

changing the HWP to 450

Importance: flathead screws possibly rusting

Notes * 400 kg long flathead
we need to order more.

② little damages on the cooling \equiv
(a couple of them)

plus dusts particles on the HWP
tiny

③ intermittent connection with the motor cable

Throughput / Vignetting Test

Box 4 on, HWP = 50
no aperture

File	Filter
40917	350
40918	450

60 sec. files
+ 10 sec. manual check w/ hot load

SHARP alignment check

aperture plate @ ~~exit~~ entrance aperture

H: $\frac{3}{4}$ pix U, \odot L-R $\frac{1}{3}$ pix
V: 1 pix U, \odot L-R

file = 40919 [H: 0.26 R, 0.35 U; V: 1.0 U, 0.13 R]

alignment by eye $\frac{1}{4}$ pix U-D, \odot L-R [0.13 L-R, 0.15 U-D]

aperture plate @ exit aperture, w/ wire g.d.

H w/ HWP = 50: $\frac{1}{2}$ pix U, $\frac{1}{2}$ pix L
file = 40920 [0.43 R, 0.64 U] ~~Chg H~~

V w/ HWP = 95: 1 pix U, $\frac{1}{2}$ pix L
file = 40921 [0.55 R, 0.98 U]
alignment = $\frac{1}{2}$ pix U-D, $\frac{1}{4}$ pix L-R [0.12 L-R, 0.34 U-D]

parallelism: H $\frac{1}{4}$ pix U-D, $\frac{1}{2}$ pix L-R
V: 0 pix U-D, $\frac{1}{4}$ pix L-R
files { H: 0.17 L-R, 0.21 U-D
V: 0.42 L-R, 0.02 U-D }
 \nearrow bring HWP @ exit = $\frac{1}{2}$ pix

12-30-2007

JV, HS

Aligning

exit aperture

V: $1 - \frac{3}{4}$ p.v U, $\frac{1}{4}$ L

alignment = $0 - \frac{1}{4}$ U-D, 0 L-R

S.L. = 40923

[0.13 R, 1.1 U]

~~entrance~~ entrance aperture

H: $\frac{3}{4}$ U, $\frac{1}{4}$ L

S.L. = 40924

[0.32 R, 0.63 U]

V: $1 - \frac{1}{2}$ U, $0 - \frac{1}{2}$ R

alignment = $\frac{1}{4} - \frac{1}{2}$ U-D, $0 - \frac{1}{2}$ L-R

S.L. = 410925

[0.04 L, 1.1 U]

parallelism V: $\frac{1}{4} - \frac{1}{2}$ U-D, $\frac{1}{4} - \frac{1}{2}$ L-R

H: 0 U-D, 0 L-R

H: $\frac{3}{4}$ U, $\frac{1}{4}$ L

[0.34 R, 0.80 U]

align @ exit: 0.19 L-R, 0.47 U-D

entr.: 0.38 L-R, 0.30 U-D

parallel H: 0.62 L-R, 0.17 U-D

V: 0.17 L-R, 0 U-D

move V Down ~ $\frac{1}{4}$ pix @ exit

entr.: S.L. = 40926 V [0.11 ~~R~~, 0.82 U], H [0.38 R, 0.76 U]

H exit 40927 H [0.29 R, 0.63 U]

V " 40928 V [0.13 R, 0.72 U]

align @ exit 0.16 L-R, 0.09 U-D

entr. 0.49 L-R, 0.02 U-D

parallel H: 0.09 L-R, 0.17 U-D

V: 0.12 L-R, 0.10 U-D

move H @ ~~entr.~~ ^{exit} to R ~ $\frac{1}{4}$ pix

exit ~~entr.~~ 40929 H [0.21 R, 0.51 U]

40930 L [0.22 L, 1.5 U]

31 [0 L, 0.88 U]

entr. 40932 H [0.04 L, 1.1 U] V [0.11 L, 0.80 U]

align exit 0.13 L-R, 0.16 U-D

entr. 0.07 " 0.30 U-D

parallel H 0.04 L-R, 0.22 U-D

V 0.24 L-R, 0.08 U-D

cold stage slowly warming
Hwp angle + pd. off. test 2 grids 2.5" diam vertical
 1/8" nylon on SHARC window

Angle	File	V (7,25)	H (7,5)
50	40933	+6	-174
60	34	+11	-181
70	35	-34	-143
80	36	-49	-72
90	37	-115	-26
100	38	-117	-17
110	39	-67	-28 ← {many red pixels on lower half
120	40	-46	-60
130	41	-18	-118
140	42	+16	-148
50	43	?	-168 ←

12-31-2007 SJV + 45

gains HI
 1/8" nylon on SHARC-II window
 wiped away ice on window
 2 calibrated grids, 2" parallel @ Normal exit aperture

cold load → aperture → grids → SHARC
 → nylon → SHARC-II

Angle	File	H (7,5)	V (7,25)
50	40945	-245	+13
60	46	-242	-20
70	47	-163	-37
80	48	-93	-87
90	49	-34	-150
100	50	+2	-143
110	51	-30	-121
120	52	-131	-67
130	53	-190	-10
140	54	-270	+12
50	55	-272	+20

- manual chopping ~ 30 sec in, 30 sec out

Site 40956

start HWP = 40, end HWP = 140

60 sec. per HWP angle

30 sec. hot load, 30 sec. cold load

grid wires horizontal, $\angle 0.5^\circ$ off

<u>Angle</u>	<u>Site</u>	<u>H (7.5)</u>	<u>V (7.25)</u>
50	40957	+8	-121
60	58	-26	-113
70	59	-74	-92
80	60	-170	-51
90	61	-215	-7
100	62	-211	-19
110	63	-170	0
120	64	-131	-49
130	65	-38	-97
140	66	+2	-128
50	67	-5	-128

grids @ entrance aperture

cold load \leftrightarrow grids \rightarrow aperture \rightarrow SHARP \rightarrow nylon \rightarrow SHARCU
 near vertical, but not verified w/ level

50	40968	-220	+17
60	69	-212	+17 ?
70	70	-162	-31
80	71	-51	-81
90	72	-6	-123
100	73	+10	-133
110	74	-15	-109
120	75	-73	-67
130	76	-173	-20
140	77	-209	+4
50	78	-170	+1

SMART MAY 2008 RUN

April 29 daytime

Box 0 + 1 left in place since last run.

Check Box 1 tilt:

Axis #1 Measurement #1: 0.15°
 Measurement #2 (180°): -0.03° } \rightarrow median = $\frac{0.15 + 0.03}{2} = \frac{0.09^\circ}{0.06^\circ}$

Axis #2 Measurement #1: 0.09°
 Measurement #2 (180°): -0.07° } \rightarrow median = $\frac{0.09 + 0.07}{2} = \frac{0.08^\circ}{0.01^\circ}$

Micro Grid A1 (toward outside) had a shim extending a little into beam - moved it out of the way.

screws on that side were loose, especially unshimmed one \rightarrow ~~tightened~~ tightened.

Darren's measurements of Box 1 tilt:

ll el. axis : 0.12° sag } 0.035° sag
 (-) 0.05° high

tl el axis : 0.08° low to outside } 0.02° high to outside
 (-) 0.12° high to outside

Box 2 tilt:

Axis #1 measurement #1: 0.12° } 0.045°
 measurement #2 (180°): -0.03°

Axis #2 measurement #1: 0.04° } 0.03°
 measurement #2 (180°): -0.10°

Check SMART alignment, no adjustments since early April

- 42904 - elevation axis exit
- 42905 - " " "
- 42906 - " " entrance
- 42907 - " " entrance

Box 3 Tilt

Axis #1 measurement #1 : 0.17)
 measurement #2 (120) : 0.00

Axis #2 measurement #1 : 0.18
 measurement #2 (180) : -0.01

Box 4 TILT

|| el. axis : 0.17° sag } 0.085° sag
 0.00°
 ⊥ el. axis : 0.19° high to outside } 0.01° high
 0.04° low to outside } to outside

Alignment for SHARP

EXIT aperture @ 40 sec. integ. 42916

EL Axis @ entrance 42917

April 29 daytime

Tweak F2 h mirror, tilt axis (|| el. axis)

~~42918 entrance aperture~~

42919 exit aperture

H : 0.22 pix left, 0.80 pix up
 V : 0.34 pix left, 0.84 pix up

42920 entrance aperture

H : 0.13 pix right, 0.74 pix up
 V : 0.08 pix right, 0.90 pix up

H-V H offset :
 V offset :
 H-V :

0.05 pix left, 0.87 pix up
 0.13 pix left, 0.87 pix up
 0.08 pix, 0.00 pix

H parallelism:
 V parallelism:

0.35 pix left-right, 0.14 pix up/down
 0.42 pix left-right, 0.06 pix up/down

A white
 B red
 C black
 D blue ← had to repair this

~~April~~

Cross-Polarization Efficiency Test

- 2 wire grids with horizontal wires => wires face slanted & on exit aperture.
- Thin nylon sheet on slanted window
- Cold load in beam.
- HWP angle 40 → 130, steps of 10°
- Always level on hot load. 4.50 μm

PAIRS	FILE #	
HOT	42922	) HWP = 40
COLD	42923	
HOT	42924	) HWP = 50
COLD	42925	
HOT	42926	) HWP = 60
COLD	42927	
HOT	42928	) HWP = 70
COLD	42929	
HOT	42931	) HWP = 80
COLD	42932	
HOT	42933	) HWP = 90
COLD	42934	
HOT	42935	) HWP = 100
COLD	42936	
HOT	42937	) HWP = 110
COLD	42938	
HOT	42939	) HWP = 120
COLD	42940	
HOT	42941	) HWP = 130
COLD	42942	

42929 (HOT)
 42930 (COLD)



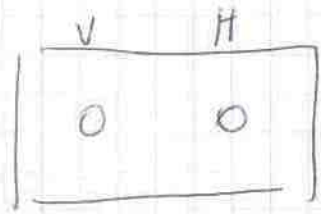
850 nm

<u>PAIRS</u>	<u>FILE</u>	<u>HWP</u>
HOT	42943	40
COLD	42944	40
HOT	42945	60
COLD	42946	60
HOT	42947	80
COLD	42948	80
HOT	42949	100
COLD	42950	100
HOT	42951	120
COLD	42952	120
HOT	42953	140
COLD	42954	140

June 2008 Run - install June 1

(Giles, Hinko, Tristan working at summit JUNE 1)

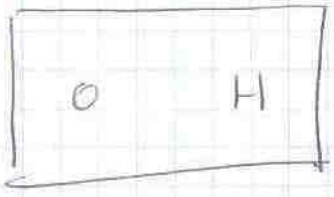
SMART alignment - exit aperture



signal level ~ 160

$\frac{1}{4}L$ 0

$\frac{7}{8}$ High | high



entrance ap.

$\frac{1}{4}R$ $\frac{1}{4}R$

$\frac{7}{8}$ | H | H

Parallelsim:

worst case: $\frac{1}{2}$ pixel

absolute alignment =

we are still a pixel high

avg. of 2:

0 $\frac{1}{8}R$

$\frac{7}{8}H$ | H

← H-V good to $\sim \frac{1}{8}$ pixel

reference angle is 96.6°

good! see p-11 of this logbook

→ 450_{mm} hwp got cracked ~~was~~ while removing. Cracks were at positions of tightening screws, was it overtightened?

→ 450_{mm} hwp was installed correctly

→ now 350_{mm} is installed correctly

V-null test Wed eve June 4th

	V_{signal}
80	-63
85	-38
90	-18
95	-11
100	-13
105	-26
110	-55
80	-47



roughly $V_{\text{null}} = 97$



July 23 (Wed) ~~Set up~~ ^{SS} John. Hiroko

Steve, Allen

Box 2

Right side level
↑ 0.07

left side
↑ 0.09



Box 3

Right side 0.12

left side 0.19

Dummy data 43846. FITS

crossi

read the value in
IDL plot screen

AWP moving fine

EDAS looks good

all connections good!

aligning SHARE-II

aperture @ nasmyth tube ~~exit~~ entrance

Site = 043847.51

center ~ (16.5, 7)

Sumol fit → center = (16.50, 6.81)

aperture @ nasmyth tube exit, center ~ (16.5, 6.5)

Site = 043848

Sumol fit → center = (16.66, 6.65)

Leveling

on Box ←

Right

0.08
~~0.14~~

back right

0.10

front left

0.17

front

0.07

back

SHARP alignment

file
43849 V: R 0 pix, U 1/2 pix
H: R 1/2 pix, U 1/2 pix align = [1/2 U, 1/2 R]

43850 V: R 1/2 pix, U 1/2 pix
H: L 1/4 pix, U 1/2 pix align = [U, L-R]
[3/4 LR, 0 UD]

parallelism
H 1/4 LR, 0 UD
V 1/2 LR, 1/2 UD

~~H: [L-R, U-D]
V: [1/2 LR, 1/2 UD]~~

from formal S.F

~~entrance H: L 0.37 pix, U 0.37 pix
V: L 0.06, U 0.54~~

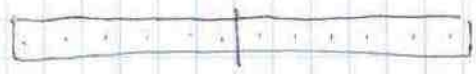
~~exit H: L 0.06, U 0.25
V: R 0.31, U 0.47~~

entrance H: L 0.74 pix, U 0.74 pix
V: L 0.12, U 1.10

exit H: L 0.12 pix, U 0.49 pix
V: R 0.62, U 0.95

align entrance 0.62 L-R, 0.36 UD
align exit 0.74 LR, 0.46 UD
parallelism H 0.62 L-R, 0.25 UD
L 0.74 L-R, 0.15 UD

@ exit V to L, H to R
V to D



July 24, 2008

JV, HS

exit aperture alignment

Site = 043851

H 0.17 L 0.29 U
V 0.74 R 0.91 U

align = [0.91 L-R, 0.62 U-D]

entrance aperture alignment

Site = 043852

H 0.74 L 0.54 U
V 0.08 R 0.95 U

align = [0.82 L-R, 0.41 U-D]

parallelism H [0.57 L-R, 0.25 U-D]
V [0.82 L-R, 0.04 U-D]

- adjust V alignment

exit Site = 43853

H [0.21 L, 0.29 U]
V [0.16 R, 0.12 D]

align = [0.37 LR, 0.41 UD]

entrance Site = 43854

H [0.74 L, 0.54 U]
V [0.49 L, 0.12 D]

align = [0.25 LR, 0.66 UD]

parallelism = H [0.53 LR, 0.25 UD]
V [0.65 LR, 0 UD]

entr. V to U
exit V to L

exit, file = 43853

H 0.16 L 0.29 U
V 0.04 L 0.54 U

align = [0.12 LR 0.25 UD]

entrance, file = 43856

H 0.74 L 0.54 U
V 0.74 L 0.54 U

align = [0 LR 0 UD]

parallel = H [0.58 LR 0.25 UD]
V [0.70 LR 0.00 UD]

entr H to R
V to R

exit file 43857

H 0.12 L 0.62 U
V 0.21 L 0.57 U

align = [0.09 LR 0.05 UD]

entr. file 43858

H 0.49 R 0.21 U
V 0.45 R 0.58 U

align = [0.04 CR 0.37 UD]

parallel H [0.61 LR 0.41 UD]
V [0.66 LR 0.01 UR]

H, V to L (R on screen) by $\sim \frac{1}{2} \text{pix}$

entr $f_{ik} = 43857$
 H 0.99 L 0.66 U
 V 0.45 L 0.49 U
 align = [0.54 LR, 0.17 UD]

Difference

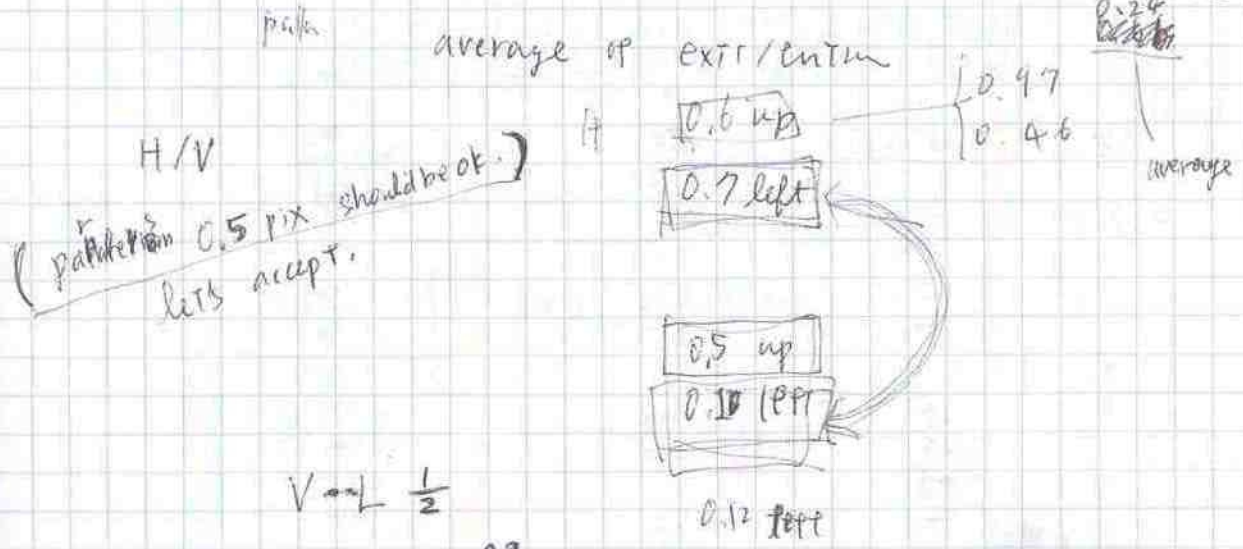
exit $f_{ik} = 43860$
 H 0.46 L 0.49 U
 V 0.21 R 0.54 U
 align = [0.67 LR, 0.05]

H 0.53 0.17
 V 0.24 0.05

parallel
 H [0.53 LR, 0.17 UD]
 V [0.66 LR, 0.05 UD]

entr H to R $\sim \frac{1}{2} \text{px}$, keep H @ 5.5-6.0 LR
 exit H to R $\sim \frac{1}{2} \text{px}$ 7.0-7.2 UD
 Can screen 0.2

2006 Jan Parallelism 1.5 pix - broadening 4 pi 0.45 left
 + 0.21 right
 0.24
~~0.21~~
 average



$V \sim L \frac{1}{2}$
 0.3

Words from Giles

- ① To adjust parallelism, we need to tweak wire grid.
- ② Let's accept 0.5 pix L-R parallelism.
 We've taken data as bad as 0.5 pix parallelism.
- ③ Try to align H/V beam within $\frac{1}{3}$ pixel.

exit file = 43861

$$H = \begin{bmatrix} 0.332 & 0.410 \end{bmatrix}$$

$$V = \begin{bmatrix} 0.042 & 0.540 \end{bmatrix}$$

$$\text{align} = \begin{bmatrix} 0.292R & 0.130V \end{bmatrix}$$

entrance file 43862

$$H = \begin{bmatrix} 0.954 & 0.700 \end{bmatrix}$$

$$V = \begin{bmatrix} 0.492 & 0.780 \end{bmatrix}$$

$$\text{align} = \begin{bmatrix} 0.462R & 0.080V \end{bmatrix}$$

move V L (R or screen)

entrance 43864

H same as above

$$V = \begin{bmatrix} 0.820 & 0.700 \end{bmatrix}$$

$$\text{align} = \begin{bmatrix} 0.072 & 0.000 \end{bmatrix}$$

exit 43865

$$H = \begin{bmatrix} 0.412 & 0.490 \end{bmatrix}$$

$$V = \begin{bmatrix} 0.212 & 0.740 \end{bmatrix}$$

$$\text{align} = \begin{bmatrix} 0.202 & 0.250V \end{bmatrix}$$

HWP alignment, single calibration grid
grid vertical ~ 0.5° of Vert.

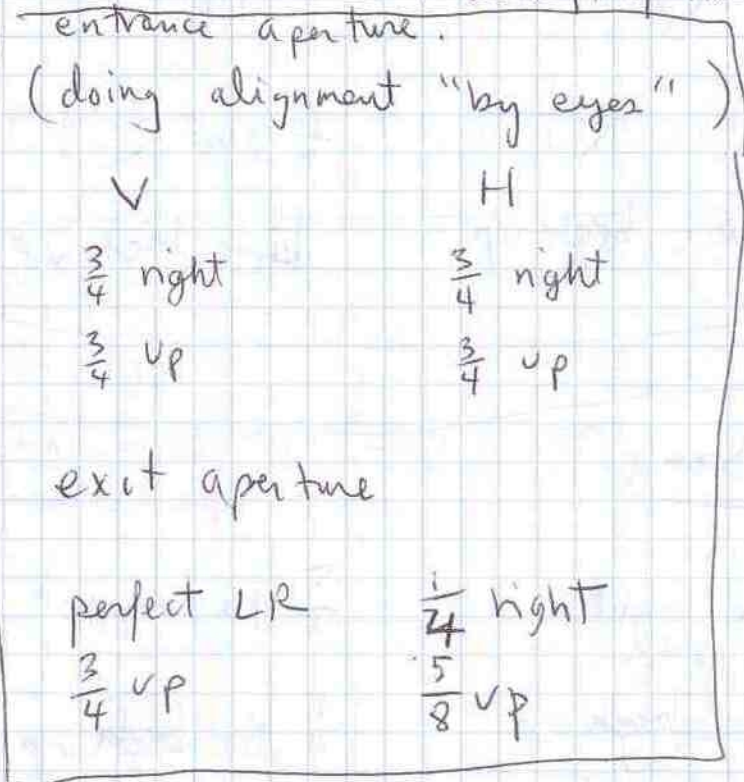
file	HWP angle	ΔV (6.25)	ΔH (6.5)
43866	50	-104	-6
67	60	-94	-21
68	70	-66	-58
69	80	-35	-106
70	90	-8	-131
71	100	-6	-132
72	110	-29	-106
73	120	-59	-65
74	130	-87	-27
75	140	-106	-6
76	50	-107	-7

Aug-September 2008 SHARP Run

Woojin & Giles

alignment: 350um filter, 10-gain
NOTE: we assume V on left of IRC display

~~exit~~ →

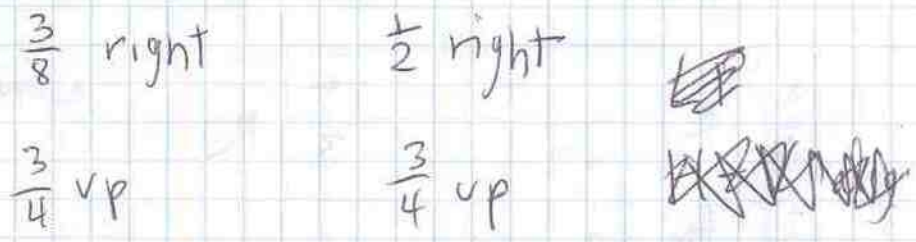


parallelism errors (exit-entrance)

$\frac{3}{4}$ L $\frac{1}{2}$ pixel L

0 $\frac{1}{8}$ pixel down

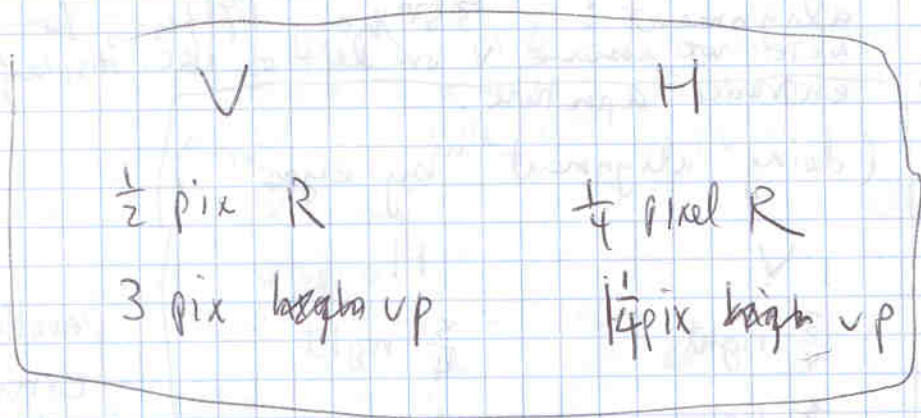
avg. of two apertures



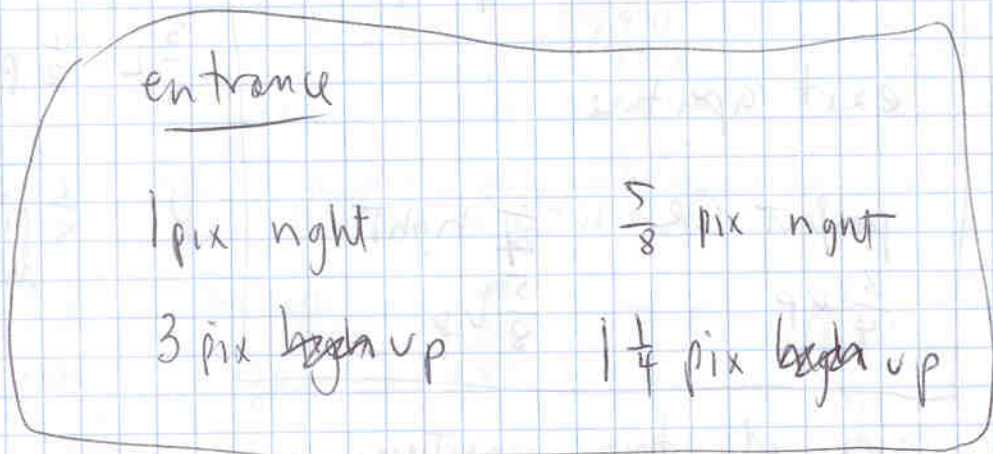
worst subarray misalignment measurement is $\sim \frac{1}{8}$ pixel

put F2h,v to ~~nom~~ nominal positions

exit



entrance



avg.

$\frac{3}{4}$ R

$\frac{5}{8}$ R

3 ~~high~~ up

$1\frac{1}{4}$ up

worst subarray misalignment ~~is~~ $1\frac{3}{4}$ pix

parallelism exit-entrance

V
 $\frac{1}{2}$ pix L

H
 $\frac{3}{8}$ pix L

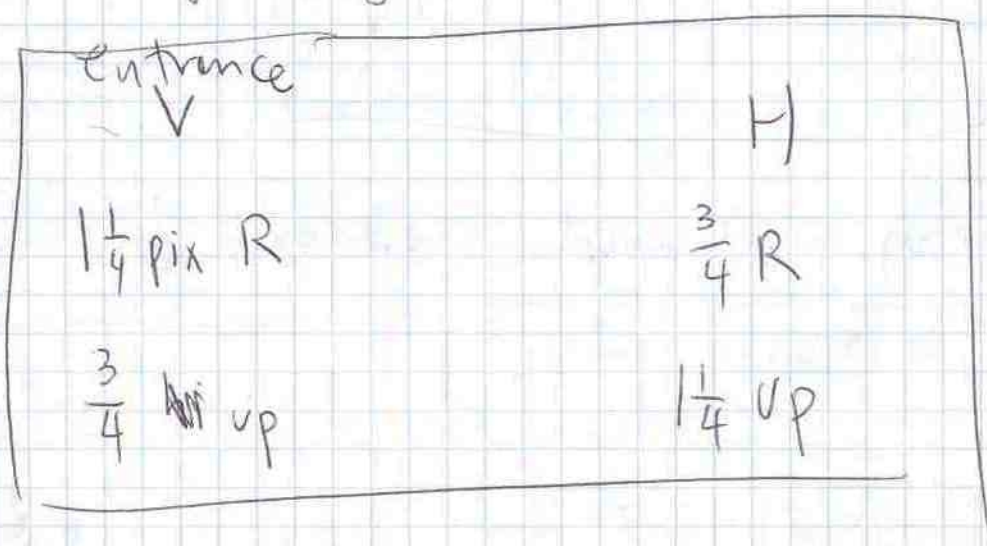
perfect

perfect

after adjusting right-most adjustment
on the V-array (closer one
entrance ap.

V
 $1\frac{1}{2}$ pix R
 $\frac{1}{8}$ pixel ~~up~~ up
adjusted again

H
presumably
same



exit

~~exit~~

V

$\frac{1}{2}$ pix R

$\frac{3}{4}$ up

H

$\frac{1}{4}$ pix R

$1\frac{1}{4}$ up

avg

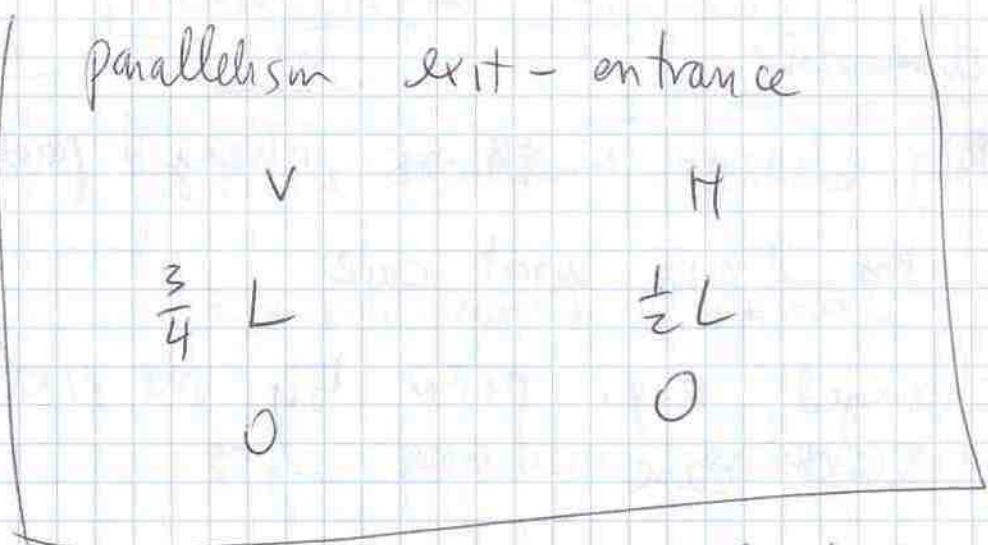
$\frac{7}{8}$ R

$\frac{3}{4}$ up

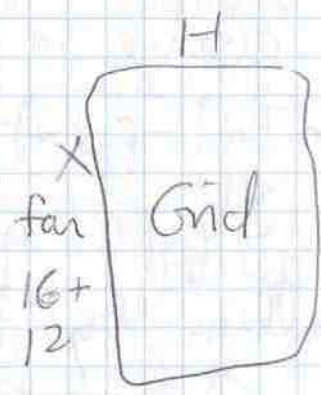
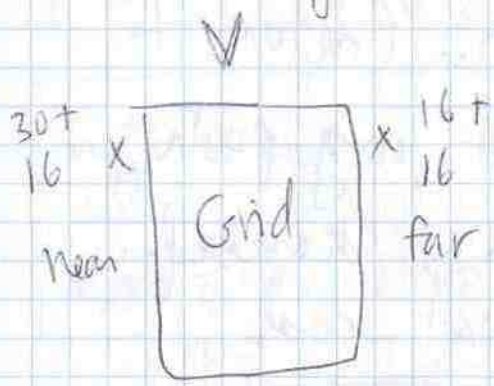
$\frac{1}{2}$ R

$1\frac{1}{4}$ up

subarray misalignment $\frac{1}{2}$ pix each dir.



removing all shims: record first



this me rocks we set so front is flat

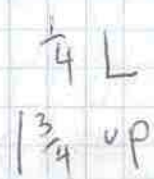
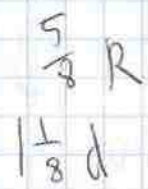
shims at bottom of F4: $28 + 4 + 4 + 5 = 41$ mils



shims had little effect



therefore



big change in shims changed parallelism
by 2 pix worst case

changed avg. pos'n by one pixel
worst case

big change in translation (return to
nominal pos'n) changed avg pos'n
by $2\frac{1}{4}$ pix worst case, changed
parallelism by $\frac{1}{4}$ pix worst case

so shims affect parallelism twice
as much as they affect avg.
pos'n

F2 adjustments affect avg. pos'n
nine times as much as they
affect parallelism.