

To: Chris Blades, Al Holm
 From: Lisa E. Walter, Rick White
 Date: 8 Dec 89
 Subject: HSP Mode I Target Acquisition Test

CC: Peggy Stanley, Colin Cox, Olivia Lupie

Four Interactive (Mode I) Target Acquisition tests were performed for the HSP on 30 August 89. The results are shown below.

Name	Positioned by Cursor or Centroid	Object Position (SIAS)	Slew (SICS)
01	cursor	x = 13.6875 y = 3.375	V2 = -1.852 V3 = 0.243
	centroid	x = 13.1653 y = 3.02067	V2 = -1.788 V3 = 0.416
04	centroid	x = 9.67537 y = 8.60075	V2 = 0.026 V3 = -0.595
07	cursor	x = 8.8125 y = 18.6875	V2 = -2.788 V3 = 2.086
0a	centroid	x = 18.1918 y = 13.0154	V2 = 0.148 V3 = 4.219

The last test, 0a, was believed to have a problem with the slew or the orientation of the North arrow because the V2 slew looked too small. So the slews were checked by hand according to the following SIAS to SICS conversion:

$$x_c = -V2 = a_{00} + a_{10}*(y_a - y_{a0}) + a_{11}*(x_a - x_{a0})$$

$$y_c = -V3 = b_{00} + b_{10}*(y_a - y_{a0}) + b_{11}*(x_a - x_{a0})$$

where x_a, y_a are the SIAS coordinates and x_c, y_c are the SICS coordinates, or the sign opposites of the V2V3 slews.

Each of the slews obtained during the test agreed with the results obtained by hand. However, it is not clear that the images displayed during the test were oriented correctly. Of the four test cases, one (04) is difficult to make a visual judgement on because the target was so diffuse. Of the remaining three, the orientation of the North angle appears to be different than we expected based on the PDB beta angles, the angular relation between the SIAS and V2V3 axes (see Figure 1). Possibly we have not done this calculation correctly, though; we are still trying to understand the details of this problem. Still, our best guess is that the beta angles in the PDB are not consistent with the SIAS-to-SICS conversion coefficients in the PDB.

Below is a summary of the inconsistency that we find:

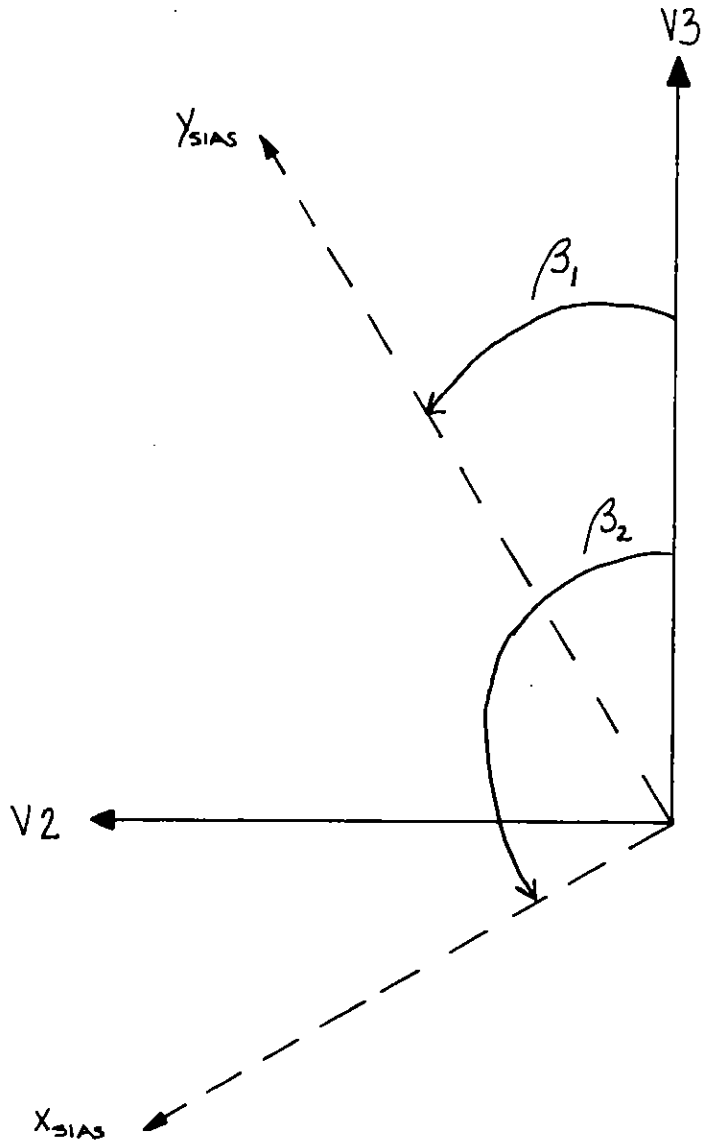
		OSS			Our results (accd'g to our diagrams)			
Test	DET	V2	V3	v2	v3	ours << theirs	ours << theirs	
01	POL	-1.8	+ 0.4	+ 0.4	+ 1.8	v2 << V3	v3 << -V2	
07	VIS	-2.8	+ 2.1	+ 2.1	+ 2.8	v2 << V3	v3 << -V2	
0A	UV2	+ 0.15	+ 4.2	+ 4.2	+ 0.15	v2 << V3	v3 << + V2	

Note that the last observation has a different mapping from our v2v3 to the OSS display values of V2V3. That explains why the last observation was noticeably inconsistent in the direction of its North arrow compared to the other tests.

Attached are diagrams illustrating 1) the definition of the beta angles, 2) the visual results obtained during the August 1989 test and, 3) the orientation that Rick and I think the images should have had.

We have been informed that the problems we discovered are probably due to the fact that the PDB is incorrect. Olivia Lupie is now updating the PDB for the HSP. We will re-run the target acquisition test when the update is officially completed.

FIGURE 1



BETA ANGLES

ANGULAR RELATION BETWEEN V_2V_3 AND SIAS AXES

ACCORDING TO OBS, THE
POSITION OF THE V3 AXIS

WITH RESPECT TO NORTH IS

0.000000 DEG

FOR ALL 4 TEST CASES



FIGURE 3

THE NORTH and EAST
ARROWS ARE CENTERED
ON POINT (0, 0) WHICH
IS THE LOCATION OF
THE SICS ORIGIN IN
SIAS COORDINATES.



FIGURE 4

TEST 01
DETECTOR: POL
APERTURE: VCLRP.T

METHOD	LOCATION	SLEWS
CURSOR	X=13.6876 Y=3.375	V2=-1.852 V3=+0.243
CENTROID	X=13.1653 Y=3.0207	V2=-1.789 V3=+0.416

TEST 04
DETECTOR: U1
APERTURE: VCLRU1.T

METHOD	LOCATION	SLEWS
CENTROID	X=9.6754 Y=8.6008	V2=+0.026 V3=-0.995

TEST 07
DETECTOR: VIS
APERTURE: VCLRV.T

METHOD	LOCATION	SLEWS
CURSOR	X=8.8126 Y=18.0075	V2=-2.788 V3=+0.006

FIGURE 5

TEST 0A
DETECTOR: U2
APERTURE: VCLRU2.T

METHOD	LOCATION	SLEWS
CENTROID	X=10.918 Y=10.004	V2=+0.008 V3=+0.00

HSP MODE I TARGET ACQUISITION TEST RESULTS

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FIGURE 6

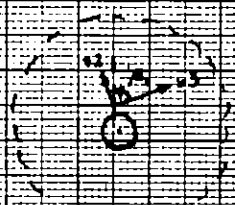
THESE DIAGRAMS HAVE BEEN ORIENTED SO THAT x_3 , WHICH CORRESPONDS TO NORTH, ALWAYS POINTS UP



TEST 01 VCLRP T

$x = 18.4$
 $y = 8.2$
 $a_{10} = 0$
 $a_{11} = 0.15317$
 $a_{12} = -0.22711$
 $\beta_1 = 225.9748$
 $b_{10} = 0$
 $b_{11} = -0.116035$
 $b_{12} = -0.22213$
 $\beta_2 = 315.9748$

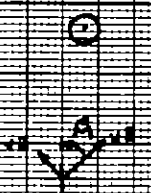
FIGURE 7



TEST 04 VCLRU2 T

$x = 9.7$
 $y = 8.6$
 $a_{10} = 0$
 $a_{11} = 0.12124$
 $a_{12} = 0.24757$
 $\beta_1 = 71.8860$
 $b_{10} = 0$
 $b_{11} = 0.38940$
 $b_{12} = 0.15312$
 $\beta_2 = 161.8860$

FIGURE 8



TEST 07 VCLRV T

$x = 8.8$
 $y = 18.9$
 $a_{10} = 0$
 $a_{11} = 0.27153$
 $a_{12} = 0.26103$
 $\beta_1 = 46.1960$
 $b_{10} = 0$
 $b_{11} = 0.28834$
 $b_{12} = 0.35266$
 $\beta_2 = 136.1960$

FIGURE 9



TEST 0A VCLRU2 T

$x = 18.2$
 $y = 13.0$
 $a_{10} = 0$
 $a_{11} = 0.33303$
 $a_{12} = 0.19930$
 $\beta_1 = 19.0960$
 $b_{10} = 0$
 $b_{11} = 0.15437$
 $b_{12} = 0.25556$
 $\beta_2 = 109.0960$

HOW THE TARGET ACQUISITION TESTS SHOULD HAVE LOOKED?

FIGURE 2

ACCORDING TO OSS, THE
POSITION OF THE V3 AXIS
WITH RESPECT TO NORTH IS
0.000000 DEG



FOR ALL 4 TEST CASES

TEST 01
DETECTOR: POL
APERTURE: VCLRP_T

METHOD	LOCATION	SLEWS
CURSOR	x=13.6875 y=3.375	V2=-1.852 V3=+0.243
CENTROID	x=13.1653 y=3.0207	V2=-1.780 V3=+0.416

FIGURE 3

THE NORTH and EAST
ARROWS ARE CENTERED
ON POINT (10,10) WHICH
IS THE LOCATION OF
THE SICS ORIGIN IN
SIAS COORDINATES.



TEST 04
DETECTOR: U1
APERTURE: VCLRU1_T

METHOD	LOCATION	SLEWS
CENTROID	x=9.6754 y=8.6008	V2=+0.026 V3=-0.595

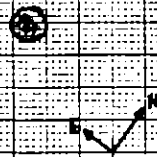
FIGURE 4



TEST 07
DETECTOR: VIS
APERTURE: VCLRV_T

METHOD	LOCATION	SLEWS
CURSOR	x=8.8125 y=18.6875	V2=-2.780 V3=+2.086

FIGURE 5



TEST 0A
DETECTOR: U2
APERTURE: VCLRU2_T

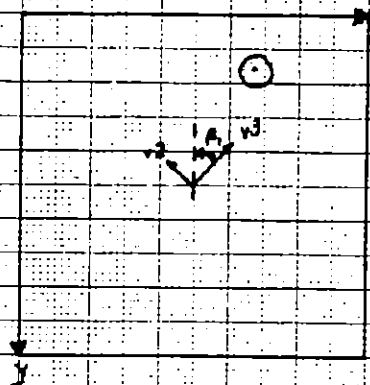
METHOD	LOCATION	SLEWS
CENTROID	x=18.1918 y=13.0154	V2=+0.148 V3=+4.219

HSP MODE I TARGET ACQUISITION TEST RESULTS

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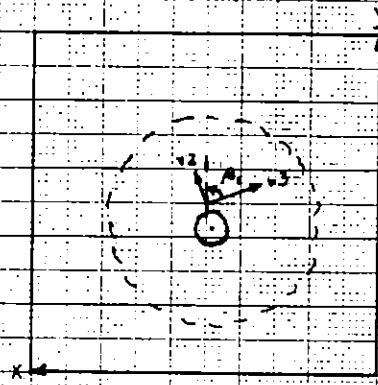
FIGURE 6

THESE DIAGRAMS HAVE
BEEN ORIENTED SO
THAT v_3 WHICH
CORRESPONDS TO NORTH,
ALWAYS POINTS UP



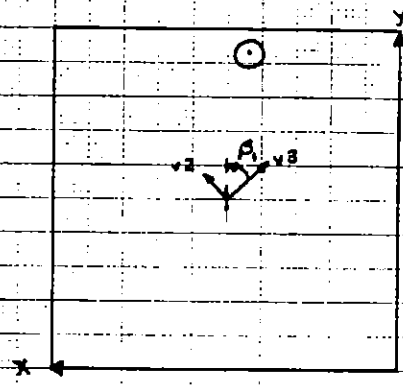
TEST 01 VCLRPLT
 $x = 13.4$
 $y = 3.2$
 $a_{00} = 0$ $b_{00} = 0$
 $a_{10} = +0.15317$ $b_{10} = -0.16035$
 $a_{11} = -0.22711$ $b_{11} = -0.22213$
 $\beta_1 = 225.9740$ $\beta_2 = 315.9740$

FIGURE 7



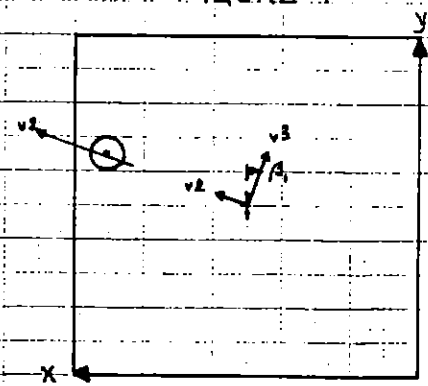
TEST 04 VCLRUIT
 $x = 9.7$
 $y = 8.6$
 $a_{00} = 0$ $b_{00} = 0$
 $a_{10} = -0.12724$ $b_{10} = 0.38940$
 $a_{11} = +0.46767$ $b_{11} = 0.15312$
 $\beta_1 = 71.8860$ $\beta_2 = 161.8860$

FIGURE 8



TEST 07 VCLRVT
 $x = 8.8$
 $y = 18.7$
 $a_{00} = 0$ $b_{00} = 0$
 $a_{10} = -0.27153$ $b_{10} = +0.28834$
 $a_{11} = +0.36103$ $b_{11} = +0.35266$
 $\beta_1 = 46.1960$ $\beta_2 = 136.1960$

FIGURE 9



TEST 0A VCLRUI2_T
 $x = 18.2$
 $y = 13.0$
 $a_{00} = 0$ $b_{00} = 0$
 $a_{10} = -0.38363$ $b_{10} = +0.13437$
 $a_{11} = +0.15930$ $b_{11} = +0.46556$
 $\beta_1 = 190.0960$ $\beta_2 = 109.0960$

HOW THE TARGET ACQUISITION TESTS SHOULD HAVE LOOKED?