

NATIONAL
HOIYOK, MASSACHUSETTS 01040-Made in USA
NATIONAL BLANK BOOK COMPANY, INC.

60 SHEETS • 5 X 5 QUAD
10 1/2 x 7 1/2 • 53-108

EMG 101 MSC
EXCIMER Log

10/85
9/95

1010151
1010151

16 Oct 1985

Preparation for EXCIMER LASER use

- ① flushed up lines + HCL pressure regulator (discharge as other rods)
- ② purged all lines (all that were open lines had been open to air) (several times) - HCL 3 times \approx 100 mbar in 1000 mbar H₂ (Xe gas)
- ③ NEW FILL (Xe gas)

Standard NEON fill.

$P \approx 237$ mJ

then down to 198 mJ after a minute at 20 Hz

18 Oct 1985

$P = 170$ mJ with reported ≈ 140 mJ

(calibration factor ≈ 2.59 V/J)

will set up at $6 \frac{7}{17}$ Hz for 7 hrs. Time: 11:21 pm

$P = 170$ mJ with reported ≈ 440 mJ

turned off at 6 pm.

23 Oct

installed new trigger generator and directions about (in excimer folder w/ manuals)

discussing display with instructor. finally works w/rt. trigger boards

$P \approx 434$ mV = 165 mJ ≈ 2 mJ

2/10/86

Gas flow (Krohn Hartman)

Gas flow 1 lit

Flow = 213 ml

Fill # 2

2/19/86

Flow = 210 ml

at 1 lit

3/8/86

Flow ~ 3 hrs @ 6 Hz

laser stopped suddenly, without warning or noticeable anomalies.

Power supply interlock light tripped. Pressed reset, light went out.

When voltage turned about ~12kV, irregular firing & arcing in supply & sounds heard.

Shut down - asked Avolio to call X on Monday.

3/18

HV box replaced by Kanada due to oil leak - laser immediately returned to normal operation ~ 200 mJ and 8W @ 49 Hz

3/24 new flow, checked flow #3 pump at 200 mJ

5/90

De/ance

Replaced all 3 solenoid valves. Negligible leaking overnight from 200 mbr

He fill.

Passivate for 24 hours

200 mbr HCL mix, 800 mbr

He.

pump out, repeat for

48 hours more.

Hook up other gas tanks,

purge several times with He.

Fill: 180 ± 9 mJ using

pyroelectric & 4.8 mV/mJ

calibration into 1 MΩ

on DSA 602 scope.

Page

George

On April 13th 1992

Excuse: 120WJ
1 premium 200 wban

I'm going to put a new fill in

Yes caps failed to a dead short.
It was a // cap combination of two
600 WJDC caps. The .25 uF one
was OK.

Are windings of motor still OK?
Ohm meter suggests yes but in .25
uF cap. error 100 good, but
that's not surprising or definitive.

Found an old uF, 850V 60~
capacitor in room 22. Checked it
up with clip leads

Yes! D.I. Flow came on as
might quit for 50 ms will do as
.25 uF, 400 + v motor starting
capacitor, eventually.

From motor supplier? Wholesale Electronics?

Anyhow, will reasonable tomorrow
with the big old metal capacitor, now
seems OK for now. (can't finish now
since first lecture is at 9:05 AM.
Should never have trusted the paper
electronics shop and used DC
capacitors. I suspected at the
time we we might have trouble

Maybe would be OK with higher
ratings -- measured $V \approx 550$ VAC across
capacitor, so P-P excursion is
actually well over 600V.

Reassembled 9/3 AM 450 mV =

Replaced capacitor on
oil pump for Raytron cooling.

Used paper caps to make
1.75 uF combination in place
of an actual motor-starting
capacitor.

9/26/92 Sudden failure of excimer
reported, with "laser head" light
illuminated. Apparently no explosion!
leaks/smoke/surges or other
excitement of this sort.

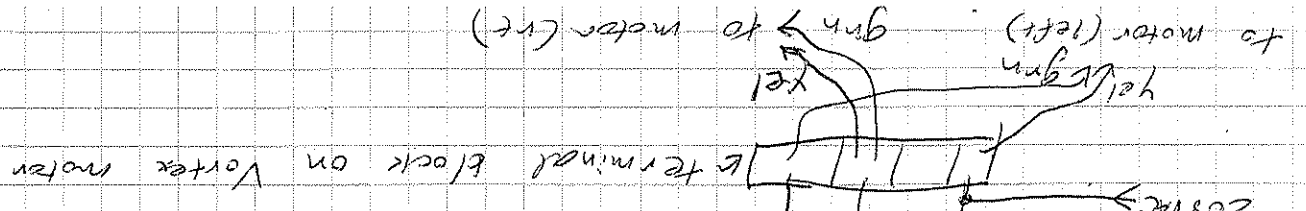
9/2/93 Searched for an Allen wrench for
cover screws (ball driver won't
grip well enough). Finally found
a 3mm wrench.

Switch in the control unit is OK. So
it's not the circulating fan.

Took off cover. After a little confusion
(later locks are 7VAC, not 2VDC!)
found the oil pump quit again.

(could it be the capacitors? -- the
replacements weren't really AC units.)

1.75 uF, 600 WJDC (paper)
terminal block on Vortex motor



9/4 Unplugged & reset control cards in control units (suggested by A. Physic on phone.) Present affect HV instability.

Next, tried disconnecting HV bayonet to load again. Rise time with rep rate $\neq 0$. Also, HV is open circuit light. Shouldn't be according to A. Physic. So apparently problem is in HV supply. Not heard.

Next - should pull out HV module and check for arcing or dirt that could be drawing current from output. Also should check all 3 phases of 208 V to HV box. (will do later on 9/4 or on 9/5.)

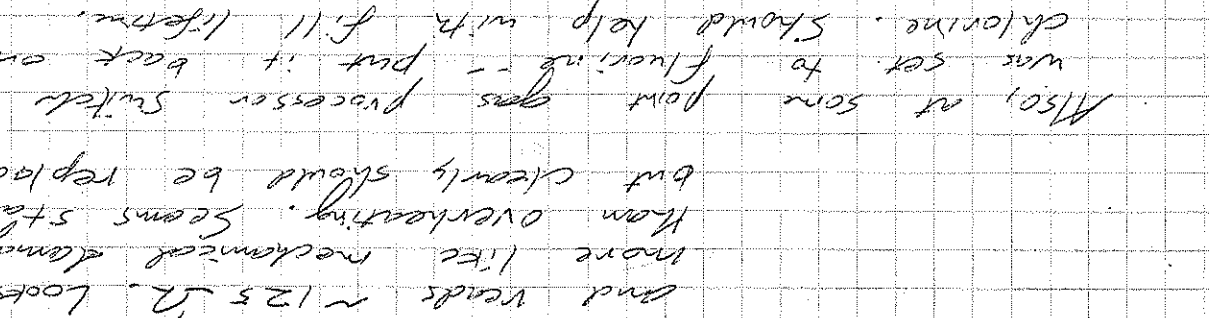
Did so. Just had single phase power, OK at 207 VAC. No obvious arcing cable or dirt. Also replaced ribbon cable between control unit & HV supply - no effect when another cable substituted. So, must be: (1) Problem in load (Thyatron oil?) and test indicating problem in HV unit is misleading (2) Control voltage to HV supply is erratic, or peak-leaking line to HV supply itself has (partially) failed. Since this problem coincides with the other repairs, errors (1) or (2) seem logically simplest. So next time, check load again and look at actual control line. No tags going in & out of control unit. Also check end of charge line.

9/5 Yet more diagnoses. Looked at heat sink sym. 1) inspect all capacitors & precision resistors pins - look OK 2) changed Thyatron cooling oil. No large effects though perhaps some change in time constants 3) Found a problem, probably not the problem though.

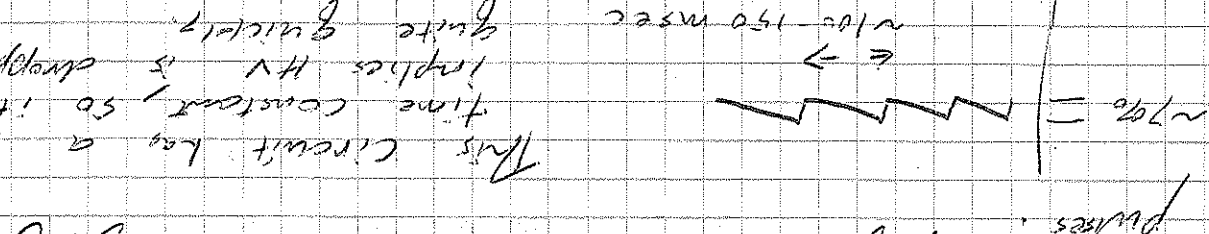
9/5

This resistor is badly cracked, and reads $\sim 125 \Omega$. Looks more like mechanical damage from overheating. Seems stable, but clearly should be replaced. Misc. at some point gas processor switch was set to fluorine - put it back on chlorine. Should help with fill lifetime. Next time - look at voltages in control unit closely.

Checked control unit. Looked at HV peak - lines are OK. Looked at the peak - detected HV signal fed to the meter. Its dropping by $\sim 70\%$ between changing pulses. This circuit has a 1.55 time constant, so it implies HV is dropping quite quickly. $\sim 70\% =$

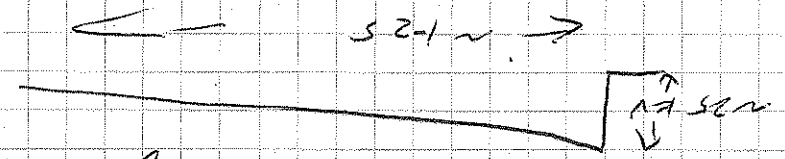


9/6



Next time - look at voltages in control unit closely.

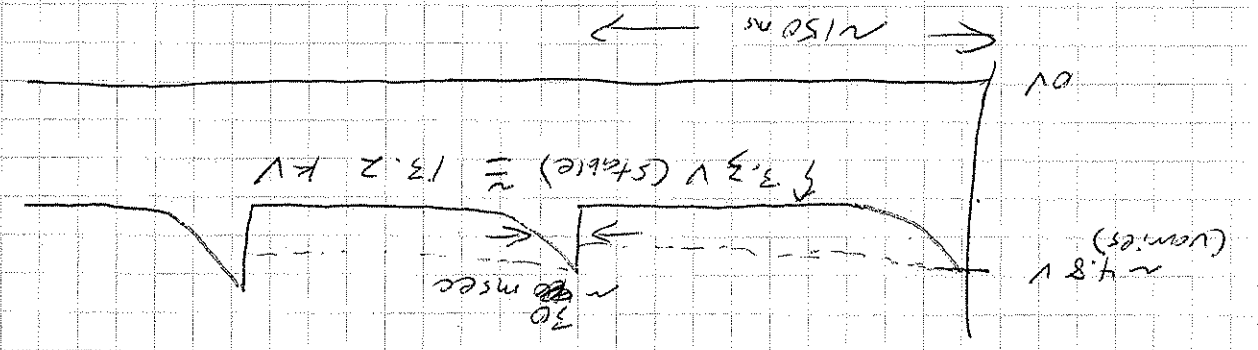
With HV beyond the lead removed, expect something similar, but because of intrinsic noise, the constant of power supply alone. That's exactly what is seen: from a single changing pulse.



So it seems likely something in lead is pulling supply down. Probably capacitor bank or hydration, could also be in HV supply itself, but I now doubt this. Keep will look at HV sense directly (in HV unit) to check that out.

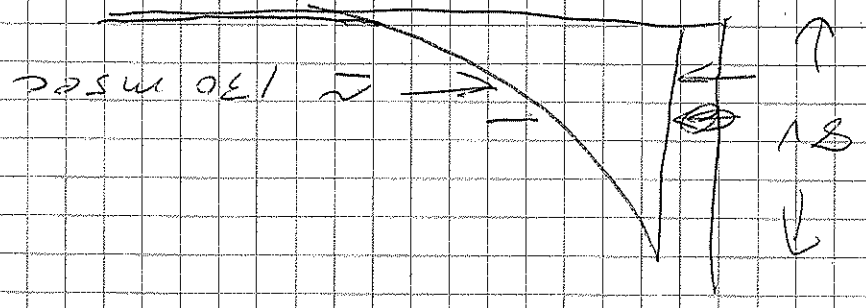
9/7/93

I looked at HV sense line directly. What I see is somewhat different from expected.



At ~20 kV (on meter)
 What gives this changing time constant? Looks like series resistance with
 $RC = 3 \times 10^{-5}$
 What is C? probably of order 1 nF (check!)
 So $R \approx \frac{3 \times 10^{-5}}{10^{-9}} = 30 M \Omega$

With lead disconnected, I see,

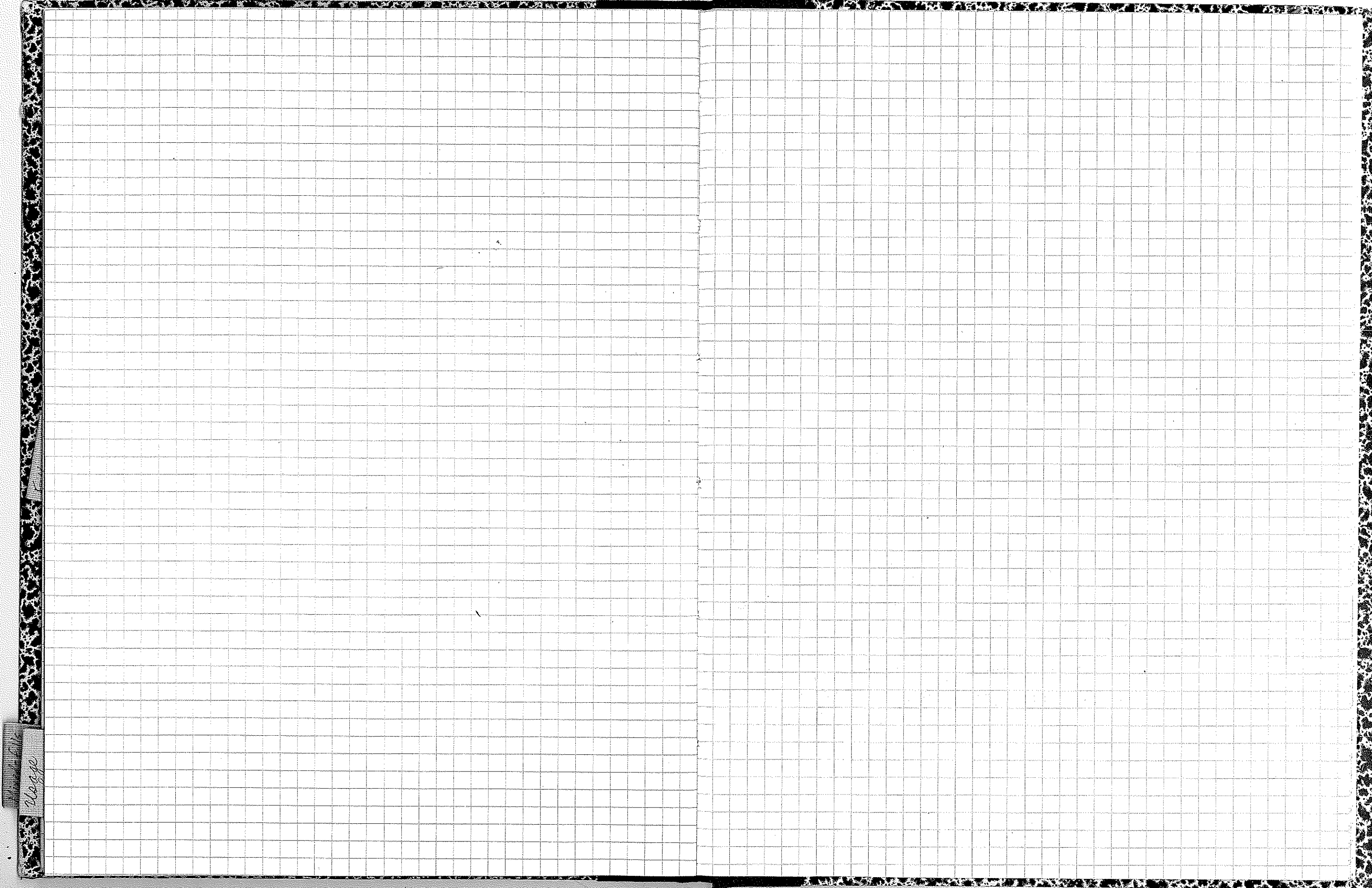


This is just what I expect. So it looks like the laser is changing wire? It looks like high impedance broken wire?

Yes -- HV wire broken inside center conductor of the large beryllium connector. Found a reasonably good way to splice it back together in about 1 hr.

All back to normal now. In 480 mV on Pyro channel meter of 20.5 kV, roughly 150 mV.

Stage



100

Miss A. C. 1/16
2008

Usage Log

3/8/86 4 hrs @ 6 Hz E3

3/20 6 hrs @ 3 Hz ~ 200 mT E3

3/22 6 hrs @ 2 Hz < 100 mT (21.5 kV) E3

3/24 1 hr @ 2-20 Hz, ~ 175 mT E3

3/31 1/2 hr @ 2 Hz, ~ 100 mT E3

4/1 4 hrs @ 5 Hz ~ 148 mT E3

4/6 2 hrs @ 3 Hz E3

4/7 2 hrs @ 3 Hz "

4/8 4 hrs @ 3-6 Hz "

4/9 4 hrs @ 3-2 Hz @ 3-2 Hz E3

4/11 370 V = 145 mT PTB

4/15 360 mV ~ 140 mT 2 1/2 hrs @ 2-3 Hz E3

4/25 320 mV = 123 mT 3 hrs E3 + 3 mV

4/26 510 mV = 192 mT 10 hrs E3 + 3 mV

5/2 3 hrs for 10-20 Hz 4 hrs for E3

5/10 6 hrs, 7 Hz (some time @ 10 Hz) E3

5/12 3 hrs, ~ 10 Hz E3

5/15 "560 mV = 216 mT 4 hrs AN

using uncalibrated scope - response is apparently accurate, ~~from~~ though!

Usage Log

7/6 10 hrs.
 7/7 15 hrs
 7/8 ~~15 hrs~~ 158 mV (if 2.25 V/T) 4 hrs
 7/9 ~~16 hrs~~
 7/12 318 mV → 122 mV (2.57 V/T) → 141 mV (2.25 V/T)
 7/16 Newfill 179 qmV (2.59 V/T) 4 hrs + AM
 7/18 484 mV = 187 mV (2.59 V/T) 3.5 hrs
 7/21 7 hrs
 7/22 500 mV 193 mV (2.59 V/T) AFTER AT 20 Hz
 7/25 2 hrs @ 10 Hz
 7/26 2 hrs " " 4 1/2 hrs
 7/27 8 1/2 hrs

J6
 J6
 E3
 E3

5/16 4 hrs
 5/21 7 hr 3 Hz E3
 5/22 438 mV Power = 170 mV 2 hrs @ 2 Hz
 5/23 440 mV 8 Hz at ~ 8 Hz
 5/24 425 mV Power = 164 mV 3 Hz
 5/25 3 hrs
 5/26 4 hrs of 15 Hz
 5/28 10 hrs
 5/29 " " 10 hrs.
 5/30 135 mV
 5/31 174 mV (FILL) 5 hrs
 6/6 3 1/2 hrs
 6/17 5 hrs
 6/24 5 hrs
 6/25 3 hr
 6/26 7 hrs
 6/27 7 hrs
 6/28 6 mV
 6/29 3 hrs
 6/30 2 hrs AT 200 mV
 7/11 A.N.

J6/LM
 E3
 E3
 E3

8/14 Started running: 107 mJ

up to 163 mJ

3 hrs.

4 hrs @ 2Hz

155 mJ

4 hrs at 8Hz

159 mJ

158 mJ

(3 hrs 3 m)

3 hrs

3 hrs

3 hrs

4 hrs @ 5Hz

3 hrs @ 10Hz

2 hrs at 10Hz

24 hrs at 5 Hz

174 mJ

E3AIN

10 hrs

10 hrs

10 hrs

D7E

DM

CW

E3

SW

SW

SW

AN

AN

AN

D7E

D7E

8/14

8/16

8/17

8/19

8/20

8/26

8/27

8/28

8/29

9/1

9/1

9/5

9/6-9/8

9/13

9/14

9/15

9/16

D6

8/14

8/16

8/17

8/19

8/20

8/26

8/27

8/28

8/29

9/1

9/1

9/5

9/6-9/8

9/13

9/14

9/15

9/16

D6

8/14

8/16

8/17

8/19

8/20

8/26

8/27

8/28

8/29

9/1

9/1

9/5

9/6-9/8

9/13

9/14

9/15

9/16

482 mV = 186 mJ

2 hrs

~~scribble~~

4 hrs

4 hrs @ 160 mJ

4 hrs @ 153 mJ

5 hrs

5 hrs

6 hrs

410 mJ = 158

3 hrs

D6

AN

AN

AN

7/20

7/24

8/4

8/5

8/6

8/7

8/8

8/9

8/11

8/13

8/13

8/13

1/2/86
22

DE 110 mV
Needle in DE 169 mV

Delay is determined by feedback
delay for jump in output
delay is determined by feedback
delay for jump in output
delay is determined by feedback
delay for jump in output

11/12/86
22

11/28

11/20-23
11/24-11/26
11/27

Q ≈ 145 mV - assumed stable
Q ≈ 148 mV
Q ≈ 135 mV
message = 54 hours
PTB

11/8

Change both voltage +2
Change maximum voltage +2
Delay to ramp ~ 13 min
Delay to ramp ~ 10 min
(probably due to both output + 60%)

New File 11/18

11/18/

33 mV
145 mV => 141 mV
(after 1 hr at 10 Hz)
by L. m. v.

12/8/86

430 mV ≈ 166 mV
rest ran 4 hours @ 3 Hz
E3

12/11

450 mV = 174 mV
470 mV = 181 mV
3 hrs @ 20 Hz
AN
E3

12/13

ADONIA for 5 hrs at 4 Hz AN

12/15

430 mV = 166 mV
AN

11/6

420 mV = 162 mV
392 mV = 151 mV
1/7 8 pm - dropped to 360 mV = 140 mV

11/7

11/9

4 pm 340 mV = 135 mV
L. m.
AN 8 hrs
AN 7 hrs

11/8

137 mV

11/13

146 mV

11/16

132 mV
134 mV
KACU FILE
1/8 mV

1/22 - 1/29

12 hrs at night
135 mV
last night at 135 mV

AN

5/11 394 mV = 154 mJ

~~394~~

6/11/82 - 6/10/82 30 hrs

6/10 = 330 mV = 130 mJ

330 mV - 140 mJ

6/14

122 mJ

3:30 - 1:00 = 8 1/2 hrs

JG

6/15

1:45 - 9:30 = 8 hrs

124 mJ

2:30 - 11:15 = 8 1/2 hrs

JG

6/18

1:00 PM - 2:45 = 1 1/2 hr
336 mV - 134 mJ

JG

6/25

11:15 AM - 1 AM = 2 hrs

404 mV = 156 mJ

JG

6/26

334 mV = 129 mJ

10:00 PM - 3:00 AM = 5 hrs

6/27 9:35 PM - 9:15 PM

354 mV = 137 mJ

JG

6/28 1:45 PM - 7:30 PM

350 mV =

JG

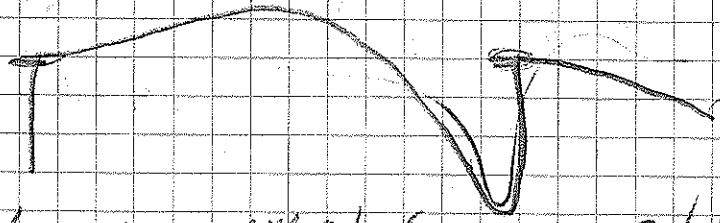
ANN

A.N.

A.N.

7/2 370 mV
7/10-7/9 Fan ~ 8 hrs each day
7/9 354 mV = 137 mJ

7/16 340 mV ~ 138 mJ



7/20 328 mV - 127 mJ TR

11:00 - 11:05 5 min

7/22 3.9 x 1.1 = 320 mV = 123.5 mJ SW

7/12/22 - 7/22 30 hrs SW

7/24 340 mV
380 mV = 115 mJ
300 mV = 115 mJ
300 mV = 115 mJ

7/25 9:30 - 10:15 300 mV = 115 mJ TR
5:30 320 mV
1:00 - 3:00 300 mV = 115 mJ TR