

BOOK 120R

Notes:

on front: "FBR Burst Exp. 61-62"
"FBR #2"

on spine: "FBR #2 61-62"

Note that there are no pages numbered 55 and 56 and they have not been torn out; manufacturer error.

Blank pages: inside cover, page opposite page 1, 1-3, 11, 16, 19, 23, 25, 27, 29, 31, 76-154 (last page), inside back cover

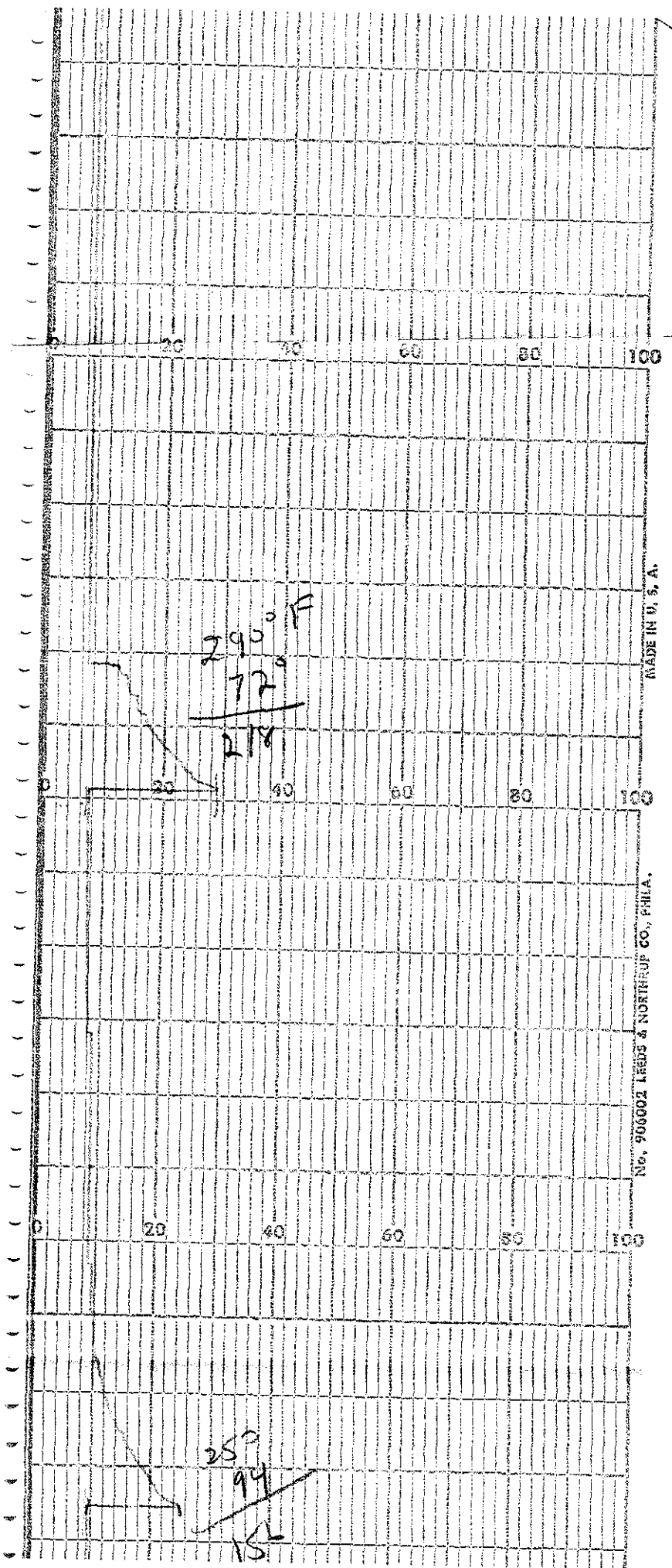
graph sheet at front of book (loose)
pages 8, 10, 12, 16, 20, and 44 each have a graph taped down
loose graph between pages 88 and 89
2 papers loose in back of book

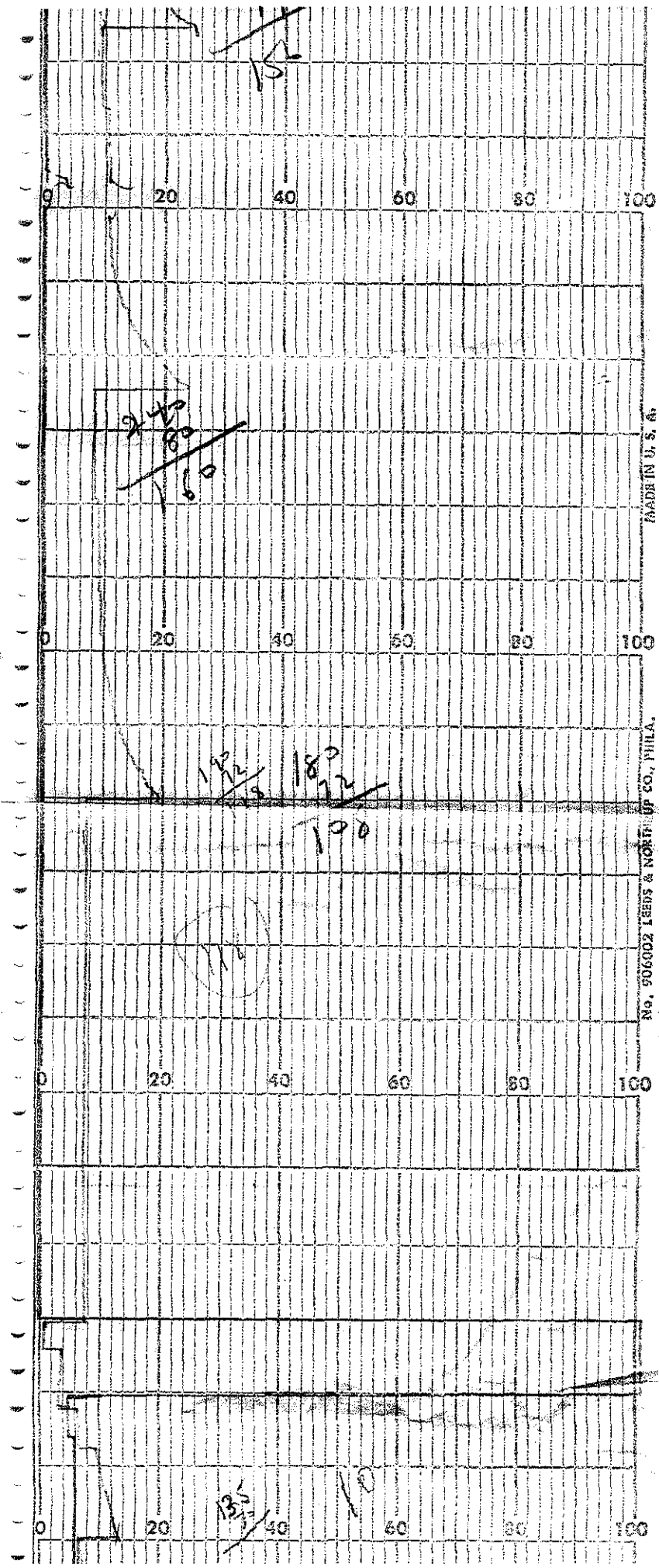
Scanned by:

Sheila Finch

RSICC /Oak Ridge National Lab.

May 16, 2001





MADE IN U. S. A.
No. 906002 LEEDS & NORTHROP CO., PHILA.

E-5



Account Book

No. S 149

NO UNITS

Journal

Ledger, Single Entry . .

Ledger, Double Entry .

Record Ruled (27 Lines)

Made in 150, and 300 Pages

MADE IN U. S. A.

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

4

Ru

7:15

7⁴

11/21/61

4¹⁵ pm

Blow hole plug H 883-50-1596
was put in reactor

113 gms

13
8⁻

8

8

8

FAST BURST OPERATION

RUN 15 11/21/61

7:15

Delayed Critical Run
Thermocouple Readings

Critical cond return
RR = "in", BR = out
MA = 3.53

7:45 PM

MA moved to 3.30 for pos period
T = 113 sec, P = 9.4 {BF₃ 101} {count rate}

MA moved to 3.382 for pos period
T = 130 sec {BF₃ count rate 101}, P =
lower level lowered and period
measured again without moving MA

8:18

8:20 PM

T = 141 sec, P = 7.484 {BF₃ read in 101}
safety block lowered
Thermocouple Readings:

- # 18 - 21.0 9 - 21.2
- # 2 - 21.1 18 - 21.0
- 4 - 21.
- 5 - 21.1
- 6 - 21.1

137
21.1
116.9

8:42 P.M

8:46

Safety started in
Burst rod inserted



6

Temp (maximum)

155°C on continuous recorder ^{c.c. #18} 155-21

~~139~~°C temp rise

Temp change on FBR thermocouple = 340 - 70 = 270 °F

Thermos

2 - 21.2

4 - 21

5 - 138

6 - 21.5

9 - 61

18 - 155

21
134

61
21.2
398

138
261
1169

RWN 16

10 ⁵² AM

MA moved to 3.310 for pos period
T = 157 sec, P = 6.8 {BF₃ counter from 101}

10 ⁵⁸ AM

MA = 3.280 for pos period
T = 128 sec, P = 8.15 # BF₃ counter
T = 128 " , log W

11 ⁰⁷ AM

MA moved to 3.270 for pos period
T = 122 ; P = 8.45 cents BF₃ in 101

11 ¹²

Safety block started out

11.

11.

12.

11 ⁴⁸/_{AM}

thermocouple readings

2 - 21.2	9 - 21.5
4 - 20.5	18 - 21.5
5 - 21.8	
6 - 21.3	

12
21.5

167.5

Burst rod inserted ← 15

alg

11 ⁵⁸/_{AM}

2
8

Temp ⁴¹⁰
60 to ~~40~~ °F on black pointer
~ 45 to

170 °C rise (up to 189 °C peak) on continuous records

101 } 12 ⁰³/_{PM}

2 - 21.5 °C	9 - 62
4 - 21.2 °C	18 - 189 (peak)
5 - 17.6 °C	
6 - 22.5 °C	

21.5

167.5

center

176
21.2

154.2

in 101

8

11/22/61

Run #16

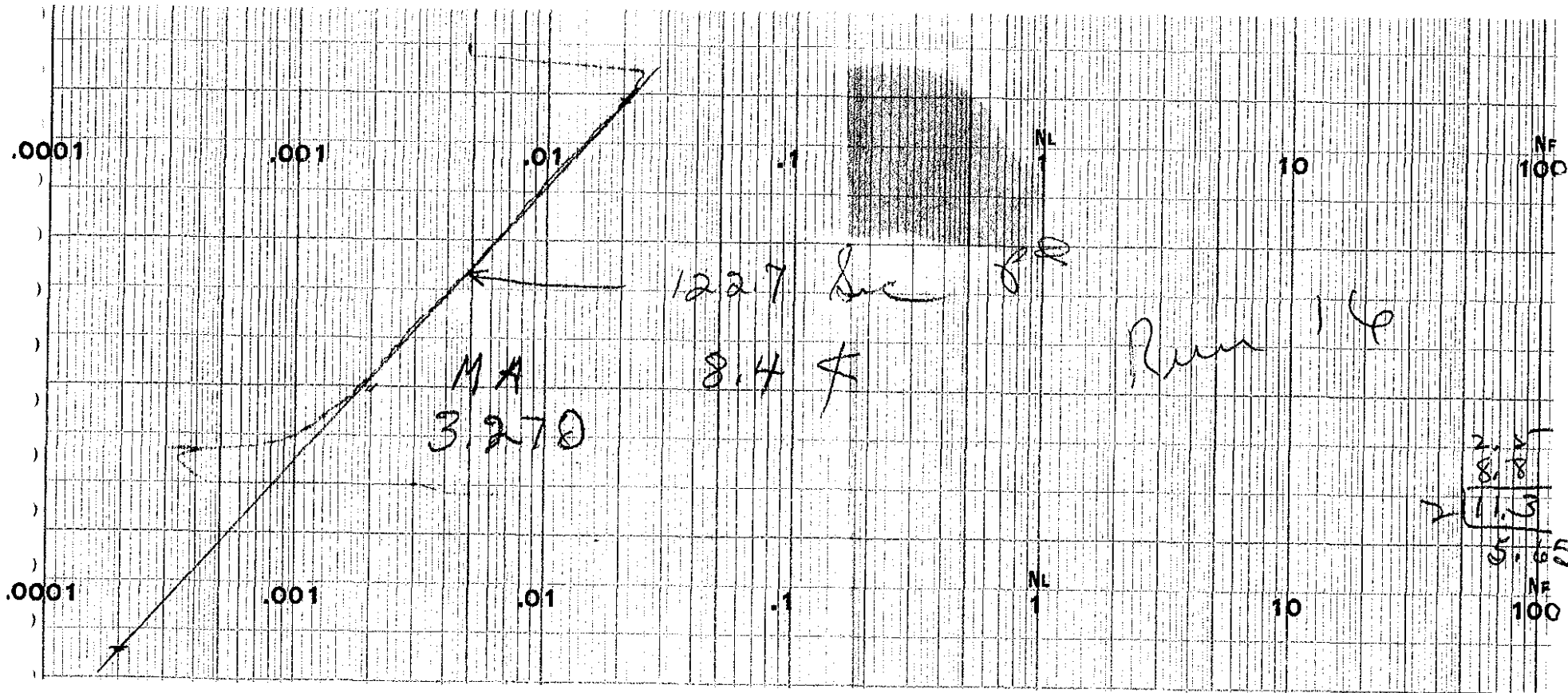
10 ²⁴/_{PM}

Start safety block in low
delayed critical

10 ⁴⁵/_{PM}

Critical MA reading = ~~3.490~~ 3.518

51



11/22/61 Run 17

3¹⁸ PM

Safety in

MA = 3.444 at Critical

MA moved to 3.195 for pos. period

Shut down because temp was changing

4⁴⁵

Run 17 cont

5⁰³ PM

Temp.

18 - 24.5

5 - 25.0

9 - 25.0

MA = 3.495 at Critical

MA = 3.26 for pos period

T = 125 sec P = 8.27 BF₃

T = 122 P = 8.4 Log N

MA moved to 3.25 for pos period

T = 116 sec ; P 8.79

T = ~~109~~¹¹³ sec ; P 8.98

5¹³ PM

10

5 ³³/_{PM}

Run 17 (Cont.)

MA moved to 3.255 for pos period

T = 117 ; 8.7 BF₃ counter

T = 118 ; 8. Log N

MA moved to 3.26 for pos period

T = 120 ; P = 8.53 BF₃

T = 125 ; P = 8.42

5 ⁵¹/_{PM}

Safety block started out

Temp

2 - 22.0 18 - 23.0 4 - 21.3

5 - 24.0 3 - 24.9 6 - 22.1

9 - 23.8

6 ¹²/_{PM}

Safety started in

⁹⁶/₂₃₈/₇₂₂

175.5

6 ¹⁶/_{PM}

Burst rod inserted

²⁴/₁₅₁₅

16

Temp change by FBR Thermocouples

450 - 65 = 385

block, en

420 - 55 = 365

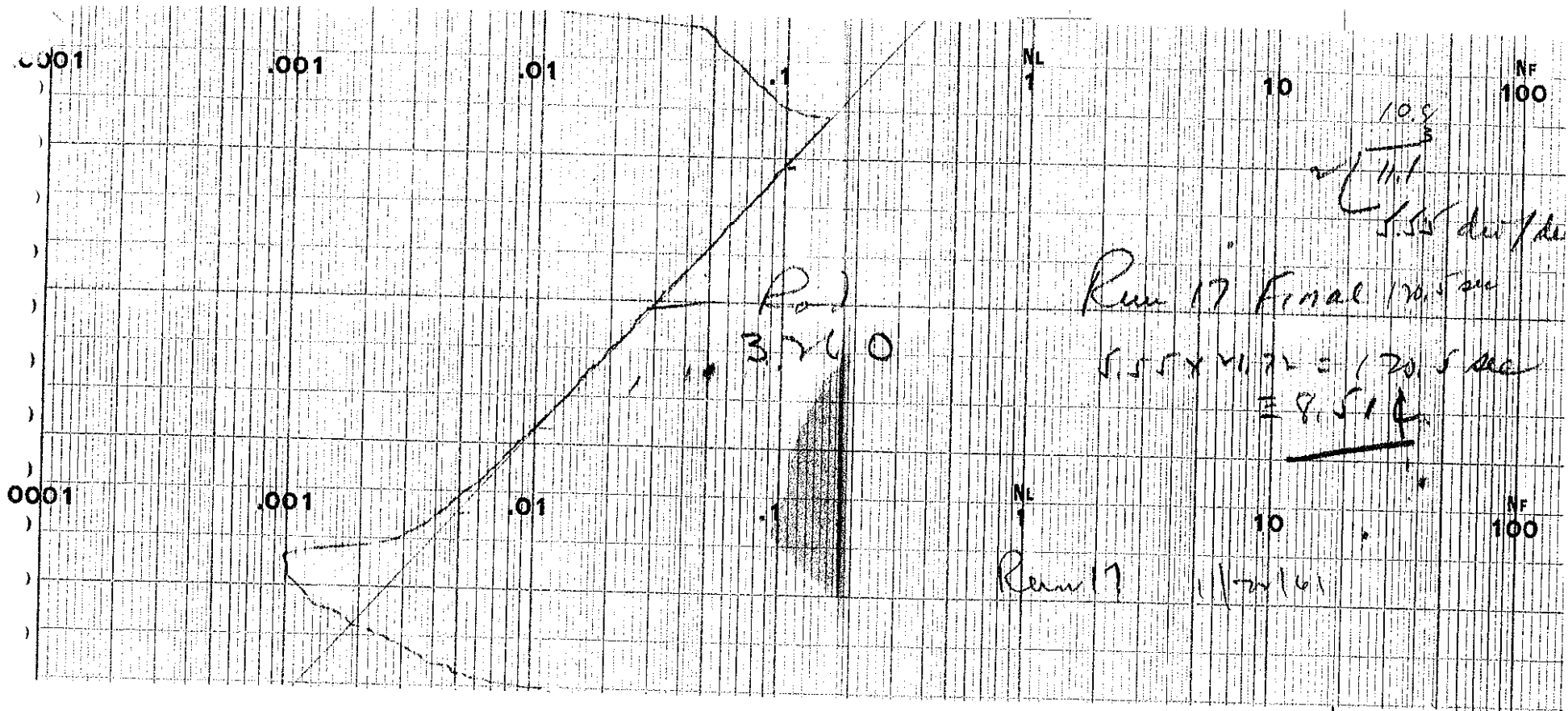
Temp by Thermocouples

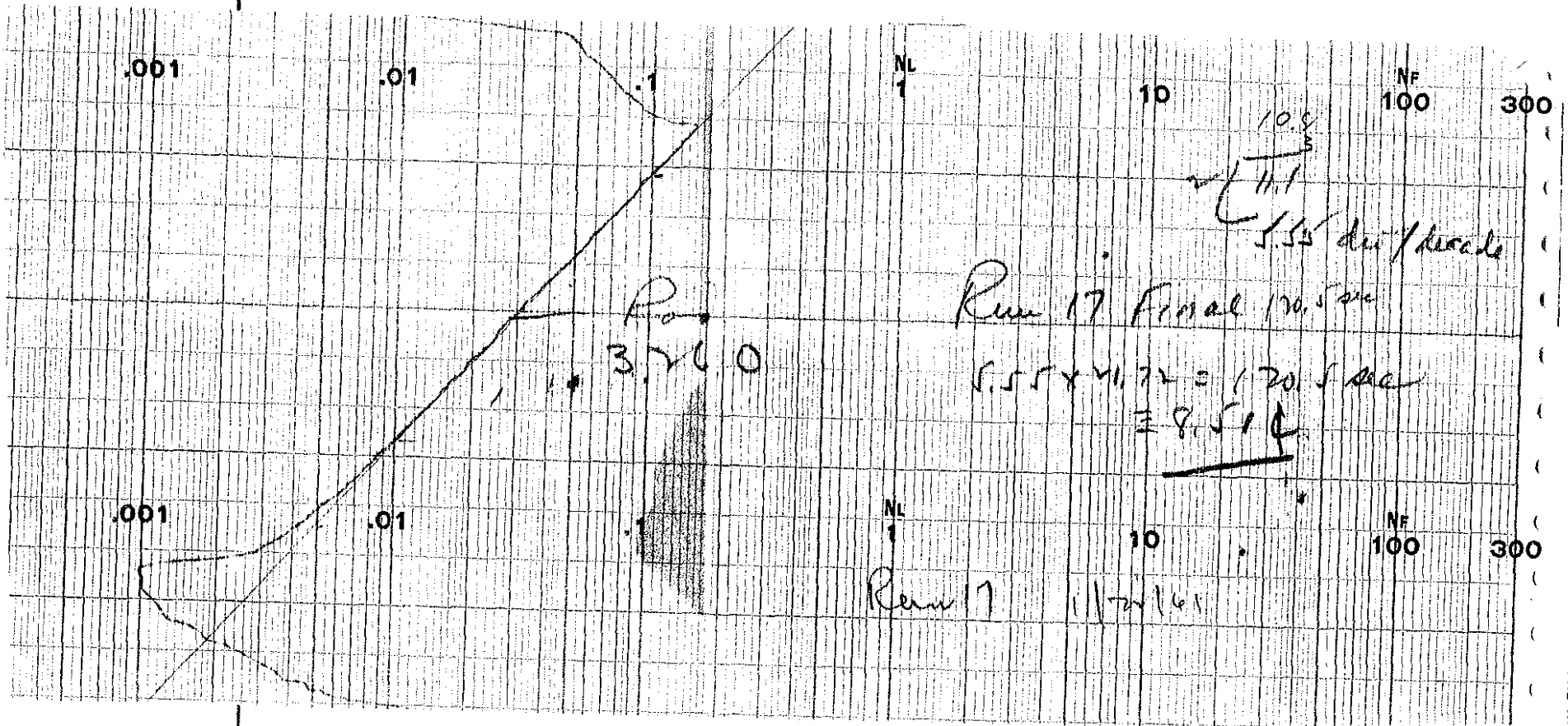
9 - 78 15 - 24.5 9 - 96

10 - 24 2 - 21.5 18 - peak off scale

13 - 25 4 - 20.5

14 - 21.5 5 - 175.5





e/c

12

11/22/61 Run 18

11²⁸/_{PM}

Safety block started in

11/23/61

12⁰⁶/_{AM}

MA = 3.52 at Critical

MA moved to 3.270 for pos period

T = 125 ; P = 8.27

T = 126 ; P = 8.2

MA rod moved to 3.248 for pos. period

T = 117 ; P = 8.71 Log W

T = 113 ; P = 8.98 BF₃

MA moved to 3.240 for pos period

T = 114 ; P = 8.90 Log W

T = 120 ; P = BF₃

Temp = 23.3 on #18

Power lowered and period repeated

at MA = 3.240

T = 115.1 ; P = 8.83 Log W

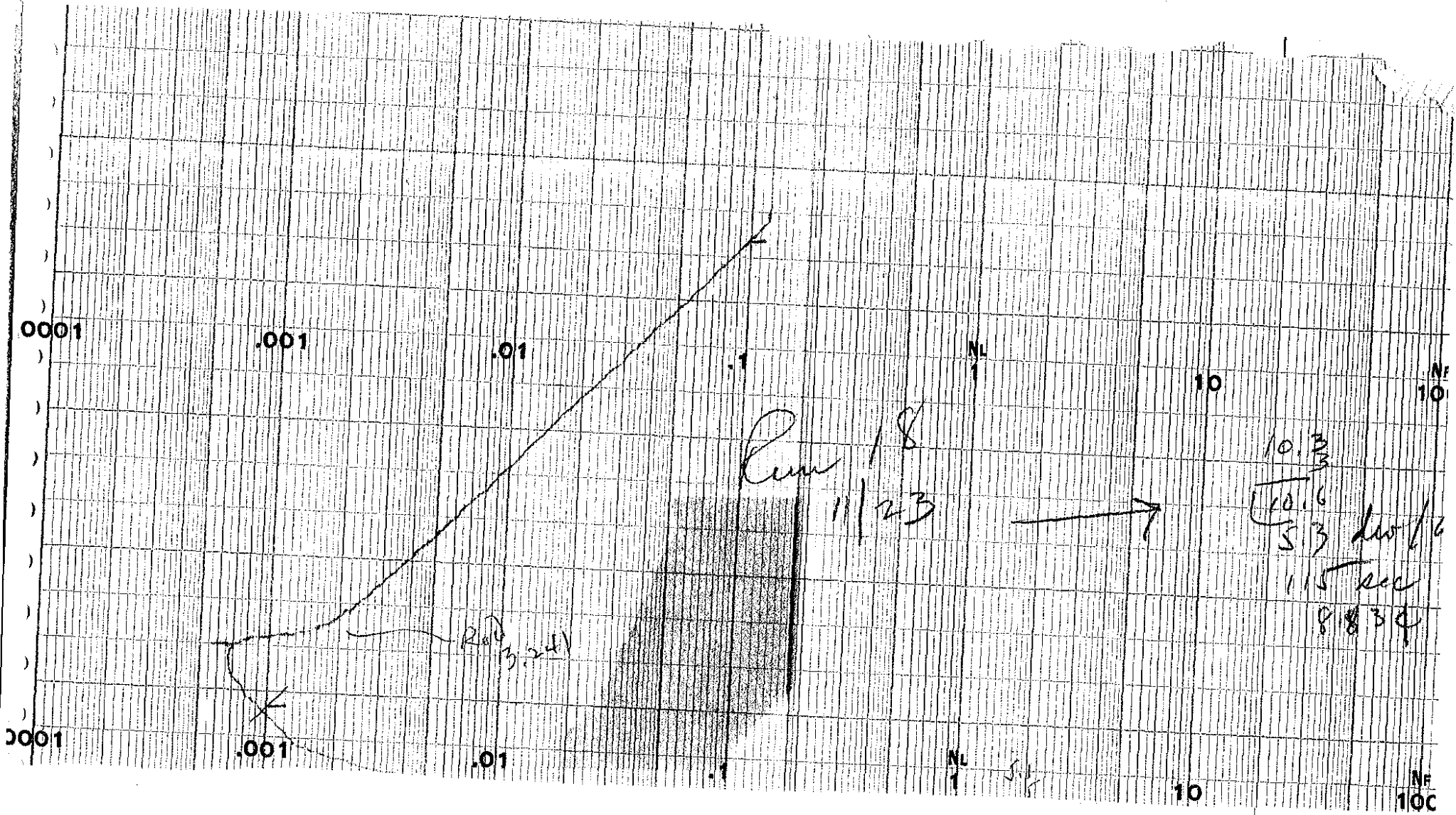
T = 114.5 ; P = 8.89 BF₃

12⁴⁸/_{AM}

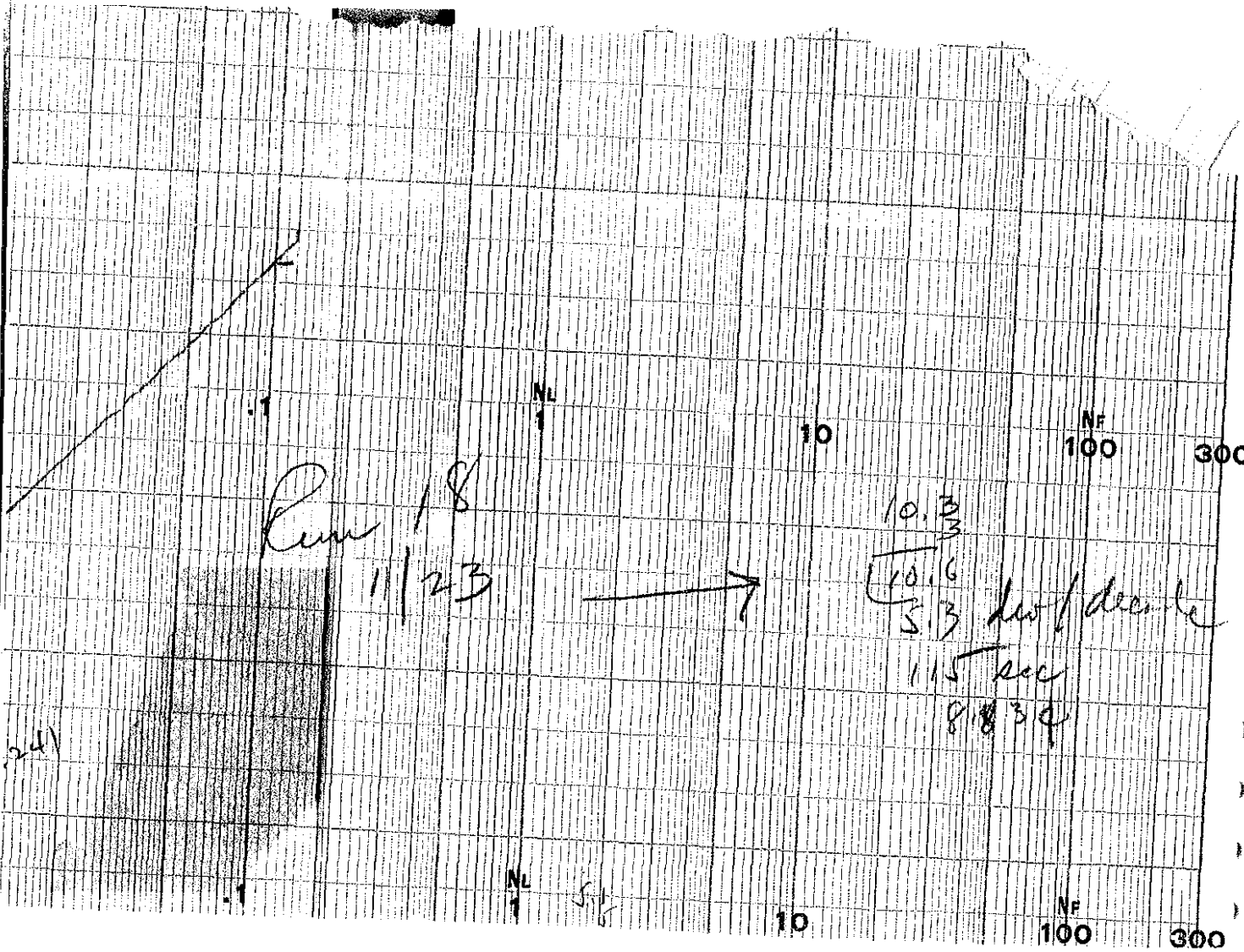
Safety block started out

Temp

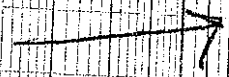
5 - 23.5 ; 9 - 23.2 ; 18 - 23.0



1/2



Run 18
11/23



10.3
 $\sqrt{10.6}$
 53 dw/decade
 115 sec
 81834

EG. CO., BROWN INSTRUMENTS DIVISION, PHILADELPHIA, PA.

e/c

10⁸
AM

Burst rod inserted ← 17

Temperature change

$$500 - 60 = 440^{\circ}\text{F} \quad \text{black pen}$$

$$465 - 55 = 410$$

12¹³

Temp from Thermocouples

#18 still > 200

#5 - 181

#9 - 112.5

#18 - off scale at 200

14

11/24/61

Run 19

8 ⁵⁰ AM

Safety block started up for delayed crit

~~Thermocouple readings:~~

9 ¹⁰

MA = 3.492 at crit

MA moved to 3.190 for pos period

T =

P =

T = 81 sec

P = 11.6

Log W

BF₃ counter

MA moved to 3.222 for pos period

T =

P = 10.4

Log W

T = 99. sec

P = 9.92

BF₃ counter

MA moved to 3.235 for pos period

T = 106

P = 9.45

Log N

T = 97.4 sec ; P =

BF₃ counter

data }
Poor } ??

9 ³⁴

Safety block started out

Thermocouple readings:

2 - 21.5 5 - 21.2 9 - 21.5

4 - 21 6 - 21.2 18 - 21.8

~~safety~~

Burst rod inserted ←

18

Temp change from FBR

515 - 55 = 460 °F

black pen

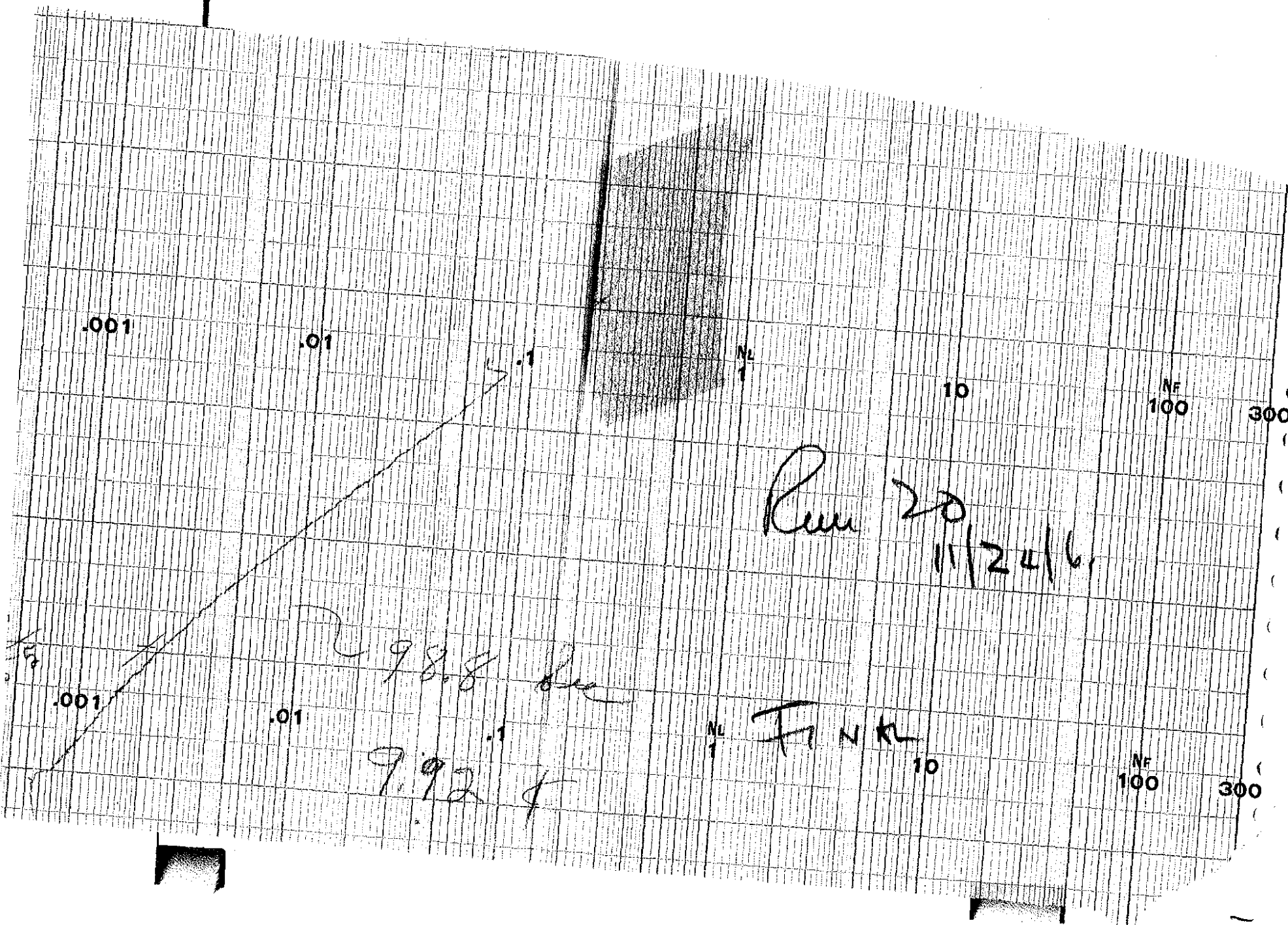
475 - 45 = 430 °F

red pen

10 ²¹ AM

See Moly
next page
on Temp
readings

Note: the temperature recorder pens
appeared to hang up during temp
rise, and may be wrong

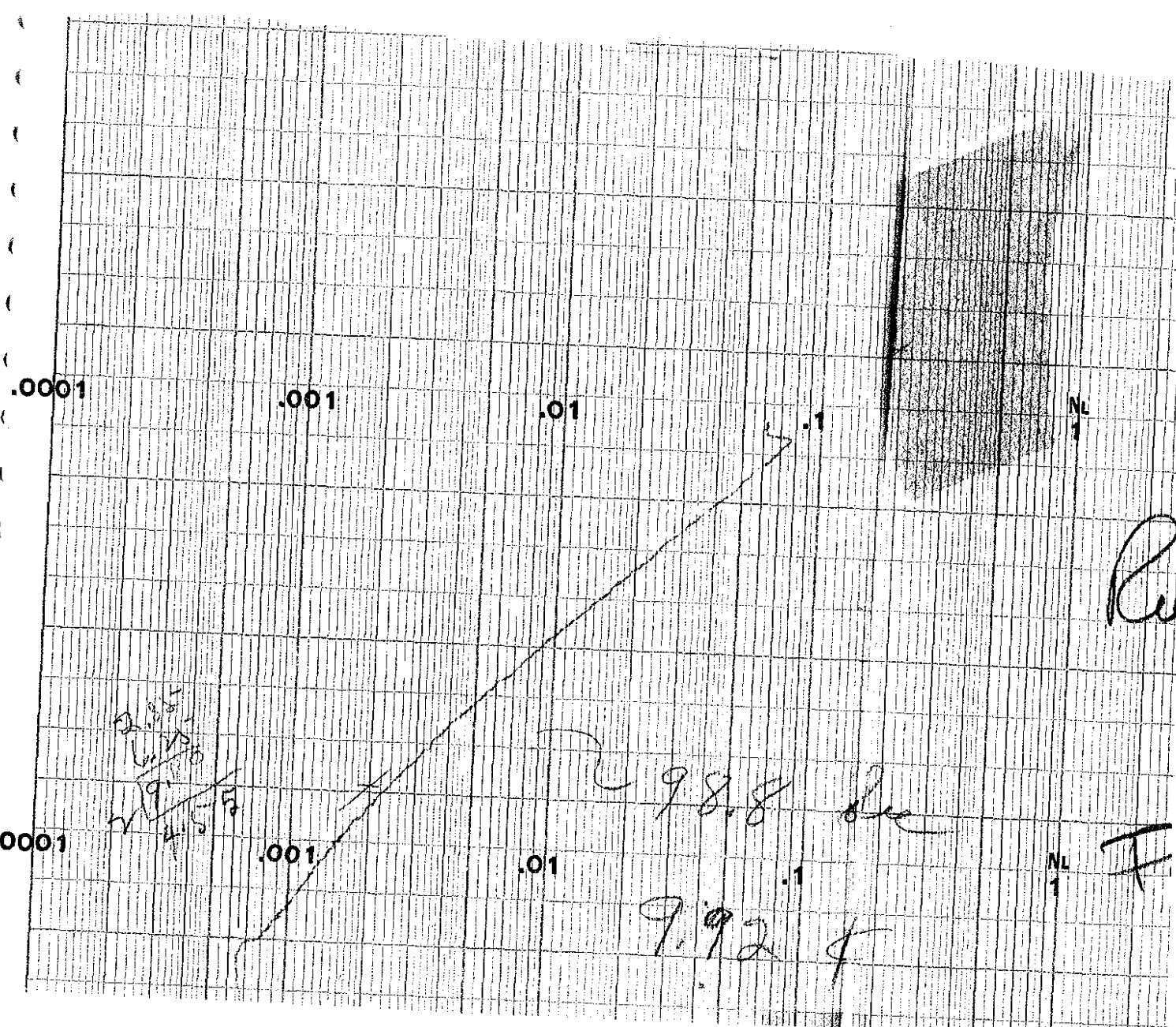


98.8 db
 9.92 db

Run 20
 11/24/6

FINK

PLATE 460 PRINTED IN U.S.A.



11/24/61 Run 20

Delayed critical run for burst

MA = 3.500 at crit

Thermocouple readings:

2-21 5-25 9-25

4-21 6-22.5 18-23.9

#18 has been changed to read from continuous recorder having a range of 0 - ~~4000~~ ^{400 °C} F

3 ⁵³ PM

MA moved to 3.212 for gas period

T = P = 10.4 Log N

T = 93.8 sec P = 10.3 Count rate 101

MA withdrawn slightly (back lash taken out) ^{essentially} so as to reduce reactivity slightly

MA = 3.213 for gas period

T = P = Log N

T = 101.5 sec P = 9.84 Count rate in 101

MA moved to 3.215 ^{on insert} for gas period

T = 98.8 sec; P = 9.92 †

T = 95.6 sec; P = 10.12

4 ³⁹ PM

Safety block started out

18

Run 20 (continued)

Thermocouple Readings

2-22 5-24.5 9-24.4

4-21.7 6-22.8 18-22

Notes: Microphones moved to within ~ 7ft of core -

5⁰⁸
pm

Burst rod inserted

Temp change from FBR thermocouples

565 - 60 °F = 505 change black

530 - 55 °F = 475 change red pen

19

268 - 22 °C = change

of temp as measured by continuous recorder (0-400 °C recorder)

2-22 5-off scale 9-151

4-21.2 6-33

24.4
1366

20

11/24/61

Run 21

Thermocouple readings

11⁰⁰ PM

2-21.0	5-24.0	6-21.8
3-28.0	9-24.0	
4-20.2	18-22.0	

11²⁶ PM

MA at 3.505 for delayed critical
MA moved to 3.185 for pos period

T = 91	P = 10.6	Log N
T = 73.86	P = 12.5 11.1	Cond rat 101

Power level lowered with safety and raised again - no change of MA

T =	P = 10.67	Log N
T = 87	P = 10.97	Cond rat 101

MA = 3.178 for pos. period

T = 83.6	P = 11.3	Log N
T = 84.4	P = 11.3 11.23	

MA = 3.181 for pos period

T = 84.7	P = 11.2
T = 79.2	P = 11.75

Repeat without changing MA

T =	P = 11.3	Log N
T = 82	P = 11.5	

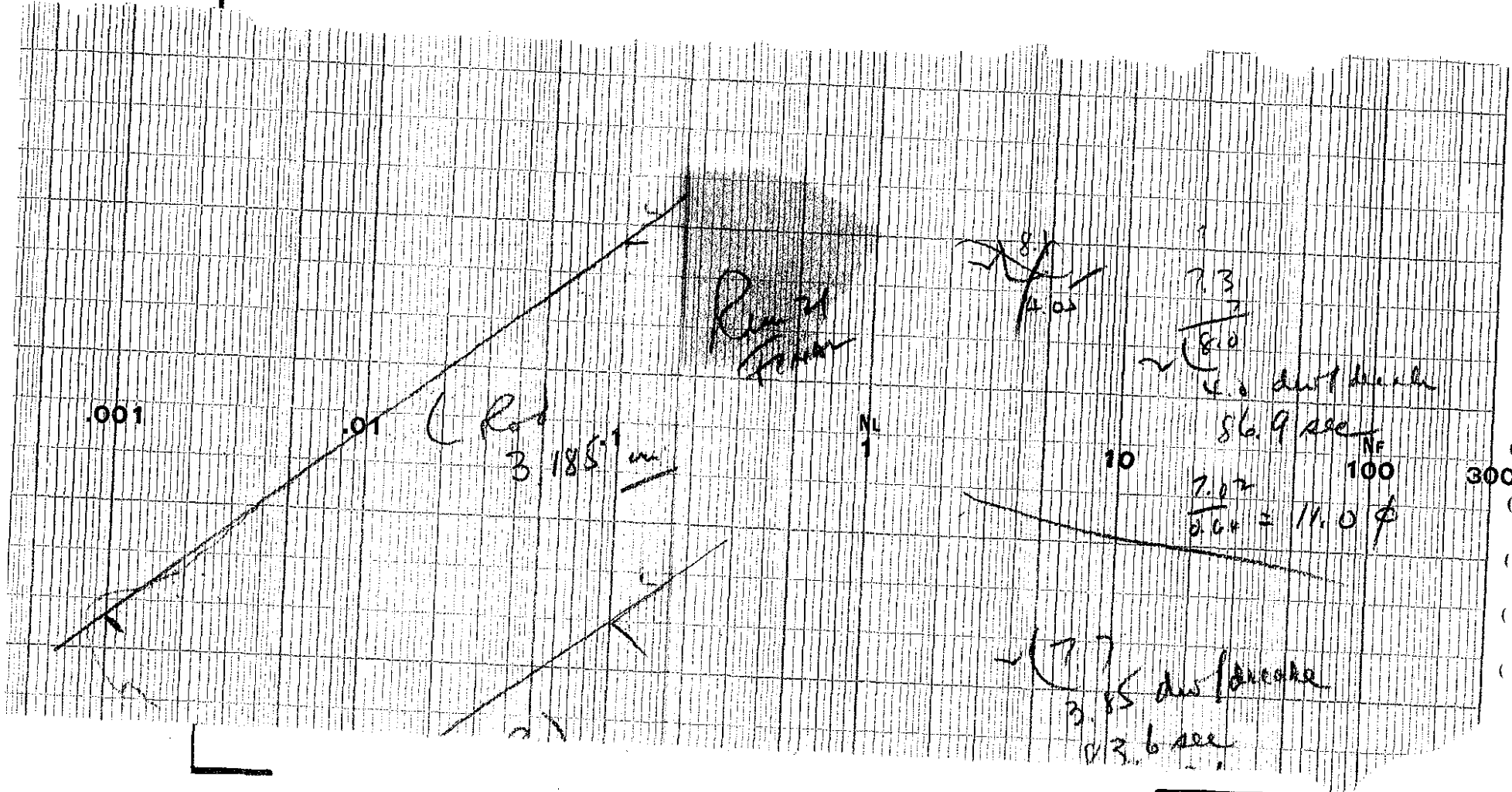
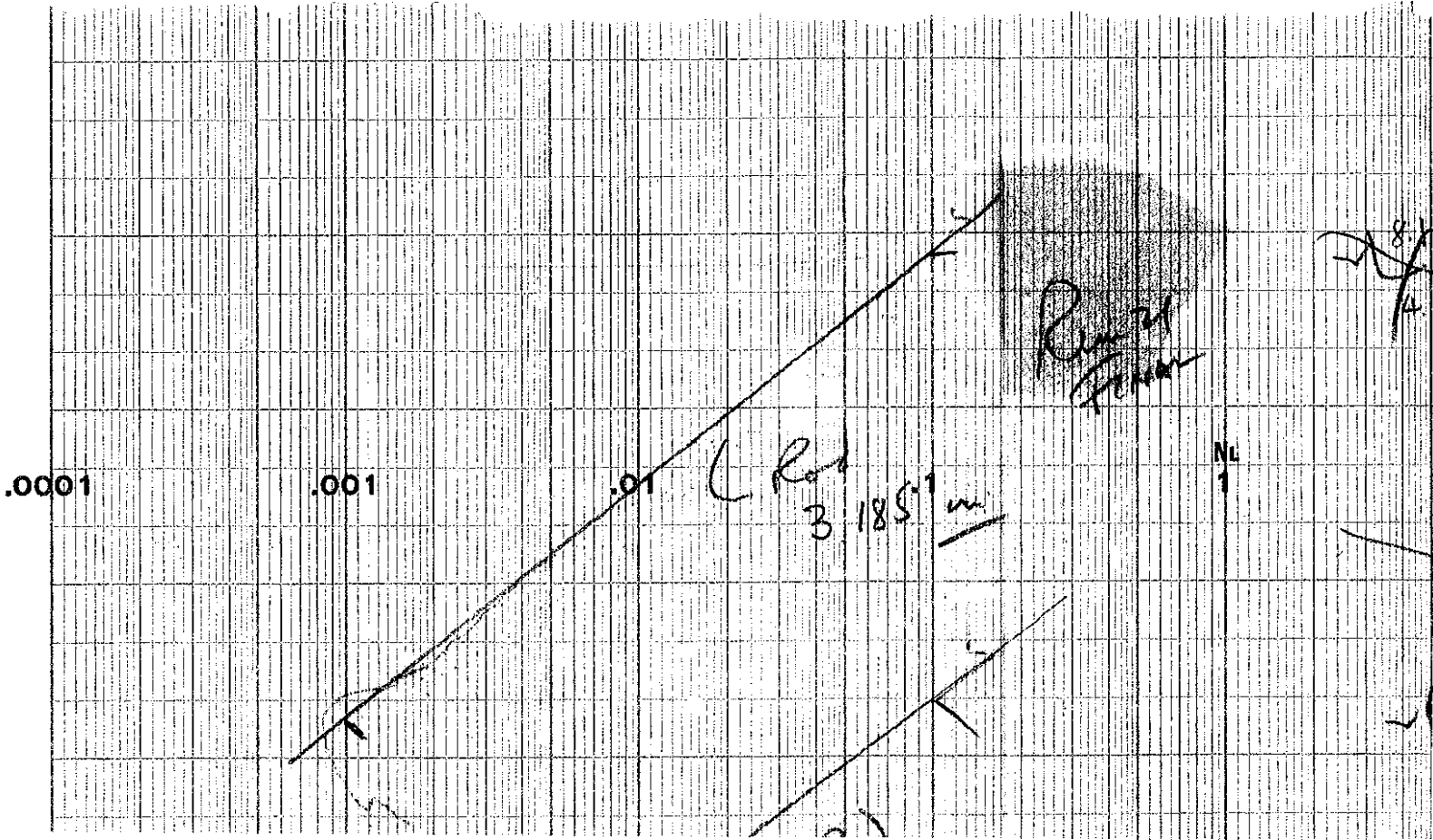


PLATE 460 PRINTED IN U.S.A.



11/25/61

MA moved to 3.18.5 for pos period

T = 86.9 P = 11.0

T = 83.3 P = 11.4 count rate

12⁴⁸ AM

Safety block started out

Thermocouples:

2 - 21.0 5 - 22.0 18 - 20.0

4 - 21.0 9 - 22.0 6 - 21.2

10⁰⁹ AM

Burst rod inserted ← 20

(735)

735 - 60 = 675 °F black pen
655 - 50 = red pen

Thermocouple readings

2 - 22.0 5 - off scale 18 - 26.3 °C

4 - 21.0 9 - off scale 6 - 29.9

325 401
ΔT

22

Run 22

11/27/61

Delayed Critical

MA - 3:48

MA = 3.42 for pos period

T = 825

P = 1.5

log W

T = 652

P = 1.85

CR 101

~~Repeat of pos period~~

9:45 AM

MA moved to 3.401 for pos period

T = 410

P = 2.92

log W

T = 386

P = 3.15

CR 101

~ 9:55

Safety block started out

10:44 AM

Burst rod inserted ← 21

Temp change = 145 - 55 = 110 °F on black pen
150 - 50 = 100 °F on red pen

Temp before burst

2 - 21.5

5 - 21.5

9 - 21.5

4 - 21.0

6 - 21.5

18 - 19.8

79

57

Temp after burst

2 - 21.5

5 - 74.5

9 - 39.0

4 - 21.0

6 - 22.0

18 - 79

Before Burst

24

11/27/61

Run 23

MA = 3.48 for delayed crit.

MA moved to 3.426 for pas. period

T = 588 ; P = 2.17 Log W 107

T = 476 sec ; P = 2.55 CR in 101

MA moved to 3.436 for pas period

T = 1100 ; P = 1.7 Log W 107

T = 520 sec ; P = 2.40 CR in 101

MA moved to 3.441 (going out)

T = 1086 P = 1.1 Log W 107

T = 1067 sec. P = 1.15 CR in 101

208

Safety block started out

239

Burst rod inserted ← 22

Temp change

140 - 65 = 75°F block per

135 - 55 = 80°F rod per

Before
9 - 22.8

2 - 21.3

4 - 21.5

5 - 23

6 - 21.8

18 - 20

After

33.5

21.8

21.5

63.5

22.0

66.0

26

11/28/61

9⁰⁸

Run 24

Critical MA = 3,49

MA moved to 3,388 for pass period

T = 250 ; P = 4.58 Log W

T = 269 ; P = 4.3 CR

MA moved to 3,420 for pass period

T = ~~388~~ 350 P = 3.4 Log N

T = 388 etc P = 3.16 CR

9⁴⁵ AM

Safety blocks started out

Thermocouples (before burst)

2-22 5-21.5 9-21.8

4-21.2 6-21.5 18-19.9

10⁴⁵ AM

Burst rod inserted ← 23

Temp (°C)

2-22.0 5-26.2 9-45.0

4-21.5 6-22.0 18-44.0

Temp change

170 - 60 = 110 °F bl/c = R per

155 - 50 = 105 °F red pen

28

11/28/61

Run 25

1:00 pm

Critical MA = 3.491

MA set at 3.42 for pen

T = 920 oz ; P = CR

Moved to 3.40

T = 369 ; P = 3.21

LogW 107

T = 370 ; P = 3.2

CR 101

1:27 pm

Safety started out

1:59 pm

Buret rod inserted ← 24

Temp change

135 - 65 = 70 °F

125 - 50 = 75 °F

Cont No 64-21

30

11/28/61 Run 24

Critical MA = 3.490

MA = 3.390 per period

T = ;
T = 369 ; P = 3.21 CR 101

MA moved to 3.380 for per period

T = 321 ; P = 3.66 Log N

T = 314 sec ; P = 3.73 CR

4²⁶/PM Safety block started out

4⁵⁰/PM Burst rod inserted ← 20"

Temp change

205 - 60 = 145° F black pen

190 - 55 = 135°

Thermo couple readings (°C)

before burst:

2 - 21.5 5 - 23.5 9 - 23.0

4 - 21.0 6 - 21.5 18 - 21.5

after burst

2 - 21.0 5 - 92.5 9 - 45

4 - 21.0 6 - 23 18 - 99

32

12/4/61

Fission Chamber - see PHS curve →

Source inserted (1.6×10^6 n/sec)
chamber inserted (PHS at 30 volts)cobs on $\sim 1.6 - 1.8$ cpscobs off $\sim 1.6 - 1.8$ cps

cobs made no detectable difference

PHS 30 cobs off - 1" poly. below chamber ~ 2.2 cps" 30 " " - $\frac{1}{2}$ " " " " ~ 2.3 "PHS 30 " " - 2" " " " ~ 2.3 "PHS 25 " " No poly " " ~ 2.8 "PHS 25 " " 2" " " " ~ 4.1 "PHS 30 " " No poly " " ~ 2.08 "PHS 30 cobs on No poly " " ~ 1.90 "PHS 25 " " " " " " ~ 3.02 "

PHS 25 cobs off, chamber inserted,

source withdrawn ~ 4.11 "above can (line of sight to
fission chamber)

PHS 25 cobs off, chamber inserted

source in approx center of paraf. can
($\frac{1}{8}$ " from bottom)

2.93 cps

Talam Nov. 2, 1961

No Source		Source	
PHS	CPS	PHS	CPS
14	602.72	100	37.1
16	81.08	95	46.15
18	18.1	90	54.68
20	3.02	85	63.37
22	0.6	80	92.52
24	0.13	75	105.09
26	0.04	70	145.90
28	0.05	65	171.24
30	0.01	60	228.17
		55	283.9
		50	357.6
Scaler PHS 1.5 v.		45	464.4
AID coarse gam 32		40	637.0
Fine " 1		35	920.3
A1 coarse 2		30	1400
Fine 1		25	2110
BW 2MC		20	2820
		15	3920

CPS

34

Run 27

Mon.
12-4-61

Burst rod is in the core and disabled.
Po-Be source (10^5) temporarily being used.

$\approx 6 \frac{0.0}{\mu\text{m}}$

Spring taken off safety because magnet would not lift it.

Burst rod "in"	} critical
RR "in"	
MA = 6.74	

CHAMBER POSITION ADJUSTMENTS:

REFERENCE POWER - .092 ON LOG N ≈ 218 WATTS
.00042 ≈ 1 WATT

μm AMMETER READING $.16 \times 10^{-8}$
FISHER C. LOG COUNT RATE METER -
OFF SCALE

Keithley - $.25 \times 10^{-8}$
 Log N (9213) - 0.40
 D (9213) - $33 \frac{10/5}{53} \frac{1000}{500}$
 E (9213) - .2 at 760 V

→ SERVO CHECK - WIRED IN BACKWARDS!
THE REGULATION ROD INSERTS AND
ADDS REACTIVITY WHEN IT SHOULD WITHDRAW
ROD AND SUBTRACT REACTIVITY.

12/4/61

Critical Conditions

BR in MA = 6.73

RR in

Check of range of fission channel with chamber inserted:

44006 $\frac{1}{30}$ sec

withdrawn:

719 $\frac{1}{30}$ sec

673 $\frac{1}{30}$ sec

692 "

LOG N READING .043

W/ AMMETER READING WITH $\frac{1}{2}$ " OF PARAFIN ADDED TO THE BASE OF THE CHAMBER

1.3×10^{-8} AMPS

18
PARTS

LE

2/500

READ

36

Run 29

12/5/61

Check on effect of 1.6×10^6 source on count rate after 20 min w
The source has been placed on support plate approximately at its "out" position. Reactor has been made critical

BR = in ; RR = 4.72 ; MA = 5.185 at crit

⁴⁵
10 AM

Safety started out

#2 - 5+34
5+21

#3 - 0+249
- 0+246

Safety reinserted

Check on MA rod over travel :

It was demonstrated that the rod will "coast" into withdraw limit switch after MA panel switch has been turned off - showing that ~~the~~ MA rod actually coasts after power shut off.

12/5/61

Run 30

37

PURPOSE: CALIBRATE ION
CHAMBERS, LOG N AMPLIFIER,
AND SET SCRAM LEVEL.

BOTH CHAMBERS TEMPORARILY
LOCATED ON LOWER PLATE.

POWER - 1 WATT, DETERMINED
BY LOG N (9213)

μW AMMETER READING - $.34 \times 10^{-8}$
LOG N READING - .0046

Critical Conditions

BR = lin, RR = 4.72

MA = 5.140

MM Ammeter came on scale
when CR meter read ~ 100 while inserted.
Log N can on scale with
MWA at 10 or 10^{-9}

38

Run 30 (cont)

12/5/61

With Log N (9213) reading
0.40, which is same reading
previously at 1.0 watt power,
the following readings were on FBR
instruments

~5 ⁵⁵/_{PM}UUA = 34 on 10^{-8} scale

Log N (FBR) = .0046

LCR Chart = 10^3 at withdraw

Correlation of readings on FBR
instruments on neg. period
^{at withdraw limit}

CRM ^{at withdraw limit} Log N UUA

550	.005	0.36 $\times 10^{-8}$
410	.004	0.28 "
320	.003	0.21 "
220	.002	0.14 "
100	.001	0.7 $\times 10^{-9}$
50	.0005	0.37 "
moving	.0004	0.29 "
2000	.0003	0.22 "
1300	.0002	0.16 "
620	.0001	0.08 "
300	off scale	0.05 "
100	"	0.025 "

6 ¹⁴/_{PM}insert
limit

6²³/_{PM}

Shut down

Run 31-A → for data see page 40

7⁰⁰/_{PM}

Went critical to check safety section of MUA chamber - never got exactly crit, went up on period to ~10 watts and back down

7¹⁴/_{PM}

Shut down

Run 31-B → for data see page 40

Tap pose - to check other chamber current (log w safety channel)

Went critical but never leveled, went up on period, then came down on period.

~7⁴⁵/_{PM}

Shut down

Data for run 31-A

Safety section of MUA chamber connected to MUA recorder on console

Leakage current 0.8×10^{-9} (1×10^{-9})

0.75×10^{-9} on (3×10^{-9})

.001	0.53	—	(3×10^{-9})
.002	0.22	—	(1×10^{-8})
.004	0.38	—	"
.01	0.81	—	"
.02	0.5	—	(3×10^{-8})
.03	0.75	—	(")
.04	0.29	—	(1×10^{-7})
10 watt .046	0.33	—	(")
.02	0.54	—	(3×10^{-8})

Data for run 31-B

Log N safety section on MUA

Leakage current 0.18 (3×10^{-9})

0.60 (1×10^{-9})

.001	.43	—	(3×10^{-9})
.002	.68	—	"
.003	.27	—	(1×10^{-8})
.004	.35	—	"
.005	.42	—	"
.01	.77	—	"
.02	.48	—	"
.03	.70	—	(3×10^{-8})
.04	.27	—	"
10 w .044	.30	—	(1×10^{-7})
			(1×10^{-7})

Run 32

8⁵³ PM

Check on operation of Servos:
System made critical at ~ 1 watt
and put on servos

9⁴¹ PM

Servos not working properly
Shut down

Run 33

15
10 PM

Purpose: To check screen
Resistor has been inserted
in level softies to cause
screen at ~ 250 watts

40% on softies; 0.3 on log W; 8% on (3×10^{-6}) μ ua

System raised on ~ 8 sec period

Scrammed by slow screen

Level reached ~ 80 watts

Brought up to critical again

Scrammed by slow screen

~~μ ua = 37 on 3×10^{-6} at screen~~

~~40% on softies~~

~~0.3 on log W~~

~~8% on (3×10^{-6}) μ ua~~

42

Run 33

120% on safety

32 ma magnet

0.95 Log W

20% (3×10^{-6}) ma

12/6/61 Run 34

10:45

Instrument check OK
D-A in trap circuit

Experiments to determine source strength & location
necessary for safe burst production

BF₃ counter # 2 below the reactor

Reactor source on top of the upper most plate
on ~ 6" of banded plastic 2" paraffin on
sides

Reactor shut down

Count rate 10^5 source in + 1.6×10^6 on top plate

$3 \times 250 +$ /min

10^5 source out

384/min

856
747
- 24
314

Critical Positions

RR 2

MA 6.275'

BR in

Assembly of system with source removed. Assembled
to critical on safety block motion

With safety blocks back down
4 in. and system rods at crit position
and 1.6×10^6 source on top plate

after
~10 min
wait →

Fission chamber (FBR)		#3	B _F #2
10	1 min		$1^{*256} + 197$
9	"	0 + 199	1 + 146
12	"	0 + 227	
4	"		#3

After reinserting safety blocks

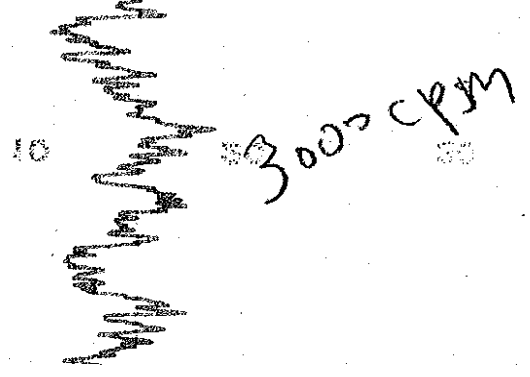
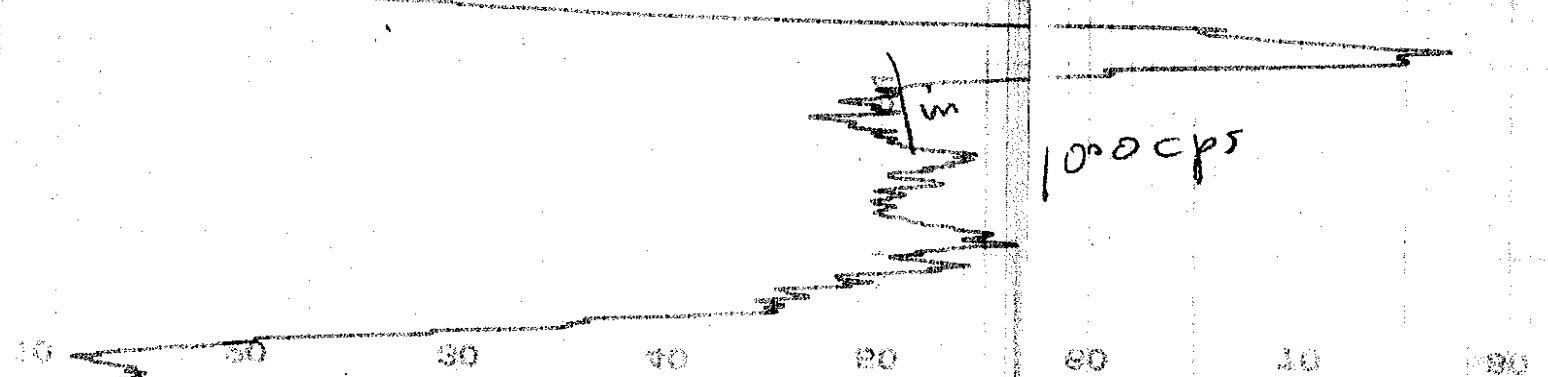
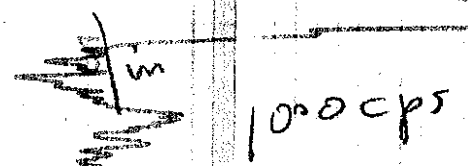
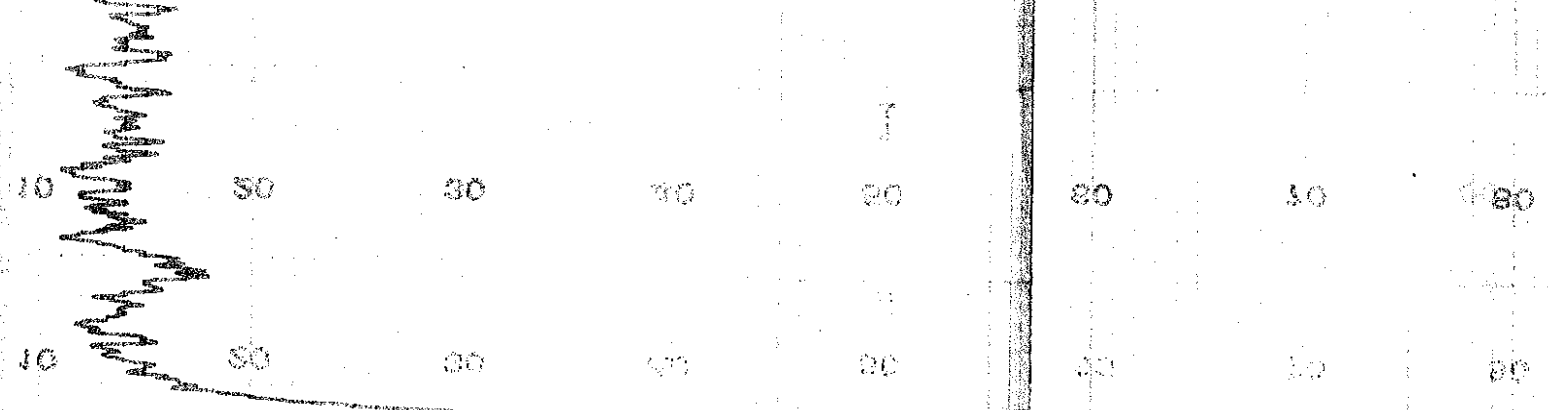
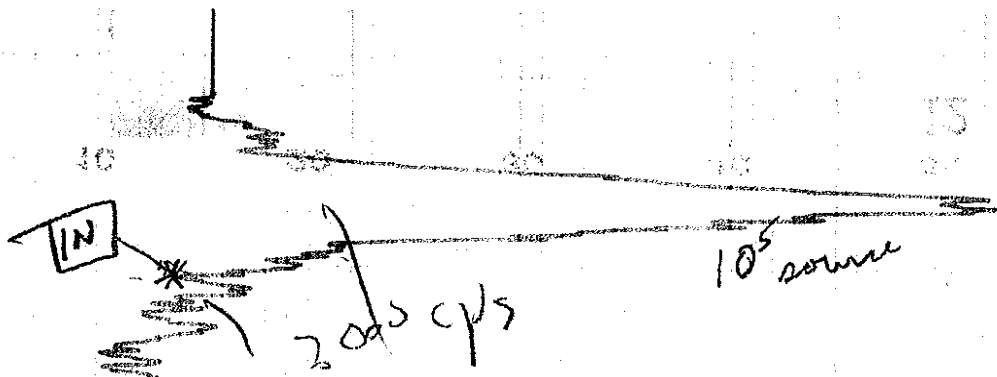
FBR	#3	#2
8	0 + 224	1 + 195
	0 + 222	1 + 167

Removal of Reactor source from top plate
to observe behavior of system with source and in
burst production ($\sim 10^5$)

#3	#2
0 65	1 + 50
0 25	1 42

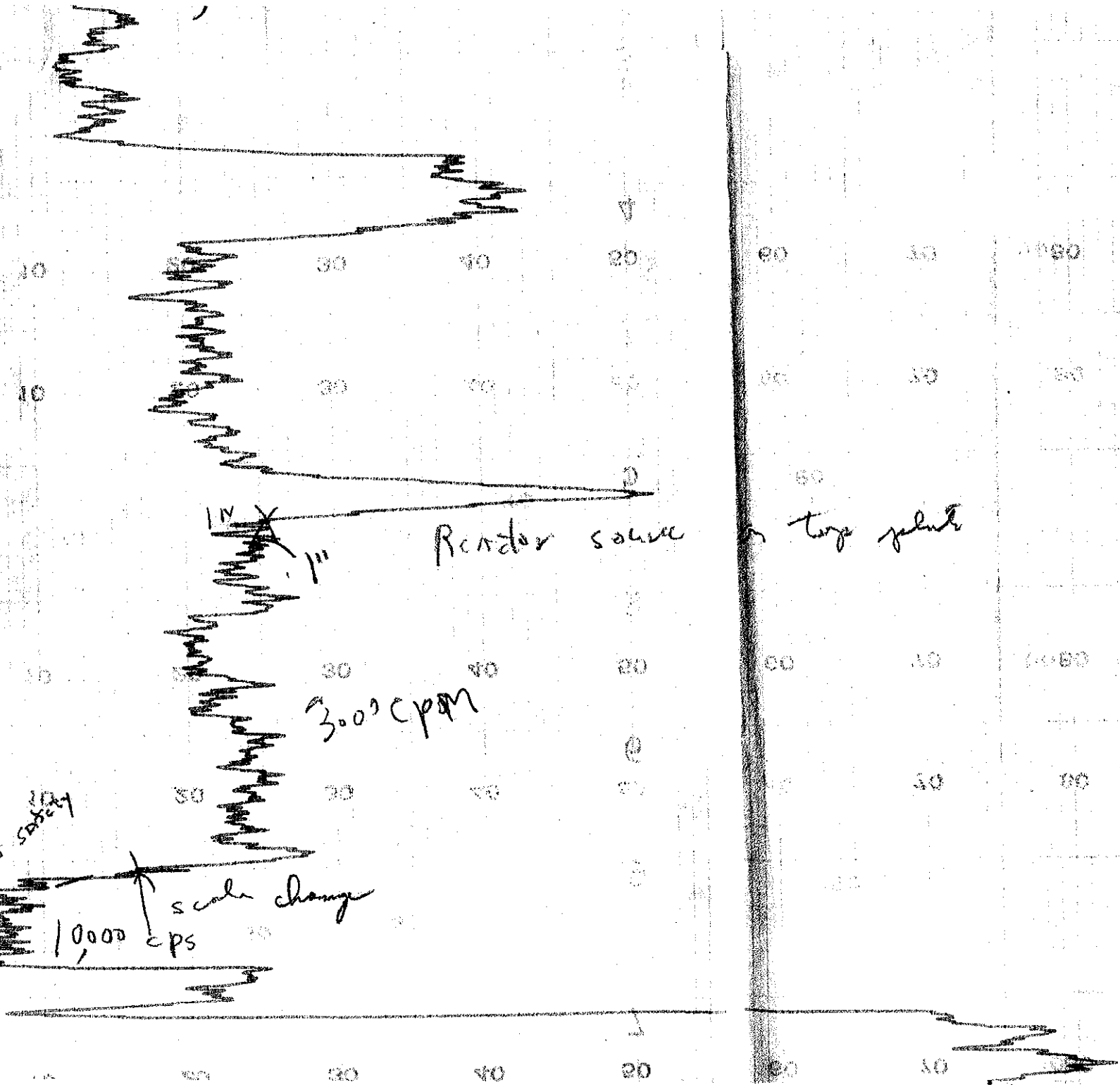
Run on different scale

Fission chamber (FBR)	#3	#2
2	1 min	0 69
3	"	
2	"	
0	"	1 47



Run 34

12/6/61



1000 cps

scale change
10000 cps

3.00 cpm

Reactor source top point

12/6/61

Run 35

Purpose - Check on servos
after installing

RELAYS K77 AND K78
WERE CHANGED FROM G.E. CR28
TO G.E. CR2790

2 $\frac{00}{PM}$

One relay was wired wrong
and burned out
- Shut down

Replaced relay - got critical
again to continue check
crit conditions

3 $\frac{15}{PM}$

BR	in	} approx critical
RR	~ 5.3	
MA	~ 5.065	

46

Source out: 10² CPM
Source in: 137 CPM

Thurs 12-7-61

2:40 PM

- Plan:
- ① Level at CRM = 100 c.p.s.
 - ② Level at 1 watt (.0043 on Log N) & try servo.
 - ③ Go quickly (10 sec period) up to 1500 w. to try scream. (6.5 on Log N)

3 PM

(critical)
Level S.B. in
at CRM=10 MA. 5.072
Counts per Sec R.R. 5.44

5 minutes:

Fission Counter	8552
Moderated BF ₃ #2	436270
(directly below core on floor)	
Unmoderated BF ₃	1718
(above reactor ion chambers)	
BF ₃ chamber on floor	8704
20' from reactor	

Levelled at ~1 watt.
Servo worked fine after it was adjusted.
Noise triggered annunciator circuits at various times.

Manual scream handle needs firmer detents.
Ran on 12-sec period up to 400 w then manually screamed.

Log N .0043 = 1 watt
.0043 × 1500 = 6.5 = 1500 watts

Effort to test 1500-w. scream resulted in a premature scream at 900 watts.
Further tests of this type will be postponed until the spring is attached to the safety block.

Burst Run 27

47

12/8/61

~~Run 38~~10⁰⁰ AM

Thermocouples 4, 5, and 6 were put in core as follows

#4 - upper TC hole, 1 1/2" in and connected to continuous recorder

#5 - lower hole - 1 1/2" in

#6 - under bolt washer (adjacent to core) - nearest bolt to reg. rod of those between reg. rod and burst rod

The Alloy hole plug is 1/2 length
Critical Conditions:

$$BR = 7.450 ; RR = 0.79$$

$$MA = 3.534$$

Counts from FBR fission chamber to determine critical (above) 30 sec count every minute

1. 3505 6. 3537 11. 3339

2. 3556 7. 3577

3. 3517 8. 3403

4. 3519 9. 3298

5. 3541 10. 3409

~ 10⁴⁵ AM

Shut down

(over)

48, 12/18/61 BR 27 (Cont.)

11¹⁰ AM

Burst rod inserted

Temp rise = 6 °C

10⁴⁴ AM

TC readings before burst

#4 - 19.5 °C ; #5 - 21.5 °C ; #6 - 21.5 °C

11¹⁵ AM

TC readings after burst

#4 - 25 °C ; #5 - 28 °C ; #6 - 24.5

99
21
—
78

12/8/61

BR 27-A (repeat)

Critical Conditions

RR = 0.92 ; MA = 3.515

Counts from FBK fission counter

1. 4841	4. 4679	7. 4808
2. 4715	5. 4674	
3. 4777	6. 4788	

note: The glory hole plug is 1/2 length.

12 ⁴⁴/_{PM}

Lowered Safety

note: FBK source rod was at insert position at above critical
∴ determine crit again with rod up.

NOTE: a jumper has been put across source insert limit relay (16E to 16F).

Also period screw has been jumpered out

Critical Conditions:

RR = 0.98 ; MA = 3.495

Counts to determine crit:

1. 8968	4. 9007	7. 9104
2. 8855	5. 8868	8. 8845
3. 8844	6. 8983	9. 8777

1 ³⁸/_{PM}

Shut down

2 ⁰⁵/_{PM}

BR inserted

Increase of temp = 23°C (from 19-42)

50

BR-27A (continued)

Counts from 107 to determine crit

75 + 187 122 + 23

73 + 42 117 + 14

75 + 184 121 + 9

75 + 50 119 + 8

77 + 51 121 + 185

75 + 46 121 + 188

76 + 84 120 + 162

76 + 213 121 + 238

76 + 179 122 + 160

74 + 90 121 + 248

Temperature before and after burst

before:1⁵³/pm

#4 - 19.5°C; #5 - 21.5; #6 - 21.5 °C

after:2⁰⁹/pm

#4 - 43 °C; #5 - 43.5 °C; #6 - 30 °C

On black per-temp rise = 40 °F

*

No + 108 Instruments in the EAST
SCRAM CIRCUIT

12/22/61

51

Instrument check OK

Fisshin chamber 719 c/3 min ~ 4 cps

GAIV 1x2 PHS-35

Either FC is sick or source is not
 1.2×10^5 ?

Previous count with 1.6×10^6 source ~ 2 cps

C

F

—

1st

52

1-2-62 BR-28

Instrument check - OK.

7.489

Burst Rod motion

MA = Mass adjustment

in	out	Total travel
0.056	7.540	7.484
0.63	7.511	7.478
Shim put in		
0043	7.522	7.479
0.043	7.521	7.478

Crash pipe 55 - Lower half of glory hole unemployed.

Safety Block - in } T = +99 sec 10.2¢
 RR in }
 MA in }

MA rod moved to 1.335"

- 1 min cont.
- 140610
 - 14157
 - 13757
 - 13720
 - 13619
 - 13140
 - 13534
 - 13614
 - 13785
 - 13363
 - 13527

old stroke 7.449

new 7.428

0.29 mils more stroke 10¢ per inch
or .29¢ more in the burst and

System Scramed at Low level due to
too high A voltage on trigger detector.
900

le

¢

54

#29 BR
1/2/62

7:30 PM

Safety Blk in - 0.935

RR in

MA in

BR out

} T = 92.3 sec

Critical with

MA Rod 1.34 in

Slight + period 8600 rev ~ 0.16¢

9:00 Start

+ Burst run

>

Voltage too high so trigger 700 volts

#30 BR

Repeat of 29 with a lower voltage
Disc 550 500 ✓

Critical MA 1.362

Tripped to 500v on D - D taken out of
trip circuit

Trigger triggered

#31

Trigger screamed to 500v
Fast scram out.

#32 No fast scram

Safety Block brought up with the
burst rod in. Added ~1 above
prompt with the safety block - burst
prevented as neutrons built up as block
was moving in

#33 Trigger tripped to 500v

58

1/3/67

#3 IABR

Instrument checks A & D, Fm Trip count

Critical Positions:

Safety = -0.923

RR = in

BR = out

MA = 1.366

10²⁸
AM

began removing safety block.

10⁵⁴

started inserting magnet.

10⁵⁸
AM

Burst rod inserted

note: delay of burst was noticeable; ~ 3 sec or so.

There was no noticeable rise of temp.

Thermocouple Positions:

2 - support rod

4 - upper TC hole - on continuous recorder

5 - lower TC hole

6 - under bolt head

1/3/62

59

32ABR

Crit positions

Safety	=	-0.923	}
RR		in	
BR		out	
MA		~1.366	

For pos. period

MA = 1.151

T = 401.8 sec : P = 2.95 4?? log W
 T = 484.8 : P = #1 ctr.
 T = 502 : P = #2
 T = 484.8 : P = #3

12²⁰ PM

Safety removed completely

12⁴¹ PM

Start in with safety blocks

12⁴⁵

BR inserted

$\Delta T = 105 - 50 = 55^\circ F$? RED ~~Block~~ gun

$\Delta T = 45 - 21 = 24^\circ C$ bolt TC

$\Delta T = 50 - 18 = 32^\circ C$ #4 1/2" in UTH

Both A + D tripped, but both on low level

TC readings before burst

2 - 21.5	6 - 21.5
5 - 21.5	4 - 18.0

60

Run BR 33A / Report of 32A
to get Better data from burst detector
MA Rnd 1.151

T C readings for BR Run 34 →

before burst

2 - 21.5' 6 - 21.5'

5 - 21.5' 4 - 18.0

after burst

2 - 21.5' 6 - 35.0

5 - 55.5 4 - 58

1/3/62

Run 34 BR

SS safety guard put back on
glory hole was filled by putting
 $\frac{1}{2}$ plug (883-1602) in lower half.
also, new thermocouple was
removed and U-110 plug put back
in half hole

\therefore conditions are same as
previous bursts

Critical conditions:

$$RR = \text{in}$$

$$MA = 3.85$$

5⁰⁰ PM

MA moved to $\frac{3.775}{3.80}$ for gas period

$$T = 643$$

$$P = 1.92, 2.00$$

$$T = 628$$

$$P = 1.95$$

$$T = 612$$

$$P = 1.92$$

down
BF₃
counters
in
107

5²⁴ PM

Safety block started out

5⁵² PM

Burst rod inserted

$$\Delta T = 125 - 50 = 75^\circ \text{F rod per}$$

$$\Delta T = 120 - 60 = 60^\circ \text{F block per}$$

Max temp = 58°C on continuous
recorder

62

1/3/62

Run 35 BR

Critical conditions

RR = in

MA = 3.845

MA moved to 3.789 for pos period

P = 1.62	¢	} from BF ₃ counters in 107
P = 1.63	¢	
P = 1.67	¢	

10 ¹¹ PM

Safety started in

10 ¹⁶ PM

Burst rod inserted

Max temp = 53°C on continuous
35°C rise on continuous recorder

$\Delta T = 115 - 50 = 65^\circ F$ red

$\Delta T = 115 - 60 = 55^\circ F$ black

TC readings

before burst:

2 - 21.5 6 - 21.8

5 - 22.0 4 - 19.0

after burst

2 - 21.5 6 - 35.0

5 - 46.5 4 - 53.0

1/4/62 Run 36 BR

U-Mo plug 883-1601 was
placed in lower half of glory hole.
~~plug~~

Crit Conditions:

RR in

MA = 3.874

MA moved to 3.675 for pos period
slow period

MA moved to 3.625

CHECK OF 10N CHAMBER:

LOG-N CHAMBER RC-300-3
NO LEAKAGE SEEMS TO
RESPOND PROPERLY, BUT NOT SR. NO. 61-1
POWER TO REALLY TELL.

T =	P =	} 7 + cents
T =	P =	
T =	P =	

MA moved to 3.643 for pos period

T = P = 6.52 BF3

T = P = 6.8 ? Log N

#2 T = 161.6

P = 6.66

#3 T = 161.6

P = 6.66

64

1/4/62
28
10 AM

Shut down

TC readings
before burst

2 - 21.5 6 - 21.5
5 - 21.8 4 - 18.0

11 ⁰⁹
AM

Safety started in

11 ¹⁴
AM

Burst rod inserted

$\Delta T = 250 - 60$ 190 black pen
 $\Delta T = 205 - 50$ 155 red pen

$\Delta T = 129 -$

TC readings after burst

2 - 21.5 6 - 64
5 - 103 4 - 129

1/4/62 BR Run 37

U-Mo plug 883-1601 was removed
 and U-Mo plug 883-52 was
 put in core 1600

Crit. cond

RR in

$$MA = 3.858$$

MA moved to 3.60 for pos period

$$T = \frac{116}{105} \text{ sec} ; P = 9.58.7 \quad \text{Fission chamber}$$

$$T = 121.6 \text{ sec} ; P = 8.49 \quad \text{log W}$$

$$T = 114.7 ; P = 8.88$$

$$\text{~~116~~ } T = 109.6 ; P = 9.2 \quad \# 2$$

$$T = 117 ; P = 8.71$$

Repeat after lowering power, with
 same rod settings

$$T = 118 \quad P =$$

MA = ~~3.507~~ 3.578 for new period

$$T = 102.9 ; P = 9.64 \# \quad \text{Fission chamber}$$

$$T = 97.7 ; \quad \# 1$$

$$T = 108 ; P = 9.30 \quad \# 2$$

$$T = 106.8 ; P = 9.39 \quad \# 3$$

66

1/4/6²

Thermocouple readings
before burst

2 - 21.0

6 - 21.4

5 - 21.5

4 - 18.0

5²⁰ PM

Starting up with safety

5²⁴ PM

Burst rod inserted

$$\Delta T = 370 - 60 = 310^{\circ}F \text{ black pen}$$

$$\Delta T = 400 - 50 = 350^{\circ}F \text{ red pen}$$

$$\Delta T = \frac{194}{197} - 18^{\circ}C = 1.76^{\circ}C$$

on continuous recorder

after burst

2 - 21.5

6 - 21.5

5 - 165.5

4 - 194.0

1/4/62

10³⁰ PM

Exp. 38 BR

U-Mo plug (1400) was removed and
 plug 883-52 1599 put in reactor

all FBR scrams have been
 removed from system. Scrams
 are A, D, and F.

Crit cond

RR = in

MA = 3.899

MA moved to 3.606 for pos period

Source was in

Repeat pos period with source removed

T = 102.2 : P = 9.7 Fission

T = 109 : P = 9.22 #1

T = 109 : P = 9.22 #3

T = 113 : P = 8.9 #2

68

1/5/62

BR 38. (continued)

MA moved to 3,509 for per period

T = 87.9 ; P = Fission

T = 104 P = 9.59 Log N

T = 99 P = 10 # 1

T = 99 P = 10 # 2

T = 99 P = 10 # 3

12¹

Safety started in

1 ²⁶/_{AM}

Burst rod inserted

$\Delta T = 420 - 60 = 360^{\circ}F$ black pen

$\Delta T = 455 - 50 = 405^{\circ}F$ red pen

$\Delta T = 223 - 19 = 204^{\circ}C$

on continuous recorder

1/5/62

Four U-Mo samples sent to Wyatt

U-Mo #3 for Run 34 and 35

U-Mo #4 for Run 36

U-Mo #5 for Run 37

U-Mo #6 for Run 38 #38

70

1/5/62

BR Run 39

Critical Cond

RR in

MA = 3.844

MA moved to 3.788 for pos period

T = 1600 P = .84 Fission

T = P = .95 BF₃

MA moved to 3.784 for pos period

T = P = 1.15 BF₃

2 counter. T = P = 1.2 BF₃

T = 1259 sec P = 1.03 Fission

11²²
AM

Safety started out

→ Recheck of periods above indicate less reactivity added than recorded above - ∴

MA moved to 3.777 for pos period

$$\begin{array}{l}
 T = \\
 T = \\
 T =
 \end{array}
 \begin{array}{l}
 P = 1.32 \\
 P = 1.34 \\
 P = 1.412
 \end{array}
 \left. \vphantom{\begin{array}{l} T \\ T \\ T \end{array}} \right\} \beta F_3$$

126

Safety started in

130

Burst rod inserted

$$\begin{array}{l}
 \Delta T = 110 - 60 = 50^\circ F \quad \text{black pen} \\
 \Delta T = 115 - 50 = 65^\circ F \quad \text{red } "
 \end{array}$$

TC readings
before burst

2 - 21.2

6 - 21.2

5 - 21.5

4 - 18.0

after burst

2 - 21.0

6 - 21.0

5 - 47.0

4 - 52.0

cont on

72

1/5/62
3:05 PM

BR Run 40
critical cond:

RR in
MA = 3.839

MA moved to 3.52 for pos period
period slow (add ~1.1%)

Changed MA to 3.488 for pos period

T = 89 P = 10.78

T = 91.2 P = 10.6

T = 92.2 P = 10.48

T = P = 10.67 log W

4:32 PM

Start Safety lowered

5:08

Burst rod inserted

$\Delta T = 535 - 65 = 470$ °F black pen

$\Delta T = 580 - 55 = 525$ °F

TC readings
before burst

2 - 21.3

6 - 21.3

5 - 22.8

4 - 20.0

after burst

2 - 21.5?

6 - 21.5?

5 - off scale

4 - 27.7

) cont

1/5/62

BR Run 41

Critical conditions

determined from 11 one minute counts

of BF₃ counters

RR in

$$MA = 3.793$$

10³⁵

Burst rod inserted

$$\Delta T = 108 - 55 = 53$$

black pen

$$\Delta T = 105 - 55 = 50$$

red pen

before burst

$$\# 5 - 22 \text{ } ^\circ\text{C}$$

$$\# 4 - 19.8 \text{ } ^\circ\text{C}$$

after burst

$$5 - 44.5 \text{ } ^\circ\text{C}$$

$$4 - 48 \text{ } ^\circ\text{C}$$

) cont

74

1/5/62

BR 42

FBR level scram put back
in system

11:54
PM

temp = 22°C fan off
air cond. off in 108

Crit cond

RR in

MA = 3.724

MA moved to 3.634 for pos. period

P slightly high

MA moved to 3.647 for pos. period

T = 434 ; P = 2.77 #2

T = 445 ; P = 2.70 #3

T = 443 ; P = 2.72 #1

1:34
AM

Burst rod inserted 115

$\Delta T = 165 - 65 = 100^\circ F$ black pen

$\Delta T = 170 - 55 = 115^\circ F$ red pen

$\Delta T = 82 - 22^\circ C = 60^\circ C$ on cont. rec.

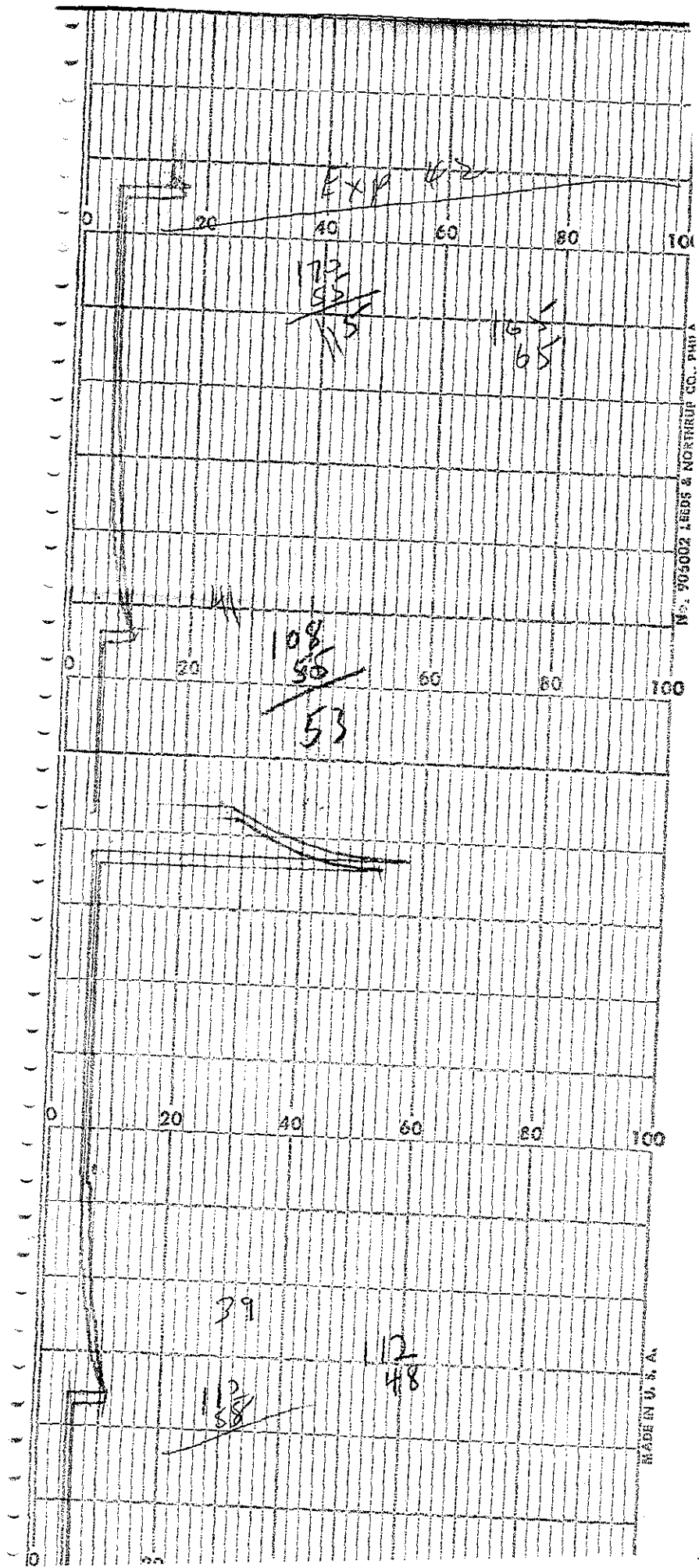
Bolt Lengths

1	10.360
2	10.325
3	10.335
4	10.330
5	10.325
6	10.342
7	10.360
8	10.325
9	10.335

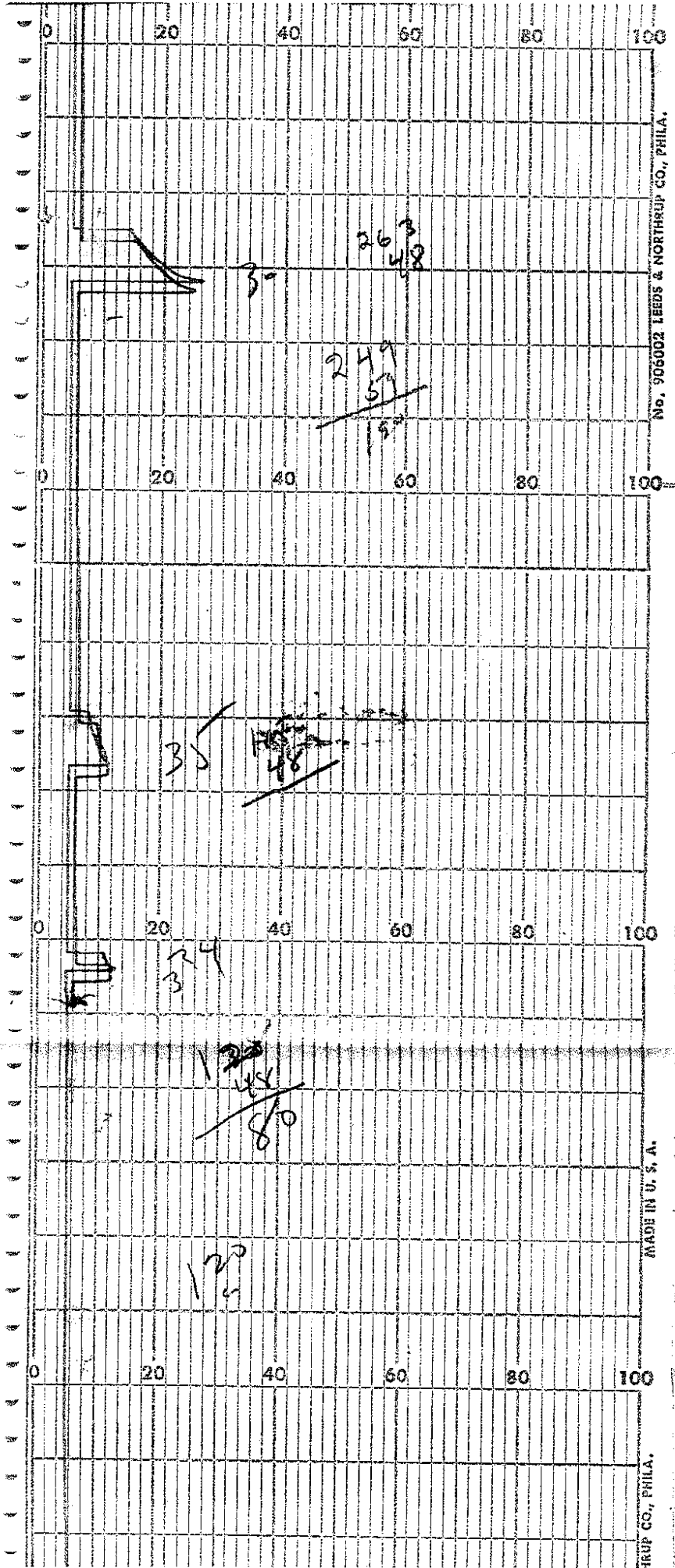
on

n

x.



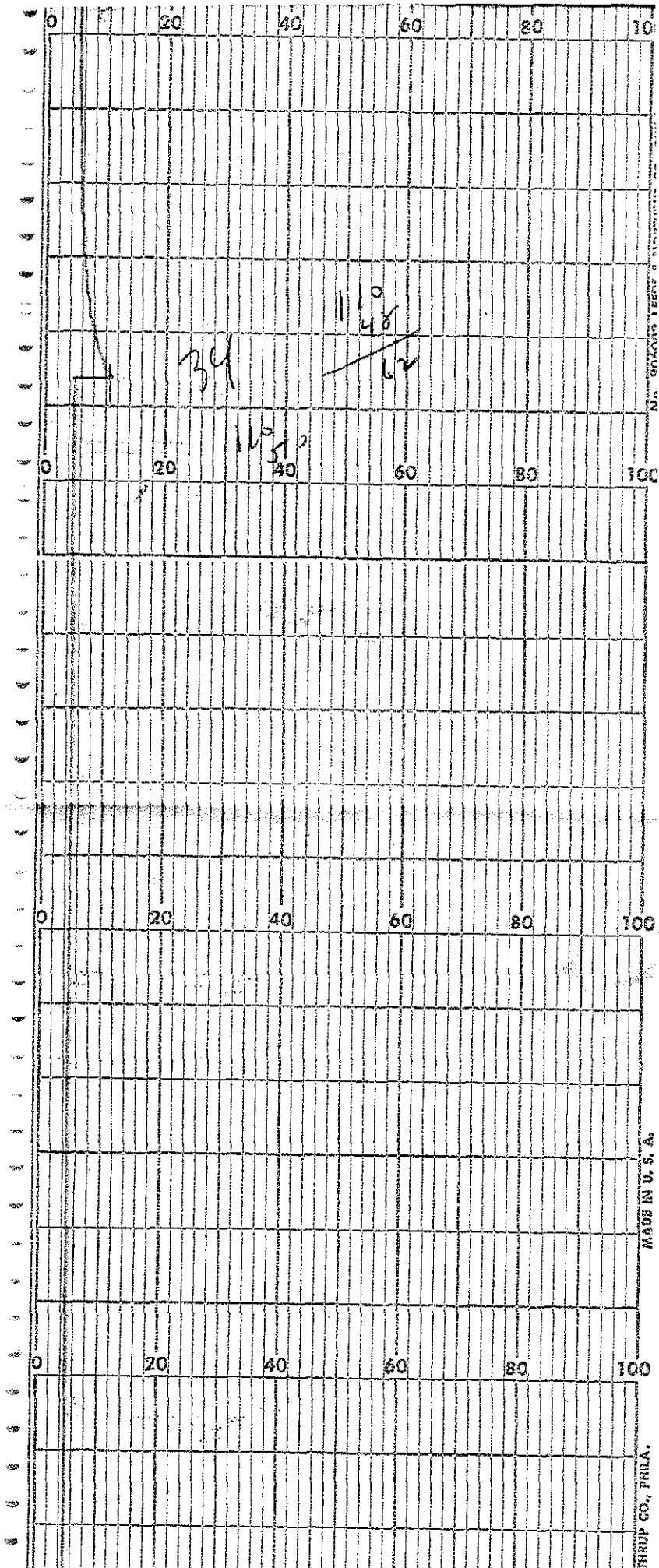
3/4



No. 906002 LEEDS & NORTHROP CO., PHILA.

MADE IN U. S. A.

TRUP CO., PHILA.



MADE IN U. S. A.

MADE IN U. S. A.

FRUP CO., PHILA.

front

FC

238

326

360

526

753

932

1343

1705

2325

2911

3998

5221

7348

9321

13037

17358

23778

back

6 x 9
11
2
2.2.2

After #18

Scope I ~~gain = 1.6/2~~, ^{.05 V Range} Sig = 100 MV, Deflection 1.6 cm

Scope I deflection = 80% of normal

Scope II 100 V Sig, ~~gain~~ (Range = 20V) 2.2 CM deflection
(as used) Variable not set on Cal pas

Scope III 0.5 V Sig, gain = (Range) = .05V, deflection 4 CM

MA 5.100 12-5-61

RR 4.87