

MIT Voyager Memo No. 20

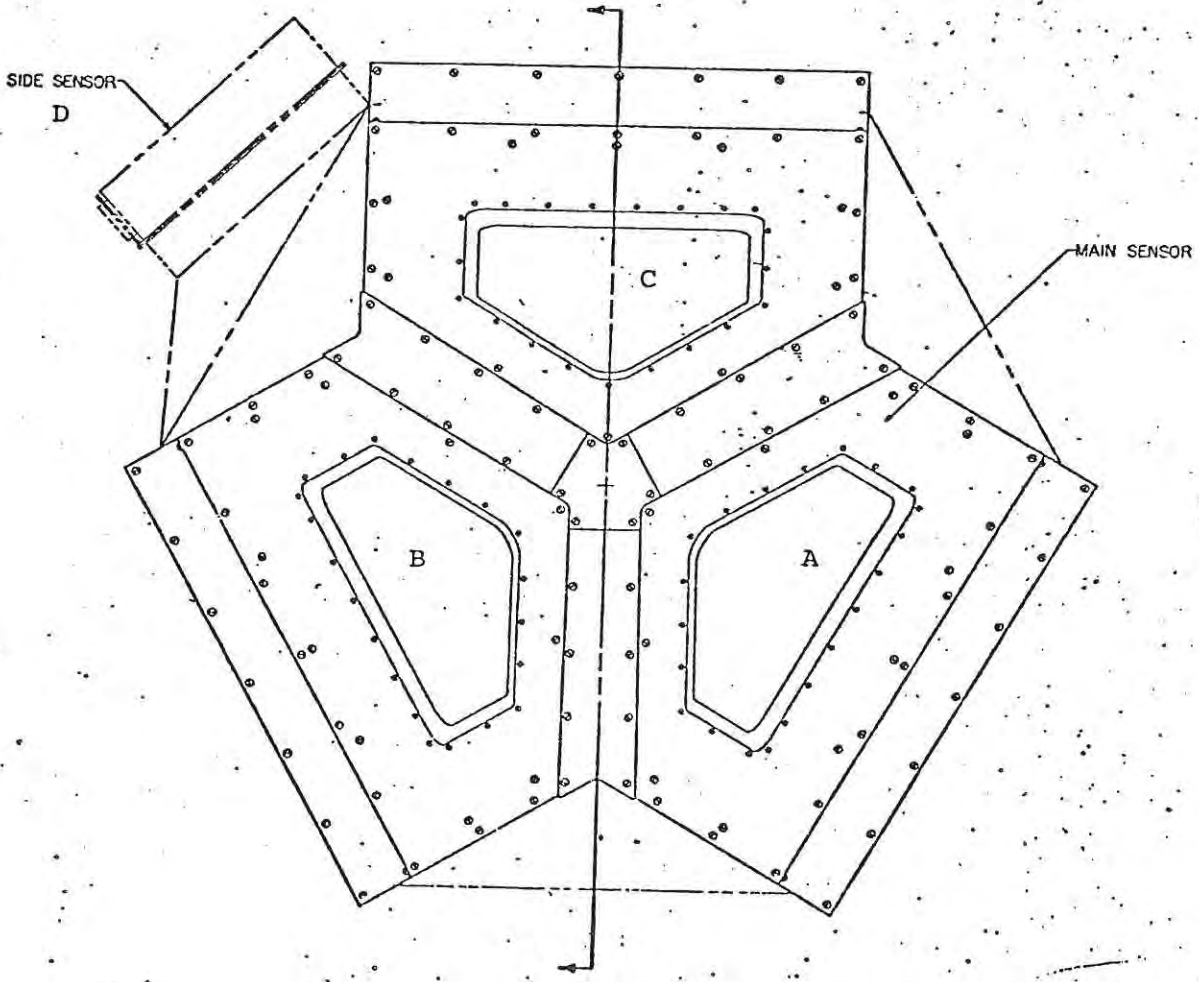
TO: Voyager Internal
H. Mertz

FROM: J.D. Sullivan

DATE: August 9, 1977

RE: Final sensor alignment date

The angles are standard spherical coordinates (θ is the polar angle and ϕ is the azimuth) of the outward normal to the respective sensors in a right handed coordinate system defined as follows: the z-axis is the outward normal to the front face of the reference cube (the nominal axis of symmetry for the main sensor); the x-axis is perpendicular to the z-axis in the general direction of the C sensor, and is in the plane which contains the outward normal to a side of the reference cube which is most nearly parallel to the long side of the C sensor; and the y-axis completes a right-handed coordinate system.



FINAL PLS ALIGNMENTS

MIT Unit Serial Number

<u>Sensor</u>	<u>PTM SN001</u>	<u>FLT1 SN002</u>	<u>FLT2 SN003</u>
A	20.3	19.99	19.97
	-120.7	-120.7	-120.3
B	19.78	20.0	19.78
	121.2	119.6	121.1
C	19.5	19.47	19.6
	0.56	+0.3	0.58
D	88.2	88.31	88.77
	47.16		47.43
Date Measured	24 Mar '77	11 Apr '77	7 Mar '77
Reference Direction	90.84	90.92	90.35
	42.52	43.78	45.35
Linearity	0.999836(2)	0.999998(1)	0.999989(2)

TO: C. Reynolds

July 22, 1977

FROM: C. Odd

SUBJECT: PLS Alignment Verification

The offset of the PLS alignment mirror with respect to the scan platform L vector as determined by the ISS boresight was measured on May 24, 1977 on the 77-2 spacecraft and on June 29, 1977 on the 77-3 spacecraft. Immediately prior to making the measurements, the dogs in the scan actuators in the science boom/scan platform interface were engaged and their position readout in the spacecraft telemetry. These measurements were made with the spacecraft mounted on the system test stand and the scan platform supported in its assembly and transportation fixture.

The PLS alignment mirror is in the form of a cube with small mirrors attached to several of the surfaces. Its position was fixed in three axis by "shooting in" two perpendicular mirrors, A and B. Mirror A is that one on the front surface of the cube facing the scan platform with a normal to its surface approximately parallel to the science boom. Mirror B is that mirror facing approximately in the direction of the scan platform positive N vector. See Fig. 1

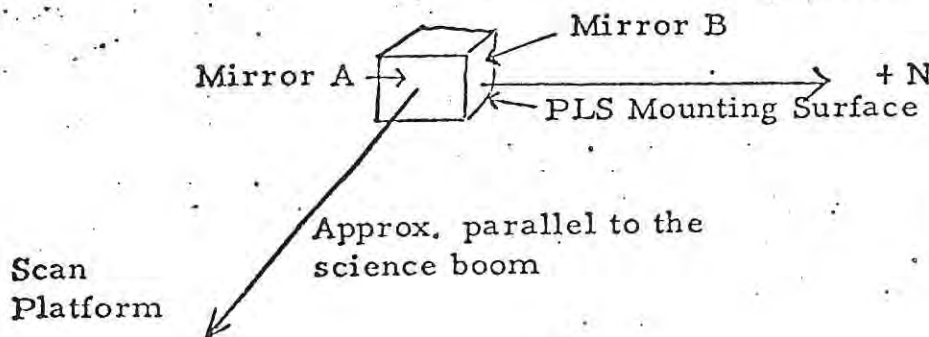


Fig. 1

PLS Alignment Cube Orientation

The direction of a normal to Mirror A was measured in both azimuth and elevation and the direction of a normal to Mirror B in elevation to provide the three axis determination. The data is shown in Tables 1 & 2 and the respective offsets for PLS SN 001 in Fig. 2.

The accuracies shown assume a rigid science boom which is not the case. Errors caused by unweighting the boom in space are not considered. Also, the measurements for PLS SN 001 (Table 2) were taken using the alignment mirror from PLS SN 002 rather than the one originally delivered with the instrument, which was not available. It is not known how much error this introduces, although it is thought to be small.

Table 1.

PLS SN.002 Scan Platform SN 003 Voyager 77-2

<u>System Measurements</u>		
Offset of the PLS A mirror with respect to the SPM	Azimuth	$-6.3 \pm .2$ mr
	Elevation	$615.1 \pm .2$ mr
Offset of the PLS B mirror with respect to the UVS mounting surface (N vector)	Elevation	$4.4 \pm .5$ mr
Offset of the SPM to the ISS NA mounting surface (L vector)	Azimuth	$-2.45 \pm .10$ mr
	Elevation	$2.85 \pm .07$ mr
<u>Calculated Values</u>		
Offset of the PLS A mirror to L vector	Azimuth	$-8.7 \pm .3$ mr
	Elevation	$617.9 \pm .3$ mr
	χ	$-7.1 \pm .3$ mr
	ψ	$617.9 \pm .3$ mr
Telemetry readout of scan actuator		
Azimuth (SN 003)		
Course	136 DN	
Fine	51 DN	
Elevation		
Course	146 DN	
Fine	65 DN	

SPM = Scan Platform mirror

Table 2.

PLS SN 001 Scan Platform SN 002 Voyager 77-3

<u>System Measurements</u>	
Offset of the PLS A mirror with respect to the SPM	Azimuth 2.17 mr Elevation 608.08 mr
Offset of the PLS B mirror with respect to the UVS mounting surface (N vector)	Elevation 6.2 ± .5 mr
Offset of the SPM to the ISS NA mounting surface (L vector)	Azimuth 1.21 mr Elevation 4.05 mr
<u>Calculated Values</u>	
Offset of the PLS A mirror to L vector	Azimuth 3.38 mr Elevation 612.13 mr X 2.77 ψ 612.28
Telemetry readout of scan actuators	
Azimuth	
Course	137 DN
Fine	143 DN
Elevation	
Course	149 DN
Fine	195 DN

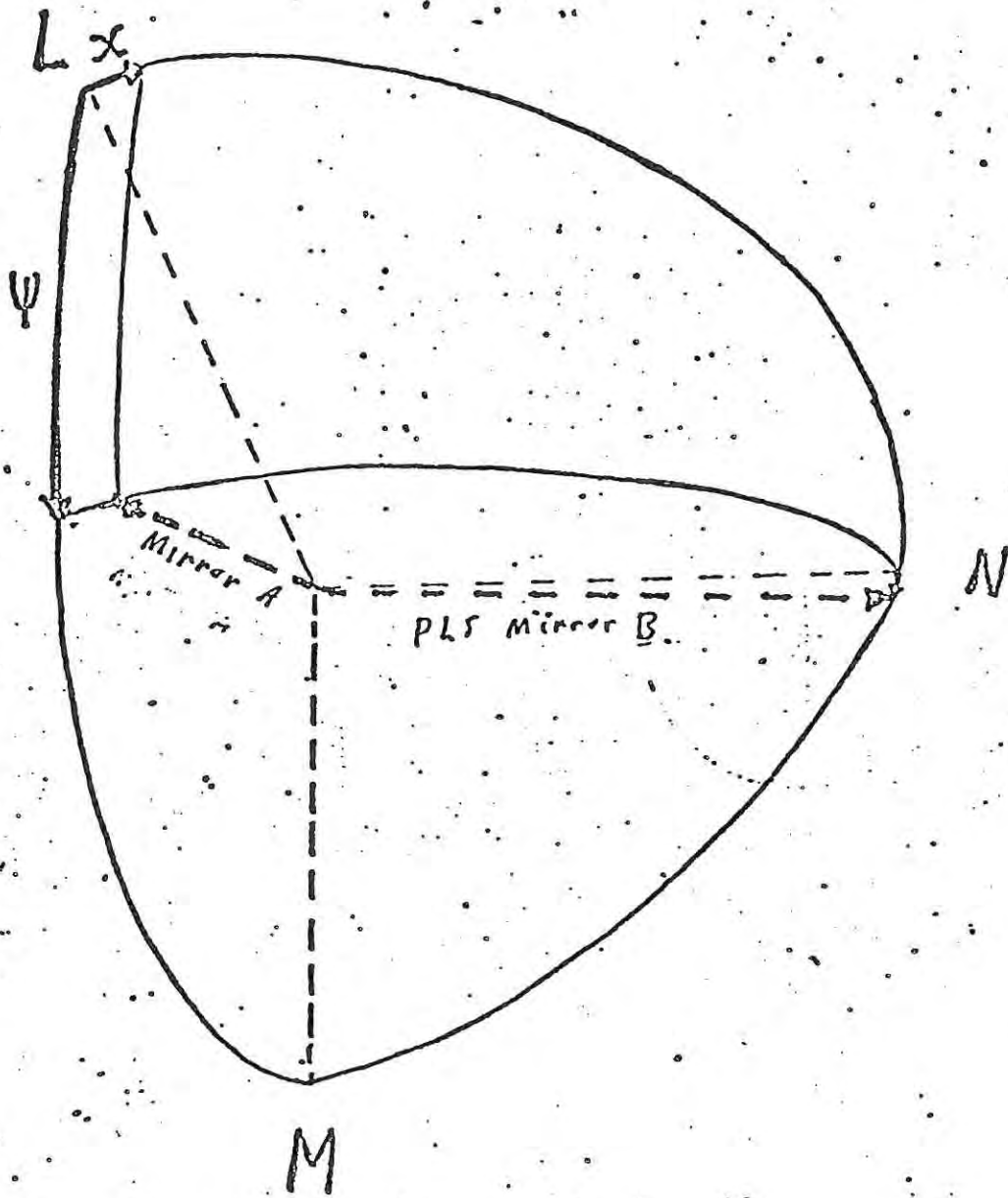


Fig. 2.

PLS SN 001 Mirror Offsets with Respect to Scan Platform Coordinates

C. Reynolds

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July 22, 1977

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