late April '07 Run

John, Megan, Gile @ telescope 4/25/07 AM: SHARC-II problems (batteries run down?) testing Larry's old and new code

5° tolerance code ∅ iterations: moving between 50 and 117
(note: we established that hwp.exe was not doing any iterations and has 2° tolerance.)

hwp_0:t_5tol.exe

Error
52.7
52.2
113.8
114.5
52.7
52.1
112.6
53.0
52.2
112.4
53.9
111.9
53.3
52.4
112.2
53.8
52.2

appears to have 2° tolerance, not 5°

Switch back to hwp.exe →

Error
120.0
114.8
53.8
52.8 -bit flip
122.2 -bit flip
53.1
52.8

run hwp_bit_2tol.exe
(0 iterations, 2° tolerance)

Error
112.1 bit flip
233
122.7
112. bit flip
114.3
115.6
53.00 bit flip
52.7

problem appears to be with encoder end of detector

Tried connecting PM4 to spare encoder
No problem!

Reboot entire system, re-upload hwp_bit_5tol.exe
Run, connect to first encoder
(Note: encoder V = 13.44)

Error
52.2
52.03
110.8 bitflip
22.32
106.4
54.6
53.0
52.03
(50.84 2°)

} -bit 2° tol

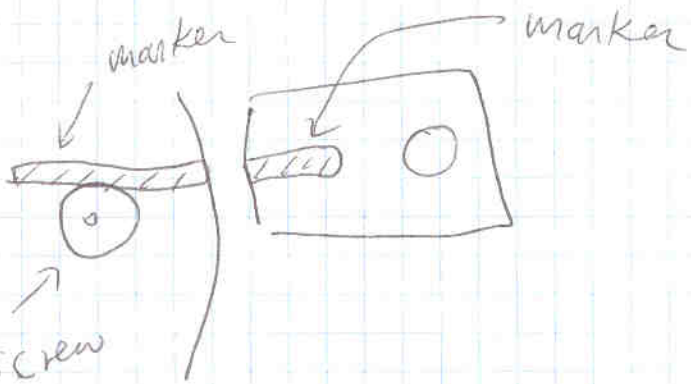
52.4
52.1
51.9 ok
110 error flipping to 220 for many sec.
115.6 error
115.8 ok
53.7 error
52.5 error
51.0 error
50.9 error
50.8 ok

We had that X2 problem w/ encoder again
It was definitely triggered by stepper but could go off ~~on the middle~~ on its own for no apparent reason. Hard to find any cause and effect, though testing connector sometimes helped.

The Space encoder never showed the problem, but we did not test it a lot.

The trick to removing the ~~set~~ encoder is to access the set screw through the hole in the gear

298°



This is the reference position

With new encoder installed, reference position is 119°

There is roughly 0.2° slack between gears (backlash)

offset between old & new encoder = 179°
~180°

So, instead of starting at 50°, start at 230, increase in 22.5° increments

Note: new encoder does not have flat edge on shaft, like old encoder

set screw was not tightened on new encoder shaft; however, shaft appears to be well-coupled to gear.

Removed motor shaft — set screw was out.
Set screw: 1/16" wrench 6-30?

Tried moving hwp with EDAS, IRC. Now moves to within 0.2°!

April 26 → ~~Wed~~ Thursday (second set-up day)

Aligning SHARC-II (JEV, H.S.)

aperture in ~~rear~~ side of Nasmyth w.r.t. SHARC-II

File no	int. time (sec)	Comments
038194	90 sec	{ for side aperture up.left is 30% brighter than low.right
038195	"	{ rear side aperture up.right is 25% brighter than low.left.

Aligning SHARP JV, GN, HS

File no.	int. time	comments
38196	60 sec	ext aperture
38197	"	entrance "

38196 H-array (6.1, 7.3) = (h, v)
V-array (26.8, 6.7) = (h, v)

38197 H-array (5.2, 6.5) = (h, v)
V-array (26.4, 6.0) = (h, v)

link:

http://cvs588.gsfc.nasa.gov/web5start/sharc/sharc.html

entrance aperture

038198

H-array (~~5.2~~, ~~6.5~~) =

V-array (26.4, 6.0) =

after dinner ~~near aperture~~ entrance is good exit aperture is good

~~by eye : at least 1/2 pix~~

3/4 pixel high in both

half pixel left in both

by eye after shims removed

V-array: good up/down
left by about 1/2 pixel

H-array: low by 1/3 pixel
left by 1/3 pixel

removing shims move exit ap. down 1

~~exit ap~~
entrance aperture

V-array down 1 3/4
~~left~~ right ~~2~~ 1/3 pixel

H-array down 2 1/2
left 1/3 pixel

removing mirror shims moves entrance aperture down 2 pixels

Now the entrance ap down 2
exit ap good
entrance is low rel. to exit

before the entrance good
the ext high by 3/4
entrance low rel to exit

removing shims makes entrance low rel. to exit 42 mils under mirror

after putting shims

Entrance aperture

V: 3/4 pix high
1/3 pix right

H: 1/3 - 3/4 pix high
good left/right

Exit aperture

V 1 pixel hi
1/3 pixel left

H 3/4 high
1/3 - 1/2 left

Avg for V

V 7/8 high
centered

H 3/4 high
1/6 - 1/4 left

Removed box 3 to repair hwp.
The set screw had gotten loose
again and we saw bad moves
(often 8° short): Even w/ 2
iterations only occasionally got to desired
position. John noticed cases of over-
shooting. The culprit was a
loose set screw. So we disassembled
and re-tightened set screw. This
time I really torqued it hard.
I may have stripped the ~~head~~
socket of the set screw. ~~The the~~
Just to be clear: this is the
motor shaft coupling to gear.
In the process of debugging, we
verified that the spare indexer
works, but it needs to have

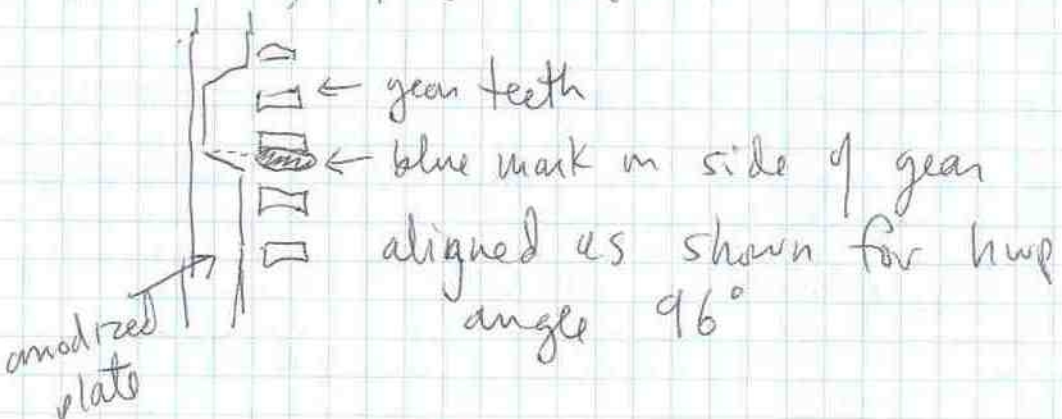
its default parameters set properly. This should be done before it is needed. According to manual it is OK to power up c/o motor attached. Just can't disconnect & connect motor to indexer while indexer is powered.
Also nicked hwp a/r coating once or twice while ~~adjusting the~~ tightening the set screw.
We observed for 1/2 hour (polarimetry of B335) and hwp was good to $\pm 0.1^\circ$ on every move
Calso I checked reference mark to verify encoder didn't slip

Fri night

hwp worked well, but there were 4 bad moves out of ~200. See observing log excel sheet. The rest of the moves were good to $\pm 0.1^\circ$ or 0.2°. We heated to room temp. Note we saw the bit-flip problem.

Sat night

In order to guard against encoder problem (slipping due to lack of set screw tightening) I made a mark that you can see when SHAKY is installed.



— even w/ spare encoder!

Apr 30 2007 UT
(Sunday; night 4)

Grid test

wires 2.5 deg ccw from vertical

signal at night in IRC
(assumed to be V):

HWP	
70	-80
80	-40
90	-20
100	-23
110	-50
120	-83

~~signal at~~

signal at left (assumed H)

90	-200, -180
100	-205
110	-181
70	-150
80	-186
110	-184
90	-210

$\vec{J}$ of hwp points towards SMARC-II for positive direction of encoder

blue mark still at 96°

---

starting up. → got one error on 3rd move "encoder not responding". This was on our practice move.

This was either cavity plate too hot... or some ~~weird~~ weird start-up issue?

A few scattered errors noted in excel spreadsheet

May 1 UT last night

Did QUICK ±2° check of gear-mark at 96°. It was good.

5/1 7:45am

Grid test

grids are aligned 2.19° CW from vertical (viewed wrt SHARP)

Taking ~~hot~~ ~~lead~~ files with level at 1st hump angle w/ hot load in place

SHARP single file → 1 file
standard file → 2 file

June '07 RUN

Larry, Gilo, Hua-bai, Hiroko present at setup

June 8th. Installing 450 μm hwp.
See p. 178 of instrument log #1
removed continuous cork spacer*

NOTE: BRING DOUBLE-SIDED TAPE FOR CONVERSION TO 350 μm

NOTE: I don't think cork is doing anything. hwp is lodged (stuck) into metal retainer.

NOTE: we want working ethernet ahead of time

Today Larry & Gilo got the 450 μm installed, got EDTS + hwp working inside, then installed box 3 and got it all working outside

H-Bai & Hiroko got initial data on SHARC-II alignment. ~~in~~ entrance ap. looks pretty centered

* Store in 450 μm HWP case

NOTE: buy a parastrip and store it at CSO

H-bai & Hinko also installed box 2

June 9th

SHARC-II alignment done as He-3 running out all-gain_low

exit aperture	-100 -100 / -70 -70

entrance aperture	-45 -45 / -30 -30	repeat	-30 -30 / -20 -20

They are parallel but off by something less than 1/2 pixel. Decided not to adjust.

cherry picker test

Giles, Hunabai, Hiroko

① cold center

Bolo Array -25° -300 154

Bolometer median black ~~-285~~

-.279 -.240 -.259

② cold out

Bolo median min -.17 max 0 mean 0.011 → level

Bolo median -0.8×10⁻⁴ max 8E-3 9×10⁻⁴ → level

-2×E-4

③ cold center Bolo median -.29 2.8E-3 -.10

④ cold out -.28 1.5E-3 -.140 → level

④ cold out	Bolometer Frame Median (voice) 2.20E-3	cold ⑩ out -.011 → level	6.2E-04
⑤ cold center	-.290	⑪ cold right -.307	
⑥ cold out	-7.9E-4	⑫ out -4E-03	
⑦ cold top	-.248	⑬ left -.147	
⑧ cold out	8.65E-3	⑭ out -4E-03 →	
⑨ cold bottom	-.247		

(15) cold top middle -0.316

(16) out -2.58E-3

(17) bottom middle -.318

(18) out -1.3E-3

(19) right middle -.319

(20) out -7.9E-03

(21) left middle -.316

(22) out -8.5E-3

(23) cold center -.299

(24) out -.012

248

316

147 316 290 (299) 319 307

318

247

you have to roll your mouse over the trace

Note: we were looking at BOLOMETER FRAME MEDIAN (VOLTS) which is plotted in the bolometer medians window

NOTE WE ARE ASSUMING V IS ON LEFT OF DISPLAY

entrance ap.

		after adjustment of H V minor
V	good L/R 1 pix high	good L/R 1 pix high
H	½ pix left 1 pix high	good L/R 3/4 pix high

exit aperture

V	left ⅓ ⅞ high	3/8 left 1 high
H	left ⅓ 1 high	⅛ left ¾ high

avg V	left 1/6 1 pix hi	avg V	3/16 left 1 high
avg H	left ½ 1 pix hi	avg H	1/16 left 3/4 high

after 2nd adj (of Vmirror this time)

good L/R
5/8 - 3/4 high

good L/R
7/8 high

3/8 left
5/8 high

good L/R
3/4 high

avgV 3/16 left
11/16 high

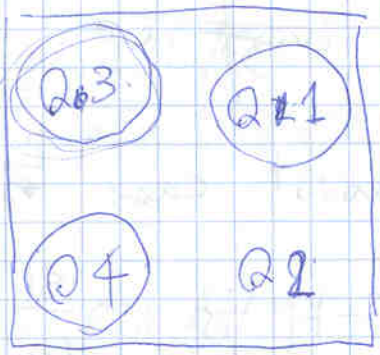
avgH good L/R
13/16 high

~~roof~~ co

worst case V-H is 3/16 pix

worst case parallelism error is 3/8 pix

DSOS.



we checked SHARP w/ level
error is 0.1° and 0.15° for the
two axes.

↑ parallel to light propagation

---

searching for V-null (assumes V is on left of display)

	(V)	(H)
50	0	-158
72.5	-65	-100
95	-158	0
117.5	-100	-65