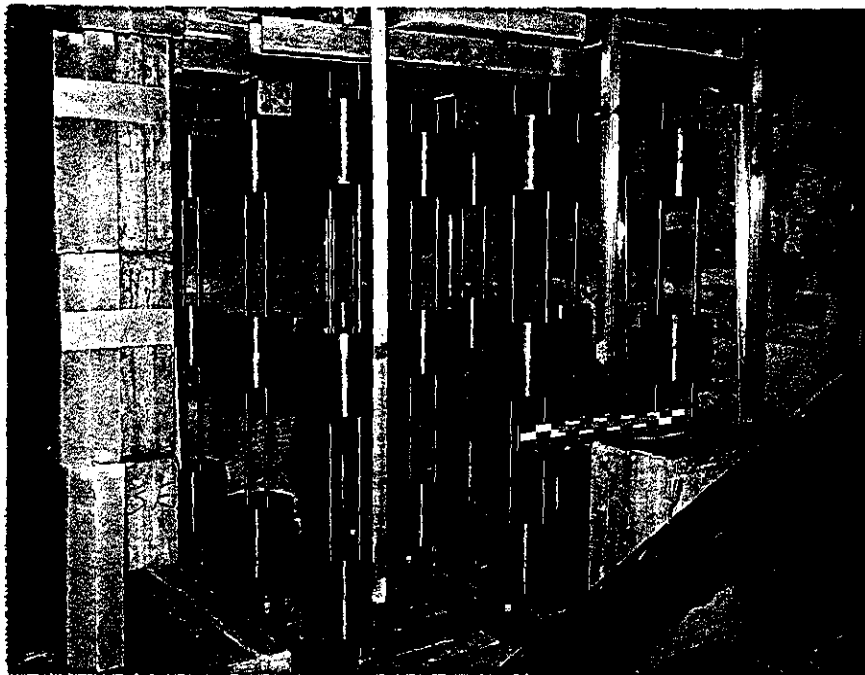
STS 7.538 ± .005 (over)

Expr. 35

Summary

27 units 20.877 $R_{\frac{0(93.2)}{\text{unit}}}$

6" paraffin Reflector

S.T.S. = 7.538 \pm .005 in.

Expt 35 A

Have placed a sheet of $\frac{1}{8}$ " thick plexiglas on movable table \rightarrow it is midway between units when tables are together. the sheet is $\sim 35 \times 55$ inches sq.

Instrument Check on 3-1-63 Source 10 mc δ

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | |
| IC-3 | $> 3 \times 10^{-11}$ | Calibration | | | Clock 2393 |
| IC-4 | Response | Calibration | JT | | M-43 |
| CRM | | Meter Trip | | | check list <input checked="" type="checkbox"/> |

$R > 1$ when tables separated 5.8 revs ($0.350''$) pos. period ~ 182 sec.
 $R = 1$ " " " 6.7 revs. ($0.408''$)
 $\Delta s = 0.058''$

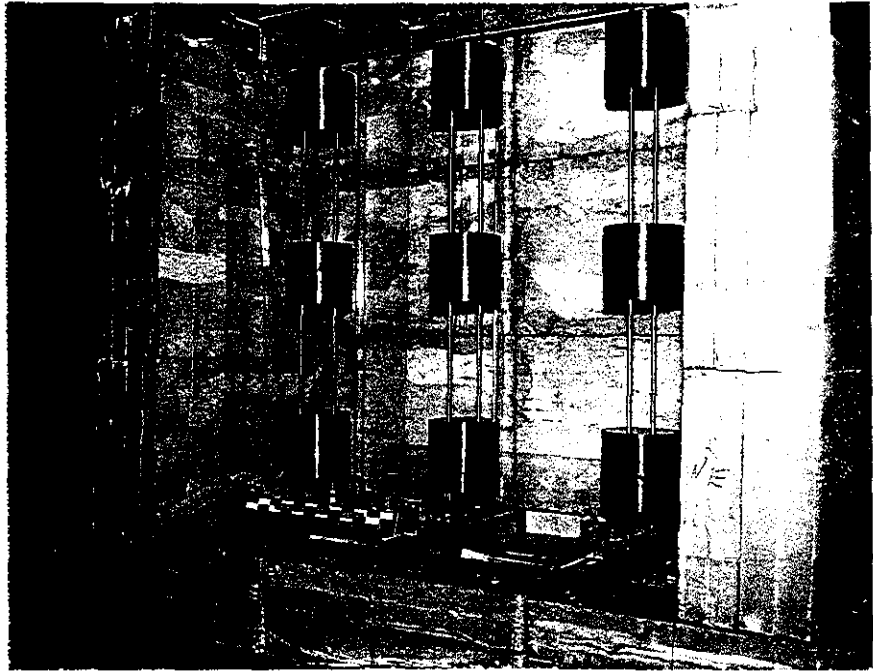
Removed Plexiglas

$R > 1$ when tables together 000 revs pos. period ~ 160 sec
 $R = 1$ when tables separated 3.3² revs ($0.157''$)
 $R < 1$ when tables separated 6.7 revs ($0.408''$) neg. period ~ 99 sec.
 $\Delta s = 0.251''$

Extrapolation of $R = 1$ data yields spacing of $7.538 \pm .005''$
 Compare with expts. 30, 31 and 32.

E-pr. 35 A

Effect of moderator in array



Insertion of $\frac{1}{8}$ "-thick sheet of Plexiglas between movable and fixed table. Effect is to increase reactivity of array. Assuming linear relationship between period and displacement, estimate $\frac{1}{4}$ increase in spacing between units is required to close tables.

Exp. 36

27 units; 3" reflector of paraffin STS = $7\frac{3}{8}$ "

Bottom reflector $\frac{1}{8}$ " too far from bottom of units

Instrument Check on 3-6-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2385 |
| IC-3 | | Calibration | | | M-43 |
| IC-4 | Responds | Calibration | JH | | check list ✓ |
| CRM | | Meter Trip | | | |

119^u $k \leq 1$ tables together neg period ~ 108 sec.

Checked spacing, readjusted side reflector, which was $\sim \frac{1}{4}$ " too far out on one side and removed visible cracks.

Several cracks, minor, remain in sides and unit must be completely prevented from providing leakage paths.

112^o $k \leq 1$ tables together neg period ~ 190 sec.

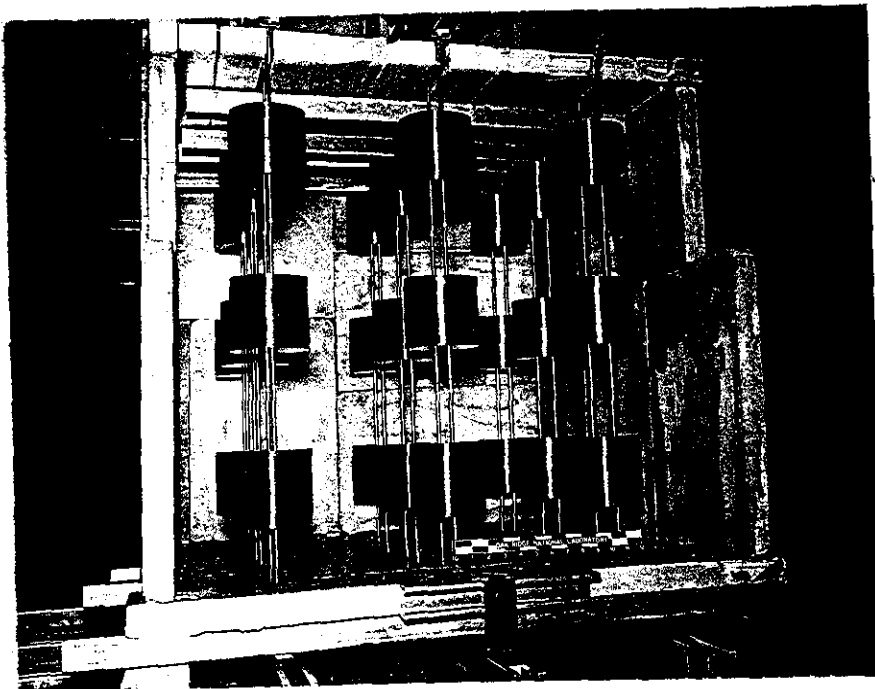
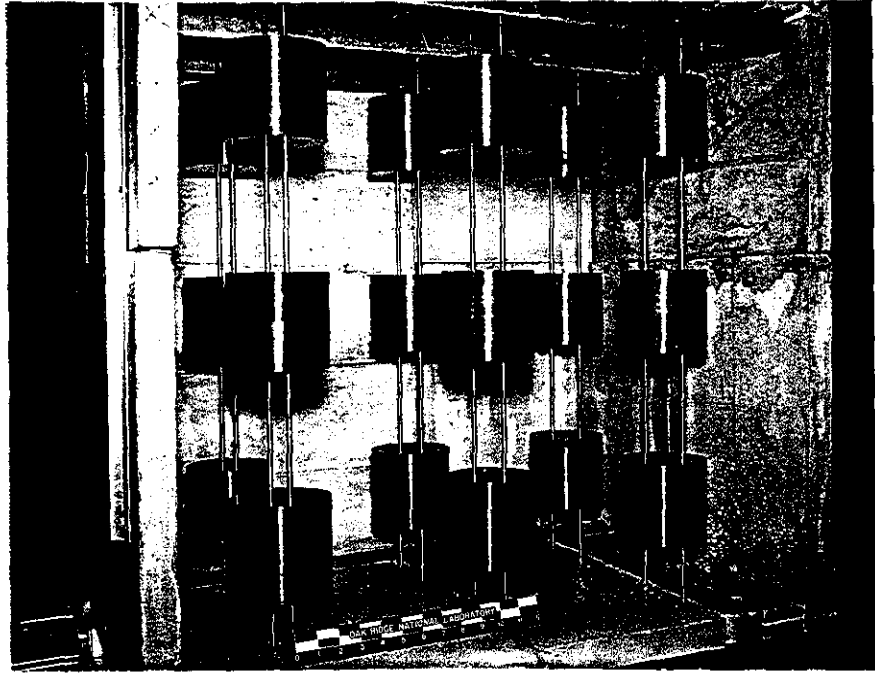
take $k=1$ when STS = $7.370 \pm .005$ "

Conclusion:

27 units 20.877 Rg/unit

3" paraffin reflector

STS = $7.370 \pm .005$ "



Expr. 37

27 units; $1\frac{1}{2}$ "-thick paraffin reflector STS = $5\frac{57}{64}$ "Instrument Check on 3-8-63 Source 10 mc 8

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Test Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2397 |
| IC-3 | | Calibration | | | H-43 |
| IC-4 | Responds | Calibration | JH | | check list ✓ |
| CRM | | Meter Trip | | | |

$R \pm 1$ neg period ~ 80 sec - check spacing and reflector cracks.

Found units in N-S plane with spacing $\sim 1/16$ " too large due to fitting box.

Reset spacing and reduced size of cracks.

$R \pm 1$ neg period ~ 85 sec.

3/11/63

Reset spacing to $5\frac{13}{16}$ "Instrument Check on 3-11-63 Source 10 mc 8

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Test Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2399 |
| IC-3 | | Calibration | | | H-43 |
| IC-4 | Responds | Calibration | JH | | check list ✓ |
| CRM | | Meter Trip | | | |

$R = 1$ Tables together.

| |
|---|
| Summary |
| 27 units; 20.877 kg (49.32) / unit |
| $1\frac{1}{2}$ -in-thick paraffin reflector |
| STS = 5.8125 ± 0.005 in. |

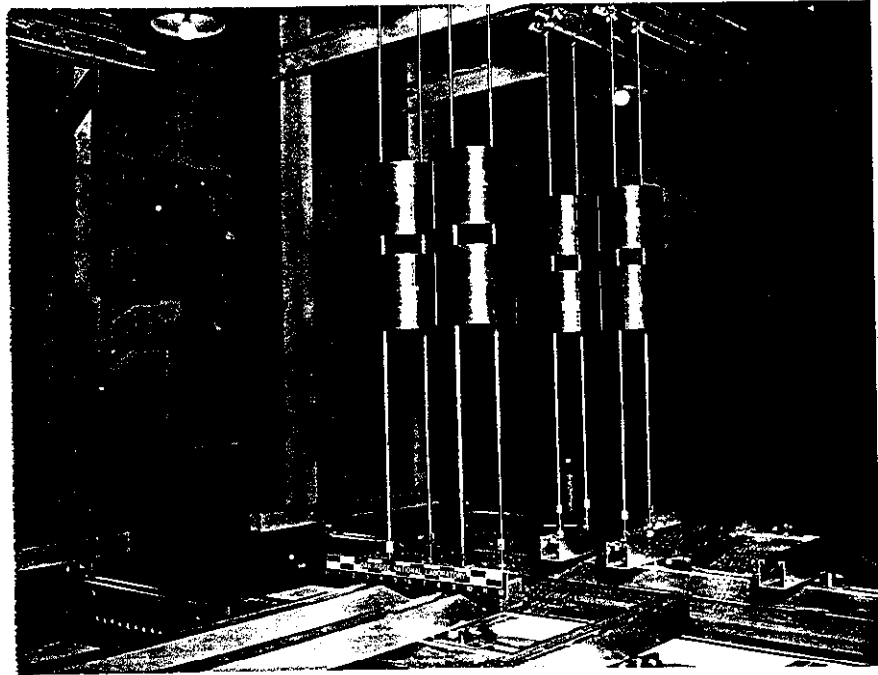
Expt 38

Purpose of this experiment is to determine the center-to-center spacing in place of surface-to-surface distance. The first attempt is to equate cell volumes, i.e. let x be C.T.C and s the S.T.S. then

$$(D+s)^2(H+s) = x^3$$

from p.22 obtain s then $x = 5.306''$

This requires separation between flat surfaces to be 1.076''
and separation between cylindrical surfaces to be 0.786''



Expr. 38

8 units; $20.960^{k \geq 1}$ unit; unreflected C.T.C. = 5.318" ($1\frac{5}{64}$ " between flat surfaces of units)

Instrument Check on 3-13-63 Source 10mc γ

| | | | | | |
|------|------------------------|-------------|------------|-----------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ " | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ " | Meter Trip | OK | | Clock 2399 |
| IC-3 | | Calibration | | | M-43 |
| IC-4 | Responds | Calibration | JH | | check list <input checked="" type="checkbox"/> |
| CRM | | Meter Trip | | | |

10^{80} PH $k < 1$ neg. period ~ 82 sec. when tables together

Decreased spacing between E+W units by .010"

11^{94} $k \leq 1$ neg. period ~ 126 sec. when tables together

Decreased spacing between N+S units by .010"

12^{10} PH $k > 1$ pos. period ~ 76 sec. when tables together

$$Q = 11.94$$

Dimensions of cell $5.308 \times 5.308 \times 5.318$ at $k \geq 1$

Separation between cyl. surfaces 0.778"

Separation " flat " 1.078"

Conclusion: Within accuracy with which units can be located the lattice volume of a unit is the same for C.T.C. & STS separations

Expt 39

Purpose: Examine safety of assembly operation. Determine length of unreflected cylinder 4.530" Diameter.



Exp 39

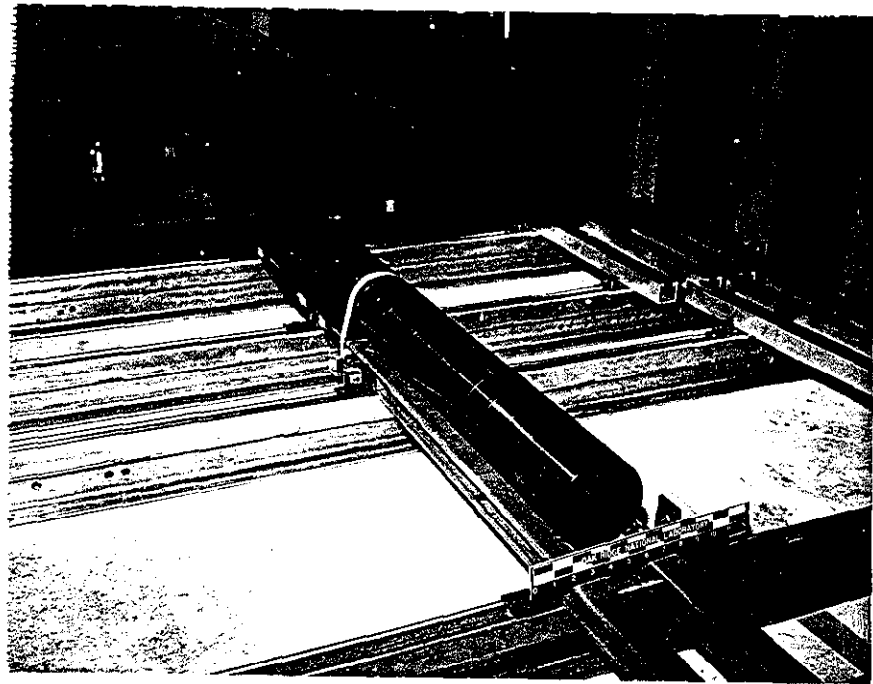
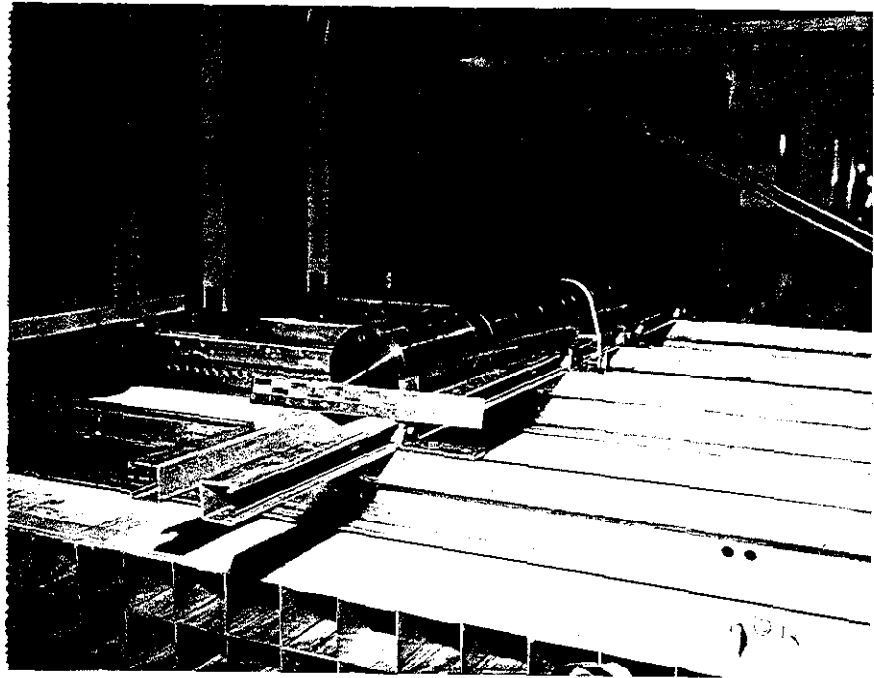
Single Cylinder: 4.530" Dia.

Instrument Check on 3-14-63 Source 10 mCi

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Water Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Water Trip | OK | | Clock - 2401 |
| IC-3 | | | | | M |
| IC-4 | Response | Calibration | JT | | checklist ✓ |
| CRM | | Water Trip | | | |

| | ⑦ | ⑥ | ③ | ① | ② | ④ | ⑤ | 8 | | | | | | |
|---------|--------------------------------------|-------------------|--------|-----------------|------|------|------|------|------|------|------|------|------|--|
| | 2185 | 2193 | 2197 | 2198 | 2204 | 2176 | 2189 | 2205 | 2200 | 2162 | 2172 | 2168 | 2196 | |
| | Water Trip | | | | | | | | | | | | | |
| | J 1-C2 (10×10^{-12} scale) | | | | | | | | | | | | | |
| 11.8K ① | $k < 1$ | $M \approx 2$ | | length = 12.72" | 6 | 4.30 | | 1 | | | | | | |
| 11.5 ② | $k < 1$ | $M \approx 2$ | | length = 14.84" | 7 | 4.90 | | .88 | | | | | | |
| 11.30 ③ | $k < 1$ | $M \approx 2^+$ | | = 16.96" | 8 | 5.20 | | .83 | | | | | | |
| 13.0 ④ | $k < 1$ | $M \approx 2.2$ | | = 19.08" | 9 | 5.55 | | .77 | | | | | | |
| 14.5 ⑤ | $k < 1$ | $M \approx 2.4$ | | = 21.20" | 10 | 5.90 | | .73 | | | | | | |
| 200 ⑥ | $k < 1$ | $M \approx 2.4^+$ | } same | = 23.32" | 11 | 6.15 | | .70 | | | | | | |
| 215 ⑦ | $k < 1$ | $M \approx 2.4^+$ | | = 25.44" | 12 | 6.20 | | .69 | | | | | | |
| 230 ⑧ | $k < 1$ | $M \approx 2.5$ | | = 27.56" | 13 | 6.30 | | .68 | | | | | | |

| Number | Mass |
|-------------|--------|
| 2181 | 10 422 |
| 2158 | 10 469 |
| 2177 | 10 424 |
| 2175 | 10 371 |
| 2164 | 10 408 |
| 2202 | 10 445 |
| 2155 | 10 462 |
| 2156 | 10 498 |
| 2194 | 10 479 |
| 2172 | 10 506 |
| 2193 | 10 473 |
| 2189 | 10 486 |
| <u>2168</u> | 10 490 |
| 2205 | 10 486 |
| 2152 | 10 469 |
| 2197 | 10 455 |
| 2195 | 10 483 |
| 2190 | 10 443 |
| 2170 | 10 491 |
| 2200 | 10 461 |
| 2162 | 10 519 |
| 2185 | 10 427 |
| 2159 | 10 380 |
| 2184 | 10 404 |
| 2167 | 10 365 |
| 2180 | 10 501 |



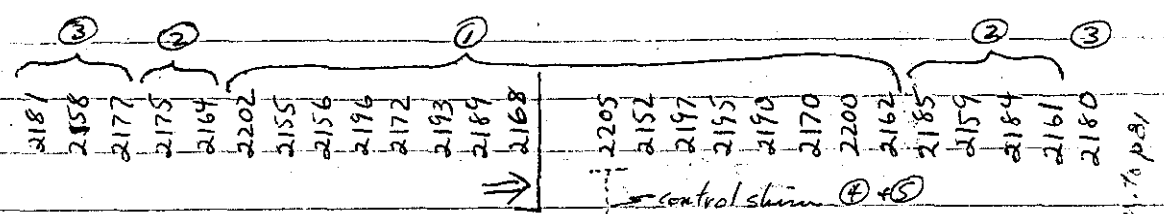
271 817 kg U

253 333 kg U-235

Expt 39

Instrument Check on 3-15-63 Source 10mcV

| | | | | | |
|------|---------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $>3 \times 10^{-4}$ | Motor Trip | OK | Fast Trip | OK |
| IC-2 | $>3 \times 10^{-4}$ | | OK | | Check 2403 |
| IC-3 | | | | | M- |
| IC-4 | Responds | Calibration | III | | check list ✓ |
| CRM | | Meter Trip | | | |

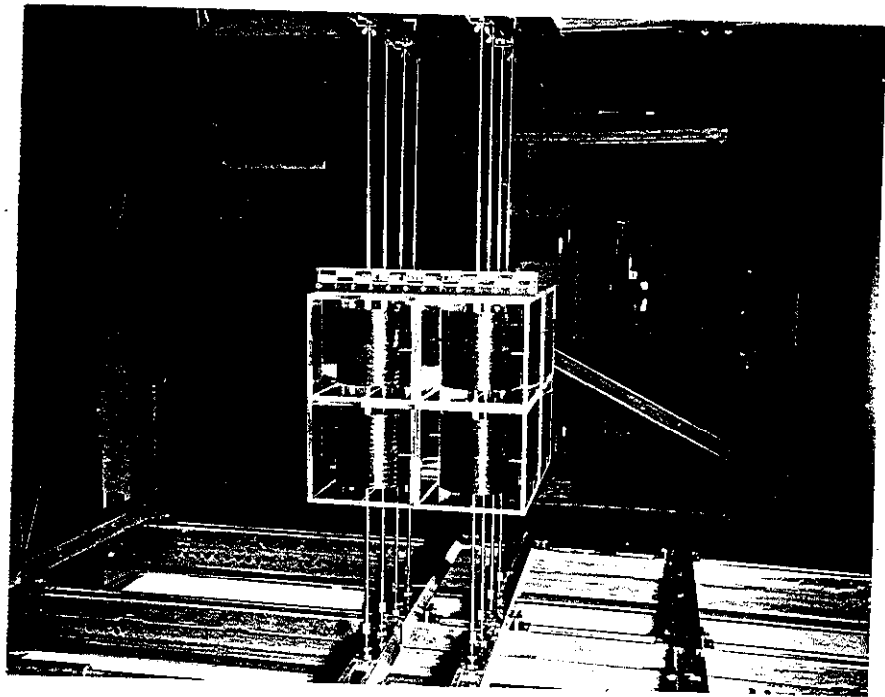
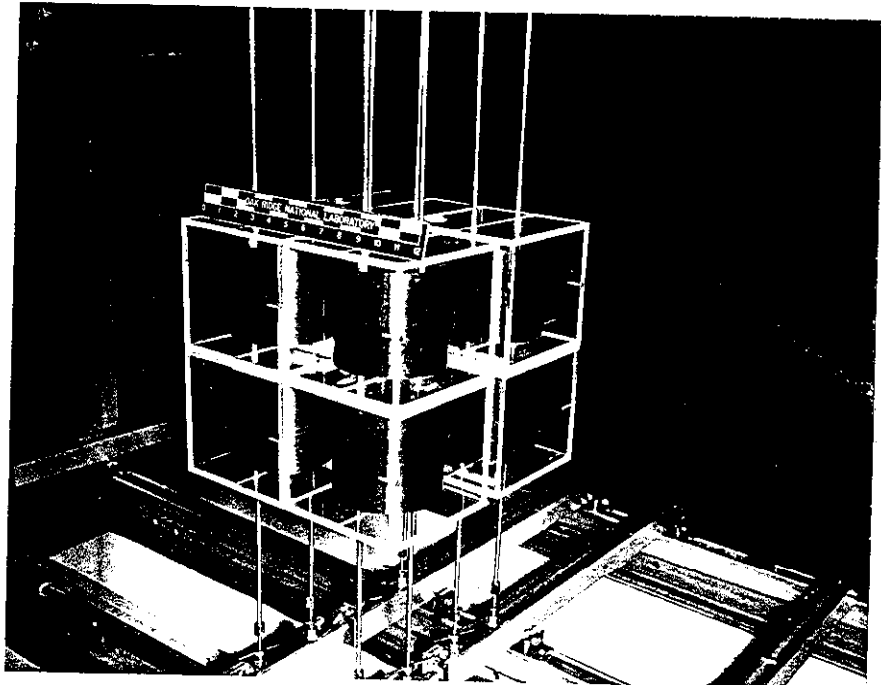


| | | | IC-2 (10×10^{-12} scale) | H ⁻¹ | Norm. to p. 81 |
|---|---------|----------------|------------------------------------|-----------------|----------------|
| ① | $k < 1$ | length = 33.92 | 5.70 | 16 | .605 .66 |
| ② | $k < 1$ | " = 46.64 | 6.00 | 22 | .575 .63 |
| ③ | $k < 1$ | " = 55.12 | 6.00 | 26 | .575 .63 |
| | | $w/d = 12.17$ | | | |

Added control shim of $\frac{1}{4} \times 2\frac{7}{8} \times 2\frac{7}{8}$ aluminum $\frac{1}{2}$ " from West side of unit 2205

| | | | | | |
|---|---|-----------------|------|---|----------|
| ④ | $k < 1$ | length = 55.12 | 6.00 | | .575 .63 |
| ⑤ | Replaced aluminum shim by Plexiglas $1 \times 2\frac{7}{8} \times 2\frac{7}{8}$ | | | | |
| | $k < 1$ | length = 55.12 | 6.15 | | .561 .61 |
| | Removed all but 6 units | | | | |
| | $k < 1$ | length = 12.72" | 3.45 | 1 | .10929 |

← Conclusion: There is minor reflection due to support structure therefore 4.53" diameter is less than infinite cylinder diameter



Experiment 40

8 units; 20.960 kg UC93.2/unit. in $\frac{1}{4}$ " Plexiglas boxes. STS = $1\frac{13}{32}$ Instrument Check on 4-22-63 Source 10mcX

| | | | | | |
|------|----------------------|-------------|------------|-----------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | | | Clock 2422 |
| IC-3 | | Calibration | | | M=230 |
| IC-4 | Responds | Calibration | JH | | Check list <input checked="" type="checkbox"/> |
| CRM | | Meter Trip | | | |

1 box on lower units of subassemblies 1 and 2 $\Rightarrow k < 1$, $M \approx 2$
 boxes on units of " " " $\Rightarrow k < 1$, $M \approx 4$
 boxes on all units: $k = 1$ at 0.250" table separation
 $k > 1$ at 0.233" positive period ≈ 128 sec.

Instrument Check on 4-23-63 Source 10mcX

| | | | | | |
|------|----------------------|-------------|------------|-----------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2422 |
| IC-3 | | Calibration | | | |
| IC-4 | Responds | Calibration | JH | | |
| CRM | | Meter Trip | | | |

Reset spacing to $1\frac{43}{64}$ " 1.672 $k < 1$ negative period ≈ 305 sec.Take $k = 1$ at STS = 1.669 ± 0.005 "

Summary 8 units: 20.960 kg UC93.2/unit

Each unit in $\frac{1}{4}$ " Plexiglas boxes 6.13 x 6.13 x 5.84 in.STS = 1.669 ± 0.005

see p. 113

Exp. 40.

Plexiglas boxes were removed and replaced.

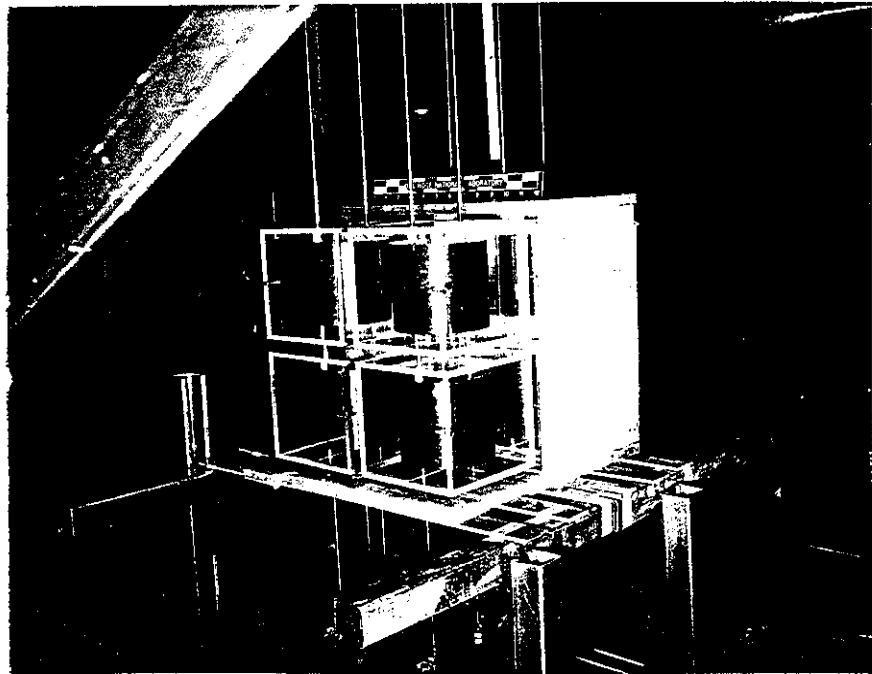
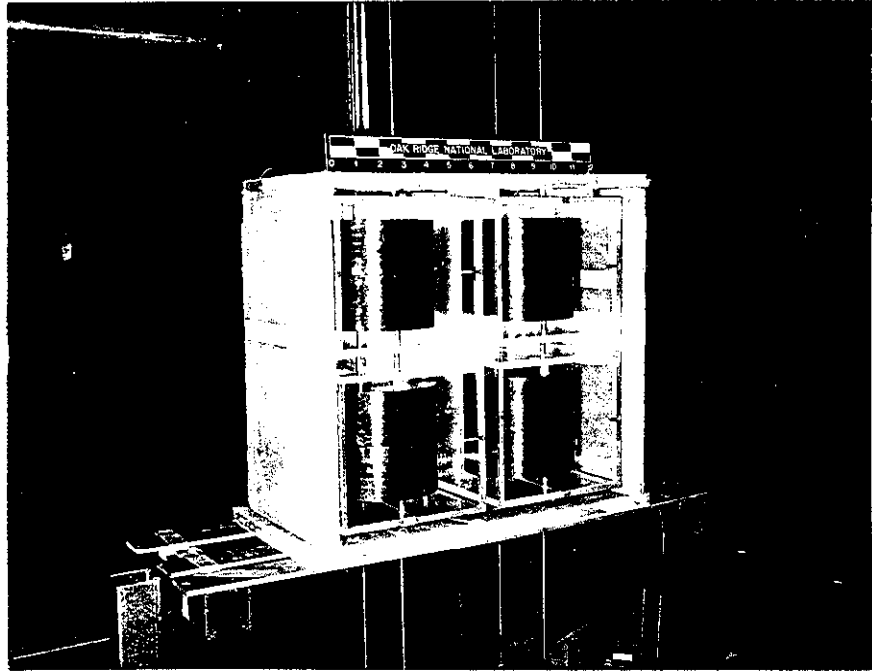
$k < 1$ ~~positive~~ ^{negative} period ≈ 212 sec.

Fabricated $\frac{1}{16} \times \frac{1}{4}$ strips to fill void between boxes.

$k < 1$ negative period ≈ 368 sec.

Conclusion: May consider array as having
a $\frac{1}{4}$ -in-thick Plexiglas reflector and
 $\frac{1}{2}$ -in-thick Plexiglas moderator.

$k = 1$ at STS = 1.669 ± 0.005 .



Experiment 41

8 units; 20.960 kg $U^{235.2}$ /unit; units in $\frac{1}{4}$ " Plexiglas boxes; Array in $\frac{1}{2}$ " paraffin Refl.

Instrument Check on 4-24-63 Source 10 mc γ

| | | | | |
|------|----------------------|-------------|------------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter TRMS | OK | Test Trip |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Clock 2423 |
| IC-3 | | Calibration | | M-230 |
| IC-4 | Responds | Calibration | J11 | check list <input checked="" type="checkbox"/> |
| CRM | | Meter Trip | | |

$$STS = 2 \frac{9}{32}''$$

5.5 pos period

$k > 1$ positive period ~ 41 sec when tables ^{6.2} separated 0.255"

$k = 1$ tables separated 0.365"

Comparison of experiments II-6 and I-28 \rightarrow estimate required added spacing to be between .029 and .047. Since the original estimate of spacing was $25/16$ " take SFS at $k=1$ to be this value.

Summary

8 units 20.960 kg $U^{235.2}$ /unit

units in $\frac{1}{4}$ -in-thick Plexiglas boxes

6.13 x 6.13 x 5.84 - inches.

Array reflected by $\frac{1}{2}$ -in-thick paraffin

$$STS = 2.313 \pm 0.010$$

Experiment 42

Instrument Check on 4-25-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock-2424 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | J11 | | check list ✓ |
| CRM | | Meter Trip | | | |

8 units; 20.960 kg UC93.2/unit in $\frac{1}{4}$ "-plexiglas boxes

Array Reflected by 3" paraffin.

STS 5.844

R < 1

Reset spacing to $5\frac{3}{32}$ R < 1.

4-29-63 Reset spacing to 4.5"

Instrument Check on 4-29-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock-2424 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | J11 | | check list ✓ |
| CRM | | Meter Trip | | | |

R > 1 positive period ~ 26 sec at 0.950" separation 26 $\frac{1}{2}$ ✓R = 1 at 1.05" separation 2.5 $\frac{d}{in}$

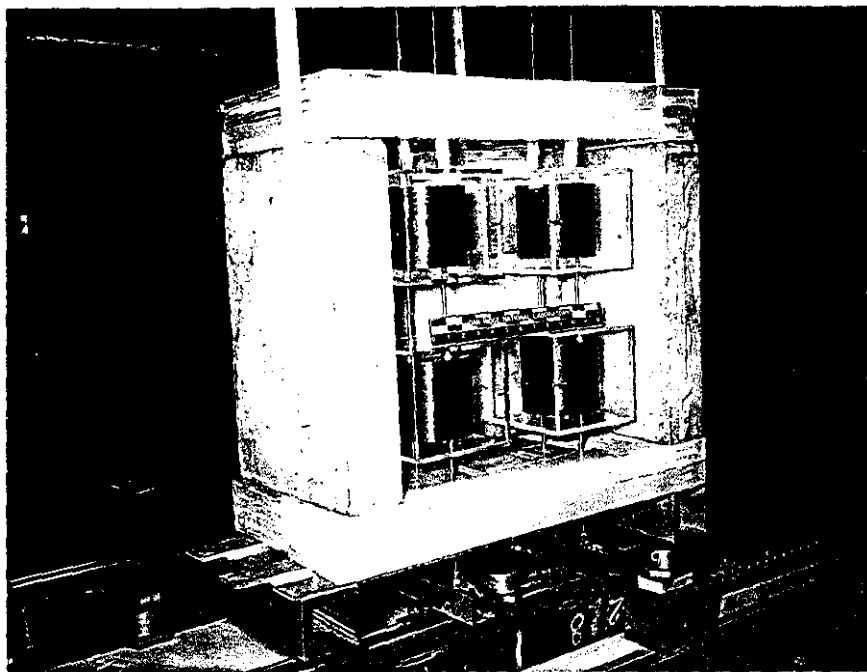
Reset Spacing to 4.813"

R > 1 positive period ~ 43 seconds at 0.502" separation

R = 1 at 0.584" sep.

2.10 $\frac{d}{in}$ 1724Extrapolate to 4.960 ± 0.010 "

4/29/



Summary: $STS = 4.950 \pm 0.010$ in.
8 units $20.960 \text{ Kg U}^{235.2}$ / unit
Each unit in $\frac{1}{4}$ -in-thick Plexiglas Box
O.D. Box $\equiv 6.13 \times 6.13 \times 5.84$ in.
3-in-thick paraffin reflector

4/29/63
2 PM

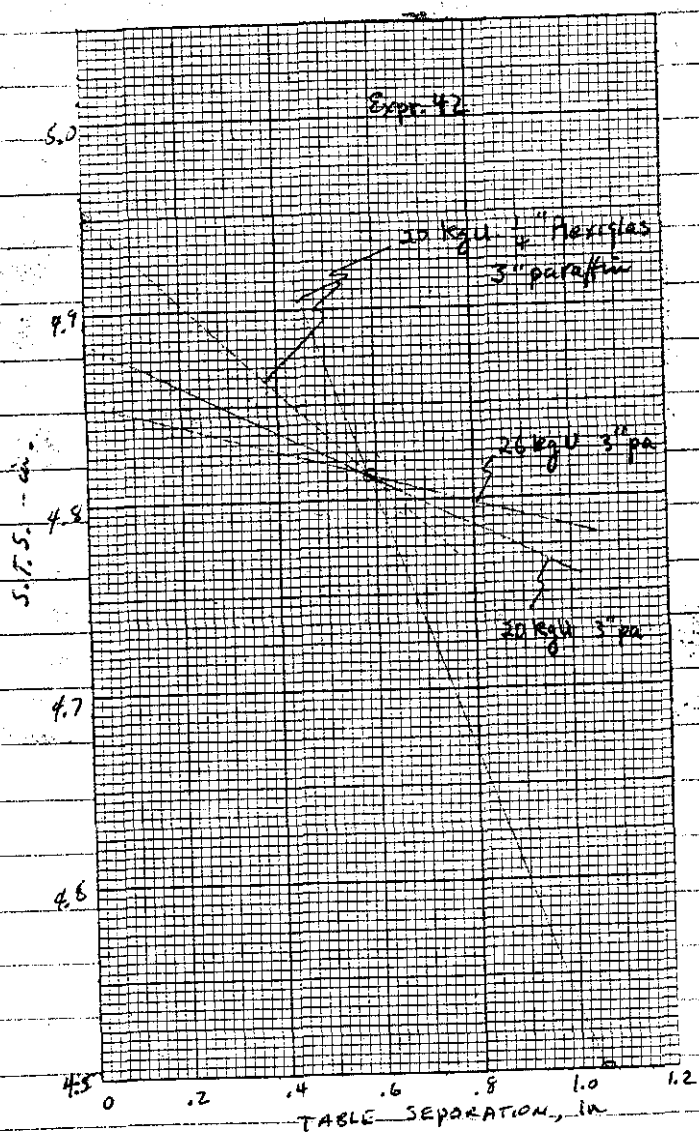
Experiment 42 cont'd

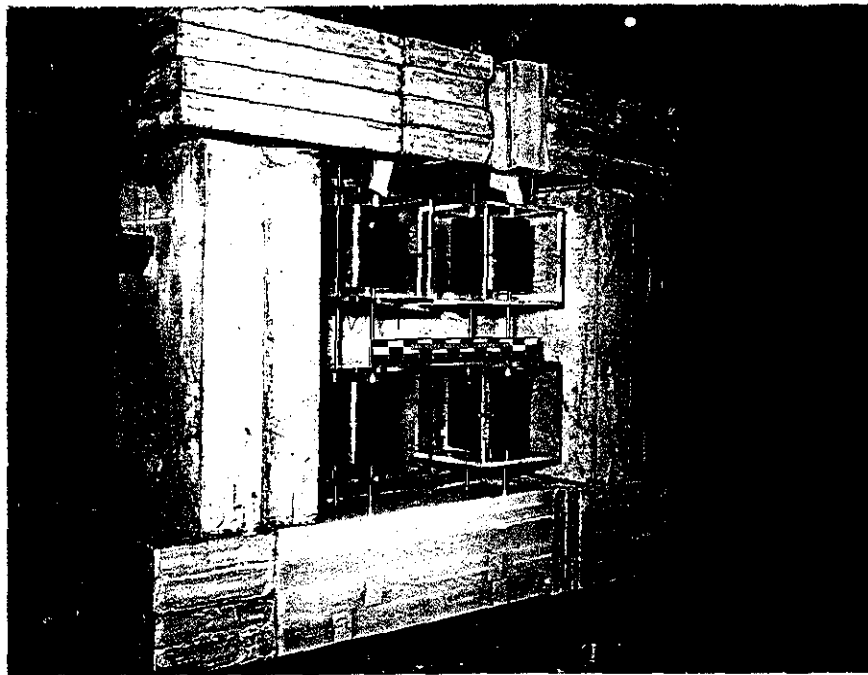
40/60

Reset spacing to $4 \frac{6}{64}'' = 4.953''$

$k < 1$ negative period 178 sec.

Take $k=1$ at STS = $4.950 \pm 0.010''$





Experiment 43

Instrument Check on H-3063 Source 10 mc

| | | | | | |
|------|------------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ " | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ " | Meter Trip | OK | | Clock 2424 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | JII | | check list - |
| GSM | | Meter Trip | | | |

8 units $20.960 \text{ kg}^{U(93.2)}/\text{unit}$ in $\frac{1}{4}$ "-Plexiglas Boxes 6" paraffin Refl.
 STS = $5 \frac{9}{64}$ " $k < 1$ by more than 9%

Instrument Check on 5-1-63 Source 10 mc

| | | | | | |
|------|------------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ " | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ " | Meter Trip | OK | | Clock 2725 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | JII | | check list ✓ |
| GSM | | Meter Trip | | | |

Reset spacing to 5.00"

 $k > 1$ positive period 78 sec at 0.289 $k = 1$ separation in. 0.385

Extrapolation parallel to 3" pa. reflector result of I-42 gives STS = 5.090"

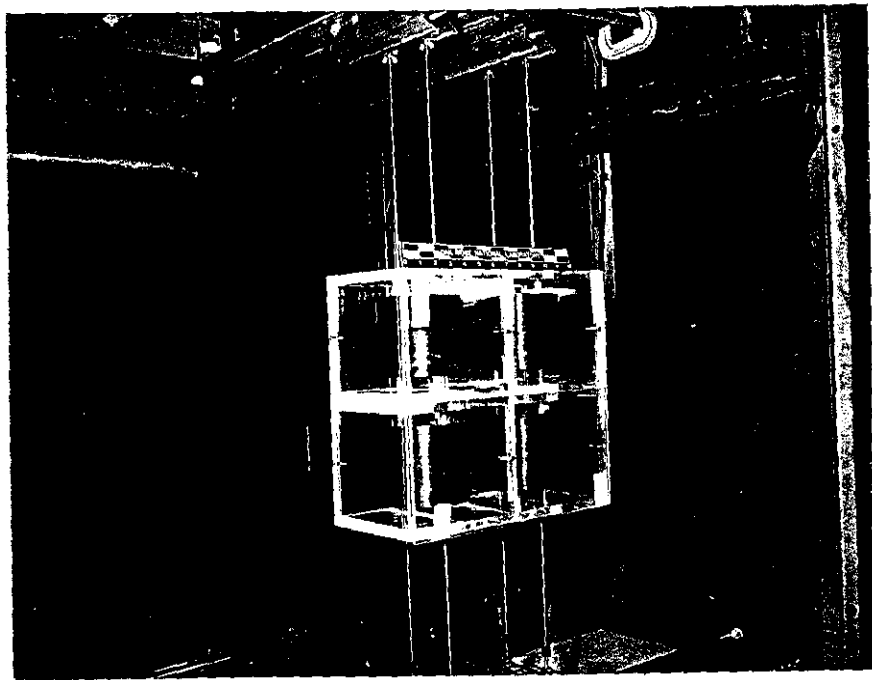
Summary

8 units; $20.960 \text{ kg}^{U(93.2)}/\text{unit}$ Each unit in $\frac{1}{4}$ "-in-thick Plexiglas boxbox dim. $\approx 6.13 \times 6.13 \times 5.84$ in. outside

6-in-thick paraffin reflector

S.T.S. $\approx 5.090 \pm 0.010$ in.

96



$\frac{1}{4} \times 13\frac{1}{2} \times 14$ in sheet of Plexiglas on fixed half of track.

Experiment 44

Instrument Check on 5-3-63 Source 10 mCi

| | | | | | |
|------|----------------------|-------------|------------|-----------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | | OK | | Clock 2426 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | JT | | check list |
| CRM | | Meter Trip | | | |

8 units 20.960 kg U(93.2)/unit in $\frac{1}{2}$ -in-thick Plexiglas. STS = 2.500"
boxes on 4 units $k < 1$, $M \sim 2$ when tables closed.

$k > 1$ positive period ~ 61.7 sec at 0.285 in separation. (4.8 revs)

$k = 1$ at 0.312 in separation. (5.3 revs)

.037

Have placed a sheet of $\frac{1}{16}$ "-thick Plexiglas $13\frac{1}{2} \times 14$ in. between array halves.

$k > 1$ positive period ~ 55.2 sec at 0.337 in separation. (5.7 revs)

$k = 1$ at 0.380 in separation

.043

Have placed a sheet of $\frac{1}{4}$ "-thick Plexiglas $13\frac{1}{2} \times 14$ in. between array halves.

$k > 1$ positive period ~ 43.3 sec at 0.518 in separation. (8.2 revs)

$k = 1$ at 0.550 in separation. (8.7 revs)

.032

Have placed a sheet of $\frac{1}{16}$ "-thick Plexiglas $13\frac{1}{2} \times 14$ in on moveable half

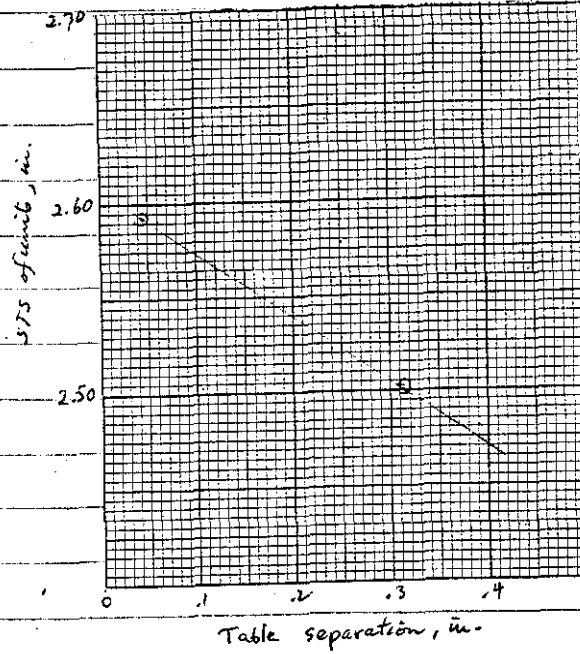
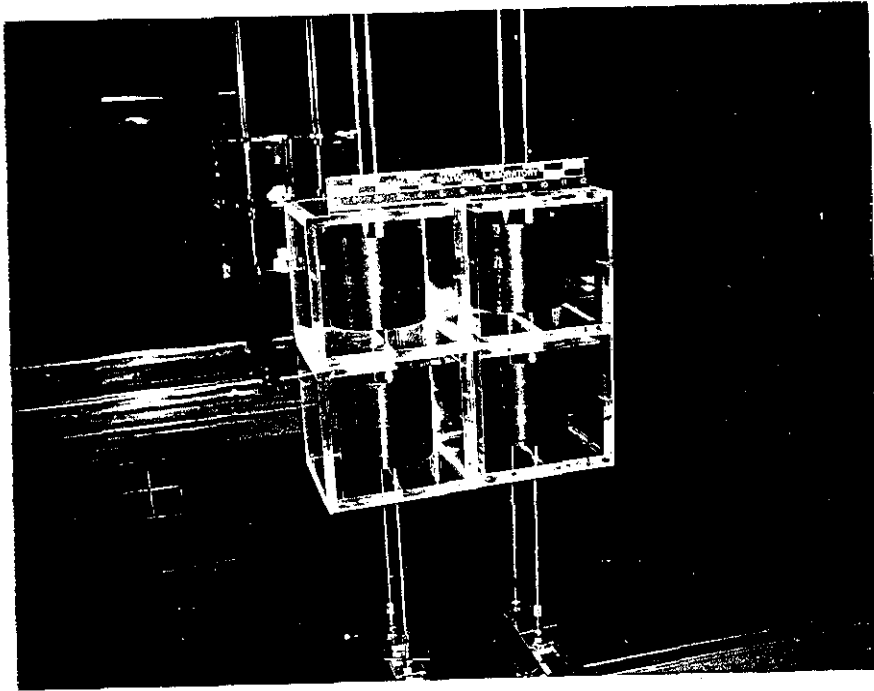
" " " " " $\frac{1}{4}$ "-thick " " " " fixed half

Total of $5/16$ "-thick Plexiglas between halves.

$k > 1$ positive period ~ 58.8 sec at 0.582 in separation. 9.0 revs

$k = 1$ at 0.625 in separation. 9.5

.043



Exp. 44 cont'd.

Instrument Check on 5-13-63 Source 10 mc

| | | | | | |
|-----|----------------------|------------|----|------------|--------------|
| M-1 | | Low Trip | OK | Alarm Trip | OK |
| M-2 | | | | Alarm Trip | OK |
| C-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| C-2 | $> 3 \times 10^{-4}$ | | OK | | Clock 242 |
| C-3 | | | | | M-230 |
| C-4 | Responds | | OK | | check list ✓ |
| ASM | | Meter Trip | | | |

k=1.2 Reset Spacing to 2.594"

4.6 k>1 k>1 tables together positive period ~ 99.9 sec.

k=1 tables separated 0.043 in. (1/2 rev)

Summary

8 units; 20.960 RgV^(493.2)/unitEach unit in $\frac{1}{2}$ "-thick Plexiglas box

Outside dim. 7.03 x 7.03 x 6.75 in.

S.T.S. 2,606 \pm 0.005"

$17^{\circ}30'$

$$47 \text{ sec} \Rightarrow R_E = 10.9 \times 10^{-4}$$

Experiment 45

Instrument Check on 5-14-63 Source 10mc γ

| | | | | | |
|------|----------------------|-------------|------------|------------|------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | 73×10^{-11} | Meter Trip | OK | Fast Trip | OK |
| IC-2 | 73×10^{-11} | Meter Trip | OK | Clock | 2428 |
| IC-3 | | Calibration | | M-230 | |
| IC-4 | Respon. | Calibration | JN | check list | ✓ |
| CRM | | Meter Trip | | | |

$k=1$ 5.48 sec 8 units; 20.960 kgU(93.2)/unit. in $\frac{1}{2}$ -in-thick Plexiglas boxes. OD. $7.03 \times 7.03 \times 6.75$ in.
 period 4.6 sec Array reflected with $\frac{1}{2}$ -in-thick paraffin. STS = 3.347 in.

$k > 1$ positive period ~ 47 sec. at 0.275 in. separation.

$k = 1$ at 0.312 in. separation. $\Delta S = .067$ $\frac{\Delta k}{\Delta S} = 2.542/\text{in}$

Summary

8 units 20.960 kgU(93.2)/unit

units in $\frac{1}{2}$ -in-thick Plexiglas boxes

with OD. $7.03 \times 7.03 \times 6.75$ in.

Array reflected by $\frac{1}{2}$ -in-thick paraffin

STS = 3.390 ± 0.010 in.

$$204 \quad 36.8 \text{ arc} \Rightarrow 12.75 \times 10^4 e$$

$$211 \quad 39.56 \text{ arc} \Rightarrow 13.5 e \times 10^4$$

Experiment 46

8 units ; 20.960 kg U(93.2) / unit ; each unit in $\frac{1}{2}$ -in-thick Plexiglas box

Array surrounded by 6-in-thick paraffin reflector STS = 5.250"
Instrument Check on 5-15-63 Source comet

| | | | | | |
|--------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| ① IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2428 |
| IC-3 | | Calibration | | | H-230 |
| IC-4 | Responds | Calibration | JH | | check list ✓ |
| CRM | | Meter Trip | | | |

$k > 1$ positive period 36.8 sec. 1.385 in. (17.05 Rows)

$k = 1$ table separation = 1.455 in. (17.80 Rows)

$$\Delta = .070$$

$$\frac{\Delta R}{\Delta S} = 2.857/\text{in}$$

② Have placed $\frac{1}{4}$ -in-thick Plexiglas pieces $6 \times 5 \frac{3}{4}$ " on inner faces
of all boxes (3 pieces per box).

$k > 1$ positive period 33.56 sec. at 1.655 in. (20.00 Rows)

$k = 1$ Table separation = 1.724 in. (20.72 Rows)

$$\Delta = .069$$

$$\frac{\Delta R}{\Delta S} = 3.058/\text{in}$$

5-16-63 Reset spacing to $5 \frac{13}{16}$ " $\frac{1}{2}$ " boxes no excess plexiglas
Instrument Check on 5-16-63 Source 10 med

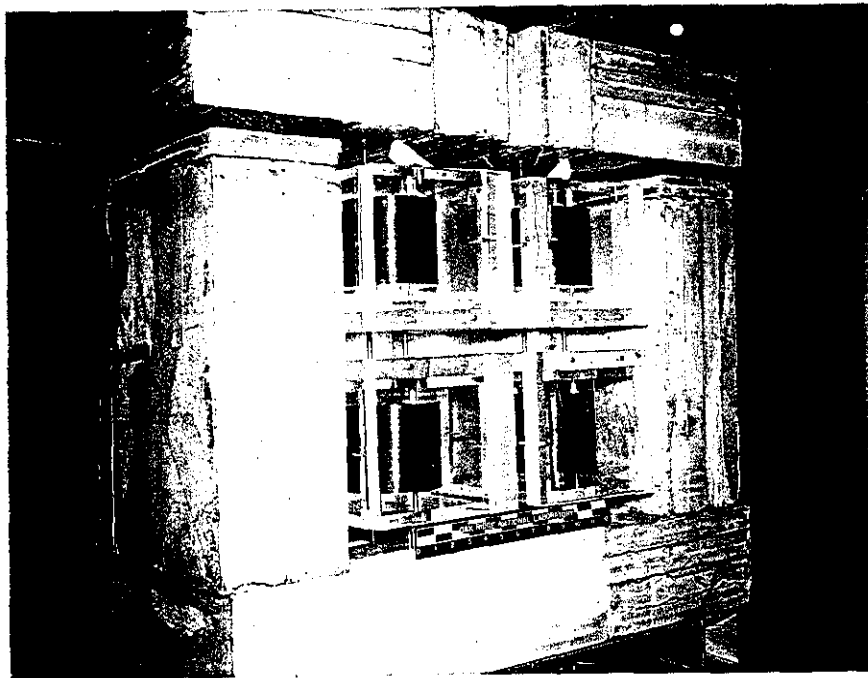
| | | | | | |
|--------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| ③ IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2429 |
| IC-3 | | Calibration | | | H-230 |
| IC-4 | Responds | Calibration | JH | | check list ✓ |
| CRM | | Meter Trip | | | |

$k \approx 1$ more than 1.

Reading on IC-1 = 2.1 on 10×10^{-12} scale

8.94 113.97 $\Rightarrow 5.72 \times 10^{-4} e$

14.4 60.49 $\Rightarrow 9.22 \times 10^{-4} e$



$\frac{1}{2}$ " Plexiglas
box
+
1" Plexiglas
between
units
cf photo
p. 108

Experiment 46

Added $\frac{1}{4}$ " Plexiglas pieces as above. $k > 1$ positive period at closure ~ 113.97 sec $k = 1$ at 0.1299 in $\Delta = 0.129$

(Revs. 2.55)

$$\frac{\Delta R}{\Delta S} = 0.693/\text{in}$$

Instrument Check on 5-17-63 Source 10 mcd

| | | | |
|------|----------------------|-------------|--------------|
| PM-1 | Low Trip | Alarm Trip | OK |
| PM-2 | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK |
| IC-3 | | Calibration | M-270 |
| IC-4 | Responds | Calibration | JII |
| CRM | | Meter Trip | check list ✓ |

Added $\frac{1}{2}$ "-thick plexiglas pieces (3 per unit) $k > 1$ positive period ~ 60.49 sec. 0.510 in

(Revs. 8.00)

 $k = 1$, tables separated 0.565 in $\Delta = .055$

(Revs. 8.75)

$$\frac{\Delta R}{\Delta S} = 2.418/\text{in.}$$

Instrument Check on 5-21-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2430 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | JII | | check list |
| CRM | | Meter Trip | | | |

Added 1"-thick plexiglas pieces (see photograph.)

 $k < 1$ more than #1-Total 3" plexiglas
between units

$$17.34 \quad 45.9 \text{ sec} \Rightarrow 11.1 \times 10^{-4} \rho_k$$

$$s = 19.765 \text{ cm}$$

$$V = 17.61992$$

$$\rho_a = 11.89^{\circ}$$

$$F = 0.06340$$

Summary

8-20.960 kg U(93.2)/unit

units in $\frac{1}{2}$ -in thick plexiglas boxes

O.D. 7.03 x 7.03 x 6.75 in.

array reflected by 6-in-thick paraffin

at STS = 5.813 \pm 0.010 in

$k = 1$ with $\overset{2.970 \text{ cm}}{4.82}$ in Plexiglas mod-

or $\overset{6.385}{2.75}$ in Plexiglas Mod.

} i.e., 2 cases.

$$14.31 \quad 60.49 \text{ sec} \Rightarrow 9.16 \times 10^{-4} \rho_k$$

Thickness of Plexiglas moderator for
maximum reactivity effect is 1.78 in.

$$16.56 \quad 49.04 \text{ sec} \Rightarrow 10.6 \times 10^{-4} \rho_k$$

Experiment #6

5-21-63

Removed 1" moderator pieces - only 1/2" plexiglas boxes present
 Compare with p103 (5-16-63) run.

⑦

11/2/foot

$k < 1$ Reading on IC/E2 on 10×10^{-12} scale

5-21-63

Added 3/8" thick Plexiglas as moderator.

⑧

7/8/foot

$R > 1$ positive period ~ 45.90 sec. at 0.432 (7.00 Revs.)

$R = 1$ at 0.520" $D = 0.088$ (8.15 Revs.)

$$\frac{\Delta R}{\Delta S} = 1.9704/\text{in}$$

Instrument Check on 5-22-63 Source 10 mc γ

| | | | | |
|------|-----------------------|-------------|------------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | OK |
| IC-2 | $> 3 \times 10^{-11}$ | | OK | Check 2431 |
| IC-3 | | | | M-230 |
| IC-4 | Responds | Calibration | JN | Check list <input checked="" type="checkbox"/> |
| CRM | | Meter Trip | | |

Added 7/16" thick plexiglas to 1/2" boxes -

1 1/16"/foot

⑨

$k > 1$ positive period of ~ 62.49 sec. at 0.508 in. (8.00 Revs.)

$k = 1$ at 0.575 in. $D = 0.067$ (8.90 Revs.)

$$\frac{\Delta R}{\Delta S} = 2.136/\text{in}$$

Replaced moderator with 1/4"-thick plexiglas on boxes.

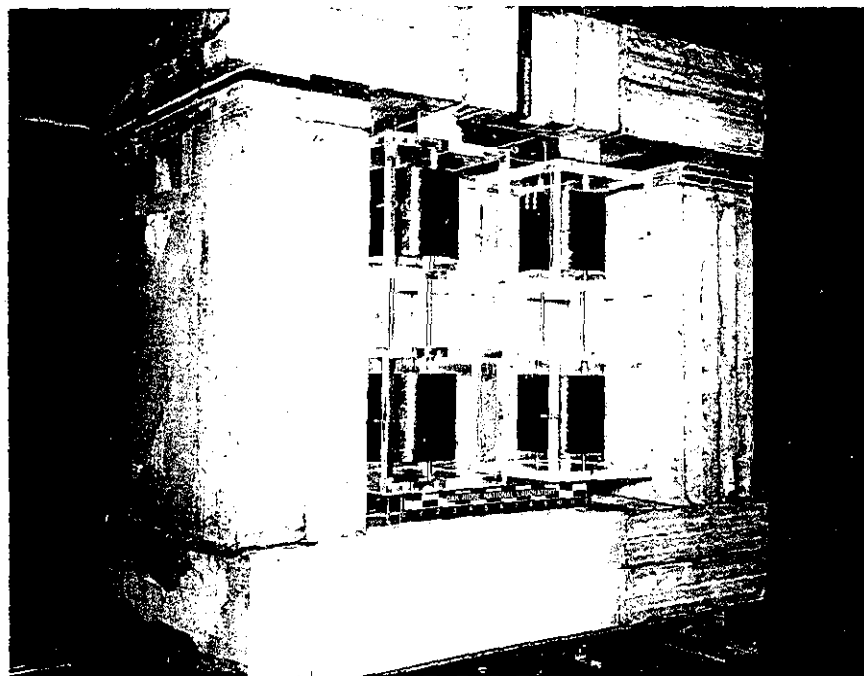
Pieces $7\frac{1}{4} \times 7\frac{1}{4} \times \frac{1}{4}$ " compare pp103-4.

⑩

$R > 1$ positive period of ~ 48.04 sec. at 0.291 in. (5.00 Revs.)

$k = 1$ at 0.372 in. $D = 0.081$ (6.20 Revs.)

$$\frac{\Delta R}{\Delta S} = 2.0444/\text{in}$$



Summary:

8 - 20.960 Kgh (93.2) / unit

Units in $\frac{1}{2}$ -in-thick Plexiglas boxes

OD. 7.03 x 7.03 x 6.75 in.

Array reflected by 6-in-thick paraffin

S.T.S. = 5.710 \pm 0.010 in.

YA = 1043.33312

F = 0.06549

1.9219
- 12.7 x 10⁻⁴ P_K

Experiment 46

Instrument Check on 5-23-63 Source 10mc

| | | | | | |
|------|---------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $>3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $>3 \times 10^{-4}$ | Meter Trip | OK | Clock | 2431 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | JIT | | check list ✓ |
| CRM | | Meter Trip | | | |

Return to just $\frac{1}{2}$ -in-thick Plexiglas boxes. $R < 1$ more than #1 - IC:1 1.95 on 10×10^{-12} scale.From Expt 46-12 estimate $R \sim (993-965)$ from changed spacing. JHInstrument Check on 5-24-63 Source 10mc

| | | | | | |
|------|---------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $>3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $>3 \times 10^{-4}$ | Meter Trip | OK | Clock | 2431 |
| IC-3 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | JIT | | Check list ✓ |
| CRM | | Meter Trip | | | |

Have reset spacing to $5 \frac{2}{32}$

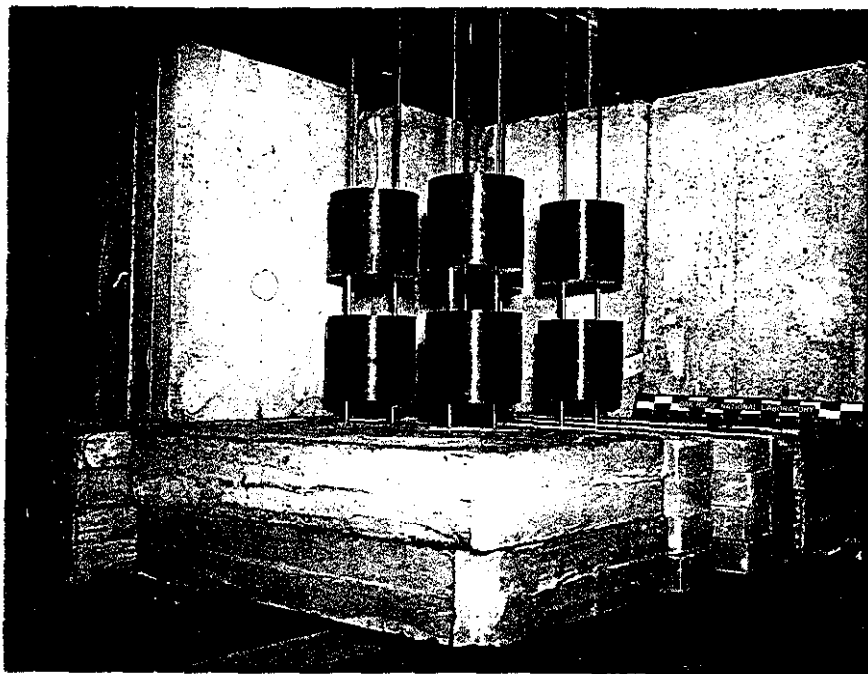
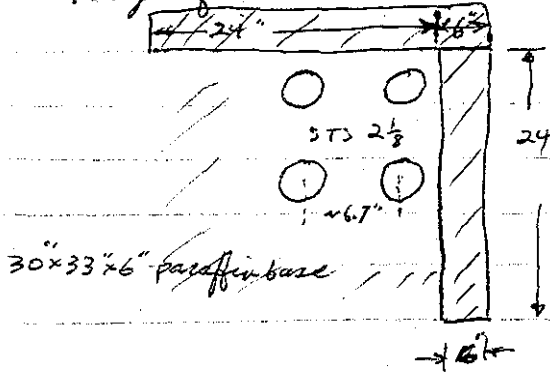
(12) $R < 1$ negative period ~ 115 sec at closure. ($-19.21 \pm$)
 assuming $\frac{64}{1002}$ $\Rightarrow R = 1$ at STS = 5.710 ± 0.010

Reflector dimensions

base 30 x 33 x 6 in. paraffin

height 18"

length of corner walls 24"



Experiment 47

12.8×10^{-4} "Corner effect."

8 units, 20.960 kg U(93.2)/unit STS = 2.00"

Array reflected by 6-in-thick paraffin on three sides.

20f $R > 1$ positive period ~ 3.68 sec. at 0.416 in. (8.80 Revs)

$R = 1$ at 0.475 in. $\Delta S = 0.059$ in. $\frac{\Delta R}{\Delta S} = 3.390$ /in. (7.60 Revs)

Instrument Check on 5-27-63 Source 10 mCi

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | Clock 2432 |
| IC-5 | | Calibration | | | M-230 |
| IC-4 | Responds | Calibration | FN | | check list ✓ |
| CRM | | Meter Trip | | | |

Reset spacing to 2.0625"

$R > 1$ positive period ~ 3.5 sec. at 0.188 in. (3.70 Revs)

216f $R = 1$ at 0.250 in. table separation. $\Delta S = .062$ (4.75 Revs)
 $\frac{\Delta R}{\Delta S} = 5.47$ /in.

Summary

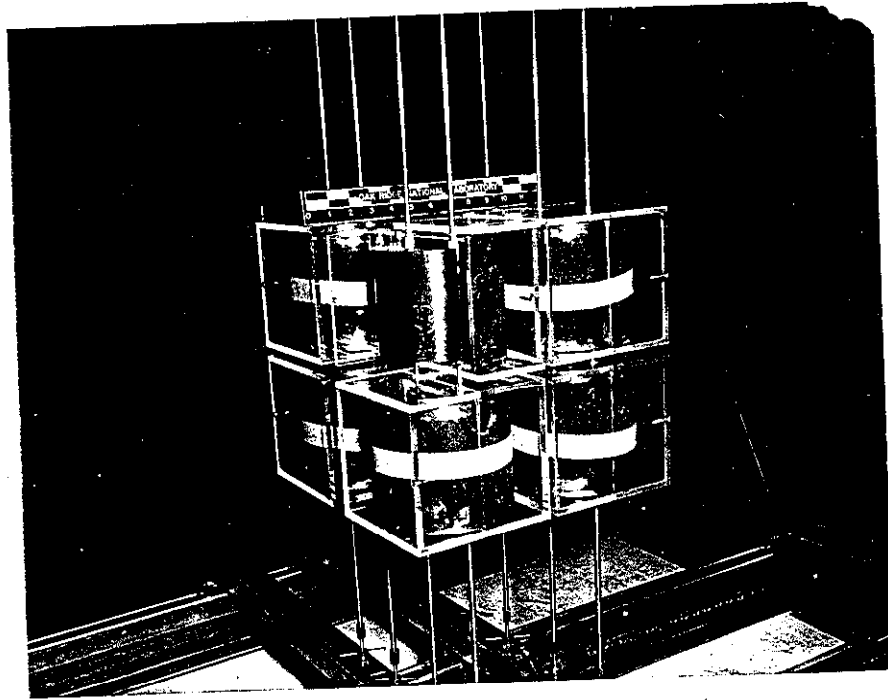
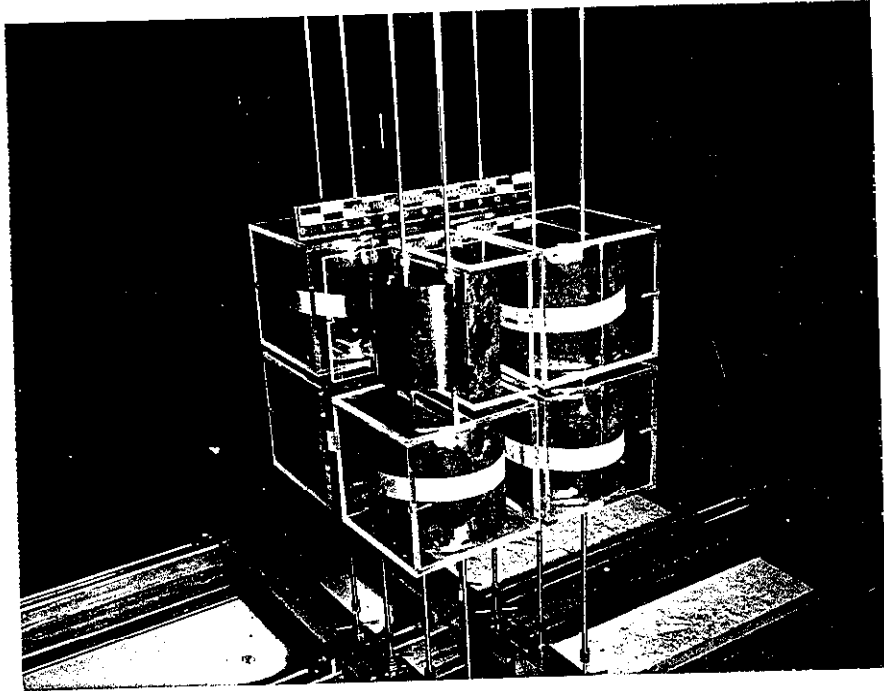
8 - 20.960 kg U(93.2)/unit

Array reflected on 3-sides by
6-in-thick paraffin.

STS at $R = 1$ is 2.125 ± 0.010 in.

$$V_A = 281.89961$$

$$F = 0.24241$$



Ex. (d)

Experiment 48

Instrument Check on 6-25-63 Source 10 me

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Water Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Water Trip | OK | | Clock - 2439 |
| IC-3 | | Calibration | | | H-230 |
| IC-4 | Responds | Calibration | JIT | | check list ✓ |
| CRM | | Water Trip | | | |

8 - 20.960 kg (8932)/unit + 5" schedule 40 pipe + $\frac{1}{4}$ " Plexiglasa) 8 units + pipe at STS = $12\frac{1}{32}$ " $R < 1$; counter 2448 c/2min. IC-2 = $6.70 \times 10 \times 10^{-12}$ scale

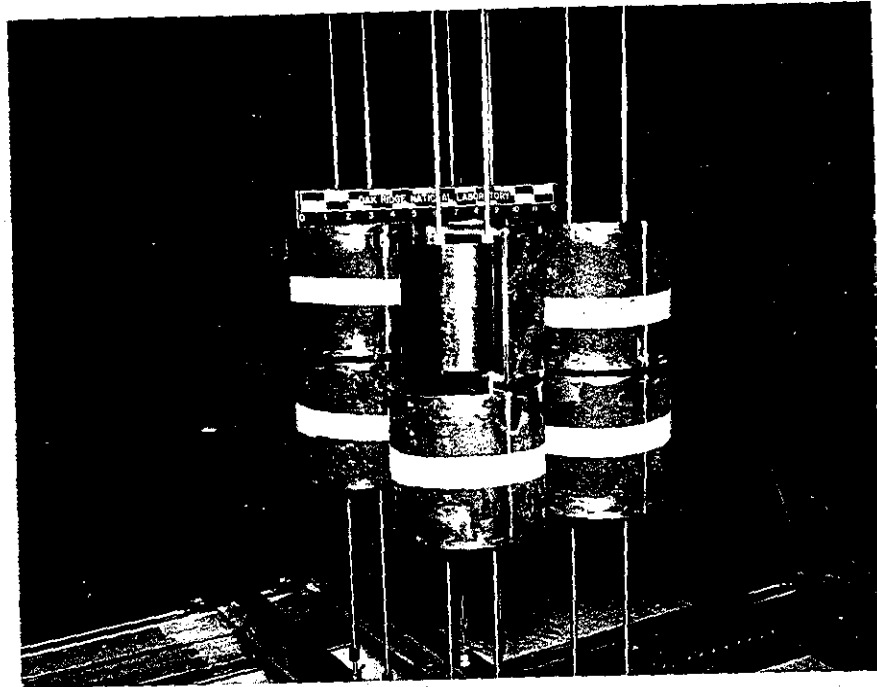
IC-4 = .0092

b) 2 units + pipe + $\frac{1}{4}$ " plexiglas boxes $R > 1$ positive period ~ 19.74 sec at 1.355 (17.0 Revs) $R = 1$ at 1.425 in (17.68 Revs)Instrument Check on 6-26-63 Source 10 me

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Water Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Water Trip | OK | | Clock 2440 |
| IC-3 | | Calibration | | | H-230 |
| IC-4 | Responds | Calibration | JIT | | check list ✓ |
| CRM | | Water Trip | | | |

c) 8 units + $\frac{1}{4}$ " plexiglas boxes $R > 1$ positive period ~ 24.83 sec. 0.012" (0.60 Revs) $R = 1$ at 0.052 (1.50 Revs)

Compare p. 84



Summary 8 units; 20.960 kg (46.2) / unit

| | Condition | S.T.S. | |
|--|--------------------------|--------|-------------|
| $V_A = 185.84458$ $F = 0.36770$ $V_R = 270.44961$ $F = 0.25267$ | Unreflected no Moderator | 0.885 | } ± 0.005 " |
| | " 1/4" Plexiglas boxes | 1.669 | |
| | " 5" pipe | 1.275 | |
| | " 1/4" Plexiglas + boxes | 2.035 | |

Experiment 48

d)

Reset spacing to $2\frac{1}{32}$ "8 units + 5" pipe + $\frac{1}{4}$ " plexiglas boxes.

R > L positive period 259.8 sec at 0.00 rep (0.00 Revs)

R = L at 0.013 in. (0.75 Revs)

Instrument Check on 1-17-63 Source 10 mc

| | | | | |
|------|-----------------------|-----|------------|--------------|
| IC-1 | Row 2/10 | OK | Align 2/10 | OK |
| IC-2 | | | Align 2/10 | OK |
| IC-3 | $> 3 \times 10^{-11}$ | OK | | OK |
| IC-4 | $> 3 \times 10^{-11}$ | OK | | Clock 2440 |
| IC-5 | | | | M-230 |
| IC-6 | Responds | JIT | | check list ✓ |
| CRM | | | | |

e) Reset spacing to 1.250 in.

8 units + 5" pipe.

R > L positive period 35.02 sec at 0.043 in (1.20 Revs)

R = L at 0.0855 in. (1.95 Revs)

take R = L at STS = 1.275"

The plexiglas boxes used have a thickness of 1 inch
and nominal outside dimensions of $8.80 \times 8.80 \times 8.52$ inches.
 $22.4 \times 22.4 \times 21.6$

EXPERIMENT 49

8-Units ; 20.960 Kg(93.2)/unit 1"-thick Plexiglas boxes

Instrument Check on 6-27-63 Source 10 mc γ

| | | | | |
|------|-----------------------|-------------|------------|--|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-11}$ | Motor Trip | OK | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Motor Trip | OK | Clock 2441 |
| IC-3 | | | | H-230 |
| IC-4 | Responds | Calibration | JIT | check list <input checked="" type="checkbox"/> |
| ORM | | Motor Trip | | |

STS = $4 \frac{9}{32}$ "
 $k \ll 1$

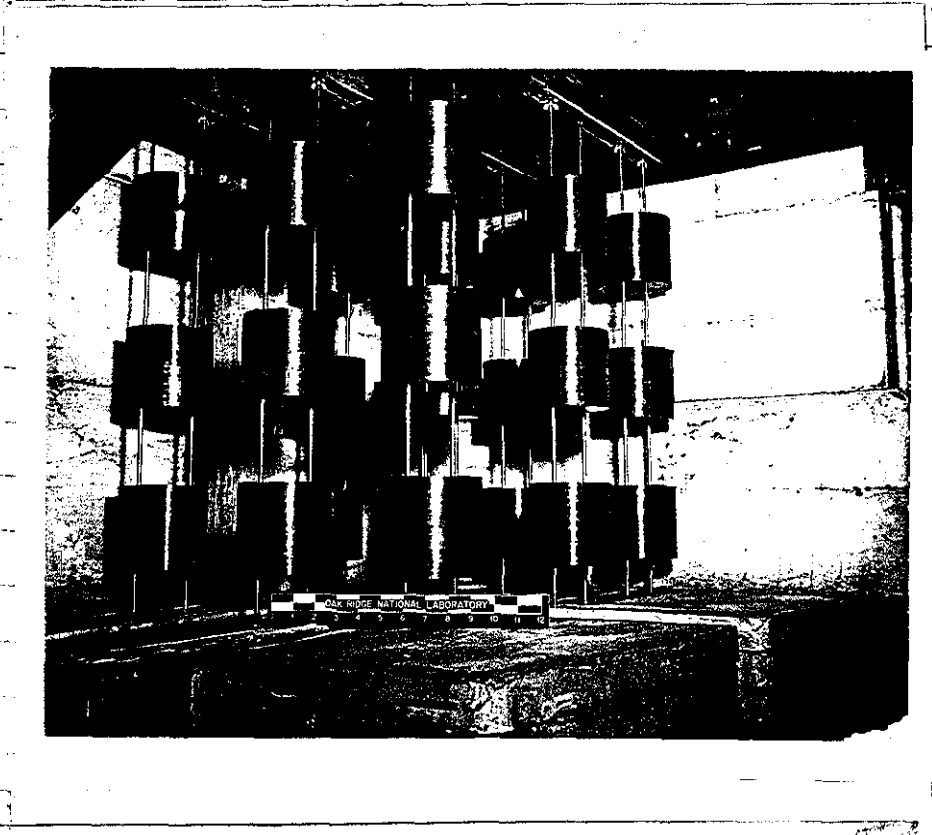
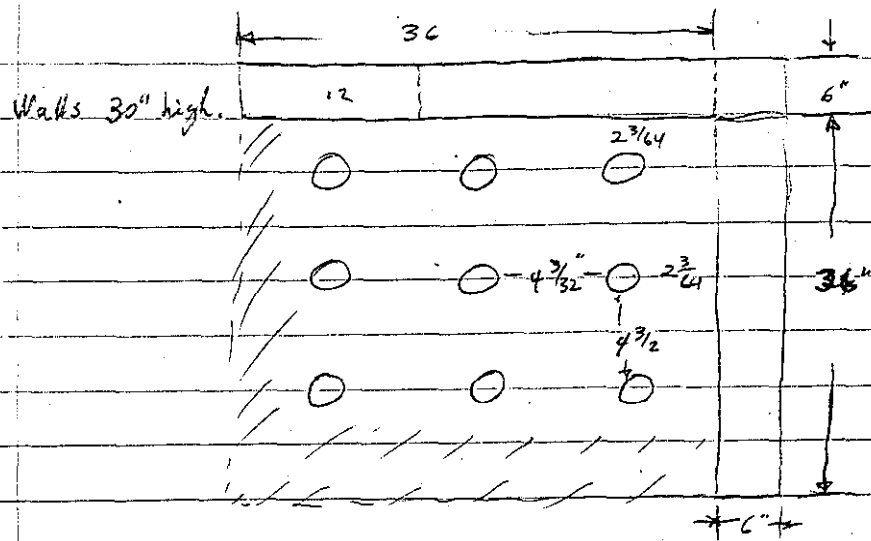
Instrument Check on 6-28-63 source 10 mc γ

| | | | | |
|------|-----------------------|-------------|------------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-11}$ | Motor Trip | OK | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Motor Trip | OK | Clock 2441 |
| IC-3 | | | | |
| IC-4 | Responds | Calibration | JIT | |
| ORM | | Motor Trip | | |

STS = $4 \frac{5}{32}$ " $k < 1$

Have placed a $\frac{1}{2}$ "-thick layer on top of the plexiglas boxes.

$k \approx 1$ positive period 5.74 sec (0.000 Revs)
 $k = 1$ at 0.122 (2.400 Revs)



Experiment 50

27 units; 20.877 kg U(93.2)/unit "Corner Reflection" 6"-paraffin-

Instrument Check on 7-1-63 Source 10 mc Y

| | | | | |
|------|-----------------------|-------------|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Clock 24422 |
| IC-3 | | Calibration | | M-230 |
| IC-4 | Responds | Calibration | JH | check list |
| CRM | | Meter Trip | | |

R < 1

7-2-63 Reset spacing to $4 \frac{3}{32}$ "
Instrument Check on 7-2-63 Source 10 mc Y

| | | | | |
|------|-----------------------|-------------|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Clock |
| IC-3 | | Calibration | | M-230 |
| IC-4 | Responds | Calibration | JH | check list ✓ |
| CRM | | Meter Trip | | |

$C = 6.82 \times 10^{-4}$

R > 1 positive period $88.74 \mu\text{sec}$ at 0.146 in. (3.00 Revs)
 R = 1 at 0.259 in. $\#0.95/\text{in}$ (4.95 Revs)

Summary 27 - 20.877 kg U(93.2)/unit
 6"-paraffin "Corner Reflection"
 STS = 4.150 ± 0.010 in

$V_c = 632.123 \text{ in}^3$
 $F = 0.10810$

Experiment 51

27 units; 20.877 kg U(93.2)/unit Unreflected - Spaced Center-to-Center

Instrument Check on 7-3-63 Source 10mc

| | | | | |
|------|----------------------|-------------|--------------------|--------------|
| FM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK (slow to reset) | Clock 2442 |
| IC-3 | | Calibration | | |
| IC-4 | Responds | Calibration | JIT. | |
| CRM | | Meter Trip | | |

$k < 1$ but within #1 - Spacing of units on fixed table in error $\approx \frac{1}{8}$ "

Have reset to following:

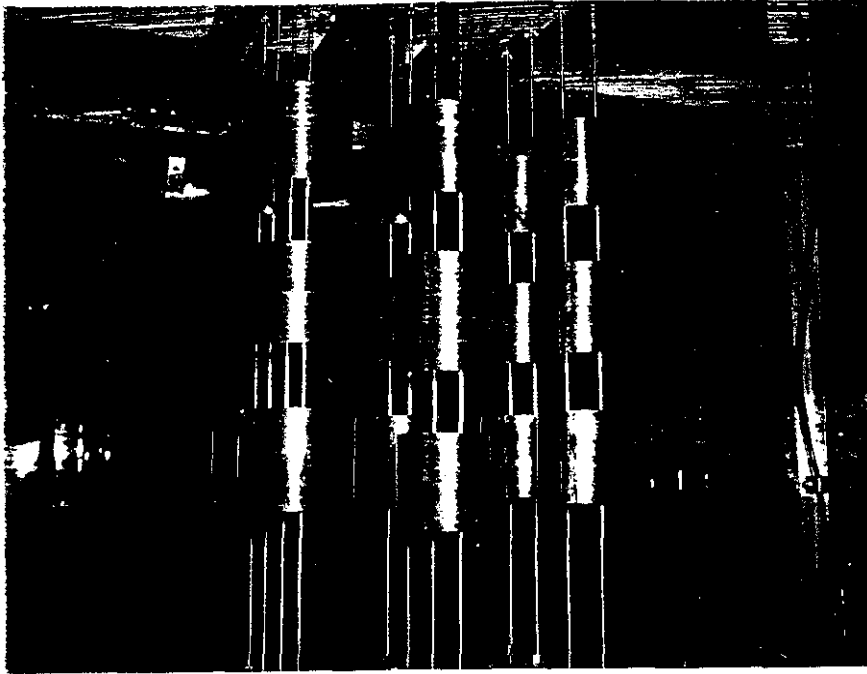
STS between flat surfaces is 2.688 in } ± 0.005
 STS between cylindrical surfaces is 2.406 in

$V = 12.1 \times 10^4$

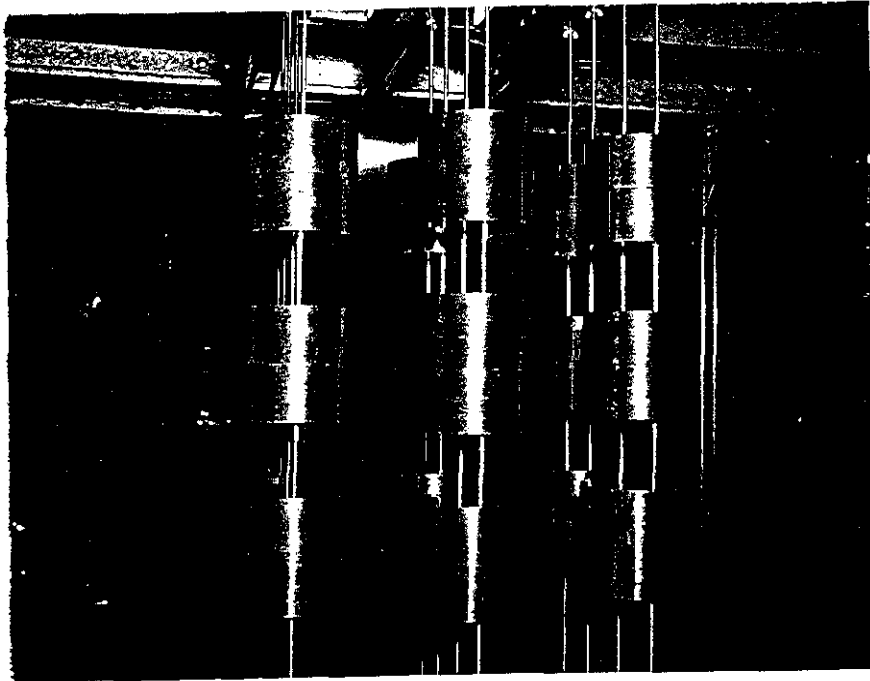
$k \approx 1$ req period = 116.9 sec at closure - 18.9 f

Within accuracy of spacing CTC is equivalent to STS for 20 kg units ($\frac{1}{2} \approx 0.93$)

| | | |
|---------|----------------------------------|------------------------------|
| Summary | 27 units; 20.877 kg U(93.2)/unit | $V_L = 332.813 \text{ in}^3$ |
| | unreflected | $F = 0.20532$ |
| | CTC = 6.930 \pm 0.005 inches | |



Expt 52
(a)



Expt 52
(c)

216

Experiment 52

27 units 20.877 kgU/unit Spacing same as experi. 51. p 121.

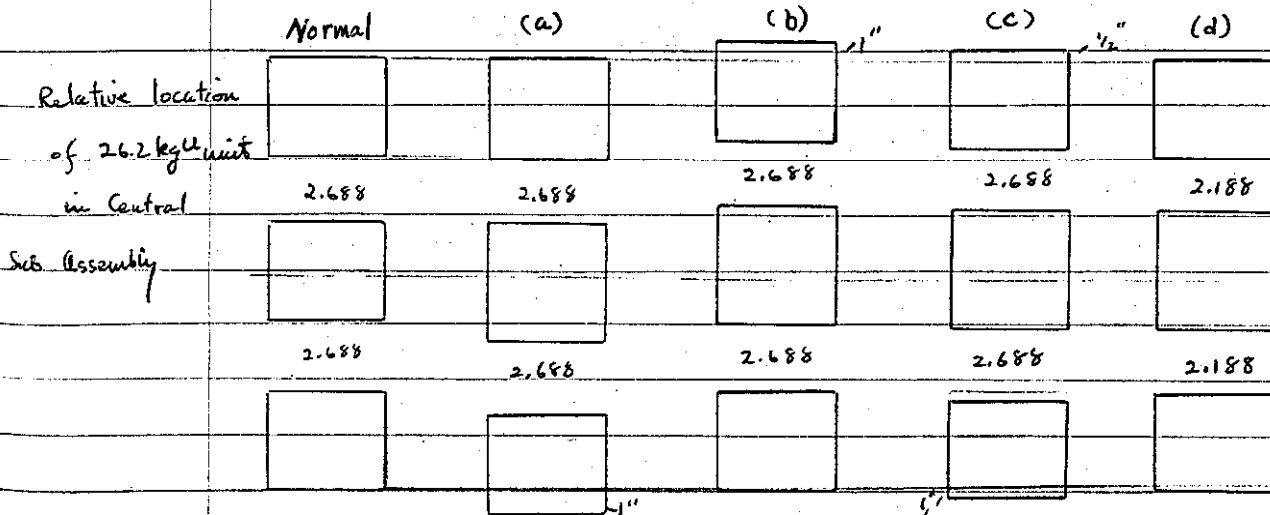
Instrument Check on 7-8-63 Source 10 mcK

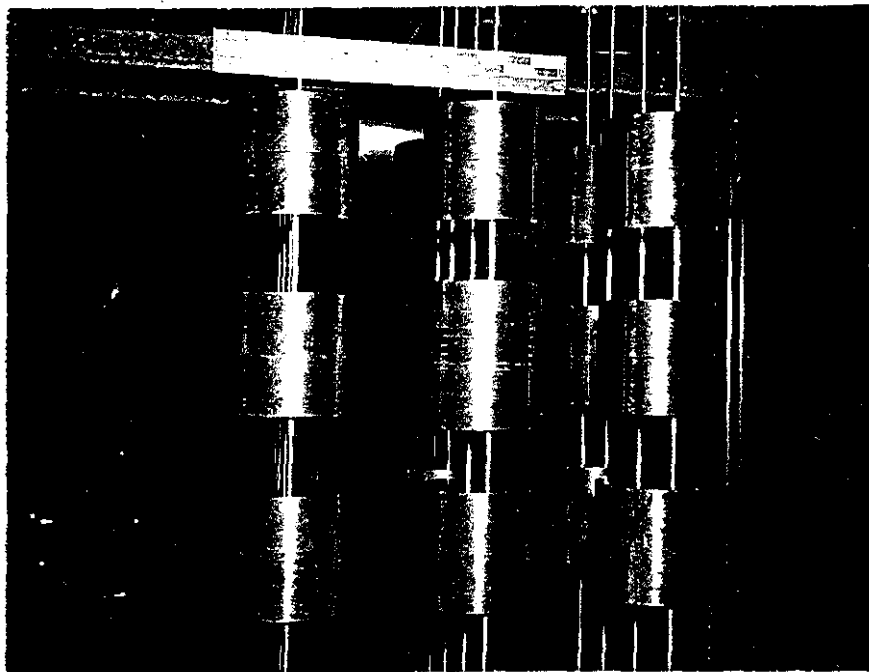
| | | | | |
|------|----------------------|-------------|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | $> 3 \times 10^{-4}$ | Water Trip | OK | Fast Trip OK |
| IC-2 | $> 3 \times 10^{-4}$ | Water Trip | OK | Clock 2443 |
| IC-3 | | Calibration | | M-230 |
| IC-4 | Responds | Calibration | √ | check list |
| CRM | | Meter Trip | | |

Have placed additional 5.2 kg piece on central unit.

See diagram below for specific location of appes a, b, c & d

| | | | | | |
|-----------------------------------|---------|---------|-----------------|----------------------|-----------------------------------|
| 11.45×10^{-4} 17.9 ft | part a) | $k > 1$ | positive period | 43.3 sec at 0.395 | (6.50 Revs) |
| | | $k = 1$ | (1.01) | .480 $\Delta = .085$ | $210.5 \frac{ft}{in}$ (7.65 Revs) |
| 11.15×10^{-4} 12.4 ft | b) | $k > 1$ | positive period | 45.6 sec at 0.395 | (6.15 Revs) |
| | | $k = 1$ | (.983) | .480 $\Delta = .085$ | $204.7 \frac{ft}{in}$ (7.65 Revs) |
| 11.50×10^{-4} 18 ft | c) | $k > 1$ | positive period | 43.4 sec at 0.433 | (7.00 Revs) |
| | | $k = 1$ | (1.219) | .508 $\Delta = .075$ | $270 \frac{ft}{in}$ (8.05 Revs) |
| 12.1×10^{-4} 19.9 ft | d) | $k > 1$ | positive period | 40.1 sec at .680 | (10.2 Revs) |
| | | $k = 1$ | (1.501) | .778 $\Delta = .098$ | $192.9 \frac{ft}{in}$ (11.3 Revs) |





Experiment 52 (d)

Experiment 53

7-8-63

4 - 20.960 kgU units or 8 - 10.4 kgU units in contact.

 $k < 1$ $M \sim 2$

Experiment 54

Instrument Check on 7-24-63 Source 10 mCi

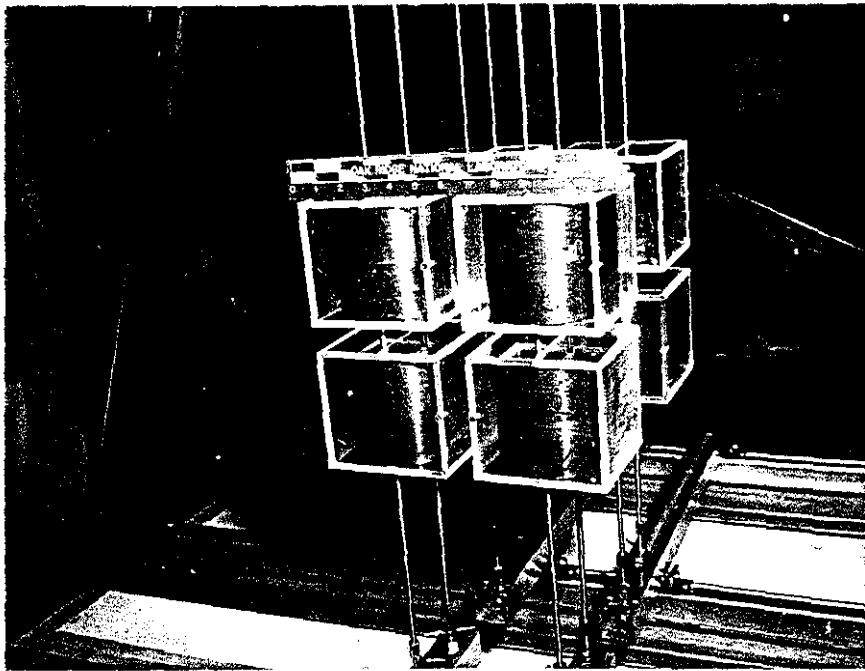
| | | | | | |
|------|----------------------|-------------|---------------|-----------|-------------------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2457 |
| IC-3 | Responds | Calibration | JIT ER Rohrer | | M-23 |
| IC-4 | | Calibration | | | Check list \checkmark |
| CRM | | Meter Trip | | | |

8 - 20.960 kgU/unit in $\frac{1}{4}$ " plexiglas boxes. - OD. 5.0625.06 x 4.75 in.
 lateral walls of box - 0.025" less than top and bottom.

STS = $1\frac{2}{32}$ $k < 1$ more than $1 -$

Have placed $\frac{1}{16}$ -in-thick plexiglas pieces on lateral surfaces
 of plexiglas boxes between units

 $k < 1$, $1 -$



Assuming S.T.S. is directly proportional to thickness of plexiglas inserted between the cylindrical surfaces of units, then an increase of 0.025 in would result in a $k=1$ when the S.T.S. = 1.582 in. which would represent a typical plexiglas box

$$\frac{0.025}{0.025} \times 0.080 = 0.032 \quad 0.032 + 1.550 = 1.582$$

Summary: 8 units ; 20,960 kg (493.2)/unit
 unreflected
 Units in plexiglas boxes with wall thickness of 0.250" and O.D of 5.06 x 5.06 x 4.75 in.
 S.T.S = 1.582 ± 0.005 in.

Still need to correct for thinness of outer surfaces of boxes

Experiment 54

Instrument Check on 7-25-63 Source 60 mHz

| | | | |
|-------|-----------------------|------------|--------------|
| PM-1 | OK | Alarm Trip | OK |
| PM-2 | | Alarm Trip | OK |
| DC-1 | $> 3 \times 10^{-11}$ | OK | OK |
| DC-2 | $> 3 \times 10^{-11}$ | OK | Clock 2451 |
| REC-3 | Responds | J11 | M-230 |
| REC-4 | | | check list ✓ |
| CRM | Meter Trip | | |

Reset spacing to $1^{19/32}'' = 1.59375''$

$k > 1$ > 1

Added $1/16''$ - thick plexiglas sheet as before

$k > 1$ positive period 32.78 sec at 0.124 in. (2.29 Revs)

21.64

$k = 1$ at 0.138 in. $\Delta = 0.035$ in. 6.35 $1/16''$ (3.01 Revs)

Reset spacing to $1^{17/32}'' = 1.53125''$

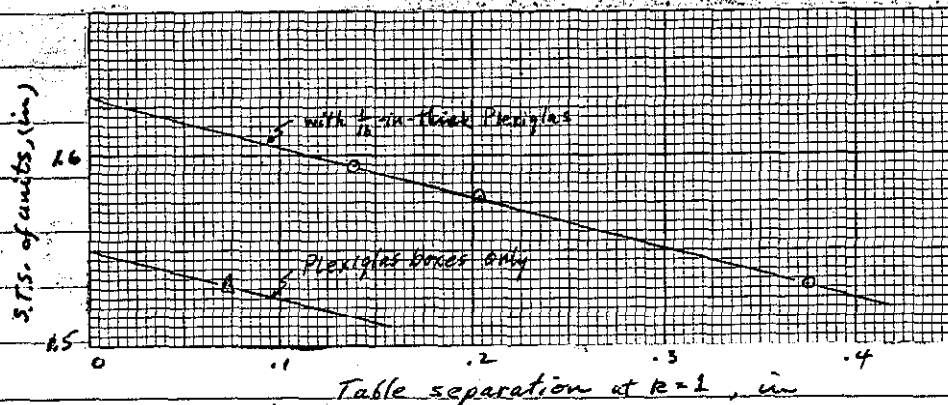
$k > 1$ positive period 36.93 at 0.428 in. (1.19 Revs)

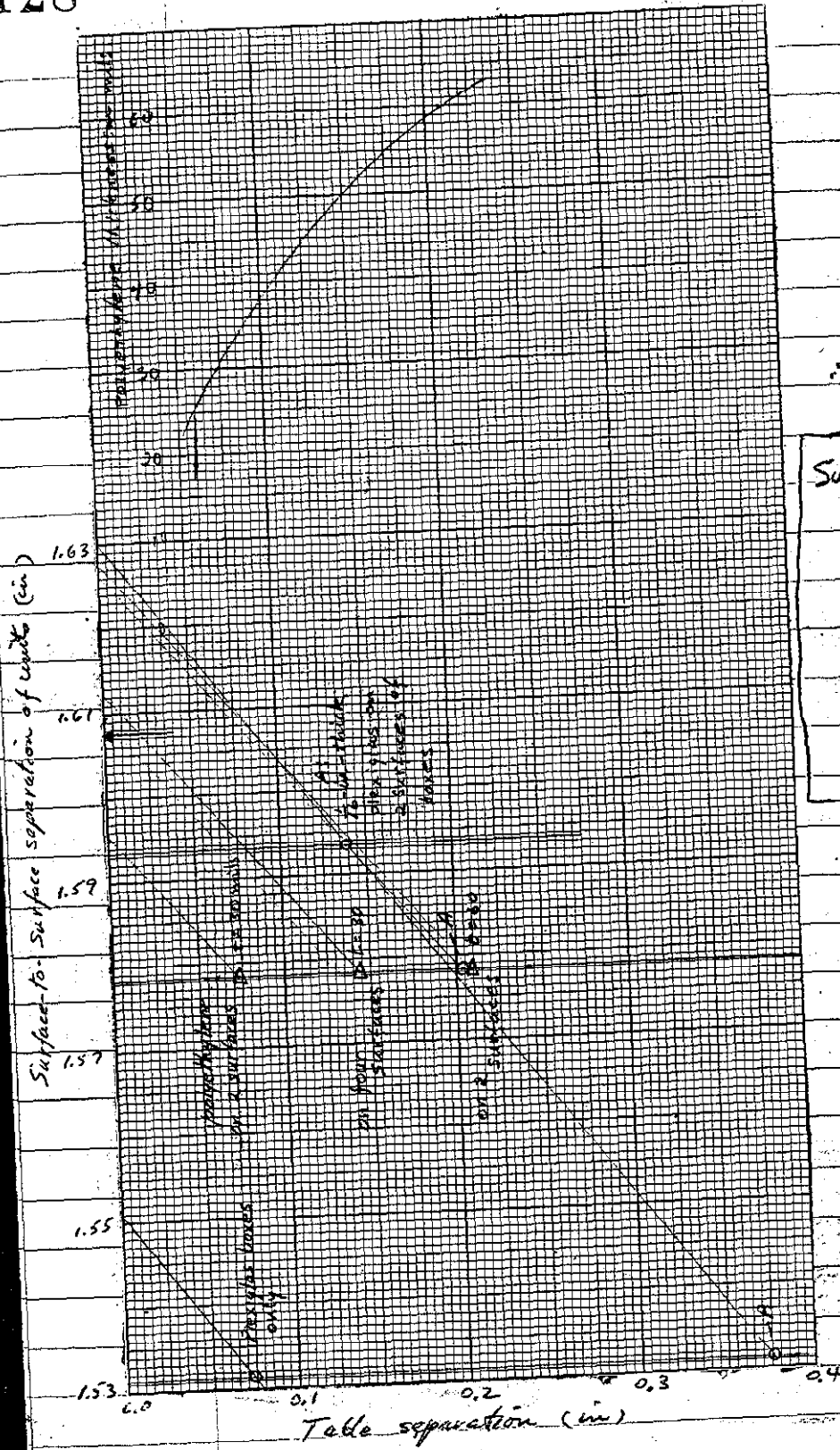
$k = 1$ at 0.735 in. (1.88 Revs)

Added $1/16''$ plexiglas pieces

$k > 1$ positive period 31.2 sec at 0.33 in. (5.59 Revs)

$k = 1$ at ~~0.33~~ 0.37 in. (6.25 Revs)





∴ For 25 mil correction:

Summary 8 units
 20.960 kg (463.2) / unit
 Unreflected
 Units in Plexiglas boxes
 5.06 x 5.06 x 4.75" out. dim.
 Wall thickness 1/4" in.
 STS = 1.607 ± 0.005 in.
 $V_A = 220.214 \text{ in}^3$
 $F = 0.31031$

Experiment 54

Rest spacing to $1\frac{3}{64}$ " = 1.5781 in.Instrument Check on 7-26-64 Source 10 meV

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Water Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Water Trip | OK | | Clock 2452 |
| IC-5 | Responds | Calibration | JIT | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Water Trip | | | |

4 lateral surfaces of boxes covered with 0.030 in. polyethylene

$k > 1$ positive period 34.38 sec at 0.1105 in. (2.40 Revs)

$k = 1$ at 0.144 in. $\Delta = 0.035$ (3.10 Revs)

Have removed polyethylene from outer surfaces of array, polyethylene remaining between cyl. surfaces of units

$k > 1$ positive period 74.5 sec at .058 in. (1.39 Revs)

$k = 1$ at .0732 in. $\Delta = 0.015^2$ (1.88 Revs)

Have doubled the thickness of polyethylene between cylindrical surfaces of the units

$k > 1$ positive period 36.3 sec at 0.174 in. (3.46 Revs)

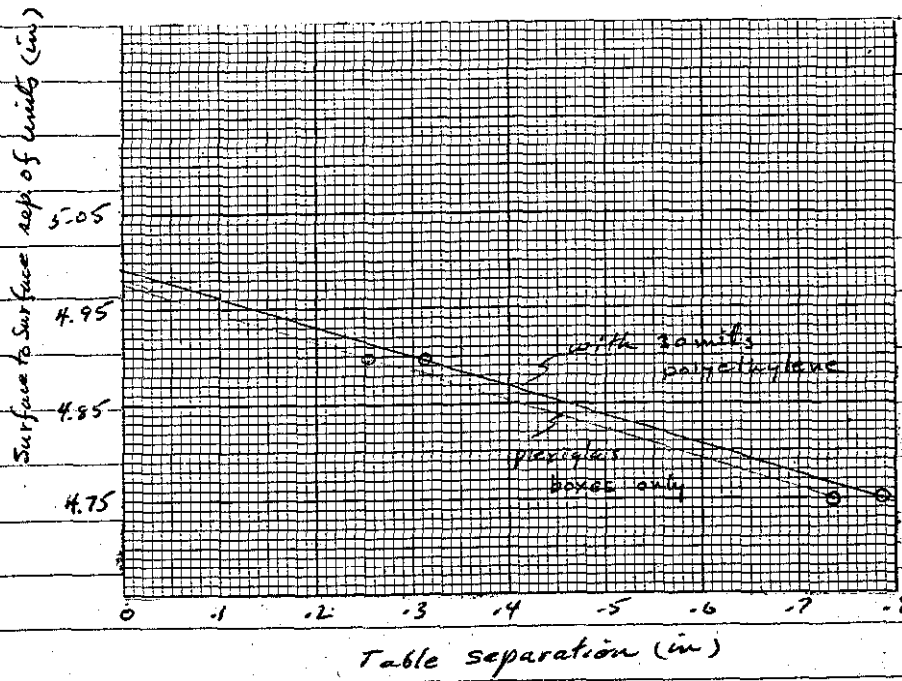
$k = 1$ at ~~0.174~~ 0.202 in. $\Delta = 0.035$ (4.13 Revs)

Have removed polyethylene and added $\frac{1}{16}$ -in-thick sheets of Plexiglas between lateral surfaces of units.

$k > 1$ positive period 52.22 sec at 0.1755 in. (3.48 Revs)

$k = 1$ at 0.204 in. $\Delta = .0285$ (4.05 Revs)

Data of pp 131 + 133



EXPERIMENT 55

8 units; 20.960 kg (463.2) / unit in $\frac{1}{4}$ " Plexiglas boxes + 6" Paraffin Ref.
(5.06 x 5.06 x 4.75 in)

Instrument Check on 7-29-63 Source 10 mCi

STS = $5\frac{1}{32}$ "

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Glock-2454 |
| IC-3 | Responds | Calibration | JII | | M-230 |
| IC-4 | | Calibration | | | Check list ✓ |
| CRM | | Meter Trip | | | |

$R < 1$.

Instrument Check on 7-30-63 Source 10 mCi

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Glock-2454 |
| IC-3 | Responds | Calibration | JII | | M-230 |
| IC-4 | | Calibration | | | Check list ✓ |
| CRM | | Meter Trip | | | |

Added 30 mils polyethylene ^{to lateral surfaces of boxes.} $R < 1$ - little difference on IC 1, 2 & 4.

Removed polyethylene and added $\frac{1}{16}$ "-thick plexiglas between units

$R < 1$ about same as other attempts.

Reset Spacing⁽¹⁾ to 4.75"

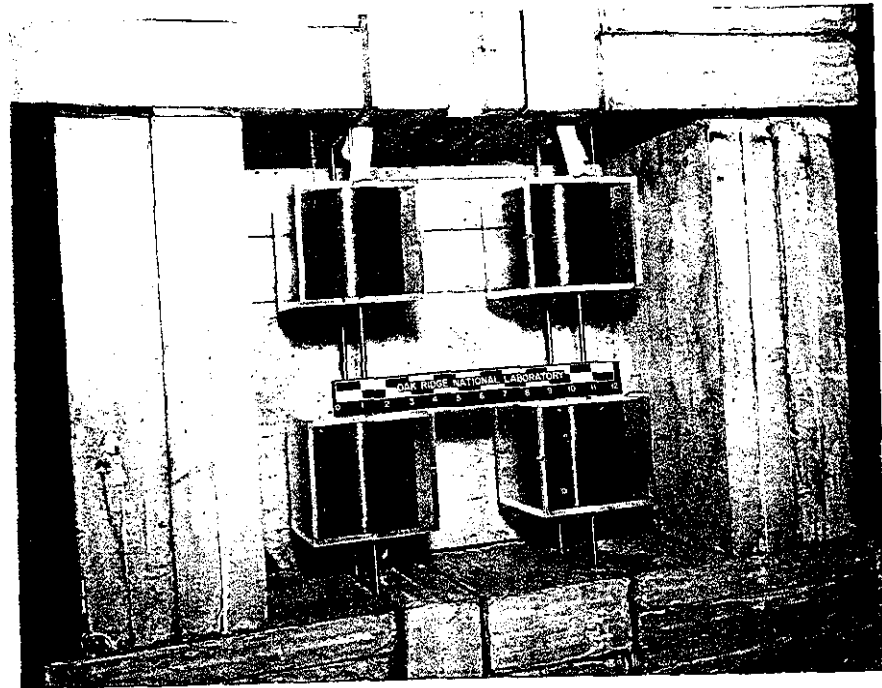
$R > 1$ positive, period 57.31 sec 670 at 0.670 in. (10.00 Revs)

$R = 1$ at 0.735 in. (10.85 Revs)

Placed polyethylene between surfaces of units 2 pcs/box

$R > 1$ positive period 33.23 sec, 670 at 0.670 in. (10.00 Revs)

$R = 1$ at 0.787 in. (11.17 Revs)



Experiment 55

Reset Spacing to $4 \frac{57}{64}$ Instrument Check on 7-31-63 Source 10 mc'd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PK-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | clock 2456 |
| IC-3 | Responds | Calibration | J/I | | 11-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

Plastic boxes + 6" - thick paraffin reflector

| | | | | |
|---------|-----------------|-----------|----------|-------------|
| $R > 1$ | positive period | 50.31 sec | 0.146 in | (3.00 Revs) |
| $R = 1$ | at | 0.252 in | | (4.82 Revs) |

Increased thickness between surfaces of units by 30 mils of polyethylene ^{2 Pcs / 100%}

| | | | | |
|---------|-----------------|-----------|----------|-------------|
| $R > 1$ | positive period | 45.21 sec | at 0.200 | (3.60 Revs) |
| $R = 1$ | at | .312 | | (5.30 Revs) |

When corrected for thin walls of boxes $STS = 4.985 \pm 0.010$ in at $R = 1$

Summary

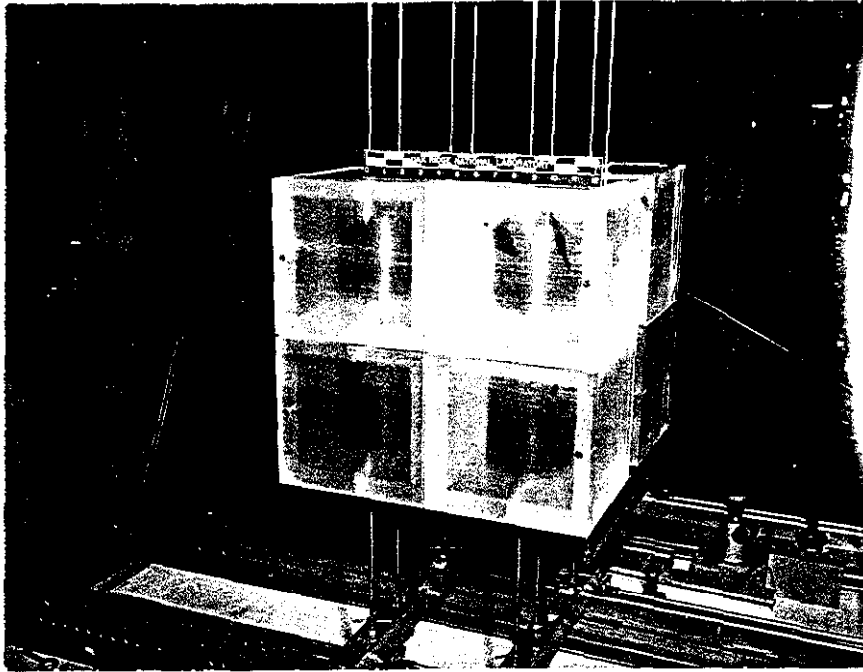
8 units, 20.960 RgU(93.2)/unit

units in $\frac{1}{4}$ " plexiglas boxesO.D.: $5.06 \times 5.06 \times 4.75$ in.Array Reflected by 6-in-thick
paraffin.S.T.S. = 4.985 ± 0.010 in

$$V_A = 835.187 \text{ in}^3$$

$$F = 0.08182$$

Expt. 56



EXPERIMENT 56

8 - 20.960 kg units in $\frac{15}{16}$ " thick Plexiglas boxes.Instrument Check on 8-1-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2456 |
| IC-3 | Responds | Calibration | ✓ | | M-230 |
| IC-4 | | Calibration | | | Check list ✓ |
| CRM | | Meter Trip | | | |

$$STS = 4 \frac{3}{32}$$

$$R < 1 \sim 4 -$$

Reset spacing to $4 \frac{1}{32}$ " = 4.03125 $R = 1$ at closure.

$$\left\{ \begin{array}{l} V_A = 606.188 \text{ in}^3 \\ F = 0.11273 \end{array} \right.$$

Have placed $\frac{1}{16}$ -in-thick plexiglas sheets into vertical spaces (E-W) between units. $16 \frac{3}{8} \times 17$ inches.

 $R \leq 1$ - negative period 790 sec. at closure.

$$\rho = -1.6959$$

Summary

8 units 20.960 kg U(93.2)/unit

units in $\frac{15}{16}$ -in-thick PlexiglasBoxes with O.D. $8.44 \times 8.44 \times 8 \frac{1}{16}$ in. ~~8.44 x 8.44 x 8.40 in.~~STS = 4.031 in \pm 0.005 in.
 $R < 1$ with additional Plexiglas added between units

7/64

$$V_A = 606.188 \text{ in}^3$$

$$F = 0.11273$$

| ① | | mass kg | 2 | mass kg |
|------|---------------|---------|---------------|---------|
| 2306 | 5246 | 2317 | 5243 | |
| 2182 | 10392 | 2187 | 10386 | |
| 2312 | 5261 | 2384 | 5244 | |
| | <u>20,899</u> | | <u>20,893</u> | |

| | | | |
|------|---------------|------|---------------|
| 2302 | 5227 | 2283 | 5248 |
| 2175 | 10371 | 2192 | 10385 |
| 2316 | 5280 | 2281 | 5259 |
| | <u>20,878</u> | | <u>20,892</u> |

| 3 | | | 4 | |
|------|---------------|------|---------------|--|
| 2326 | 5241 | 2574 | 5253 | |
| 2157 | 10400 | 2198 | 10395 | |
| 2300 | 5265 | 2431 | 5254 | |
| | <u>20,906</u> | | <u>20,912</u> | |

| | | | |
|------|---------------|------|---------------|
| 2315 | 5250 | 2434 | 5253 |
| 2161 | 10365 | 2159 | 10380 |
| 2313 | 5258 | 2276 | 5254 |
| | <u>20,873</u> | | <u>20,887</u> |

ave wt of unit ~~20.897~~ kg ^{20.892}

$5.25825 \pm .0273 \text{ kg}$
 $10.38425 \pm .0113 \text{ kg}$
 $5.259375 \pm .0097 \text{ kg}$
 ave. $20.8925 \pm .01238 \text{ kg}$

EXPERIMENT 57

2 unit 20.892 R_g U(93.2)/unit

STS = 0.500"

Instrument Check on 10-2-63 Source 10mc

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | clock 2475 |
| IC-3 | Responds | Calibration | OK | | H-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

 $R < 1$

(0.00 Revs)

Instrument Check on 10-3-63 Source 10mc

| | | | | | |
|------|-----------------------|-------------|------------|-----------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | clock 2475 |
| IC-3 | Responds | Calibration | OK | | H-230 |
| IC-4 | | Calibration | | | |
| CRM | | Meter Trip | | | |

Set E-W plane at 0.410 in

 $R < 1$

(0.00 Revs)

Set N-S plane at 0.410 in

 $R < 1$

(0.00 Revs)

Set E-W plane at 0.375

 $R < 1$

(0.00 Revs)

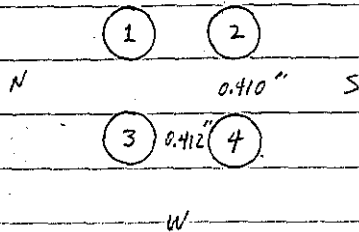
Set N-S plane at 0.375

 $R < 1$

(0.00 Revs)

Summary

Spacings at R=1



Unreflected assembly
ave vertical spacing 0.369

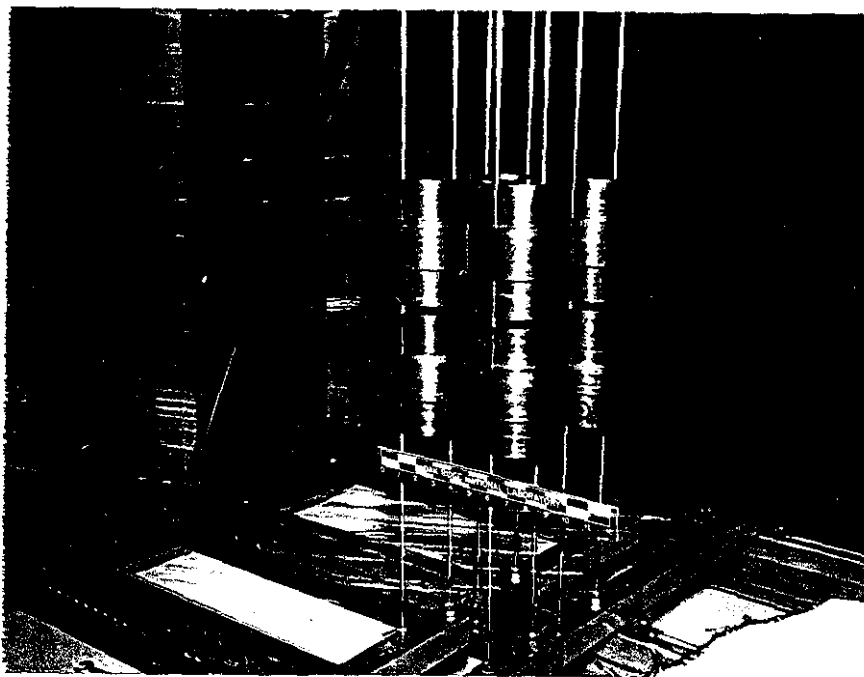
ave diameter of 60 kg pieces
is 11.454 cm, ht = 14.023

20.892 kg U(93.2) per unit

Volume unit occupies in array is $(12.5048)(12.4954)(14.023) = 2.33678 \text{ l}$

average uranium density in array = $\frac{8.9405}{2.33678} \text{ g/cc}$

F = 0.47657



EXPERIMENT 57

8 - 20892 kg (43.2) per unit

STS = 3/8"

Subassembly 4 located only ~ with respect to 3.

Instrument Check on 10-4-63 Source 10 me 8

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-6}$ | Meter Trip | OK | | clock 247.6 |
| IC-3 | Response | Calibration | JTC | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| GRM | | Meter Trip | | | |

k > 1 positive period ^{11.284} 77.1 sec ~~at~~ at 0.077 in. (1.80 Revs)

k = 1 at 0.089 in. (2.15 Revs)

Reversed tables to ~ 3 in. Reset subassembly 4.

k > 1 positive period ^{5.944} 110.2 sec at 0.094 (2.10 Revs)

k = 1 at 0.100 in. (2.36 Revs)

Set E-W spacing at 0.400 in. N.S. spacing is 0.356 at closure.

k > 1 positive period ^{14.574} 57.3 sec at 0.049 in. (1.30 Revs)

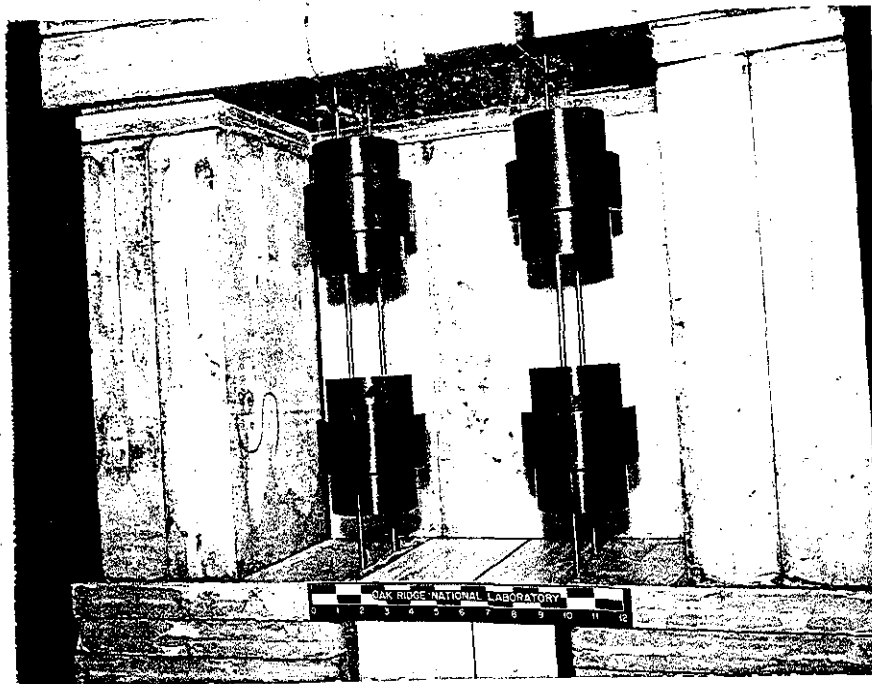
k = 1 0.064 (1.69 Revs)

Set E-W spacing at 0.410 in.

k > 1 positive period ^{17.14} 38.2 sec at 0.032 in. (1.00 Revs)

k = 1 0.056 ^{7 1/2} 1/4 in. (1.54 Revs)

Average vertical spacing between units is 0.369 in.



EXPERIMENT 58

8 - 20.892 Kg U(93.2)/unit; 6-in-thick paraffin refl. STS = $4\frac{3}{32}$ Instrument Check on 10-7-63 Source 10mc

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | Clock 2478 |
| IC-3 | Responds | Calibration | OK | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

3.1
 $k > 1$ positive period $68.9^{2.8}$ sec at 0.565 in. (8.80 Revs)
 $k = 1$ at 0.625 in. 2.13 #/in. (9.52 Revs)

10/8/63 Reset spacing to $4\frac{7}{32}$ Instrument Check on 10-8-63 Source 10mc

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | Clock 2478 |
| IC-3 | Responds | Calibration | OK | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

14.64
 $k > 1$ positive period 56.8 sec at 0.239 in. (4.50 Revs)
 $k = 1$ at 0.334 in. 1.54 #/in. (5.85 Revs)

Summary 8 units
 20.892 Kg U(93.2) per unit
 6-in-thick Paraffin reflector
 STS = 4.309 ± 0.010 in
 10.945 cm

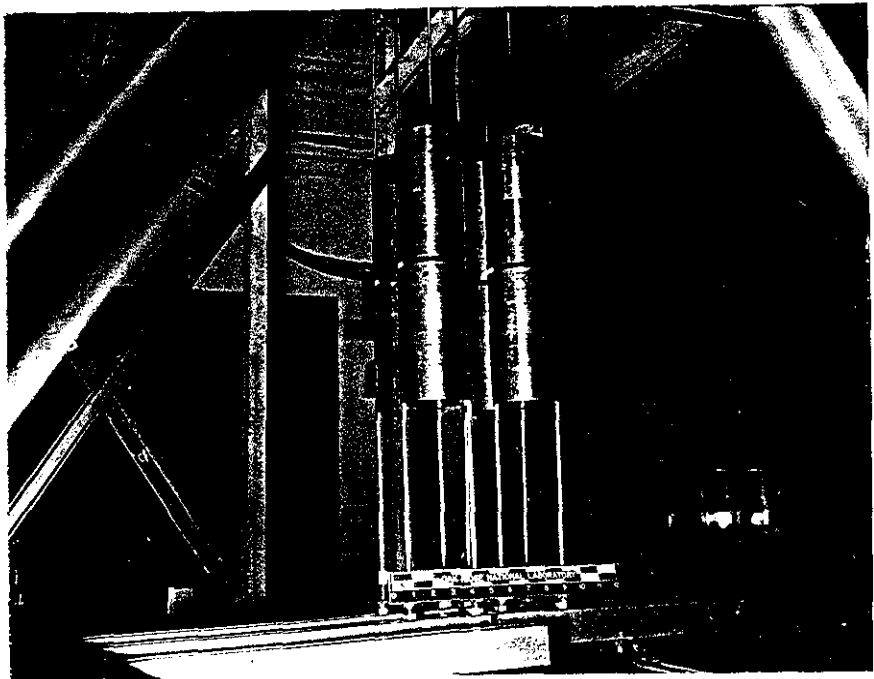
$$V_c = 12,5268 \text{ ?}$$

$$E_{\text{eff}} = 1.668 \text{ } \frac{1}{\text{cc}}$$

$$F = .08891$$

| | | | | | | | | | | | |
|---|------|-------|---|------|-------|---|------|--------|---|------|-------|
| ① | 2306 | 5.246 | ② | 2317 | 5.263 | ③ | 2326 | 5.241 | ④ | 2574 | 5.253 |
| | 2312 | 5.261 | | 2384 | 5.244 | | 2300 | 5.265 | | 2431 | 5.257 |
| | 2323 | 5.244 | | 2271 | 5.231 | | 2299 | 5.236 | | 2280 | 5.234 |
| | 2572 | 5.286 | | 2277 | 5.270 | | 2314 | 5.267 | | 2278 | 5.266 |
| | | | | | 5.08 | | | | | | |
| | 2302 | 5.227 | | 2353 | 5.228 | | 2315 | 5.250 | | 2432 | 5.232 |
| | 2316 | 5.250 | | 2308 | 5.266 | | 2313 | 5.258 | | 2304 | 5.208 |
| | 2303 | 5.221 | | 2283 | 5.248 | | 2328 | 5.227 | | 2434 | 5.253 |
| | 2275 | 5.280 | | 2281 | 5.259 | | 2322 | 5.271 | | 2276 | 5.257 |
| | | | | | | | | 21.006 | | | |

ave: 21.0078 kg V / unit



Summary: 8 units
 21.008 kg (43.2) per unit
 Unreflected
 STS N-S plane ^{2.167 cm} 0.853 in ± 0.005 in
 STS E-W plane ^{1.27 cm} 0.500 in ± 0.005 in
 STS Vertically ^{2.54 cm} 0.250 in ± 0.005 in.

STS 1.466 g/m² 25

V₁ = 25.816 l.
 P_A = 10.002 g⁴/cc

EXPERIMENT 59

8 units 21.008 R_g (193.2) percent, unreflected STS ^{13/16}"

Instrument Check on 10-10-63 Source 10mc

| | | | | |
|------|----------------------|-------------|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | > 3x10 ⁻⁴ | Meter Trip | OK | Fast Trip |
| IC-2 | > 3x10 ⁻⁴ | Meter Trip | OK | clock 2479 |
| IC-3 | Responds | Calibration | JT | M-230 |
| IC-4 | | Calibration | | check list ✓ |
| CRM | | Meter Trip | | |

R < 1 Subassembly 3 to close to 4 (0.00 Revs)

Moved E-W plane to an STS = 0.500"

R < 1

Instrument Check on 10-11-63 Source 10mc

| | | | | |
|------|----------------------|-------------|------------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK |
| PM-2 | | | Alarm Trip | OK |
| IC-1 | > 3x10 ⁻⁴ | Meter Trip | OK | Fast Trip |
| IC-2 | > 3x10 ⁻⁴ | Meter Trip | OK | clock 2480 |
| IC-3 | Responds | Calibration | JT | M-230 |
| IC-4 | | Calibration | | check list ✓ |
| CRM | | Meter Trip | | |

Vertical spacing 0.25 E-W and NS spacing 0.853

R < 1, (separate tables ~1" to set spacing on subass. 3) (0.00 Revs)

Moved E-W spacing to 0.750 in.

R < 1 (0.00 Revs)

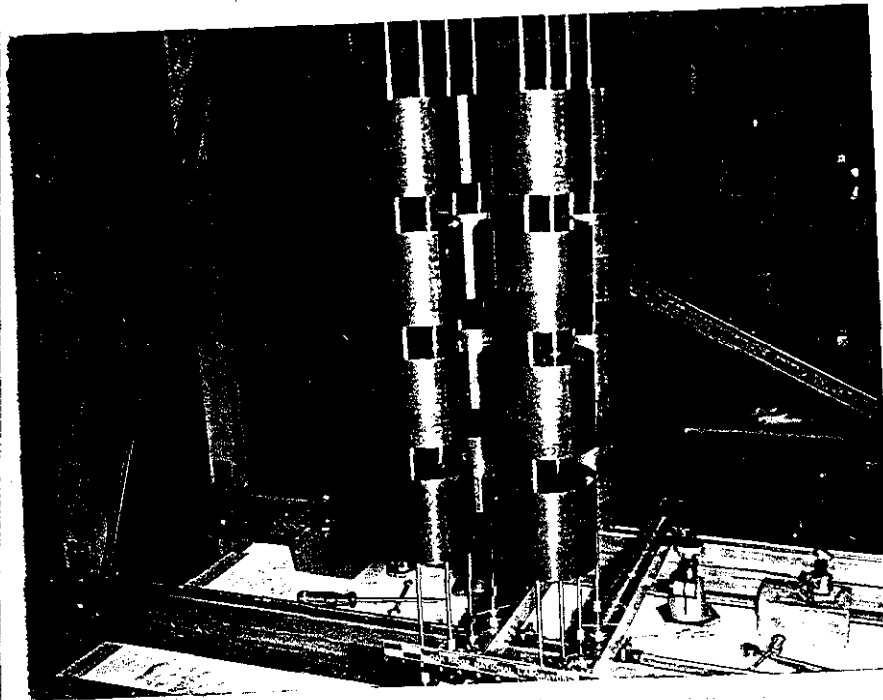
Set E-W spacing at 0.500 in. -1.024

R < 1 negative period 669 sec (0.00 Revs)

Set E-W spacing at 0.490 in. 6.174

R > 1 positive period 173.2 sec (0.00 Revs)

R = 1 at 0.020 in. (0.90 Revs)



Subassemblies

| | | | |
|-----------------|-------------------|-------------------|-------------------|
| ① 2184 } 20.887 | ② 2158 } 20.893 ✓ | ③ 2173 } 20.890 ✓ | ④ 2181 } 20.908 ✓ |
| 2195 } | 2177 } | 2155 } | 2205 } |
| 2152 } 20.891 ✓ | 2170 } 20.883 | 2169 } | 2179 } |
| 2166 } | 2182 } | 2204 } | 2192 } |
| 2193 } 20.900 ✓ | 2196 } 20.889 ✓ | 2197 } | 2164 } |
| 2185 } | 2153 } | 2202 } | 2176 } |
| 2168 } 20.885 | 2189 } 20.886 | 2154 } 20.893 ✓ | 2190 } |
| 2198 } | 2157 } | 2167 } | 2200 } |

ave mass/unit = 20.891 kg (46.2)

ave. dia = 11.488

| | |
|---------|---------------------------|
| Summary | 16 units |
| | 20.891 kg (46.2) per unit |
| | unreflected |
| | STS = 1.538 ± 0.005 in. |
| | 3.907 cm |

$V_L = 3.47735$

$\rho_a = 6008.84/cc$ $F = 0.32025$

Experiment 60

16 units (2x2x4) 20.891 $k_y(93.2)$ / unit Unreflected STS = $1\frac{1}{2}$ "

Instrument Check on 11-11-63 Source 10mcd

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | clock 2488 |
| IC-3 | Responds | Calibration | JH | | 11-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

Spacing between N.S. plane approximate only

$k \geq 1$

(6.00 Revs) (±)

(+) Forward Motion Set N.S. - plane spacing +13.524

(-) Reverse only $k > 1$ positive period 63.67 μ sec at 0.182 in. (3.60 Revs) (±)

$k = 1$

0.210 in

+666 μ sec

(4.10 Revs) (±)

Reset spacing to $1\frac{9}{16}$ "

Instrument Check on 11-12-63 Source 10mcd

| | | | | | |
|------|-----------------------|-------------|------------|-----------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | clock 2489 |
| IC-3 | Responds | Calibration | JH | | 11-230 |
| IC-4 | | Calibration | | | check list |
| CRM | | Meter Trip | | | |

$k \leq 1$ negative period 97.4 μ sec ~ -27.4 (0.00 Revs)

Estimate $k = 1$ when STS = 1.588 ± 0.005 in.

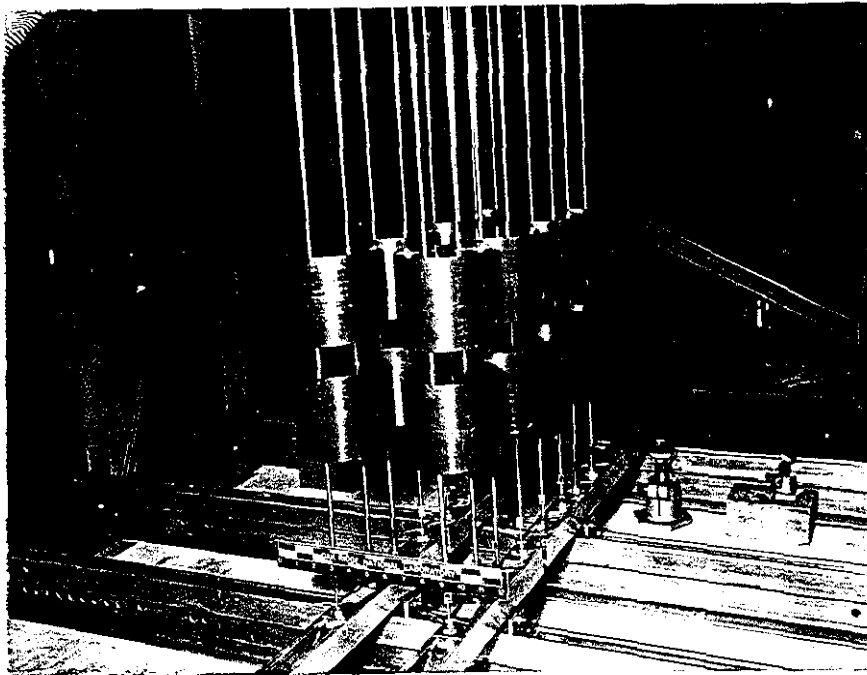
93.2)

Subassemblies

| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
|------|------|------|------|------|------|------|------|
| 2193 | 2184 | 2158 | 2196 | 2197 | 2173 | 2181 | 2164 |
| 2185 | 2195 | 2177 | 2153 | 2202 | 2155 | 2205 | 2176 |
| 2168 | 2152 | 2170 | 2189 | 2154 | 2169 | 2179 | 2190 |
| 2198 | 2166 | 2182 | 2157 | 2162 | 2204 | 2192 | 2200 |

see Expt. 60 p. 145 for individual wts.

Ave. Mass/unit 20.891 kg/l



①
②
③
④
⑤
⑥
⑦
⑧

EXPERIMENT 61

16 units 20.891 kg U(93.2)/unit Unreflected

STS = $1\frac{1}{2}$ "

Instrument Check on 11-13-63 Source 10mc8

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | check 2489 |
| IC-3 | Reponds | Calibration | JIT | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

$R > 1$ positive period at 0.201 in. 77.31 sec. (3.90 Revs)
 $R = 1$ 0.234 in \Rightarrow 3.56 $\frac{1}{in}$ (4.54 Revs)

Reset spacing to $1\frac{9}{16}$ "
 $R \leq 1$ $\frac{1}{21}$

$$\begin{aligned} & .234 \times 3.56 = \frac{.91560}{.038} \times .21 \\ & x = 52 \text{ mils. to add.} \end{aligned}$$

$R = 1$ at STS = 1.551 ± 0.005 in.
3.94 cm

| |
|----------------------------|
| Summary |
| 16 units |
| 20.891 kg U(93.2) per unit |
| unreflected |
| STS = 1.532 ± 0.005 in |
| 2.891 |

$V_L = 3.46634 \text{ l.}$

$F_0 = 6.027 \text{ gU/rev} \Rightarrow F = 0.32126$

$R > 1$ (3.90 Revs.)

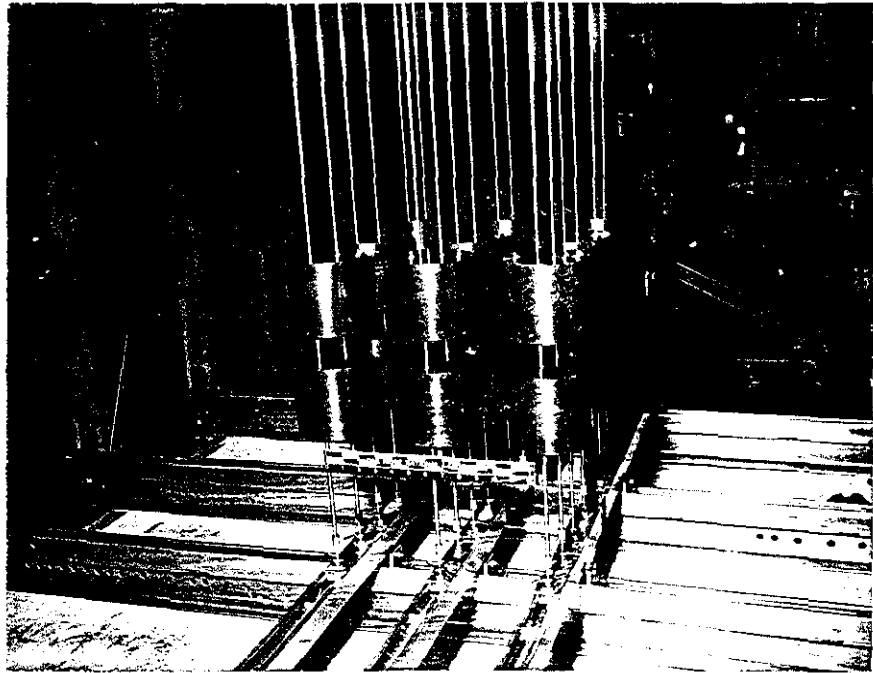
$R = 1$ (4.54 Revs)

148

Subassemblies

| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ |
|------|------|------|------|------|------|------|------|---------------|
| 2193 | 2184 | 2158 | 2196 | 2173 | 2197 | 2181 | 2164 | 2178 (20.879) |
| 2185 | 2195 | 2177 | 2153 | 2155 | 2202 | 2205 | 2176 | 2187 |
| 2168 | 2152 | 2170 | 2189 | 2169 | 2154 | 2179 | 2190 | 2159 (20.878) |
| 2198 | 2166 | 2182 | 2157 | 2204 | 2167 | 2192 | 2200 | 2156 |

ave. 20.880 kg/unit



Summary

18 units

20.880 kg/unit

Unreflected

STS = 1.827 ± 0.005 in

4.641 cm

$V = 4.00719 \text{ cc}$

$\rho_A = 5.212 \text{ g/cc}$

$F = 0.27782$

77)

878)

EXPERIMENT 62

3x3x2 18 units 20.840 Rg/unit Unreflected STS = 1 1/16

Instrument Check on 11-14-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2490 |
| IC-3 | Responds | Calibration | JN | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

k > 1 positive period ~70 sec. 1.17 in. (14.50 Revs)

k = 1 1.27 in. (15.09 Revs)

Increase spacing between N'S planes by 1/8"

k > 1 positive period (10.80 Revs)

k = 1 (11.40 Revs)

1 1/16 1.8125 in.

Instrument Check on 11-15-63 Source 10 mcd

| | | | | | |
|------|----------------------|-------------|------------|-----------|------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-4}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-4}$ | Meter Trip | OK | | Clock 2491 |
| IC-3 | Responds | Calibration | JN | | M-230 |
| IC-4 | | Calibration | | | check list |
| CRM | | Meter Trip | | | |

k > 1 positive period $p = 10.49$ 89.8 sec .115 at 0.115 in. (2.50 Revs)

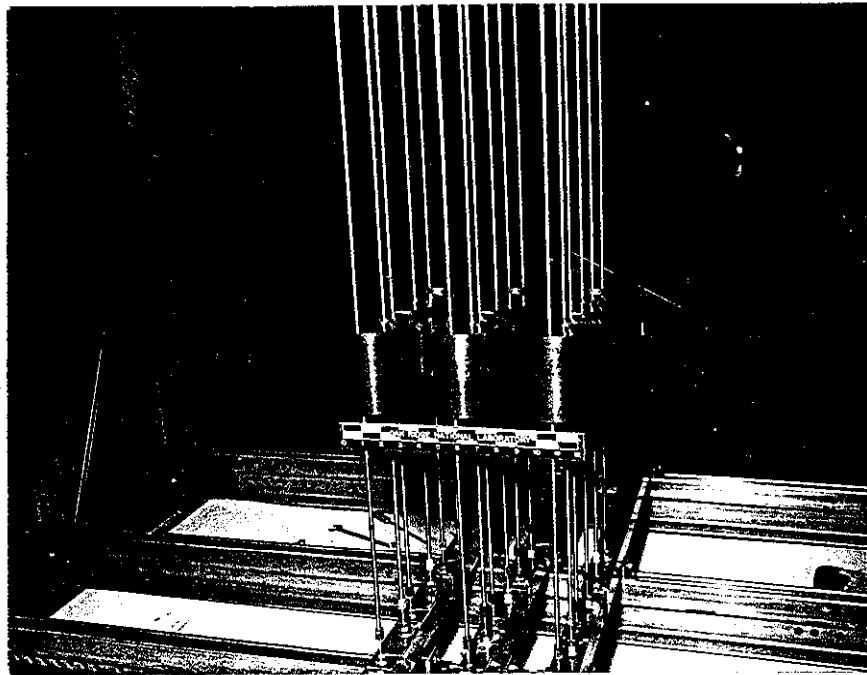
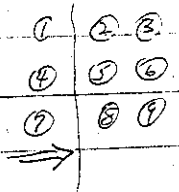
k = 1 0.1145 in. 3496 $\frac{1}{in}$ (3.12 Revs)

$p = 10.49$
0.1145 in.
3496 $\frac{1}{in}$

Subassemblies

| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ |
|------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 2152 | 2158 | 2196 | 2173 | 2193 | 2181 | 2197 | 2154 | 2190 |
| | 2166 | 2177 | 2153 | 2155 | 2185 | 2205 | 2202 | 2167 | 2200 |
| mass | 21891 | 20.893 | 20.889 | 20.890 | 20.900 | 20.908 | 20.900 | 20.893 | 20.904 |

Ave 20.896 $\frac{kg}{amp}$



EXPERIMENT 63

9 units 20.896 kg U/unit Unreflected

Instrument Check on 11-19-63 Source 10mc

kg U/unit

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | - |
| PM-2 | | | Alarm Trip | OK | - |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | clock 2491 |
| IC-3 | Responds | Calibration | JII | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

STS = 1.72" $k < 1$ $M \approx 2$

Instrument Check on 11-20-63 Source 10mc

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| PM-1 | Low Trip | OK | Alarm Trip | OK | |
| PM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | clock 2492 |
| IC-3 | Responds | Calibration | JII | | M-230 |
| IC-4 | | Calibration | | | check list ✓ |
| CRM | | Meter Trip | | | |

STS = 0.531" $k < 1$ $M \sim 5$

STS = 0.475" $k < 1$ $M \sim 7$

STS = 0.250" $k > 1$ positive period 6.64 159.8 sec 0.0605 in^2 (1.50 Rev)
 $k > 1$ positive period 43.3 sec 0.0432 in^2 (1.20 Rev)
 $k = 1$ 0.0702 in (1.82 Rev)

Summary
 9 units
 20.896 kg U (93.2) per unit
 Unreflected
 STS = $0.259 \pm 0.005 \text{ in.}$
 0.658 cm $V_L = 1.6852 \text{ ?}$

$P_A = 12.400 \text{ ?}$
 $F = 2.05 \text{ ?}$

Expr. 64

see P. 100 in Tinker Toy Book IV (154pg)

Experiment 63

STS = 0.275

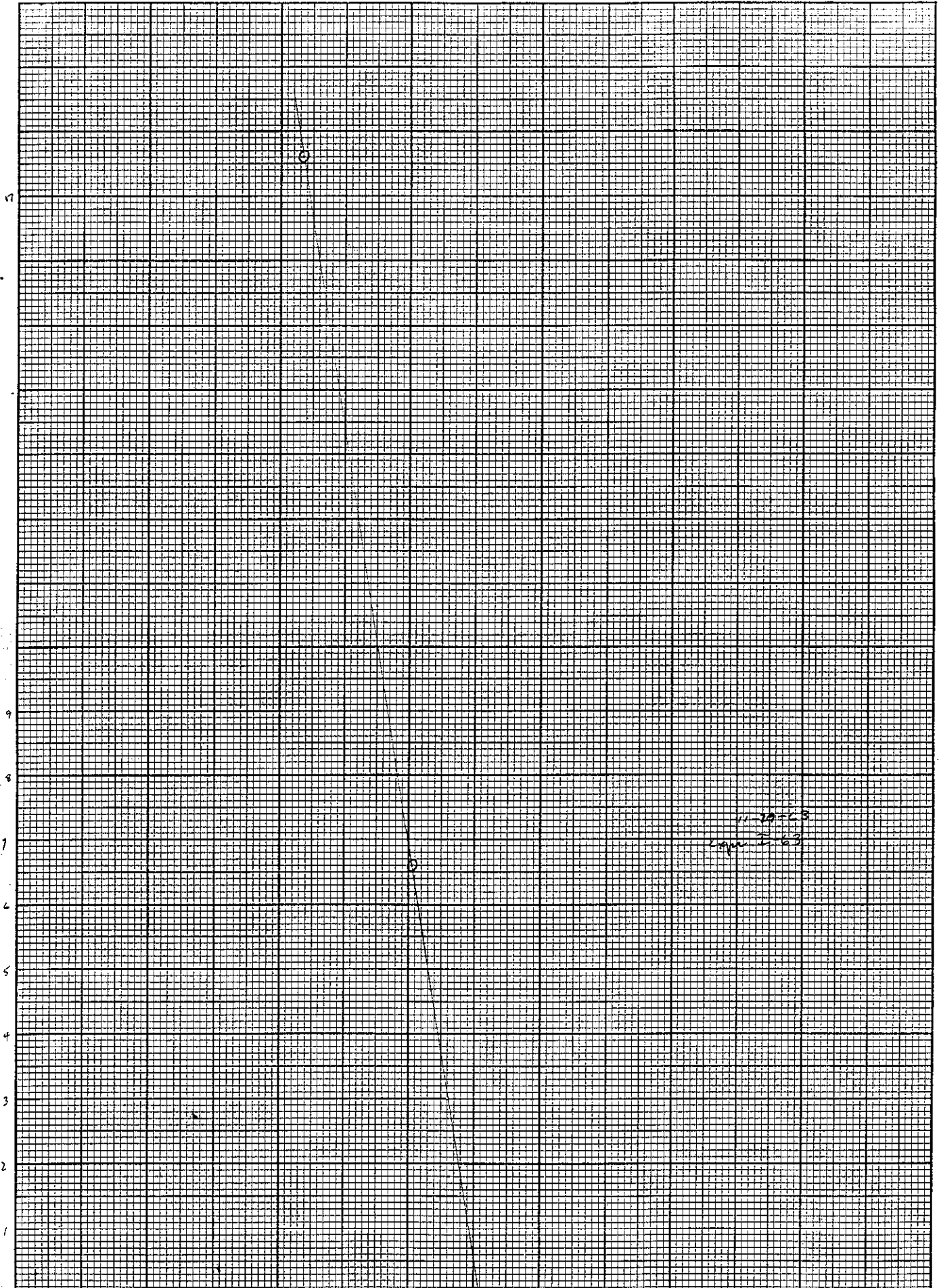
Instrument Check on 11-21-63 Source 10mcV

| | | | | | |
|------|-----------------------|-------------|------------|-----------|--------------|
| FM-1 | Low Trip | OK | Alarm Trip | OK | |
| FM-2 | | | Alarm Trip | OK | |
| IC-1 | $> 3 \times 10^{-11}$ | Meter Trip | OK | Fast Trip | OK |
| IC-2 | $> 3 \times 10^{-11}$ | Meter Trip | OK | | Clock 2493 |
| IC-3 | Responds | Calibration | J11. | | 11-230 |
| IC-4 | | Calibration | | | Check list ✓ |
| CRM | | Meter Trip | | | |

k21 81-

358-10 1/2
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0. 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10

Table sep. in.