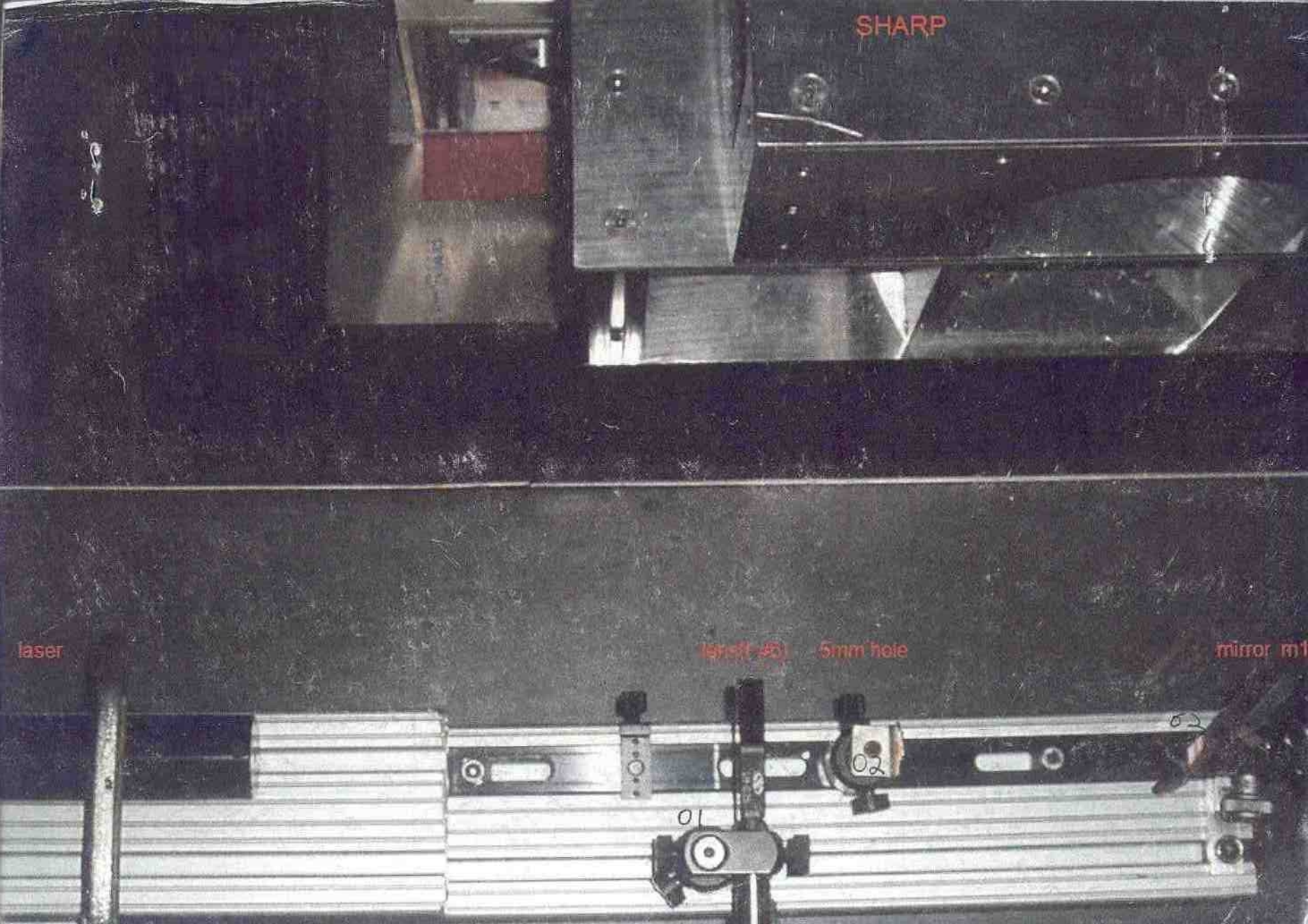

SHARP
laser
5mm hole
mirror m1
02
01

Test 1:

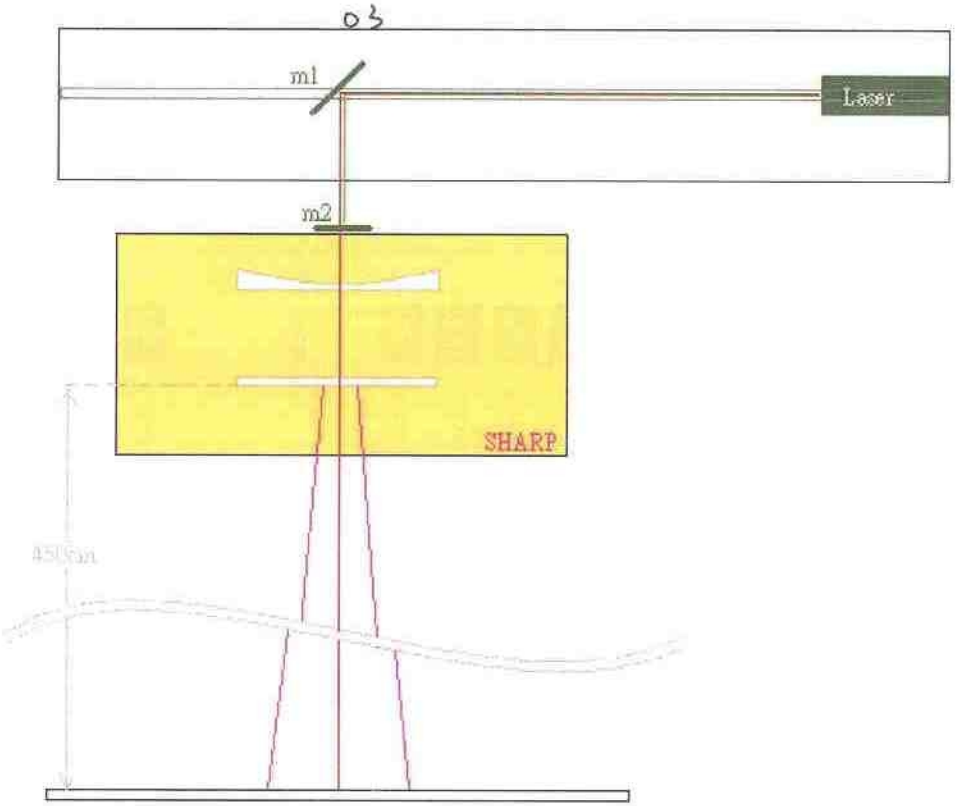


Fig.1

(1) Level SHARP and Laser bench
(2) Adjust m1 so that the beam reflected by m2 (mounted on Box IV) will trace the same path back to the laser
(3) Remove Box IV, record the image position on the screen (shown as dark blue in Fig.2)
(4) Put Box IV back, record the image position on the screen ((shown as red in Fig.2)

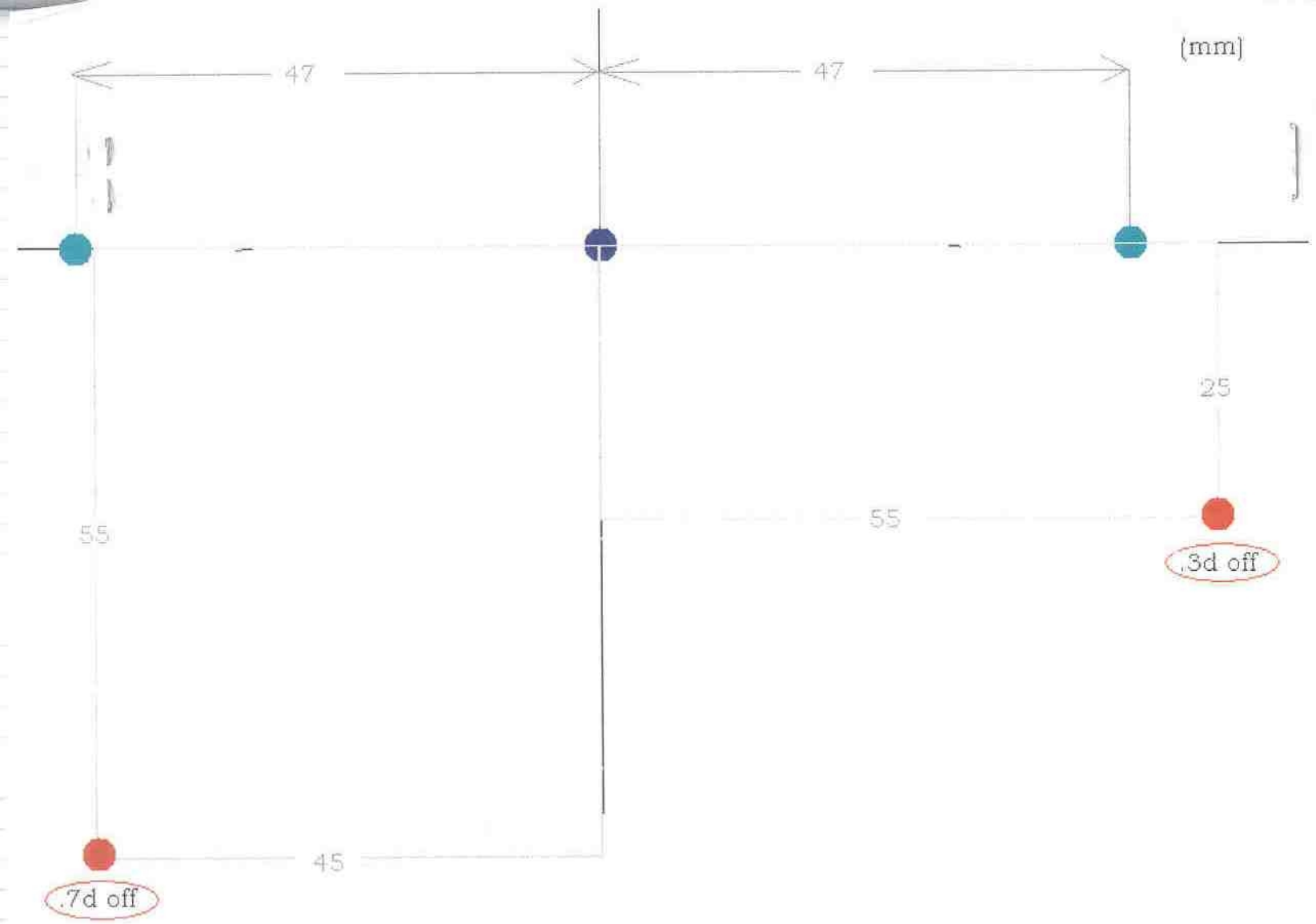


Fig.2

(5) The light blue images in Fig.2 show the ideal positions gave by ZEMAX.
(6) This error can be fixed by adjusting the mirror right after the Xgrid easily.
(7) Remove BoxIV, adjust m1 so that the laser beam is .5 degree off the original direction (toward up, dowm, left or right)
(8) Install BoxIV, the result is that the beam is .5 degree from (4) in the same direction as (7)

Test 2:

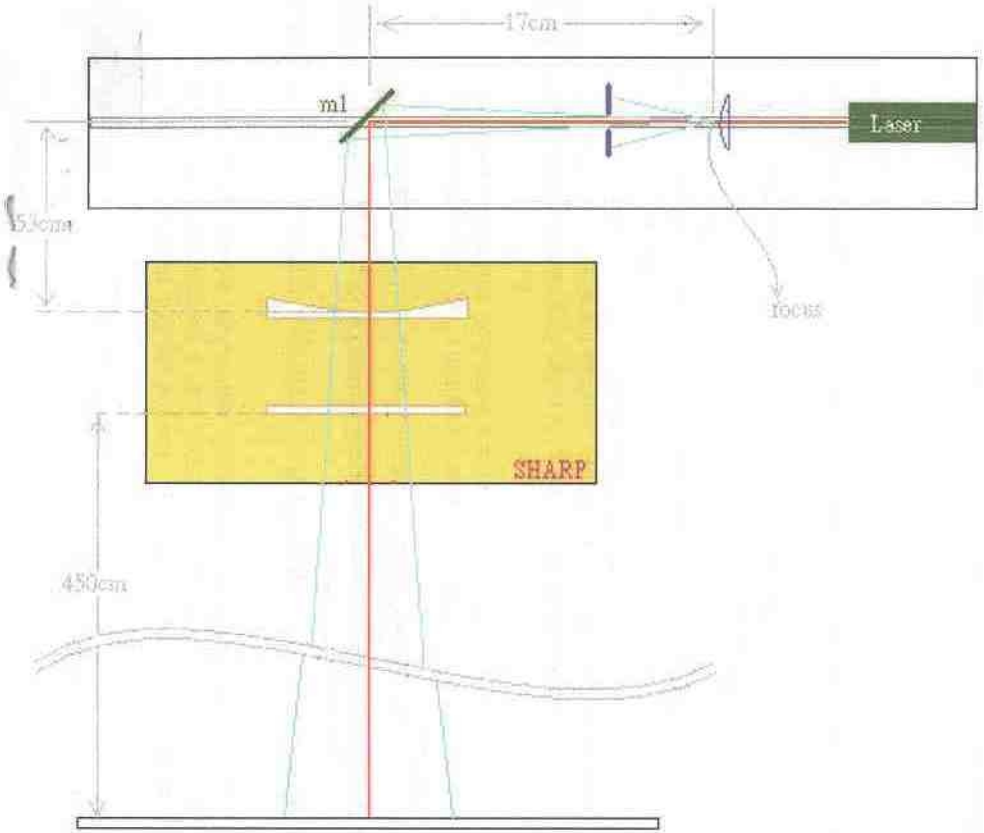


Fig.3

(9) Set up combiner screen as the figure at the lower right corner of Fig.5. The laser spot on the screen is ~25mm from the combiner center edge (Fig.4).
(10) Remove Box IV, insert the F#6 lens and the 5mm hole as Fig.3
(11) Adjust the hole to be 6cm from the lens focus to simulate the F#12 beam (light blue) as CSO
(12) Adjust the lens to center the F12 beam image at the position from (3)
(13) Install Box IV. Record image on the combiner screen (Fig.5)

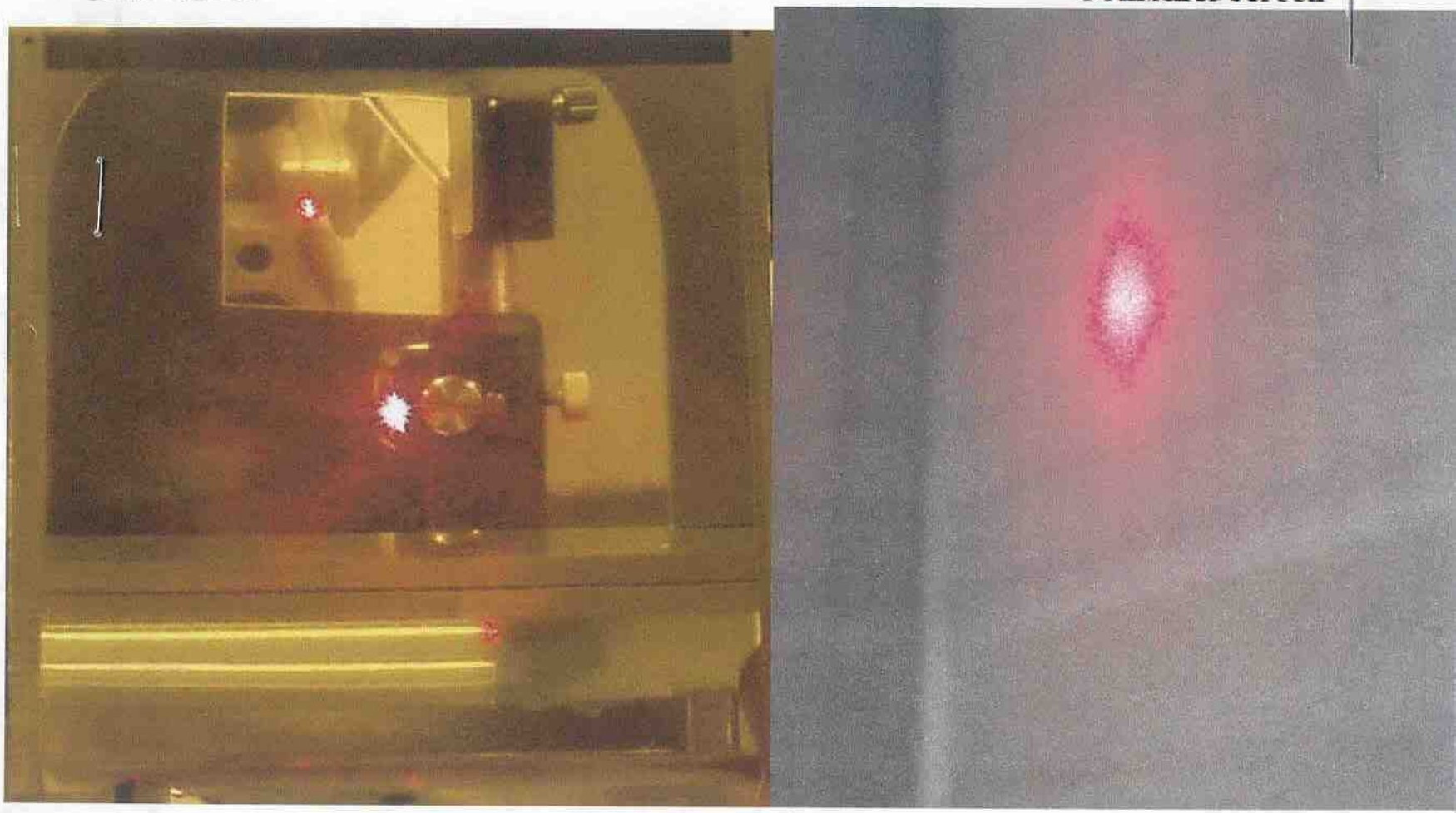


Fig.4.

First mirror

Combiner screen

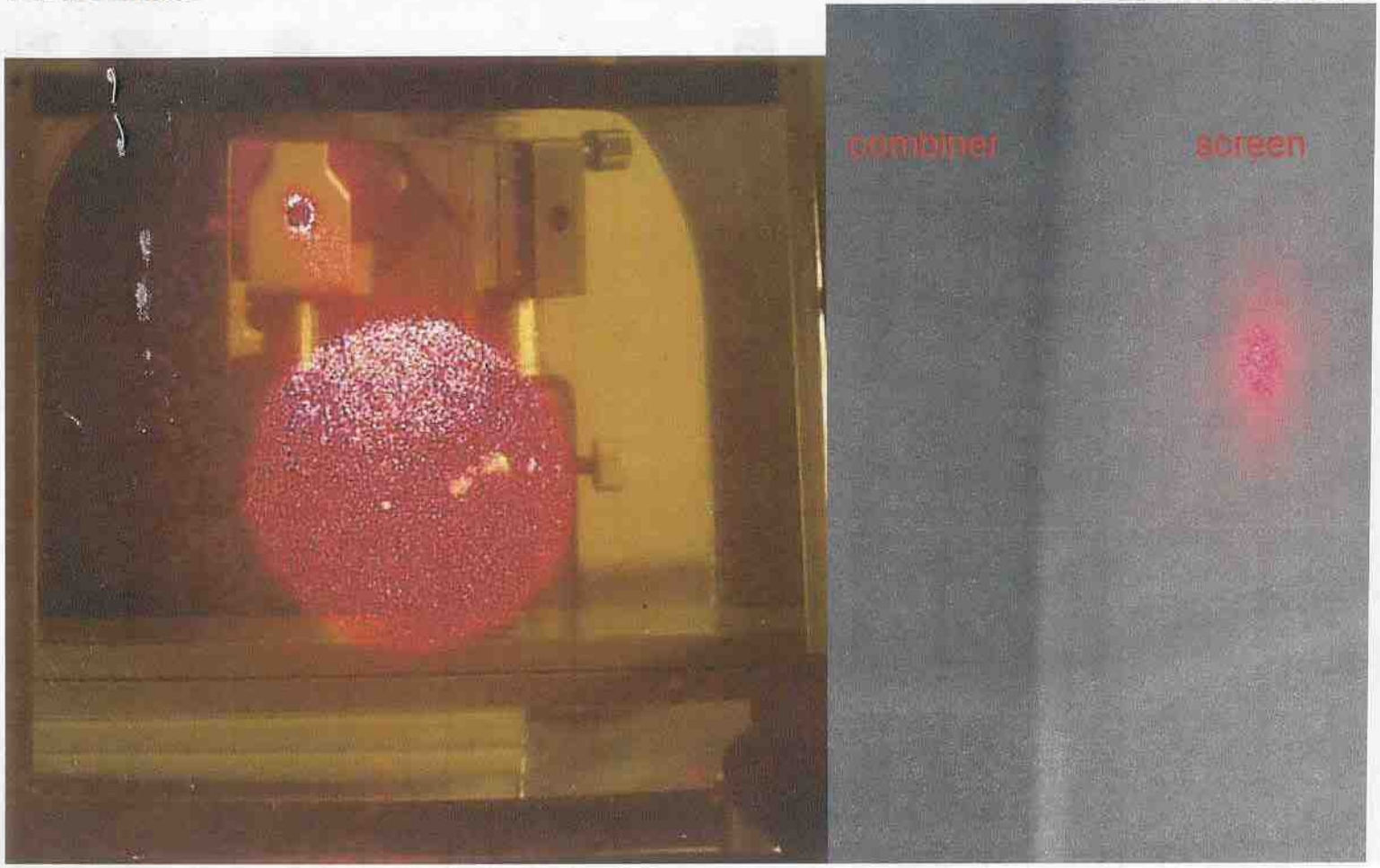


Fig.5 The F12 beam is focused on combiner screen.

Huabai Li 8/1/2005

Others

T nuts ✓
L brackets ✓
Lock down Screws / washers ✓
SHIM ✓
x spare M 15X15 ✓
gloves

8/4 . Packing list.

Box I

- (Grid screws ✓ X 4
- Grid ✓ X 2
- M15x15 ✓ X 1
- combiner ✓ (shipped)
- M cold ✓ X 2
- cold screws ✓ X 6

Box II

- curv M ✓ (shipped) X 2
- M15x15 ✓ X 2
- conn screws ✓ (shipped)

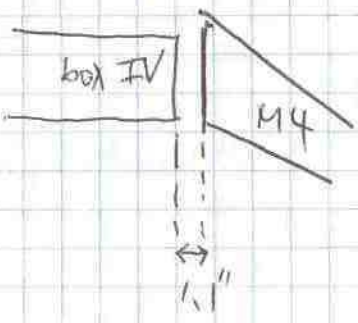
Box III

- M15x15 ✓ X 1
- Xg screws ✓ X 3
- Xgrid ✓ X 1
- Xgrid spacer ✓ X 3
- Xg PIN ✓ X 1
- HWP hold ✓ X 1
- HWP X 3
- Hwp screws ✓ X 2
- M10x10 ✓ X 2
- conn screws ✓ X 2

Box IV

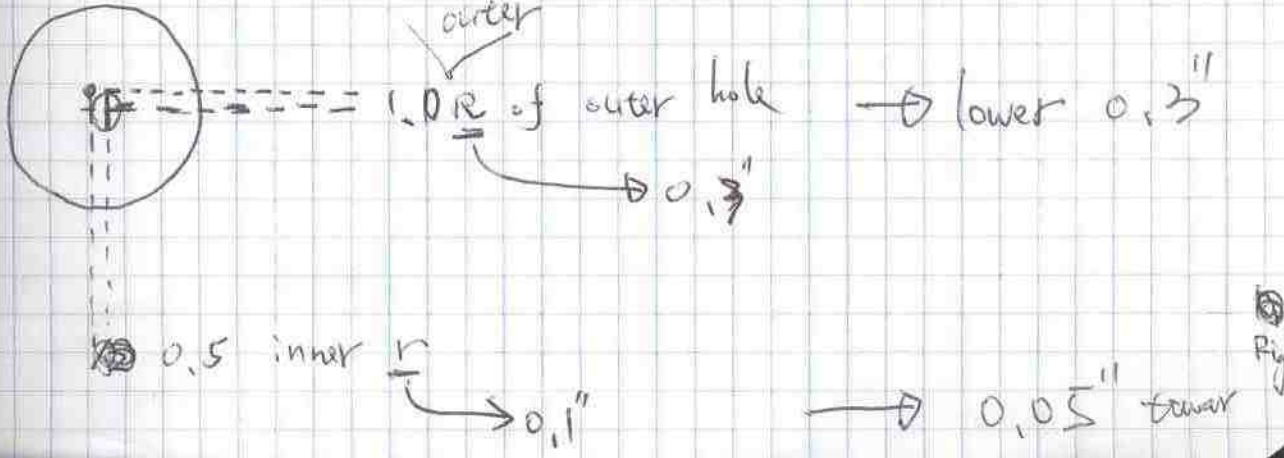
- curv M ✓ X 1
- M20x20 ✓ X 1
- conn screws X 4

dist between box IV and M4 box : 1.1"

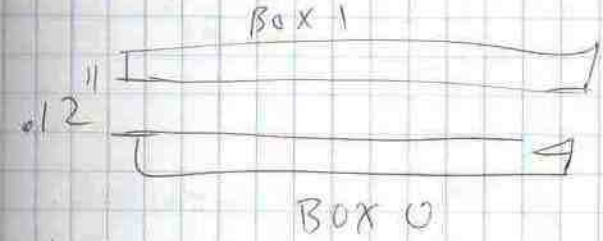


dist between counterweight and : 1 1/8" at 40 (Zenith
1" 50
7/8" ≥
7/8" >0
1" 10
1.25" 5

Jab dist plate and box I bottom



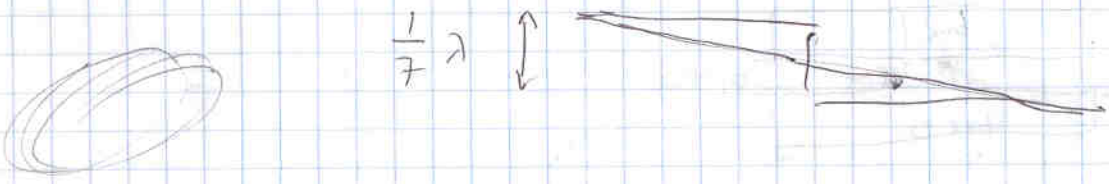
after adjustments



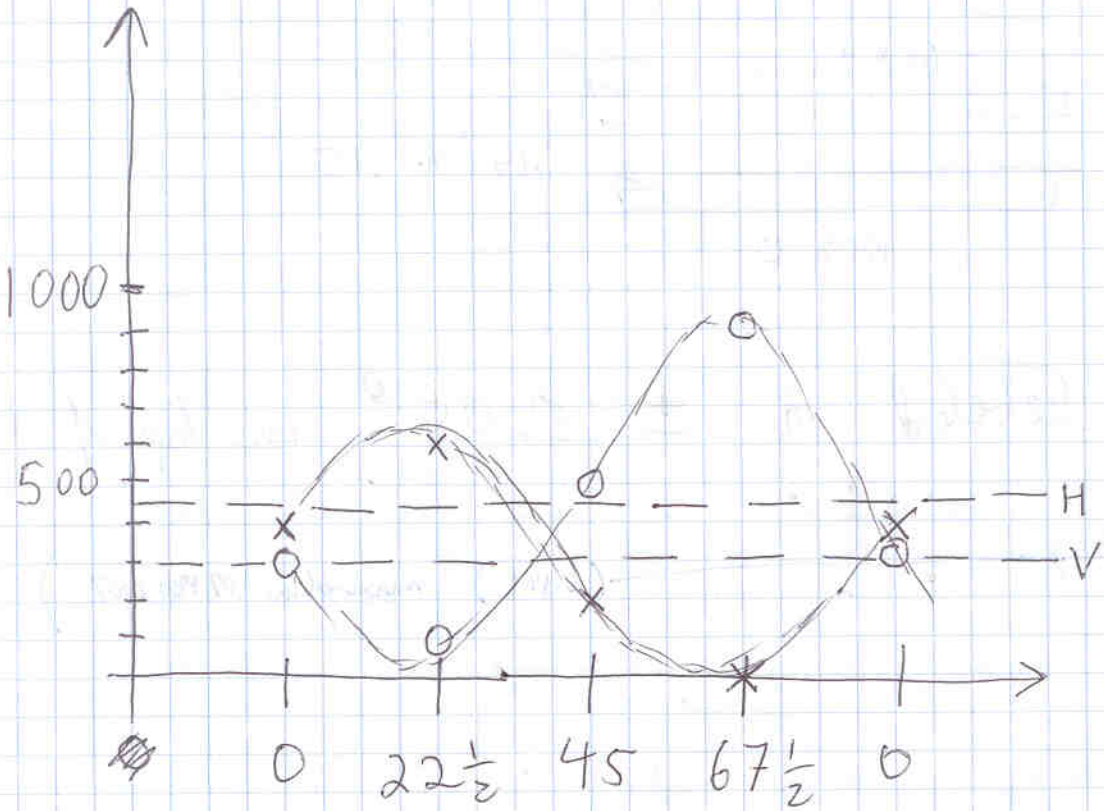
.14" to .15"

leveled to ± 0.05° on top of box 1

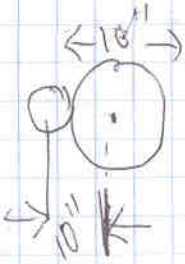
((.123) ——— (0.141) measured on 07 Feb 2007)



V = X H = 0



At angle of 0° 20% of power in sidelobe 2-2.5 pixels away



8/8.

△ HWP positive direction : right hand toward SHARC II.
($\vec{J}$ towards SHARC)

8/9

△ two grids installed in front of SHARP
= Horizontally (wires!)

angle (degree)	left (V)	right (H)
0	-218 -250	-190 -250
22 1/2	-430	-20
45	-200	-600
67 1/2		-927

levelling not stable

67 1/2	-20	-900
0	-400	-310
22 1/2	-600	-90
45	-220	-520
67 1/2	-30	-890
0	-400	-325

△ ~~45°~~ grids at 45° ◎ P.A. +45° from previous

HWP angle (°)	Left (V)	Right (H)
0	0	-1000
22½	-400	-300
45	-650	0
67½	-250	-650
0	0	-950

△ wires go lower left ↔ upper right
when looking from SHARP down Nasmyth

△ Wires vertical

HWP	V	H
0	-300	-700
22	-70	-1000
45	-500	-400
67	-750	-100
0	-300	-600

cold load tests:

300K SHARC 25041 lo-gain mode values used to level hardware are stored on disk

77K SHARC 25042

77K SHARP 25043

77K SHARP w/ absorbers blocking cold load mirr. 25044

300K SHARP w/ absorbers blocking cold load mirrors 25045

300K SHARP 25046

procedure used

1. set up condition
2. level
3. start observation

→ shake test

we see changes on scale of a few mV on lo-gain when Darren leans on SHARP

→ Darren is now tilting cold load mirror in middle, can never make it colder.

Checking near aperture again 25047

Now checking Par aperture 25048

~~the~~

Repeat (forgot to take load out half-way through)

(one night dropped 1½ pixels

Allans Arm in beam occasionally)

2005 Aug 10 UT

SHARP installed. w/ cold ~~Loads~~ load mirrors
350 μm uncoated wave plate.

Scattered cirrus, especially around thunderstorm to South.

350 μm SWEEP 30 10 /YAMP=30 /YPER=14.14 /ALT

FAZO -115 FZAO +63

25050 SWEEP on Moon, no chop

25051 SWEEP on Jupiter no chop

FAZO -75 FZAO 30

25052

Remove box 4

FAZO ~~-75~~ -115 FZAO ~~30~~ +63

25053 Jupiter

FAZO -80 FZAO +50

25054 ZA = 48° 4.9 UT

=> FAZO = -63, FZAO +56 ???

MUCH DIFFERENT! FROM ROTATING DEWAR. I GUESS

25055 => (-64, +58)

ZA=50° Put Box 4 in

25056 SEC 120 1.388888 4 4
SWEEP 10 10 /YAMP=10 /YPER=7 /ALT

25057 Polarization scan
-25060

SWEEP 10 20 /YAMP=10 /YPER=14.14 /ALT

25061-25064 Pol. scan

~~ROLL OFFSET~~

25065-25068 "

FOCUS /OFFSET = 0.2

25069-25072

FOCUS /OFFSET = 0.0

FA20 -80 FZA0 +56

25073-25076

FA20 -100 FZA0 +56

25077 1 HWP

FA20 -120 FZA0 +56

25078-25081 pretty good

FOCUS/OFFSET = -0.2

25082-25085

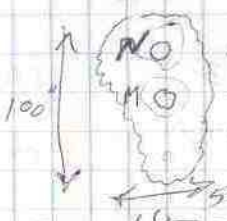
FOCUS /OFFSET = +0.2

25086-25089

FOCUS /OFFSET = +0.0

25090-25093

SGRB2N



SWEEP 50 20 /YAMP = 50 /YPER = 28.2/ALT
FA20 -120 FA0 +56

25094 No HWP
SWEEP 30 20 /YAMP = 30 /YPER = 28.2/ALT

25095 No HWP

TLENGTH PROBCEM

25096

CAL-G34.3

Remove polarimeter
Point by eye
ZA = 22 FA20 = -116, FA0 = +62

25097 FOCUS/OFFSET = 0.0

SGRB2N

25098 ZA = 48° ⇒ FA20 = -115.4, FA0 = 57.5
~~FOCUS~~ ~1.2 mV in shorts dive

25099 FOCUS/OFFSET = +0.1 ~1.2 mV
SHARC

Put Box 4 back

25100 ~~Right~~ Left image : 0.4 mV
~~Right~~ Left image : 0.3 mV

25101 FOCUS/OFFSET = +0.2

long delay → 25102 FOCUS/OFFSET = 0.0
SHARP

25103 FOCUS/OFFSET = -0.1

25104 FOCUS/OFFSET = -0.2

25105-25108 Focus/offset = 0.0 sweep 10 10 /yamp=10 /ypar =14.142 /alt

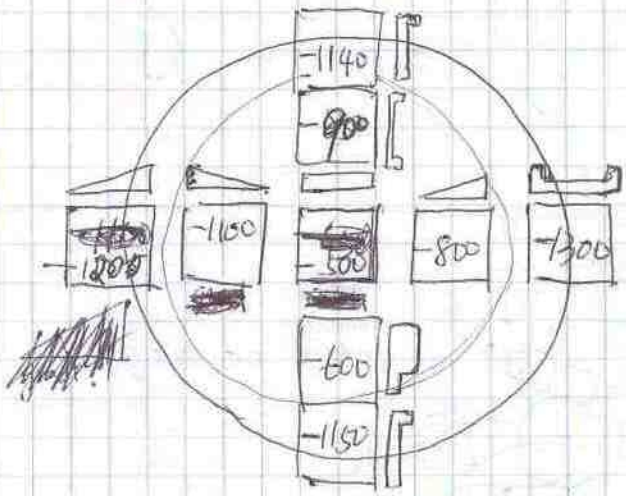
to log on a system on Alpha1: Password is vmsforever
to restart UIP Daemon on system @BIGDISK:[HIRO.UIP.EXE]UIPD.COM
instructions on UIP restarting at puwo.submm.caltech.edu/docs/~~hiro~~/ant/ftp.html

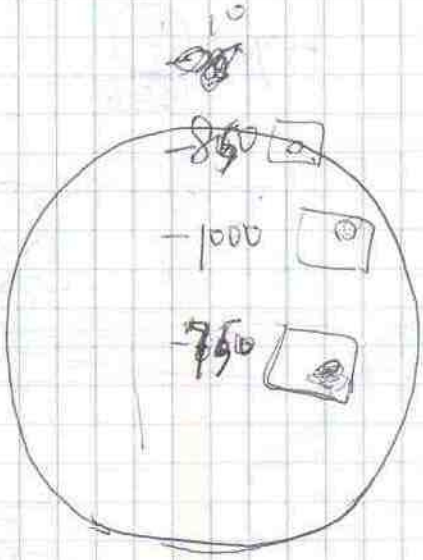
Main beam size in I Co-added for file (25194-97) is 10.81"

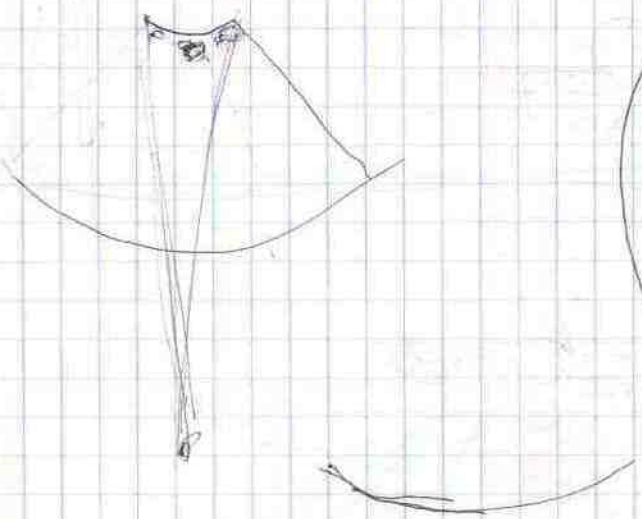
In H map beam is 10.12"
In V map beam is 14.7" x 23.2" at hwp=0

H is 9.2"
V map is 22.5"

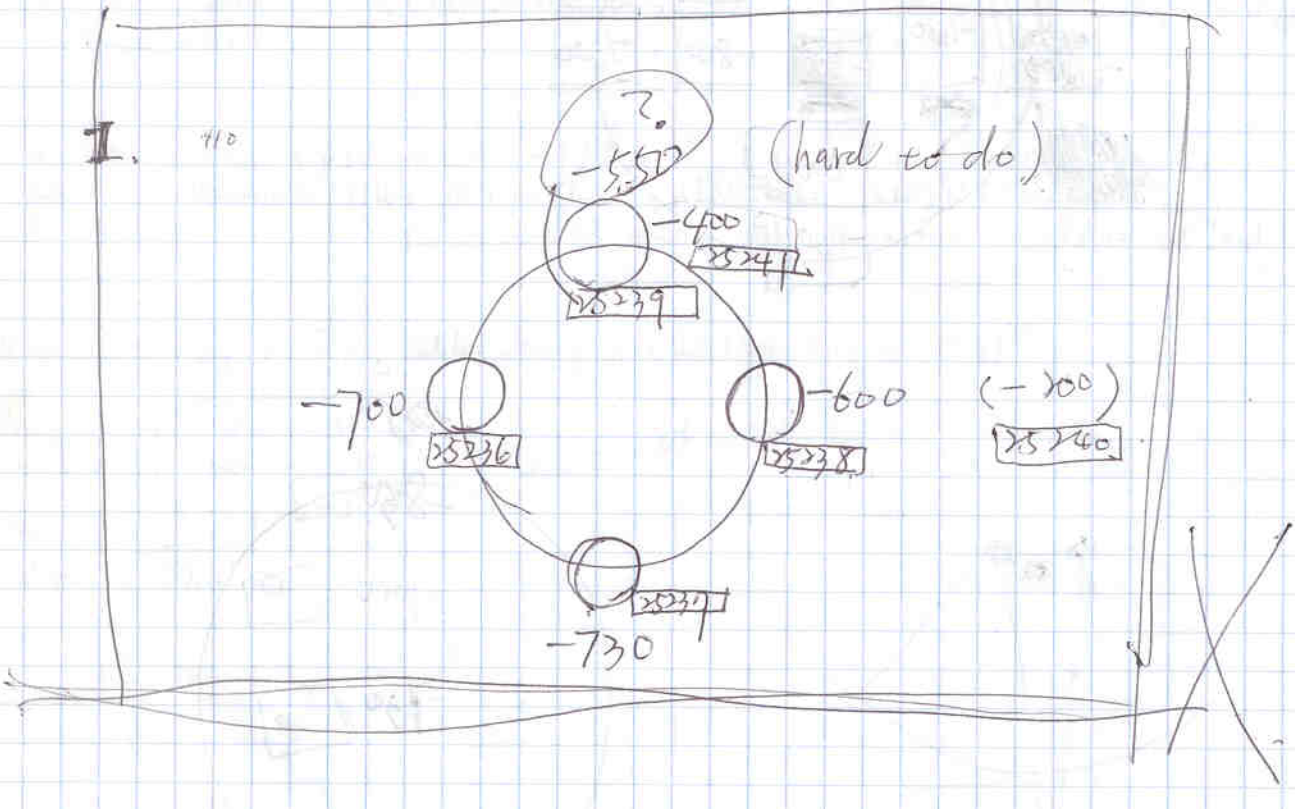
8/10

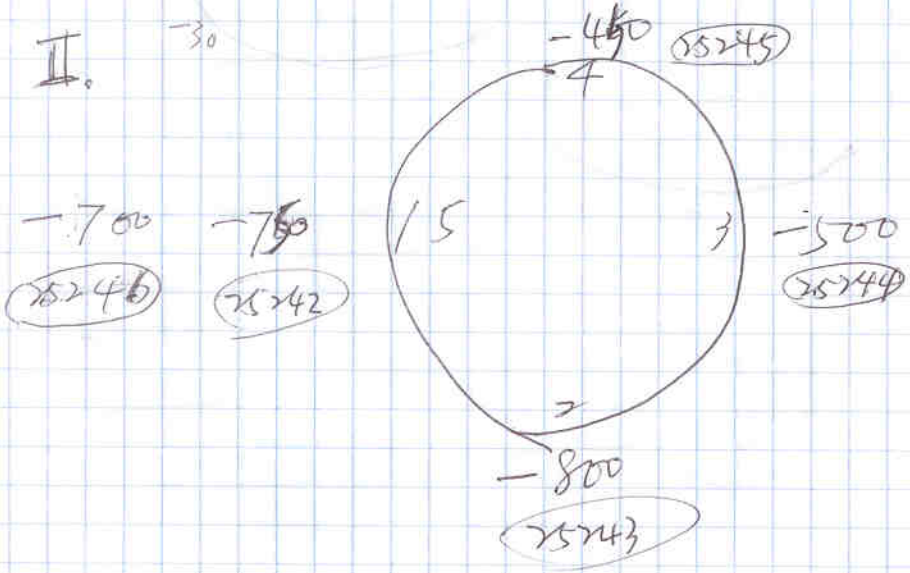


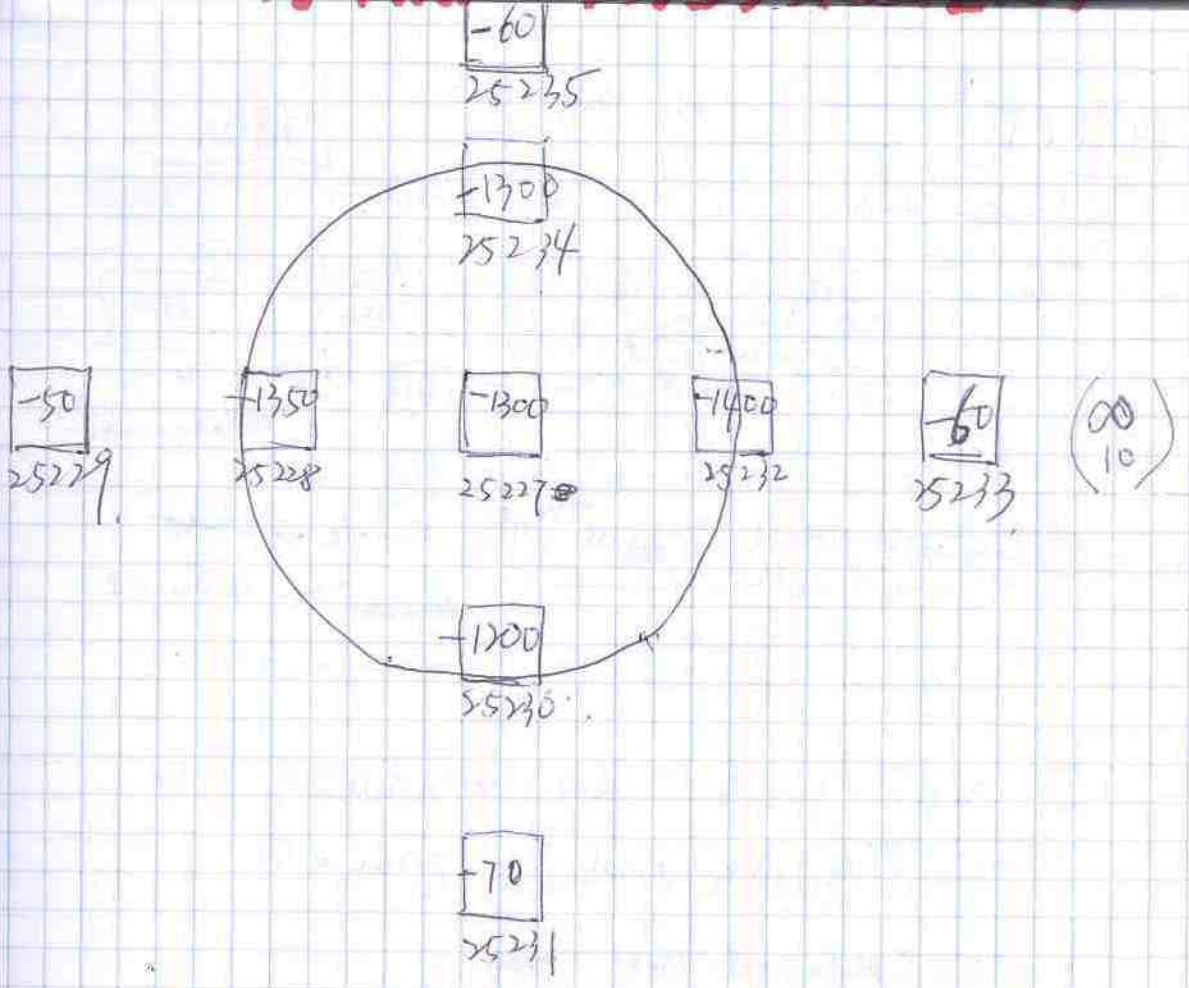




Half cold load on 2ndary






-60
25235
-1300
25234
-50
25229
-1350
25228
-1300
25227
-1400
25232
-60
25233
∞
10
-1200
25230
-70
25231

SHARC II

11 Aug 2005

① plastic disk inside the Za encoder

- beam - half pixels high
centered left-right

※ gain set low before the measurement

② Centered properly with the pinhole ~~outside~~ closer to sharc II

pixel 2.9mm

③ the plastic pinhole inside Za encoder
(the closer pinhole) → same as ①

about half a pixel high beam

④ rotate 180 of (pinhole)

0.4 pixel high beam

SHARP

① closer pinhole only (with gain to sexy)

[H] Right perfectly centered

[V] Left (double peak (one weak))

- half a pixel right
- half a pixel high

} offset from the center

② pinhole inside AZ encoder only

[H] Right
- 1.2 pixels low
- left-right good!

[V] Left
- half a pixel right
- quarter a pixel high

} offset from the center

8/11

After putting 0.012" shim under mirror after combiner. Far aperture

H: { centered ↕

1/2 pix toward right

V: { 1 pix high
1/2 pix toward right

△ from yesterday (= change due to shim)

H moved up 1.2 pixels
0.5 pixel to right

V moved up 0.75 pixels
H NO CHANGE horizontally

on average moved up one pixel
night 1/4 pixel

EXPECTED $\frac{.012''}{5''} = \frac{12}{5000} \times 57 = 0.14°$

$\times 2 = 0.28°$

8/11

near Apt.

H: { centered ↕
1/4 pix toward right

V: { 1/2 pix toward right.
1/2 pix high.

Δ from yesterday

H: no change up-down
1/4 pix. to right

V: no change

on average moved not at all up/down
1/8 pix right

Did the angle change by 0.28°?

2.7 mm over 28 cm (distance we measured between plates)

.57° is change in angle

Checking i.p. w/ close aperture

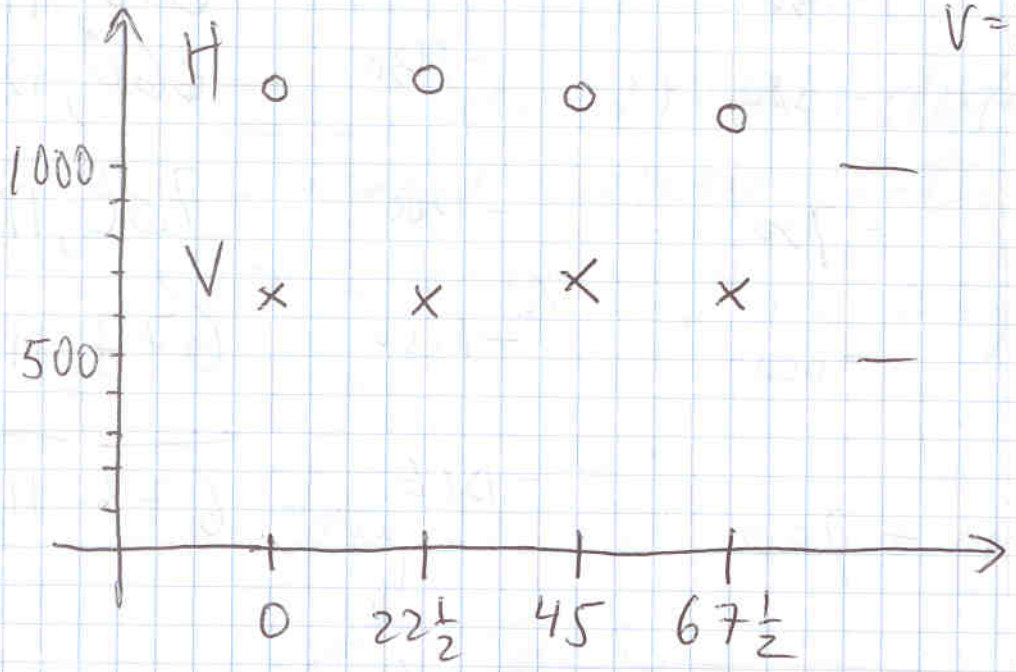
	V	H	
0	-590	-1200	
22½	-760	-1350	
45	-640	-1100	
67½	-700	-1200	(.58)
0	-700	-1200	
22½	-640	-1300	
45	-740	-1230	
67½	-730	-1150	(.63)

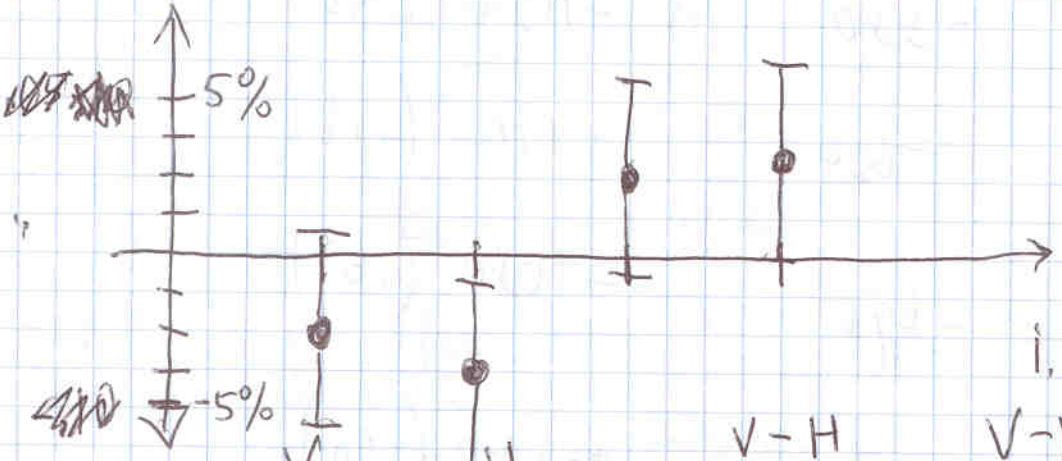
	V	H	avg
0	-630	-1150	655, 1190
22½	-580	-1130	660, 1227
45	-720	-1200	700, 1177
67.5	-600	-1050	677, 1133
0	-700	-1216 (.57)	673 1182

0	-580	-1120 (.52)
45	-650	-1110 (.58)
90	-690	-1080 (.63)
135	-730	-1200 (.60)
0	-650	-1130 (.57)

ICP ⇒

FIRST SHARP i.p. curve





V	H	V-H	i.p. V-H/2
.97	1.01	-0.04	-0.02
.98	1.04	-0.06	-0.03
1.04	1.00	+0.04	+0.02
1.01	0.96	+0.05	+0.025

instrumental polarization

is $\sqrt{(.04)^2 + (.055)^2} \Rightarrow 6.8\%$

peak is ~~near~~ between 45° and $67\frac{1}{2}$

Forgot to divide by two.

3.4% is the instrumental pol.

angle is like //// and |||| grid lines

i.p. is 22½° CCW from horizontal, looking at cold source in Nasmyth

error in ratio of V/H for 0° seems to be ± 10% worst case. So rms is 8%. (So individually the rms is 5%) So rms of V-H is 10% so rms of V-H/2 is 5%. So add these error-bars to see i.p. is consistent w/ noise.

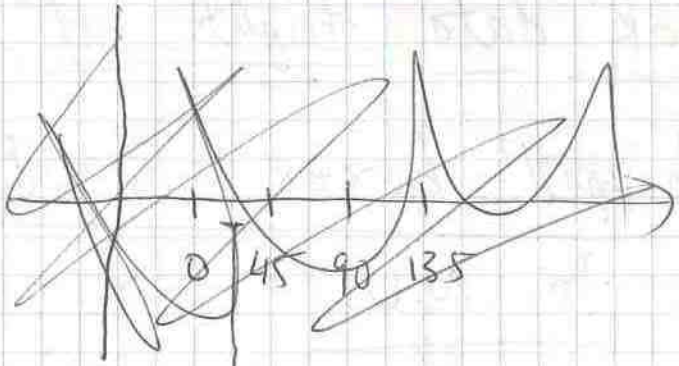
Each stokes par has ~3.5% error.

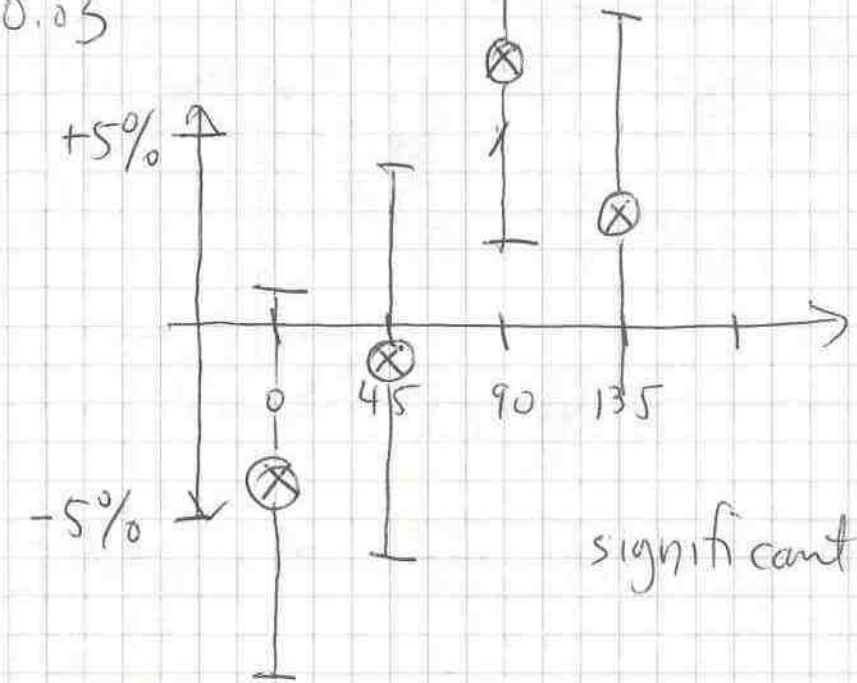
i.p. is $(3.5 \pm 3.5)\%$ @ $22\frac{1}{2}$ ccw from horizontal.

V	H
580	1120
650	1110
690	1080
730	1200
650	1130

θ	V	H	V	H
0	615	1125	0.92	1.00
45	650	1110	0.97	0.98
90	690	1080	1.03	0.96
135	730	1200	1.09	1.06
	671	1129		

	(V-H)/2
0	-0.04
45	-0.01
90	+0.07
135	+0.03



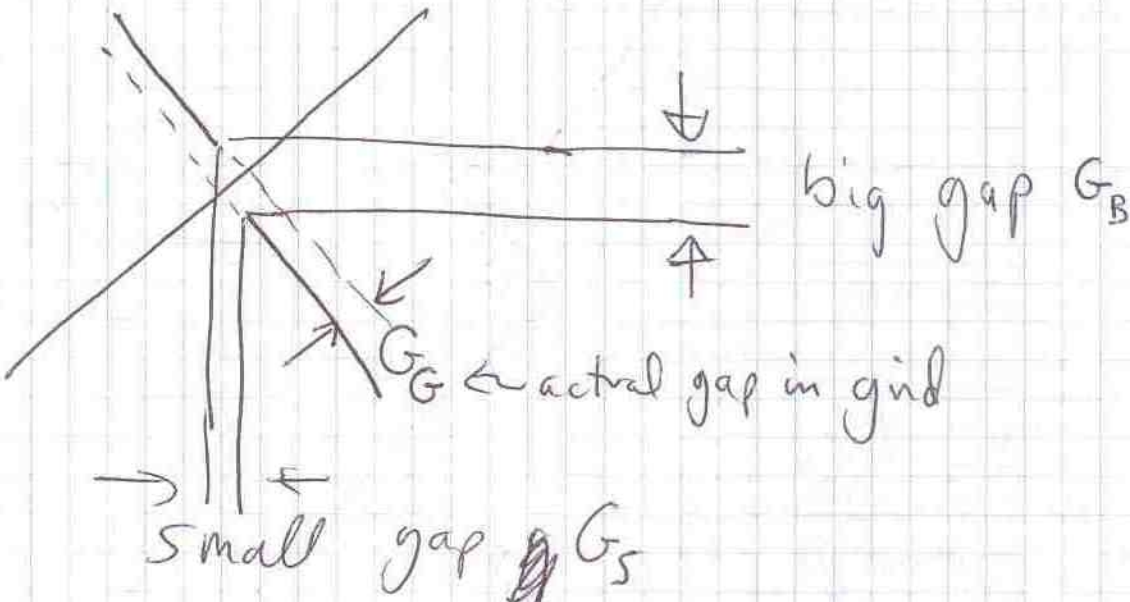


significant ?

Took data nights of Aug. 8 - 14.

Shipped boxes 3 & 4 back to N.U.

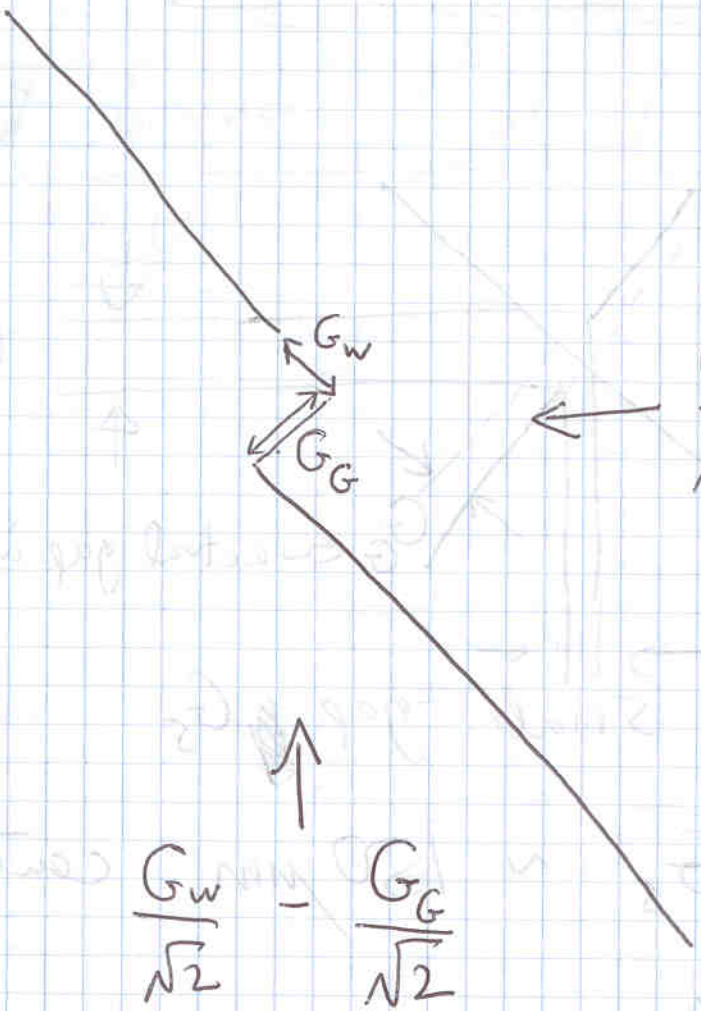
October 11, 2005



$\Delta G = G_B - G_S \sim 150\,\mu m$ center

	G_B	G_S	ΔG
one side	210 μm (7)	60 μm (2)	150 μm
center	300 μm (10)	150 μm (5)	150 μm
other side	240 μm (8)	150 μm (5)	90 μm

these should be repeated. They were done by finding squares and counting wires.



The difference is $\frac{2}{\sqrt{2}} G_G$

The sum is $\frac{2}{\sqrt{2}} G_W$

difference 150 μm $\Rightarrow G_G =$ 105 μm

$= 4$ mils

The gap is

$G_W = 320$ μm

October 19

more careful grid-gap measurements

center

	gap 1	gap 2	gap 3	gap 4
	4 (120 μm)	8 (240 μm)	5 (150 μm)	8 (240 μm)
repeat	4	9	4	8
send w/ no. ed #'s	2	5	2	7
side w/ ed letter	6	7	4	8
repeat	5	8	4	8

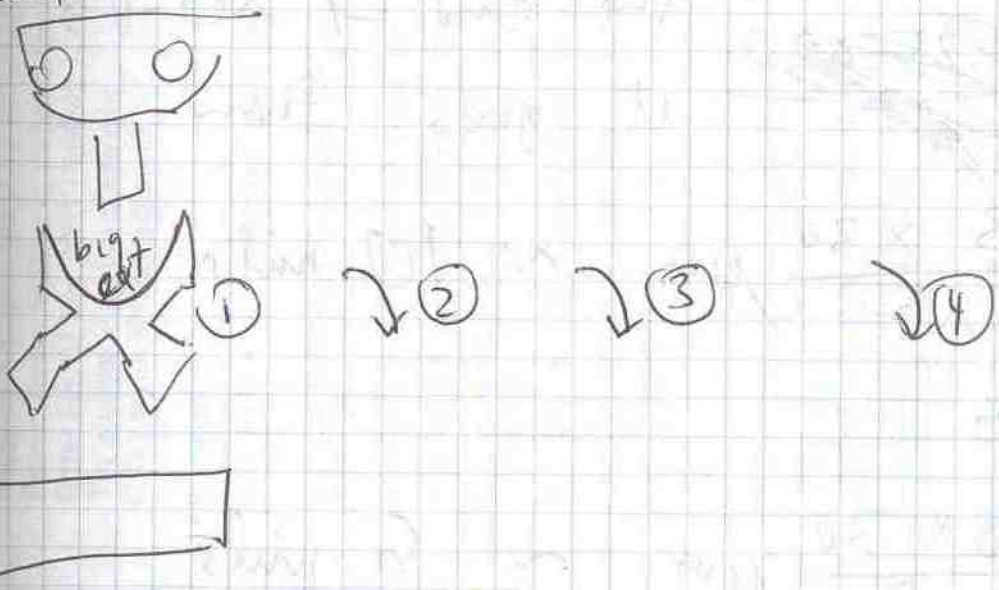
gap measured in wires

gap in μm

$\Delta G = 105$ μm

$G_G = 75$ μm

$= 3$ mils



	small gap	big gap	
3	4.75	7.75	end w/ red ~~letters~~ #'s
4	4.25	8.25	center
4	2.00	6.00	end w/o red #'s

Now I'm getting $\frac{120\mu m}{\sqrt{2}}$ for G_G at center of grid, a bit less at end w/ red #'s.

G_W also seems to vary at the end w/ red #'s ~~12.25 x 30~~ it goes from

$\frac{13 \times 30}{\sqrt{2}}\ \mu m \sim 10$ mils

to

$\frac{8 \times 30}{\sqrt{2}}\ \mu m \sim 6$ mils

Subject: X Grid repair
From: Trevor Walker <t.walker@terahertz.co.uk>
Date: Sat, 03 Dec 2005 13:09:47 +0000
To: g-novak@northwestern.edu
CC: r.wylde@terahertz.co.uk

Hi Giles,

Have made a more thorough measurement of the X grid and have the following results before any rework

Big gap viewed from both directions 0.268 / 0.265 µ
Small gap " " " " 0.134 / 0.133 µ

Splitting the difference gives us .066µ which at 45° equates as 093µ or .0036"

This figure is fairly close to your .0033"

Having reworked the C frames I am now getting a difference of 0.014 µ between the big gap and the little gap.

Splitting the difference gives us 0.007µ which at 45° equates to 0.010µ or .0004" offset.

I am out on Monday, but will arrange to have the grid shipped back to you on Tuesday.

Best regards,

Trevor.

Trevor Walker
Scientific Instruments Supervisor
Phone ++1403 787618
t.walker@terahertz.co.uk
www.terahertz.co.uk

Thomas Keating Ltd
Station Mills, Billingshurst West Sussex UK
Phone ++ 1403 782045 Fax ++ 1403 785464

3.3 mils is the gap for grid center. At one end it goes to 2.5 mils

Trevor's measurements:

big gap 267 μm

small gap 134 μm

compare with: 8.25 wires

4.25 wires

= 247 μm

= 128 μm