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### 3-DIMENSIONAL BUNDLE ADJUSTMENTS IN INDUSTRIAL METROLOGY -- A COMPARISON \* \*\*

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## 1. ABSTRACT

Several theodolite measurement systems are available for use in the industrial metrology market. Many of them offer a rigorous 3-dimensional bundle adjustment routine. In this paper several systems in use and available for evaluation purposes at the Stanford Linear Accelerator Center will be tested and their results compared.

## 2. INTRODUCTION

Since 1986 theodolite based industrial measurement systems have become an essential tool in the survey and alignment work done at the Stanford Linear Accelerator Center (SLAC). Due to the precision and accuracy required for today's particle accelerator alignment, industrial measurement system techniques have replaced or complimented many of our traditional optical tooling methods. We first used the KERN ECDS-PC system and later our own SLAC Industrial Measurement System (SIMS) to perform everything from magnet fiducialization<sup>1</sup> to mapping of entire beamlines. The greatest advantage of an industrial measurement system is the speed and accuracy in which 3-dimensional coordinates can be generated using redundant data. The core of an industrial measurement system is a 3-dimensional bundle adjustment routine. It is the comparison of these bundle adjustment routines that this paper will concentrate on. Table 1 is a list of the five industrial measurement systems made available for evaluation.

System	Manufacturer
1. AIMS III -- Automated Industrial Measurement System <i>version 2.0B</i>	Cubic Precision / K&E
2. BETS -- Brunson Electronic Triangulation System <i>version 6.2</i>	Brunson
3. ECDS3 -- Electronic Coordinate Determination System <i>version 3.04</i>	Leica / KERN
4. MANCAT -- MANual Coordinate Analyzing Theodolite system <i>version 2.2</i>	Leica / WILD
5. SIMS -- SLAC Industrial Measurement System <i>version 2.0</i>	SLAC

*Table 1 A list of the bundle routines used in the comparison*

Although each of these systems utilizes a different approach, each has the same goal: precise, accurate and timely 3-dimensional position data.

## 3. MEASUREMENTS

Each industrial measurement system evaluated is capable of recording directions from a variety of electronic theodolites. To insure that any differences in the bundle results were not caused by the use of different measurement data, one set of measurement data was used for all bundle reductions in each comparison. Each system allows the input of angular observations not directly recorded from a theodolite. Therefore it was possible to input the same angular observations, either by hand, or using a file, for each system.

Initially, several data sets from past surveys done at SLAC were used and the results compared. The comparisons from data set to data set were consistent. We chose one data set for this paper. The data set selected was a magnet fiducialization for a superconducting triplet magnet done at SLAC for the SLD (SLAC Large Detector) project.

<sup>1</sup>Fiducialization - Relating the effective electromagnetic axes of components to some kind of marks or fiducials (e.g. tooling balls), that can be touched by instruments.



### 3.1. OVERVIEW

Superconducting triplets are located on both the north and south ends of the SLD detector. The triplets provide the final focusing of the electron and positron beams to micron size before collision of the two beams inside the detector. A superconducting triplet consists of three quadrupole magnets enclosed in a stainless steel cylinder with an approximate diameter of 13 inches and an approximate length of 182 inches. To make the quadrupoles superconducting they are sealed into the triplet cylinder and surrounded by layers of liquid Helium and Liquid Nitrogen to keep the temperature near absolute zero (0 degrees Kelvin, -273 degrees Celsius).

The task of fiducializing the triplets involved establishing a reference using the stainless steel triplet cylinder. After measuring the triplet a cylinder was fit through five rings machined into the stainless steel cylinder, see figure 2. The center line of the cylinder defined beamline and consequently the magnetic centers of the three quadrupole magnets were aligned to the established line. The data set used in the comparison was from one of these fiducialization measurements.

### 3.2. OBSERVATIONS

The measurements consisted of one set of observations (direct and reverse) to the triplet fiducials, tie points, and to a scale bar using KERN E2 theodolites. The mean of these direct and reverse observations were calculated and used in the evaluation of each bundle. Although each of the systems handles direct and reverse observations, for consistency, the mean was taken before the observations were input.

There were 6 theodolite positions and 51 object points used with a total of 191 angle observation pairs (horizontal and vertical angle = 1 pair). One 2 meter scale bar was used to scale the coordinate system. Figure 1 is a diagram of the theodolite positions (1 to 6) and the angles observed in the data set used for the bundle comparisons.

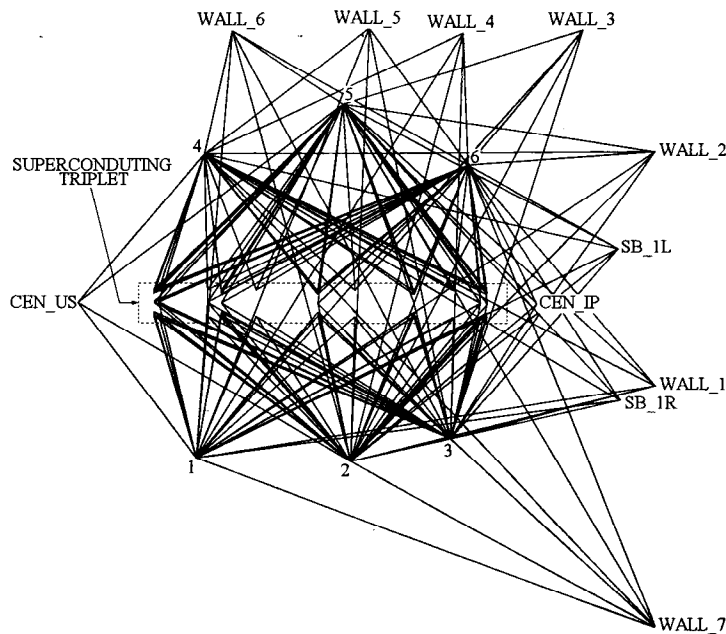


Figure 1 Plan view of the superconducting triplet fiducialization measurements



Figure 2 shows an enlarged view of the superconducting triplet with the names and locations of the fiducials measured.

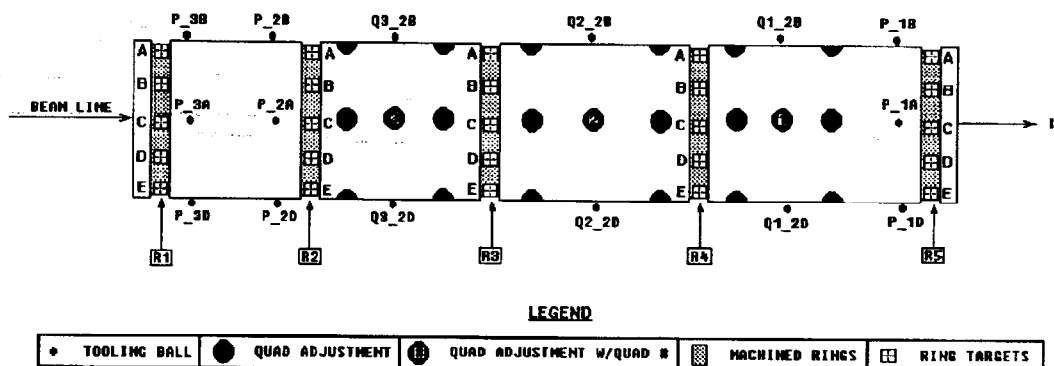


Figure 2 Plan view of the superconducting triplet showing fiducial points

### 3.3. ORIENTATION

Each system handles the task of initially orienting the theodolites in reference to each other differently. The orientation is important because the approximate coordinates for the bundle routines are dependent on the orientation. Since the triplet data was measured using SIMS some adjustments had to be made to the observations in order to be compatible with the other industrial measurement systems. A description of the adjustments made and the systems affected follows.

#### 3.3.1. COLLIMATIONS

The AIMS III, BETS and MANCAT systems utilize collimations between two base theodolites to calculate approximate coordinates for the bundle routine. Although in using the bundle routines these collimations need only be approximate, there were no collimations measured during the triplet survey. To overcome this problem the results from the SIMS bundle were used to calculate the collimation angles for the base pair of theodolites used in the AIMS III, BETS and MANCAT systems. The ECDS3 system uses the same initialization procedures as SIMS so no adjustment was necessary.

#### 3.3.2. HORIZONTAL CIRCLE ORIENTATION

When collimating the base theodolites the BETS system sets the horizontal angle of theodolites 1 and 2 to zero. Any other theodolites used are not required to be oriented. To provide this condition the angles for the theodolites 1 and 2 were rotated by a calculated amount in order to set the zero mark of the horizontal circle to the proper orientation. ECDS3 and SIMS also need the zero mark on the theodolites to be oriented. For these systems all the theodolites are zeroed approximately parallel to the X axis of the object being measured. Since the triplet was measured using SIMS and since the ECDS3 system uses the same approach no correction was necessary. The AIMS III and MANCAT systems do not require the zero mark on the horizontal circle to be in any particular orientation.



## 4. RESULTS

After orienting and inputting the observations for each industrial measurement system the bundle adjustments were executed. All the adjustments were done in a right handed system with the positive Z axis pointing up and using millimeters and gons as the length and angular units. In order to ensure that the results were easy to compare and not influenced by anything but the observations, the datum was only minimally constrained. The datum was defined by fixing all three coordinates of one point, Y and Z of a second and Z of a third. The distance for the scale bar was the seventh and last fixed parameter needed for the bundles. Table 2 lists the point names and the values of the parameters held fixed in all the bundle adjustments.

Point Name	X (mm)		Y (mm)		Z (mm)	
WALL_1	6612.100	Unknown	-1071.385	Unknown	1672.126	Fixed
WALL_4	4070.170	Unknown	3563.230	Fixed	501.739	Fixed
WALL_6	1021.850	Fixed	3581.824	Fixed	1069.253	Fixed
SCALE (SB_1L to SB_1R)			2000.000 mm			

Table 2 List of fixed parameters used in the bundle adjustments

The BETS bundle adjustment routine will only handle 20 points, so a subset of points was taken and used for the bundle adjustment. The coordinates for all the other point were calculated in the on-line data capture mode. By adjusting only 20 points and transforming the rest into the established coordinate system the significance of the statistical data might be reduced. Brunson is currently upgrading the BETS bundle to handle more points. The AIMS III bundle adjustment also limits the number of points to less than we desired. However, Cubic Precision provided us with a beta copy of their next version which does not limit the number of points.

### 4.1. COORDINATE COMPARISON

The coordinate comparisons were done by using one set of results as the benchmark and then taking the difference between the benchmark and the other sets of results. Since the SIMS results already existed they were used as the benchmark for the comparisons. Table 3 is a sample of the coordinate differences between systems.

AIMS III - SIMS				BETS - SIMS		
Point Name	DX (mm)	DY (mm)	DZ (mm)	DX (mm)	DY (mm)	DZ (mm)
WALL_2	0.012	0.048	0.001	0.008	0.054	-0.013
WALL_5	-0.002	0.008	0.005	0.004	0.033	0.002
P_1A	0.004	0.031	0.001	0.086	0.055	0.026
P_3A	0.041	0.000	0.005	0.059	-0.029	0.020
Q2_2B	0.003	0.025	0.012	0.085	0.005	0.021
R2_C	0.005	0.005	0.006	0.054	-0.035	0.026
R4_C	0.005	0.025	0.001	0.080	0.016	0.026



ECDS3 - SIMS				MANCAT - SIMS		
Point Name	DX (mm)	DY (mm)	DZ (mm)	DX (mm)	DY (mm)	DZ (mm)
WALL_2	0.001	-0.002	0.000	0.004	0.000	0.000
WALL_5	0.001	0.000	0.000	0.002	0.000	0.001
P_1A	0.001	-0.001	0.000	0.004	-0.001	0.000
P_3A	0.000	-0.001	0.000	0.005	-0.003	-0.001
Q2_2B	0.001	-0.001	0.000	0.003	-0.003	0.000
R2_C	0.001	0.000	0.000	0.004	-0.002	-0.001
R4_C	0.001	-0.002	0.000	0.004	-0.001	0.000

Table 3 Bundle output coordinate comparisons using SIMS output as benchmark

## 4.2. SCALE AND ORIENTATION COMPARISON

Along with the coordinate comparisons a seven parameter transformation was done to compare the orientation and scale of the bundle output for each system. Again, as in the coordinate comparisons, the SIMS bundle output was used as the benchmark. The benchmark data was held fixed and the other data sets were transformed into the benchmark system. Table 4 shows the results of the seven parameter transformations.

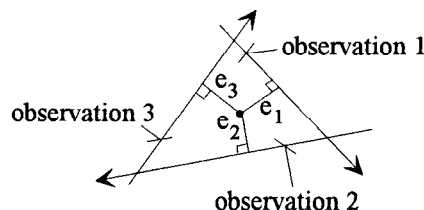
	AIMS III -SIMS	BETS - SIMS	ECDS3 - SIMS	MANCAT -SIMS
X shift (mm)	-0.0350	-0.0705	-0.0004	-0.0039
Y shift (mm)	-0.0102	0.0382	0.0009	0.0023
Z shift (mm)	-0.0062	-0.0178	0.0001	0.0017
Rotation about X (gon)	0.000067	-0.000160	0.000002	0.000026
Rotation about Y (gon)	0.000073	0.000078	-0.000001	-0.000016
Rotation about Z (gon)	0.000378	0.000951	0.000000	0.000018
Scale	1.000006	1.000002	0.999999	0.999999

Table 4 Bundle output seven parameter results

## 4.3. STATISTICS COMPARISON

The comparison of the provided statistical information was not as straight forward as the comparison of the coordinates. The bundle routines use two different methods of representing the statistics, standard errors and root mean square errors. Figures 3 and 4 describe the two methods.

$$RMS = \sqrt{\frac{e_1^2 + e_2^2 + \dots + e_n^2}{n}}$$



Where

$n$  = number of observations

$e_i$  = 3D perpendicular distance from observation vector to point

Figure 3 Root mean square errors



$$\sigma_X = \sigma_0 \sqrt{V_X}$$

Where

$$\sigma_0 = \sqrt{\frac{\mathbf{v}^T \mathbf{W} \mathbf{v}}{r}} = \text{reference standard error}$$

$r$  = degrees of freedom

$\mathbf{v}$  = observation residual matrix

$\mathbf{W}$  = weight matrix

$V_X$  = diagonal term from inversed normal matrix  $\mathbf{N}^{-1}$

Figure 4 Standard errors

The RMS error, being a single value, does not represent a 3-dimensional error very well. The standard errors representing the error components in each coordinate axis individually is a much better way of representing a 3-dimensional error. None of the bundle adjustment routines compared used both. Although these two approaches are not directly comparable an attempt was made to link the two by calculating the RMS errors for the SIMS results. Unlike the other two comparisons, coordinate and scale, the statistical values shown in tables 5 and 6 are the values produced by the bundle adjustments.

BETS *				MANCAT			SIMS		
Point Name	$\sigma_x$	$\sigma_y$	$\sigma_z$	$\sigma_x$	$\sigma_y$	$\sigma_z$	$\sigma_x$	$\sigma_y$	$\sigma_z$
WALL_2	0.112	0.104	0.035	0.058	0.055	0.025	0.061	0.060	0.023
WALL_5	0.096	0.093	0.032	0.025	0.027	0.021	0.026	0.025	0.020
P_1A	0.060	0.049	0.013	0.051	0.044	0.020	0.055	0.048	0.020
P_3A	0.029	0.054	0.012	0.045	0.042	0.042	0.047	0.044	0.040
Q2_2B	0.043	0.041	0.014	0.044	0.042	0.029	0.047	0.044	0.028
R2_C	0.035	0.050	0.022	0.046	0.040	0.038	0.047	0.041	0.037
R4_C	0.049	0.039	0.013	0.048	0.043	0.024	0.052	0.046	0.024

\* The BETS standard errors are based on a 95% confidence interval

Table 5 Standard errors comparison from bundle output

AIMS III		ECDS3		SIMS *	
Point Name	RMS (mm)	RMS (mm)	RMS (mm)	RMS (mm)	RMS (mm)
WALL_2	0.030	0.039	0.039	0.039	0.039
WALL_5	0.024	0.035	0.035	0.035	0.035
P_1A	0.060	0.039	0.039	0.039	0.039
P_3A	0.046	0.025	0.025	0.025	0.025
Q2_2B	0.009	0.012	0.012	0.011	0.011
R2_C	0.019	0.014	0.014	0.014	0.014
R4_C	0.031	0.022	0.022	0.022	0.022

\* SIMS RMS value calculated from angular residuals for comparison

Table 6 Root Mean Square error comparison from bundle output



#### 4.4. SYSTEM PROPERTIES

Each of the compared 3-dimensional bundle routines offers a different approach to obtain 3-dimensional coordinates. Tables 7 and 8 list features and size limitations.

	All theo's assumed level to gravity	Approximate collimation required for initial theo orientation	Collimations as an observation	Type of statistics	Error ellipses	Allows weighting of angle observations	Additional observations allowed
AIMS III	YES	YES	NO	RMS	NO	NO	NONE
BETS	YES	YES	NO	SD	NO	NO	NONE
ECDS3	NO	NO	NO	RMS	YES *	NO	NONE
MANCAT	NO	YES	YES	SD	NO	YES	NONE
SIMS	NO	NO	YES	SD	YES	YES	Distances from station to point and leveled height differences

\* ECDS3 calculates error ellipses but they can only be viewed on the screen in simulation mode

*Table 7 Industrial measurement system properties*

	# of points in bundle	# of theo's in bundle
AIMS III	limit extended memory and then hard disk space	8
BETS	limit 20 points + scale bar *	10
ECDS3	limit extended memory	99
MANCAT	limit hard disk space	14
SIMS	limit extended memory	50

\* The BETS bundle is currently being upgraded to handle more points

*Table 8 Bundle size limitations*

#### 5. CONCLUSION

All five systems supply valid 3-dimensional coordinate sets. Although each package has a somewhat different approach the results are comparable. However, as expected the results do not agree completely and we believe some effort will be necessary to standardize in some way the coordinate and statistic presentation. We would like to repeat this comparison later next year to take advantage of any new systems available and of the upgrades taking place in the systems already compared.

#### 6. ACKNOWLEDGMENTS

We wish to acknowledge the cooperation by Brunson, Cubic Precision and Leica. All three manufacturers made their systems freely available for the evaluations. We thank them for their assistance in making this comparison possible.





## APPENDIX A

3 D C D - ORIENTATION DATA CAPTURE

PROJECT = SLD TRIPLET C  
 TASK = SLD TRIPLET C TB LOCATION  
 DATE = Mon, Sep-24-90

P	T	Point Name	Horizontal	Vertical	Typ	Point Comment
1	1	Z-AXIS DIRECTION	0.000000	100.368800	GON	POINTING ALONG Z-AXIS
1	5	Z-AXIS DIRECTION	0.000000	100.661700	GON	POINTING ALONG Z-AXIS
1	6	Z-AXIS DIRECTION	0.000000	100.007300	GON	POINTING ALONG Z-AXIS
1	1	X-AXIS DIRECTION	300.418700	100.368500	GON	POINTING ALONG X-AXIS
1	5	X-AXIS DIRECTION	300.234600	100.661700	GON	POINTING ALONG X-AXIS
1	6	X-AXIS DIRECTION	300.264000	100.007300	GON	POINTING ALONG X-AXIS
1	1	THEO1_1	300.418700	100.368600	GON	DISTANCE = 0.0000
1	5	THEO1_1	203.236600	133.320300	GON	DISTANCE = 2000.0000
1	6	THEO1_1	192.982500	116.691700	GON	DISTANCE = 4000.0000
1	1	SB_1L	371.398200	87.043900	GON	
1	5	SB_1L	360.502900	93.910700	GON	
1	6	SB_1L	346.939300	89.838600	GON	
1	1	SB_1R	393.700000	85.710100	GON	
1	5	SB_1R	389.249400	92.763800	GON	
1	6	SB_1R	387.232500	85.795300	GON	
1	1	WALL_7	27.480200	82.195600	GON	
1	5	WALL_7	35.055800	86.873700	GON	
1	6	WALL_7	48.304200	82.168000	GON	
1	1	WALL_1	392.458500	83.744200	GON	
1	5	WALL_1	388.053500	89.150700	GON	
1	6	WALL_1	385.380500	81.846200	GON	
1	1	WALL_2	363.207100	86.296000	GON	
1	5	WALL_2	352.700200	91.780200	GON	
1	6	WALL_2	340.249300	88.486300	GON	
1	1	WALL_3	346.693200	90.173800	GON	
1	5	WALL_3	334.499800	96.313700	GON	
1	6	WALL_3	320.536400	94.633700	GON	
1	1	WALL_4	334.500000	94.354100	GON	
1	5	WALL_4	319.285000	102.080800	GON	
1	6	WALL_4	302.490800	101.046800	GON	
1	1	WALL_5	322.698200	81.057200	GON	
1	5	WALL_5	305.695400	88.283800	GON	
1	6	WALL_5	287.891400	86.703400	GON	
1	1	WALL_6	302.921500	87.314700	GON	
1	5	WALL_6	285.760400	95.902600	GON	
1	6	WALL_6	269.045000	94.968200	GON	
1	1	FLOOR_1	260.601700	124.823400	GON	
1	5	FLOOR_1	237.712300	129.049500	GON	
1	6	FLOOR_1	221.878200	121.540200	GON	
1	1	AUX_2	235.631800	94.341500	GON	
1	5	AUX_2	226.572600	104.826300	GON	
1	6	AUX_2	216.705200	102.966600	GON	
1	1	AUX_2	35.630600	305.659000	GON	
1	5	AUX_2	26.572700	295.173000	GON	
1	6	AUX_2	16.704000	297.033100	GON	
1	1	FLOOR_1	60.598800	275.176700	GON	
1	5	FLOOR_1	37.714500	270.950100	GON	
1	6	FLOOR_1	21.878300	278.458500	GON	
1	1	WALL_6	102.920200	312.685600	GON	
1	5	WALL_6	85.760900	304.097500	GON	
1	6	WALL_6	69.043800	305.030600	GON	
1	1	WALL_5	122.697800	318.944800	GON	

1 5	WALL_5	105.694700	311.715800	GON
1 6	WALL_5	87.890200	313.295100	GON
1 1	WALL_4	134.498300	305.647400	GON
1 5	WALL_4	119.284400	297.919300	GON
1 6	WALL_4	102.490100	298.953100	GON
1 1	WALL_3	146.691300	309.826600	GON
1 5	WALL_3	134.499500	303.686000	GON
1 6	WALL_3	120.534800	305.366600	GON
1 1	WALL_2	163.205500	313.705200	GON
1 5	WALL_2	152.699600	308.220200	GON
1 6	WALL_2	140.247200	311.512800	GON
1 1	WALL_1	192.457900	316.256000	GON
1 5	WALL_1	188.053500	310.849400	GON
1 6	WALL_1	185.377200	318.152300	GON
1 1	WALL_7	227.479400	317.805100	GON
1 5	WALL_7	235.054500	313.125600	GON
1 6	WALL_7	248.302900	317.830400	GON
1 1	SB_1R	193.698500	314.290100	GON
1 5	SB_1R	189.249000	307.234500	GON
1 6	SB_1R	187.228300	314.203700	GON
1 1	SB_1L	171.396400	312.955500	GON
1 5	SB_1L	160.501600	306.089000	GON
1 6	SB_1L	146.936700	310.159600	GON
1 1	R5_E	369.497200	102.215400	GON
1 5	R5_E	350.176600	120.612200	GON
1 6	R5_E	318.565300	127.299800	GON
1 1	R5_D	368.894600	100.464500	GON
1 5	R5_D	349.479900	118.113800	GON
1 6	R5_D	318.082200	123.505900	GON
1 5	R5_C	347.848500	116.489900	GON
1 6	R5_C	317.126500	120.722900	GON
1 1	R4_E	359.328700	102.449400	GON
1 5	R4_E	328.541300	124.806400	GON
1 6	R4_E	282.656300	126.778500	GON
1 1	R4_D	358.645700	100.502500	GON
1 5	R4_D	328.049300	122.000600	GON
1 6	R4_D	283.088800	123.337400	GON
1 5	R4_C	326.834900	119.831300	GON
1 6	R4_C	284.074900	120.610900	GON
1 1	R3_E	335.941100	103.719500	GON
1 5	R3_E	289.215500	126.493200	GON
1 6	R3_E	249.004500	120.081700	GON
1 1	R3_D	335.337000	100.664100	GON
1 5	R3_D	289.501900	123.144100	GON
1 6	R3_D	249.828800	117.274900	GON
1 5	R3_C	290.192700	120.783200	GON
1 6	R3_C	251.816900	115.588600	GON
1 1	R2_E	297.968000	104.461600	GON
1 5	R2_E	257.678400	121.137500	GON
1 6	R2_E	232.710300	114.424800	GON
1 1	R2_D	298.063800	100.769300	GON
1 5	R2_D	258.348300	118.396500	GON
1 6	R2_D	233.398300	112.340400	GON
1 5	R2_C	259.998500	116.754500	GON
1 6	R2_C	235.117400	111.267200	GON
1 1	R1_E	271.893600	103.925100	GON
1 5	R1_E	244.429800	117.114100	GON
1 6	R1_E	226.267100	111.764600	GON
1 1	R1_D	272.428600	100.687900	GON

1 5 R1_D	245.077300	114.921600	GON
1 6 R1_D	226.849900	110.078000	GON
1 5 R1_C	246.888700	113.698700	GON
1 6 R1_C	228.469400	109.239400	GON
1 5 R1_C	46.890700	286.302100	GON
1 6 R1_C	28.470300	290.760600	GON
1 1 R1_D	72.426700	299.311200	GON
1 5 R1_D	45.079700	285.076900	GON
1 6 R1_D	26.848400	289.922700	GON
1 1 R1_E	71.891000	296.074400	GON
1 5 R1_E	44.431800	282.884900	GON
1 6 R1_E	26.266200	288.235900	GON
1 5 R2_C	60.000100	283.243600	GON
1 6 R2_C	35.115700	288.732200	GON
1 1 R2_D	98.061700	299.230700	GON
1 5 R2_D	58.351500	281.603400	GON
1 6 R2_D	33.397000	287.659100	GON
1 1 R2_E	97.965600	295.538300	GON
1 5 R2_E	57.681300	278.861300	GON
1 6 R2_E	32.708000	285.575000	GON
1 5 R3_C	90.195600	279.217800	GON
1 6 R3_C	51.813900	284.410300	GON
1 1 R3_D	135.334300	299.336600	GON
1 5 R3_D	89.505300	276.855600	GON
1 6 R3_D	49.826300	282.723500	GON
1 1 R3_E	135.939200	296.280100	GON
1 5 R3_E	89.219400	273.506900	GON
1 6 R3_E	49.002000	279.917900	GON
1 5 R4_C	126.836900	280.167300	GON
1 6 R4_C	84.071000	279.386400	GON
1 1 R4_D	158.643700	299.498000	GON
1 5 R4_D	128.052700	277.999100	GON
1 6 R4_D	83.085300	276.660500	GON
1 1 R4_E	159.326900	297.551800	GON
1 5 R4_E	128.545200	275.194100	GON
1 6 R4_E	82.652900	273.219800	GON
1 5 R5_C	147.850200	283.510300	GON
1 6 R5_C	117.122500	279.276200	GON
1 1 R5_D	168.892700	299.536600	GON
1 5 R5_D	149.482400	281.886100	GON
1 6 R5_D	118.079300	276.492200	GON
1 1 R5_E	169.494800	297.785700	GON
1 5 R5_E	150.178200	279.386300	GON
1 6 R5_E	118.563200	272.698700	GON
1 1 P_1A	366.483100	99.439900	GON
1 5 P_1A	346.100900	116.554500	GON
1 6 P_1A	314.071300	120.527300	GON
1 1 P_1D	368.867900	102.279100	GON
1 5 P_1D	348.695000	121.133100	GON
1 6 P_1D	315.392800	127.790300	GON
1 1 Q1_2D	365.551000	102.463600	GON
1 5 Q1_2D	341.572800	122.886200	GON
1 6 Q1_2D	302.095900	128.430700	GON
1 1 Q2_2D	346.890200	103.387400	GON
1 5 Q2_2D	304.803600	127.238600	GON
1 6 Q2_2D	259.126700	123.121700	GON
1 1 Q3_2D	312.747400	104.302500	GON
1 5 Q3_2D	266.999300	123.367100	GON
1 6 Q3_2D	237.137100	116.135500	GON

1	1	P_2A	292.921500	98.888100	GON		
1	5	P_2A	256.898200	115.822600	GON		
1	6	P_2A	233.589700	110.594100	GON		
1	1	P_2D	291.987400	104.275100	GON		
1	5	P_2D	254.247900	120.177100	GON		
1	6	P_2D	230.982400	113.726200	GON		
1	1	P_3D	273.458800	103.879700	GON		
1	5	P_3D	245.069400	117.338800	GON		
1	6	P_3D	226.520300	111.883100	GON		
1	1	P_3A	275.587900	99.013200	GON		
1	5	P_3A	247.675700	113.726700	GON		
1	6	P_3A	228.865300	109.224200	GON		
1	1	TB_1	251.155800	100.319400	GON		
1	5	TB_1	234.219700	112.084600	GON		
1	6	TB_1	220.692900	108.289200	GON		
1	5	TB_2	221.751900	106.932700	GON		
1	6	TB_2	213.788000	105.026900	GON		
1	5	CEN_IP	357.504200	117.142700	GON		
1	6	CEN_IP	336.007300	122.516600	GON		
1	1	CEN_US	254.357300	102.904400	GON		
1	1	CEN_US	54.355100	297.094800	GON		
1	5	CEN_IP	157.506700	282.857100	GON		
1	6	CEN_IP	136.004900	277.483300	GON		
1	5	TB_2	21.752500	293.066100	GON		
1	6	TB_2	13.787400	294.973200	GON		
1	1	TB_1	51.153800	299.679900	GON		
1	5	TB_1	34.223000	287.913700	GON		
1	6	TB_1	20.691400	291.711600	GON		
1	1	P_3A	75.586300	300.986800	GON		
1	5	P_3A	47.677900	286.272800	GON		
1	6	P_3A	28.864600	290.775900	GON		
1	1	P_3D	73.455500	296.120500	GON		
1	5	P_3D	45.071700	282.659700	GON		
1	6	P_3D	26.519300	288.116600	GON		
1	1	P_2D	91.983700	295.725500	GON		
1	5	P_2D	54.249900	279.821500	GON		
1	6	P_2D	30.981100	286.274500	GON		
1	1	P_2A	92.918600	301.108300	GON		
1	5	P_2A	56.900000	284.174100	GON		
1	6	P_2A	33.588300	289.403500	GON		
1	1	Q3_2D	112.745400	295.697900	GON		
1	5	Q3_2D	67.002800	276.632800	GON		
1	6	Q3_2D	37.135300	283.864200	GON		
1	1	Q2_2D	146.887600	296.613400	GON		
1	5	Q2_2D	104.806800	272.761600	GON		
1	6	Q2_2D	59.124700	276.876600	GON		
1	1	Q1_2D	165.548100	297.537000	GON		
1	5	Q1_2D	141.575600	277.114500	GON		
1	6	Q1_2D	102.093500	271.569200	GON		
1	1	P_1D	168.865400	297.721700	GON		
1	5	P_1D	148.697700	278.867500	GON		
1	6	P_1D	115.391000	272.209500	GON		
1	1	P_1A	166.481500	300.561000	GON		
1	5	P_1A	146.103200	283.445300	GON		
1	6	P_1A	114.068000	279.471100	GON		
2	1	Z-AXIS DIRECTION	0.000000	100.237800	GON	POINTING	ALONG Z-AXIS
2	5	Z-AXIS DIRECTION	0.000000	100.484000	GON	POINTING	ALONG Z-AXIS
2	6	Z-AXIS DIRECTION	0.000000	100.200200	GON	POINTING	ALONG Z-AXIS
2	1	X-AXIS DIRECTION	300.460200	100.236900	GON	POINTING	ALONG X-AXIS

2	5	X-AXIS DIRECTION	300.493700	100.484600	GON	POINTING ALONG X-AXIS	
2	6	X-AXIS DIRECTION	297.791100	100.199800	GON	POINTING ALONG X-AXIS	
2	1	THEO1_1	104.236800	100.237400	GON	DISTANCE =	4000.0000
2	5	THEO1_1	126.574400	112.272100	GON	DISTANCE =	6000.0000
2	6	THEO1_1	143.878800	111.029800	GON	DISTANCE =	5000.0000
2	1	SB_1L	16.775200	85.330500	GON		
2	5	SB_1L	37.216500	91.113700	GON		
2	6	SB_1L	33.148300	83.306700	GON		
2	1	SB_1R	37.891500	87.522400	GON		
2	5	SB_1R	58.571100	93.683200	GON		
2	6	SB_1R	63.691500	89.880300	GON		
2	1	WALL_7	55.347400	86.937700	GON		
2	5	WALL_7	70.726600	91.532800	GON		
2	6	WALL_7	75.423700	89.106700	GON		
2	1	WALL_1	33.742800	85.222300	GON		
2	5	WALL_1	52.817400	90.365500	GON		
2	6	WALL_1	55.613000	85.506700	GON		
2	1	WALL_2	0.758300	82.759200	GON		
2	5	WALL_2	13.836100	85.925400	GON		
2	6	WALL_2	396.599100	77.213000	GON		
2	5	WALL_3	380.721100	89.609700	GON		
2	6	WALL_3	345.253100	84.974400	GON		
2	1	WALL_4	368.235700	89.106300	GON		
2	6	WALL_4	297.409800	100.328100	GON		
2	1	WALL_5	351.413300	57.457300	GON		
2	6	WALL_5	258.677700	67.053500	GON		
2	1	WALL_6	294.247400	60.933100	GON		
2	5	WALL_6	228.493900	86.224900	GON		
2	6	WALL_6	232.140600	90.074500	GON		
2	1	WALL_6	94.244200	339.065700	GON		
2	5	WALL_6	28.494100	313.774300	GON		
2	6	WALL_6	32.138300	309.923400	GON		
2	1	WALL_5	151.414200	342.541500	GON		
2	6	WALL_5	58.673800	332.944800	GON		
2	1	WALL_4	168.235100	310.893100	GON		
2	6	WALL_4	97.406400	299.669100	GON		
2	5	WALL_3	180.720700	310.389500	GON		
2	6	WALL_3	145.249300	315.024700	GON		
2	1	WALL_2	200.757500	317.240000	GON		
2	5	WALL_2	213.835500	314.074600	GON		
2	6	WALL_2	196.596300	322.784700	GON		
2	1	WALL_1	233.742200	314.778300	GON		
2	5	WALL_1	252.817100	309.632500	GON		
2	6	WALL_1	255.611000	314.492700	GON		
2	1	WALL_7	255.346000	313.062800	GON		
2	5	WALL_7	270.725400	308.462800	GON		
2	6	WALL_7	275.422500	310.892200	GON		
2	1	SB_1R	237.891200	312.478400	GON		
2	5	SB_1R	258.570800	306.315800	GON		
2	6	SB_1R	263.690300	310.119100	GON		
2	1	SB_1L	216.773800	314.669200	GON		
2	5	SB_1L	237.216600	308.885700	GON		
2	6	SB_1L	233.143500	316.689900	GON		
2	1	R5_A	32.683600	102.227700	GON		
2	5	R5_A	68.206500	117.350100	GON		
2	6	R5_A	90.082300	125.807700	GON		
2	1	R5_B	33.401500	100.349400	GON		
2	5	R5_B	68.707600	114.892700	GON		
2	6	R5_B	90.312500	121.647700	GON		

2 5 R5_C	69.987700	113.453500	GON
2 6 R5_C	90.956800	118.843200	GON
2 1 R4_A	43.053600	102.954200	GON
2 5 R4_A	89.729300	119.643100	GON
2 6 R4_A	126.071400	124.266600	GON
2 1 R4_B	43.839800	100.486400	GON
2 5 R4_B	89.924300	116.803700	GON
2 6 R4_B	125.427100	120.357900	GON
2 5 R4_C	90.471100	115.002800	GON
2 6 R4_C	123.919800	117.776100	GON
2 1 R3_A	68.698700	103.957900	GON
2 5 R3_A	121.644300	118.851900	GON
2 6 R3_A	156.146700	117.060100	GON
2 1 R3_B	69.392500	100.559800	GON
2 5 R3_B	121.255100	116.181100	GON
2 6 R3_B	155.215300	114.421200	GON
2 5 R3_C	120.380100	114.552800	GON
2 6 R3_C	153.028200	112.979800	GON
2 1 R2_A	111.861500	104.242400	GON
2 5 R2_A	145.994100	115.225000	GON
2 6 R2_A	170.384000	112.077400	GON
2 1 R2_B	111.546300	100.552400	GON
2 5 R2_B	145.365000	113.160200	GON
2 6 R2_B	169.609200	110.278200	GON
2 5 R2_C	143.918100	112.016900	GON
2 6 R2_C	167.797500	109.399400	GON
2 1 R1_A	139.097600	103.699100	GON
2 5 R1_A	157.268200	112.881100	GON
2 6 R1_A	176.100600	109.977300	GON
2 1 R1_B	138.387600	100.739200	GON
2 5 R1_B	156.740600	111.250900	GON
2 6 R1_B	175.549800	108.575200	GON
2 5 R1_C	155.270900	110.216600	GON
2 6 R1_C	173.991300	107.760700	GON
2 5 R1_C	355.270900	289.784500	GON
2 6 R1_C	373.990700	292.239200	GON
2 1 R1_B	338.384500	299.261400	GON
2 5 R1_B	356.742000	288.749200	GON
2 6 R1_B	375.548400	291.424100	GON
2 1 R1_A	339.094600	296.300400	GON
2 5 R1_A	357.269200	287.119300	GON
2 6 R1_A	376.099100	290.024400	GON
2 5 R2_C	343.918700	287.981400	GON
2 6 R2_C	367.796400	290.598900	GON
2 1 R2_B	311.543800	299.448400	GON
2 5 R2_B	345.367000	286.839700	GON
2 6 R2_B	369.608100	289.720800	GON
2 1 R2_A	311.858900	295.757200	GON
2 5 R2_A	345.996600	284.774200	GON
2 6 R2_A	370.383400	287.922300	GON
2 5 R3_C	320.381400	285.448000	GON
2 6 R3_C	353.026200	287.018100	GON
2 1 R3_B	269.389800	299.440300	GON
2 5 R3_B	321.257200	283.819200	GON
2 6 R3_B	355.214000	285.577600	GON
2 1 R3_A	268.695500	296.043700	GON
2 5 R3_A	321.646700	281.146200	GON
2 6 R3_A	356.144300	282.938700	GON
2 5 R4_C	290.473200	284.997700	GON

2 6 R4_C	323.915700	282.222100	GON
2 1 R4_B	243.837900	299.516100	GON
2 5 R4_B	289.927500	283.196900	GON
2 6 R4_B	325.423700	279.640600	GON
2 1 R4_A	243.051900	297.046900	GON
2 5 R4_A	289.731600	280.356900	GON
2 6 R4_A	326.068100	275.732200	GON
2 5 R5_C	269.989400	286.546100	GON
2 6 R5_C	290.952900	281.154300	GON
2 1 R5_B	233.399400	299.651500	GON
2 5 R5_B	268.709600	285.106200	GON
2 6 R5_B	290.309300	278.350300	GON
2 1 R5_A	232.681700	297.774000	GON
2 5 R5_A	268.208400	282.648400	GON
2 6 R5_A	290.078100	274.190600	GON
2 1 P_1A	35.892300	99.376700	GON
2 5 P_1A	71.595900	113.464300	GON
2 6 P_1A	94.062900	118.710400	GON
2 1 P_1B	33.272200	102.401500	GON
2 5 P_1B	69.832000	117.804500	GON
2 6 P_1B	93.447900	126.346700	GON
2 1 Q1_2B	36.628300	102.618200	GON
2 5 Q1_2B	77.293000	118.745700	GON
2 6 Q1_2B	107.260100	126.298700	GON
2 1 Q2_2B	56.385500	103.738300	GON
2 5 Q2_2B	109.669200	119.916800	GON
2 6 Q2_2B	147.304100	119.969900	GON
2 1 Q3_2B	95.154800	104.844900	GON
2 5 Q3_2B	138.533200	116.925500	GON
2 6 Q3_2B	166.516400	113.845300	GON
2 1 P_2A	116.757600	98.737700	GON
2 5 P_2A	146.640400	111.445900	GON
2 6 P_2A	169.358600	108.842200	GON
2 1 P_2B	118.249700	104.696200	GON
2 5 P_2B	148.771600	115.005100	GON
2 6 P_2B	171.915900	111.825600	GON
2 1 P_3B	137.489400	104.098100	GON
2 5 P_3B	156.649000	113.243400	GON
2 6 P_3B	175.867600	110.275700	GON
2 1 P_3A	134.808700	98.909700	GON
2 5 P_3A	154.526900	110.183200	GON
2 6 P_3A	173.587700	107.724900	GON
2 1 TB_4	159.075700	100.339300	GON
2 5 TB_4	166.684900	109.406300	GON
2 6 TB_4	181.231800	107.074200	GON
2 5 TB_3	179.546700	105.622800	GON
2 6 TB_3	187.578200	104.272800	GON
2 5 CEN_IP	58.942600	114.975500	GON
2 6 CEN_IP	70.054300	121.759300	GON
2 1 CEN_US	155.346700	102.924100	GON
2 1 CEN_US	355.343600	297.075800	GON
2 5 CEN_IP	258.943600	285.023400	GON
2 6 CEN_IP	270.050300	278.238100	GON
2 5 TB_3	379.548400	294.376500	GON
2 6 TB_3	387.577700	295.727400	GON
2 1 TB_4	359.073300	299.661900	GON
2 5 TB_4	366.685300	290.594200	GON
2 6 TB_4	381.231000	292.925900	GON
2 1 P_3A	334.805700	301.090600	GON



2 5 P_3A	354.527900	289.816300	GON
2 6 P_3A	373.587000	292.274900	GON
2 1 P_3B	337.490300	295.901300	GON
2 5 P_3B	356.652600	286.755900	GON
2 6 P_3B	375.866800	289.724500	GON
2 1 P_2B	318.245000	295.304500	GON
2 5 P_2B	348.771700	284.994800	GON
2 6 P_2B	371.914100	288.172100	GON
2 1 P_2A	316.754500	301.263100	GON
2 5 P_2A	346.642300	288.553400	GON
2 6 P_2A	369.358200	291.157700	GON
2 1 Q3_2B	295.152600	295.156900	GON
2 5 Q3_2B	338.534800	283.074000	GON
2 6 Q3_2B	366.515100	286.154500	GON
2 1 Q2_2B	256.381800	296.262000	GON
2 5 Q2_2B	309.671800	280.083200	GON
2 6 Q2_2B	347.301700	280.029900	GON
2 1 Q1_2B	236.624800	297.381400	GON
2 5 Q1_2B	277.294100	281.253700	GON
2 6 Q1_2B	307.257000	273.698700	GON
2 1 P_1B	233.271100	297.600000	GON
2 5 P_1B	269.834000	282.194300	GON
2 6 P_1B	293.445400	273.650900	GON
2 1 P_1A	235.890500	300.624300	GON
2 5 P_1A	271.597100	286.534300	GON
2 6 P_1A	294.059800	281.287500	GON

3 D C D - ORIENTATION DATA CAPTURE

PROJECT = SLD TRIPLET C  
 TASK = SLD TRIPLET C TB LOCATION  
 DATE = Mon, Sep-24-90

P	T	Point Name	Horizontal	Vertical	Typ	Point Comment
1	1	Z-AXIS DIRECTION	0.000000	100.368800	GON	POINTING ALONG Z-AXIS
1	5	Z-AXIS DIRECTION	0.000000	100.661700	GON	POINTING ALONG Z-AXIS
1	6	Z-AXIS DIRECTION	0.000000	100.007300	GON	POINTING ALONG Z-AXIS
2	1	Z-AXIS DIRECTION	0.000000	100.237800	GON	POINTING ALONG Z-AXIS
2	5	Z-AXIS DIRECTION	0.000000	100.484000	GON	POINTING ALONG Z-AXIS
2	6	Z-AXIS DIRECTION	0.000000	100.200200	GON	POINTING ALONG Z-AXIS
1	1	X-AXIS DIRECTION	300.418700	100.368500	GON	POINTING ALONG X-AXIS
1	5	X-AXIS DIRECTION	300.234600	100.661700	GON	POINTING ALONG X-AXIS
1	6	X-AXIS DIRECTION	300.264000	100.007300	GON	POINTING ALONG X-AXIS
2	1	X-AXIS DIRECTION	300.460200	100.236900	GON	POINTING ALONG X-AXIS
2	5	X-AXIS DIRECTION	300.493700	100.484600	GON	POINTING ALONG X-AXIS
2	6	X-AXIS DIRECTION	297.791100	100.199800	GON	POINTING ALONG X-AXIS
1	1	WALL_6	302.920850	87.314550	GON	DISTANCE = 5752.0000
1	5	WALL_6	285.760650	95.902550	GON	DISTANCE = 5875.0000
1	6	WALL_6	269.044400	94.968800	GON	DISTANCE = 6093.0000
2	1	WALL_6	294.245800	60.933700	GON	DISTANCE = 1980.0000
2	5	WALL_6	228.494000	86.225300	GON	DISTANCE = 2190.0000
2	6	WALL_6	232.139450	90.075550	GON	DISTANCE = 3607.0000
1	1	SB_1L	371.397300	87.044200	GON	0.001800 0.000600
1	5	SB_1L	360.502250	93.910850	GON	0.001300 0.000300
1	6	SB_1L	346.938000	89.839500	GON	0.002600 0.001800
1	1	SB_1R	393.699250	85.710000	GON	0.001500 0.000200
1	5	SB_1R	389.249200	92.764650	GON	0.000400 0.001700
1	6	SB_1R	387.230400	85.795800	GON	0.004200 0.001000
1	1	WALL_7	27.479800	82.195250	GON	0.000800 0.000700
1	5	WALL_7	35.055150	86.874050	GON	0.001300 0.000700
1	6	WALL_7	48.303550	82.168800	GON	0.001300 0.001600
1	1	WALL_1	392.458200	83.744100	GON	0.000600 0.000200
1	5	WALL_1	388.053500	89.150650	GON	0.000000 0.000100
1	6	WALL_1	385.378850	81.846950	GON	0.003300 0.001500
1	1	WALL_2	363.206300	86.295400	GON	0.001600 0.001200
1	5	WALL_2	352.699900	91.780000	GON	0.000600 0.000400
1	6	WALL_2	340.248250	88.486750	GON	0.002100 0.000900
1	1	WALL_3	346.692250	90.173600	GON	0.001900 0.000400
1	5	WALL_3	334.499650	96.313850	GON	0.000300 0.000300
1	6	WALL_3	320.535600	94.633550	GON	0.001600 0.000300
1	1	WALL_4	334.499150	94.353350	GON	0.001700 0.001500
1	5	WALL_4	319.284700	102.080750	GON	0.000600 0.000100
1	6	WALL_4	302.490450	101.046850	GON	0.000700 0.000100
1	1	WALL_5	322.698000	81.056200	GON	0.000400 0.002000
1	5	WALL_5	305.695050	88.284000	GON	0.000700 0.000400
1	6	WALL_5	287.890800	86.704150	GON	0.001200 0.001500
1	1	WALL_6	302.920850	87.314550	GON	0.001300 0.000300
1	5	WALL_6	285.760650	95.902550	GON	0.000500 0.000100
1	6	WALL_6	269.044400	94.968800	GON	0.001200 0.001200
1	1	R5_E	369.496000	102.214850	GON	0.002400 0.001100
1	5	R5_E	350.177400	120.612950	GON	0.001600 0.001500
1	6	R5_E	318.564250	127.300550	GON	0.002100 0.001500
1	1	R5_D	368.893650	100.463950	GON	0.001900 0.001100
1	5	R5_D	349.481150	118.113850	GON	0.002500 0.000100
1	6	R5_D	318.080750	123.506850	GON	0.002900 0.001900
1	5	R5_C	347.849350	116.489800	GON	0.001700 0.000200

1 6 R5_C	317.124500	120.723350	GON	0.004000	0.000900
1 1 R4_E	359.327800	102.448800	GON	0.001800	0.001200
1 5 R4_E	328.543250	124.806150	GON	0.003900	0.000500
1 6 R4_E	282.654600	126.779350	GON	0.003400	0.001700
1 1 R4_D	358.644700	100.502250	GON	0.002000	0.000500
1 5 R4_D	328.051000	122.000750	GON	0.003400	0.000300
1 6 R4_D	283.087050	123.338450	GON	0.003500	0.002100
1 5 R4_C	326.835900	119.832000	GON	0.002000	0.001400
1 6 R4_C	284.072950	120.612250	GON	0.003900	0.002700
1 1 R3_E	335.940150	103.719700	GON	0.001900	0.000400
1 5 R3_E	289.217450	126.493150	GON	0.003900	0.000100
1 6 R3_E	249.003250	120.081900	GON	0.002500	0.000400
1 1 R3_D	335.335650	100.663750	GON	0.002700	0.000700
1 5 R3_D	289.503600	123.144250	GON	0.003400	0.000300
1 6 R3_D	249.827550	117.275700	GON	0.002500	0.001600
1 5 R3_C	290.194150	120.782700	GON	0.002900	0.001000
1 6 R3_C	251.815400	115.589150	GON	0.003000	0.001100
1 1 R2_E	297.966800	104.461650	GON	0.002400	0.000100
1 5 R2_E	257.679850	121.138100	GON	0.002900	0.001200
1 6 R2_E	232.709150	114.424900	GON	0.002300	0.000200
1 1 R2_D	298.062750	100.769300	GON	0.002100	0.000000
1 5 R2_D	258.349900	118.396550	GON	0.003200	0.000100
1 6 R2_D	233.397650	112.340650	GON	0.001300	0.000500
1 5 R2_C	259.999300	116.755450	GON	0.001600	0.001900
1 6 R2_C	235.116550	111.267500	GON	0.001700	0.000600
1 1 R1_E	271.892300	103.925350	GON	0.002600	0.000500
1 5 R1_E	244.430800	117.114600	GON	0.002000	0.001000
1 6 R1_E	226.266650	111.764350	GON	0.000900	0.000500
1 1 R1_D	272.427650	100.688350	GON	0.001900	0.000900
1 5 R1_D	245.078500	114.922350	GON	0.002400	0.001500
1 6 R1_D	226.849150	110.077650	GON	0.001500	0.000700
1 5 R1_C	246.889700	113.698300	GON	0.002000	0.000800
1 6 R1_C	228.469850	109.239400	GON	0.000900	0.000000
1 1 P_1A	366.482300	99.439450	GON	0.001600	0.000900
1 5 P_1A	346.102050	116.554600	GON	0.002300	0.000200
1 6 P_1A	314.069650	120.528100	GON	0.003300	0.001600
1 1 P_1D	368.866650	102.278700	GON	0.002500	0.000800
1 5 P_1D	348.696350	121.132800	GON	0.002700	0.000600
1 6 P_1D	315.391900	127.790400	GON	0.001800	0.000200
1 1 Q1_2D	365.549550	102.463300	GON	0.002900	0.000600
1 5 Q1_2D	341.574200	122.885850	GON	0.002800	0.000700
1 6 Q1_2D	302.094700	128.430750	GON	0.002400	0.000100
1 1 Q2_2D	346.888900	103.387000	GON	0.002600	0.000800
1 5 Q2_2D	304.805200	127.238500	GON	0.003200	0.000200
1 6 Q2_2D	259.125700	123.122550	GON	0.002000	0.001700
1 1 Q3_2D	312.746400	104.302300	GON	0.002000	0.000400
1 5 Q3_2D	267.001050	123.367150	GON	0.003500	0.000100
1 6 Q3_2D	237.136200	116.135650	GON	0.001800	0.000300
1 1 P_2A	292.920050	98.889900	GON	0.002900	0.003600
1 5 P_2A	256.899100	115.824250	GON	0.001800	0.003300
1 6 P_2A	233.589000	110.595300	GON	0.001400	0.002400
1 1 P_2D	291.985550	104.274800	GON	0.003700	0.000600
1 5 P_2D	254.248900	120.177800	GON	0.002000	0.001400
1 6 P_2D	230.981750	113.725850	GON	0.001300	0.000700
1 1 P_3D	273.457150	103.879600	GON	0.003300	0.000200
1 5 P_3D	245.070550	117.339550	GON	0.002300	0.001500
1 6 P_3D	226.519800	111.883250	GON	0.001000	0.000300
1 1 P_3A	275.587100	99.013200	GON	0.001600	0.000000
1 5 P_3A	247.676800	113.726950	GON	0.002200	0.000500

1 6	P_3A	228.864950	109.224150	GON	0.000700	0.000100
1 5	CEN_IP	357.505450	117.142800	GON	0.002500	0.000200
1 6	CEN_IP	336.006100	122.516650	GON	0.002400	0.000100
1 1	CEN_US	254.356200	102.904800	GON	0.002200	0.000800
2 1	SB_1L	16.774500	85.330650	GON	0.001400	0.000300
2 5	SB_1L	37.216550	91.114000	GON	0.000100	0.000600
2 6	SB_1L	33.145900	83.308400	GON	0.004800	0.003400
2 1	SB_1R	37.891350	87.522000	GON	0.000300	0.000800
2 5	SB_1R	58.570950	93.683700	GON	0.000300	0.001000
2 6	SB_1R	63.690900	89.880600	GON	0.001200	0.000600
2 1	WALL_7	55.346700	86.937450	GON	0.001400	0.000500
2 5	WALL_7	70.726000	91.535000	GON	0.001200	0.004400
2 6	WALL_7	75.423100	89.107250	GON	0.001200	0.001100
2 1	WALL_1	33.742500	85.222000	GON	0.000600	0.000600
2 5	WALL_1	52.817250	90.366500	GON	0.000300	0.002000
2 6	WALL_1	55.612000	85.507000	GON	0.002000	0.000600
2 1	WALL_2	0.757900	82.759600	GON	0.000800	0.000800
2 5	WALL_2	13.835800	85.925400	GON	0.000600	0.000000
2 6	WALL_2	396.597700	77.214150	GON	0.002800	0.002300
2 5	WALL_3	380.720900	89.610100	GON	0.000400	0.000800
2 6	WALL_3	345.251200	84.974850	GON	0.003800	0.000900
2 1	WALL_4	368.235400	89.106600	GON	0.000600	0.000600
2 6	WALL_4	297.408100	100.329500	GON	0.003400	0.002800
2 1	WALL_5	351.413750	57.457900	GON	0.000900	0.001200
2 6	WALL_5	258.675750	67.054350	GON	0.003900	0.001700
2 1	WALL_6	294.245800	60.933700	GON	0.003200	0.001200
2 5	WALL_6	228.494000	86.225300	GON	0.000200	0.000800
2 6	WALL_6	232.139450	90.075550	GON	0.002300	0.002100
2 1	R5_A	32.682650	102.226850	GON	0.001900	0.001700
2 5	R5_A	68.207450	117.350850	GON	0.001900	0.001500
2 6	R5_A	90.080200	125.808550	GON	0.004200	0.001700
2 1	R5_B	33.400450	100.348950	GON	0.002100	0.000900
2 5	R5_B	68.708600	114.893250	GON	0.002000	0.001100
2 6	R5_B	90.310900	121.648700	GON	0.003200	0.002000
2 5	R5_C	69.988550	113.453700	GON	0.001700	0.000400
2 6	R5_C	90.954850	118.844450	GON	0.003900	0.002500
2 1	R4_A	43.052750	102.953650	GON	0.001700	0.001100
2 5	R4_A	89.730450	119.643100	GON	0.002300	0.000000
2 6	R4_A	126.069750	124.267200	GON	0.003300	0.001200
2 1	R4_B	43.838850	100.485150	GON	0.001900	0.002500
2 5	R4_B	89.925900	116.803400	GON	0.003200	0.000600
2 6	R4_B	125.425400	120.358650	GON	0.003400	0.001500
2 5	R4_C	90.472150	115.002550	GON	0.002100	0.000500
2 6	R4_C	123.917750	117.777000	GON	0.004100	0.001800
2 1	R3_A	68.697100	103.957100	GON	0.003200	0.001600
2 5	R3_A	121.645500	118.852850	GON	0.002400	0.001900
2 6	R3_A	156.145500	117.060700	GON	0.002400	0.001200
2 1	R3_B	69.391150	100.559750	GON	0.002700	0.000100
2 5	R3_B	121.256150	116.180950	GON	0.002100	0.000300
2 6	R3_B	155.214650	114.421800	GON	0.001300	0.001200
2 5	R3_C	120.380750	114.552400	GON	0.001300	0.000800
2 6	R3_C	153.027200	112.980850	GON	0.002000	0.002100
2 1	R2_A	111.860200	104.242600	GON	0.002600	0.000400
2 5	R2_A	145.995350	115.225400	GON	0.002500	0.000800
2 6	R2_A	170.383700	112.077550	GON	0.000600	0.000300
2 1	R2_B	111.545050	100.552000	GON	0.002500	0.000800
2 5	R2_B	145.366000	113.160250	GON	0.002000	0.000100
2 6	R2_B	169.608650	110.278700	GON	0.001100	0.001000
2 5	R2_C	143.918400	112.017750	GON	0.000600	0.001700

2 6	R2_C	167.796950	109.400250	GON	0.001100	0.001700
2 1	R1_A	139.096100	103.699350	GON	0.003000	0.000500
2 5	R1_A	157.268700	112.880900	GON	0.001000	0.000400
2 6	R1_A	176.099850	109.976450	GON	0.001500	0.001700
2 1	R1_B	138.386050	100.738900	GON	0.003100	0.000600
2 5	R1_B	156.741300	111.250850	GON	0.001400	0.000100
2 6	R1_B	175.549100	108.575550	GON	0.001400	0.000700
2 5	R1_C	155.270900	110.216050	GON	0.000000	0.001100
2 6	R1_C	173.991000	107.760750	GON	0.000600	0.000100
2 1	P_1A	35.891400	99.376200	GON	0.001800	0.001000
2 5	P_1A	71.596500	113.465000	GON	0.001200	0.001400
2 6	P_1A	94.061350	118.711450	GON	0.003100	0.002100
2 1	P_1B	33.271650	102.400750	GON	0.001100	0.001500
2 5	P_1B	69.833000	117.805100	GON	0.002000	0.001200
2 6	P_1B	93.446650	126.347900	GON	0.002500	0.002400
2 1	Q1_2B	36.626550	102.618400	GON	0.003500	0.000400
2 5	Q1_2B	77.293550	118.746000	GON	0.001100	0.000600
2 6	Q1_2B	107.258550	126.300000	GON	0.003100	0.002600
2 1	Q2_2B	56.383650	103.738150	GON	0.003700	0.000300
2 5	Q2_2B	109.670500	119.916800	GON	0.002600	0.000000
2 6	Q2_2B	147.302900	119.970000	GON	0.002400	0.000200
2 1	Q3_2B	95.153700	104.844000	GON	0.002200	0.001800
2 5	Q3_2B	138.534000	116.925750	GON	0.001600	0.000500
2 6	Q3_2B	166.515750	113.845400	GON	0.001300	0.000200
2 1	P_2A	116.756050	98.737300	GON	0.003100	0.000800
2 5	P_2A	146.641350	111.446250	GON	0.001900	0.000700
2 6	P_2A	169.358400	108.842250	GON	0.000400	0.000100
2 1	P_2B	118.247350	104.695850	GON	0.004700	0.000700
2 5	P_2B	148.771650	115.005150	GON	0.000100	0.000100
2 6	P_2B	171.915000	111.826750	GON	0.001800	0.002300
2 1	P_3B	137.489850	104.098400	GON	0.000900	0.000600
2 5	P_3B	156.650800	113.243750	GON	0.003600	0.000700
2 6	P_3B	175.867200	110.275600	GON	0.000800	0.000200
2 1	P_3A	134.807200	98.909550	GON	0.003000	0.000300
2 5	P_3A	154.527400	110.183450	GON	0.001000	0.000500
2 6	P_3A	173.587350	107.725000	GON	0.000700	0.000200
2 5	CEN_IP	58.943100	114.976050	GON	0.001000	0.001100
2 6	CEN_IP	70.052300	121.760600	GON	0.004000	0.002600
2 1	CEN_US	155.345150	102.924150	GON	0.003100	0.000100



## APPENDIX B

AIMS III  
JOB SUMMARY

Job Name: TRIPC

Date: 07/02/92

Coordinate Systems:

6 - BUNDLE NEW                      FIXED CNTL

JOB SUMMARY

VALUES SHOWN IN:    RH    -MM-    -GRAD-

TAR	CS	COORDINATES			POINTING	APEX	TARGET
No.	No.	X	Y	Z	ERROR	ANGLE	NAME
1	6	6120.1062	727.6560	1288.3766	0.0273		SB_1L
2	6	6149.5094	-1269.6707	1387.4084	0.0274		SB_1R
3	6	6612.1118	-1071.3373	1672.1252	0.0223		WALL_1
4	6	6600.0885	2010.5428	1524.1744	0.0295		WALL_2
5	6	5647.2405	3605.6353	1065.3275	0.0273		WALL_3
6	6	4070.1577	3563.2294	501.7399	0.0218		WALL_4
7	6	2829.1441	3624.1396	1743.5424	0.0242		WALL_5
8	6	1021.8482	3581.8220	1069.2529	0.0216		WALL_6
9	6	6628.8557	-4230.2220	2105.0707	0.0387		WALL_7
10	6	5049.2212	0.0688	0.5451	0.0201		CEN_IP
11	6	-997.1106	-0.4006	-1.7185	0.0128		CEN_US
12	6	4306.9157	8.7767	169.7246	0.0596		P_1A
13	6	4306.7731	170.7876	-10.1633	0.0336		P_1B
14	6	4306.9006	-170.1877	9.7937	0.0139		P_1D
15	6	708.5409	9.2141	171.2579	0.0653		P_2A
16	6	708.7758	170.9906	-10.3211	0.0055		P_2B
17	6	707.0128	-169.4963	10.2511	0.0252		P_2D

18	6	70.2881	9.0534	169.8032	0.0460	P_3A
19	6	70.3081	170.3544	-10.7511	0.0100	P_3B
20	6	68.7460	-170.4122	9.9049	0.0206	P_3D
21	6	3954.2020	170.4260	-9.9723	0.0108	Q1_2B
22	6	3954.2342	-169.9845	10.0907	0.0094	Q1_2D
23	6	2652.0053	170.7542	-9.6288	0.0087	Q2_2B
24	6	2652.1299	-169.8904	10.4648	0.0156	Q2_2D
25	6	1350.0187	171.3170	-9.7303	0.0152	Q3_2B
26	6	1350.0297	-169.4115	10.3530	0.0151	Q3_2D
27	6	0.0614	160.5222	0.0181	0.0152	R1_A
28	6	0.8712	125.0148	100.2367	0.0132	R1_B
29	6	3.5212	10.4146	159.7488	0.0439	R1_C
30	6	0.5153	-110.8927	115.7057	0.0127	R1_D
31	6	2.1643	-160.4999	5.2414	0.0142	R1_E
32	6	889.7462	160.5238	5.1978	0.0163	R2_A
33	6	890.2583	116.9248	110.2715	0.0148	R2_B
34	6	892.0234	1.6401	160.6346	0.0194	R2_C
35	6	892.4746	-110.7766	116.3134	0.0162	R2_D
36	6	893.1430	-160.4459	5.0061	0.0201	R2_E
37	6	2159.7517	160.5755	-0.1895	0.0055	R3_A
38	6	2160.9729	118.6638	108.6224	0.0157	R3_B
39	6	2162.6420	2.5868	160.9319	0.0161	R3_C
40	6	2162.4220	-110.0054	117.3151	0.0094	R3_D
41	6	2162.7137	-160.0613	12.1596	0.0121	R3_E
42	6	3432.3730	160.3837	-7.2499	0.0046	R4_A
43	6	3432.7385	121.5678	105.1301	0.0215	R4_B
44	6	3431.4463	4.1899	160.6382	0.0306	R4_C
45	6	3432.6648	-109.6814	117.2362	0.0176	R4_D
46	6	3432.7296	-158.2750	25.8524	0.0118	R4_E
47	6	4395.4968	160.4285	-2.6328	0.0234	R5_A



48	6	4396.7153	118.8231	107.4442	0.0190	R5_B
49	6	4396.9207	-1.5105	160.1042	0.0266	R5_C
50	6	4395.8944	-112.4955	114.0177	0.0136	R5_D
51	6	4397.9594	-160.0842	10.1304	0.0164	R5_E

AIMS III

COORDINATE SYSTEM DETAIL

Job Name: TRIPC

Date: 07/02/92

COORDINATE SYSTEM DETAIL

VALUES SHOWN IN: RH -MM- -GRAD-

CS No. 6 Name: BUNDLE NEW Comment: FIXED CNTL  
Scale Factor: 1.0000000 (Mutual 1-2) Zenith: 70.7000

Theodolite Positions

	X	Y	Z	(Mutual)Azimuth.
1	1070.6776	-2117.7184	133.6744	3.6834
2	2611.2235	-2117.6744	894.4025	3.4487
3	3927.0638	-1803.9924	791.2671	1.0162
4	1181.7281	1911.3872	132.1476	1.2837
5	2956.5239	2650.2113	802.2741	1.8194
6	4130.5424	1812.2463	712.2270	0.3165

Rotation:

3.6506 399.9498 0.3471

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B U N D L I N G      C A L I B R A T I O N      R E P O R T

=====

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P R E L I M I N A R Y      D A T A

=====

Job Name: TRIPC

Date : 07/23/92

Time : 06:12:02

Number of Theodolites : 6  
 Number of Targets : 22  
 Number of Observations : 104  
 Number of Calibration Bars : 1  
 Number of Shots/Target : 1

\*\*\*\*\*  
 \* First Approximations for Theodolite Positions \*  
 \*\*\*\*\*

Theo. ID.	X	Y	Z	Azimuth(Grad)
1	1059.334	-2112.847	255.630	100.0000
2	2599.458	-2077.446	1016.254	300.0000
3	3916.718	-1777.576	896.422	102.6774
4	1191.811	1909.528	23.032	102.4177
5	2969.897	2673.373	651.334	101.8266
6	4140.117	1827.790	610.284	103.3631

-----  
 Coordinates are Given in the System Obtained by Orienting to the  
 Control Points.

Azimuth Angles are Given in the Theodolite Coordinate System.  
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\*\*\*\*\*  
 \* First Approximations for Target Coordinates \*  
 \*\*\*\*\*

Targ. ID.	X	Y	Z
SB_1L	6120.164	727.389	1288.332
SB_1R	6149.223	-1269.948	1387.341
WALL_1	6612.083	-1071.532	1672.126
WALL_2	6600.186	2010.346	1524.113
WALL_3	5647.247	3605.405	1065.411
WALL_4	4070.346	3563.230	501.739

WALL_5	2829.216	3624.045	1743.637
WALL_6	1021.851	3581.824	1069.253
WALL_7	6629.015	-4230.243	2104.996
P_1A	4307.212	8.639	169.643
P_2A	708.777	8.771	171.237
P_3A	70.467	8.670	169.709
R1_C	2.887	10.684	159.292
R2_C	892.061	1.506	160.382
R3_C	2162.916	2.137	160.867
R4_C	3431.628	3.780	160.592
R5_C	4397.243	-1.605	159.965
CEN_IP	5049.998	0.349	0.232
CEN_US	-997.997	0.164	-1.943
R1_A	-10.137	147.062	-0.475
R5_E	4398.225	-160.319	10.133
Q2_2B	2652.916	168.675	-9.916

-----  
Coordinates are Given in the System Obtained by Orienting to the  
Control Points.  
-----

-----  
Control Points and their Desired Variances to Which the First Approximation  
Results were Oriented. (Pending Bundle will also be Oriented to These Points)  
-----

Targ. ID.	X	var X	Y	var Y	Z	var Z
WALL_1	6612.104	1.000	-1071.386	1.000	1672.126	0.000
WALL_4	4070.175	1.000	3563.230	0.000	501.739	0.000
WALL_6	1021.851	0.000	3581.824	0.000	1069.253	0.000

\*\*\*\*\*  
\* Calibration Bar Observations \*  
\*\*\*\*\*

From	To	Distance	sd
SB_1L	SB_1R	2000.000	0.001

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O U T P U T  
=====

\*\* Iteration stopped due to small corrections \*\*

\*\* Number of Iteration : 4 \*\*

\*\*\*\*\*  
\* BUNDLE CALIBRATION FINAL VALUES \*  
\*\*\*\*\*

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Residuals of Observations (in Ground Coordinate System, in inches)

Target ID.	Theodolite ID.	Horizontal Direction	Vertical Direction
SB_1L	1	-0.0651	0.0256
	2	-0.0141	0.0380
	3	0.0083	-0.0408
	4	0.0406	-0.0084
	5	0.0070	0.0115
	6	-0.0054	0.0230
SB_1R	1	-0.0625	-0.0112
	2	0.0068	0.0098
	3	0.0117	-0.0061
	4	0.0290	-0.0048
	5	-0.0380	0.0384
	6	0.0108	0.0394
WALL_1	1	-0.0553	-0.0162
	2	0.0110	-0.0071
	3	0.0029	-0.0093
	4	0.0233	-0.0083
	5	-0.0013	0.0430
	6	-0.0001	0.0092
WALL_2	1	-0.0736	0.0601
	2	-0.0073	0.0421
	3	0.0059	-0.0303
	4	0.0435	-0.0020
	5	-0.0044	0.0143
	6	0.0038	-0.0002
WALL_3	1	-0.0232	-0.1049
	2	0.0442	0.1597
	3	0.0006	-0.0449
	5	0.0523	0.0018
	6	-0.0197	0.0429
	WALL_4	1	0.0023
2		-0.0027	-0.0211
3		-0.0000	-0.0065
4		0.0742	-0.0076
6		0.0000	0.0065
WALL_5		1	-0.0131
	2	0.0000	-0.0015
	3	0.0054	0.0141
	4	0.0171	0.0119
	6	-0.0114	0.0406
	WALL_6	1	-0.0000
2		-0.0056	-0.0231
3		0.0245	0.0889
4		0.0002	0.0008
5		-0.0344	0.0181
6		-0.0158	-0.0058
WALL_7	1	-0.1469	0.0076
	2	-0.0092	-0.0453

	3	0.0430	0.0160
	4	-0.0068	-0.0516
	5	0.0250	-0.1696
	6	-0.0154	0.0045
P_1A	1	0.0782	0.0651
	2	0.0022	-0.0443
	3	0.0001	0.0153
	4	-0.0246	-0.0091
	5	-0.0112	-0.0170
	6	-0.0001	-0.0154
P_2A	1	-0.0000	0.0709
	2	0.0208	-0.0538
	3	-0.0171	0.0346
	4	-0.0000	-0.0655
	5	-0.0053	-0.1260
	6	-0.0238	-0.0236
P_3A	1	-0.0025	-0.0830
	2	0.0310	0.0127
	3	0.0477	0.0176
	4	-0.0014	0.0675
	5	0.0067	0.0309
	6	-0.0250	0.0073
R1_C	2	0.0072	0.0218
	3	-0.0388	-0.0192
	5	-0.0081	0.0535
	6	0.0377	-0.0041
R2_C	2	0.0006	0.0134
	3	-0.0015	0.0044
	5	-0.0011	0.0119
	6	0.0034	0.0053
R3_C	2	-0.0002	-0.0093
	3	0.0213	0.0163
	5	0.0006	-0.0444
	6	-0.0236	0.0057
R4_C	2	-0.0050	0.0049
	3	-0.0020	0.0028
	5	-0.0019	-0.0322
	6	-0.0033	-0.0377
R5_C	2	0.0323	0.0057
	3	-0.0006	-0.0180
	5	0.0204	-0.0225
	6	-0.0005	0.0190
CEN_IP	2	0.0266	-0.0002
	3	-0.0026	-0.0206
	5	0.0249	0.0358
	6	-0.0048	0.0113
CEN_US	1	0.0000	-0.0273
	4	0.0001	0.0252

R1_A	4	0.0002	0.0144
	5	-0.0125	-0.0354
	6	0.0211	-0.0167
R5_E	1	0.0383	0.0215
	2	-0.0202	-0.0152
	3	0.0002	-0.0012
Q2_2B	4	-0.0033	0.0017
	5	-0.0000	-0.0002
	6	-0.0015	0.0096

Adjusted Distances and Residuals

From	To	Distance (Measured)	Residual	Distance (Fit)
SB_1L	SB_1R	2000.0000	-0.0000	2000.0000

Final Theodolite Parameters and Standard Deviations

Theo. ID.	X (inch) sd(X:inch)	Y sd(Y)	Z sd(Z)	Azimuth (Grad) sd(Az:Grad)
1	1058.992 0.000	-2112.416 0.000	255.675 0.000	99.9966 0.0010
2	2599.270 0.036	-2077.182 0.001	1016.393 0.019	299.9942 0.0012
3	3916.822 0.050	-1777.061 0.029	896.492 0.017	102.6630 0.0012
4	1192.151 0.060	1909.372 0.070	23.335 0.010	102.3959 0.0011
5	2970.737 0.085	2675.678 0.077	651.398 0.018	101.8608 0.0012
6	4140.152 0.078	1827.525 0.069	610.449 0.016	103.3632 0.0012

Coordinates are Given in the System Obtained by Orienting  
to the Control Points.  
Azimuth Angles are Given in the Theodolite Coordinate System.

Final Target Coordinates and Standard Deviations

Targ. ID.	X	sd(X)	Y	sd(Y)	Z	sd(Z)
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SB_1L	6120.146	0.092	727.684	0.083	1288.380	0.030
SB_1R	6149.588	0.085	-1269.646	0.074	1387.410	0.030
WALL_1	6612.181	0.096	-1071.304	0.083	1672.126	0.036
WALL_2	6600.106	0.112	2010.555	0.104	1524.166	0.036
WALL_3	5647.189	0.117	3605.531	0.110	1065.305	0.027
WALL_4	4070.201	0.104	3563.230	0.100	501.739	0.017
WALL_5	2829.150	0.096	3624.164	0.093	1743.549	0.033
WALL_6	1021.851	0.087	3581.824	0.100	1069.253	0.024
WALL_7	6628.871	0.113	-4230.089	0.097	2105.057	0.040
P_1A	4306.997	0.060	8.801	0.049	169.749	0.013
P_2A	708.566	0.028	9.157	0.055	171.283	0.008
P_3A	70.307	0.029	9.025	0.054	169.818	0.013
R1_C	3.533	0.049	10.365	0.065	159.774	0.029
R2_C	892.072	0.035	1.600	0.050	160.654	0.022
R3_C	2162.725	0.036	2.554	0.037	160.955	0.014
R4_C	3431.522	0.049	4.181	0.039	160.663	0.013
R5_C	4396.992	0.061	-1.528	0.050	160.121	0.013
CEN_IP	5049.288	0.070	0.070	0.059	0.565	0.017
CEN_US	-997.115	0.045	-0.420	0.066	-1.698	0.025
R1_A	0.025	0.064	160.439	0.094	0.043	0.020
R5_E	4398.018	0.060	-160.106	0.060	10.171	0.021
Q2_2B	2652.087	0.043	170.734	0.041	-9.619	0.014

-----  
Coordinates are Given in the System Obtained by Orienting  
to the Control Points.  
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\*\*\*\*\*  
\* Bundle Calibration RMS Error = 0.035 \*  
\*\*\*\*\*

\*\*\*\*\*  
\* RESULTS OF ORIENTING THE BUNDLE \*  
\* \*  
\* TO KNOWN CONTROL POINTS \*  
\*\*\*\*\*

-----  
Control Points (and Desired Variances) to Which the Bundle was Oriented  
-----

Targ. ID.	X	var X	Y	var Y	Z	var Z
WALL_1	6612.104	1.000	-1071.386	1.000	1672.126	0.000
WALL_4	4070.175	1.000	3563.230	0.000	501.739	0.000
WALL_6	1021.851	0.000	3581.824	0.000	1069.253	0.000

-----  
Distance Between Bundle Points and Their Corresponding Control Points  
-----

Targ. ID.	X	dif X	Y	dif Y	Z	dif Z
WALL_1	6612.181	-0.077	-1071.304	-0.082	1672.126	0.000
WALL_4	4070.201	-0.026	3563.230	0.000	501.739	-0.000
WALL_6	1021.851	0.000	3581.824	-0.000	1069.253	0.000



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\*\*\*\*\*  
\* RMS Error from Orienting Procedure = 0.066 \*  
\*\*\*\*\*

-----  
(1) Time to reorder theodolites(in seconds) : 0.00  
(2) Time to build normal eq. of theodolites : 6.10  
(3) Time to solve for theodolites : 0.93  
(4) Time to solve for targets : 2.04  
(5) Time to compute statistics : 5.49  
(6) Main computation time ((1) + ... + (5)) : 14.56  
(7) Total run time including I/O : 15.76

\*\*\*\*\* End of File \*\*\*\*\*

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07/23/92  
06:20:03

STANFORD LINEAR ACCELERATOR  
J O B F I L E R E C A P

POINT NAME ORIENTATION	X X DOUBT	Y Y DOUBT	Z Z DOUBT	METH TEMP	DATE TIME
R1_B BUNORT	0.82164 0.01504	124.91392 0.02125	100.25727 0.00538	X-Y-Z 68 F	07/23/92 06:14:18
R1_D BUNORT	0.54716 0.01261	-110.95395 0.02155	115.71036 0.00633	X-Y-Z 68 F	07/23/92 06:14:28
R1_E BUNORT	2.19680 0.01046	-160.56778 0.01750	5.25528 0.00533	X-Y-Z 68 F	07/23/92 06:14:38
R2_A BUNORT	889.76290 0.00037	160.45109 0.00219	5.20543 0.00032	X-Y-Z 68 F	07/23/92 06:14:49
R2_B BUNORT	890.26782 0.00253	116.84318 0.01545	110.29844 0.00198	X-Y-Z 68 F	07/23/92 06:14:57
R2_D BUNORT	892.49505 0.00089	-110.81032 0.00998	116.31202 0.00121	X-Y-Z 68 F	07/23/92 06:15:05
R2_E BUNORT	893.15270 0.00115	-160.45039 0.01268	5.00372 0.00177	X-Y-Z 68 F	07/23/92 06:15:15
R3_A BUNORT	2159.8217 0.00113	160.53834 0.00310	-0.18546 0.00261	X-Y-Z 68 F	07/23/92 06:15:24
R3_B BUNORT	2161.0463 0.00345	118.61271 0.00966	108.61867 0.00803	X-Y-Z 68 F	07/23/92 06:15:31
R3_D BUNORT	2162.4864 0.00269	-109.95871 0.01122	117.30161 0.00738	X-Y-Z 68 F	07/23/92 06:15:39
R3_E BUNORT	2162.7809 0.00294	-160.01472 0.01207	12.14245 0.00834	X-Y-Z 68 F	07/23/92 06:15:47
R4_A BUNORT	3432.4567 0.00063	160.39754 0.00248	-7.23957 0.00245	X-Y-Z 68 F	07/23/92 06:16:01
R4_B BUNORT	3432.8313 0.00189	121.61005 0.00749	105.13911 0.00740	X-Y-Z 68 F	07/23/92 06:16:08
R4_D BUNORT	3432.7412 0.00245	-109.71925 0.00793	117.27590 0.00700	X-Y-Z 68 F	07/23/92 06:16:16
R4_E BUNORT	3432.8061 0.00275	-158.33106 0.00884	25.90692 0.00788	X-Y-Z 68 F	07/23/92 06:16:24
R5_A BUNORT	4395.5718 0.00265	160.44477 0.01561	-2.61536 0.00737	X-Y-Z 68 F	07/23/92 06:16:36
R5_B BUNORT	4396.7929 0.00148	118.81539 0.00892	107.44107 0.00361	X-Y-Z 68 F	07/23/92 06:16:43

R5_D	4395.9578	-112.50786	114.05254	X-Y-Z	07/23/92
BUNORT	0.00264	0.00943	0.00415	68 F	06:16:53
P_1B	4306.8487	170.78588	-10.16708	X-Y-Z	07/23/92
BUNORT	0.00120	0.01063	0.00501	68 F	06:17:03
P_1D	4306.9544	-170.22029	9.84694	X-Y-Z	07/23/92
BUNORT	0.00386	0.01661	0.00837	68 F	06:17:11
P_2B	708.77432	170.90846	-10.30519	X-Y-Z	07/23/92
BUNORT	0.00236	0.00846	0.00166	68 F	06:17:18
P_2D	707.03688	-169.54312	10.24356	X-Y-Z	07/23/92
BUNORT	0.00363	0.01907	0.00382	68 F	06:17:25
P_3B	70.27419	170.27116	-10.73353	X-Y-Z	07/23/92
BUNORT	0.01194	0.01744	0.00460	68 F	06:17:35
P_3D	68.78937	-170.48706	9.91057	X-Y-Z	07/23/92
BUNORT	0.01378	0.02460	0.00738	68 F	06:17:42
Q3_2D	1350.0536	-169.40827	10.33837	X-Y-Z	07/23/92
BUNORT	0.00110	0.00747	0.00224	68 F	06:17:53
Q1_2B	3954.2764	170.42388	-9.95737	X-Y-Z	07/23/92
BUNORT	0.00062	0.00568	0.00259	68 F	06:18:06
Q1_2D	3954.3032	-169.99634	10.12671	X-Y-Z	07/23/92
BUNORT	0.00010	0.00564	0.00273	68 F	06:18:15
Q2_2D	2652.2253	-169.90514	10.47496	X-Y-Z	07/23/92
BUNORT	0.00054	0.02458	0.01134	68 F	06:18:25
Q3_2B	1350.0557	171.24942	-9.71406	X-Y-Z	07/23/92
BUNORT	0.00039	0.00390	0.00087	68 F	06:18:35

\*\*\*\*\*  
 \*\*\*\*\* END OF RECAP FOR JOB FILE TRIPC \*\*\*\*\*  
 \*\*\*\*\*

1 Jul 1992 Begin @ 1:49:26

KERN BUNDLE ADJUSTMENT V3.00

FROM PROG = PROCESS  
PROJECT = SLD TRIPLET C  
TASK = SLD TRIPLET C TB LOCATION  
MEAS DATE = Mon, Sep-24-90

CURV/REF = 0 0.000 0.000  
#LINES AP = 0  
CON SIGMA = 1.0E-01  
BLUN. DET = NO  
PARAM 1 = 0.0  
PARAM 2 = 0.0  
ERR PROP = NO  
HOLD CTRL = NO  
FREE NET = 0  
ANG PARAM = 1  
LISTING = LONG  
UNITS =  
THEO OBS =  
SIM FILES =  
LIST FILE =  
MAX ITER = 10

51 - Total number of object points  
51 - Number of object points used  
6 - Number of stations

XYZ Position corrections	77.95778	74.50157	201.24202
XYZ Position corrections	2.79221	8.19296	4.78527
XYZ Position corrections	0.01831	0.01770	0.01511

Solution converged

Object point residuals (mm)

CEN_IP		
1	5	0.01492
1	6	0.00868
2	5	0.02138
2	6	0.00869
RMS		0.01441
CEN_US		
1	1	0.00572
2	1	0.00566
RMS		0.00569
P_1A		
1	1	0.07927
1	5	0.02611
1	6	0.00824
2	1	0.01645
2	5	0.03525
2	6	0.01989
RMS		0.03861
P_1B		
2	1	0.04932
2	5	0.01545
2	6	0.00927

		RMS	0.03031
P_1D			
	1	1	0.02954
	1	5	0.01682
	1	6	0.00401
		RMS	0.01976
P_2A			
	1	1	0.04673
	1	5	0.05526
	1	6	0.03915
	2	1	0.03004
	2	5	0.09393
	2	6	0.04498
		RMS	0.05556
P_2B			
	2	1	0.00055
	2	5	0.00404
	2	6	0.00311
		RMS	0.00296
P_2D			
	1	1	0.01336
	1	5	0.01497
	1	6	0.02955
		RMS	0.02062
P_3A			
	1	1	0.01511
	1	5	0.02381
	1	6	0.01918
	2	1	0.01412
	2	5	0.03184
	2	6	0.03735
		RMS	0.02507
P_3B			
	2	1	0.00443
	2	5	0.02159
	2	6	0.01094
		RMS	0.01421
P_3D			
	1	1	0.00740
	1	5	0.01034
	1	6	0.02200
		RMS	0.01467
Q1_2B			
	2	1	0.01653
	2	5	0.01106
	2	6	0.00716
		RMS	0.01220
Q1_2D			
	1	1	0.01430
	1	5	0.01129
	1	6	0.00352
		RMS	0.01071
Q2_2B			
	2	1	0.01457
	2	5	0.01260
	2	6	0.00534
		RMS	0.01154
Q2_2D			
	1	1	0.01363

	1	5	0.00513
	1	6	0.01143
RMS			0.01069
Q3_2B			
	2	1	0.00121
	2	5	0.01413
	2	6	0.01288
RMS			0.01106
Q3_2D			
	1	1	0.01068
	1	5	0.01255
	1	6	0.00854
RMS			0.01072
R1_A			
	2	1	0.01094
	2	5	0.02172
	2	6	0.03123
RMS			0.02285
R1_B			
	2	1	0.00424
	2	5	0.02753
	2	6	0.02184
RMS			0.02043
R1_C			
	1	5	0.01727
	1	6	0.06603
	2	5	0.07585
	2	6	0.02835
RMS			0.05295
R1_D			
	1	1	0.00072
	1	5	0.00172
	1	6	0.00356
RMS			0.00232
R1_E			
	1	1	0.01162
	1	5	0.02142
	1	6	0.03063
RMS			0.02260
R2_A			
	2	1	0.00729
	2	5	0.01517
	2	6	0.01501
RMS			0.01302
R2_B			
	2	1	0.00329
	2	5	0.02417
	2	6	0.01728
RMS			0.01726
R2_C			
	1	5	0.00874
	1	6	0.01554
	2	5	0.02089
	2	6	0.00737
RMS			0.01422
R2_D			
	1	1	0.00442
	1	5	0.01719
	1	6	0.02395

			RMS	0.01721
R2_E				
	1	1		0.00434
	1	5		0.02341
	1	6		0.02750
			RMS	0.02100
R3_A				
	2	1		0.00274
	2	5		0.00515
	2	6		0.00367
			RMS	0.00398
R3_B				
	2	1		0.01211
	2	5		0.01782
	2	6		0.00370
			RMS	0.01262
R3_C				
	1	5		0.01324
	1	6		0.01837
	2	5		0.00596
	2	6		0.01162
			RMS	0.01307
R3_D				
	1	1		0.00262
	1	5		0.00129
	1	6		0.00472
			RMS	0.00320
R3_E				
	1	1		0.00352
	1	5		0.00500
	1	6		0.00271
			RMS	0.00386
R4_A				
	2	1		0.00802
	2	5		0.00235
	2	6		0.00403
			RMS	0.00535
R4_B				
	2	1		0.00999
	2	5		0.02570
	2	6		0.01522
			RMS	0.01818
R4_C				
	1	5		0.00651
	1	6		0.00757
	2	5		0.03785
	2	6		0.01841
			RMS	0.02163
R4_D				
	1	1		0.01604
	1	5		0.01252
	1	6		0.00306
			RMS	0.01188
R4_E				
	1	1		0.01144
	1	5		0.00638
	1	6		0.00477
			RMS	0.00805
R5_A				

	2	1	0.01719
	2	5	0.02973
	2	6	0.00673
	RMS		0.02020
R5_B			
	2	1	0.01814
	2	5	0.01407
	2	6	0.00595
	RMS		0.01369
R5_C			
	1	5	0.01808
	1	6	0.01334
	2	5	0.02544
	2	6	0.00285
	RMS		0.01703
R5_D			
	1	1	0.00274
	1	5	0.00753
	1	6	0.00298
	RMS		0.00494
R5_E			
	1	1	0.01460
	1	5	0.01405
	1	6	0.00356
	RMS		0.01188
SB_1L			
	1	1	0.04527
	1	5	0.03621
	1	6	0.03221
	2	1	0.01163
	2	5	0.01008
	2	6	0.02305
	RMS		0.02934
SB_1R			
	1	1	0.06169
	1	5	0.03056
	1	6	0.00570
	2	1	0.03385
	2	5	0.03755
	2	6	0.03179
	RMS		0.03728
WALL_1			
	1	1	0.06525
	1	5	0.03089
	1	6	0.01239
	2	1	0.02321
	2	5	0.02504
	2	6	0.00443
	RMS		0.03304
WALL_2			
	1	1	0.08592
	1	5	0.02368
	1	6	0.01233
	2	1	0.01418
	2	5	0.02350
	2	6	0.02033
	RMS		0.03929
WALL_3			
	1	1	0.06852



1	5	0.03999
1	6	0.02306
2	5	0.00676
2	6	0.01690
RMS		0.03783
WALL_4		
1	1	0.01411
1	5	0.06861
1	6	0.03617
2	1	0.01080
2	6	0.00874
RMS		0.03580
WALL_5		
1	1	0.05715
1	5	0.04728
1	6	0.00920
2	1	0.01872
2	6	0.01449
RMS		0.03506
WALL_6		
1	1	0.04089
1	5	0.05539
1	6	0.02518
2	1	0.00499
2	5	0.01065
2	6	0.03391
RMS		0.03332
WALL_7		
1	1	0.02753
1	5	0.04594
1	6	0.01301
2	1	0.02507
2	5	0.13744
2	6	0.03520
RMS		0.06297
Total RMS		0.02790

Final station parameters (Gon & mm)

1	1				
Angles :	-3.651340	-0.030085	3.334390	(Omega-Phi-Kappa)	
Coords :	1058.97781	-2112.47020	255.70181		
1	5				
Angles :	-3.650941	-0.030137	3.099040	(Omega-Phi-Kappa)	
Coords :	2599.13212	-2077.15986	1016.36990		
1	6				
Angles :	-3.650490	-0.030329	0.666206	(Omega-Phi-Kappa)	
Coords :	3916.69727	-1777.09011	896.44552		
2	1				
Angles :	-3.650442	-0.030080	0.933744	(Omega-Phi-Kappa)	
Coords :	1192.12599	1909.36885	23.31468		
2	5				
Angles :	-3.650698	-0.030376	1.469529	(Omega-Phi-Kappa)	
Coords :	2970.65986	2675.66106	651.39770		
2	6				
Angles :	-3.650763	-0.030310	-0.033213	(Omega-Phi-Kappa)	
Coords :	4140.09457	1827.50605	610.44536		

Final object point coords (mm)

	Z	X	Y
CEN_IP	5049.21612	0.03881	0.54557
CEN_US	-997.20725	-0.41406	-1.72074
P_1A	4306.91283	8.74469	169.72305
P_1B	4306.77117	170.76129	-10.16815
P_1D	4306.87593	-170.25784	9.81615
P_2A	708.51653	9.21424	171.25426
P_2B	708.73036	170.95217	-10.33845
P_2D	706.99761	-169.51052	10.25697
P_3A	70.24777	9.05287	169.79853
P_3B	70.23227	170.30868	-10.76835
P_3D	68.69079	-170.39574	9.90145
Q1_2B	3954.20023	170.40169	-9.97729
Q1_2D	3954.21880	-170.05019	10.11011
Q2_2B	2652.00263	170.72782	-9.64004
Q2_2D	2652.13816	-169.93757	10.47857
Q3_2B	1349.99658	171.28679	-9.74481
Q3_2D	1350.03253	-169.42683	10.35734
R1_A	-0.01278	160.48113	0.00015
R1_B	0.79618	124.97178	100.22247
R1_C	3.51583	10.41234	159.74180
R1_D	0.44539	-110.86002	115.70271
R1_E	2.08688	-160.46232	5.23303
R2_A	889.70862	160.47931	5.17807
R2_B	890.22099	116.89019	110.25931
R2_C	892.01928	1.63491	160.62828
R2_D	892.46204	-110.77739	116.31678
R2_E	893.12832	-160.44250	5.00606
R3_A	2159.74536	160.54933	-0.20203
R3_B	2160.96368	118.63672	108.60975
R3_C	2162.64185	2.57109	160.92880
R3_D	2162.43441	-110.04474	117.32581
R3_E	2162.72692	-160.09995	12.17107
R4_A	3432.37167	160.35848	-7.25825
R4_B	3432.73861	121.54292	105.12158
R4_C	3431.44262	4.16325	160.63735
R4_D	3432.66199	-109.73809	117.25043
R4_E	3432.72601	-158.33406	25.86916
R5_A	4395.50342	160.39244	-2.63900
R5_B	4396.71305	118.79597	107.43915
R5_C	4396.91429	-1.53747	160.10375
R5_D	4395.87102	-112.56454	114.03486
R5_E	4397.93240	-160.15965	10.14626
SB_1L	6120.10728	727.61336	1288.37966
SB_1R	6149.49835	-1269.71716	1387.40960
WALL_1	6612.10068	-1071.38614	1672.12609
WALL_2	6600.09913	2010.49956	1524.17991
WALL_3	5647.25608	3605.59846	1065.33209
WALL_4	4070.17102	3563.23055	501.73911
WALL_5	2829.14676	3624.13152	1743.54803
WALL_6	1021.85077	3581.82417	1069.25310
WALL_7	6628.79850	-4230.25119	2105.05633

Control point errors (mm)

	Z	X	Y
WALL_1			0.00009
WALL_4		0.00055	0.00011
WALL_6	-0.00023	0.00017	0.00010
Control RMS	0.00023	0.00041	0.00010

Completed @ 1:49:41

Page: 1  
Job name: TRIPC Date: 07-01-92 10:08  
Coordinate system: BASE RHR

FULL-ORIENTATION  
BEGINNING MEAN ERROR = 87445.5655

ITERATION 1  
MEAN ERROR = 1.6348  
PERCENT CHANGE = 99.9981

ITERATION 2  
MEAN ERROR = 0.8427  
PERCENT CHANGE = 48.4519

ITERATION 3  
MEAN ERROR = 0.8427  
PERCENT CHANGE = 0.0000

SOLUTION SUCCESSFUL

Length units: MM Angle units: GN Coordinate system type: RHR  
Error limit = 0.00092

STATION PARAMETERS FOR STATION 1  
LOCATION = 1058.98276 -2112.47047 255.69371  
ROTATION = 396.34886 399.96989 303.33443

COLLIMATION MEASUREMENT TO STATION 1  
FROM STATION 2 H = 203.44320 V = 129.20010

STATION PARAMETERS FOR STATION 2  
LOCATION = 2599.13481 -2077.16092 1016.36627  
ROTATION = 396.34913 399.96983 303.09906

COLLIMATION MEASUREMENT TO STATION 2  
FROM STATION 1 H = 3.67890 V = 70.80000

STATION PARAMETERS FOR STATION 3  
LOCATION = 3916.70064 -1777.09014 896.44608  
ROTATION = 396.34947 399.96967 300.66622

STATION PARAMETERS FOR STATION 4  
LOCATION = 1192.12720 1909.36473 23.31238  
ROTATION = 396.34950 399.96990 300.93380

STATION PARAMETERS FOR STATION 5  
LOCATION = 2970.66195 2675.66073 651.39687  
ROTATION = 396.34929 399.96963 301.46955

STATION PARAMETERS FOR STATION 6  
LOCATION = 4140.09710 1827.50625 610.44551  
ROTATION = 396.34925 399.96968 299.96681

Coordinates | X [MM] | Y [MM] | Z [MM] |  
 =====

SCALE BAR MEASUREMENT OF POSITION 1 NOMINAL SCALE BAR LENGTH = 2000.00000

POINT ON END 1 POINTING ERROR = -0.00062  
 COORDINATES = 6120.11793 727.61293 1288.38525  
 EST DEV OUT = 0.05554 0.05539 0.01746  
 FROM STATION 1 H = 371.39730 -0.00032 V = 87.04420 -0.00034  
 FROM STATION 2 H = 360.50225 0.00001 V = 93.91085 0.00045  
 FROM STATION 3 H = 346.93800 0.00055 V = 89.83950 0.00034  
 FROM STATION 4 H = 16.77450 0.00013 V = 85.33065 0.00006  
 FROM STATION 5 H = 37.21655 0.00006 V = 91.11400 0.00004  
 FROM STATION 6 H = 33.14590 -0.00011 V = 83.30840 -0.00072

POINT ON END 2 POINTING ERROR = 0.00062  
 COORDINATES = 6149.50064 -1269.72334 1387.40940  
 EST DEV OUT = 0.06602 0.05588 0.02106  
 FROM STATION 1 H = 393.69925 -0.00029 V = 85.71000 0.00062  
 FROM STATION 2 H = 389.24920 0.00024 V = 92.76465 0.00053  
 FROM STATION 3 H = 387.23040 0.00033 V = 85.79580 -0.00006  
 FROM STATION 4 H = 37.89135 0.00016 V = 87.52200 -0.00031  
 FROM STATION 5 H = 58.57095 -0.00030 V = 93.68370 -0.00029  
 FROM STATION 6 H = 63.69090 0.00036 V = 89.88060 -0.00045

CALCULATED SCALE BAR LENGTH = 2000.00532

RESULTS OF POINT CEN\_IP POINTING ERROR = -0.00031  
 COORDINATES = 5049.21932 0.03939 0.54489  
 EST DEV OUT = 0.05410 0.04763 0.02056  
 FROM STATION 2 H = 357.50545 0.00030 V = 117.14280 0.00006  
 FROM STATION 3 H = 336.00610 -0.00025 V = 122.51665 0.00000  
 FROM STATION 5 H = 58.94310 0.00025 V = 114.97605 -0.00031  
 FROM STATION 6 H = 70.05230 -0.00022 V = 121.76060 0.00016  
 DESCRIPTOR -

RESULTS OF POINT CEN\_US POINTING ERROR = -0.00013  
 COORDINATES = -997.20136 -0.41745 -1.72204  
 EST DEV OUT = 0.05741 0.05465 0.05031  
 FROM STATION 1 H = 254.35620 -0.00001 V = 102.90480 -0.00013  
 FROM STATION 4 H = 155.34515 -0.00001 V = 102.92415 0.00013  
 DESCRIPTOR -

RESULTS OF POINT P\_1A \*\*\*\*\* MAX POINTING ERROR EXCEEDED = -0.00096  
 COORDINATES = 4306.91556 8.74509 169.72290  
 EST DEV OUT = 0.05057 0.04397 0.02024  
 FROM STATION 1 H = 366.48230 0.00089 V = 99.43945 -0.00096  
 FROM STATION 2 H = 346.10205 0.00030 V = 116.55460 -0.00054  
 FROM STATION 3 H = 314.06965 -0.00007 V = 120.52810 -0.00029  
 FROM STATION 4 H = 35.89140 -0.00025 V = 99.37620 0.00018  
 FROM STATION 5 H = 71.59650 -0.00003 V = 113.46500 0.00075  
 FROM STATION 6 H = 94.06135 0.00041 V = 118.71145 0.00055  
 DESCRIPTOR -

RESULTS OF POINT P\_1B POINTING ERROR = 0.00087  
 COORDINATES = 4306.77438 170.75995 -10.16861  
 EST DEV OUT = 0.05176 0.05169 0.02393  
 FROM STATION 4 H = 33.27165 -0.00026 V = 102.40075 0.00087  
 FROM STATION 5 H = 69.83300 -0.00019 V = 117.80510 -0.00029

FROM STATION 6 H = 93.44665 0.00017 V = 126.34790 -0.00029  
DESCRIPTOR -

RESULTS OF POINT P\_1D POINTING ERROR = -0.00049  
COORDINATES = 4306.88002 -170.25543 9.81455  
EST DEV OUT = 0.05569 0.05293 0.02811  
FROM STATION 1 H = 368.86665 0.00000 V = 102.27870 -0.00049  
FROM STATION 2 H = 348.69635 -0.00022 V = 121.13280 0.00034  
FROM STATION 3 H = 315.39190 0.00015 V = 127.79040 0.00002  
DESCRIPTOR -

RESULTS OF POINT P\_2A \*\*\*\*\* MAX POINTING ERROR EXCEEDED = -0.00167  
COORDINATES = 708.52022 9.21273 171.25276  
EST DEV OUT = 0.04306 0.03957 0.03772  
FROM STATION 1 H = 292.92005 -0.00026 V = 98.88990 0.00134  
FROM STATION 2 H = 256.89910 0.00066 V = 115.82425 0.00100  
FROM STATION 3 H = 233.58900 0.00001 V = 110.59530 0.00067  
FROM STATION 4 H = 116.75605 0.00014 V = 98.73730 -0.00095  
FROM STATION 5 H = 146.64135 0.00005 V = 111.44625 -0.00167  
FROM STATION 6 H = 169.35840 -0.00014 V = 108.84225 -0.00072  
DESCRIPTOR -

RESULTS OF POINT P\_2B POINTING ERROR = 0.00005  
COORDINATES = 708.73367 170.95160 -10.33879  
EST DEV OUT = 0.04592 0.05147 0.03835  
FROM STATION 4 H = 118.24735 -0.00001 V = 104.69585 0.00000  
FROM STATION 5 H = 148.77165 0.00005 V = 115.00515 -0.00004  
FROM STATION 6 H = 171.91500 -0.00003 V = 111.82675 0.00005  
DESCRIPTOR -

RESULTS OF POINT P\_2D POINTING ERROR = 0.00045  
COORDINATES = 707.00105 -169.51206 10.25558  
EST DEV OUT = 0.04982 0.04904 0.04134  
FROM STATION 1 H = 291.98555 -0.00007 V = 104.27480 -0.00043  
FROM STATION 2 H = 254.24890 -0.00015 V = 120.17780 0.00029  
FROM STATION 3 H = 230.98175 0.00027 V = 113.72585 0.00045  
DESCRIPTOR -

RESULTS OF POINT P\_3A POINTING ERROR = -0.00055  
COORDINATES = 70.25245 9.05100 169.79744  
EST DEV OUT = 0.04518 0.04186 0.04156  
FROM STATION 1 H = 275.58710 0.00005 V = 99.01320 -0.00042  
FROM STATION 2 H = 247.67680 -0.00013 V = 113.72695 -0.00045  
FROM STATION 3 H = 228.86495 0.00029 V = 109.22415 0.00002  
FROM STATION 4 H = 134.80720 0.00014 V = 98.90955 0.00039  
FROM STATION 5 H = 154.52740 0.00007 V = 110.18345 0.00052  
FROM STATION 6 H = 173.58735 -0.00055 V = 107.72500 0.00000  
DESCRIPTOR -

RESULTS OF POINT P\_3B POINTING ERROR = -0.00033  
COORDINATES = 70.23890 170.30983 -10.76881  
EST DEV OUT = 0.06375 0.06179 0.04235  
FROM STATION 4 H = 137.48985 -0.00001 V = 104.09840 0.00012  
FROM STATION 5 H = 156.65080 -0.00009 V = 113.24375 -0.00033  
FROM STATION 6 H = 175.86720 0.00013 V = 110.27560 0.00012  
DESCRIPTOR -

RESULTS OF POINT P\_3D POINTING ERROR = 0.00028  
COORDINATES = 68.69570 -170.39812 9.89971

EST DEV OUT =		0.05760	0.05676	0.04586		
FROM STATION 1	H =	273.45715	-0.00002	V =	103.87960	-0.00022
FROM STATION 2	H =	245.07055	-0.00014	V =	117.33955	0.00012
FROM STATION 3	H =	226.51980	0.00021	V =	111.88325	0.00028
DESCRIPTOR -						

RESULTS OF POINT Q1_2B				POINTING ERROR =	0.00025	
COORDINATES =		3954.20334	170.39934	-9.97815		
EST DEV OUT =		0.04948	0.04789	0.02418		
FROM STATION 4	H =	36.62655	0.00024	V =	102.61840	-0.00019
FROM STATION 5	H =	77.29355	-0.00016	V =	118.74600	-0.00021
FROM STATION 6	H =	107.25855	0.00006	V =	126.30000	0.00025
DESCRIPTOR -						

RESULTS OF POINT Q1_2D				POINTING ERROR =	0.00029	
COORDINATES =		3954.22200	-170.04871	10.10895		
EST DEV OUT =		0.05314	0.04934	0.02777		
FROM STATION 1	H =	365.54955	-0.00022	V =	102.46330	0.00011
FROM STATION 2	H =	341.57420	0.00029	V =	122.88585	0.00002
FROM STATION 3	H =	302.09470	-0.00010	V =	128.43075	-0.00007
DESCRIPTOR -						

RESULTS OF POINT Q2_2B				POINTING ERROR =	-0.00036	
COORDINATES =		2652.00525	170.72612	-9.64080		
EST DEV OUT =		0.04448	0.04174	0.02851		
FROM STATION 4	H =	56.38365	0.00013	V =	103.73815	-0.00036
FROM STATION 5	H =	109.67050	-0.00005	V =	119.91680	0.00029
FROM STATION 6	H =	147.30290	0.00000	V =	119.97000	0.00013
DESCRIPTOR -						

RESULTS OF POINT Q2_2D				POINTING ERROR =	-0.00034	
COORDINATES =		2652.14090	-169.93822	10.47783		
EST DEV OUT =		0.05016	0.04317	0.03107		
FROM STATION 1	H =	346.88890	0.00001	V =	103.38700	-0.00034
FROM STATION 2	H =	304.80520	-0.00017	V =	127.23850	0.00002
FROM STATION 3	H =	259.12570	0.00013	V =	123.12255	0.00030
DESCRIPTOR -						

RESULTS OF POINT Q3_2B				POINTING ERROR =	0.00030	
COORDINATES =		1349.99888	171.28515	-9.74538		
EST DEV OUT =		0.04099	0.04522	0.03474		
FROM STATION 4	H =	95.15370	0.00000	V =	104.84400	-0.00004
FROM STATION 5	H =	138.53400	0.00005	V =	116.92575	0.00030
FROM STATION 6	H =	166.51575	-0.00008	V =	113.84540	-0.00024
DESCRIPTOR -						

RESULTS OF POINT Q3_2D				POINTING ERROR =	-0.00033	
COORDINATES =		1350.03618	-169.42867	10.35620		
EST DEV OUT =		0.04898	0.04458	0.03740		
FROM STATION 1	H =	312.74640	-0.00015	V =	104.30230	-0.00033
FROM STATION 2	H =	267.00105	0.00012	V =	123.36715	0.00029
FROM STATION 3	H =	237.13620	-0.00002	V =	116.13565	0.00020
DESCRIPTOR -						

RESULTS OF POINT R1_A				POINTING ERROR =	-0.00036	
COORDINATES =		-0.00592	160.48202	0.00011		
EST DEV OUT =		0.06658	0.06324	0.04282		
FROM STATION 4	H =	139.09610	-0.00001	V =	103.69935	0.00032
FROM STATION 5	H =	157.26870	-0.00021	V =	112.88090	-0.00028

FROM STATION 6 H = 176.09985 0.00024 V = 109.97645 -0.00036  
DESCRIPTOR -

RESULTS OF POINT R1\_B POINTING ERROR = 0.00037  
COORDINATES = 0.80207 124.97220 100.22199  
EST DEV OUT = 0.06555 0.06316 0.04261  
FROM STATION 4 H = 138.38605 -0.00012 V = 100.73890 0.00001  
FROM STATION 5 H = 156.74130 0.00037 V = 111.25085 -0.00024  
FROM STATION 6 H = 175.54910 -0.00018 V = 108.57555 0.00025  
DESCRIPTOR -

RESULTS OF POINT R1\_C \*\*\*\*\* MAX POINTING ERROR EXCEEDED = 0.00116  
COORDINATES = 3.51882 10.41138 159.74093  
EST DEV OUT = 0.05109 0.04328 0.04412  
FROM STATION 2 H = 246.88970 0.00016 V = 113.69830 -0.00031  
FROM STATION 3 H = 228.46985 -0.00050 V = 109.23940 -0.00082  
FROM STATION 5 H = 155.27090 -0.00034 V = 110.21605 0.00116  
FROM STATION 6 H = 173.99100 0.00038 V = 107.76075 -0.00006  
DESCRIPTOR -

RESULTS OF POINT R1\_D POINTING ERROR = -0.00004  
COORDINATES = 0.45036 -110.86248 115.70072  
EST DEV OUT = 0.05844 0.05788 0.04515  
FROM STATION 1 H = 272.42765 0.00001 V = 100.68835 0.00000  
FROM STATION 2 H = 245.07850 -0.00004 V = 114.92235 0.00001  
FROM STATION 3 H = 226.84915 0.00004 V = 110.07765 -0.00001  
DESCRIPTOR -

RESULTS OF POINT R1\_E POINTING ERROR = -0.00036  
COORDINATES = 2.09205 -160.46441 5.23062  
EST DEV OUT = 0.05908 0.05780 0.04637  
FROM STATION 1 H = 271.89230 0.00003 V = 103.92535 0.00032  
FROM STATION 2 H = 244.43080 0.00025 V = 117.11460 -0.00031  
FROM STATION 3 H = 226.26665 -0.00036 V = 111.76435 -0.00024  
DESCRIPTOR -

RESULTS OF POINT R2\_A POINTING ERROR = 0.00026  
COORDINATES = 889.71254 160.47890 5.17761  
EST DEV OUT = 0.04358 0.04943 0.03729  
FROM STATION 4 H = 111.86020 0.00009 V = 104.24260 -0.00025  
FROM STATION 5 H = 145.99535 -0.00013 V = 115.22540 0.00026  
FROM STATION 6 H = 170.38370 0.00003 V = 112.07755 0.00025  
DESCRIPTOR -

RESULTS OF POINT R2\_B POINTING ERROR = -0.00045  
COORDINATES = 890.22381 116.88918 110.25846  
EST DEV OUT = 0.04375 0.04992 0.03714  
FROM STATION 4 H = 111.54505 -0.00006 V = 100.55200 0.00010  
FROM STATION 5 H = 145.36600 0.00011 V = 113.16025 -0.00045  
FROM STATION 6 H = 169.60865 0.00000 V = 110.27870 0.00028  
DESCRIPTOR -

RESULTS OF POINT R2\_C POINTING ERROR = 0.00039  
COORDINATES = 892.02228 1.63291 160.62747  
EST DEV OUT = 0.04648 0.03972 0.03821  
FROM STATION 2 H = 259.99930 -0.00007 V = 116.75545 -0.00020  
FROM STATION 3 H = 235.11655 -0.00002 V = 111.26750 -0.00027  
FROM STATION 5 H = 143.91840 -0.00013 V = 112.01775 0.00039  
FROM STATION 6 H = 167.79695 0.00002 V = 109.40025 0.00011



DESCRIPTOR -

RESULTS OF POINT R2\_D POINTING ERROR = 0.00043  
 COORDINATES = 892.46581 -110.77896 116.31564  
 EST DEV OUT = 0.04862 0.04760 0.03917  
 FROM STATION 1 H = 298.06275 -0.00012 V = 100.76930 0.00006  
 FROM STATION 2 H = 258.34990 0.00043 V = 118.39655 0.00001  
 FROM STATION 3 H = 233.39765 -0.00041 V = 112.34065 -0.00012  
 DESCRIPTOR -

RESULTS OF POINT R2\_E POINTING ERROR = -0.00055  
 COORDINATES = 893.13189 -160.44384 5.00456  
 EST DEV OUT = 0.04915 0.04743 0.04014  
 FROM STATION 1 H = 297.96680 0.00007 V = 104.46165 0.00011  
 FROM STATION 2 H = 257.67985 -0.00001 V = 121.13810 -0.00055  
 FROM STATION 3 H = 232.70915 -0.00012 V = 114.42490 0.00049  
 DESCRIPTOR -

RESULTS OF POINT R3\_A POINTING ERROR = -0.00009  
 COORDINATES = 2159.74741 160.54755 -0.20277  
 EST DEV OUT = 0.04264 0.04210 0.03076  
 FROM STATION 4 H = 68.69710 0.00005 V = 103.95710 -0.00006  
 FROM STATION 5 H = 121.64550 -0.00009 V = 118.85285 0.00003  
 FROM STATION 6 H = 156.14550 0.00006 V = 117.06070 0.00005  
 DESCRIPTOR -

RESULTS OF POINT R3\_B POINTING ERROR = -0.00041  
 COORDINATES = 2160.96603 118.63562 108.60954  
 EST DEV OUT = 0.04274 0.04270 0.03046  
 FROM STATION 4 H = 69.39115 -0.00013 V = 100.55975 0.00036  
 FROM STATION 5 H = 121.25615 0.00012 V = 116.18095 -0.00041  
 FROM STATION 6 H = 155.21465 -0.00002 V = 114.42180 -0.00009  
 DESCRIPTOR -

RESULTS OF POINT R3\_C POINTING ERROR = 0.00041  
 COORDINATES = 2162.64427 2.57051 160.92821  
 EST DEV OUT = 0.04603 0.03855 0.03035  
 FROM STATION 2 H = 290.19415 -0.00032 V = 120.78270 0.00021  
 FROM STATION 3 H = 251.81540 0.00041 V = 115.58915 -0.00022  
 FROM STATION 5 H = 120.38075 0.00009 V = 114.55240 -0.00008  
 FROM STATION 6 H = 153.02720 -0.00027 V = 112.98085 0.00005  
 DESCRIPTOR -

RESULTS OF POINT R3\_D POINTING ERROR = -0.00012  
 COORDINATES = 2162.43730 -110.04534 117.32470  
 EST DEV OUT = 0.04898 0.04311 0.03227  
 FROM STATION 1 H = 335.33565 0.00001 V = 100.66375 0.00006  
 FROM STATION 2 H = 289.50360 0.00001 V = 123.14425 0.00004  
 FROM STATION 3 H = 249.82755 -0.00001 V = 117.27570 -0.00012  
 DESCRIPTOR -

RESULTS OF POINT R3\_E POINTING ERROR = 0.00013  
 COORDINATES = 2162.72994 -160.10116 12.17008  
 EST DEV OUT = 0.04960 0.04291 0.03318  
 FROM STATION 1 H = 335.94015 -0.00001 V = 103.71970 -0.00010  
 FROM STATION 2 H = 289.21745 -0.00004 V = 126.49315 0.00013  
 FROM STATION 3 H = 249.00325 0.00007 V = 120.08190 -0.00003  
 DESCRIPTOR -

RESULTS OF POINT R4 A POINTING ERROR = -0.00015  
 COORDINATES = 3432.37432 160.35714 -7.25869  
 EST DEV OUT = 0.04739 0.04417 0.02550  
 FROM STATION 4 H = 43.05275 0.00002 V = 102.95365 -0.00015  
 FROM STATION 5 H = 89.73045 0.00007 V = 119.64310 -0.00002  
 FROM STATION 6 H = 126.06975 -0.00004 V = 124.26720 0.00013  
 DESCRIPTOR -

RESULTS OF POINT R4 B POINTING ERROR = -0.00049  
 COORDINATES = 3432.74107 121.54071 105.12099  
 EST DEV OUT = 0.04738 0.04482 0.02495  
 FROM STATION 4 H = 43.83885 -0.00014 V = 100.48515 -0.00015  
 FROM STATION 5 H = 89.92590 0.00039 V = 116.80340 -0.00049  
 FROM STATION 6 H = 125.42540 -0.00016 V = 120.35865 0.00047  
 DESCRIPTOR -

RESULTS OF POINT R4 C POINTING ERROR = 0.00085  
 COORDINATES = 3431.44554 4.16350 160.63671  
 EST DEV OUT = 0.04844 0.04292 0.02385  
 FROM STATION 2 H = 326.83590 -0.00008 V = 119.83200 0.00014  
 FROM STATION 3 H = 284.07295 -0.00016 V = 120.61225 -0.00019  
 FROM STATION 5 H = 90.47215 -0.00029 V = 115.00255 0.00085  
 FROM STATION 6 H = 123.91775 -0.00013 V = 117.77700 -0.00055  
 DESCRIPTOR -

RESULTS OF POINT R4 D POINTING ERROR = -0.00033  
 COORDINATES = 3432.66444 -109.73768 117.24940  
 EST DEV OUT = 0.05067 0.04612 0.02723  
 FROM STATION 1 H = 358.64470 0.00009 V = 100.50225 0.00032  
 FROM STATION 2 H = 328.05100 0.00000 V = 122.00075 -0.00033  
 FROM STATION 3 H = 283.08705 -0.00007 V = 123.33845 0.00006  
 DESCRIPTOR -

RESULTS OF POINT R4 E POINTING ERROR = -0.00021  
 COORDINATES = 3432.72864 -158.33338 25.86828  
 EST DEV OUT = 0.05123 0.04573 0.02824  
 FROM STATION 1 H = 359.32780 0.00009 V = 102.44880 -0.00021  
 FROM STATION 2 H = 328.54325 -0.00019 V = 124.80615 0.00002  
 FROM STATION 3 H = 282.65460 0.00010 V = 126.77935 0.00013  
 DESCRIPTOR -

RESULTS OF POINT R5 A POINTING ERROR = -0.00063  
 COORDINATES = 4395.50726 160.39027 -2.64004  
 EST DEV OUT = 0.05261 0.05297 0.02393  
 FROM STATION 4 H = 32.68265 -0.00010 V = 102.22685 0.00029  
 FROM STATION 5 H = 68.20745 0.00019 V = 117.35085 -0.00063  
 FROM STATION 6 H = 90.08020 -0.00004 V = 125.80855 0.00024  
 DESCRIPTOR -

RESULTS OF POINT R5 B POINTING ERROR = 0.00034  
 COORDINATES = 4396.71691 118.79390 107.43821  
 EST DEV OUT = 0.05265 0.05387 0.02295  
 FROM STATION 4 H = 33.40045 0.00003 V = 100.34895 0.00034  
 FROM STATION 5 H = 68.70860 -0.00032 V = 114.89325 -0.00002  
 FROM STATION 6 H = 90.31090 0.00016 V = 121.64870 -0.00016  
 DESCRIPTOR -

RESULTS OF POINT R5 C POINTING ERROR = 0.00053  
 COORDINATES = 4396.91769 -1.53681 160.10296

EST DEV OUT =	0.05116	0.04637	0.02053	
FROM STATION 2	H = 347.84935	0.00041	V = 116.48980	0.00015
FROM STATION 3	H = 317.12450	-0.00023	V = 120.72335	-0.00037
FROM STATION 5	H = 69.98855	0.00005	V = 113.45370	0.00053
FROM STATION 6	H = 90.95485	-0.00005	V = 118.84445	-0.00008

DESCRIPTOR -

RESULTS OF POINT R5\_D POINTING ERROR = 0.00016

COORDINATES =	4395.87431	-112.56318	114.03386	
EST DEV OUT =	0.05613	0.05484	0.02671	
FROM STATION 1	H = 368.89365	-0.00002	V = 100.46395	-0.00001
FROM STATION 2	H = 349.48115	0.00006	V = 118.11385	0.00016
FROM STATION 3	H = 318.08075	-0.00002	V = 123.50685	-0.00011

DESCRIPTOR -

RESULTS OF POINT R5\_E POINTING ERROR = -0.00024

COORDINATES =	4397.93595	-160.15744	10.14521	
EST DEV OUT =	0.05660	0.05408	0.02828	
FROM STATION 1	H = 369.49600	0.00022	V = 102.21485	0.00012
FROM STATION 2	H = 350.17740	-0.00022	V = 120.61295	-0.00024
FROM STATION 3	H = 318.56425	0.00004	V = 127.30055	0.00010

DESCRIPTOR -

RESULTS OF POINT WALL\_1 POINTING ERROR = 0.00069

INPUT COORD =	6612.10364	-1071.38557	1672.12639	
CORRECTION =	0.00118	0.00024	0.00000	
COORDINATES =	6612.10482	-1071.38533	1672.12639	
STD DEV IN =	0.10000	0.10000	0.00001	
EST DEV OUT =	0.06306	0.06244	0.00001	
FROM STATION 1	H = 392.45820	-0.00010	V = 83.74410	0.00069
FROM STATION 2	H = 388.05350	0.00017	V = 89.15065	-0.00044
FROM STATION 3	H = 385.37885	-0.00007	V = 81.84695	0.00025
FROM STATION 4	H = 33.74250	-0.00002	V = 85.22200	-0.00021
FROM STATION 5	H = 52.81725	0.00010	V = 90.36650	-0.00028
FROM STATION 6	H = 55.61200	0.00006	V = 85.50700	-0.00005

DESCRIPTOR -

RESULTS OF POINT WALL\_2 POINTING ERROR = -0.00066

COORDINATES =	6600.10184	2010.50091	1524.17986	
EST DEV OUT =	0.05821	0.05482	0.02497	
FROM STATION 1	H = 363.20630	-0.00031	V = 86.29540	-0.00066
FROM STATION 2	H = 352.69990	-0.00020	V = 91.78000	0.00021
FROM STATION 3	H = 340.24825	0.00012	V = 88.48675	0.00012
FROM STATION 4	H = 0.75790	-0.00012	V = 82.75960	-0.00010
FROM STATION 5	H = 13.83580	-0.00010	V = 85.92540	-0.00041
FROM STATION 6	H = 396.59770	0.00024	V = 77.21415	0.00043

DESCRIPTOR -

RESULTS OF POINT WALL\_3 POINTING ERROR = 0.00067

COORDINATES =	5647.25924	3605.60014	1065.33293	
EST DEV OUT =	0.05492	0.05919	0.02592	
FROM STATION 1	H = 346.69225	-0.00001	V = 90.17360	0.00067
FROM STATION 2	H = 334.49965	0.00024	V = 96.31385	0.00033
FROM STATION 3	H = 320.53560	0.00025	V = 94.63355	-0.00012
FROM STATION 5	H = 380.72090	0.00004	V = 89.61010	0.00012
FROM STATION 6	H = 345.25120	-0.00021	V = 84.97485	-0.00039

DESCRIPTOR -

RESULTS OF POINT WALL\_4 POINTING ERROR = -0.00062

INPUT COORD =	4070.17532	3563.23028	501.73910	
CORRECTION =	-0.00196	0.00000	0.00000	
COORDINATES =	4070.17336	3563.23028	501.73910	
STD DEV IN =	0.10000	0.00001	0.00001	
EST DEV OUT =	0.03686	0.00001	0.00001	
FROM STATION 1	H = 334.49915	-0.00009	V = 94.35335	0.00001
FROM STATION 2	H = 319.28470	-0.00062	V = 102.08075	-0.00037
FROM STATION 3	H = 302.49045	-0.00041	V = 101.04685	-0.00018
FROM STATION 4	H = 368.23540	0.00017	V = 89.10660	0.00005
FROM STATION 6	H = 297.40810	0.00029	V = 100.32950	0.00014

DESCRIPTOR -

RESULTS OF POINT WALL 5 POINTING ERROR = 0.00065

COORDINATES =	2829.14824	3624.13190	1743.54874	
EST DEV OUT =	0.02512	0.02722	0.02114	
FROM STATION 1	H = 322.69800	0.00021	V = 81.05620	0.00065
FROM STATION 2	H = 305.69505	-0.00022	V = 88.28400	-0.00044
FROM STATION 3	H = 287.89080	0.00000	V = 86.70415	-0.00015
FROM STATION 4	H = 351.41375	0.00012	V = 57.45790	-0.00044
FROM STATION 6	H = 258.67575	0.00018	V = 67.05435	0.00034

DESCRIPTOR -

RESULTS OF POINT WALL 6 POINTING ERROR = -0.00054

INPUT COORD =	1021.85052	3581.82440	1069.25293	
CORRECTION =	0.00000	0.00000	0.00000	
COORDINATES =	1021.85052	3581.82440	1069.25293	
STD DEV IN =	0.00001	0.00001	0.00001	
EST DEV OUT =	0.00001	0.00001	0.00001	
FROM STATION 1	H = 302.92085	0.00041	V = 87.31455	-0.00004
FROM STATION 2	H = 285.76065	-0.00049	V = 95.90255	-0.00038
FROM STATION 3	H = 269.04440	0.00003	V = 94.96880	0.00024
FROM STATION 4	H = 294.24580	0.00004	V = 60.93370	0.00011
FROM STATION 5	H = 228.49400	0.00009	V = 86.22530	0.00030
FROM STATION 6	H = 232.13945	-0.00021	V = 90.07555	-0.00054

DESCRIPTOR -

RESULTS OF POINT WALL 7 \*\*\*\*\* MAX POINTING ERROR EXCEEDED = 0.00107

COORDINATES =	6628.80398	-4230.25239	2105.05503	
EST DEV OUT =	0.10189	0.09618	0.04205	
FROM STATION 1	H = 27.47980	0.00007	V = 82.19525	0.00014
FROM STATION 2	H = 35.05515	-0.00013	V = 86.87405	-0.00066
FROM STATION 3	H = 48.30355	0.00015	V = 82.16880	-0.00011
FROM STATION 4	H = 55.34670	-0.00016	V = 86.93745	0.00006
FROM STATION 5	H = 70.72600	0.00027	V = 91.53500	0.00107
FROM STATION 6	H = 75.42310	-0.00035	V = 89.10725	0.00002

DESCRIPTOR -

```

3333333333 DDDDDDDDD          CCC          DDDDDDDDD
3333333333 DDDDDDDDD          CCCCCCCC   DDDDDDDDD
          333 DDD          DDD          CCC          CCC   DDD          DDD
          333 DDD          DDD          CCC          CCC   DDD          DDD
3333333333 DDD          DDD          CCC          CCC   DDD          DDD
3333333333 DDD          DDD          CCC          CCC   DDD          DDD
          333 DDD          DDD          CCC          CCC   DDD          DDD
          333 DDD          DDD          CCC          CCC   DDD          DDD
3333333333 DDDDDDDDD          CCCCCCCC   DDDDDDDDD
3333333333 DDDDDDDDD          CCC          DDDDDDDDD

```

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Bundle Adjustment Output File

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SLAC Three-Dimensional Coordinate Determination

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```

Job Id   : SLD TRIPLET C
Part Id  : SLD TRIPLET C TB LOCATION
Date     : Mon, Sep-24-90
File     : D:\SIMS\DATA\TRIPC.3DD
Run      : 07-01-92 at 10:43:20

```

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```

6  Number of stations
51 Total number of object points
1  Number of distances
0  Number of height differences
191 Total number of angle observation pairs

```

Iteration Summary

	X	Y	Z
XYZ Position Corrections :	324.65629	186.14558	119.94577
XYZ Position Corrections :	275.90728	164.74719	87.46091
XYZ Position Corrections :	9.04215	13.61821	3.13829
XYZ Position Corrections :	0.09090	0.10306	0.09390
XYZ Position Corrections :	0.00003	0.00006	0.00001

BUNDLE: Solution has converged after 5 iterations

Reference standard deviation = 0.87  
 Degrees of freedom = 200

Horizontal and vertical angle residuals (gons)

1 1	SB_1L	0.00037	-0.00032
1 5	SB_1L	0.00008	0.00051
1 6	SB_1L	-0.00041	0.00046
2 1	SB_1L	-0.00012	0.00010
2 5	SB_1L	-0.00011	0.00013
2 6	SB_1L	0.00004	-0.00061
1 1	SB_1R	0.00037	0.00066
1 5	SB_1R	-0.00012	0.00053
1 6	SB_1R	-0.00013	-0.00008
2 1	SB_1R	-0.00009	-0.00035
2 5	SB_1R	0.00035	-0.00029
2 6	SB_1R	-0.00030	-0.00046
1 1	WALL_7	-0.00008	0.00026
1 5	WALL_7	0.00012	-0.00063
1 6	WALL_7	-0.00014	-0.00017
2 1	WALL_7	0.00018	0.00000
2 5	WALL_7	-0.00027	0.00106
2 6	WALL_7	0.00034	0.00002
1 1	WALL_1	0.00008	0.00072
1 5	WALL_1	-0.00018	-0.00043
1 6	WALL_1	0.00008	0.00025
2 1	WALL_1	0.00003	-0.00023
2 5	WALL_1	-0.00010	-0.00028
2 6	WALL_1	-0.00006	-0.00004
1 1	WALL_2	0.00030	-0.00072
1 5	WALL_2	0.00020	0.00018
1 6	WALL_2	-0.00012	0.00015
2 1	WALL_2	0.00014	-0.00010
2 5	WALL_2	0.00010	-0.00039
2 6	WALL_2	-0.00025	0.00044
1 1	WALL_3	0.00002	0.00057
1 5	WALL_3	-0.00024	0.00030
1 6	WALL_3	-0.00025	-0.00009
2 5	WALL_3	-0.00004	0.00015
2 6	WALL_3	0.00021	-0.00038
1 1	WALL_4	0.00010	-0.00010
1 5	WALL_4	0.00063	-0.00040

1 6	WALL_4	0.00041	-0.00015
2 1	WALL_4	-0.00018	0.00010
2 6	WALL_4	-0.00028	0.00014
1 1	WALL_5	-0.00022	0.00055
1 5	WALL_5	0.00023	-0.00046
1 6	WALL_5	-0.00001	-0.00011
2 1	WALL_5	-0.00012	-0.00040
2 6	WALL_5	-0.00016	0.00034
1 1	WALL_6	-0.00043	-0.00015
1 5	WALL_6	0.00048	-0.00040
1 6	WALL_6	-0.00006	0.00027
2 1	WALL_6	-0.00004	0.00016
2 5	WALL_6	-0.00006	0.00030
2 6	WALL_6	0.00022	-0.00055
1 1	R5_E	-0.00020	0.00011
1 5	R5_E	0.00022	-0.00024
1 6	R5_E	-0.00004	0.00011
1 1	R5_D	0.00003	-0.00002
1 5	R5_D	-0.00006	0.00016
1 6	R5_D	0.00001	-0.00010
1 5	R5_C	-0.00039	0.00015
1 6	R5_C	0.00022	-0.00036
2 5	R5_C	-0.00005	0.00053
2 6	R5_C	0.00005	-0.00009
1 1	R4_E	-0.00008	-0.00022
1 5	R4_E	0.00018	0.00002
1 6	R4_E	-0.00010	0.00013
1 1	R4_D	-0.00008	0.00031
1 5	R4_D	0.00000	-0.00033
1 6	R4_D	0.00007	0.00007
1 5	R4_C	0.00010	0.00014
1 6	R4_C	0.00015	-0.00019
2 5	R4_C	0.00029	0.00085
2 6	R4_C	0.00014	-0.00056
1 1	R3_E	0.00002	-0.00009
1 5	R3_E	0.00003	0.00014
1 6	R3_E	-0.00006	-0.00004
1 1	R3_D	-0.00001	0.00007
1 5	R3_D	-0.00002	0.00004
1 6	R3_D	0.00001	-0.00013
1 5	R3_C	0.00033	0.00022
1 6	R3_C	-0.00042	-0.00022
2 5	R3_C	-0.00009	-0.00008
2 6	R3_C	0.00027	0.00005
1 1	R2_E	-0.00007	0.00012
1 5	R2_E	0.00001	-0.00056
1 6	R2_E	0.00012	0.00048
1 1	R2_D	0.00012	0.00007
1 5	R2_D	-0.00043	0.00001
1 6	R2_D	0.00041	-0.00014
1 5	R2_C	0.00006	-0.00018
1 6	R2_C	0.00002	-0.00027
2 5	R2_C	0.00013	0.00038
2 6	R2_C	-0.00002	0.00010
1 1	R1_E	-0.00003	0.00033
1 5	R1_E	-0.00025	-0.00031

1 6	R1_E	0.00037	-0.00026
1 1	R1_D	-0.00001	0.00001
1 5	R1_D	0.00004	0.00001
1 6	R1_D	-0.00003	-0.00003
1 5	R1_C	-0.00017	-0.00029
1 6	R1_C	0.00050	-0.00082
2 5	R1_C	0.00034	0.00115
2 6	R1_C	-0.00038	-0.00007
1 1	P_1A	-0.00087	-0.00096
1 5	P_1A	-0.00029	-0.00054
1 6	P_1A	0.00006	-0.00028
2 1	P_1A	0.00022	0.00017
2 5	P_1A	0.00002	0.00075
2 6	P_1A	-0.00040	0.00054
1 1	P_1D	0.00001	-0.00051
1 5	P_1D	0.00021	0.00034
1 6	P_1D	-0.00015	0.00003
1 1	Q1_2D	0.00023	0.00010
1 5	Q1_2D	-0.00029	0.00001
1 6	Q1_2D	0.00010	-0.00007
1 1	Q2_2D	-0.00001	-0.00034
1 5	Q2_2D	0.00016	0.00003
1 6	Q2_2D	-0.00013	0.00030
1 1	Q3_2D	0.00015	-0.00032
1 5	Q3_2D	-0.00012	0.00029
1 6	Q3_2D	0.00003	0.00018
1 1	P_2A	0.00025	0.00136
1 5	P_2A	-0.00067	0.00101
1 6	P_2A	-0.00001	0.00066
2 1	P_2A	-0.00013	-0.00095
2 5	P_2A	-0.00006	-0.00169
2 6	P_2A	0.00013	-0.00073
1 1	P_2D	0.00007	-0.00042
1 5	P_2D	0.00015	0.00029
1 6	P_2D	-0.00026	0.00043
1 1	P_3D	0.00002	-0.00021
1 5	P_3D	0.00014	0.00012
1 6	P_3D	-0.00020	0.00026
1 1	P_3A	-0.00005	-0.00040
1 5	P_3A	0.00013	-0.00044
1 6	P_3A	-0.00029	0.00001
2 1	P_3A	-0.00013	0.00039
2 5	P_3A	-0.00008	0.00050
2 6	P_3A	0.00054	-0.00002
1 5	CEN_IP	-0.00028	0.00006
1 6	CEN_IP	0.00024	0.00001
2 5	CEN_IP	-0.00025	-0.00031
2 6	CEN_IP	0.00023	0.00015
1 1	CEN_US	0.00001	-0.00012
2 1	CEN_US	0.00001	0.00012
2 1	R5_A	0.00010	0.00028
2 5	R5_A	-0.00019	-0.00062
2 6	R5_A	0.00005	0.00025
2 1	R5_B	-0.00004	0.00033
2 5	R5_B	0.00032	-0.00002
2 6	R5_B	-0.00016	-0.00016



2 1	R4_A	-0.00003	-0.00017
2 5	R4_A	-0.00006	-0.00001
2 6	R4_A	0.00003	0.00013
2 1	R4_B	0.00013	-0.00016
2 5	R4_B	-0.00038	-0.00049
2 6	R4_B	0.00016	0.00048
2 1	R3_A	-0.00006	-0.00006
2 5	R3_A	0.00010	0.00004
2 6	R3_A	-0.00007	0.00005
2 1	R3_B	0.00013	0.00036
2 5	R3_B	-0.00011	-0.00041
2 6	R3_B	0.00001	-0.00008
2 1	R2_A	-0.00009	-0.00025
2 5	R2_A	0.00013	0.00026
2 6	R2_A	-0.00003	0.00024
2 1	R2_B	0.00006	0.00011
2 5	R2_B	-0.00011	-0.00046
2 6	R2_B	0.00000	0.00028
2 1	R1_A	0.00001	0.00033
2 5	R1_A	0.00020	-0.00029
2 6	R1_A	-0.00024	-0.00037
2 1	R1_B	0.00013	0.00002
2 5	R1_B	-0.00039	-0.00025
2 6	R1_B	0.00018	0.00024
2 1	P_1B	0.00025	0.00085
2 5	P_1B	0.00019	-0.00028
2 6	P_1B	-0.00017	-0.00028
2 1	Q1_2B	-0.00025	-0.00021
2 5	Q1_2B	0.00016	-0.00021
2 6	Q1_2B	-0.00006	0.00026
2 1	Q2_2B	-0.00014	-0.00037
2 5	Q2_2B	0.00006	0.00029
2 6	Q2_2B	-0.00001	0.00014
2 1	Q3_2B	0.00000	-0.00004
2 5	Q3_2B	-0.00005	0.00030
2 6	Q3_2B	0.00008	-0.00024
2 1	P_2B	0.00002	0.00000
2 5	P_2B	-0.00005	-0.00005
2 6	P_2B	0.00003	0.00004
2 1	P_3B	0.00001	0.00013
2 5	P_3B	0.00008	-0.00035
2 6	P_3B	-0.00012	0.00012

Distance residuals

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SB\_1L      SB\_1R      0.00000

Final station parameters (rads)

```

-----
1 1
RxRyRz :      -0.057355      -0.000472      0.052377      0.000000
xyz      :      1058.97805    -2112.47016    255.70243
1 5
RxRyRz :      -0.057349      -0.000473      0.048680      0.000000
xyz      :      2599.13160    -2077.15914    1016.36962
1 6
RxRyRz :      -0.057342      -0.000476      0.010465      0.000000
xyz      :      3916.69626    -1777.08908    896.44555
2 1
RxRyRz :      -0.057341      -0.000472      0.014667      0.000000
xyz      :      1192.12520    1909.36964     23.31476
2 5
RxRyRz :      -0.057345      -0.000477      0.023083      0.000000
xyz      :      2970.65891    2675.66228    651.39759
2 6
RxRyRz :      -0.057346      -0.000476     -0.000522      0.000000
xyz      :      4140.09345    1827.50750    610.44563

```

Final object point coordinates

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-----
              X              Y              Z
              ---              ---              ---
WALL_7      6628.79567      -4230.24857      2105.05523
WALL_1      6612.10023      -1071.38481      1672.12639
WALL_2      6600.09787      2010.50122      1524.17947
WALL_3      5647.25584      3605.60052      1065.33253
WALL_4      4070.17019      3563.23028       501.73910
WALL_5      2829.14600      3624.13148      1743.54754
WALL_6      1021.85052      3581.82440      1069.25293
R5_E        4397.93101      -160.15895       10.14691
R5_D        4395.86948      -112.56454      114.03532
R5_C        4396.91370       -1.53597      160.10338
R4_E        3432.72512     -158.33382      25.86976

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R4_D	3432.66091	-109.73804	117.25075
R4_C	3431.44173	4.16493	160.63720
R3_E	2162.72684	-160.10033	12.17155
R3_D	2162.43416	-110.04442	117.32611
R3_C	2162.64053	2.57268	160.92880
R2_E	893.12773	-160.44171	5.00627
R2_D	892.46177	-110.77688	116.31737
R2_C	892.01819	1.63524	160.62825
R1_E	2.08660	-160.46159	5.23256
R1_D	0.44531	-110.85984	115.70273
R1_C	3.51444	10.41382	159.74183
P_1A	4306.91175	8.74591	169.72322
P_1D	4306.87525	-170.25685	9.81625
Q1_2D	3954.21784	-170.04975	10.11057
Q2_2D	2652.13781	-169.93788	10.47929
Q3_2D	1350.03256	-169.42699	10.35783
P_2A	708.51603	9.21508	171.25383
P_2D	706.99664	-169.50977	10.25737
P_3D	68.69036	-170.39536	9.90166
P_3A	70.24753	9.05367	169.79868
CEN_IP	5049.21528	0.04019	0.54526
CEN_US	-997.20855	-0.41378	-1.72038
R5_A	4395.50298	160.39251	-2.63956
R5_B	4396.71263	118.79610	107.43861
R4_A	3432.37064	160.35984	-7.25820
R4_B	3432.73736	121.54339	105.12140
R3_A	2159.74438	160.55058	-0.20234
R3_B	2160.96295	118.63863	108.60995

R2_A	889.70863	160.48120	5.17812
R2_B	890.21995	116.89158	110.25904
R1_A	-0.01214	160.48351	0.00065
R1_B	0.79616	124.97392	100.22269
P_1B	4306.77015	170.76224	-10.16812
Q1_2B	3954.19932	170.40181	-9.97765
Q2_2B	2652.00204	170.72911	-9.64035
Q3_2B	1349.99560	171.28784	-9.74492
P_2B	708.72939	170.95372	-10.33829
P_3B	70.23287	170.31135	-10.76828
SB_1L	6120.10574	727.61479	1288.37894
SB_1R	6149.49601	-1269.71572	1387.40940

## Coordinate standard errors

	SX	SY	SZ
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1 1	0.06927	0.06395	0.04810
1 5	0.06969	0.05850	0.03621
1 6	0.06855	0.05700	0.02801
2 1	0.02487	0.03044	0.02459
2 5	0.03713	0.02552	0.01077
2 6	0.04337	0.03793	0.00891
SB_1L	0.06088	0.06284	0.01531
SB_1R	0.07164	0.06342	0.01870
WALL_7	0.10609	0.10087	0.03740
WALL_1	0.07297	0.07200	0.00000
WALL_2	0.06083	0.06034	0.02261
WALL_3	0.05645	0.05827	0.02363
WALL_4	0.04091	0.00000	0.00000
WALL_5	0.02573	0.02498	0.01970
WALL_6	0.00000	0.00000	0.00000
R5_E	0.06046	0.05566	0.02670
R5_D	0.05993	0.05622	0.02518
R5_C	0.05612	0.05005	0.02007
R4_E	0.05498	0.04778	0.02741
R4_D	0.05439	0.04805	0.02636
R4_C	0.05235	0.04552	0.02351
R3_E	0.05182	0.04412	0.03249
R3_D	0.05117	0.04425	0.03145
R3_C	0.04851	0.04056	0.02973
R2_E	0.05009	0.04722	0.03916
R2_D	0.04953	0.04734	0.03804
R2_C	0.04739	0.04127	0.03699
R1_E	0.05751	0.05579	0.04490
R1_D	0.05688	0.05584	0.04357
R1_C	0.05054	0.04468	0.04240
P_1A	0.05543	0.04813	0.01992
P_1D	0.05968	0.05465	0.02664
Q1_2D	0.05726	0.05134	0.02664
Q2_2D	0.05299	0.04481	0.03040
Q3_2D	0.05039	0.04505	0.03658
P_2A	0.04488	0.04111	0.03684
P_2D	0.05052	0.04855	0.04028
P_3D	0.05637	0.05494	0.04444
P_3A	0.04650	0.04376	0.04037
CEN_IP	0.05957	0.05237	0.01987
CEN_US	0.05665	0.05589	0.04856
R5_A	0.05709	0.05447	0.02313
R5_B	0.05714	0.05531	0.02213
R4_A	0.05091	0.04666	0.02530
R4_B	0.05093	0.04736	0.02460
R3_A	0.04479	0.04403	0.03054
R3_B	0.04496	0.04472	0.03003
R2_A	0.04474	0.04881	0.03664
R2_B	0.04497	0.04944	0.03630
R1_A	0.06327	0.05958	0.04166
R1_B	0.06245	0.05972	0.04133
P_1B	0.05625	0.05337	0.02322
Q1_2B	0.05370	0.05006	0.02376

Q2_2B	0.04700	0.04407	0.02838
Q3_2B	0.04277	0.04580	0.03433
P_2B	0.04655	0.05027	0.03764
P_3B	0.06093	0.05837	0.04125



## APPENDIX C

Bundle Comparison

SIMS

Sta / Pt Name	X (mm)	Y (mm)	Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)	RMS
1	1058.978	-2112.470	255.702	0.069	0.064	0.048	
1	-0.05736	-0.00047	0.05238				
2	2599.132	-2077.159	1016.370	0.070	0.059	0.036	
2	-0.05735	-0.00047	0.04868				
3	3916.696	-1777.089	896.446	0.069	0.057	0.028	
3	-0.05734	-0.00048	0.01047				
4	1192.125	1909.370	23.315	0.025	0.030	0.025	
4	-0.05734	-0.00047	0.01467				
5	2970.659	2675.662	651.398	0.037	0.026	0.011	
5	-0.05735	-0.00048	0.02308				
6	4140.093	1827.508	610.446	0.043	0.038	0.009	
6	-0.05735	-0.00048	-0.00052				
SB_1L	6120.106	727.615	1288.379	0.061	0.063	0.015	
SB_1R	6149.496	-1269.716	1387.409	0.072	0.063	0.019	
CEN_IP	5049.215	0.040	0.545	0.060	0.052	0.020	
CEN_US	-997.209	-0.414	-1.720	0.057	0.056	0.049	
P_1A	4306.912	8.746	169.723	0.055	0.048	0.020	
P_1B	4306.770	170.762	-10.168	0.056	0.053	0.023	
P_1D	4306.875	-170.257	9.816	0.060	0.055	0.027	
P_2A	708.516	9.215	171.254	0.045	0.041	0.037	
P_2B	708.729	170.954	-10.338	0.047	0.050	0.038	
P_2D	706.997	-169.510	10.257	0.051	0.049	0.040	
P_3A	70.248	9.054	169.799	0.047	0.044	0.040	
P_3B	70.233	170.311	-10.768	0.061	0.058	0.041	
P_3D	68.690	-170.395	9.902	0.056	0.055	0.044	
Q1_2B	3954.199	170.402	-9.978	0.054	0.050	0.024	
Q1_2D	3954.218	-170.050	10.111	0.057	0.051	0.027	
Q2_2B	2652.002	170.729	-9.640	0.047	0.044	0.028	
Q2_2D	2652.138	-169.938	10.479	0.053	0.045	0.030	
Q3_2B	1349.996	171.288	-9.745	0.043	0.046	0.034	
Q3_2D	1350.033	-169.427	10.358	0.050	0.045	0.037	
R1_A	-0.012	160.484	0.001	0.063	0.060	0.042	
R1_B	0.796	124.974	100.223	0.062	0.060	0.041	
R1_C	3.514	10.414	159.742	0.051	0.045	0.042	
R1_D	0.445	-110.860	115.703	0.057	0.056	0.044	
R1_E	2.087	-160.462	5.233	0.058	0.056	0.045	
R2_A	889.709	160.481	5.178	0.045	0.049	0.037	
R2_B	890.220	116.892	110.259	0.045	0.049	0.036	
R2_C	892.018	1.635	160.628	0.047	0.041	0.037	
R2_D	892.462	-110.777	116.317	0.050	0.047	0.038	
R2_E	893.128	-160.442	5.006	0.050	0.047	0.039	
R3_A	2159.744	160.551	-0.202	0.045	0.044	0.031	
R3_B	2160.963	118.639	108.610	0.045	0.045	0.030	
R3_C	2162.641	2.573	160.929	0.049	0.041	0.030	
R3_D	2162.434	-110.044	117.326	0.051	0.044	0.031	
R3_E	2162.727	-160.100	12.172	0.052	0.044	0.032	
R4_A	3432.371	160.360	-7.258	0.051	0.047	0.025	
R4_B	3432.737	121.543	105.121	0.051	0.047	0.025	
R4_C	3431.442	4.165	160.637	0.052	0.046	0.024	
R4_D	3432.661	-109.738	117.251	0.054	0.048	0.026	
R4_E	3432.725	-158.334	25.870	0.055	0.048	0.027	
R5_A	4395.503	160.393	-2.640	0.057	0.054	0.023	
R5_B	4396.713	118.796	107.439	0.057	0.055	0.022	
R5_C	4396.914	-1.536	160.103	0.056	0.050	0.020	
R5_D	4395.869	-112.565	114.035	0.060	0.056	0.025	
R5_E	4397.931	-160.159	10.147	0.060	0.056	0.027	
WALL_1	6612.100	-1071.385	1672.126	0.073	0.072	0.000	
WALL_2	6600.098	2010.501	1524.179	0.061	0.060	0.023	
WALL_3	5647.256	3605.601	1065.333	0.056	0.058	0.024	
WALL_4	4070.170	3563.230	501.739	0.041	0.000	0.000	
WALL_5	2829.146	3624.131	1743.548	0.026	0.025	0.020	
WALL_6	1021.851	3581.824	1069.253	0.000	0.000	0.000	
WALL_7	6628.796	-4230.249	2105.055	0.106	0.101	0.037	



Bundle Comparison

ECDS3

SIMS - ECDS3

Sta / Pt Name	X (mm)	Y (mm)	Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)	RMS	delta X (mm)	delta Y (mm)	delta Z (mm)	delta sdX (mm)	delta sdY (mm)	delta sdZ (mm)	delta RMS
1	1058.978	-2112.470	255.702					0.000	0.000	0.001				
1	-3.65134	-0.03009	3.33439					0.00001	0.00004	0.00003				
2	2599.132	-2077.160	1016.370					-0.001	0.001	0.000				
2	-3.65094	-0.03014	3.09904					-0.00001	0.00002	0.00003				
3	3916.697	-1777.090	896.446					-0.001	0.001	0.000				
3	-3.65049	-0.03033	0.66621					-0.00002	0.00003	0.00002				
4	1192.126	1909.369	23.315					-0.001	0.001	0.000				
4	-3.65044	-0.03008	0.93374					0.00000	0.00003	-0.00001				
5	2970.660	2675.661	651.398					-0.001	0.001	0.000				
5	-3.65070	-0.03038	1.46953					0.00000	0.00001	-0.00002				
6	4140.095	1827.506	610.445					-0.001	0.001	0.000				
6	-3.65076	-0.03031	-0.03321					0.00000	0.00001	-0.00002				
SB_1L	6120.107	727.613	1288.380				0.029	-0.002	0.001	-0.001				
SB_1R	6149.498	-1269.717	1387.410				0.037	-0.002	0.001	0.000				
CEN_IP	5049.216	0.039	0.546				0.014	-0.001	0.001	0.000				
CEN_US	-997.207	-0.414	-1.721				0.006	-0.001	0.000	0.000				
P_1A	4306.913	8.745	169.723				0.039	-0.001	0.001	0.000				
P_1B	4306.771	170.761	-10.168				0.030	-0.001	0.001	0.000				
P_1D	4306.876	-170.258	9.816				0.020	-0.001	0.001	0.000				
P_2A	708.517	9.214	171.254				0.056	0.000	0.001	0.000				
P_2B	708.730	170.952	-10.338				0.003	-0.001	0.002	0.000				
P_2D	706.998	-169.511	10.257				0.021	-0.001	0.001	0.000				
P_3A	70.248	9.053	169.799				0.025	0.000	0.001	0.000				
P_3B	70.232	170.309	-10.768				0.014	0.001	0.003	0.000				
P_3D	68.691	-170.396	9.901				0.015	0.000	0.000	0.000				
Q1_2B	3954.200	170.402	-9.977				0.012	-0.001	0.000	0.000				
Q1_2D	3954.219	-170.050	10.110				0.011	-0.001	0.000	0.000				
Q2_2B	2652.003	170.728	-9.640				0.012	-0.001	0.001	0.000				
Q2_2D	2652.138	-169.938	10.479				0.011	0.000	0.000	0.001				
Q3_2B	1349.997	171.287	-9.745				0.011	-0.001	0.001	0.000				
Q3_2D	1350.033	-169.427	10.357				0.011	0.000	0.000	0.000				
R1_A	-0.013	160.481	0.000				0.023	0.001	0.002	0.001				
R1_B	0.796	124.972	100.222				0.020	0.000	0.002	0.000				
R1_C	3.516	10.412	159.742				0.053	-0.001	0.001	0.000				
R1_D	0.445	-110.860	115.703				0.002	0.000	0.000	0.000				
R1_E	2.087	-160.462	5.233				0.023	0.000	0.001	0.000				
R2_A	889.709	160.479	5.178				0.013	0.000	0.002	0.000				
R2_B	890.221	116.890	110.259				0.017	-0.001	0.001	0.000				
R2_C	892.019	1.635	160.628				0.014	-0.001	0.000	0.000				
R2_D	892.462	-110.777	116.317				0.017	0.000	0.001	0.001				
R2_E	893.128	-160.443	5.006				0.021	-0.001	0.001	0.000				
R3_A	2159.745	160.549	-0.202				0.004	-0.001	0.001	0.000				
R3_B	2160.964	118.637	108.610				0.013	-0.001	0.002	0.000				
R3_C	2162.642	2.571	160.929				0.013	-0.001	0.002	0.000				
R3_D	2162.434	-110.045	117.326				0.003	0.000	0.000	0.000				
R3_E	2162.727	-160.100	12.171				0.004	0.000	0.000	0.000				
R4_A	3432.372	160.358	-7.258				0.005	-0.001	0.001	0.000				
R4_B	3432.739	121.543	105.122				0.018	-0.001	0.000	0.000				
R4_C	3431.443	4.163	160.637				0.022	-0.001	0.002	0.000				
R4_D	3432.662	-109.738	117.250				0.012	-0.001	0.000	0.000				
R4_E	3432.726	-158.334	25.869				0.008	-0.001	0.000	0.001				
R5_A	4395.503	160.392	-2.639				0.020	0.000	0.000	-0.001				
R5_B	4396.713	118.796	107.439				0.014	0.000	0.000	-0.001				
R5_C	4396.914	-1.537	160.104				0.017	-0.001	0.001	0.000				
R5_D	4395.871	-112.565	114.035				0.005	-0.002	0.000	0.000				
R5_E	4397.932	-160.160	10.146				0.012	-0.001	0.001	0.001				
WALL_1	6612.101	-1071.386	1672.126				0.033	0.000	0.001	0.000				
WALL_2	6600.099	2010.500	1524.180				0.039	-0.001	0.002	0.000				
WALL_3	5647.256	3605.598	1065.332				0.038	0.000	0.002	0.000				
WALL_4	4070.171	3563.231	501.739				0.036	-0.001	0.000	0.000				
WALL_5	2829.147	3624.132	1743.548				0.035	-0.001	0.000	0.000				
WALL_6	1021.851	3581.824	1069.253				0.033	0.000	0.000	0.000				
WALL_7	6628.799	-4230.251	2105.056				0.063	-0.003	0.003	-0.001				

Bundle Comparison

MANCAT

SIMS - MANCAT

Sta / Pt Name	X (mm)	Y (mm)	Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)	RMS	SIMS - MANCAT								
								delta X (mm)	delta Y (mm)	delta Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)	delta RMS		
1	1058.983	-2112.470	255.694					-0.005	0.000	0.009						
1	396.34886	399.96989	303.33443					-0.00019	0.00006	-0.00001						
2	2599.135	-2077.161	1016.366					-0.003	0.002	0.003						
2	396.34913	399.96983	303.09906					-0.00008	0.00006	0.00001						
3	3916.701	-1777.090	896.446					-0.004	0.001	-0.001						
3	396.34947	399.96967	300.66622					0.00002	0.00003	0.00000						
4	1192.127	1909.365	23.312					-0.002	0.005	0.002						
4	396.34950	399.96990	300.93380					0.00006	0.00005	-0.00007						
5	2970.662	2675.661	651.397					-0.003	0.002	0.001						
5	396.34929	399.96963	301.46955					0.00001	0.00000	-0.00004						
6	4140.097	1827.506	610.446					-0.004	0.001	0.000						
6	396.34925	399.96968	299.96681					-0.00001	0.00002	-0.00004						
SB_1L	6120.118	727.613	1288.385	0.056	0.055	0.017		-0.012	0.002	-0.006	0.005	0.007	-0.002			
SB_1R	6149.501	-1269.723	1387.409	0.066	0.056	0.021		-0.005	0.008	0.000	0.006	0.008	-0.002			
CEN_IP	5049.219	0.039	0.545	0.054	0.048	0.021		-0.004	0.001	0.000	0.005	0.005	-0.001			
CEN_US	-997.201	-0.417	-1.722	0.057	0.055	0.050		-0.007	0.004	0.002	-0.001	0.001	-0.002			
P_1A	4306.916	8.745	169.723	0.051	0.044	0.020		-0.004	0.001	0.000	0.005	0.004	0.000			
P_1B	4306.774	170.760	-10.169	0.052	0.052	0.024		-0.004	0.002	0.000	0.004	0.002	-0.001			
P_1D	4306.880	-170.255	9.815	0.056	0.053	0.028		-0.005	-0.001	0.002	0.004	0.002	-0.001			
P_2A	708.520	9.213	171.253	0.043	0.040	0.038		-0.004	0.002	0.001	0.002	0.002	-0.001			
P_2B	708.734	170.952	-10.339	0.046	0.051	0.038		-0.004	0.002	0.000	0.001	-0.001	-0.001			
P_2D	707.001	-169.512	10.256	0.050	0.049	0.041		-0.004	0.002	0.002	0.001	0.000	-0.001			
P_3A	70.252	9.051	169.797	0.045	0.042	0.042		-0.005	0.003	0.001	0.001	0.002	-0.001			
P_3B	70.239	170.310	-10.769	0.064	0.062	0.042		-0.006	0.002	0.001	-0.003	-0.003	-0.001			
P_3D	68.696	-170.398	9.900	0.058	0.057	0.046		-0.005	0.003	0.002	-0.001	-0.002	-0.001			
Q1_2B	3954.203	170.399	-9.978	0.049	0.048	0.024		-0.004	0.002	0.000	0.004	0.002	0.000			
Q1_2D	3954.222	-170.049	10.109	0.053	0.049	0.028		-0.004	-0.001	0.002	0.004	0.002	-0.001			
Q2_2B	2652.005	170.726	-9.641	0.044	0.042	0.029		-0.003	0.003	0.000	0.003	0.002	0.000			
Q2_2D	2652.141	-169.938	10.478	0.050	0.043	0.031		-0.003	0.000	0.001	0.003	0.002	-0.001			
Q3_2B	1349.999	171.285	-9.745	0.041	0.045	0.035		-0.003	0.003	0.000	0.002	0.001	0.000			
Q3_2D	1350.036	-169.429	10.356	0.049	0.045	0.037		-0.004	0.002	0.002	0.001	0.000	-0.001			
R1_A	-0.006	160.482	0.000	0.067	0.063	0.043		-0.006	0.001	0.001	-0.003	-0.004	-0.001			
R1_B	0.802	124.972	100.222	0.066	0.063	0.043		-0.006	0.002	0.001	-0.003	-0.003	-0.001			
R1_C	3.519	10.411	159.741	0.051	0.043	0.044		-0.004	0.002	0.001	-0.001	0.001	-0.002			
R1_D	0.450	-110.862	115.701	0.058	0.058	0.045		-0.005	0.003	0.002	-0.002	-0.002	-0.002			
R1_E	2.092	-160.464	5.231	0.059	0.058	0.046		-0.005	0.003	0.002	-0.002	-0.002	-0.001			
R2_A	889.713	160.479	5.178	0.044	0.049	0.037		-0.004	0.002	0.001	0.001	-0.001	-0.001			
R2_B	890.224	116.889	110.258	0.044	0.050	0.037		-0.004	0.002	0.001	0.001	0.000	-0.001			
R2_C	892.022	1.633	160.627	0.046	0.040	0.038		-0.004	0.002	0.001	0.001	0.002	-0.001			
R2_D	892.466	-110.779	116.316	0.049	0.048	0.039		-0.004	0.002	0.002	0.001	0.000	-0.001			
R2_E	893.132	-160.444	5.005	0.049	0.047	0.040		-0.004	0.002	0.002	0.001	0.000	-0.001			
R3_A	2159.747	160.548	-0.203	0.043	0.042	0.031		-0.003	0.003	0.000	0.002	0.002	0.000			
R3_B	2160.966	118.636	108.610	0.043	0.043	0.030		-0.003	0.003	0.000	0.002	0.002	0.000			
R3_C	2162.644	2.571	160.928	0.046	0.039	0.030		-0.004	0.002	0.001	0.002	0.002	-0.001			
R3_D	2162.437	-110.045	117.325	0.049	0.043	0.032		-0.003	0.001	0.001	0.002	0.001	-0.001			
R3_E	2162.730	-160.101	12.170	0.050	0.043	0.033		-0.003	0.001	0.001	0.002	0.001	-0.001			
R4_A	3432.374	160.357	-7.259	0.047	0.044	0.026		-0.004	0.003	0.000	0.004	0.002	0.000			
R4_B	3432.741	121.541	105.121	0.047	0.045	0.025		-0.004	0.003	0.000	0.004	0.003	0.000			
R4_C	3431.446	4.164	160.637	0.048	0.043	0.024		-0.004	0.001	0.000	0.004	0.003	0.000			
R4_D	3432.664	-109.738	117.249	0.051	0.046	0.027		-0.004	0.000	0.001	0.004	0.002	-0.001			
R4_E	3432.729	-158.333	25.868	0.051	0.046	0.028		-0.004	0.000	0.001	0.004	0.002	-0.001			
R5_A	4395.507	160.390	-2.640	0.053	0.053	0.024		-0.004	0.002	0.000	0.004	0.001	-0.001			
R5_B	4396.717	118.794	107.438	0.053	0.054	0.023		-0.004	0.002	0.000	0.004	0.001	-0.001			
R5_C	4396.918	-1.537	160.103	0.051	0.046	0.021		-0.004	0.001	0.000	0.005	0.004	0.000			
R5_D	4395.874	-112.563	114.034	0.056	0.055	0.027		-0.005	-0.001	0.001	0.004	0.001	-0.002			
R5_E	4397.936	-160.157	10.145	0.057	0.054	0.028		-0.005	-0.002	0.002	0.004	0.002	-0.002			
WALL_1	6612.105	-1071.385	1672.126	0.063	0.062	0.000		-0.005	0.001	0.000	0.010	0.010	0.000			
WALL_2	6600.102	2010.501	1524.180	0.058	0.055	0.025		-0.004	0.000	0.000	0.003	0.006	-0.002			
WALL_3	5647.259	3605.600	1065.333	0.055	0.059	0.026		-0.003	0.000	0.000	0.002	-0.001	-0.002			
WALL_4	4070.173	3563.230	501.739	0.037	0.000	0.000		-0.003	0.000	0.000	0.004	0.000	0.000			
WALL_5	2829.148	3624.132	1743.549	0.025	0.027	0.021		-0.002	0.000	-0.001	0.001	-0.002	-0.001			
WALL_6	1021.851	3581.824	1069.253	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000			
WALL_7	6628.804	-4230.252	2105.055	0.102	0.096	0.042		-0.008	0.004	0.000	0.004	0.005	-0.005			

Bundle Comparison

AIMS III

SIMS - AIMS III

Sta / Pt Name	X (mm)	Y (mm)	Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)	RMS	delta X (mm)	delta Y (mm)	delta Z (mm)	delta sdX (mm)	delta sdY (mm)	delta sdZ (mm)	delta RMS
1	1070.678	-2117.718	133.674					-11.700	5.248	122.028				
1														
2	2611.224	-2117.674	894.403					-12.092	40.515	121.967				
2														
3	3927.064	-1803.992	791.267					-10.368	26.903	105.178				
3														
4	1181.728	1911.387	132.148					10.397	-2.018	-108.833				
4														
5	2956.524	2650.211	802.274					14.135	25.451	-150.877				
5														
6	4130.542	1812.246	712.227					9.551	15.261	-101.781				
6														
SB_1L	6120.106	727.656	1288.377				0.027	0.000	-0.041	0.002				0.002
SB_1R	6149.509	-1269.671	1387.408				0.027	-0.013	-0.045	0.001				0.010
CEN_IP	5049.221	0.069	0.545				0.020	-0.006	-0.029	0.000				-0.006
CEN_US	-997.111	-0.401	-1.719				0.013	-0.098	-0.013	-0.002				-0.007
P_1A	4306.916	8.777	169.725				0.060	-0.004	-0.031	-0.001				-0.021
P_1B	4306.773	170.788	-10.163				0.034	-0.003	-0.025	-0.005				-0.003
P_1D	4306.901	-170.188	9.794				0.014	-0.025	-0.069	0.023				0.006
P_2A	708.541	9.214	171.258				0.065	-0.025	0.001	-0.004				-0.010
P_2B	708.776	170.991	-10.321				0.006	-0.046	-0.037	-0.017				-0.003
P_2D	707.013	-169.496	10.251				0.025	-0.016	-0.013	0.006				-0.005
P_3A	70.288	9.053	169.803				0.046	-0.041	0.000	-0.005				-0.021
P_3B	70.308	170.354	-10.751				0.010	-0.075	-0.043	-0.017				0.004
P_3D	68.746	-170.412	9.905				0.021	-0.056	0.017	-0.003				-0.006
Q1_2B	3954.202	170.426	-9.972				0.011	-0.003	-0.024	-0.005				0.001
Q1_2D	3954.234	-169.985	10.091				0.009	-0.016	-0.065	0.020				0.001
Q2_2B	2652.005	170.754	-9.629				0.009	-0.003	-0.025	-0.012				0.003
Q2_2D	2652.130	-169.890	10.465				0.016	0.008	-0.047	0.014				-0.005
Q3_2B	1350.019	171.317	-9.730				0.015	-0.023	-0.029	-0.015				-0.004
Q3_2D	1350.030	-169.412	10.353				0.015	0.003	-0.015	0.005				-0.004
R1_A	0.061	160.522	0.018				0.015	-0.074	-0.039	-0.017				0.008
R1_B	0.871	125.015	100.237				0.013	-0.075	-0.041	-0.014				0.007
R1_C	3.521	10.415	159.749				0.044	-0.007	-0.001	-0.007				0.009
R1_D	0.515	-110.893	115.706				0.013	-0.070	0.033	-0.003				-0.010
R1_E	2.164	-160.500	5.241				0.014	-0.078	0.038	-0.009				0.008
R2_A	889.746	160.524	5.198				0.016	-0.038	-0.043	-0.020				-0.003
R2_B	890.258	116.925	110.272				0.015	-0.038	-0.033	-0.012				0.002
R2_C	892.023	1.640	160.635				0.019	-0.005	-0.005	-0.006				-0.005
R2_D	892.475	-110.777	116.313				0.016	-0.013	0.000	0.004				0.001
R2_E	893.143	-160.446	5.006				0.020	-0.015	0.004	0.000				0.001
R3_A	2159.752	160.576	-0.190				0.006	-0.007	-0.025	-0.013				-0.002
R3_B	2160.973	118.664	108.622				0.016	-0.010	-0.025	-0.012				-0.003
R3_C	2162.642	2.587	160.932				0.016	-0.001	-0.014	-0.003				-0.003
R3_D	2162.422	-110.005	117.315				0.009	0.012	-0.039	0.011				-0.006
R3_E	2162.714	-160.061	12.160				0.012	0.013	-0.039	0.012				-0.008
R4_A	3432.373	160.384	-7.250				0.005	-0.002	-0.024	-0.008				0.001
R4_B	3432.739	121.568	105.130				0.022	-0.001	-0.024	-0.009				-0.003
R4_C	3431.446	4.190	160.638				0.031	-0.005	-0.025	-0.001				-0.009
R4_D	3432.665	-109.681	117.236				0.018	-0.004	-0.057	0.015				-0.006
R4_E	3432.730	-158.275	25.852				0.012	-0.004	-0.059	0.017				-0.004
R5_A	4395.497	160.429	-2.633				0.023	0.006	-0.036	-0.007				-0.003
R5_B	4396.715	118.823	107.444				0.019	-0.003	-0.027	-0.006				-0.005
R5_C	4396.921	-1.511	160.104				0.027	-0.007	-0.025	-0.001				-0.010
R5_D	4395.894	-112.496	114.018				0.014	-0.025	-0.069	0.018				-0.009
R5_E	4397.959	-160.084	10.130				0.016	-0.028	-0.075	0.017				-0.005
WALL_1	6612.112	-1071.337	1672.125				0.022	-0.012	-0.048	0.001				0.011
WALL_2	6600.089	2010.543	1524.174				0.030	0.009	-0.042	0.005				0.010
WALL_3	5647.241	3605.635	1065.328				0.027	0.015	-0.035	0.005				0.011
WALL_4	4070.158	3563.229	501.740				0.022	0.012	0.001	-0.001				0.014
WALL_5	2829.144	3624.140	1743.542				0.024	0.002	-0.008	0.005				0.011
WALL_6	1021.848	3581.822	1069.253				0.022	0.002	0.002	0.000				0.012
WALL_7	6628.856	-4230.222	2105.071				0.039	-0.060	-0.027	-0.015				0.024

Bundle Comparison

BETS

SIMS - BETS

Sta / Pt Name	X (mm)	Y (mm)	Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)	RMS	delta	delta	delta	delta	delta	delta
								X (mm)	Y (mm)	Z (mm)	sdX (mm)	sdY (mm)	sdZ (mm)
1	1058.992	-2112.416	255.675					-0.014	-0.054	0.027			
1													
2	2599.270	-2077.182	1016.393					-0.138	0.023	-0.023			
2													
3	3916.822	-1777.061	896.492					-0.126	-0.028	-0.046			
3													
4	1192.151	1909.372	23.335					-0.026	-0.002	-0.020			
4													
5	2970.737	2675.678	651.398					-0.078	-0.016	0.000			
5													
6	4140.152	1827.525	610.449					-0.059	-0.018	-0.003			
6													
SB_1L	6120.146	727.684	1288.380	0.092	0.083	0.029		-0.041	-0.069	-0.001	-0.031	-0.020	-0.014
SB_1R	6149.588	-1269.646	1387.410	0.085	0.074	0.030		-0.092	-0.070	0.000	-0.014	-0.010	-0.011
CEN_IP	5049.288	0.070	0.565	0.070	0.059	0.017		-0.073	-0.029	-0.020	-0.010	-0.007	0.003
CEN_US	-997.115	-0.420	-1.698	0.045	0.066	0.025		-0.093	0.007	-0.023	0.012	-0.010	0.024
P_1A	4306.997	8.801	169.749	0.060	0.049	0.013		-0.086	-0.055	-0.026	-0.004	-0.001	0.007
P_1B	4306.849	170.786	-10.167	0.001	0.011	0.005		-0.079	-0.024	-0.001	0.055	0.043	0.018
P_1D	4306.954	-170.220	9.847	0.004	0.017	0.008		-0.079	-0.037	-0.031	0.056	0.038	0.018
P_2A	708.566	9.157	171.283	0.028	0.055	0.007		-0.050	0.058	-0.029	0.016	-0.014	0.030
P_2B	708.774	170.908	-10.305	0.002	0.008	0.002		-0.045	0.045	-0.033	0.044	0.042	0.036
P_2D	707.037	-169.543	10.244	0.004	0.019	0.004		-0.040	0.033	0.014	0.047	0.029	0.036
P_3A	70.307	9.025	169.818	0.029	0.054	0.012		-0.059	0.029	-0.020	0.017	-0.010	0.028
P_3B	70.274	170.271	-10.734	0.012	0.017	0.005		-0.041	0.040	-0.035	0.049	0.041	0.037
P_3D	68.789	-170.487	9.911	0.014	0.025	0.007		-0.099	0.092	-0.009	0.043	0.030	0.037
Q1_2B	3954.276	170.424	-9.957	0.001	0.006	0.003		-0.077	-0.022	-0.020	0.053	0.044	0.021
Q1_2D	3954.303	-169.996	10.127	0.000	0.006	0.003		-0.085	-0.053	-0.016	0.057	0.046	0.024
Q2_2B	2652.087	170.734	-9.619	0.043	0.041	0.014		-0.085	-0.005	-0.021	0.004	0.003	0.015
Q2_2D	2652.225	-169.905	10.475	0.001	0.025	0.011		-0.087	-0.033	0.004	0.052	0.020	0.019
Q3_2B	1350.056	171.249	-9.714	0.000	0.004	0.001		-0.060	0.038	-0.031	0.042	0.042	0.033
Q3_2D	1350.054	-169.408	10.338	0.001	0.007	0.002		-0.021	-0.019	0.019	0.049	0.038	0.034
R1_A	0.025	160.439	0.043	0.064	0.094	0.020		-0.038	0.045	-0.042	-0.001	-0.034	0.022
R1_B	0.822	124.914	100.257	0.015	0.021	0.005		-0.025	0.060	-0.035	0.047	0.038	0.036
R1_C	3.533	10.365	159.774	0.049	0.065	0.029		-0.019	0.048	-0.033	0.001	-0.020	0.013
R1_D	0.547	-110.954	115.710	0.013	0.022	0.006		-0.102	0.094	-0.008	0.044	0.034	0.037
R1_E	2.197	-160.568	5.255	0.010	0.018	0.005		-0.110	0.106	-0.023	0.047	0.038	0.040
R2_A	889.763	160.451	5.205	0.000	0.002	0.000		-0.054	0.030	-0.027	0.044	0.047	0.036
R2_B	890.268	116.843	110.298	0.003	0.015	0.002		-0.048	0.048	-0.039	0.042	0.034	0.034
R2_C	892.072	1.600	160.654	0.035	0.050	0.022		-0.054	0.035	-0.026	0.012	-0.009	0.015
R2_D	892.495	-110.810	116.312	0.001	0.010	0.001		-0.033	0.033	0.005	0.049	0.037	0.037
R2_E	893.153	-160.450	5.004	0.001	0.013	0.002		-0.025	0.009	0.003	0.049	0.035	0.037
R3_A	2159.822	160.538	-0.185	0.001	0.003	0.003		-0.077	0.012	-0.017	0.044	0.041	0.028
R3_B	2161.046	118.613	108.619	0.003	0.010	0.008		-0.083	0.026	-0.009	0.042	0.035	0.022
R3_C	2162.725	2.554	160.955	0.036	0.037	0.014		-0.085	0.019	-0.026	0.012	0.004	0.016
R3_D	2162.486	-109.959	117.302	0.003	0.011	0.007		-0.052	-0.086	0.025	0.048	0.033	0.024
R3_E	2162.781	-160.015	12.142	0.003	0.012	0.008		-0.054	-0.086	0.029	0.049	0.032	0.024
R4_A	3432.457	160.398	-7.240	0.001	0.002	0.002		-0.086	-0.038	-0.019	0.050	0.044	0.023
R4_B	3432.831	121.610	105.139	0.002	0.007	0.007		-0.094	-0.067	-0.018	0.049	0.040	0.017
R4_C	3431.522	4.181	160.663	0.049	0.039	0.013		-0.080	-0.016	-0.026	0.003	0.007	0.010
R4_D	3432.741	-109.719	117.276	0.002	0.008	0.007		-0.080	-0.019	-0.025	0.052	0.040	0.019
R4_E	3432.806	-158.331	25.907	0.003	0.009	0.008		-0.081	-0.003	-0.037	0.052	0.039	0.020
R5_A	4395.572	160.445	-2.615	0.003	0.016	0.007		-0.069	-0.052	-0.024	0.054	0.039	0.016
R5_B	4396.793	118.815	107.441	0.001	0.009	0.004		-0.080	-0.019	-0.002	0.056	0.046	0.019
R5_C	4396.992	-1.528	160.121	0.061	0.050	0.013		-0.078	-0.008	-0.017	-0.005	0.000	0.007
R5_D	4395.958	-112.508	114.053	0.003	0.009	0.004		-0.088	-0.057	-0.017	0.057	0.047	0.021
R5_E	4398.018	-160.106	10.171	0.060	0.060	0.021		-0.087	-0.053	-0.024	0.000	-0.004	0.006
WALL_1	6612.181	-1071.304	1672.126	0.096	0.083	0.036		-0.080	-0.081	0.000	-0.023	-0.011	-0.036
WALL_2	6600.106	2010.555	1524.166	0.112	0.104	0.035		-0.008	-0.054	0.013	-0.051	-0.044	-0.013
WALL_3	5647.189	3605.531	1065.305	0.117	0.111	0.026		0.067	0.070	0.027	-0.061	-0.052	-0.002
WALL_4	4070.201	3563.230	501.739	0.104	0.100	0.016		-0.030	0.000	0.000	-0.063	-0.100	-0.016
WALL_5	2829.150	3624.164	1743.549	0.096	0.093	0.032		-0.004	-0.033	-0.002	-0.070	-0.068	-0.013
WALL_6	1021.851	3581.824	1069.253	0.087	0.101	0.024		0.000	0.000	0.000	-0.087	-0.101	-0.024
WALL_7	6628.871	-4230.089	2105.057	0.113	0.097	0.040		-0.075	-0.159	-0.002	-0.007	0.003	-0.003

Italicized point names indicate the point not included in the bundle adjustment



## APPENDIX D

AIMS III - SIMS comparision

9 PARAMETERS TRANSFORMATION  
 algorithm published in AVN 4/1989

DATE : 07-07-1992  
 TIME : 09:41

transformation based on 51 points  
 m1=m2=m3 imposed

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COMMON points

name	U	V	W	X	Y	Z
SB_1L	6120.106	727.656	1288.377	6120.106	727.615	1288.379
SB_1R	6149.509	-1269.671	1387.408	6149.496	-1269.716	1387.409
CEN_IP	5049.221	.069	.545	5049.215	.040	.545
CEN_US	-997.111	-.401	-1.719	-997.209	-.414	-1.720
P_1A	4306.916	8.777	169.725	4306.912	8.746	169.723
P_1B	4306.773	170.788	-10.163	4306.770	170.762	-10.168
P_1D	4306.901	-170.188	9.794	4306.875	-170.257	9.816
P_2A	708.541	9.214	171.258	708.516	9.215	171.254
P_2B	708.776	170.991	-10.321	708.729	170.954	-10.338
P_2D	707.013	-169.496	10.251	706.997	-169.510	10.257
P_3A	70.288	9.053	169.803	70.248	9.054	169.799
P_3B	70.308	170.354	-10.751	70.233	170.311	-10.768
P_3D	68.746	-170.412	9.905	68.690	-170.395	9.902
Q1_2B	3954.202	170.426	-9.972	3954.199	170.402	-9.978
Q1_2D	3954.234	-169.985	10.091	3954.218	-170.050	10.111
Q2_2B	2652.005	170.754	-9.629	2652.002	170.729	-9.640
Q2_2D	2652.130	-169.890	10.465	2652.138	-169.938	10.479
Q3_2B	1350.019	171.317	-9.730	1349.996	171.288	-9.745
Q3_2D	1350.030	-169.412	10.353	1350.033	-169.427	10.358
R1_A	.061	160.522	.018	-.012	160.484	.001
R1_B	.871	125.015	100.237	.796	124.974	100.223
R1_C	3.521	10.415	159.749	3.514	10.414	159.742
R1_D	.515	-110.893	115.706	.445	-110.860	115.703
R1_E	2.164	-160.500	5.241	2.087	-160.462	5.233
R2_A	889.746	160.524	5.198	889.709	160.481	5.178
R2_B	890.258	116.925	110.272	890.220	116.892	110.259
R2_C	892.023	1.640	160.635	892.018	1.635	160.628
R2_D	892.475	-110.777	116.313	892.462	-110.777	116.317
R2_E	893.143	-160.446	5.006	893.128	-160.442	5.006
R3_A	2159.752	160.576	-.190	2159.744	160.551	-.202
R3_B	2160.973	118.664	108.622	2160.963	118.639	108.610
R3_C	2162.642	2.587	160.932	2162.641	2.573	160.929
R3_D	2162.422	-110.005	117.315	2162.434	-110.044	117.326
R3_E	2162.714	-160.061	12.160	2162.727	-160.100	12.172
R4_A	3432.373	160.384	-7.250	3432.371	160.360	-7.258
R4_B	3432.739	121.568	105.130	3432.737	121.543	105.121
R4_C	3431.446	4.190	160.638	3431.442	4.165	160.637
R4_D	3432.665	-109.681	117.236	3432.661	-109.738	117.251
R4_E	3432.730	-158.275	25.852	3432.725	-158.334	25.870
R5_A	4395.497	160.429	-2.633	4395.503	160.393	-2.640
R5_B	4396.715	118.823	107.444	4396.713	118.796	107.439

R5_C	4396.921	-1.511	160.104	4396.914	-1.536	160.103
R5_D	4395.894	-112.496	114.018	4395.869	-112.565	114.035
R5_E	4397.959	-160.084	10.130	4397.931	-160.159	10.147
WALL_1	6612.112	-1071.337	1672.125	6612.100	-1071.385	1672.126
WALL_2	6600.089	2010.543	1524.174	6600.098	2010.501	1524.179
WALL_3	5647.241	3605.635	1065.328	5647.256	3605.601	1065.333
WALL_4	4070.158	3563.229	501.740	4070.170	3563.230	501.739
WALL_5	2829.144	3624.140	1743.542	2829.146	3624.131	1743.548
WALL_6	1021.848	3581.822	1069.253	1021.851	3581.824	1069.253
WALL_7	6628.856	-4230.222	2105.071	6628.796	-4230.249	2105.055

STATISTICS

number of iterations : 2

residuals on:

name	U	V	W	X	Y	Z
SB_1L	-.00400	.00378	-.00590	.00000	.00000	.00000
SB_1R	-.00377	.01161	-.01021	.00000	.00000	.00000
CEN_IP	-.00010	.01504	-.00012	.00000	.00000	.00000
CEN_US	-.05714	-.00947	.00560	.00000	.00000	.00000
P_1A	.00632	.00770	-.00167	.00000	.00000	.00000
P_1B	.00602	.01241	-.00388	.00000	.00000	.00000
P_1D	-.01410	-.02943	.02297	.00000	.00000	.00000
P_2A	.00623	.01570	.00024	.00000	.00000	.00000
P_2B	-.01662	-.02288	-.01164	.00000	.00000	.00000
P_2D	.01592	.00246	.01130	.00000	.00000	.00000
P_3A	-.00578	.01077	.00061	.00000	.00000	.00000
P_3B	-.04174	-.03327	-.01081	.00000	.00000	.00000
P_3D	-.01986	.02856	.00261	.00000	.00000	.00000
Q1_2B	.00834	.01125	-.00396	.00000	.00000	.00000
Q1_2D	-.00307	-.02786	.02074	.00000	.00000	.00000
Q2_2B	.01529	.00174	-.00850	.00000	.00000	.00000
Q2_2D	.02874	-.01870	.01703	.00000	.00000	.00000
Q3_2B	.00298	-.01093	-.00990	.00000	.00000	.00000
Q3_2D	.03122	.00469	.00903	.00000	.00000	.00000
R1_A	-.03956	-.02933	-.01107	.00000	.00000	.00000
R1_B	-.04070	-.03143	-.00825	.00000	.00000	.00000
R1_C	.02839	.00928	-.00169	.00000	.00000	.00000
R1_D	-.03407	.04366	.00242	.00000	.00000	.00000
R1_E	-.04161	.04954	-.00287	.00000	.00000	.00000
R2_A	-.00873	-.02737	-.01447	.00000	.00000	.00000
R2_B	-.00909	-.01786	-.00791	.00000	.00000	.00000
R2_C	.02486	.01112	-.00223	.00000	.00000	.00000
R2_D	.01793	.01641	.00822	.00000	.00000	.00000
R2_E	.01567	.02130	.00500	.00000	.00000	.00000
R3_A	.01416	-.00129	-.00922	.00000	.00000	.00000
R3_B	.01194	-.00142	-.00951	.00000	.00000	.00000
R3_C	.02124	.01025	-.00060	.00000	.00000	.00000
R3_D	.03556	-.01395	.01363	.00000	.00000	.00000
R3_E	.03674	-.01354	.01511	.00000	.00000	.00000
R4_A	.01175	.00819	-.00627	.00000	.00000	.00000
R4_B	.01336	.00773	-.00737	.00000	.00000	.00000
R4_C	.01079	.00778	-.00013	.00000	.00000	.00000
R4_D	.01216	-.02317	.01554	.00000	.00000	.00000
R4_E	.01177	-.02496	.01882	.00000	.00000	.00000
R5_A	.01472	.00242	-.00599	.00000	.00000	.00000
R5_B	.00628	.01152	-.00551	.00000	.00000	.00000
R5_C	.00281	.01369	-.00119	.00000	.00000	.00000
R5_D	-.01443	-.02919	.01739	.00000	.00000	.00000
R5_E	-.01773	-.03449	.01682	.00000	.00000	.00000
WALL_1	-.00558	.01069	-.01203	.00000	.00000	.00000
WALL_2	-.00512	-.00112	-.00364	.00000	.00000	.00000



WALL_3	-.00476	-.00930	.00208	.00000	.00000	.00000
WALL_4	.00107	.01685	.00148	.00000	.00000	.00000
WALL_5	-.00115	-.00217	.00190	.00000	.00000	.00000
WALL_6	.00915	-.00255	.00295	.00000	.00000	.00000
WALL_7	-.03271	.04951	-.03494	.00000	.00000	.00000

a posteriori standard deviation : .018497883

TRANSFORMED coordinates

name	XTR	YTR	ZTR	DX	DY	DZ
SB_1L	6120.10974	727.61101	1288.38484	.00400	-.00378	.00590
SB_1R	6149.49978	-1269.72733	1387.41961	.00377	-.01161	.01021
CEN_IP	5049.21538	.02515	.54538	.00010	-.01504	.00012
CEN_US	-997.15141	-.40431	-1.72598	.05714	.00947	-.00560
P_1A	4306.90543	8.73821	169.72489	-.00632	-.00770	.00167
P_1B	4306.76413	170.74983	-10.16424	-.00602	-.01241	.00388
P_1D	4306.88935	-170.22742	9.79328	.01410	.02943	-.02297
P_2A	708.50980	9.19938	171.25359	-.00623	-.01570	-.00024
P_2B	708.74601	170.97661	-10.32665	.01662	.02289	.01164
P_2D	706.98072	-169.51223	10.24607	-.01592	-.00246	-.01130
P_3A	70.25331	9.04290	169.79807	.00578	-.01077	-.00061
P_3B	70.27461	170.34462	-10.75747	.04174	.03327	.01081
P_3D	68.71022	-170.42392	9.89905	.01986	-.02856	-.00261
Q1_2B	3954.19098	170.39056	-9.97369	-.00834	-.01125	.00396
Q1_2D	3954.22091	-170.02189	10.08983	.00307	.02786	-.02074
Q2_2B	2651.98675	170.72737	-9.63185	-.01529	-.00174	.00850
Q2_2D	2652.10907	-169.91918	10.46226	-.02874	.01870	-.01703
Q3_2B	1349.99262	171.29877	-9.73502	-.00298	.01093	.00990
Q3_2D	1350.00134	-169.43168	10.34880	-.03122	-.00469	-.00903
R1_A	.02742	160.51284	.01172	.03956	.02933	.01107
R1_B	.83686	125.00535	100.23094	.04070	.03143	.00825
R1_C	3.48605	10.40454	159.74352	-.02839	-.00928	.00169
R1_D	.47938	-110.90350	115.70031	.03407	-.04366	-.00242
R1_E	2.12821	-160.51113	5.23543	.04161	-.04954	.00287
R2_A	889.71736	160.50857	5.19259	.00873	.02737	.01447
R2_B	890.22904	116.90944	110.26695	.00909	.01786	.00791
R2_C	891.99333	1.62412	160.63048	-.02486	-.01112	.00223
R2_D	892.44384	-110.79329	116.30915	-.01793	-.01641	-.00822
R2_E	893.11206	-160.46301	5.00127	-.01567	-.02130	-.00500
R3_A	2159.73022	160.55187	-.19312	-.01416	.00129	.00922
R3_B	2160.95101	118.64005	108.61946	-.01194	.00142	.00951
R3_C	2162.61929	2.56243	160.92940	-.02124	-.01025	.00060
R3_D	2162.39860	-110.03048	117.31248	-.03556	.01394	-.01363
R3_E	2162.69010	-160.08679	12.15644	-.03674	.01354	-.01511
R4_A	3432.35889	160.35165	-7.25193	-.01175	-.00819	.00627
R4_B	3432.72400	121.53566	105.12877	-.01336	-.00773	.00737
R4_C	3431.43094	4.15715	160.63733	-.01079	-.00778	.00013
R4_D	3432.64875	-109.71487	117.23521	-.01216	.02317	-.01554
R4_E	3432.71335	-158.30886	25.85094	-.01177	.02496	-.01882
R5_A	4395.48826	160.39009	-2.63357	-.01472	-.00242	.00599
R5_B	4396.70635	118.78458	107.44412	-.00628	-.01152	.00551
R5_C	4396.91089	-1.54966	160.10457	-.00281	-.01369	.00119
R5_D	4395.88391	-112.53535	114.01793	.01443	.02919	-.01739
R5_E	4397.94874	-160.12446	10.13009	.01773	.03449	-.01682
WALL_1	6612.10581	-1071.39550	1672.13842	.00558	-.01069	.01203
WALL_2	6600.10299	2010.50234	1524.18311	.00512	.00112	.00364
WALL_3	5647.26060	3605.60982	1065.33045	.00476	.00930	-.00208
WALL_4	4070.16912	3563.21343	501.73762	-.00107	-.01685	-.00148
WALL_5	2829.14715	3624.13365	1743.54564	.00115	.00217	-.00190
WALL_6	1021.84137	3581.82695	1069.24998	-.00915	.00255	-.00295
WALL_7	6628.82838	-4230.29808	2105.09017	.03271	-.04951	.03494

TRANSFORMATION parameters

shift in X direction	:	-.035039	+/-	.003816
shift in Y direction	:	-.010289	+/-	.003860
shift in Z direction	:	-.006193	+/-	.004159
rotation around X axis	:	.00006759818	+/-	.00011379876
rotation around Y axis	:	.00007338767	+/-	.00006913858
rotation around Z axis	:	.00037856288	+/-	.00006278532
scale factor	:	1.000005787	+/-	.000000603

ROTATION matrix

.9999999999774	.0000066071701	-.0000012808487
-.0000066071686	.9999999999775	.0000011798193
.0000012808564	-.0000011798108	.9999999999985

BETS - SIMS comparision (all points)

9 PARAMETERS TRANSFORMATION  
 algorithm published in AVN 4/1989

DATE : 07-24-1992  
 TIME : 08:14

transformation based on 57 points  
 m1=m2=m3 imposed

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COMMON points

name	U	V	W	X	Y	Z
1	1058.992	-2112.416	255.675	1058.978	-2112.470	255.702
2	2599.270	-2077.182	1016.393	2599.132	-2077.159	1016.370
3	3916.822	-1777.061	896.492	3916.696	-1777.089	896.446
4	1192.151	1909.372	23.335	1192.125	1909.370	23.315
5	2970.737	2675.678	651.398	2970.659	2675.662	651.398
6	4140.152	1827.525	610.449	4140.093	1827.508	610.446
SB_1L	6120.146	727.684	1288.380	6120.106	727.615	1288.379
SB_1R	6149.588	-1269.646	1387.410	6149.496	-1269.716	1387.409
CEN_IP	5049.288	.069	.565	5049.215	.040	.545
CEN_US	-997.115	-.420	-1.698	-997.209	-.414	-1.720
P_1A	4306.997	8.801	169.749	4306.912	8.746	169.723
P_1B	4306.849	170.786	-10.167	4306.770	170.762	-10.168
P_1D	4306.954	-170.220	9.847	4306.875	-170.257	9.816
P_2A	708.566	9.157	171.283	708.516	9.215	171.254
P_2B	708.774	170.908	-10.305	708.729	170.954	-10.338
P_2D	707.037	-169.543	10.244	706.997	-169.510	10.257
P_3A	70.307	9.025	169.818	70.248	9.054	169.799
P_3B	70.274	170.271	-10.734	70.233	170.311	-10.768
P_3D	68.789	-170.487	9.911	68.690	-170.395	9.902
Q1_2B	3954.276	170.424	-9.957	3954.199	170.402	-9.978
Q1_2D	3954.303	-169.996	10.127	3954.218	-170.050	10.111
Q2_2B	2652.087	170.734	-9.619	2652.002	170.729	-9.640
Q2_2D	2652.225	-169.905	10.475	2652.138	-169.938	10.479
Q3_2B	1350.056	171.249	-9.714	1349.996	171.288	-9.745
Q3_2D	1350.054	-169.408	10.338	1350.033	-169.427	10.358
R1_A	.025	160.439	.043	-.012	160.484	.001
R1_B	.822	124.914	100.257	.796	124.974	100.223
R1_C	3.533	10.365	159.774	3.514	10.414	159.742
R1_D	.547	-110.954	115.710	.445	-110.860	115.703
R1_E	2.197	-160.568	5.255	2.087	-160.462	5.233
R2_A	889.763	160.451	5.205	889.709	160.481	5.178
R2_B	890.268	116.843	110.298	890.220	116.892	110.259
R2_C	892.072	1.600	160.654	892.018	1.635	160.628
R2_D	892.495	-110.810	116.312	892.462	-110.777	116.317
R2_E	893.153	-160.450	5.004	893.128	-160.442	5.006
R3_A	2159.822	160.538	-.185	2159.744	160.551	-.202
R3_B	2161.046	118.613	108.619	2160.963	118.639	108.610
R3_C	2162.725	2.554	160.955	2162.641	2.573	160.929
R3_D	2162.486	-109.959	117.302	2162.434	-110.044	117.326
R3_E	2162.781	-160.015	12.142	2162.727	-160.100	12.172
R4_A	3432.457	160.398	-7.240	3432.371	160.360	-7.258

R4_B	3432.831	121.610	105.139	3432.737	121.543	105.121
R4_C	3431.522	4.181	160.663	3431.442	4.165	160.637
R4_D	3432.741	-109.719	117.276	3432.661	-109.738	117.251
R4_E	3432.806	-158.331	25.907	3432.725	-158.334	25.870
R5_A	4395.572	160.445	-2.615	4395.503	160.393	-2.640
R5_B	4396.793	118.815	107.441	4396.713	118.796	107.439
R5_C	4396.992	-1.528	160.121	4396.914	-1.536	160.103
R5_D	4395.958	-112.508	114.053	4395.869	-112.565	114.035
R5_E	4398.018	-160.106	10.171	4397.931	-160.159	10.147
WALL_1	6612.181	-1071.304	1672.126	6612.100	-1071.385	1672.126
WALL_2	6600.106	2010.555	1524.166	6600.098	2010.501	1524.179
WALL_3	5647.189	3605.531	1065.305	5647.256	3605.601	1065.333
WALL_4	4070.201	3563.230	501.739	4070.170	3563.230	501.739
WALL_5	2829.150	3624.164	1743.549	2829.146	3624.131	1743.548
WALL_6	1021.851	3581.824	1069.253	1021.851	3581.824	1069.253
WALL_7	6628.871	-4230.089	2105.057	6628.796	-4230.249	2105.055

STATISTICS

number of iterations : 2

residuals on:

name	U	V	W	X	Y	Z
1	.08978	-.06971	.04917	.00000	.00000	.00000
2	-.03738	.03494	-.00541	.00000	.00000	.00000
3	-.03258	.00492	-.03088	.00000	.00000	.00000
4	.01057	-.02462	-.00946	.00000	.00000	.00000
5	-.05725	-.00827	.00450	.00000	.00000	.00000
6	-.02609	.01099	.00240	.00000	.00000	.00000
SB_1L	.00692	-.00396	.00328	.00000	.00000	.00000
SB_1R	-.01088	.00018	.00978	.00000	.00000	.00000
CEN_IP	-.01242	.01633	-.00933	.00000	.00000	.00000
CEN_US	-.02072	-.04806	-.00370	.00000	.00000	.00000
P_1A	-.02384	-.02121	-.01460	.00000	.00000	.00000
P_1B	-.01977	.00929	.01041	.00000	.00000	.00000
P_1D	-.01469	-.00287	-.01832	.00000	.00000	.00000
P_2A	.01879	.03194	-.01253	.00000	.00000	.00000
P_2B	.02125	.01845	-.01672	.00000	.00000	.00000
P_2D	.03162	.00727	.03110	.00000	.00000	.00000
P_3A	.01120	-.00789	-.00235	.00000	.00000	.00000
P_3B	.02618	.00278	-.01750	.00000	.00000	.00000
P_3D	-.02582	.05503	.00926	.00000	.00000	.00000
Q1_2B	-.01757	.00501	-.00834	.00000	.00000	.00000
Q1_2D	-.02017	-.02557	-.00329	.00000	.00000	.00000
Q2_2B	-.02268	.00042	-.00733	.00000	.00000	.00000
Q2_2D	-.01963	-.02652	.01896	.00000	.00000	.00000
Q3_2B	.00475	.02226	-.01536	.00000	.00000	.00000
Q3_2D	.04950	-.03412	.03587	.00000	.00000	.00000
R1_A	.03026	.00637	-.02461	.00000	.00000	.00000
R1_B	.04307	.02184	-.01733	.00000	.00000	.00000
R1_C	.05172	.01064	-.01507	.00000	.00000	.00000
R1_D	-.02936	.05648	.01024	.00000	.00000	.00000
R1_E	-.03704	.06838	-.00448	.00000	.00000	.00000
R2_A	.01173	.00637	-.01118	.00000	.00000	.00000
R2_B	.01900	.02506	-.02337	.00000	.00000	.00000
R2_C	.01524	.01199	-.00955	.00000	.00000	.00000
R2_D	.03737	.01062	.02200	.00000	.00000	.00000
R2_E	.04635	-.01434	.01957	.00000	.00000	.00000
R3_A	-.01394	.00957	-.00248	.00000	.00000	.00000
R3_B	-.01913	.02367	.00557	.00000	.00000	.00000
R3_C	-.01865	.01675	-.01124	.00000	.00000	.00000
R3_D	.01578	-.08745	.03941	.00000	.00000	.00000
R3_E	.01465	-.08753	.04437	.00000	.00000	.00000
R4_A	-.02531	-.01926	-.00596	.00000	.00000	.00000
R4_B	-.03239	-.04782	-.00516	.00000	.00000	.00000
R4_C	-.01659	.00332	-.01321	.00000	.00000	.00000
R4_D	-.01488	.00056	-.01198	.00000	.00000	.00000
R4_E	-.01489	.01644	-.02366	.00000	.00000	.00000
R5_A	-.01005	-.01781	-.01286	.00000	.00000	.00000

R5_B	-.02066	.01557	.00877	.00000	.00000	.00000
R5_C	-.01652	.02760	-.00587	.00000	.00000	.00000
R5_D	-.02485	-.02134	-.00535	.00000	.00000	.00000
R5_E	-.02248	-.01812	-.01161	.00000	.00000	.00000
WALL_1	-.00342	-.00234	.00870	.00000	.00000	.00000
WALL_2	.01738	.01753	.01318	.00000	.00000	.00000
WALL_3	.06771	.12084	.02513	.00000	.00000	.00000
WALL_4	-.02667	.02373	.00133	.00000	.00000	.00000
WALL_5	.00308	-.02642	-.00156	.00000	.00000	.00000
WALL_6	.00990	-.02521	.00411	.00000	.00000	.00000
WALL_7	.05452	-.07271	.01456	.00000	.00000	.00000

̄ a posteriori standard deviation : .029018452

TRANSFORMED coordinates

name	XTR	YTR	ZTR	DX	DY	DZ
1	1058.88827	-2112.40045	255.65326	-.08978	.06971	-.04917
2	2599.16898	-2077.19408	1016.37503	.03738	-.03494	.00541
3	3916.72884	-1777.09400	896.47643	.03258	-.00492	.03088
4	1192.11463	1909.39426	23.32422	-.01057	.02462	.00946
5	2970.71616	2675.67056	651.39309	.05725	.00828	-.00450
6	4140.11954	1827.49651	610.44323	.02609	-.01099	-.00240
SB_1L	6120.09882	727.61875	1288.37566	-.00692	.00396	-.00328
SB_1R	6149.50689	-1269.71590	1387.39962	.01088	-.00018	-.00978
CEN_IP	5049.22770	.02386	.55459	.01242	-.01633	.00933
CEN_US	-997.18784	-.36572	-1.71668	.02071	.04806	.00370
P_1A	4306.93559	8.76712	169.73782	.02384	.02121	.01460
P_1B	4306.78992	170.75295	-10.17853	.01977	-.00929	-.01041
P_1D	4306.88994	-170.25398	9.83457	.01469	.00287	.01832
P_2A	708.49724	9.18314	171.26636	-.01879	-.03194	.01253
P_2B	708.70814	170.93527	-10.32157	-.02125	-.01845	.01672
P_2D	706.96502	-169.51704	10.22627	-.03162	-.00727	-.03110
P_3A	70.23633	9.06156	169.80103	-.01120	.00789	.00235
P_3B	70.20669	170.30857	-10.75078	-.02618	-.00278	.01750
P_3D	68.71618	-170.45039	9.89240	.02582	-.05503	-.00926
Q1_2B	3954.21689	170.39680	-9.96931	.01757	-.00501	.00834
Q1_2D	3954.23801	-170.02418	10.11386	.02017	.02557	.00329
Q2_2B	2652.02472	170.72869	-9.63302	.02268	-.00042	.00733
Q2_2D	2652.15743	-169.91136	10.46033	.01962	.02652	-.01896
Q3_2B	1349.99085	171.26558	-9.72956	-.00475	-.02226	.01536
Q3_2D	1349.98306	-169.39287	10.32196	-.04950	.03412	-.03587
R1_A	-.04240	160.47714	.02526	-.03026	-.00637	.02461
R1_B	.75309	124.95208	100.24002	-.04307	-.02184	.01733
R1_C	3.46272	10.40318	159.75690	-.05172	-.01064	.01507
R1_D	.47467	-110.91632	115.69249	.02936	-.05648	-.01024
R1_E	2.12364	-160.52997	5.23704	.03704	-.06838	.00448
R2_A	889.69690	160.47483	5.18930	-.01173	-.00637	.01118
R2_B	890.20095	116.86652	110.28241	-.01900	-.02506	.02337
R2_C	892.00295	1.62325	160.63780	-.01524	-.01199	.00955
R2_D	892.42440	-110.78750	116.29537	-.03737	-.01062	-.02200
R2_E	893.08138	-160.42737	4.98670	-.04635	.01434	-.01957
R3_A	2159.75832	160.54101	-.19986	.01394	-.00957	.00248
R3_B	2160.98208	118.61496	108.60438	.01913	-.02367	-.00557
R3_C	2162.65918	2.55593	160.94004	.01865	-.01675	.01124
R3_D	2162.41838	-109.95697	117.28670	-.01578	.08745	-.03941
R3_E	2162.71219	-160.01280	12.12718	-.01465	.08753	-.04437
R4_A	3432.39595	160.37910	-7.25224	.02531	.01926	.00596
R4_B	3432.76975	121.59121	105.12656	.03239	.04782	.00516
R4_C	3431.45832	4.16161	160.65041	.01659	-.00332	.01321
R4_D	3432.67579	-109.73860	117.26273	.01488	-.00056	.01198
R4_E	3432.74001	-158.35026	25.89342	.01489	-.01644	.02366
R5_A	4395.51302	160.41032	-2.62670	.01004	.01781	.01286
R5_B	4396.73329	118.78053	107.42984	.02066	-.01557	-.00877
R5_C	4396.93022	-1.56357	160.10925	.01652	-.02760	.00587
R5_D	4395.89433	-112.54320	114.04067	.02485	.02134	.00535
R5_E	4397.95349	-160.14083	10.15852	.02248	.01812	.01161
WALL_1	6612.10365	-1071.38247	1672.11769	.00342	.00234	-.00870
WALL_2	6600.08049	2010.48369	1524.16629	-.01738	-.01753	-.01318



WALL_3	5647.18814	3605.47968	1065.30740	-.06770	-.12084	-.02513
WALL_4	4070.19686	3563.20655	501.73777	.02667	-.02373	-.00133
WALL_5	2829.14292	3624.15790	1743.54910	-.00308	.02642	.00156
WALL_6	1021.84062	3581.84961	1069.24882	-.00990	.02521	-.00411
WALL_7	6628.74114	-4230.17586	2105.04067	-.05453	.07271	-.01456

TRANSFORMATION parameters

shift in X direction	:	-.070488	+/-	.005683
shift in Y direction	:	.038193	+/-	.005728
shift in Z direction	:	-.017803	+/-	.006290
rotation around X axis	:	-.00016029543	+/-	.00015566378
rotation around Y axis	:	.00007840051	+/-	.00010624038
rotation around Z axis	:	.00095123839	+/-	.00009275957
scale factor	:	1.000002058	+/-	.000000899

ROTATION matrix

.9999999998612	.0000166022381	-.0000013683936
-.0000166022419	.9999999998583	-.0000027976603
.0000013683471	.0000027976830	.9999999999952

BETS - SIMS comparision (bundled points only)

9 PARAMETERS TRANSFORMATION  
 algorithm published in AVN 4/1989

DATE : 07-24-1992  
 TIME : 08:24

transformation based on 28 points  
 m1=m2=m3 imposed

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COMMON points

name	U	V	W	X	Y	Z
1	1058.992	-2112.416	255.675	1058.978	-2112.470	255.702
2	2599.270	-2077.182	1016.393	2599.132	-2077.159	1016.370
3	3916.822	-1777.061	896.492	3916.696	-1777.089	896.446
4	1192.151	1909.372	23.335	1192.125	1909.370	23.315
5	2970.737	2675.678	651.398	2970.659	2675.662	651.398
6	4140.152	1827.525	610.449	4140.093	1827.508	610.446
SB_1L	6120.146	727.684	1288.380	6120.106	727.615	1288.379
SB_1R	6149.588	-1269.646	1387.410	6149.496	-1269.716	1387.409
CEN_IP	5049.288	.069	.565	5049.215	.040	.545
CEN_US	-997.115	-.420	-1.698	-997.209	-.414	-1.720
P_1A	4306.997	8.801	169.749	4306.912	8.746	169.723
P_2A	708.566	9.157	171.283	708.516	9.215	171.254
P_3A	70.307	9.025	169.818	70.248	9.054	169.799
Q2_2B	2652.087	170.734	-9.619	2652.002	170.729	-9.640
R1_A	.025	160.439	.043	-.012	160.484	.001
R1_C	3.533	10.365	159.774	3.514	10.414	159.742
R2_C	892.072	1.600	160.654	892.018	1.635	160.628
R3_C	2162.725	2.554	160.955	2162.641	2.573	160.929
R4_C	3431.522	4.181	160.663	3431.442	4.165	160.637
R5_C	4396.992	-1.528	160.121	4396.914	-1.536	160.103
R5_E	4398.018	-160.106	10.171	4397.931	-160.159	10.147
WALL_1	6612.181	-1071.304	1672.126	6612.100	-1071.385	1672.126
WALL_2	6600.106	2010.555	1524.166	6600.098	2010.501	1524.179
WALL_3	5647.189	3605.531	1065.305	5647.256	3605.601	1065.333
WALL_4	4070.201	3563.230	501.739	4070.170	3563.230	501.739
WALL_5	2829.150	3624.164	1743.549	2829.146	3624.131	1743.548
WALL_6	1021.851	3581.824	1069.253	1021.851	3581.824	1069.253
WALL_7	6628.871	-4230.089	2105.057	6628.796	-4230.249	2105.055

STATISTICS

number of iterations : 2

residuals on:

name	U	V	W	X	Y	Z
1	.08545	-.05890	.05800	.00000	.00000	.00000
2	-.04406	.04230	-.00034	.00000	.00000	.00000
3	-.04151	.00768	-.02767	.00000	.00000	.00000
4	.01715	-.02352	-.00576	.00000	.00000	.00000
5	-.05164	-.01311	.00343	.00000	.00000	.00000
6	-.02558	.00465	.00105	.00000	.00000	.00000
SB_1L	.00073	-.01258	-.00068	.00000	.00000	.00000
SB_1R	-.02271	-.00392	.00829	.00000	.00000	.00000
CEN_IP	-.01997	.01065	-.00801	.00000	.00000	.00000
CEN_US	-.01473	-.03645	.00552	.00000	.00000	.00000
P_1A	-.02948	-.02456	-.01271	.00000	.00000	.00000
P_2A	.02121	.03889	-.00594	.00000	.00000	.00000
P_3A	.01504	.00088	.00508	.00000	.00000	.00000
Q2_2B	-.02438	.00120	-.00310	.00000	.00000	.00000
R1_A	.03448	.01477	-.01691	.00000	.00000	.00000
R1_C	.05570	.01959	-.00753	.00000	.00000	.00000
R2_C	.01721	.01842	-.00317	.00000	.00000	.00000
R3_C	-.01952	.01954	-.00652	.00000	.00000	.00000
R4_C	-.02030	.00247	-.01015	.00000	.00000	.00000
R5_C	-.02240	.02400	-.00406	.00000	.00000	.00000
R5_E	-.02902	-.02157	-.00924	.00000	.00000	.00000
WALL_1	-.01535	-.00782	.00569	.00000	.00000	.00000
WALL_2	.01410	.00499	.00632	.00000	.00000	.00000
WALL_3	.07052	.10683	.01836	.00000	.00000	.00000
WALL_4	-.02118	.01356	-.00205	.00000	.00000	.00000
WALL_5	.01315	-.03149	-.00618	.00000	.00000	.00000
WALL_6	.02301	-.02593	.00341	.00000	.00000	.00000
WALL_7	.03408	-.07058	.01487	.00000	.00000	.00000

a posteriori standard deviation : .029859071

TRANSFORMED coordinates

name	XTR	YTR	ZTR	DX	DY	DZ
1	1058.89260	-2112.41126	255.64443	-.08545	.05890	-.05800
2	2599.17567	-2077.20144	1016.36996	.04407	-.04230	.00034
3	3916.73777	-1777.09676	896.47322	.04151	-.00768	.02767
4	1192.10805	1909.39316	23.32052	-.01715	.02352	.00576
5	2970.71055	2675.67540	651.39416	.05164	.01312	-.00343
6	4140.11903	1827.50285	610.44458	.02558	-.00465	-.00105
SB_1L	6120.10501	727.62737	1288.37962	-.00073	.01258	.00068
SB_1R	6149.51872	-1269.71180	1387.40111	.02271	.00392	-.00829
CEN_IP	5049.23525	.02954	.55327	.01997	-.01065	.00801
CEN_US	-997.19382	-.37733	-1.72590	.01473	.03645	-.00552
P_1A	4306.94123	8.77047	169.73593	.02948	.02456	.01271
P_2A	708.49482	9.17619	171.25977	-.02121	-.03889	.00594
P_3A	70.23249	9.05279	169.79360	-.01504	-.00088	-.00508
Q2_2B	2652.02642	170.72791	-9.63725	.02438	-.00120	.00310
R1_A	-.04662	160.46874	.01756	-.03448	-.01477	.01691
R1_C	3.45874	10.39423	159.74936	-.05570	-.01959	.00753
R2_C	892.00098	1.61682	160.63142	-.01721	-.01842	.00317
R3_C	2162.66005	2.55314	160.93532	.01952	-.01954	.00652
R4_C	3431.46203	4.16246	160.64735	.02030	-.00247	.01015
R5_C	4396.93610	-1.55997	160.10744	.02240	-.02400	.00406
R5_E	4397.96003	-160.13738	10.15615	.02902	.02157	.00924
WALL_1	6612.11558	-1071.37699	1672.12070	.01535	.00782	-.00569
WALL_2	6600.08377	2010.49623	1524.17315	-.01410	-.00499	-.00632
WALL_3	5647.18532	3605.49369	1065.31417	-.07052	-.10683	-.01836
WALL_4	4070.19137	3563.21672	501.74115	.02118	-.01356	.00205
WALL_5	2829.13285	3624.16297	1743.55372	-.01315	.03149	.00618
WALL_6	1021.82751	3581.85033	1069.24952	-.02301	.02593	-.00341
WALL_7	6628.76159	-4230.17799	2105.04036	-.03408	.07058	-.01487

TRANSFORMATION parameters

shift in X direction	:	-.074243	+/-	.008353
shift in Y direction	:	.029429	+/-	.008374
shift in Z direction	:	-.025716	+/-	.009702
rotation around X axis	:	-.00023839802	+/-	.00016568863
rotation around Y axis	:	.00015324117	+/-	.00013833366
rotation around Z axis	:	.00078730029	+/-	.00011150433
scale factor	:	1.000004297	+/-	.000001081

ROTATION matrix

.9999999999020	.0000137409712	-.0000026746201
-.0000137409823	.9999999998969	-.0000041607937
.0000026745629	.0000041608305	.9999999999878

ECDS3 - SIMS comparision

9 PARAMETERS TRANSFORMATION  
 algorithm published in AVN 4/1989

DATE : 07-07-1992  
 TIME : 09:15

transformation based on 57 points  
 m1=m2=m3 imposed

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COMMON points

name	U	V	W	X	Y	Z
1	1058.978	-2112.470	255.702	1058.978	-2112.470	255.702
2	2599.132	-2077.160	1016.370	2599.132	-2077.159	1016.370
3	3916.697	-1777.090	896.446	3916.696	-1777.089	896.446
4	1192.126	1909.369	23.315	1192.125	1909.370	23.315
5	2970.660	2675.661	651.398	2970.659	2675.662	651.398
6	4140.095	1827.506	610.445	4140.093	1827.508	610.446
SB_1L	6120.107	727.613	1288.380	6120.106	727.615	1288.379
SB_1R	6149.498	-1269.717	1387.410	6149.496	-1269.716	1387.409
CEN_IP	5049.216	.039	.546	5049.215	.040	.545
CEN_US	-997.207	-.414	-1.721	-997.209	-.414	-1.720
P_1A	4306.913	8.745	169.723	4306.912	8.746	169.723
P_1B	4306.771	170.761	-10.168	4306.770	170.762	-10.168
P_1D	4306.876	-170.258	9.816	4306.875	-170.257	9.816
P_2A	708.517	9.214	171.254	708.516	9.215	171.254
P_2B	708.730	170.952	-10.338	708.729	170.954	-10.338
P_2D	706.998	-169.511	10.257	706.997	-169.510	10.257
P_3A	70.248	9.053	169.799	70.248	9.054	169.799
P_3B	70.232	170.309	-10.768	70.233	170.311	-10.768
P_3D	68.691	-170.396	9.901	68.690	-170.395	9.902
Q1_2B	3954.200	170.402	-9.977	3954.199	170.402	-9.978
Q1_2D	3954.219	-170.050	10.110	3954.218	-170.050	10.111
Q2_2B	2652.003	170.728	-9.640	2652.002	170.729	-9.640
Q2_2D	2652.138	-169.938	10.479	2652.138	-169.938	10.479
Q3_2B	1349.997	171.287	-9.745	1349.996	171.288	-9.745
Q3_2D	1350.033	-169.427	10.357	1350.033	-169.427	10.358
R1_A	-.013	160.481	.000	-.012	160.484	.001
R1_B	.796	124.972	100.222	.796	124.974	100.223
R1_C	3.516	10.412	159.742	3.514	10.414	159.742
R1_D	.445	-110.860	115.703	.445	-110.860	115.703
R1_E	2.087	-160.462	5.233	2.087	-160.462	5.233
R2_A	889.709	160.479	5.178	889.709	160.481	5.178
R2_B	890.221	116.890	110.259	890.220	116.892	110.259
R2_C	892.019	1.635	160.628	892.018	1.635	160.628
R2_D	892.462	-110.777	116.317	892.462	-110.777	116.317
R2_E	893.128	-160.443	5.006	893.128	-160.442	5.006
R3_A	2159.745	160.549	-.202	2159.744	160.551	-.202
R3_B	2160.964	118.637	108.610	2160.963	118.639	108.610
R3_C	2162.642	2.571	160.929	2162.641	2.573	160.929
R3_D	2162.434	-110.045	117.326	2162.434	-110.044	117.326
R3_E	2162.727	-160.100	12.171	2162.727	-160.100	12.172
R4_A	3432.372	160.358	-7.258	3432.371	160.360	-7.258

R4_B	3432.739	121.543	105.122	3432.737	121.543	105.121
R4_C	3431.443	4.163	160.637	3431.442	4.165	160.637
R4_D	3432.662	-109.738	117.250	3432.661	-109.738	117.251
R4_E	3432.726	-158.334	25.869	3432.725	-158.334	25.870
R5_A	4395.503	160.392	-2.639	4395.503	160.393	-2.640
R5_B	4396.713	118.796	107.439	4396.713	118.796	107.439
R5_C	4396.914	-1.537	160.104	4396.914	-1.536	160.103
R5_D	4395.871	-112.565	114.035	4395.869	-112.565	114.035
R5_E	4397.932	-160.160	10.146	4397.931	-160.159	10.147
WALL_1	6612.101	-1071.386	1672.126	6612.100	-1071.385	1672.126
WALL_2	6600.099	2010.500	1524.180	6600.098	2010.501	1524.179
WALL_3	5647.256	3605.598	1065.332	5647.256	3605.601	1065.333
WALL_4	4070.171	3563.231	501.739	4070.170	3563.230	501.739
WALL_5	2829.147	3624.132	1743.548	2829.146	3624.131	1743.548
WALL_6	1021.851	3581.824	1069.253	1021.851	3581.824	1069.253
WALL_7	6628.799	-4230.251	2105.056	6628.796	-4230.249	2105.055



STATISTICS

number of iterations : 2

residuals on:

name	U	V	W	X	Y	Z
1	.00078	-.00120	.00045	.00000	.00000	.00000
2	.00021	-.00054	-.00031	.00000	.00000	.00000
3	-.00009	-.00018	.00003	.00000	.00000	.00000
4	-.00023	.00011	.00004	.00000	.00000	.00000
5	-.00017	.00062	.00001	.00000	.00000	.00000
6	-.00018	.00074	.00038	.00000	.00000	.00000
SB_1L	-.00034	.00055	-.00052	.00000	.00000	.00000
SB_1R	-.00114	.00029	-.00006	.00000	.00000	.00000
CEN_IP	.00024	.00045	-.00034	.00000	.00000	.00000
CEN_US	-.00103	-.00067	.00019	.00000	.00000	.00000
P_1A	-.00010	.00028	.00015	.00000	.00000	.00000
P_1B	-.00004	.00004	-.00001	.00000	.00000	.00000
P_1D	.00030	.00003	.00005	.00000	.00000	.00000
P_2A	-.00001	-.00011	-.00054	.00000	.00000	.00000
P_2B	-.00047	.00063	.00004	.00000	.00000	.00000
P_2D	-.00047	-.00022	.00026	.00000	.00000	.00000
P_3A	.00017	-.00015	.00003	.00000	.00000	.00000
P_3B	.00101	.00175	-.00007	.00000	.00000	.00000
P_3D	-.00002	-.00059	.00006	.00000	.00000	.00000
Q1_2B	.00003	-.00079	-.00041	.00000	.00000	.00000
Q1_2D	-.00002	-.00052	.00040	.00000	.00000	.00000
Q2_2B	.00017	.00038	-.00039	.00000	.00000	.00000
Q2_2D	.00041	-.00127	.00063	.00000	.00000	.00000
Q3_2B	-.00040	.00013	-.00022	.00000	.00000	.00000
Q3_2D	.00061	-.00112	.00037	.00000	.00000	.00000
R1_A	.00104	.00146	.00036	.00000	.00000	.00000
R1_B	.00038	.00121	.00009	.00000	.00000	.00000
R1_C	-.00099	.00053	-.00009	.00000	.00000	.00000
R1_D	.00032	-.00079	-.00012	.00000	.00000	.00000
R1_E	.00012	-.00024	-.00062	.00000	.00000	.00000
R2_A	.00053	.00097	-.00007	.00000	.00000	.00000
R2_B	-.00052	.00046	-.00038	.00000	.00000	.00000
R2_C	-.00057	-.00062	-.00013	.00000	.00000	.00000
R2_D	.00025	-.00045	.00048	.00000	.00000	.00000
R2_E	-.00007	-.00017	.00008	.00000	.00000	.00000
R3_A	-.00029	.00033	-.00040	.00000	.00000	.00000
R3_B	-.00004	.00098	.00012	.00000	.00000	.00000
R3_C	-.00063	.00064	-.00007	.00000	.00000	.00000
R3_D	.00044	-.00064	.00022	.00000	.00000	.00000
R3_E	.00061	-.00134	.00038	.00000	.00000	.00000
R4_A	-.00016	.00045	-.00001	.00000	.00000	.00000
R4_B	-.00039	-.00045	-.00023	.00000	.00000	.00000
R4_C	-.00003	.00074	-.00019	.00000	.00000	.00000
R4_D	-.00022	-.00090	.00027	.00000	.00000	.00000
R4_E	-.00002	-.00072	.00053	.00000	.00000	.00000
R5_A	.00056	-.00084	-.00060	.00000	.00000	.00000

R5_B	.00057	-.00079	-.00056	.00000	.00000	.00000
R5_C	.00040	.00056	-.00039	.00000	.00000	.00000
R5_D	-.00055	-.00095	.00043	.00000	.00000	.00000
R5_E	-.00039	-.00025	.00060	.00000	.00000	.00000
WALL_1	.00081	.00019	.00050	.00000	.00000	.00000
WALL_2	-.00001	.00095	-.00014	.00000	.00000	.00000
WALL_3	.00089	.00158	.00072	.00000	.00000	.00000
WALL_4	.00010	-.00074	.00015	.00000	.00000	.00000
WALL_5	-.00003	-.00056	-.00019	.00000	.00000	.00000
WALL_6	.00025	-.00027	.00000	.00000	.00000	.00000
WALL_7	-.00157	.00104	-.00097	.00000	.00000	.00000

a posteriori standard deviation : .000577153

TRANSFORMED coordinates

name	XTR	YTR	ZTR	DX	DY	DZ
1	1058.97727	-2112.46896	255.70198	-.00078	.00120	-.00045
2	2599.13139	-2077.15860	1016.36993	-.00021	.00054	.00031
3	3916.69635	-1777.08890	896.44552	.00009	.00018	-.00003
4	1192.12543	1909.36953	23.31472	.00023	-.00011	-.00004
5	2970.65908	2675.66166	651.39758	.00017	-.00062	-.00001
6	4140.09363	1827.50676	610.44525	.00018	-.00074	-.00038
SB_1L	6120.10608	727.61424	1288.37946	.00034	-.00055	.00052
SB_1R	6149.49715	-1269.71601	1387.40946	.00114	-.00029	.00006
CEN_IP	5049.21504	.03974	.54560	-.00024	-.00045	.00034
CEN_US	-997.20752	-.41311	-1.72057	.00103	.00067	-.00019
P_1A	4306.91185	8.74563	169.72307	.00010	-.00028	-.00015
P_1B	4306.77019	170.76220	-10.16811	.00004	-.00004	.00001
P_1D	4306.87495	-170.25688	9.81620	-.00030	-.00003	-.00005
P_2A	708.51604	9.21519	171.25437	.00001	.00011	.00054
P_2B	708.72986	170.95309	-10.33833	.00047	-.00063	-.00004
P_2D	706.99711	-169.50955	10.25711	.00047	.00022	-.00026
P_3A	70.24736	9.05382	169.79865	-.00017	.00015	-.00003
P_3B	70.23186	170.30960	-10.76821	-.00101	-.00175	.00007
P_3D	68.69038	-170.39477	9.90160	.00002	.00059	-.00006
Q1_2B	3954.19929	170.40260	-9.97724	-.00003	.00079	.00041
Q1_2D	3954.21786	-170.04923	10.11017	.00002	.00052	-.00040
Q2_2B	2652.00187	170.72873	-9.63996	-.00017	-.00038	.00039
Q2_2D	2652.13740	-169.93661	10.47866	-.00041	.00127	-.00063
Q3_2B	1349.99600	171.28771	-9.74470	.00040	-.00013	.00022
Q3_2D	1350.03195	-169.42587	10.35746	-.00061	.00112	-.00037
R1_A	-.01318	160.48205	.00029	-.00104	-.00146	-.00036
R1_B	.79578	124.97271	100.22260	-.00038	-.00121	-.00009
R1_C	3.51543	10.41329	159.74192	.00099	-.00053	.00009
R1_D	.44499	-110.85905	115.70285	-.00032	.00079	.00012
R1_E	2.08648	-160.46135	5.23318	-.00012	.00024	.00062
R2_A	889.70810	160.48023	5.17819	-.00053	-.00097	.00007
R2_B	890.22047	116.89112	110.25942	.00052	-.00046	.00038
R2_C	892.01876	1.63586	160.62838	.00057	.00062	.00013
R2_D	892.46152	-110.77643	116.31689	-.00025	.00045	-.00048
R2_E	893.12780	-160.44154	5.00619	.00007	.00017	-.00008
R3_A	2159.74467	160.55025	-.20194	.00029	-.00033	.00040
R3_B	2160.96299	118.63765	108.60983	.00004	-.00098	-.00012
R3_C	2162.64116	2.57204	160.92887	.00063	-.00064	.00007
R3_D	2162.43372	-110.04378	117.32589	-.00044	.00064	-.00022
R3_E	2162.72623	-160.09899	12.17117	-.00061	.00134	-.00038
R4_A	3432.37080	160.35939	-7.25819	.00016	-.00045	.00001
R4_B	3432.73775	121.54384	105.12163	.00039	.00045	.00023
R4_C	3431.44176	4.16419	160.63739	.00003	-.00074	.00019
R4_D	3432.66113	-109.73714	117.25048	.00022	.00090	-.00027
R4_E	3432.72514	-158.33310	25.86923	.00002	.00072	-.00053
R5_A	4395.50242	160.39335	-2.63896	-.00056	.00084	.00060
R5_B	4396.71206	118.79689	107.43917	-.00057	.00079	.00056
R5_C	4396.91330	-1.53653	160.10377	-.00040	-.00056	.00039
R5_D	4395.87003	-112.56359	114.03489	.00055	.00095	-.00043
R5_E	4397.93140	-160.15870	10.14631	.00039	.00025	-.00060
WALL_1	6612.09942	-1071.38500	1672.12589	-.00081	-.00019	-.00050
WALL_2	6600.09788	2010.50027	1524.17961	.00001	-.00095	.00014

WALL_3	5647.25495	3605.59894	1065.33181	-.00089	-.00158	-.00072
WALL_4	4070.17009	3563.23102	501.73895	-.00010	.00074	-.00015
WALL_5	2829.14603	3624.13204	1743.54773	.00003	.00056	.00019
WALL_6	1021.85027	3581.82467	1069.25293	-.00025	.00027	.00000
WALL_7	6628.79724	-4230.24961	2105.05620	.00157	-.00104	.00097

TRANSFORMATION parameters

shift in X direction	:	-.000401	+/-	.000113
shift in Y direction	:	.000946	+/-	.000114
shift in Z direction	:	.000147	+/-	.000125
rotation around X axis	:	.00000229744	+/-	.00000309600
rotation around Y axis	:	-.00000138088	+/-	.00000211304
rotation around Z axis	:	.00000018679	+/-	.00000184491
scale factor	:	.999999865	+/-	.000000018

ROTATION matrix

1.00000000000000	.0000000032601	.0000000241008
-.0000000032601	1.00000000000000	.0000000400979
-.0000000241008	-.0000000400979	1.00000000000000

MANCAT - SIMS comparision

9 PARAMETERS TRANSFORMATION  
 algorithm published in AVN 4/1989

DATE : 07-07-1992  
 TIME : 09:26

transformation based on 57 points  
 m1=m2=m3 imposed

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COMMON points

name	U	V	W	X	Y	Z
1	1058.983	-2112.470	255.694	1058.978	-2112.470	255.702
2	2599.135	-2077.161	1016.366	2599.132	-2077.159	1016.370
3	3916.701	-1777.090	896.446	3916.696	-1777.089	896.446
4	1192.127	1909.365	23.312	1192.125	1909.370	23.315
5	2970.662	2675.661	651.397	2970.659	2675.662	651.398
6	4140.097	1827.506	610.446	4140.093	1827.508	610.446
SB_1L	6120.118	727.613	1288.385	6120.106	727.615	1288.379
SB_1R	6149.501	-1269.723	1387.409	6149.496	-1269.716	1387.409
CEN_IP	5049.219	.039	.545	5049.215	.040	.545
CEN_US	-997.201	-.417	-1.722	-997.209	-.414	-1.720
P_1A	4306.916	8.745	169.723	4306.912	8.746	169.723
P_1B	4306.774	170.760	-10.169	4306.770	170.762	-10.168
P_1D	4306.880	-170.255	9.815	4306.875	-170.257	9.816
P_2A	708.520	9.213	171.253	708.516	9.215	171.254
P_2B	708.734	170.952	-10.339	708.729	170.954	-10.338
P_2D	707.001	-169.512	10.256	706.997	-169.510	10.257
P_3A	70.252	9.051	169.797	70.248	9.054	169.799
P_3B	70.239	170.310	-10.769	70.233	170.311	-10.768
P_3D	68.696	-170.398	9.900	68.690	-170.395	9.902
Q1_2B	3954.203	170.399	-9.978	3954.199	170.402	-9.978
Q1_2D	3954.222	-170.049	10.109	3954.218	-170.050	10.111
Q2_2B	2652.005	170.726	-9.641	2652.002	170.729	-9.640
Q2_2D	2652.141	-169.938	10.478	2652.138	-169.938	10.479
Q3_2B	1349.999	171.285	-9.745	1349.996	171.288	-9.745
Q3_2D	1350.036	-169.429	10.356	1350.033	-169.427	10.358
R1_A	-.006	160.482	.000	-.012	160.484	.001
R1_B	.802	124.972	100.222	.796	124.974	100.223
R1_C	3.519	10.411	159.741	3.514	10.414	159.742
R1_D	.450	-110.862	115.701	.445	-110.860	115.703
R1_E	2.092	-160.464	5.231	2.087	-160.462	5.233
R2_A	889.713	160.479	5.178	889.709	160.481	5.178
R2_B	890.224	116.889	110.258	890.220	116.892	110.259
R2_C	892.022	1.633	160.627	892.018	1.635	160.628
R2_D	892.466	-110.779	116.316	892.462	-110.777	116.317
R2_E	893.132	-160.444	5.005	893.128	-160.442	5.006
R3_A	2159.747	160.548	-.203	2159.744	160.551	-.202
R3_B	2160.966	118.636	108.610	2160.963	118.639	108.610
R3_C	2162.644	2.571	160.928	2162.641	2.573	160.929
R3_D	2162.437	-110.045	117.325	2162.434	-110.044	117.326
R3_E	2162.730	-160.101	12.170	2162.727	-160.100	12.172
R4_A	3432.374	160.357	-7.259	3432.371	160.360	-7.258

R4_B	3432.741	121.541	105.121	3432.737	121.543	105.121
R4_C	3431.446	4.163	160.637	3431.442	4.165	160.637
R4_D	3432.664	-109.738	117.249	3432.661	-109.738	117.251
R4_E	3432.729	-158.333	25.868	3432.725	-158.334	25.870
R5_A	4395.507	160.390	-2.640	4395.503	160.393	-2.640
R5_B	4396.717	118.794	107.438	4396.713	118.796	107.439
R5_C	4396.918	-1.537	160.103	4396.914	-1.536	160.103
R5_D	4395.874	-112.563	114.034	4395.869	-112.565	114.035
R5_E	4397.936	-160.157	10.145	4397.931	-160.159	10.147
WALL_1	6612.105	-1071.385	1672.126	6612.100	-1071.385	1672.126
WALL_2	6600.102	2010.501	1524.180	6600.098	2010.501	1524.179
WALL_3	5647.259	3605.600	1065.333	5647.256	3605.601	1065.333
WALL_4	4070.173	3563.230	501.739	4070.170	3563.230	501.739
WALL_5	2829.148	3624.132	1743.549	2829.146	3624.131	1743.548
WALL_6	1021.851	3581.824	1069.253	1021.851	3581.824	1069.253
WALL_7	6628.804	-4230.252	2105.055	6628.796	-4230.249	2105.055

STATISTICS

number of iterations : 2

residuals on:

name	U	V	W	X	Y	Z
1	-.00003	-.00227	.00635	.00000	.00000	.00000
2	.00155	-.00066	.00158	.00000	.00000	.00000
3	.00057	-.00085	-.00182	.00000	.00000	.00000
4	.00150	.00325	.00184	.00000	.00000	.00000
5	.00039	.00032	.00115	.00000	.00000	.00000
6	.00028	.00024	.00048	.00000	.00000	.00000
SB_1L	-.00771	.00096	-.00577	.00000	.00000	.00000
SB_1R	.00046	.00630	-.00035	.00000	.00000	.00000
CEN_IP	.00082	.00001	.00003	.00000	.00000	.00000
CEN_US	-.00350	.00096	-.00036	.00000	.00000	.00000
P_1A	.00085	-.00028	-.00019	.00000	.00000	.00000
P_1B	.00043	.00130	.00002	.00000	.00000	.00000
P_1D	-.00001	-.00249	.00108	.00000	.00000	.00000
P_2A	-.00022	.00011	-.00044	.00000	.00000	.00000
P_2B	-.00031	-.00001	-.00097	.00000	.00000	.00000
P_2D	-.00034	.00008	.00017	.00000	.00000	.00000
P_3A	-.00108	.00022	-.00045	.00000	.00000	.00000
P_3B	-.00219	-.00081	-.00112	.00000	.00000	.00000
P_3D	-.00140	.00035	.00015	.00000	.00000	.00000
Q1_2B	.00057	.00137	-.00007	.00000	.00000	.00000
Q1_2D	.00054	-.00222	.00090	.00000	.00000	.00000
Q2_2B	.00113	.00148	-.00048	.00000	.00000	.00000
Q2_2D	.00135	-.00125	.00038	.00000	.00000	.00000
Q3_2B	.00081	.00076	-.00083	.00000	.00000	.00000
Q3_2D	.00057	-.00032	.00019	.00000	.00000	.00000
R1_A	-.00239	-.00087	-.00113	.00000	.00000	.00000
R1_B	-.00210	-.00069	-.00097	.00000	.00000	.00000
R1_C	-.00055	-.00002	-.00081	.00000	.00000	.00000
R1_D	-.00117	.00017	.00024	.00000	.00000	.00000
R1_E	-.00152	.00040	.00012	.00000	.00000	.00000
R2_A	.00009	.00022	-.00091	.00000	.00000	.00000
R2_B	.00012	.00026	-.00084	.00000	.00000	.00000
R2_C	-.00008	.00015	-.00068	.00000	.00000	.00000
R2_D	.00002	-.00010	.00021	.00000	.00000	.00000
R2_E	-.00006	-.00001	.00014	.00000	.00000	.00000
R3_A	.00122	.00135	-.00064	.00000	.00000	.00000
R3_B	.00115	.00128	-.00066	.00000	.00000	.00000
R3_C	.00051	.00039	-.00052	.00000	.00000	.00000
R3_D	.00116	-.00086	.00024	.00000	.00000	.00000
R3_E	.00125	-.00091	.00026	.00000	.00000	.00000
R4_A	.00082	.00143	-.00023	.00000	.00000	.00000
R4_B	.00077	.00135	-.00030	.00000	.00000	.00000
R4_C	.00069	.00005	-.00027	.00000	.00000	.00000
R4_D	.00102	-.00174	.00053	.00000	.00000	.00000
R4_E	.00107	-.00179	.00062	.00000	.00000	.00000
R5_A	.00040	.00127	.00003	.00000	.00000	.00000



R5_B	.00038	.00117	-.00005	.00000	.00000	.00000
R5_C	.00070	-.00023	-.00007	.00000	.00000	.00000
R5_D	-.00010	-.00243	.00091	.00000	.00000	.00000
R5_E	-.00016	-.00255	.00111	.00000	.00000	.00000
WALL_1	.00044	-.00075	-.00007	.00000	.00000	.00000
WALL_2	.00013	-.00030	.00091	.00000	.00000	.00000
WALL_3	.00014	-.00001	.00128	.00000	.00000	.00000
WALL_4	.00023	-.00064	.00111	.00000	.00000	.00000
WALL_5	.00056	-.00201	-.00017	.00000	.00000	.00000
WALL_6	.00265	-.00186	.00038	.00000	.00000	.00000
WALL_7	-.00239	.00175	-.00122	.00000	.00000	.00000

a posteriori standard deviation : .001476048

TRANSFORMED coordinates

name	XTR	YTR	ZTR	DX	DY	DZ
1	1058.97808	-2112.46789	255.69608	.00003	.00227	-.00635
2	2599.13005	-2077.15848	1016.36804	-.00155	.00066	-.00158
3	3916.69569	-1777.08823	896.44737	-.00057	.00085	.00182
4	1192.12370	1909.36639	23.31292	-.00150	-.00325	-.00184
5	2970.65852	2675.66196	651.39644	-.00039	-.00032	-.00115
6	4140.09317	1827.50726	610.44515	-.00028	-.00024	-.00048
SB_1L	6120.11345	727.61383	1288.38471	.00771	-.00096	.00577
SB_1R	6149.49555	-1269.72202	1387.40975	-.00046	-.00630	.00035
CEN_IP	5049.21446	.04018	.54523	-.00082	-.00001	-.00003
CEN_US	-997.20505	-.41474	-1.72002	.00350	-.00096	.00036
P_1A	4306.91090	8.74619	169.72341	-.00085	.00028	.00019
P_1B	4306.76972	170.76094	-10.16814	-.00043	-.00130	-.00002
P_1D	4306.87526	-170.25436	9.81517	.00001	.00249	-.00108
P_2A	708.51625	9.21497	171.25427	.00022	-.00011	.00044
P_2B	708.72970	170.95373	-10.33732	.00031	.00001	.00097
P_2D	706.99698	-169.50985	10.25720	.00034	-.00008	-.00017
P_3A	70.24861	9.05345	169.79913	.00108	-.00022	.00045
P_3B	70.23506	170.31216	-10.76716	.00219	.00081	.00112
P_3D	68.69176	-170.39571	9.90151	.00140	-.00035	-.00015
Q1_2B	3954.19875	170.40044	-9.97758	-.00057	-.00137	.00007
Q1_2D	3954.21730	-170.04753	10.10967	-.00054	.00222	-.00090
Q2_2B	2652.00091	170.72763	-9.63987	-.00113	-.00148	.00048
Q2_2D	2652.13646	-169.93663	10.47891	-.00135	.00125	-.00038
Q3_2B	1349.99479	171.28708	-9.74409	-.00081	-.00076	.00083
Q3_2D	1350.03199	-169.42667	10.35764	-.00057	.00032	-.00019
R1_A	-.00975	160.48438	.00178	.00239	.00087	.00113
R1_B	.79826	124.97461	100.22366	.00210	.00069	.00097
R1_C	3.51499	10.41384	159.74264	.00055	.00002	.00081
R1_D	.44648	-110.86001	115.70249	.00117	-.00017	-.00024
R1_E	2.08812	-160.46199	5.23244	.00152	-.00040	-.00012
R2_A	889.70854	160.48098	5.17903	-.00009	-.00022	.00091
R2_B	890.21983	116.89132	110.25988	-.00012	-.00026	.00084
R2_C	892.01827	1.63509	160.62893	.00008	-.00015	.00068
R2_D	892.46175	-110.77678	116.31716	-.00002	.00010	-.00021
R2_E	893.12779	-160.44170	5.00613	.00006	.00001	-.00014
R3_A	2159.74316	160.54923	-.20170	-.00122	-.00135	.00064
R3_B	2160.96180	118.63735	108.61061	-.00115	-.00128	.00066
R3_C	2162.64002	2.57229	160.92932	-.00051	-.00039	.00052
R3_D	2162.43300	-110.04356	117.32587	-.00116	.00086	-.00024
R3_E	2162.72559	-160.09942	12.17129	-.00125	.00091	-.00026
R4_A	3432.36982	160.35841	-7.25797	-.00082	-.00143	.00023
R4_B	3432.73659	121.54204	105.12170	-.00077	-.00135	.00030
R4_C	3431.44104	4.16488	160.63747	-.00069	-.00005	.00027
R4_D	3432.65989	-109.73630	117.25022	-.00102	.00174	-.00053
R4_E	3432.72405	-158.33203	25.86914	-.00107	.00179	-.00062
R5_A	4395.50258	160.39124	-2.63959	-.00040	-.00127	-.00003
R5_B	4396.71225	118.79493	107.43866	-.00038	-.00117	.00005
R5_C	4396.91300	-1.53574	160.10345	-.00070	.00023	.00007
R5_D	4395.86958	-112.56211	114.03441	.00010	.00243	-.00091
R5_E	4397.93117	-160.15640	10.14580	.00016	.00255	-.00111
WALL_1	6612.09979	-1071.38406	1672.12646	-.00044	.00075	.00007
WALL_2	6600.09774	2010.50152	1524.17856	-.00013	.00030	-.00091

WALL_3	5647.25570	3605.60053	1065.33125	-.00014	.00001	-.00128
WALL_4	4070.16996	3563.23092	501.73799	-.00023	.00064	-.00111
WALL_5	2829.14544	3624.13349	1743.54771	-.00056	.00201	.00017
WALL_6	1021.84787	3581.82626	1069.25255	-.00265	.00186	-.00038
WALL_7	6628.79806	-4230.25032	2105.05645	.00239	-.00175	.00122

TRANSFORMATION parameters

shift in X direction	:	-.003880	+/-	.000289
shift in Y direction	:	.002391	+/-	.000291
shift in Z direction	:	.001745	+/-	.000320
rotation around X axis	:	.00002615701	+/-	.00000791790
rotation around Y axis	:	-.00001593905	+/-	.00000540401
rotation around Z axis	:	.00001812858	+/-	.00000471829
scale factor	:	.999999806	+/-	.000000046

ROTATION matrix

.999999999999999	.0000003164032	.0000002781890
-.0000003164034	.9999999999998	.0000004565258
-.0000002781889	-.0000004565259	.9999999999999