SITE GEODETIC SURVEY REPORT

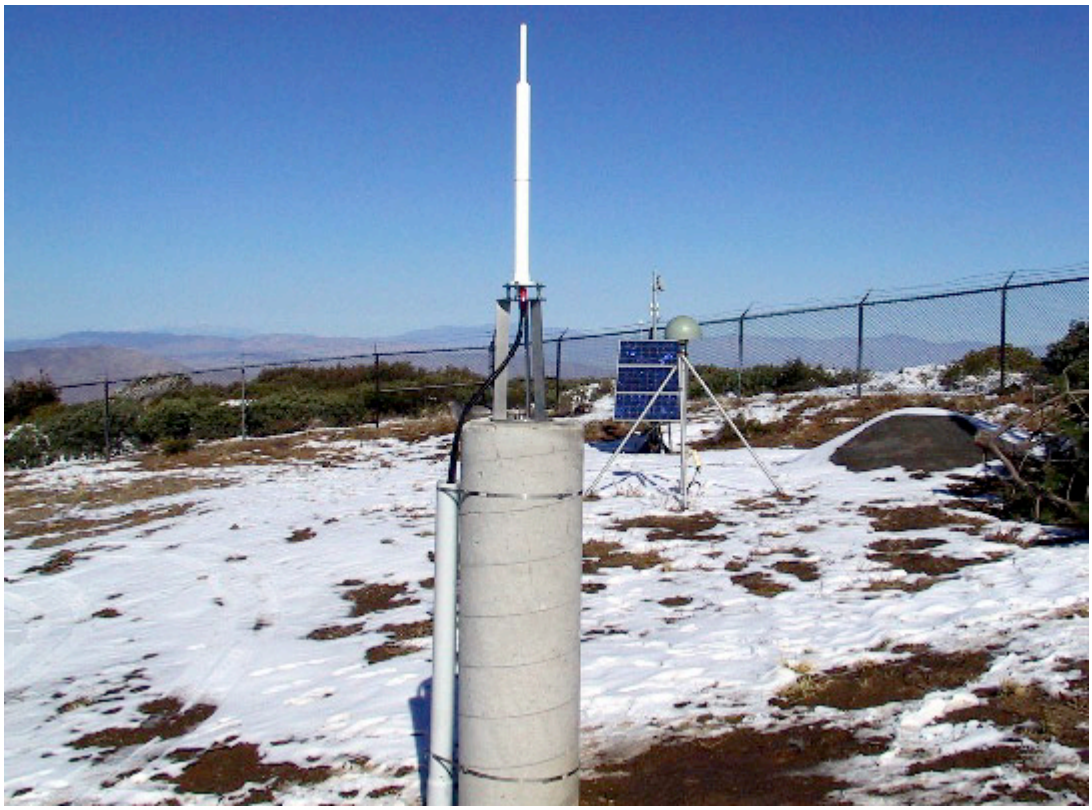
MONUMENT PEAK, CALIFORNIA

2011 MOBLAS 4 Site Geodetic Survey

Dates of Survey: **November 2011**

Date of Report: **November 23, 2011**

By: **Troy D. Carpenter**



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1. Introduction

The realization of the International Terrestrial Reference Frame (ITRF) is a product of the International Earth Rotation and Reference Frames Service (IERS) International Terrestrial Reference System (ITRS) Product Center. The ITRF coordinates are obtained by the combination of individual ITRF solutions computed from the observations of the different space geodesy techniques: Global Positioning System (GPS), Very Long Baseline Interferometry (VLBI), Satellite Laser Ranging (SLR), and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) located at sites around the whole earth. Two very important components of this combination of space geodesy solutions are the co-location site, where multiple space geodesy techniques are located in close proximity, and the local tie survey, which provides an accurate ground connection between the different space geodesy systems.

This report decribes the site survey conducted at the NASA MOBLAS 4 Satellite Laser Ranging (SLR) Monument Peak, California site, and includes the results of the adjustment and analysis of the collected survey data.

2. MOBLAS 4 Site Description

The Moblas 4 site is located approximately 65 miles East of San Diego, California. The site is operated by the NASA Goddard Space Flight Center (GSFC) for space geodesy research and development. The site has three space geodesy techniques:

a. SLR

b. GPS (System operated by the Southern California Integrated GPS Network – SCIGN)

c. DORIS (This system has been deactivated)

The local survey control network at the Monument Peak, California site consists of several stable, inter-visible ground monuments and concrete pillars. The concrete pillars are equipped with stainless steel self-centering fixtures, that accept will special self-centering ball survey tribrachs.

2.1 SLR Station – DOMES Number : 40497M001 Monument Peak SLR 7110

This station refers to the ground survey mark, designated ORT 7110, located beneath the SLR Moblas 4 telescope. The survey mark is a standard NASA 100 millimeter (mm) brass disk set flush in the center of the isolated concrete foundation for the SLR Moblas 4 mount.

The SLR is a transportable system named MOBLAS 4 (ILRS designation: MONP). The system consists of a 0.76 meter (m) telescope on an azimuth/elevation (Az/El) mount supported by three legs, isolated from the mobile trailer enclosure. The trailer has a roll back roof and sides that can be lowered to expose the SLR telescope. The foundation for the mobile trailer is separate and isolated from the foundation of the SLR telescope.

The conventional reference point for the SLR telescope is the intersection of the horizontal and vertical axis of rotation. This reference point is not accessible and cannot be measured directly. The SLR reference point is horizontally and vertically eccentric from the station mark.

2.2 GPS Station – DOMES Number: 40497M004 Monument Peak GNSS MONP

This station refers to a punch mark located on the side of the center pole brace of the Wyatt/Agnew drilled-braced steel supports. The actual vertical reference point is located at this punch mark and the horizontal point referenced to the center of the GPS antenna ARP.

The GPS station is designated MONP by the IGS and it is an IGS Reference Frame Station. The MONP antenna is an ASH701945B_M with a SCIS antenna radome. The height of the MONP antenna reference point (ARP) is o.1176 meters above the station mark.

2.3 DORIS Antenna – DOMES Number: 40497S009 Monument Peak DORIS MOOB

The DORIS station is designated by the IDS and the station refers to the antenna reference point (400 MHz phase center). The antenna is mounted on a stainless steel plate fixture and frame attached to the top of a 300 mm diameter reinforced concrete pillar. The DORIS reference mark (survey point) is the intersection of the centerline of the DORIS antenna at the 400 MHz phase center point (red line). This point is located 0.894 meters above a punch mark in a small brass pin imbedded in the top of the concrete pillar.

2.4 Site Survey Control Monuments/Calibration Piers

(a) Monument SLR 7220 DOMES Number: 40497M002 – Punch Mark in center of a steel plate set in top of concrete monument.
(b) Monument 7274 – Center mark of standard National Geodetic Survey (NGS) brass triangulation disk set in top of concrete monument.
(c) Monument Reference Mark 1 – Center mark of standard National Geodetic Survey (NGS) brass reference disk set in top of concrete monument.
(d) Lookout – Center mark of Standard NASA brass survey disk set flush in the top of a concrete helio-pad.
(e) Calibration Pier A – Center top of a stainless steel insert imbedded in the top of a concrete pillar that is incased in a hard black plastic ribbed material.
(f) Calibration Pier C – Center top of a stainless steel insert imbedded in the top of a concrete pillar.

3. Survey Description

3.1 Organization

The survey work was completed by ITT surveyor Troy Carpenter, under the NASA SCNS contract and TO22. The field survey data was collected during November 2011 for a re-survey of the Moblas 4 Monument Peak site survey control monuments, the existing Global Positioning and DORIS systems, and the Moblas 4 calibration piers. This was to update the Moblas 4 system calibration distances to the

two existing calibration pillars and the Moblas 4 system eccentricity from survey control monument ORT 7110. In addition Global Positioning System (GPS) data was collected to upgrade and reference the site geodetic coordinates to the ITRF2008 epoch 2005 International terrestrial Reference Frame.

3.2 Instruments and Equipment

All of the survey instruments and equipment utilized for this project is owned by NASA and administered by ITT under the SCNS TO22 Contract.

The following are the primary survey instruments utilized:

a. Leica electronic theodolite T3000, with an angular accuracy standard deviation of 0.5 arc seconds, were used to measure horizontal directions and zenith distances.

b. Two Leica electronic distance measurement (EDM) instruments (DI2000 66886 and DI2002 180595), with an accuracy standard deviation of 1 mm + 1 ppm were used to measure the slope distances.

c. Lieca electronic level NA3003 (93769), with an accuracy standard deviation of 1.2 mm was used for the differential level measurements.

d. Four Trimble 4000SSE GPS receivers with Trimble choke ring antennas, with a horizontal accuracy standard deviation of 5mm + 1ppm and a vertical accuracy standard deviation of 10 mm + 1 ppm were used to collect the GPS data.

Other survey accessory equipment included:

a. Leica optical plummet
b. Wild T2 targets
c. Tripods
d. Translation Stage
e. Trivet plates, tribrachs, and tribrach adapters
f. Calibrated 40 mm mini-prisms

Prior to the site survey, the calibration constants for the Leica EDM instruments where verified using a Leica TS30 robotic theodolite. Several distances where measured and compared between the Leica instruments at the NASA GGAO facility in Greenbelt, Maryland. The Leica DI2000 and DI2002 had been calibrated at the National Geodetic Survey (NGS) precise baseline in Corbin, Virginia (CBL) in May 2009. The Leica TS30 robotic theodolite was calibrated at the NGS precise baseline in Corbin, Virginia in April 2010. This calibration confirmed the manufactures published calibration value.

3.3 Survey Network and Strategy

The special self centering pier tribrach was used to set the T3000 theodolite at both Calibration Pier A and Calibration Pier C to ensure stability and eliminate plumbing errors. The prisms at these calibration piers where set directly into the stainless steel inserts to also eliminate any plumbing errors. The Leica optical plummet was used for all tripod setups to minimize plumbing errors.

The majority of the inter-visible lines-of-sight between the survey stations were observed. Horizontal directions where observed in sets of four observations with each set consisting of an observation in both the direct and reverse theodolite telescope pointings. Zenith distances where observed in sets of three observations, both direct and reverse theodolite telescope pointings. Zenith distance observations where observed across all the lines from each of the occupied stations.

The distance measurements where made from each station standpoint with both the Leica DI2000 and the Leica DI2002 to the majority of the inter-visible target points. The atmospheric pressure and temperature data were recorded at the beginning and end of each distance measurement.

Direct differential levels where observed to determine orthometric height differences between the majority of the survey control stations in the control network. All observations where double run: forward run and backward run. The exceptions where both Calibration Pier A and Calibration Pier C. The heights of these control points where determined by a combination of zenith distance observations and Global Positioning System (GPS) collected data.

All of the observations to the Moblas 4 system mount (translation stage target/prism) where made from as many of the ground survey monuments as possible. These consisted of horizontal directions, zenith distances, distance measurements, and differential levels. No observations where made from the top of the Moblas 4 mount with the exception of the differential levels.

Both the Global Positioning System (GPS) and the DORIS system antennas could not be removed. To provide the survey ties to both of these systems, it was necessary to use survey intersection methods. The survey intersection observations consisted of horizontal directions and zenith distances from several of the control monuments in the site survey scheme. Differential levels where observed to the base of both antennas, and a vertical tape was used to measure the vertical heights from the base to the GPS antenna ARP and the DORIS antenna reference point.

3.4 SLR Conventional Reference Point Observations

The conventional reference point for the SLR Moblas 4 telescope was determined two ways. For the vertical height from the Moblas 4 vertical axis of rotation relative to a horizontal plane, to the top of the system mount survey plate, the standard prior determined value of 0.489 meters was used. To determine the vertical axis of rotation, a trivet plate with a translation stage assembly (two slides in orthogonal directions) was set onto the system mount survey plate. The system mount survey plate has been mounted approximately on the vertical axis of rotation. The Moblas 4 mount was then leveled with a large carpenters level and locked in place. A theodolite with an EDM instrument was set up on a tripod approximately 10 to 16 meters away, and a prism placed in the translation stage tribrach. The center of the prism was sighted and the distance recorded. Then the Moblas 4 telescope was rotated 180 degrees about the vertical axis and the distance to the prism was measured again. The translation stage was then adjusted by one-half of the value of the difference in the two distance measurements. The Moblas 4 telescope was then rotated by 90 degrees from the original position and the process repeated until the prism remains within 0.5 mm during an entire rotation.

3.5 GPS Antenna Observations

The conventional reference point for the ASH701945B_M GPS antenna is defined as the center of the 5/8”-11 threaded insert at the base of the power amplifier (BPA). This point is normally referred to as the Antenna Reference Point (ARP).

Since the MONP GPS antenna and the radome could not be removed, the conventional reference point was determined by indirect methods. For the horizontal position, the forward intersection method was used by observing horizontal directions (4 sets, direct and reverse pointings) to the tangent point of both the left side and the right side of the antenna power amplifier (BPA). In the actual final adjustment, the mean of the left and right directions was used as input for the horizontal directions.

The vertical position was determined by observing direct differential levels to a fixed point at the base of the GPS antenna center pole mount. A vertical tape was then used to measure from this point to the base of the GPS antenna ARP. In the adjustment, the height difference was reduced to the published survey point using the published dimension of 0.1176 meters as listed in the site log for the ASH701945B_M GPS antenna. In addition, zenith distance observations (3 sets, direct and reverse pointings) where observed from all those survey monuments with line-of-sight to the GPS antenna.

3.6 DORIS Antenna Observations

The conventional reference point for the DORIS antenna is defined as the intersection of the vertical antenna axis and at the center of the horizontal red stripe. This point is designated as the 400 MHz reference point of the DORIS antenna.

Since the DORIS antenna could not be removed, the conventional reference point was also determined by indirect methods. The method used was exactly the same as with the GPS antenna observations, except the actual left and right pointings where made at the tangent points of the actual antenna at the red stripe location. The zenith distance observations where made to the actual center of the red stripe.

3.7 GPS Observations for Network Orientation and Reference Frame Update

In order to provide for orientation of the topocentric survey network at the Moblas 4 site, Global Positioning System (GPS) data was collected on select ground control monuments and pillars. The GPS observations consisted of five sessions over five different days. These sessions ranged from 3 to 5 hours with two sessions of 11 hours each. For each session, GPS data was collected with two Trimble 4000SSE receivers and two Trimble choke ring antennas. The appropriate MONP GPS RINEX data was subsequently downloaded for the post processing with the collected GPS data.

4. Survey Computations

4.1 Survey Control Network

The conventional electro-optical survey data recorded in the filed (distances, horizontal directions, zenith distances, and direct differential levels) was reduced and organized in abstract form fro subsequent input into a least-squares adjustment. The distance measurements were corrected for the deviations in atmospheric pressure and temperature.

The MicroSearch software program GeoLab32v3 was used for the preliminary and final least-squares adjustment of both the conventional and collected GPS data. The original input .iob file was developed from the reduced conventional survey observation data. The geodetic coordinates for station MONP were constrained, and a control survey scheme azimuth developed from the GPS collected data. A preliminary adjustment was used to identify any blunders or outliers in the survey observations, and verify the accuracy of the survey meets requirements.

4.2 GPS Network

The collected Trimble GPS data was post processed with the Trimble software GPSurvey, version 2.35, along with the downloaded RINEX GPS data for MONP. Since all of the collected GPS data covered a small area of 200 meters or less, only the broadcast ephemeris orbits for the GPS satellites were utilized during the post processing. For these processed solutions, the reference station MONP was constrained (at 1mm) to the ITRF2008 coordinates at epoch 2005.

5. Results

The final comprehensive least-squares adjustment was completed with the GeoLab32v3 software, and is a combination of the survey control network observations and the collected GPS data. The conventional survey observations are used to develop the input file developed from the output data from the GPSurvey GPS post-processing (vector coordinate values and extracted covariance matrix) for the selected baselines. The coordinates for the MONP station were constrained at 1 mm to the ITRF2008 epoch 2005 values.

5.1 Summary Results of Final Adjustment

The summary of the adjusted coordinates from GeoLab are shown below, after Table 1. The full results are provided in Appendix A.

Table 1 is a translation table provided to assist in coordinating the survey point description and the names used in the adjustment for selected points of interest.

Table 1. Translation Table for Survey Point Names

Survey Point Description	DOMES Number	Adjustment Name
GNSS GPS MONP	40497M004	MONP
SLR 7110	40497M001	7110
SLR 7220	40497M002	7220
SLR 7274	40497M003	7274
SLR MOBLAS 4	None	MOB4
DORIS MOOB	40497S009	DORIS
Calibration Pier A	None	CALA
Calibration Pier C	None	CALC

Adjusted PLH Coordinates:

CODE	FFF	STATION	LATITUDE STD DEV	LONGITUDE STD DEV	ELIP-HEIGHT STD DEV
PLH	000	7110	N 32 53 30.263652 0.0008	W116 25 21.627103 0.0009	1839.0167 m 0.0007
PLH	000	7220	N 32 53 30.243919 0.0005	W116 25 22.236593 0.0005	1838.8594 m 0.0005
PLH	000	7274	N 32 53 30.366118 0.0005	W116 25 22.152856 0.0007	1838.7781 m 0.0005
PLH	000	CALA	N 32 53 28.849748 0.0002	W116 25 14.652824 0.0005	1855.4677 m 0.0007
PLH	000	CALC	N 32 53 26.966377 0.0002	W116 25 22.961759 0.0006	1841.3288 m 0.0006
PLH	000	DORIS	N 32 53 30.676777 0.0016	W116 25 20.521364 0.0012	1843.3467 m 0.0006
PLH	000	LOOK	N 32 53 27.980648 0.0003	W116 25 23.485154 0.0005	1840.4324 m 0.0005
PLH	000	MOB4	N 32 53 30.262821 0.0004	W116 25 21.627790 0.0005	1842.2063 m 0.0005
PLH	111	MONP	N 32 53 30.982870 0.0000	W116 25 20.453170 0.0000	1842.5470 m 0.0000
PLH	000	PIN1	N 32 53 29.974514 0.0002	W116 25 21.550397 0.0004	1838.9911 m 0.0004
PLH	000	PIN2	N 32 53 31.380341 0.0002	W116 25 20.590385 0.0004	1840.2358 m 0.0004
PLH	000	RM1	N 32 53 31.067867 0.0006	W116 25 21.902165 0.0006	1838.2695 m 0.0005

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	
XYZ		7110	-2386278.4496 0.0009	-4802353.9274 0.0008	3444881.7198 0.0008	m
XYZ		7220	-2386292.7283 0.0005	-4802347.0537 0.0005	3444881.1238 0.0005	m
XYZ		7274	-2386289.8383 0.0007	-4802346.1300 0.0006	3444884.2416 0.0005	m
XYZ		CALA	-2386132.7445 0.0005	-4802468.1704 0.0006	3444854.0680 0.0005	m
XYZ		CALC	-2386334.9411 0.0005	-4802389.6381 0.0005	3444797.6565 0.0004	m
XYZ		DORIS	-2386251.2468 0.0014	-4802363.7845 0.0008	3444894.7610 0.0014	m
XYZ		LOOK	-2386339.2393 0.0005	-4802367.7090 0.0005	3444823.4147 0.0004	m
XYZ		MOB4	-2386279.6637 0.0005	-4802356.3304 0.0005	3444883.4304 0.0004	m
XYZ		MONP	-2386247.0810 0.0000	-4802359.3849 0.0000	3444902.2471 0.0000	m
XYZ		PIN1	-2386278.8073 0.0004	-4802359.1286 0.0004	3444874.2243 0.0003	m
XYZ		PIN2	-2386246.4523 0.0004	-4802350.1029 0.0004	3444911.2766 0.0003	m
XYZ		RM1	-2386278.5859 0.0006	-4802338.1313 0.0006	3444902.1235 0.0006	m

5.2 SLR Reference Point Eccentricity

Table 2. Values for the Eccentricity of the SLR (MOBLAS 4) Conventional Reference Point from Survey Control Monument 7110 (DOMES Number: 40497M001)

DN (m) -00.026	DE (m) -00.018	DU (m) +03.190
DX (m) -01.214	DY (m) -02.403	DZ (m) +01.710

5.3 Co-Location Vector Components

The local tie vectors were calculated from the results of the final Geolab least-squares adjustment.

Table 3 contains a summary of the local tie vectors, as determined during the survey, compared to local tie vectors used in the ITRF2008 epoch 2005 combination solution shown in Table 4.

From Domes	To Domes	DX (m)	DY (m)	DZ (m)	Name	Name
40497M001	40497M004	+31.369	-05.458	+20.527	7110	MONP
40497M001	40497S009	+27.203	-09.857	+13.041	7110	DORIS
40497M004	40497S009	-04.166	-04.400	-07.486	MONP	DORIS

Table 4. Local tie vectors as published in the ITRF2008 Epoch 2005 solution.

From Domes	To Domes	DX (m)	DY (m)	DZ (m)	Name	Name
40497M001	40497M004	+31.374	-05.444	+20.522	7110	MONP
40497M001	40497S009	+27.208	-09.839	+13.021	7110	DORIS
40497M004	40497S009	-04.166	-04.395	-07.501	MONP	DORIS

5.4 MOBLAS 4 System Calibration Pier Results

Table 5. MOBLAS 4 System Calibration Pier Data

Target:	Prism SN:	Prism Constant Applied
Cal Pier A	**LTN 91-D**	**+0.0331**
Calibration Distance:	187.003 meters	
Elevation Angle:	+04.0898 Degrees	
Geodetic Azimuth:	103.5020 Degrees	

Target:	Prism SN:	Prism Constant Applied
Cal Pier C	**LTN 90-F**	**+0.0313**
Calibration Distance:	107.372 meters	
Elevation Angle:	-00.4288 Degrees	
Geodetic Azimuth:	198.8508 Degrees	

Appendix A. Global results Listing from Geolab Adjustment Output

```
================================================================================
            MOBLAS-4 Monument Peak, CA Geodetic SITE SURVEY 2011 END
GeoLab V3.65            ITRF2008 (2005)         UNITS: m,DMS           Page 0001
================================================================================
10:48:51, Sat Nov 19, 2011

Input file:  C:\glab32v3\MON_Peak\MP_03G.iob
Output file: C:\glab32v3\MON_Peak\MP_03G.lst
Options file: C:\glab32v3\default.cfg

Geoid File:  C:\glab32v3\GEOID09\g2009u05.gsp
Geoid File:  C:\glab32v3\geoid09\g2009u05.gsp
```

PARAMETERS		OBSERVATIONS	
Description	Number	Description	Number
No. of Stations	12	Directions	50
Coord Parameters	33	Distances	79
Free Latitudes	11	Azimuths	0
Free Longitudes	11	Vertical Angles	0
Free Heights	11	Zenithal Angles	26
Fixed Coordinates	3	Angles	0
Astro. Latitudes	0	Heights	0
Astro. Longitudes	0	Height Differences	32
Geoid Records	0	Auxiliary Params.	0
All Aux. Pars.	16	2-D Coords.	0
Direction Pars.	16	2-D Coord. Diffs.	0
Scale Parameters	0	3-D Coords.	0
Constant Pars.	0	3-D Coord. Diffs.	48
Rotation Pars.	0		
Translation Pars.	0		
Total Parameters	49	Total Observations	235
Degrees of Freedom =	186		

```
--------------------------------------------------------------------------------
                        SUMMARY OF SELECTED OPTIONS
--------------------------------------------------------------------------------
================================================================================
            MOBLAS-4 Monument Peak, CA Geodetic SITE SURVEY 2011 END
GeoLab V3.65            ITRF2008 (2005)         UNITS: m,DMS           Page 0002
================================================================================
    OPTION                                  |   SELECTION
--------------------------------------------------------------------------------
    Computation Mode                        |   Adjustment
    Maximum Iterations                      |   15
    Convergence Criterion                   |   0.00100
    Angular Misclosure Limit Factor         |   2.00
    Linear Misclosure Limit Factor          |   2.00
    Residual Rejection Criterion            |   Tau Max
    Confidence Region Types                 |   1D 2D Station Relative
    Relative Confidence Regions             |   Connected Only
    Variance Factor (VF) Known              |   Yes
    Scale Covariance Matrix With VF         |   Yes
    Scale Residual Variances With VF        |   No
    Force Convergence in Max Iters          |   No
    Distances Contribute To Heights         |   No
    Compute Full Inverse                    |   Yes
    Optimize Band Width                     |   Yes
    Generate Initial Coordinates            |   Yes
    Re-Transform Obs After 1st Pass         |   Yes
    Geoid Interpolation Method              |   Bi-Quadratic
--------------------------------------------------------------------------------

================================================================================
            MOBLAS-4 Monument Peak, CA Geodetic SITE SURVEY 2011 END
GeoLab V3.65            ITRF2008 (2005)         UNITS: m,DMS           Page 0003
================================================================================
Input Station Data:
FFF STATION      ELIP-LATITUDE     ELIP-LONGITUDE    ELIP-HEIGHT
                 ASTRO-LATITUDE    ASTRO-LONGITUDE   ORTHO-HEIGHT
                 N/S DEFLECTION    N/S DEFLECTION    GEOID-HEIGHT
--- ------------ ----------------- ----------------- ------------
000 7110         N 32 53 30.263610 W116 25 21.626710    1839.0280
                 N 32 53 37.573610 W116 25  6.907135    1870.9875
                    0  0      7.31    0  0     12.36     -31.9595
000 7220         N 32 53 30.239110 W116 25 22.224740    1838.8660
                 N 32 53 37.539110 W116 25  7.528984    1870.8240
                    0  0      7.30    0  0     12.34     -31.9580
000 7274         N 32 53 30.361310 W116 25 22.140960    1838.7850
                 N 32 53 37.661310 W116 25  7.445199    1870.7430
                    0  0      7.30    0  0     12.34     -31.9580
000 CALA         N 32 53 28.832250 W116 25 14.603440    1856.3678
                 N 32 53 36.182250 W116 24 59.741023    1888.3362
                    0  0      7.35    0  0     12.48     -31.9684
000 CALC         N 32 53 26.948860 W116 25 22.912450    1842.2315
                 N 32 53 34.168860 W116 25  8.288299    1874.1851
                    0  0      7.22    0  0     12.28     -31.9536
000 DORIS        N 32 53 30.676580 W116 25 20.521040    1842.9434
                 N 32 53 37.996580 W116 25  5.777628    1874.9045
                    0  0      7.32    0  0     12.38     -31.9611
000 LOOK         N 32 53 27.963180 W116 25 23.436030    1841.3291
```

```
                N 32 53 35.193180 W116 25  8.823742    1873.2822
                   0  0      7.23    0  0     12.27     -31.9531
000 MOB4        N 32 53 30.257950 W116 25 21.615720    1842.2130
                N 32 53 37.567950 W116 25  6.896145    1874.1725
                   0  0      7.31    0  0     12.36     -31.9595
111 MONP        N 32 53 30.982870 W116 25 20.453170    1842.5470
                N 32 53 38.302870 W116 25  5.709744    1874.5081
                   0  0      7.32    0  0     12.38     -31.9611
000 PIN1        N 32 53 29.957040 W116 25 21.501180    1839.8923
                N 32 53 37.247040 W116 25  6.805437    1871.8507
                   0  0      7.29    0  0     12.34     -31.9584
000 PIN2        N 32 53 31.362860 W116 25 20.541090    1841.1341
                N 32 53 38.712860 W116 25  5.785737    1873.0963
                   0  0      7.35    0  0     12.39     -31.9622
000 RM1         N 32 53 31.062970 W116 25 21.890210    1838.2780
                N 32 53 38.392970 W116 25  7.158689    1870.2387
                   0  0      7.33    0  0     12.37     -31.9607
```

Misclosures (pass 1):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
GROUP: 00001925.SSF,obs#:	2	day 310	OPT		310 1 18	
DXCT		CALC	CALA	202.1999	0.0022	-0.0004
DYCT		CALC	CALA	-78.5278	0.0036	-0.0032
DZCT		CALC	CALA	56.4064	0.0021	0.0042
GROUP: 00001910.SSF,obs#:	3	day 308	OPT		308 15	
DXCT		MONP	CALA	114.3397	0.0020	0.6800
DYCT		MONP	CALA	-108.7866	0.0026	-1.5093
DZCT		MONP	CALA	-48.1796	0.0017	0.0366
GROUP: 00001919.SSF,obs#:	4	day 310	OPT		310 18	
DXCT		MONP	CALA	114.3376	0.0027	0.6821
DYCT		MONP	CALA	-108.7786	0.0040	-1.5173
DZCT		MONP	CALA	-48.1846	0.0022	0.0416
GROUP: 00001913.SSF,obs#:	5	day 308	OPT		308 14	
DXCT		MONP	CALC	-87.8601	0.0016	0.6803
DYCT		MONP	CALC	-30.2572	0.0028	-1.5077
DZCT		MONP	CALC	-104.5894	0.0017	0.0358
GROUP: 00001922.SSF,obs#:	6	day 310	OPT		310 18	
DXCT		MONP	CALC	-87.8607	0.0025	0.6809
DYCT		MONP	CALC	-30.2533	0.0039	-1.5116
DZCT		MONP	CALC	-104.5902	0.0021	0.0366
GROUP: 00001952.SSF,obs#:	7	day 314	OPT		314 17	
DXCT		MONP	LOOK	-92.1600	0.0016	0.6803
DYCT		MONP	LOOK	-8.3207	0.0021	-1.5078
DZCT		MONP	LOOK	-78.8332	0.0015	0.0358
GROUP: 00001937.SSF,obs#:	8	day 312	OPT		312	
DXCT		MONP	PIN1	-31.7275	0.0012	0.6803
DYCT		MONP	PIN1	0.2551	0.0017	-1.5078
DZCT		MONP	PIN1	-28.0211	0.0012	0.0357
GROUP: 00001931.SSF,obs#:	9	day 312	OPT		312 23	
DXCT		MONP	PIN1	-31.7334	0.0311	0.6862
DYCT		MONP	PIN1	0.2677	0.0222	-1.5204
DZCT		MONP	PIN1	-28.0295	0.0161	0.0441
GROUP: 00001949.SSF,obs#:	10	day 313	OPT		313	
DXCT		MONP	PIN1	-31.7245	0.0011	0.6773
DYCT		MONP	PIN1	0.2579	0.0015	-1.5106
DZCT		MONP	PIN1	-28.0244	0.0011	0.0390
GROUP: 00001955.SSF,obs#:	11	day 314	OPT		314 16	
DXCT		MONP	PIN1	-31.7288	0.0020	0.6816
DYCT		MONP	PIN1	0.2588	0.0026	-1.5115
DZCT		MONP	PIN1	-28.0227	0.0018	0.0373
GROUP: 00001934.SSF,obs#:	12	day 312	OPT		312	
DXCT		MONP	PIN2	0.6302	0.0013	0.6804
DYCT		MONP	PIN2	9.2819	0.0025	-1.5077
DZCT		MONP	PIN2	9.0292	0.0015	0.0359
GROUP: 00001943.SSF,obs#:	15	day 313	OPT		313 1	
DXCT		PIN2	MONP	-0.6303	0.0010	-0.6803
DYCT		PIN2	MONP	-9.2841	0.0014	1.5099
DZCT		PIN2	MONP	-9.0283	0.0010	-0.0368
GROUP: 00001946.SSF,obs#:	17	day 312	OPT		312 1 23	

DXCT	PIN2	PIN1	-32.3550	0.0011	-0.0028
DYCT	PIN2	PIN1	-9.0265	0.0015	-0.0004
DZCT	PIN2	PIN1	-37.0522	0.0011	0.0017
GROUP: DISTANCES					
DIST	PIN1	7110	9.0094	0.0022	1.0227
DIST	PIN1	LOOK	79.4168	0.0012	0.0029
DIST	PIN1	LOOK	79.4167	0.0012	0.0030
DIST	PIN1	7220	19.6684	0.0012	1.0794
DIST	PIN1	7220	19.6690	0.0012	1.0788
DIST	PIN1	7274	19.7700	0.0012	1.0407
DIST	7220	7110	15.8578	0.0022	-0.2908
DIST	7220	7110	15.8550	0.0022	-0.2880
DIST	PIN1	CALA	183.3861	0.0013	0.0050
DIST	PIN1	CALA	183.3852	0.0013	0.0059
DIST	PIN1	7274	19.7706	0.0012	1.0401
DIST	7220	CALA	202.4815	0.0013	1.1016
DIST	7220	CALA	202.4825	0.0013	1.1006
DIST	7220	PIN1	19.6774	0.0012	1.0704
DIST	7220	PIN1	19.6776	0.0012	1.0702
DIST	RM1	PIN2	35.4956	0.0012	0.8884
DIST	RM1	PIN2	35.4950	0.0012	0.8890
DIST	CALA	MOB4	186.9655	0.0013	1.0954
DIST	CALA	MOB4	186.9656	0.0013	1.0953
DIST	CALA	MOB4	186.9652	0.0013	1.0957
DIST	CALA	MOB4	186.9658	0.0013	1.0951
DIST	CALC	MOB4	107.3450	0.0012	0.0537
DIST	CALC	MOB4	107.3454	0.0012	0.0533
DIST	CALC	MOB4	107.3457	0.0012	0.0530
DIST	CALC	MOB4	107.3451	0.0012	0.0536
DIST	CALC	MOB4	107.3451	0.0012	0.0536
DIST	CALC	MOB4	107.3456	0.0012	0.0531
DIST	CALC	PIN1	99.7197	0.0012	0.0026
DIST	CALC	LOOK	34.0993	0.0012	0.0046
DIST	CALC	LOOK	34.0989	0.0012	0.0050
DIST	PIN2	RM1	35.4901	0.0012	0.8939
DIST	PIN2	RM1	35.4914	0.0012	0.8926
DIST	LOOK	MOB4	85.3186	0.0012	-0.2251
DIST	LOOK	MOB4	85.3188	0.0012	-0.2253
DIST	LOOK	PIN1	79.4172	0.0012	0.0025
DIST	LOOK	CALC	34.0994	0.0012	0.0045
DIST	LOOK	CALC	34.0995	0.0012	0.0044
DIST	LOOK	CALA	231.6734	0.0013	0.0062
DIST	LOOK	CALA	231.6734	0.0013	0.0062
DIST	CALA	PIN1	183.3859	0.0013	0.0053
DIST	CALA	PIN1	183.3851	0.0013	0.0061
DIST	CALA	LOOK	231.6729	0.0013	0.0067
DIST	CALA	LOOK	231.6729	0.0013	0.0067
DIST	CALA	MOB4	186.9669	0.0013	1.0939
DIST	CALA	MOB4	186.9670	0.0013	1.0938
DIST	CALA	7220	202.4793	0.0013	1.1038
DIST	CALA	7220	202.4796	0.0013	1.1035
DIST	7220	MOB4	16.1878	0.0012	0.0060
DIST	7220	MOB4	16.1880	0.0012	0.0058

Misclosures (pass 1):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
DIST		7220	MOB4	16.1872	0.0012	0.0066
DIST		7220	MOB4	16.1874	0.0012	0.0064
DIST		PIN1	MOB4	9.5822	0.0012	0.4295
DIST		PIN1	MOB4	9.5821	0.0012	0.4296
DIST		PIN1	MOB4	9.5809	0.0012	0.4308
DIST		PIN1	MOB4	9.5812	0.0012	0.4305
DIST		7274	PIN1	19.7766	0.0012	1.0341
DIST		7274	CALC	106.8956	0.0012	0.2109
DIST		PIN1	7110	9.0087	0.0022	1.0234
DIST		PIN1	7110	9.0088	0.0022	1.0233
DIST		PIN1	7110	9.0115	0.0022	1.0206
DIST		PIN1	7110	9.0110	0.0022	1.0211
GROUP: ZENITHAL ANGLE OBSERVATIONS						
ZANG		7220	RM1	91 15 23.13	6.99	14.85
ZANG		PIN2	PIN1	91 25 46.03	4.03	10.64
ZANG		PIN2	RM1	93 10 43.50	5.29	-4779.13
ZANG		PIN2	DORIS	81 42 57.48	8.73	-12231.1
ZANG		PIN1	PIN2	88 34 6.55	4.03	-19.75
ZANG		RM1	7220	88 44 38.14	6.99	-14.49
ZANG		LOOK	MOB4	88 48 15.82	2.76	-2150.14
ZANG		LOOK	CALC	88 29 38.76	5.60	34.95
ZANG		CALC	MOB4	89 31 42.39	2.44	-1724.17
ZANG		CALC	LOOK	91 30 13.45	5.60	-43.86
ZANG		CALA	MOB4	94 4 13.36	2.01	-899.73
ZANG		CALA	PIN1	95 9 33.86	2.02	4.61
ZANG		CALA	7220	94 42 29.59	1.97	-818.57
ZANG		LOOK	MONP	88 59 53.87	2.31	-1520.88
ZANG		LOOK	DORIS	88 31 9.45	2.38	-2368.35
ZANG		LOOK	CALC	88 29 41.40	5.60	37.59
ZANG		PIN1	LOOK	88 57 50.94	2.88	-12.01
ZANG		PIN1	7220	90 24 3.02	8.92	-8772.59
ZANG		PIN1	7274	90 36 57.25	8.90	-8768.78
ZANG		PIN1	MONP	85 9 1.98	4.68	-4341.94
GROUP: DIRECTIONS						

Misclosures (pass 1):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
DIR		PIN1	7220	75 38 49.02	12.39	-557.73
DIR		PIN1	7274	88 18 18.18	12.35	-2811.96
DIR		PIN1	7110	128 4 51.94	25.59	-23208.8
DIR		PIN1	MONP	183 14 52.09	6.18	-6469.39
DIR		PIN1	DORIS	191 43 29.18	7.60	-7418.09
DIR		PIN1	CALA	241 37 54.72	1.57	-3.99
DIR		PIN1	CALC	342 17 22.86	2.67	-11.82

DIR	7220	PIN1	12	39	36.36	12.39	-724.93
DIR	7220	7274	287	44	35.39	58.99	-136.92
DIR	7220	7110	345	30	31.89	16.50	-2268.49
DIR	PIN2	RM1	44	17	13.54	7.09	3610.12
DIR	PIN2	MONP	313	48	29.53	21.37	18707.76
DIR	PIN2	DORIS	325	19	16.18	12.11	11941.79
DIR	RM1	MONP	19	44	33.42	6.85	-4328.31
DIR	7220	PIN1	96	2	51.84	12.39	-569.63
DIR	RM1	7220	124	40	6.80	9.59	-3591.76
DIR	RM1	PIN2	235	19	53.75	7.09	3591.21
DIR	CALC	LOOK	261	30	38.48	7.56	-18.95
DIR	CALC	MOB4	303	53	19.99	2.49	-2000.08
DIR	CALC	PIN1	306	38	6.25	2.67	-7.73
DIR	CALA	7220	27	19	51.14	1.44	176.20
DIR	CALA	MOB4	28	32	29.25	1.54	164.38
DIR	LOOK	CALC	73	7	27.05	7.56	-18.00
DIR	LOOK	MOB4	311	7	39.24	3.10	-2457.92
DIR	LOOK	MONP	1	7	37.73	2.23	-2258.54
DIR	LOOK	DORIS	3	32	16.78	2.38	-2367.95
DIR	PIN1	MOB4	145	38	42.69	25.64	-18161.2
DIR	7220	MOB4	332	55	49.39	15.86	612.33
DIR	7274	PIN1	296	15	47.78	12.35	-829.89
DIR	7274	7220	82	25	39.52	58.99	2832.60
GROUP: ORTHOMETRIC HEIGHT DIFFERENCES							
EHDF	7220	LOOK			1.5677	0.0009	0.8905
EHDF	LOOK	7220			-1.5677	0.0009	-0.8905
EHDF	MOB4	PIN2			-1.9682	0.0009	0.8920
EHDF	PIN2	MOB4			1.9676	0.0009	-0.8914
EHDF	7220	7110			0.1587	0.0009	0.0048
EHDF	7110	7220			-0.1590	0.0009	-0.0045
EHDF	PIN2	MONP			2.3092	0.0009	-0.8974
EHDF	MONP	PIN2			-2.3094	0.0009	0.8976
EHDF	PIN2	DORIS			3.1088	0.0009	-1.3006
EHDF	DORIS	PIN2			-3.1087	0.0009	1.3005
EHDF	MOB4	PIN2			-1.9679	0.0009	0.8917
EHDF	PIN2	MOB4			1.9676	0.0009	-0.8914
EHDF	PIN2	RM1			-1.9668	0.0009	-0.8908
EHDF	RM1	PIN2			1.9675	0.0009	0.8901
EHDF	RM1	7220			0.5872	0.0009	-0.0019
EHDF	7274	PIN1			0.2131	0.0009	0.8946
EHDF	PIN1	7274			-0.2132	0.0009	-0.8945
EHDF	7220	PIN1			0.1322	0.0009	0.8945
EHDF	PIN1	7220			-0.1321	0.0009	-0.8946
EHDF	PIN1	PIN2			1.2474	0.0009	-0.0018
EHDF	PIN2	PIN1			-1.2474	0.0009	0.0018
EHDF	7220	PIN1			0.1330	0.0013	0.8937
EHDF	PIN1	7220			-0.1328	0.0013	-0.8939
EHDF	7220	7110			0.1585	0.0013	0.0050
EHDF	7110	7220			-0.1583	0.0013	-0.0052

Solution (pass 1):

NAME	TYPE	OLD VALUE	CORRECTION	UPDATED VALUE
7110	ELAT	N 32 53 30.263610	0 0 -0.001523	N 32 53 30.262087
7110	ELON	W116 25 21.626710	0 0 0.003594	W116 25 21.623116
7110	EHYT	1839.0280	-0.0130	1839.0150
7220	ELAT	N 32 53 30.239110	0 0 0.004431	N 32 53 30.243541
7220	ELON	W116 25 22.224740	0 0 -0.010195	W116 25 22.234935
7220	EHYT	1838.8660	-0.0082	1838.8578
7274	ELAT	N 32 53 30.361310	0 0 0.004506	N 32 53 30.365816
7274	ELON	W116 25 22.140960	0 0 -0.010237	W116 25 22.151197
7274	EHYT	1838.7850	-0.0082	1838.7768
CALA	ELAT	N 32 53 28.832250	0 0 0.017782	N 32 53 28.850032
CALA	ELON	W116 25 14.603440	0 0 -0.049973	W116 25 14.653413
CALA	EHYT	1856.3678	-0.8814	1855.4864
CALC	ELAT	N 32 53 26.948860	0 0 0.017879	N 32 53 26.966739
CALC	ELON	W116 25 22.912450	0 0 -0.049184	W116 25 22.961634
CALC	EHYT	1842.2315	-0.8970	1841.3345
DORIS	ELAT	N 32 53 30.676580	0 0 -0.000078	N 32 53 30.676502
DORIS	ELON	W116 25 20.521040	0 0 -0.001068	W116 25 20.522108
DORIS	EHYT	1842.9434	0.3952	1843.3386
LOOK	ELAT	N 32 53 27.963180	0 0 0.017593	N 32 53 27.980773
LOOK	ELON	W116 25 23.436030	0 0 -0.049043	W116 25 23.485073
LOOK	EHYT	1841.3291	-0.8931	1840.4360
MOB4	ELAT	N 32 53 30.257950	0 0 0.007233	N 32 53 30.265183
MOB4	ELON	W116 25 21.615720	0 0 -0.011229	W116 25 21.626949
MOB4	EHYT	1842.2130	-0.0054	1842.2076
PIN1	ELAT	N 32 53 29.957040	0 0 0.017291	N 32 53 29.974331
PIN1	ELON	W116 25 21.501180	0 0 -0.048876	W116 25 21.550056
PIN1	EHYT	1839.8923	-0.8975	1838.9948
PIN2	ELAT	N 32 53 31.362860	0 0 0.017385	N 32 53 31.380245
PIN2	ELON	W116 25 20.541090	0 0 -0.048993	W116 25 20.590083
PIN2	EHYT	1841.1341	-0.8946	1840.2395
RM1	ELAT	N 32 53 31.062970	0 0 0.004583	N 32 53 31.067553
RM1	ELON	W116 25 21.890210	0 0 -0.009773	W116 25 21.899983
RM1	EHYT	1838.2780	-0.0126	1838.2654

Misclosures (pass 2):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
GROUP: 00001916.SSF,obs#:	1	day 308	OPT	308 1 15		
DXCT		CALC	CALA	202.1995	0.0015	-0.0249
DYCT		CALC	CALA	-78.5311	0.0019	-0.0040

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DZCT              CALC          CALA                56.4107   0.0013   0.0059
GROUP: 00001925.SSF,obs#:    2 day 310  OPT                 310 1  18
DXCT              CALC          CALA               202.1999   0.0022  -0.0253
DYCT              CALC          CALA               -78.5278   0.0036  -0.0073
DZCT              CALC          CALA                56.4064   0.0021   0.0102
GROUP: 00001910.SSF,obs#:    3 day 308  OPT                 308    15
DXCT              MONP          CALA               114.3397   0.0020  -0.0218
DYCT              MONP          CALA              -108.7866   0.0026  -0.0019
DZCT              MONP          CALA               -48.1796   0.0017   0.0181
GROUP: 00001919.SSF,obs#:    4 day 310  OPT                 310    18
DXCT              MONP          CALA               114.3376   0.0027  -0.0197
DYCT              MONP          CALA              -108.7786   0.0040  -0.0099
DZCT              MONP          CALA               -48.1846   0.0022   0.0231
GROUP: 00001913.SSF,obs#:    5 day 308  OPT                 308    14
DXCT              MONP          CALC               -87.8601   0.0016   0.0035
DYCT              MONP          CALC               -30.2572   0.0028   0.0038
DZCT              MONP          CALC              -104.5894   0.0017   0.0113
GROUP: 00001922.SSF,obs#:    6 day 310  OPT                 310    18
DXCT              MONP          CALC               -87.8607   0.0025   0.0041
DYCT              MONP          CALC               -30.2533   0.0039  -0.0001
DZCT              MONP          CALC              -104.5902   0.0021   0.0121
GROUP: 00001952.SSF,obs#:    7 day 314  OPT                 314    17
DXCT              MONP          LOOK               -92.1600   0.0016   0.0032
DYCT              MONP          LOOK                -8.3207   0.0021  -0.0051
DZCT              MONP          LOOK               -78.8332   0.0015   0.0060
GROUP: 00001937.SSF,obs#:    8 day 312  OPT                 312
DXCT              MONP          PIN1               -31.7275   0.0012   0.0064
DYCT              MONP          PIN1                 0.2551   0.0017  -0.0083
DZCT              MONP          PIN1               -28.0211   0.0012  -0.0043
GROUP: 00001949.SSF,obs#:   10 day 313  OPT                 313
DXCT              MONP          PIN1               -31.7245   0.0011   0.0034
DYCT              MONP          PIN1                 0.2579   0.0015  -0.0111
DZCT              MONP          PIN1               -28.0244   0.0011  -0.0010
GROUP: 00001955.SSF,obs#:   11 day 314  OPT                 314    16
DXCT              MONP          PIN1               -31.7288   0.0020   0.0077
DYCT              MONP          PIN1                 0.2588   0.0026  -0.0120
DZCT              MONP          PIN1               -28.0227   0.0018  -0.0027
GROUP: 00001934.SSF,obs#:   12 day 312  OPT                 312
DXCT              MONP          PIN2                 0.6302   0.0013   0.0034
DYCT              MONP          PIN2                 9.2819   0.0025  -0.0076
DZCT              MONP          PIN2                 9.0292   0.0015  -0.0001
GROUP: 00001958.SSF,obs#:   14 day 314  OPT                 314 1  17
DXCT              PIN1          LOOK               -60.4327   0.0016  -0.0030
DYCT              PIN1          LOOK                -8.5795   0.0023   0.0069
DZCT              PIN1          LOOK               -50.8102   0.0016   0.0084
GROUP: 00001943.SSF,obs#:   15 day 313  OPT                 313   1
DXCT              PIN2          MONP                -0.6303   0.0010  -0.0033
DYCT              PIN2          MONP                -9.2841   0.0014   0.0098
DZCT              PIN2          MONP                -9.0283   0.0010  -0.0008
GROUP: 00001940.SSF,obs#:   16 day 311  OPT                 311 1  23
DXCT              PIN2          PIN1               -32.3571   0.0012   0.0024
DYCT              PIN2          PIN1                -9.0273   0.0024  -0.0002
DZCT              PIN2          PIN1               -37.0502   0.0015  -0.0043
GROUP: 00001946.SSF,obs#:   17 day 312  OPT                 312 1  23
DXCT              PIN2          PIN1               -32.3550   0.0011   0.0003
DYCT              PIN2          PIN1                -9.0265   0.0015  -0.0010
DZCT              PIN2          PIN1               -37.0522   0.0011  -0.0023
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GROUP: DISTANCES

DIST	PIN1	7110	9.1286	0.0022	-0.0602
DIST	PIN1	7220	19.6770	0.0012	-0.0331
DIST	PIN1	7220	19.6776	0.0012	-0.0337
DIST	PIN1	7274	19.7736	0.0012	-0.0293
DIST	7220	7110	15.8585	0.0022	0.0589
DIST	7220	7110	15.8557	0.0022	0.0617
DIST	PIN1	CALA	183.3863	0.0013	-0.0245
DIST	PIN1	CALA	183.3854	0.0013	-0.0236
DIST	PIN1	CALC	99.7203	0.0012	-0.0118
DIST	PIN1	CALC	99.7207	0.0012	-0.0122
DIST	PIN1	7274	19.7742	0.0012	-0.0299
DIST	7220	CALA	202.4761	0.0013	-0.0607
DIST	7220	CALA	202.4771	0.0013	-0.0617
DIST	7220	PIN1	19.6774	0.0012	-0.0335
DIST	7220	PIN1	19.6776	0.0012	-0.0337
DIST	PIN1	PIN2	50.0103	0.0012	0.0033
DIST	PIN1	PIN2	50.0102	0.0012	0.0034
DIST	RM1	7220	26.8431	0.0012	0.0072
DIST	RM1	7220	26.8443	0.0012	0.0060
DIST	RM1	PIN2	35.4918	0.0012	-0.0447
DIST	RM1	PIN2	35.4912	0.0012	-0.0441
DIST	CALA	CALC	224.1274	0.0013	-0.0177
DIST	CALA	CALC	224.1276	0.0013	-0.0179
DIST	CALA	MOB4	186.9631	0.0013	-0.0189
DIST	CALA	MOB4	186.9632	0.0013	-0.0190
DIST	CALA	MOB4	186.9628	0.0013	-0.0186
DIST	CALA	MOB4	186.9634	0.0013	-0.0192
DIST	CALC	MOB4	107.3406	0.0012	0.0650
DIST	CALC	MOB4	107.3410	0.0012	0.0646
DIST	CALC	MOB4	107.3413	0.0012	0.0643
DIST	CALC	MOB4	107.3407	0.0012	0.0649
DIST	CALC	MOB4	107.3407	0.0012	0.0649
DIST	CALC	MOB4	107.3412	0.0012	0.0644
DIST	CALC	CALA	224.1270	0.0013	-0.0174
DIST	CALC	CALA	224.1271	0.0013	-0.0175
DIST	CALC	PIN1	99.7197	0.0012	-0.0113
DIST	CALC	PIN1	99.7199	0.0012	-0.0115
DIST	CALC	LOOK	34.0992	0.0012	-0.0049
DIST	CALC	LOOK	34.0988	0.0012	-0.0045
DIST	7220	RM1	26.8429	0.0012	0.0075
DIST	7220	RM1	26.8440	0.0012	0.0064
DIST	PIN2	PIN1	50.0109	0.0012	0.0027
DIST	PIN2	PIN1	50.0108	0.0012	0.0028
DIST	PIN2	RM1	35.4909	0.0012	-0.0437
DIST	PIN2	RM1	35.4922	0.0012	-0.0450
DIST	LOOK	MOB4	85.3269	0.0012	0.0676
DIST	LOOK	MOB4	85.3271	0.0012	0.0674
DIST	LOOK	CALC	34.0992	0.0012	-0.0049
DIST	LOOK	CALC	34.0993	0.0012	-0.0050
DIST	LOOK	CALA	231.6735	0.0013	-0.0165
DIST	LOOK	CALA	231.6735	0.0013	-0.0165
DIST	CALA	PIN1	183.3860	0.0013	-0.0242
DIST	CALA	PIN1	183.3852	0.0013	-0.0234
DIST	CALA	LOOK	231.6730	0.0013	-0.0160
DIST	CALA	LOOK	231.6730	0.0013	-0.0160
DIST	CALA	MOB4	186.9646	0.0013	-0.0204

DIST	CALA	MOB4	186.9647	0.0013	-0.0205	
DIST	CALA	7220	202.4751	0.0013	-0.0598	
DIST	CALA	7220	202.4754	0.0013	-0.0601	
DIST	7220	MOB4	16.1881	0.0012	-0.0166	
DIST	7220	MOB4	16.1883	0.0012	-0.0168	
DIST	7220	MOB4	16.1875	0.0012	-0.0160	
DIST	7220	MOB4	16.1877	0.0012	-0.0162	
DIST	PIN1	MOB4	9.6586	0.0012	0.0701	
DIST	PIN1	MOB4	9.6585	0.0012	0.0702	
DIST	PIN1	MOB4	9.6573	0.0012	0.0714	
DIST	PIN1	MOB4	9.6576	0.0012	0.0711	
DIST	7274	PIN1	19.7736	0.0012	-0.0293	
DIST	7274	CALC	106.8836	0.0012	-0.0116	
DIST	PIN1	7110	9.1270	0.0022	-0.0586	
DIST	PIN1	7110	9.1271	0.0022	-0.0587	
DIST	PIN1	7110	9.1298	0.0022	-0.0614	
DIST	PIN1	7110	9.1293	0.0022	-0.0609	
GROUP: ZENITHAL ANGLE OBSERVATIONS						
ZANG	7220	RM1	91 15 22.88	6.99	-17.63	

Misclosures (pass 2):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
ZANG	PIN2	RM1	93 10	54.72	5.29	-52.90
ZANG	PIN2	DORIS	81 51	32.07	8.73	-131.34
ZANG	RM1	7220	88 44	38.39	6.99	17.99
ZANG	LOOK	MOB4	88 48	21.89	2.76	-7.06
ZANG	LOOK	CALA	86 16	35.31	1.93	14.77
ZANG	CALC	CALA	86 22	50.41	1.94	14.24
ZANG	CALC	MOB4	89 31	42.21	2.44	-12.03
ZANG	CALC	LOOK	91 30	15.80	5.60	-19.67
ZANG	CALC	PIN1	91 20	24.55	2.53	-6.33
ZANG	CALA	CALC	93 37	16.94	1.94	-14.34
ZANG	CALA	MOB4	94 4	17.82	2.01	-19.11
ZANG	CALA	LOOK	93 43	34.73	1.93	-12.42
ZANG	CALA	PIN1	95 9	34.08	2.02	-16.29
ZANG	CALA	7220	94 42	36.81	1.97	-21.06
ZANG	LOOK	DORIS	88 31	21.91	2.38	-22.67
ZANG	LOOK	CALA	86 16	34.34	1.93	13.80
ZANG	LOOK	CALC	88 29	38.76	5.60	13.11
ZANG	PIN1	7220	90 23	2.89	8.92	-64.78
ZANG	PIN1	7274	90 37	3.83	8.90	-59.71
ZANG	PIN1	MONP	85 10	34.47	4.68	-22.68
GROUP: DIRECTIONS						
DIR	PIN1	LOOK	0 0	0.00	3.31	25.13
DIR	PIN1	7220	75 38	49.02	12.39	94.72
DIR	PIN1	7274	88 18	18.18	12.35	185.63
DIR	PIN1	7110	128 4	51.94	25.59	1874.12
DIR	PIN1	MONP	183 14	52.09	6.18	-59.39
DIR	PIN1	DORIS	191 43	29.18	7.60	-99.39
DIR	PIN1	CALA	241 37	54.72	1.57	-13.56
DIR	PIN1	CALC	342 17	22.86	2.67	18.48
DIR	7220	CALA	0 0	0.00	1.44	-6.34

DIR	7220	PIN1	12	39	36.36	12.39	105.07
DIR	7220	7110	345	30	31.89	16.50	510.51
DIR	PIN2	PIN1	0	0	0.00	5.18	48.65
DIR	PIN2	RM1	44	17	13.54	7.09	-62.05
DIR	PIN2	MONP	313	48	29.53	21.37	188.36
DIR	PIN2	DORIS	325	19	16.18	12.11	319.41
DIR	RM1	PIN2	0	0	0.00	7.09	-92.17
DIR	RM1	PIN2	0	0	0.00	7.09	-134.45
DIR	RM1	7220	124	40	6.80	9.59	79.56
DIR	RM1	7220	0	0	0.00	9.59	79.92
DIR	RM1	PIN2	235	19	53.75	7.09	-134.65
DIR	PIN1	LOOK	0	0	0.00	3.31	11.55
DIR	PIN1	PIN2	170	38	29.46	5.18	-28.42
DIR	CALC	CALA	0	0	0.00	1.34	-3.36
DIR	CALC	LOOK	261	30	38.48	7.56	-20.98
DIR	CALC	PIN1	306	38	6.25	2.67	20.36
DIR	CALA	CALC	0	0	0.00	1.34	-9.75
DIR	CALA	LOOK	8	23	9.39	1.31	-14.08
DIR	CALA	PIN1	25	58	40.61	1.57	-20.56
DIR	CALA	7220	27	19	51.14	1.44	-16.28
DIR	CALA	MOB4	28	32	29.25	1.54	68.28
DIR	LOOK	PIN1	315	57	36.49	3.31	33.89
DIR	LOOK	MOB4	311	7	39.24	3.10	-45.74
DIR	LOOK	PIN1	0	0	0.00	3.31	23.08
DIR	LOOK	MONP	1	7	37.73	2.23	-8.17
DIR	LOOK	DORIS	3	32	16.78	2.38	-20.51
DIR	PIN1	MOB4	145	38	42.69	25.64	642.33
DIR	7220	PIN1	0	0	0.00	12.39	465.94
DIR	7220	MOB4	332	55	49.39	15.86	-710.81
DIR	7274	CALC	0	0	0.00	2.50	5.87
DIR	7274	PIN1	296	15	47.78	12.35	103.28
DIR	7274	PIN1	0	0	0.00	12.35	154.02

GROUP: ORTHOMETRIC HEIGHT DIFFERENCES

EHDF	7220	LOOK	1.5677	0.0009	0.0056
EHDF	LOOK	7220	-1.5677	0.0009	-0.0056
EHDF	MOB4	PIN2	-1.9682	0.0009	0.0028
EHDF	PIN2	MOB4	1.9676	0.0009	-0.0022
EHDF	PIN2	MONP	2.3092	0.0009	-0.0028
EHDF	MONP	PIN2	-2.3094	0.0009	0.0030
EHDF	PIN2	DORIS	3.1088	0.0009	-0.0108
EHDF	DORIS	PIN2	-3.1087	0.0009	0.0107
EHDF	MOB4	PIN2	-1.9679	0.0009	0.0025
EHDF	PIN2	MOB4	1.9676	0.0009	-0.0022
EHDF	PIN2	RM1	-1.9668	0.0009	-0.0088
EHDF	RM1	PIN2	1.9675	0.0009	0.0081
EHDF	RM1	7274	0.5059	0.0009	0.0028
EHDF	7274	RM1	-0.5060	0.0009	-0.0027
EHDF	RM1	7220	0.5872	0.0009	0.0025
EHDF	7220	RM1	-0.5870	0.0009	-0.0027
EHDF	7274	PIN1	0.2131	0.0009	0.0053
EHDF	PIN1	7274	-0.2132	0.0009	-0.0052
EHDF	7220	PIN1	0.1322	0.0009	0.0053
EHDF	PIN1	7220	-0.1321	0.0009	-0.0054
EHDF	7220	PIN1	0.1330	0.0013	0.0045
EHDF	PIN1	7220	-0.1328	0.0013	-0.0047

Solution (pass 2):

NAME	TYPE	OLD VALUE	CORRECTION	UPDATED VALUE
7110	ELAT	N 32 53 30.262087	0 0 0.001543	N 32 53 30.263630
7110	ELON	W116 25 21.623116	0 0 -0.003956	W116 25 21.627072
7110	EHYT	1839.0150	0.0020	1839.0170
7220	ELAT	N 32 53 30.243541	0 0 0.000374	N 32 53 30.243915
7220	ELON	W116 25 22.234935	0 0 -0.001644	W116 25 22.236579
7220	EHYT	1838.8578	0.0020	1838.8598
7274	ELAT	N 32 53 30.365816	0 0 0.000300	N 32 53 30.366116
7274	ELON	W116 25 22.151197	0 0 -0.001651	W116 25 22.152847
7274	EHYT	1838.7768	0.0017	1838.7785
CALA	ELAT	N 32 53 28.850032	0 0 -0.000285	N 32 53 28.849747
CALA	ELON	W116 25 14.653413	0 0 0.000551	W116 25 14.652862
CALA	EHYT	1855.4864	-0.0202	1855.4662
CALC	ELAT	N 32 53 26.966739	0 0 -0.000364	N 32 53 26.966376
CALC	ELON	W116 25 22.961634	0 0 -0.000132	W116 25 22.961766
CALC	EHYT	1841.3345	-0.0058	1841.3287
DORIS	ELAT	N 32 53 30.676502	0 0 0.000275	N 32 53 30.676777
DORIS	ELON	W116 25 20.522108	0 0 0.000746	W116 25 20.521362
DORIS	EHYT	1843.3386	0.0082	1843.3468
LOOK	ELAT	N 32 53 27.980773	0 0 -0.000125	N 32 53 27.980648
LOOK	ELON	W116 25 23.485073	0 0 -0.000084	W116 25 23.485157
LOOK	EHYT	1840.4360	-0.0036	1840.4324
MOB4	ELAT	N 32 53 30.265183	0 0 -0.002373	N 32 53 30.262809
MOB4	ELON	W116 25 21.626949	0 0 -0.000834	W116 25 21.627783
MOB4	EHYT	1842.2076	-0.0012	1842.2065
PIN1	ELAT	N 32 53 29.974331	0 0 0.000183	N 32 53 29.974514
PIN1	ELON	W116 25 21.550056	0 0 -0.000339	W116 25 21.550395
PIN1	EHYT	1838.9948	-0.0036	1838.9912
PIN2	ELAT	N 32 53 31.380245	0 0 0.000096	N 32 53 31.380341
PIN2	ELON	W116 25 20.590083	0 0 -0.000303	W116 25 20.590385
PIN2	EHYT	1840.2395	-0.0037	1840.2358
RM1	ELAT	N 32 53 31.067553	0 0 0.000312	N 32 53 31.067865
RM1	ELON	W116 25 21.899983	0 0 -0.002168	W116 25 21.902151
RM1	EHYT	1838.2654	0.0046	1838.2700

Misclosures (pass 3):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
GROUP: 00001916.SSF,obs#: 1 day 308 OPT				308 1 15		
DXCT		CALC	CALA	202.1995	0.0015	-0.0031
DYCT		CALC	CALA	-78.5311	0.0019	0.0001
DZCT		CALC	CALA	56.4107	0.0013	0.0001
GROUP: 00001925.SSF,obs#: 2 day 310 OPT				310 1 18		

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DXCT              CALC         CALA                  202.1999   0.0022  -0.0035
DYCT              CALC         CALA                  -78.5278   0.0036  -0.0032
DZCT              CALC         CALA                   56.4064   0.0021   0.0044
GROUP: 00001919.SSF,obs#:    4 day 310  OPT                  310    18
DXCT              MONP         CALA                  114.3376   0.0027  -0.0014
DYCT              MONP         CALA                 -108.7786   0.0040  -0.0054
DZCT              MONP         CALA                  -48.1846   0.0022   0.0047
GROUP: DISTANCES
DIST              7220         CALA                  202.4769   0.0013  -0.0035
GROUP: ZENITHAL ANGLE OBSERVATIONS
ZANG              PIN1         PIN2            88 34     6.55 4.03        -8.37
ZANG              CALA         PIN1            95  9    33.90 2.02         4.70
ZANG              CALA         7220            94 42    36.48 1.97         6.21
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================================================================================
Solution (pass 3):
NAME         TYPE           OLD VALUE          CORRECTION       UPDATED VALUE
------------ ---- ------------------- ------------------- -------------------
7110         ELAT   N 32 53 30.263630      0  0  0.000023   N 32 53 30.263653
7110         ELON   W116 25 21.627072      0  0 -0.000032   W116 25 21.627103
7110         EHYT           1839.0170            -0.0004           1839.0167
7220         ELAT   N 32 53 30.243915      0  0  0.000004   N 32 53 30.243920
7220         ELON   W116 25 22.236579      0  0 -0.000015   W116 25 22.236594
7220         EHYT           1838.8598            -0.0004           1838.8595
7274         ELAT   N 32 53 30.366116      0  0  0.000002   N 32 53 30.366118
7274         ELON   W116 25 22.152847      0  0 -0.000009   W116 25 22.152857
7274         EHYT           1838.7785            -0.0003           1838.7781
CALA         ELAT   N 32 53 28.849747      0  0  0.000001   N 32 53 28.849748
CALA         ELON   W116 25 14.652862      0  0  0.000042   W116 25 14.652820
CALA         EHYT           1855.4662             0.0014           1855.4676
CALC         ELAT   N 32 53 26.966376      0  0  0.000001   N 32 53 26.966377
CALC         ELON   W116 25 22.961766      0  0  0.000007   W116 25 22.961758
CALC         EHYT           1841.3287             0.0001           1841.3288
DORIS        ELAT   N 32 53 30.676777      0  0  0.000001   N 32 53 30.676777
DORIS        ELON   W116 25 20.521362      0  0 -0.000002   W116 25 20.521364
DORIS        EHYT           1843.3468            -0.0001           1843.3467
LOOK         ELAT   N 32 53 27.980648      0  0  0.000000   N 32 53 27.980648
LOOK         ELON   W116 25 23.485157      0  0  0.000003   W116 25 23.485154
LOOK         EHYT           1840.4324             0.0000           1840.4324
MOB4         ELAT   N 32 53 30.262809      0  0  0.000011   N 32 53 30.262821
MOB4         ELON   W116 25 21.627783      0  0 -0.000007   W116 25 21.627790
MOB4         EHYT           1842.2065            -0.0002           1842.2063
PIN1         ELAT   N 32 53 29.974514      0  0  0.000000   N 32 53 29.974514
PIN1         ELON   W116 25 21.550395      0  0 -0.000003   W116 25 21.550398
PIN1         EHYT           1838.9912            -0.0001           1838.9911
PIN2         ELAT   N 32 53 31.380341      0  0  0.000000   N 32 53 31.380341
PIN2         ELON   W116 25 20.590385      0  0  0.000000   W116 25 20.590386
PIN2         EHYT           1840.2358             0.0000           1840.2358
RM1          ELAT   N 32 53 31.067865      0  0  0.000003   N 32 53 31.067868
RM1          ELON   W116 25 21.902151      0  0 -0.000015   W116 25 21.902166
RM1          EHYT           1838.2700            -0.0005           1838.2695
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Misclosures (pass 4):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	STD.DEV.	MISC
GROUP: 00001925.SSF,obs#:	2	day 310	OPT		310 1 18	
DXCT		CALC	CALA	202.1999	0.0022	-0.0032
DYCT		CALC	CALA	-78.5278	0.0036	-0.0046
DZCT		CALC	CALA	56.4064	0.0021	0.0051
GROUP: 00001919.SSF,obs#:	4	day 310	OPT		310 18	
DXCT		MONP	CALA	114.3376	0.0027	-0.0010
DYCT		MONP	CALA	-108.7786	0.0040	-0.0069
DZCT		MONP	CALA	-48.1846	0.0022	0.0055
GROUP: ZENITHAL ANGLE OBSERVATIONS						
ZANG		PIN2	DORIS	81 51 31.65	8.73	-17.58
ZANG		CALA	7220	94 42 36.47	1.97	4.52

Solution (pass 4):

NAME	TYPE	OLD VALUE	CORRECTION	UPDATED VALUE
7110	ELAT	N 32 53 30.263653	0 0 -0.000001	N 32 53 30.263652
7110	ELON	W116 25 21.627103	0 0 0.000001	W116 25 21.627103
7110	EHYT	1839.0167	0.0000	1839.0167
7220	ELAT	N 32 53 30.243920	0 0 0.000000	N 32 53 30.243919
7220	ELON	W116 25 22.236594	0 0 0.000001	W116 25 22.236593
7220	EHYT	1838.8595	0.0000	1838.8594
7274	ELAT	N 32 53 30.366118	0 0 0.000000	N 32 53 30.366118
7274	ELON	W116 25 22.152857	0 0 0.000001	W116 25 22.152856
7274	EHYT	1838.7781	0.0000	1838.7781
CALA	ELAT	N 32 53 28.849748	0 0 0.000000	N 32 53 28.849748
CALA	ELON	W116 25 14.652820	0 0 -0.000004	W116 25 14.652824
CALA	EHYT	1855.4676	0.0000	1855.4677
CALC	ELAT	N 32 53 26.966377	0 0 0.000000	N 32 53 26.966377
CALC	ELON	W116 25 22.961758	0 0 -0.000001	W116 25 22.961759
CALC	EHYT	1841.3288	0.0000	1841.3288
DORIS	ELAT	N 32 53 30.676777	0 0 0.000000	N 32 53 30.676777
DORIS	ELON	W116 25 20.521364	0 0 0.000000	W116 25 20.521364
DORIS	EHYT	1843.3467	0.0000	1843.3467
LOOK	ELAT	N 32 53 27.980648	0 0 0.000000	N 32 53 27.980648
LOOK	ELON	W116 25 23.485154	0 0 0.000000	W116 25 23.485154
LOOK	EHYT	1840.4324	0.0000	1840.4324
MOB4	ELAT	N 32 53 30.262821	0 0 0.000000	N 32 53 30.262821
MOB4	ELON	W116 25 21.627790	0 0 0.000000	W116 25 21.627790
MOB4	EHYT	1842.2063	0.0000	1842.2063
PIN1	ELAT	N 32 53 29.974514	0 0 0.000000	N 32 53 29.974514
PIN1	ELON	W116 25 21.550398	0 0 0.000000	W116 25 21.550397
PIN1	EHYT	1838.9911	0.0000	1838.9911
PIN2	ELAT	N 32 53 31.380341	0 0 0.000000	N 32 53 31.380341

PIN2	ELON	W116	25	20.590386	0	0	0.000000	W116	25	20.590385
PIN2	EHYT			1840.2358			0.0000			1840.2358
RM1	ELAT	N 32	53	31.067868	0	0	0.000000	N 32	53	31.067867
RM1	ELON	W116	25	21.902166	0	0	0.000001	W116	25	21.902165
RM1	EHYT			1838.2695			0.0000			1838.2695

Adjusted PLH Coordinates:

CODE	FFF	STATION	LATITUDE	STD DEV	LONGITUDE	STD DEV	ELIP-HEIGHT	STD DEV		
PLH	000	7110	N 32 53 30.263652	0.0008	W116 25 21.627103	0.0009	1839.0167 m	0.0007		0
PLH	000	7220	N 32 53 30.243919	0.0005	W116 25 22.236593	0.0005	1838.8594 m	0.0005		0
PLH	000	7274	N 32 53 30.366118	0.0005	W116 25 22.152856	0.0007	1838.7781 m	0.0005		0
PLH	000	CALA	N 32 53 28.849748	0.0002	W116 25 14.652824	0.0005	1855.4677 m	0.0007		0
PLH	000	CALC	N 32 53 26.966377	0.0002	W116 25 22.961759	0.0006	1841.3288 m	0.0006		0
PLH	000	DORIS	N 32 53 30.676777	0.0016	W116 25 20.521364	0.0012	1843.3467 m	0.0006		0
PLH	000	LOOK	N 32 53 27.980648	0.0003	W116 25 23.485154	0.0005	1840.4324 m	0.0005		0
PLH	000	MOB4	N 32 53 30.262821	0.0004	W116 25 21.627790	0.0005	1842.2063 m	0.0005		0
PLH	111	MONP	N 32 53 30.982870	0.0000	W116 25 20.453170	0.0000	1842.5470 m	0.0000		0
PLH	000	PIN1	N 32 53 29.974514	0.0002	W116 25 21.550397	0.0004	1838.9911 m	0.0004		0
PLH	000	PIN2	N 32 53 31.380341	0.0002	W116 25 20.590385	0.0004	1840.2358 m	0.0004		0
PLH	000	RM1	N 32 53 31.067867	0.0006	W116 25 21.902165	0.0006	1838.2695 m	0.0005		0

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	
XYZ		7110	-2386278.4496	-4802353.9274	3444881.7198	m
0			0.0009	0.0008	0.0008	
XYZ		7220	-2386292.7283	-4802347.0537	3444881.1238	m
0			0.0005	0.0005	0.0005	
XYZ		7274	-2386289.8383	-4802346.1300	3444884.2416	m
0			0.0007	0.0006	0.0005	
XYZ		CALA	-2386132.7445	-4802468.1704	3444854.0680	m
0			0.0005	0.0006	0.0005	
XYZ		CALC	-2386334.9411	-4802389.6381	3444797.6565	m
0			0.0005	0.0005	0.0004	
XYZ		DORIS	-2386251.2468	-4802363.7845	3444894.7610	m
0			0.0014	0.0008	0.0014	
XYZ		LOOK	-2386339.2393	-4802367.7090	3444823.4147	m
0			0.0005	0.0005	0.0004	
XYZ		MOB4	-2386279.6637	-4802356.3304	3444883.4304	m
0			0.0005	0.0005	0.0004	
XYZ		MONP	-2386247.0810	-4802359.3849	3444902.2471	m
0			0.0000	0.0000	0.0000	
XYZ		PIN1	-2386278.8073	-4802359.1286	3444874.2243	m
0			0.0004	0.0004	0.0003	
XYZ		PIN2	-2386246.4523	-4802350.1029	3444911.2766	m
0			0.0004	0.0004	0.0003	
XYZ		RM1	-2386278.5859	-4802338.1313	3444902.1235	m
0			0.0006	0.0006	0.0006	

Geoid Values:

CODE	STATION	N/S DEFLECTION	E/W DEFLECTION	UNDULATION
GEOI	7110	0 0 7.31	0 0 12.36	-31.9595 m
GEOI	7220	0 0 7.30	0 0 12.34	-31.9580 m
GEOI	7274	0 0 7.30	0 0 12.34	-31.9580 m
GEOI	CALA	0 0 7.35	0 0 12.48	-31.9684 m
GEOI	CALC	0 0 7.22	0 0 12.28	-31.9536 m
GEOI	DORIS	0 0 7.32	0 0 12.38	-31.9611 m
GEOI	LOOK	0 0 7.23	0 0 12.27	-31.9531 m
GEOI	MOB4	0 0 7.31	0 0 12.36	-31.9595 m
GEOI	MONP	0 0 7.32	0 0 12.38	-31.9611 m
GEOI	PIN1	0 0 7.29	0 0 12.34	-31.9584 m
GEOI	PIN2	0 0 7.35	0 0 12.39	-31.9622 m
GEOI	RM1	0 0 7.33	0 0 12.37	-31.9607 m

Residuals (critical value = 3.813):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
GROUP: 00001916.SSF,obs#: 1 day 308 OPT					308 1 15	
DXCT		CALC	CALA	202.19950	-0.0029	-2.0018
				0.0015	0.0014	12.72
DYCT		CALC	CALA	-78.53110	-0.0013	-0.7206
				0.0019	0.0018	5.65
DZCT		CALC	CALA	56.41070	0.0008	0.6723
				0.0013	0.0012	3.64
GROUP: 00001925.SSF,obs#: 2 day 310 OPT					310 1 18	
DXCT		CALC	CALA	202.19990	-0.0033	-1.5424
				0.0022	0.0021	14.51
DYCT		CALC	CALA	-78.52780	-0.0046	-1.3039
				0.0036	0.0035	20.37
DZCT		CALC	CALA	56.40640	0.0051	2.4945
				0.0021	0.0021	22.82
GROUP: 00001910.SSF,obs#: 3 day 308 OPT					308 15	
DXCT		MONP	CALA	114.33970	-0.0032	-1.6266
				0.0020	0.0019	19.21
DYCT		MONP	CALA	-108.78660	0.0011	0.4312
				0.0026	0.0025	6.65
DZCT		MONP	CALA	-48.17960	0.0006	0.3560
				0.0017	0.0016	3.49
GROUP: 00001919.SSF,obs#: 4 day 310 OPT					310 18	
DXCT		MONP	CALA	114.33760	-0.0011	-0.4014
				0.0027	0.0027	6.48
DYCT		MONP	CALA	-108.77860	-0.0069	-1.7267
				0.0040	0.0040	41.83
DZCT		MONP	CALA	-48.18460	0.0056	2.5946

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                                                    0.0022   0.0021    33.79
GROUP: 00001913.SSF,obs#:    5 day 308  OPT                  308    14
DXCT              MONP         CALC              -87.86010   0.0000  -0.0124
                                                    0.0016   0.0015     0.13
DYCT              MONP         CALC              -30.25720   0.0041   1.4673
                                                    0.0028   0.0028    29.04
DZCT              MONP         CALC             -104.58940  -0.0011  -0.6862
                                                    0.0017   0.0017     8.14
GROUP: 00001922.SSF,obs#:    6 day 310  OPT                  310    18
DXCT              MONP         CALC              -87.86070   0.0006   0.2365
                                                    0.0025   0.0025     4.16
DYCT              MONP         CALC              -30.25330   0.0002   0.0423
                                                    0.0039   0.0039     1.17
DZCT              MONP         CALC             -104.59020  -0.0003  -0.1645
                                                    0.0021   0.0021     2.42
GROUP: 00001952.SSF,obs#:    7 day 314  OPT                  314    17
DXCT              MONP         LOOK              -92.16000   0.0017   1.1096
                                                    0.0016   0.0015    13.71
DYCT              MONP         LOOK               -8.32070  -0.0034  -1.6228
                                                    0.0021   0.0021    27.74
DZCT              MONP         LOOK              -78.83320   0.0008   0.5695
                                                    0.0015   0.0014     6.79
GROUP: 00001937.SSF,obs#:    8 day 312  OPT                  312
DXCT              MONP         PIN1              -31.72750   0.0012   1.0993
                                                    0.0012   0.0011    28.74
DYCT              MONP         PIN1                0.25510   0.0012   0.7093
                                                    0.0017   0.0017    28.12
DZCT              MONP         PIN1              -28.02110  -0.0016  -1.3702
                                                    0.0012   0.0012    37.98
GROUP: 00001931.SSF,obs#:    9 day 312  OPT                  312    23
DXCT              MONP         PIN1              -31.73340   0.0071   0.2291
                                                    0.0311   0.0311   168.12
DYCT              MONP         PIN1                0.26770  -0.0114  -0.5142
                                                    0.0222   0.0222   269.54
DZCT              MONP         PIN1              -28.02950   0.0068   0.4224
                                                    0.0161   0.0161   160.46
GROUP: 00001949.SSF,obs#:   10 day 313  OPT                  313
DXCT              MONP         PIN1              -31.72450  -0.0018  -1.7010
                                                    0.0011   0.0010    42.13
DYCT              MONP         PIN1                0.25790  -0.0016  -1.1169
                                                    0.0015   0.0014    38.03
DZCT              MONP         PIN1              -28.02440   0.0017   1.6127
                                                    0.0011   0.0010    39.98
GROUP: 00001955.SSF,obs#:   11 day 314  OPT                  314    16
DXCT              MONP         PIN1              -31.72880   0.0025   1.2564
                                                    0.0020   0.0020    59.45
DYCT              MONP         PIN1                0.25880  -0.0025  -0.9819
                                                    0.0026   0.0026    59.29
DZCT              MONP         PIN1              -28.02270   0.0000  -0.0043
                                                    0.0018   0.0018     0.18
GROUP: 00001934.SSF,obs#:   12 day 312  OPT                  312
DXCT              MONP         PIN2                0.63020  -0.0015  -1.2882
                                                    0.0013   0.0012   117.38
DYCT              MONP         PIN2                9.28190   0.0002   0.0647
                                                    0.0025   0.0025    12.26
DZCT              MONP         PIN2                9.02920   0.0004   0.2567
                                                    0.0015   0.0015    29.12
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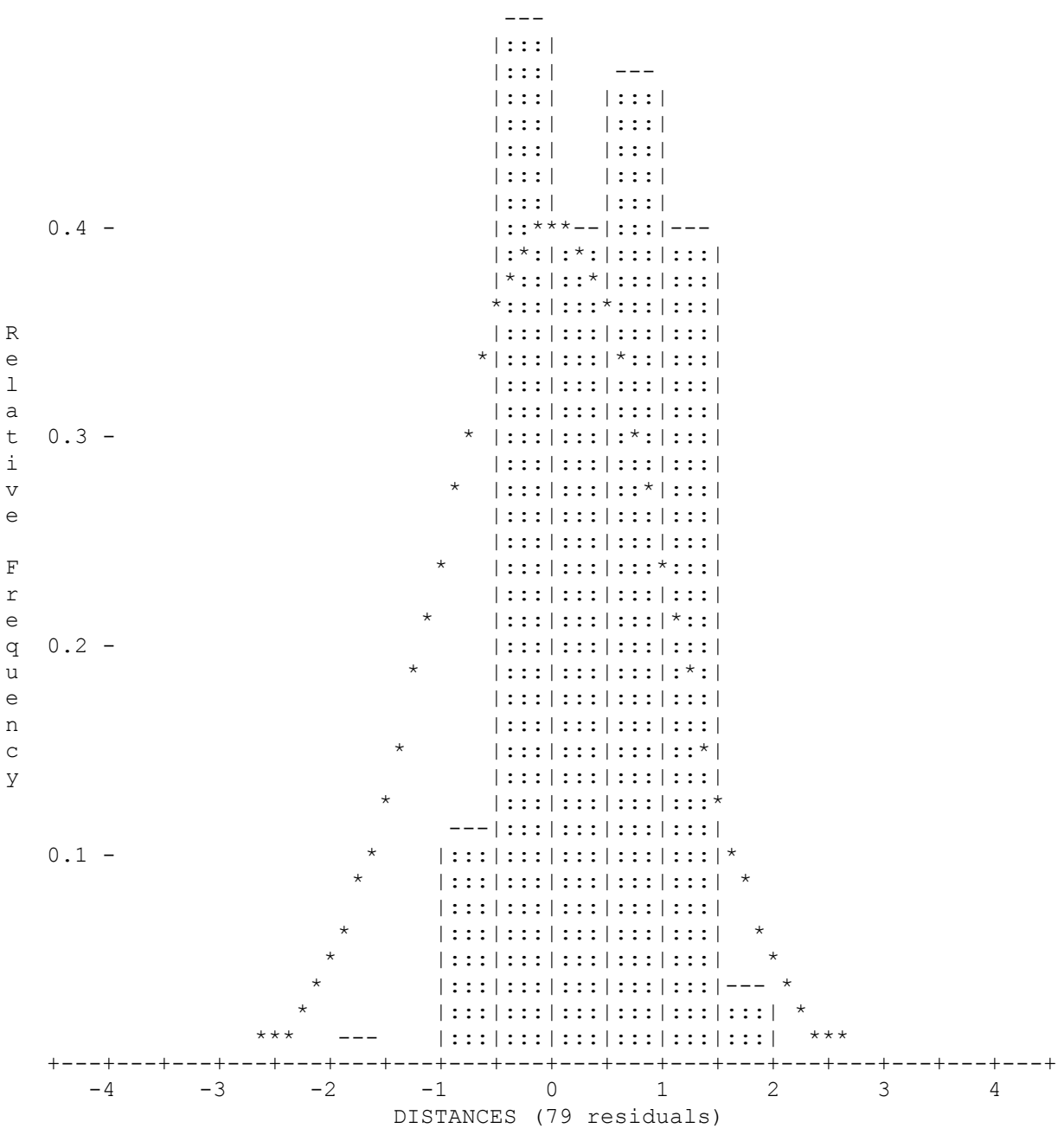
GROUP: 00001958.SSF,obs#:	14 day 314	OPT		314 1 17	
DXCT	PIN1	LOOK	-60.43270	0.0006	0.4079
			0.0016	0.0016	8.18
DYCT	PIN1	LOOK	-8.57950	-0.0009	-0.3831
			0.0023	0.0023	10.86
DZCT	PIN1	LOOK	-50.81020	0.0005	0.3477
			0.0016	0.0015	6.71
GROUP: 00001943.SSF,obs#:	15 day 313	OPT		313 1	
DXCT	PIN2	MONP	-0.63030	0.0016	1.8045
			0.0010	0.0009	125.09
DYCT	PIN2	MONP	-9.28410	0.0020	1.5256
			0.0014	0.0013	157.43
DZCT	PIN2	MONP	-9.02830	-0.0013	-1.3258
			0.0010	0.0010	98.54
GROUP: 00001940.SSF,obs#:	16 day 311	OPT		311 1 23	
DXCT	PIN2	PIN1	-32.35710	0.0021	1.8093
			0.0012	0.0012	42.76
DYCT	PIN2	PIN1	-9.02730	0.0015	0.6357
			0.0024	0.0024	30.62
DZCT	PIN2	PIN1	-37.05020	-0.0021	-1.4055
			0.0015	0.0015	41.69
GROUP: 00001946.SSF,obs#:	17 day 312	OPT		312 1 23	
DXCT	PIN2	PIN1	-32.35500	0.0000	0.0367
			0.0011	0.0011	0.77
DYCT	PIN2	PIN1	-9.02650	0.0007	0.4877
			0.0015	0.0015	14.63
DZCT	PIN2	PIN1	-37.05220	-0.0001	-0.0787
			0.0011	0.0011	1.70
GROUP: DISTANCES					
DIST	PIN1	7110	9.13027	0.0001	0.0328
			0.0022	0.0020	7.37
DIST	PIN1	LOOK	79.41676	0.0016	1.3397
			0.0012	0.0012	20.26
DIST	PIN1	LOOK	79.41666	0.0017	1.4230
			0.0012	0.0012	21.52
DIST	PIN1	7220	19.67707	0.0004	0.3089
			0.0012	0.0012	18.49
DIST	PIN1	7220	19.67767	-0.0002	-0.2005
			0.0012	0.0012	12.00
DIST	PIN1	7274	19.77360	0.0000	-0.0243
			0.0012	0.0011	1.35
DIST	7220	7110	15.85828	-0.0001	-0.0454
			0.0022	0.0020	5.68
DIST	7220	7110	15.85548	0.0027	1.3651
			0.0022	0.0020	170.89
DIST	PIN1	CALA	183.38613	0.0007	0.5922
			0.0013	0.0012	3.88
DIST	PIN1	CALA	183.38523	0.0016	1.3407
			0.0013	0.0012	8.79
DIST	PIN1	CALC	99.72024	0.0017	1.3996
			0.0012	0.0012	17.06
DIST	PIN1	CALC	99.72064	0.0013	1.0706
			0.0012	0.0012	13.05
DIST	PIN1	7274	19.77420	-0.0006	-0.5680
			0.0012	0.0011	31.70
DIST	7220	7274	4.35037	0.0000	-0.0165
			0.0012	0.0011	4.07

DIST	7220	7274	4.35027	0.0001	0.0768
			0.0012	0.0011	18.91
DIST	7220	CALA	202.47595	-0.0010	-0.8546
			0.0013	0.0012	5.03
DIST	7220	CALA	202.47695	-0.0020	-1.6936
			0.0013	0.0012	9.97
DIST	7220	PIN1	19.67740	0.0000	0.0298
			0.0012	0.0012	1.78
DIST	7220	PIN1	19.67760	-0.0002	-0.1400
			0.0012	0.0012	8.38
DIST	PIN1	PIN2	50.01030	0.0015	1.2254
			0.0012	0.0012	29.90
DIST	PIN1	PIN2	50.01020	0.0016	1.3073
			0.0012	0.0012	31.90
DIST	RM1	7220	26.84310	0.0009	0.8062
			0.0012	0.0011	33.69
DIST	RM1	7220	26.84430	-0.0003	-0.2634
			0.0012	0.0011	11.01
DIST	RM1	PIN2	35.49175	0.0000	0.0395
			0.0012	0.0011	1.25
DIST	RM1	PIN2	35.49115	0.0006	0.5738
			0.0012	0.0011	18.16
DIST	CALA	CALC	224.12738	0.0000	-0.0149
			0.0013	0.0012	0.08
DIST	CALA	CALC	224.12758	-0.0002	-0.1832
			0.0013	0.0012	0.97
DIST	CALA	MOB4	186.96309	0.0010	0.8681
			0.0013	0.0012	5.55
DIST	CALA	MOB4	186.96319	0.0009	0.7844
			0.0013	0.0012	5.01
DIST	CALA	MOB4	186.96279	0.0013	1.1191
			0.0013	0.0012	7.15
DIST	CALA	MOB4	186.96339	0.0007	0.6171
			0.0013	0.0012	3.94
DIST	CALC	MOB4	107.34057	0.0008	0.6360
			0.0012	0.0012	7.05
DIST	CALC	MOB4	107.34097	0.0004	0.2998
			0.0012	0.0012	3.32
DIST	CALC	MOB4	107.34127	0.0001	0.0476
			0.0012	0.0012	0.53
DIST	CALC	MOB4	107.34067	0.0007	0.5520
			0.0012	0.0012	6.12
DIST	CALC	MOB4	107.34067	0.0007	0.5520
			0.0012	0.0012	6.12
DIST	CALC	MOB4	107.34117	0.0002	0.1317
			0.0012	0.0012	1.46
DIST	CALC	CALA	224.12703	0.0003	0.2815
			0.0013	0.0012	1.49
DIST	CALC	CALA	224.12713	0.0002	0.1974
			0.0013	0.0012	1.05
DIST	CALC	PIN1	99.71970	0.0022	1.8430
			0.0012	0.0012	22.47
DIST	CALC	PIN1	99.71990	0.0020	1.6784
			0.0012	0.0012	20.46
DIST	CALC	LOOK	34.09909	0.0014	1.1536
			0.0012	0.0012	40.31
DIST	CALC	LOOK	34.09869	0.0018	1.4893

			0.0012	0.0012	52.04
DIST	7220	RM1	26.84288	0.0011	1.0027
			0.0012	0.0011	41.91
DIST	7220	RM1	26.84398	0.0000	0.0223
			0.0012	0.0011	0.93
DIST	PIN2	PIN1	50.01091	0.0009	0.7253
			0.0012	0.0012	17.69
DIST	PIN2	PIN1	50.01081	0.0010	0.8072
			0.0012	0.0012	19.69
DIST	PIN2	RM1	35.49086	0.0009	0.8326
			0.0012	0.0011	26.34
DIST	PIN2	RM1	35.49216	-0.0004	-0.3250
			0.0012	0.0011	10.28
DIST	LOOK	MOB4	85.32692	-0.0004	-0.3023
			0.0012	0.0012	4.14
DIST	LOOK	MOB4	85.32712	-0.0006	-0.4733
			0.0012	0.0012	6.49
DIST	LOOK	PIN1	79.41736	0.0010	0.8434
			0.0012	0.0012	12.76
DIST	LOOK	PIN1	79.41716	0.0012	1.0099
			0.0012	0.0012	15.28
DIST	LOOK	CALC	34.09911	0.0014	1.1330
			0.0012	0.0012	39.59
DIST	LOOK	CALC	34.09921	0.0013	1.0491
			0.0012	0.0012	36.66
DIST	LOOK	CALA	231.67335	-0.0006	-0.5188
			0.0013	0.0012	2.66
DIST	LOOK	CALA	231.67335	-0.0006	-0.5188
			0.0013	0.0012	2.66
DIST	CALA	PIN1	183.38589	0.0009	0.7878
			0.0013	0.0012	5.17
DIST	CALA	PIN1	183.38509	0.0017	1.4531
			0.0013	0.0012	9.53
DIST	CALA	LOOK	231.67286	-0.0001	-0.1107
			0.0013	0.0012	0.57
DIST	CALA	LOOK	231.67286	-0.0001	-0.1107
			0.0013	0.0012	0.57
DIST	CALA	MOB4	186.96453	-0.0004	-0.3367
			0.0013	0.0012	2.15
DIST	CALA	MOB4	186.96463	-0.0005	-0.4204
			0.0013	0.0012	2.69
DIST	CALA	7220	202.47500	-0.0001	-0.0582
			0.0013	0.0012	0.34
DIST	CALA	7220	202.47530	-0.0004	-0.3099
			0.0013	0.0012	1.82
DIST	7220	MOB4	16.18787	0.0005	0.4011
			0.0012	0.0012	29.01
DIST	7220	MOB4	16.18807	0.0003	0.2303
			0.0012	0.0012	16.66
DIST	7220	MOB4	16.18727	0.0011	0.9135
			0.0012	0.0012	66.08
DIST	7220	MOB4	16.18747	0.0009	0.7427
			0.0012	0.0012	53.72
DIST	PIN1	MOB4	9.66043	-0.0004	-0.3702
			0.0012	0.0012	45.54
DIST	PIN1	MOB4	9.66033	-0.0003	-0.2860
			0.0012	0.0012	35.18

DIST	PIN1	MOB4	9.65913	0.0009	0.7238
			0.0012	0.0012	89.04
DIST	PIN1	MOB4	9.65943	0.0006	0.4714
			0.0012	0.0012	57.98
DIST	7274	PIN1	19.77354	0.0000	0.0277
			0.0012	0.0011	1.55
DIST	7274	CALC	106.88352	0.0005	0.4727
			0.0012	0.0011	4.83
DIST	PIN1	7110	9.12865	0.0017	0.8261
			0.0022	0.0020	185.40
DIST	PIN1	7110	9.12875	0.0016	0.7773
			0.0022	0.0020	174.45
DIST	PIN1	7110	9.13145	-0.0011	-0.5403
			0.0022	0.0020	121.27
DIST	PIN1	7110	9.13095	-0.0006	-0.2963
			0.0022	0.0020	66.51


Relative Frequency
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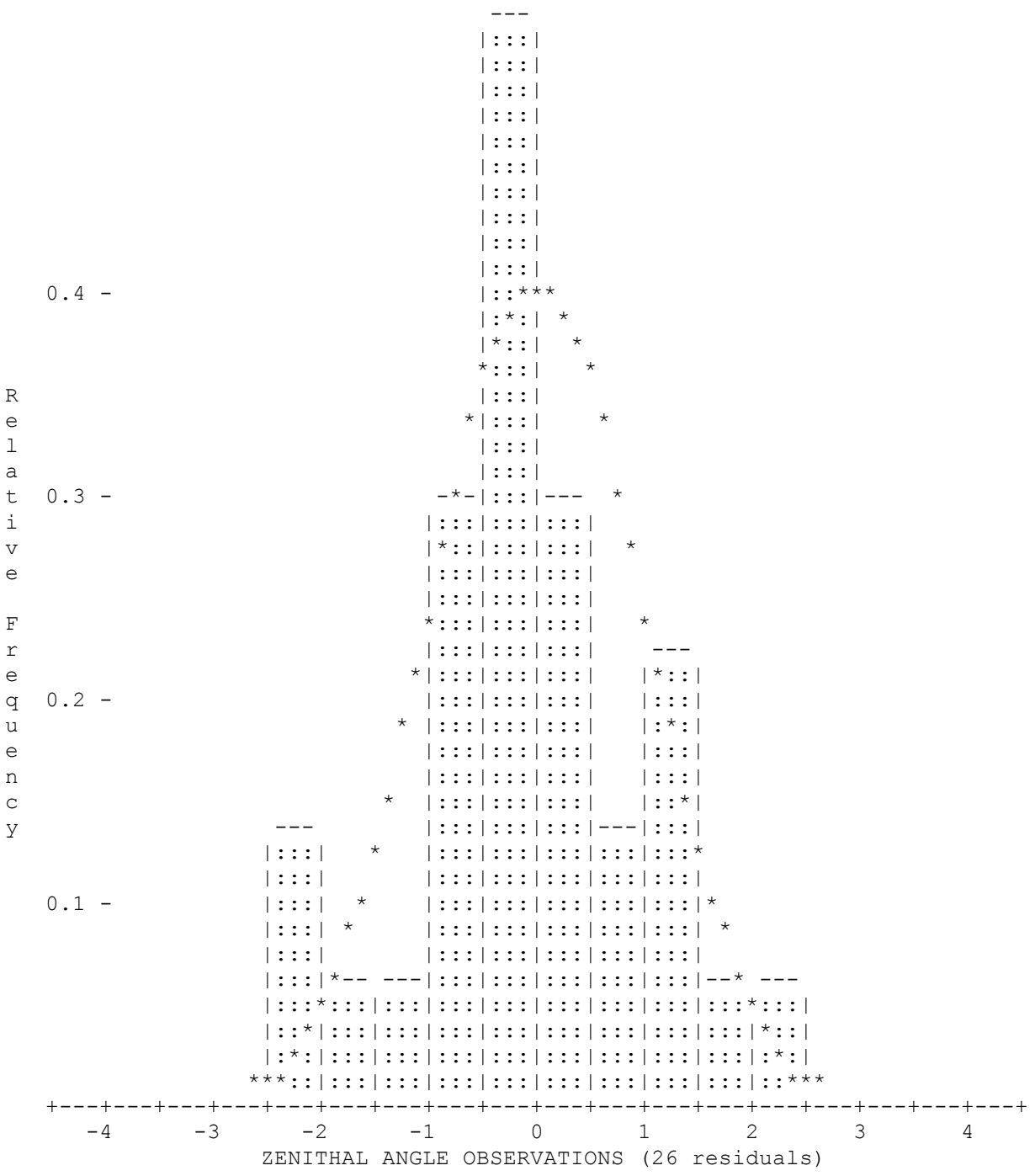
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
DISTANCES (79 residuals)

Residuals (critical value = 3.813):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
GROUP: ZENITHAL ANGLE OBSERVATIONS						
ZANG		7220	RM1	91 15 23.08	0.45	0.07
				6.99	6.47	
ZANG		PIN2	PIN1	91 25 46.04	-1.24	-0.33
				4.03	3.80	
ZANG		PIN2	RM1	93 10 54.21	7.01	1.46
				5.29	4.79	
ZANG		PIN2	DORIS	81 51 31.66	-17.59	-2.36
				8.73	7.47	
ZANG		PIN1	PIN2	88 34 6.55	-7.87	-2.07
				4.03	3.80	
ZANG		RM1	7220	88 44 38.20	-0.09	-0.01
				6.99	6.47	
ZANG		LOOK	MOB4	88 48 20.55	0.47	0.19
				2.76	2.45	
ZANG		LOOK	CALA	86 16 35.38	0.41	0.23
				1.93	1.83	
ZANG		LOOK	CALC	88 29 37.97	-1.43	-0.29
				5.60	4.91	
ZANG		CALC	CALA	86 22 50.41	1.18	0.64
				1.94	1.82	
ZANG		CALC	MOB4	89 31 42.94	-1.90	-0.89
				2.44	2.15	
ZANG		CALC	LOOK	91 30 14.27	-7.46	-1.52
				5.60	4.91	
ZANG		CALC	PIN1	91 20 24.19	-2.03	-0.89
				2.53	2.28	
ZANG		CALA	CALC	93 37 16.94	-1.28	-0.70
				1.94	1.82	
ZANG		CALA	MOB4	94 4 17.75	1.63	0.89
				2.01	1.83	
ZANG		CALA	LOOK	93 43 34.65	1.93	1.06
				1.93	1.83	
ZANG		CALA	PIN1	95 9 33.89	2.99	1.61
				2.02	1.86	
ZANG		CALA	7220	94 42 36.47	4.46	2.43
				1.97	1.83	
ZANG		LOOK	MONP	89 0 2.86	2.59	1.22
				2.31	2.12	
ZANG		LOOK	DORIS	88 31 22.54	-1.96	-0.93
				2.38	2.10	
ZANG		LOOK	CALA	86 16 34.42	-0.55	-0.30
				1.93	1.83	
ZANG		LOOK	CALC	88 29 40.48	1.09	0.22
				5.60	4.91	
ZANG		PIN1	LOOK	88 57 50.95	-0.21	-0.08
				2.88	2.66	
ZANG		PIN1	7220	90 23 4.76	-3.59	-0.43

				8.92	8.28	
ZANG	PIN1	7274	90 37	3.64	-3.57	-0.44
				8.90	8.05	
ZANG	PIN1	MONP	85 10	34.87	-4.81	-1.17
				4.68	4.10	


Relative Frequency
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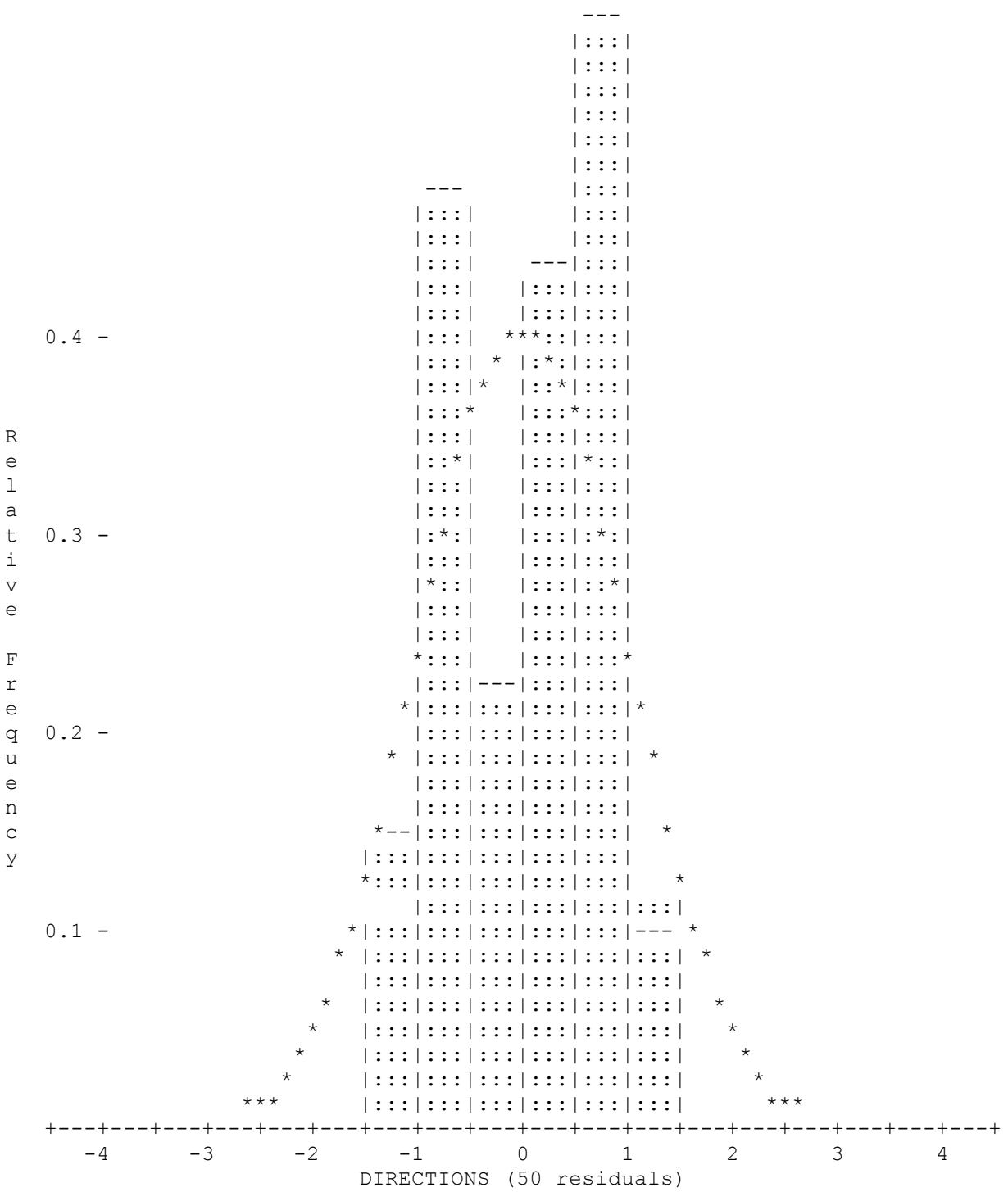
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
ZENITHAL ANGLE OBSERVATIONS (26 residuals)

Residuals (critical value = 3.813):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO		OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
GROUP: DIRECTIONS							
DIR		PIN1	LOOK	0 0	0.00	-0.31	-0.10
					3.31	2.96	
DIR		PIN1	7220	75 38	49.02	4.19	0.37
					12.39	11.23	
DIR		PIN1	7274	88 18	18.18	1.33	0.13
					12.35	10.54	
DIR		PIN1	7110	128 4	51.94	-14.16	-0.96
					25.59	14.81	
DIR		PIN1	MONP	183 14	52.09	-5.03	-0.86
					6.18	5.86	
DIR		PIN1	DORIS	191 43	29.18	-2.47	-0.58
					7.60	4.22	
DIR		PIN1	CALA	241 37	54.72	0.94	1.00
					1.57	0.95	
DIR		PIN1	CALC	342 17	22.86	-1.40	-0.62
					2.67	2.26	
DIR		7220	CALA	0 0	0.00	-0.16	-0.94
					1.44	0.17	
DIR		7220	PIN1	12 39	36.36	9.31	0.81
					12.39	11.43	
DIR		7220	7274	287 44	35.39	-4.63	-0.09
					58.99	51.12	
DIR		7220	7110	345 30	31.89	5.12	0.41
					16.50	12.43	
DIR		PIN2	PIN1	0 0	0.00	0.65	0.22
					5.18	2.93	
DIR		PIN2	RM1	44 17	13.54	-3.94	-0.75
					7.09	5.26	
DIR		PIN2	MONP	313 48	29.53	22.34	1.11
					21.37	20.06	
DIR		PIN2	DORIS	325 19	16.18	0.77	0.58
					12.11	1.31	
DIR		RM1	PIN2	0 0	0.00	-2.45	-0.49
					7.09	5.04	
DIR		RM1	MONP	19 44	33.42	2.29	0.49
					6.85	4.70	
DIR		7220	RM1	0 0	0.00	-5.10	-0.95
					9.59	5.34	
DIR		7220	PIN1	96 2	51.84	8.52	0.95
					12.39	8.93	
DIR		RM1	PIN2	0 0	0.00	-1.60	-0.45
					7.09	3.54	
DIR		RM1	7220	124 40	6.80	2.92	0.45
					9.59	6.47	

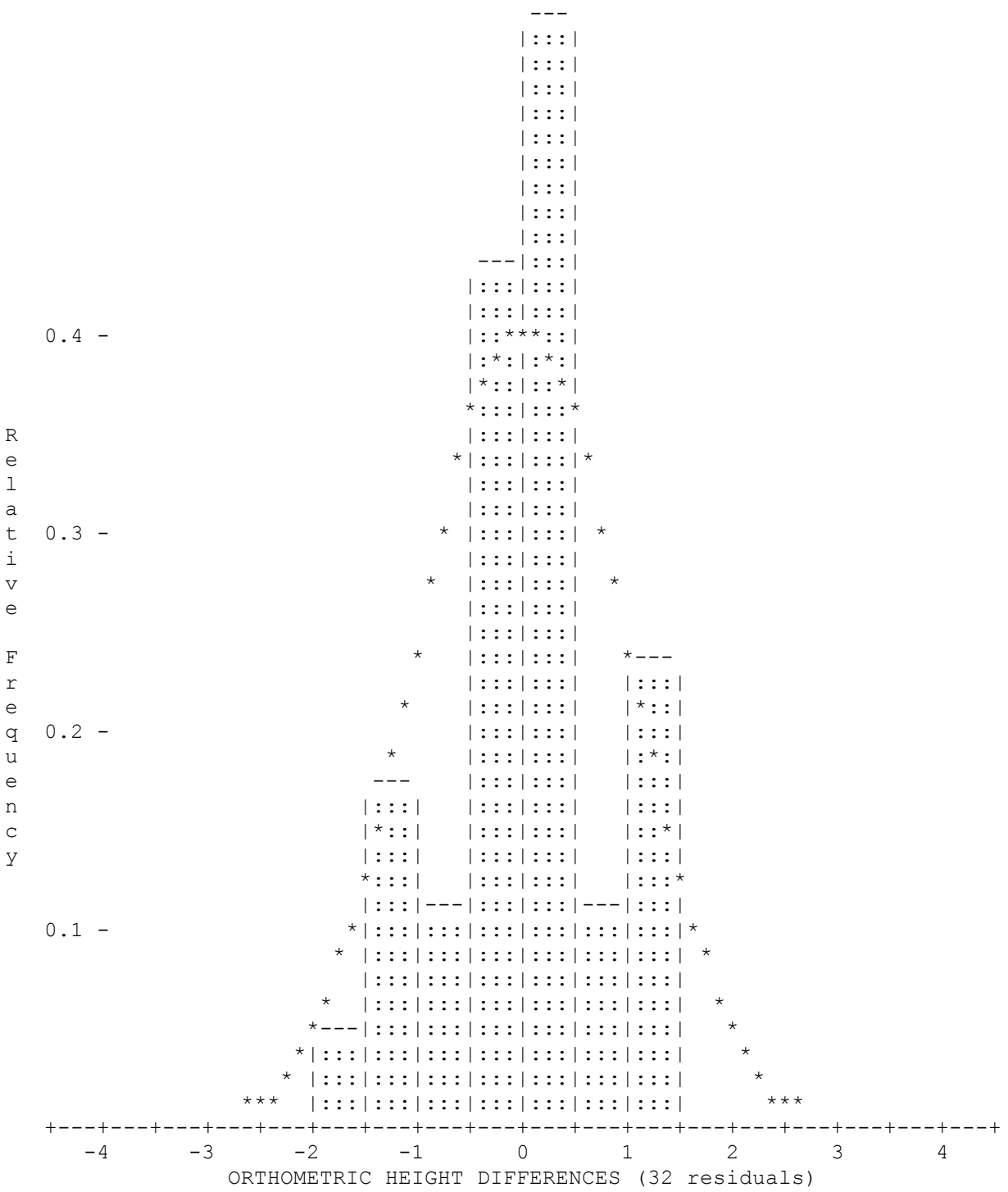
DIR	RM1	7220	0	0	0.00	3.28	0.51
					9.59	6.47	
DIR	RM1	PIN2	235	19	53.75	-1.79	-0.51
					7.09	3.54	
DIR	PIN1	LOOK	0	0	0.00	0.49	0.29
					3.31	1.69	
DIR	PIN1	PIN2	170	38	29.46	-1.19	-0.29
					5.18	4.15	
DIR	CALC	CALA	0	0	0.00	0.03	0.04
					1.34	0.75	
DIR	CALC	LOOK	261	30	38.48	4.06	0.58
					7.56	7.03	
DIR	CALC	MOB4	303	53	19.99	1.32	0.62
					2.49	2.14	
DIR	CALC	PIN1	306	38	6.25	-2.15	-0.91
					2.67	2.36	
DIR	CALA	CALC	0	0	0.00	1.20	1.04
					1.34	1.16	
DIR	CALA	LOOK	8	23	9.39	0.73	0.65
					1.31	1.12	
DIR	CALA	PIN1	25	58	40.61	-1.13	-0.80
						1.57	1.42
DIR	CALA	7220	27	19	51.14	0.05	0.04
					1.44	1.22	
DIR	CALA	MOB4	28	32	29.25	-1.54	-1.14
					1.54	1.35	
DIR	LOOK	CALA	0	0	0.00	0.03	0.05
					1.31	0.65	
DIR	LOOK	CALC	73	7	27.05	6.58	0.95
					7.56	6.92	
DIR	LOOK	PIN1	315	57	36.49	-3.08	-1.02
					3.31	3.01	
DIR	LOOK	MOB4	311	7	39.24	1.41	0.52
					3.10	2.72	
DIR	LOOK	PIN1	0	0	0.00	1.91	0.67
					3.31	2.86	
DIR	LOOK	MONP	1	7	37.73	-1.66	-1.08
					2.23	1.53	
DIR	LOOK	DORIS	3	32	16.78	0.89	0.58
					2.38	1.53	
DIR	PIN1	CALC	0	0	0.00	0.14	0.54
					2.67	0.25	
DIR	PIN1	MOB4	145	38	42.69	-12.79	-0.54
					25.64	23.50	
DIR	7220	PIN1	0	0	0.00	-10.59	-1.44
					12.39	7.34	
DIR	7220	MOB4	332	55	49.39	17.37	1.44
					15.86	12.03	
DIR	7274	CALC	0	0	0.00	0.29	0.66
					2.50	0.44	
DIR	7274	PIN1	296	15	47.78	-7.08	-0.66
					12.35	10.71	
DIR	7274	PIN1	0	0	0.00	0.87	0.39
					12.35	2.23	
DIR	7274	7220	82	25	39.52	-19.85	-0.39
					58.99	50.89	


Relative Frequency
0.4
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
DIRECTIONS (50 residuals)

Residuals (critical value = 3.813):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
GROUP: ORTHOMETRIC HEIGHT DIFFERENCES						
OHDF		7220	LOOK	1.56770	0.0004	0.4702
				0.0009	0.0008	4.69
OHDF		LOOK	7220	-1.56770	-0.0004	-0.4702
				0.0009	0.0008	4.69
OHDF		MOB4	PIN2	-1.96820	0.0004	0.4726
				0.0009	0.0008	8.47
OHDF		PIN2	MOB4	1.96760	0.0002	0.2916
				0.0009	0.0008	5.23
OHDF		7220	7110	0.15870	0.0000	0.0162
				0.0009	0.0007	0.73
OHDF		7110	7220	-0.15900	0.0003	0.4055
				0.0009	0.0007	18.19
OHDF		PIN2	MONP	2.30920	0.0009	1.2472
				0.0009	0.0008	73.18
OHDF		MONP	PIN2	-2.30940	-0.0007	-0.9843
				0.0009	0.0008	57.75
OHDF		PIN2	DORIS	3.10880	0.0010	1.3958
				0.0009	0.0007	46.57
OHDF		DORIS	PIN2	-3.10870	-0.0011	-1.5322
				0.0009	0.0007	51.12
OHDF		MOB4	PIN2	-1.96790	0.0001	0.0905
				0.0009	0.0008	1.62
OHDF		PIN2	MOB4	1.96760	0.0002	0.2916
				0.0009	0.0008	5.23
OHDF		PIN2	RM1	-1.96680	-0.0009	-1.1494
				0.0009	0.0008	25.62
OHDF		RM1	PIN2	1.96750	0.0002	0.2645
				0.0009	0.0008	5.90
OHDF		RM1	7274	0.50590	0.0000	-0.0234
				0.0009	0.0008	0.81
OHDF		7274	RM1	-0.50600	0.0001	0.1509
				0.0009	0.0008	5.24
OHDF		RM1	7220	0.58720	0.0000	0.0059
				0.0009	0.0008	0.18
OHDF		7220	RM1	-0.58700	-0.0002	-0.2527
				0.0009	0.0008	7.63
OHDF		7274	7220	0.08090	0.0004	0.5258
				0.0009	0.0008	97.28
OHDF		7220	7274	-0.08110	-0.0002	-0.2773
				0.0009	0.0008	51.30
OHDF		7274	PIN1	0.21310	0.0003	0.3321
				0.0009	0.0008	13.46
OHDF		PIN1	7274	-0.21320	-0.0002	-0.2073
				0.0009	0.0008	8.40
OHDF		7220	PIN1	0.13220	-0.0002	-0.1914
				0.0009	0.0008	7.98

OHDF	PIN1	7220	-0.13210	0.0001	0.0696
			0.0009	0.0008	2.90
OHDF	PIN1	PIN2	1.24740	0.0011	1.3020
			0.0009	0.0008	21.23
OHDF	PIN2	PIN1	-1.24740	-0.0011	-1.3020
			0.0009	0.0008	21.23
OHDF	7220	7274	-0.08300	0.0017	1.3194
			0.0013	0.0013	385.44
OHDF	7274	7220	0.08320	-0.0019	-1.4767
			0.0013	0.0013	431.42
OHDF	7220	PIN1	0.13300	-0.0010	-0.7470
			0.0013	0.0013	48.64
OHDF	PIN1	7220	-0.13280	0.0008	0.5909
			0.0013	0.0013	38.48
OHDF	7220	7110	0.15850	0.0002	0.1743
			0.0013	0.0012	13.34
OHDF	7110	7220	-0.15830	-0.0004	-0.3390
			0.0013	0.0012	25.95


Relative Frequency
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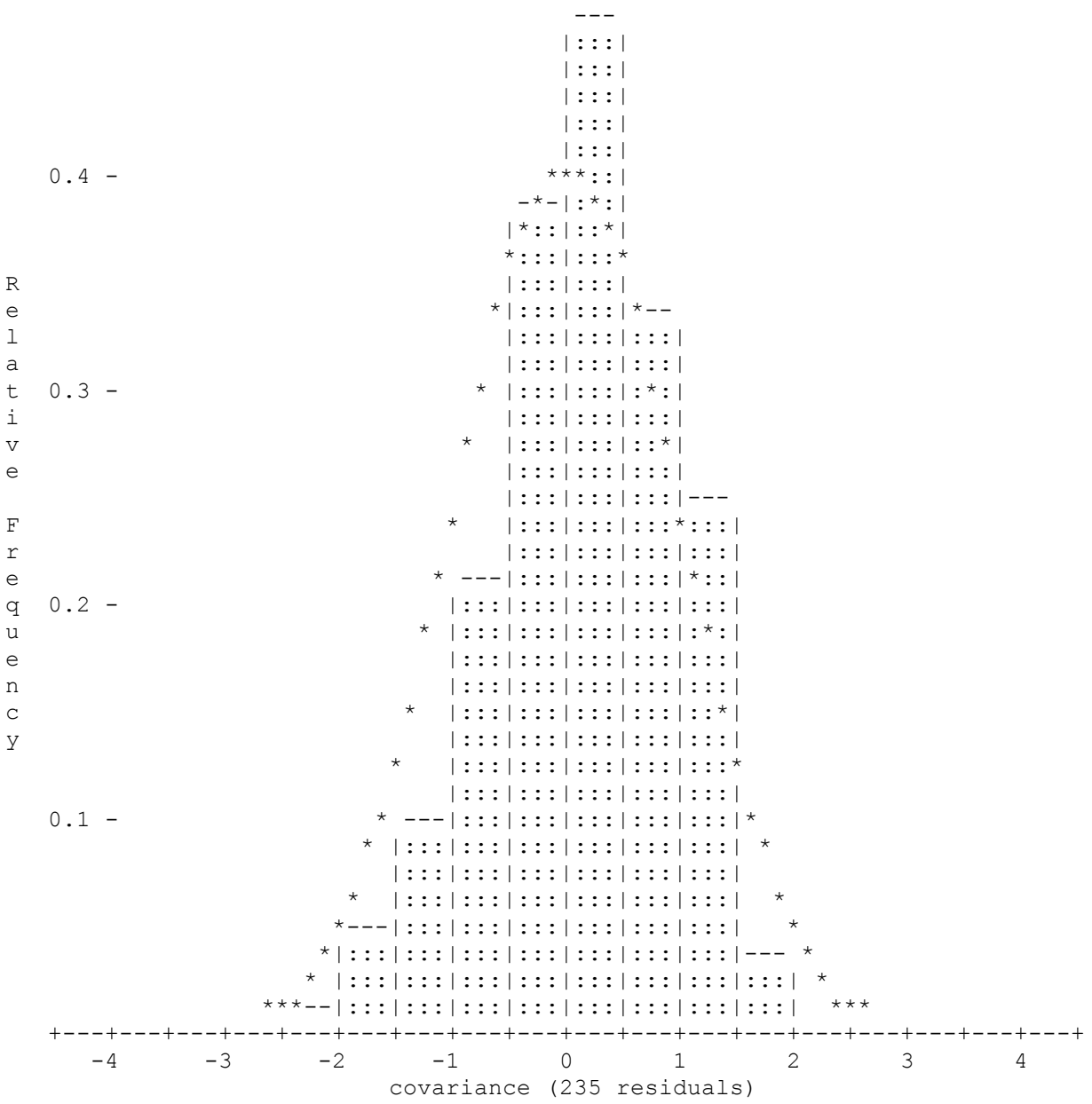
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
ORTHOMETRIC HEIGHT DIFFERENCES (32 residuals)


Relative Frequency
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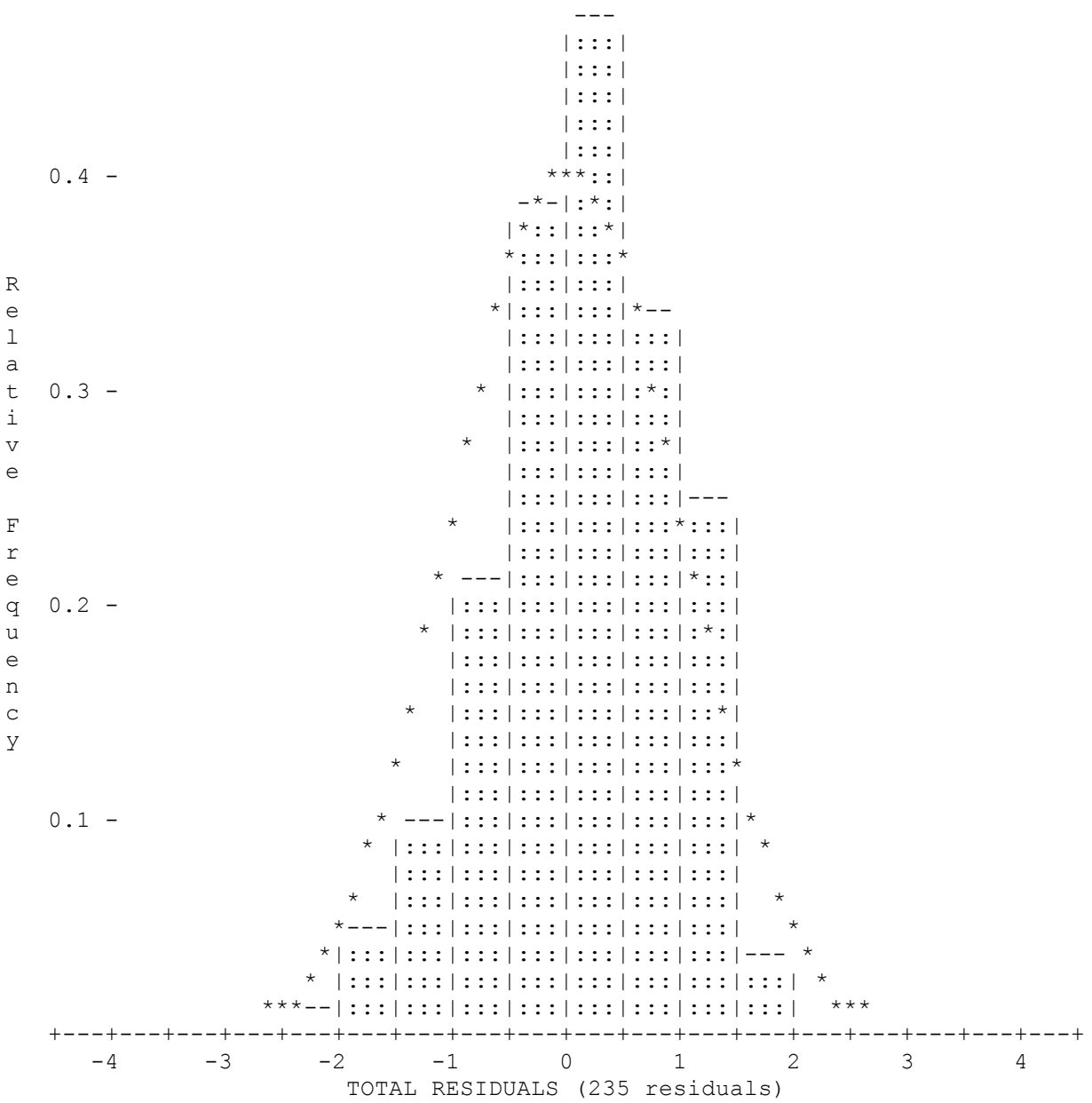
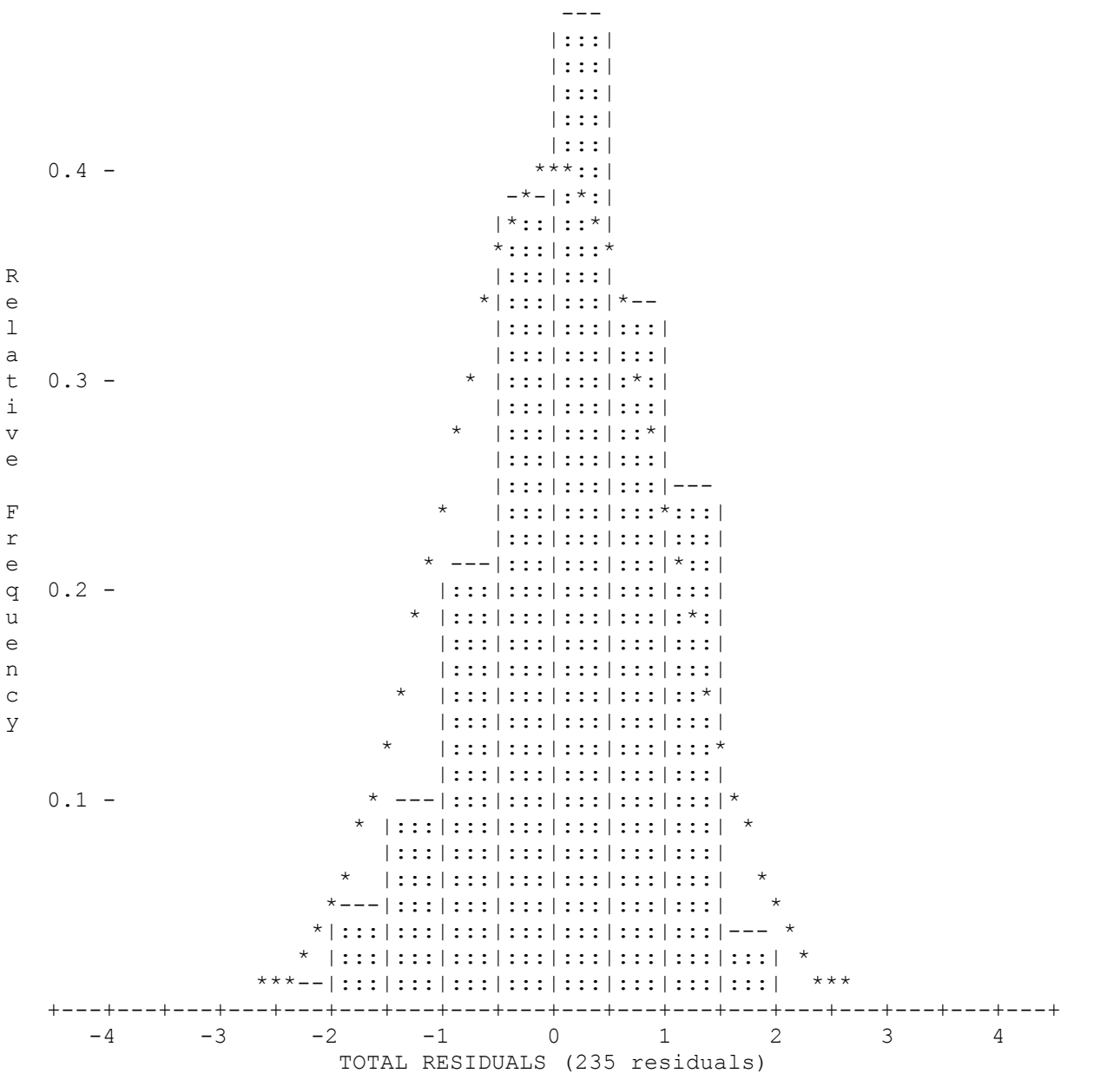
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
covariance (235 residuals)


Relative Frequency
0.4
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
TOTAL RESIDUALS (235 residuals)


Relative Frequency
0.4
0.3
0.2
0.1
-4
-3
-2
-1
0
1
2
3
4
TOTAL RESIDUALS (235 residuals)

S T A T I S T I C S S U M M A R Y

Residual Critical Value Type	Tau Max
Residual Critical Value	3.8134
Number of Flagged Residuals	0
Convergence Criterion	0.0010
Final Iteration Counter Value	4
Confidence Level Used	95.0000
Estimated Variance Factor	0.8996
Number of Degrees of Freedom	186

Chi-Square Test on the Variance Factor:

7.4149e-01 < 1.0000 < 1.1146e+00 ?

THE TEST PASSES

NOTE: All confidence regions were computed using the following factors:

Variance factor used	=	0.8996
1-D expansion factor	=	1.9600
2-D expansion factor	=	2.4477

Note that, for relative confidence regions, precisions are computed from the ratio of the major semi-axis and the spatial distance between the two stations.

GeoLab V%d%c%d%c %20s UNITS:%2s,%4s Page %04d

2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
7110	0.0023	85	0.0019	0.0014
7220	0.0012	142	0.0012	0.0010
7274	0.0017	83	0.0013	0.0010
CALA	0.0012	88	0.0006	0.0014
CALC	0.0014	92	0.0005	0.0012
DORIS	0.0045	32	0.0022	0.0012
LOOK	0.0013	93	0.0006	0.0010
MOB4	0.0013	93	0.0009	0.0011
PIN1	0.0009	90	0.0004	0.0009
PIN2	0.0010	92	0.0004	0.0008
RM1	0.0015	61	0.0014	0.0010

2-D and 1-D Relative Station Confidence Regions (95.000 and 95.000 percent):

FROM	TO	MAJ-SEMI	AZ	MIN-SEMI	VERTICAL	DISTANCE	PPM
7110	7220	0.0022	80	0.0020	0.0010	15.8582	138.88
7110	PIN1	0.0021	81	0.0019	0.0011	9.1303	235.08
7220	7274	0.0015	68	0.0014	0.0007	4.3504	344.98
7220	CALA	0.0013	8	0.0009	0.0013	202.4749	6.63
7220	LOOK	0.0013	179	0.0012	0.0008	76.9433	17.10
7220	MOB4	0.0014	1	0.0010	0.0010	16.1883	89.11
7220	PIN1	0.0012	2	0.0009	0.0006	19.6774	60.09
7220	RM1	0.0014	105	0.0012	0.0006	26.8440	52.67
7274	CALC	0.0018	85	0.0014	0.0011	106.8840	16.86
7274	PIN1	0.0015	70	0.0013	0.0007	19.7736	74.56
7274	RM1	0.0019	77	0.0017	0.0007	22.5911	85.44
CALA	CALC	0.0010	95	0.0006	0.0013	224.1274	4.53
CALA	LOOK	0.0010	101	0.0008	0.0013	231.6727	4.24
CALA	MOB4	0.0010	13	0.0009	0.0014	186.9641	5.26
CALA	MONP	0.0012	88	0.0006	0.0014	165.0101	7.17
CALA	PIN1	0.0009	82	0.0007	0.0013	183.3868	4.66
CALC	LOOK	0.0011	93	0.0007	0.0008	34.1005	33.60
CALC	MOB4	0.0012	104	0.0009	0.0011	107.3413	11.63
CALC	MONP	0.0014	92	0.0005	0.0012	139.9065	9.75
CALC	PIN1	0.0011	94	0.0006	0.0010	99.7219	11.22
DORIS	LOOK	0.0045	33	0.0023	0.0012	113.3507	40.13
DORIS	PIN1	0.0045	32	0.0021	0.0011	34.6844	129.91
DORIS	PIN2	0.0045	31	0.0022	0.0009	21.9759	202.95
LOOK	MOB4	0.0012	110	0.0010	0.0010	85.3266	13.94
LOOK	MONP	0.0013	93	0.0006	0.0010	121.5607	10.78
LOOK	PIN1	0.0010	96	0.0006	0.0008	79.4184	12.88
MOB4	PIN1	0.0010	96	0.0009	0.0009	9.6600	103.82
MOB4	PIN2	0.0013	96	0.0010	0.0007	43.7857	30.81
MONP	PIN1	0.0009	90	0.0004	0.0009	42.3308	21.89
MONP	PIN2	0.0010	92	0.0004	0.0008	12.9648	79.25
MONP	RM1	0.0015	61	0.0014	0.0010	38.0039	39.77
PIN1	PIN2	0.0010	94	0.0004	0.0006	50.0118	19.35
PIN2	RM1	0.0015	172	0.0012	0.0007	35.4918	41.09

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Appendix B. SLR MOBLAS 4 ILRS Site Log

ILRS Site and System Information Form
International Laser Ranging Service

0. Form

Prepared by (Full Name) : Nikki Desch
Preparer E-mail : Nikki.Desch@itt.com
Date Prepared : 2011-06-02
Report Type : UPDATE
Format Version : 1.0

1. Identification of the Ranging System Reference Point (SRP)

Site Name : Monument Peak
IERS DOMES Number : 40497M001
CDP Pad ID : 7110
Subnetwork : NASA
Description : MONUMENT
Monument Description : Standard NASA Disk
Monument Inscription : ORT STATION 7110 1981
Mark Description : Punch mark in center
Date Installed : 1983-08-15
Date Removed :
Geologic Characteristic : Granitic and Metamorphic rock
Additional Information : The marker has two punch marks. The center punch mark is the survey reference point.

2. Site Location Information

City or Town : Mount Laguna
State or Province : California
Country : United States
Tectonic Plate : Pacific
Approximate Position
X coordinate [m]: -2386278.2
Y coordinate [m]: -4802354.0
Z coordinate [m]: 3444881.6
Latitude [deg]: 32.8917 N
Longitude [deg]: 116.4227 W
Elevation [m]: 1837.564
Additional Information : (multiple lines)

3. General System Information

3.01 System Name : Moblas-4
4-Character Code : MONL
CDP System Number : 04
CDP Occupation Number : 11
Eccentricity to SRP (if Not Identical With SRP)
North [m]: -0.026 +- 0.001
East [m]: -0.019 +- 0.001
Up [m]: 3.189 +- 0.001
Date Measured : 1999-10-01
Date Installed : 1983-08-15
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

4. Telescope Information

4.01 Receiving Telescope Type : CASSEGRAIN
Aperture [m]: 0.762
Mount : AZ-EL
Xmitting Telescope Type : REFRACTOR
Aperture [m]: 0.163
Tracking Camera Type : CCD
Model : Gen 11 Intensifier
Manufacturer : Photon
Field of View [deg]:
Minimum Magnitude [mag]:
Transmit/Receive Path : SEPARATE
Transmit/Receive Switch : NONE
Max Slew Rate Az [deg/s]: 20
Max Slew Rate El [deg/s]: 5
Max Used Tracking Rate Az : 5
Max Used Tracking Rate El : 3
Telescope Shelter : ROLL-BACK ROOF
Daylight Filter Type : Omega Optical 532NBl 9114
Dayl. Filt. Bandwidth [nm]: <10
Adjustable Attenuation : RECEIVE
Transmit Efficiency : 0.94
Receive Efficiency : 0.76
Date Installed : 1983-08-15
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

5. Laser System Information

5.01 Laser Type : ND:YAG
Number of Amplifiers : 1
Primary Wavelength [nm]: 1064
Primary Maximum Energy [mJ]: 200
Secondary Wavelength [nm]: 532
Secondary Max. Energy [mJ]: 100
Xmit Energy Adjustable : YES
Pulse Width (FWHM) [ps]: 200
Max. Repetition Rate [Hz]: 10
Fullw. Beam Divergence ["]: 30
Final Beam Diameter [m]: 0.093
Eyesafe : NO
Eyesafe Standard : ANSI 136.1,ANSI 136.6
Date Installed : 1983-08-15
Date Removed : (yyyy-mm-dd)
Additional Information : 1)Laser repetition rate is capable of 10Hz.
Receive equipment upgraded to 10Hz for LRO support
2)Laser Cavity Upgrade 2001-01-23
3)Saturable absorber upgrade 2008-08-14

6. Receiver System

6.01.01 Primary Chain
Wavelength [nm]: 532
Detector Type : MCP
Manufacturer : ITT
Model : F4129F
Quantum Efficiency [%]: 17.7
Nominal Gain : 1E+06
Rise Time [ps]: 350
Jitter (Single PE)[ps]: 100
Field of View ["]: 360
Date Installed : 1986-03-31
Date Removed : (2001-08-19)
Signal Processing : CFD
Manufacturer : Tennelec
Model : TC454
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Amplitude Measurement : YES
Return-rate Controlled: YES
Mode of Operation : Few to Multi Photons
Time of Flight Observ. : INTERVAL
Manufacturer : Hewlett-Packard

Model : 5370B
Resolution [ps]: 20
Precision [ps]: 35
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

6.01.02 Primary Chain
Wavelength [nm]: 532
Detector Type : MCP
Manufacturer : Photek
Model : PMT318
Quantum Efficiency [%]: 13.12
Nominal Gain : 1E+07
Rise Time [ps]: 250
Jitter (Single PE)[ps]: 100
Field of View ["]: 360
Date Installed : 2001-08-19
Date Removed : (yyyy-mm-dd)
Signal Processing : CFD
Manufacturer : Tennelec
Model : TC454
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Amplitude Measurement : YES
Return-rate Controlled: YES
Mode of Operation : Few to Multi Photons
Time of Flight Observ. : INTERVAL
Manufacturer : Hewlett-Packard
Model : 5370B
Resolution [ps]: 20
Precision [ps]: 35
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

6.02.01 Secondary Chain
Wavelength [nm]: 532
Detector Type : MCP
Manufacturer : ITT
Model : F4129F
Quantum Efficiency [%]: 17.7
Nominal Gain : 1E6
Rise Time [ps]: 350
Jitter (Single PE)[ps]: 100
Field of View ["]: 360

Date Installed : 1986-03-31
Date Removed : 2001-08-19
Signal Processing : CFD
Manufacturer : Tennelec
Model : TC454
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Amplitude Measurement : YES
Return-rate Controlled: YES
Mode of Operation : Single to Multi Photons
Time of Flight Observ. : INTERVAL
Manufacturer : Hewlett-Packard
Model : 5370B
Resolution [ps]: 20
Precision [ps]: 35
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Additional Information : High sensivity laser receiver configuration installed 1997-04-01. Everything is the same as the primary chain except the discriminator threshold has been lowered to accept single photons and then amplified with 24db of gain.

6.02.02 Secondary Chain

Wavelength [nm]: 532
Detector Type : MCP
Manufacturer : Photek
Model : PMT318
Quantum Efficiency [%]: 13.12
Nominal Gain : 1E+07
Rise Time [ps]: 250
Jitter (Single PE)[ps]: 100
Field of View ["]: 360
Date Installed : 2001-08-19
Date Removed : (yyyy-mm-dd)
Signal Processing : CFD
Manufacturer : Tennelec
Model : TC454
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Amplitude Measurement : YES
Return-rate Controlled: YES
Mode of Operation : Single to Multi Photons
Time of Flight Observ. : INTERVAL
Manufacturer : Hewlett-Packard
Model : 5370B

Resolution [ps]: 20
Precision [ps]: 35
Date Installed : 1986-03-31
Date Removed : (yyyy-mm-dd)
Additional Information : High sensivity laser receiver configuration installed 1997-04-01. Everything is the same as the primary chain except the discriminator threshold has been lowered to accept single photons and then amplified with 24db of gain.

7. Tracking Capabilities

7.01.01 Satellites
Very Low Alt (<400 km) : YES
Low Altitude (400-2000) : YES
Lageos : YES
GLONASS : YES
Etalon : NIGHT
GPS : NIGHT
Moon : NO
Avge Pass Switch Time [s]: 60
Average values for Lageos
Single Shot RMS [mm]: 10
# of Obs per NP : 100
Use of Semi-trains : NO
# of Semi-train Tracks : N.A.
Range Gate Width [ns]: 600-10000
Beam Pointing Accuracy ["]: 0.6
Angle Encoder Resolution["]: 0.6
Min. Tracking Elev. [deg]: 20
Operation
Months per Year : 12
Days per Week : 7
Hours per Day : 24
Staff per Shift : 1
System Shared With : NOTHING
Time Allocated to SLR [%]: 100
Remotely Controllable : NO
Date First Applicable : 1983-08-15
Date Last Applicable : (2004-02-06 04:00 UT)
Additional Information : Station does not provide support : during U.S. holidays

7.01.02 Satellites
Very Low Alt (<400 km) : YES

Low Altitude (400-2000) : YES
Lageos : YES
GLONASS : YES
Etalon : NIGHT
GPS : NIGHT
Moon : NO
Avge Pass Switch Time [s]: 60
Average values for Lageos
Single Shot RMS [mm]: 10
# of Obs per NP : 100
Use of Semi-trains : NO
# of Semi-train Tracks : N.A.
Range Gate Width [ns]: 600-10000
Beam Pointing Accuracy ["]: 0.6
Angle Encoder Resolution["]: 0.6
Min. Tracking Elev. [deg]: 20
Operation
Months per Year : 12
Days per Week : 5
Hours per Day : 24
Staff per Shift : 1
System Shared With : NOTHING
Time Allocated to SLR [%]: 100
Remotely Controllable : NO
Date First Applicable : 2004-08-15
Date Last Applicable : (yyyy-02-06 04:00 UT)
Additional Information : Station does not provide support
: during U.S. holidays

8. Calibration

8.01 Calibration Type : PRE+POST
Target Location : EXTERNAL
Target Type : CORNER CUBE
Target Structure : CONCRETE PIER
Target Distance [m]: 187
Date Measured : 1999-10-01
Accuracy (mm) [mm]: 2
Verification : first order survey and ranging to multiple ground targets
Return-rate Controlled : YES
Mode of Operation : Few to Multi Photons
Average Cal Interval [min]: 3.5
Single Shot RMS [mm]: 5 +/- 1
Edit Criterion 1st Chain : ITERATIVE 3 SIGMA
Edit Criterion 2nd Chain : N.A.

Application of Cal Data : AVERAGE
Date Installed : 1990-12-01
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

9. Time and Frequency Standards

9.01.01 Frequency Standard Type : Rubidium disciplined by GPS
Model : XL-DC 151-358-108-2
Manufacturer : Symmetricom (TrueTime)
Short Term Stab. [e-12]: 10
Long Term Stab. [e-12]: 3
Time Reference : GPS
Synchronization : GPS
Epoch Accuracy [ns]: <100
Date Installed : 1999-06-30
Date Removed : (yyyy-mm-dd)
Additional Information : This Truetime model contains the Stanford PRS10 Rubidium Frequency Standard

9.02.01 GPS Timing Rcvr Model : XL-DC 151-358-108-2
Manufacturer : Symmetricom (TrueTime)
Date Installed : 1999-04-20
Date Removed : (yyyy-mm-dd)
Additional Information : CNS clock used for comparisons

10. Preprocessing Information

10.01 On-site NP Generation : YES
Data Screening : IRV+POLYNOMIAL
Edit Criterion 1st Chain : ITERATIVE 3.0 SIGMA
Edit Criterion 2nd Chain : N.A.
Upload interval : HOURLY
Date First Applicable : 1991-12-09
Date Last Applicable : 2001-12-19
Additional Information : (multiple lines)

10.02 On-site NP Generation : YES
Data Screening : IRV+POLYNOMIAL
Edit Criterion 1st Chain : ITERATIVE 3.0 SIGMA
Edit Criterion 2nd Chain : N.A.
Upload interval : HOURLY
Date First Applicable : 2001-12-19

Date Last Applicable : (yyyy-mm-dd)
Additional Information : Generic Normal Point Processing System 2.0 installed 2001-12-19

11. Aircraft Detection

11.01 Detection Type : RADAR
Date Installed : 1995-09-15
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

12. Meteorological Instrumentation

12.01.01 Pressure Sensor Model : MET3
Manufacturer : Paroscientific
Recording Interval : EVERY PULSE
Accuracy [mbar]: 0.1
Height Diff to SRP [m]: -0.15
Date Installed : 2000-04-16
Calibration Interval : YEARLY
Date Removed : 2011-03-29
Additional Information : (multiple lines)

12.01.02 Pressure Sensor Model : MET4
Manufacturer : Paroscientific
Recording Interval : EVERY PULSE
Accuracy [mbar]: 0.08
Height Diff to SRP [m]: -0.15
Date Installed : 2011-03-29
Calibration Interval : BIYEARLY
Date Removed : (yyyy-mm-dd hh:mm UT)
Additional Information : (multiple lines)

12.02.01 Temp Sensor Model : MET3
Manufacturer : Paroscientific
Recording Interval : EVERY PULSE
Accuracy [deg C]: 0.5
Date Installed : 2000-04-16
Calibration Interval : YEARLY
Date Removed : 2011-03-29
Additional Information : (multiple lines)

12.02.02 Temp Sensor Model : MET4
Manufacturer : Paroscientific

Recording Interval : EVERY PULSE
Accuracy [deg C]: 0.2
Date Installed : 2011-03-29
Calibration Interval : BIYEARLY
Date Removed : (yyyy-mm-dd hh:mm UT)
Additional Information : (multiple lines)

12.03.01 Humidity Sensor Model : MET3
Manufacturer : Paroscientific
Recording Interval : PER PASS
Accuracy [% rel h]: 2
Date Installed : 2000-04-16
Calibration Interval : YEARLY
Date Removed : 2011-03-29
Additional Information : (multiple lines)

12.03.02 Humidity Sensor Model : MET4
Manufacturer : Paroscientific
Recording Interval : PER PASS
Accuracy [% rel h]: 2
Date Installed : 2011-03-29
Calibration Interval : BIYEARLY
Date Removed : (yyyy-mm-dd hh:mm UT)
Additional Information : (multiple lines)

13. Local Ties, Eccentricities, and Collocation Information

13.01 Collocated Permanent Geodetic Systems

GPS : IGS
Date Installed : 1993-09-16
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
GLONASS : NO
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
DORIS : NO
Date Installed : (2005-11-30)
Date Removed : (2010-02-04)
Additional Information : (multiple lines)
PRARE : NO
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
VLBI : NO

Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
Gravimeter : NO
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

13.02.xx Local Ties from the SRP to Other Monuments or Systems on Site

Monument Name :
Instrumentation Type : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/NONE)
Instrumentation Status : (PERMANENT/MOBILE)
DOMES Number : (XXXXXXXXX)
CDP Number : (XXXX)
Differential Components (ITRS)
dx [m]: (m +- m)
dy [m]: (m +- m)
dz [m]: (m +- m)
Date Measured : (yyyy-mm-dd)
Determined by :
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

13.03.01 Eccentricities Between Other Monuments on Site

From: Monument Name : 7110
DOMES Number : 40497M001
CDP Number : 7110
To: Monument Name : NCMN 1983 mobile VLBI NGS disk
DOMES Number : 40497M003
CDP Number : 7274
Differential Components (ITRS)
dx [m]: -11.393 +- 0.002
dy [m]: 7.802 +- 0.002
dz [m]: 2.523 +- 0.002
Date Measured : 1999-10-30
Determined by : HTSI
Additional Information : (multiple lines)

13.03.02 Eccentricities Between Other Monuments on Site

From: Monument Name : 7110
DOMES Number : 40497M001

CDP Number : 7110
To: Monument Name : PGGA MARK
DOMES Number : 40497M004
CDP Number : N.A.
Differential Components (ITRS)
dx [m]: 31.365 +- 0.002
dy [m]: -5.456 +- 0.002
dz [m]: 20.526 +- 0.002
Date Measured : 1999-10-30
Determined by : HTSI
Additional Information : original site log had a typo for the Dz component 20.256

14. Local Events Possibly Affecting Computed Position

14.01 Date : (yyyy-mm-dd hh:mm UT)
Event : (EARTHQUAKE/CONSTRUCTION/etc)
Additional Information : (multiple lines)

15. On-Site, Point of Contact Agency Information

Agency : ITT
Mailing Address : NASA SLR Tracking Station
P.O. Box 130
Mt. Laguna, CA 91948
Primary Contact
Contact Name : Ronald Sebeny
Telephone (primary) : 619-473-9754
Telephone (secondary) : 619-840-9754
Fax : 619-473-8387
E-mail : Ronald.Sebeny@itt.com
Secondary Contact
Contact Name : Dr. Thomas Varghese
Telephone (primary) : 301-823-2607
Telephone (secondary) :
Fax : 301-823-2501
E-mail : Tom.Varghese.Contractor@itt.com
Additional Information : (multiple lines)

16. Responsible Agency (if different from 15.)

Agency : NASA, Code 453
Mailing Address : Code 453

NASA/GSFC
Greenbelt, MD 20771 USA

Primary Contact
Contact Name : Dave McCormick
Telephone (primary) : 301-286-2354
Telephone (secondary) : 301-377-2711
Fax : 301-286-0328
E-mail : David.R.McCormick@nasa.gov

Secondary Contact
Contact Name : Curtis Emerson
Telephone (primary) : 301-286-7670
Telephone (secondary) : 301-286-3065
Fax : 301-286-0328
E-mail : Curtis.M.Emerson@nasa.gov

Additional Information : (multiple lines)

17. More Information

URL for More Information : http://stat.hpwren.ucsd.edu/cameras/hpwren-iqeye3.JPG

Hardcopy on File
Site Map : YES
Site Diagram : YES
Horizon Mask : YES
Monument Description : YES
Site Pictures : YES

Additional Information : (multiple lines)

Appendix C: GPS MONP IGS Site Log

MONP Site Information Form
SOPAC-SIO Continuously Operating Reference Station
See Instructions at:
ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0. Form

Prepared by (full name) : Toni Hollingsworth
Date Prepared : 2008-04-24
Report Type : UPDATE

If Update:
Previous Site Log : monp_20080410.log
Modified/Added Sections : 3.16, 3.17, 11

1. Site Identification of the GNSS Monument

Site Name : Monument Peak
Four Character ID : MONP
Monument Inscription :
IERS DOMES Number : 40497M004
CDP Number : (A4)
Monument Description : Wyatt/Agnew drilled-braced
Height of the Monument: (m)
Monument Foundation : (STEEL RODS/CONCRETE BLOCK/ROOF/etc)
Foundation Depth : (m)
Marker Description : (CHISELLED CROSS/DIVOT/BRASS NAIL/etc)
Date Installed : 1994-04-01T00:00Z
Geologic Characteristic : (BEDROCK/CLAY/CONGLOMERATE/GRAVEL/SAND/etc)
Bedrock Type : (IGNEOUS/METAMORPHIC/SEDIMENTARY)
Bedrock Condition : (FRESH/JOINTED/WEATHERED)
Fracture Spacing : (1-10 cm/10-50 cm/50-200 cm/over 200 cm)
Fault Zones Nearby : (YES/NO/Name of the zone)
Distance/activity : (multiple lines)
Additional Information : SCIGN - Southern California Integrated GPS
: Network. Fixed cylinder attached to rod, nut,
: base plate... cylinder ht. is .063m, ht. from
: top of cylinder is .04m to bottom of antenna
: pre-amplifier.

2. Site Location Information

City or Town : Laguna Mountains
State or Province : California
Country : USA
Tectonic Plate : North America Pacific
Approximate Position (ITRF)
X coordinate (m) : -2386246.889
Y coordinate (m) : -4802359.686
Z coordinate (m) : 3444902.184
Latitude (N is +) : 325330.97791
Longitude (E is +) : -1162520.44140
Elevation (m,ellips.) : 1842.668
Additional Information : ARP ITRF00 POSITION (EPOCH 1997.0)
:

:

3. GNSS Receiver Information

3.1 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 01426
Firmware Version : 1C01-1C00
Elevation Cutoff Setting: (deg)
Date Installed : 1994-03-31T00:00Z
Date Removed : 1994-04-15T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : P/N 700724-6(B)

3.2 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 02085
Firmware Version : 1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-04-15T00:00Z
Date Removed : 1994-05-26T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : P/N 700724-6(B)

3.3 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 01894
Firmware Version : 1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-05-26T00:00Z
Date Removed : 1994-07-01T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information :

3.4 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 01894
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-07-01T00:00Z
Date Removed : 1994-07-20T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information :

3.5 Receiver Type : ASHTECH Z-XII3

Satellite System : GPS
Serial Number : 03862
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-07-20T00:00Z
Date Removed : 1994-10-06T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : P/N 700570C

3.6 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03233
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-10-06T00:00Z
Date Removed : 1994-10-12T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : MIT 6

3.7 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03373
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-10-12T00:00Z
Date Removed : 1994-10-19T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : LNR-3

3.8 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03233
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1994-10-19T00:00Z
Date Removed : 1995-03-03T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : MIT-6

3.9 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03866
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1995-03-03T00:00Z
Date Removed : 1995-05-16T00:00Z

Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : PW Lnr-2

3.10 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03233
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1995-05-16T00:00Z
Date Removed : 1995-06-18T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : MIT-6

3.11 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03862
Firmware Version : 1D00-1C01
Elevation Cutoff Setting: (deg)
Date Installed : 1995-06-18T00:00Z
Date Removed : 1995-08-01T19:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : PW Lnr-1

3.12 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 00242
Firmware Version : 1J00-1C63
Elevation Cutoff Setting: (deg)
Date Installed : 1995-08-01T19:00Z
Date Removed : 1995-11-29T19:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : Lnr LP-II

3.13 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 00242
Firmware Version : 1E76-1D01
Elevation Cutoff Setting: (deg)
Date Installed : 1995-11-29T19:00Z
Date Removed : 1997-12-17T23:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : Firmware upgrade.

3.14 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : 03007

Firmware Version : 1F50
Elevation Cutoff Setting: (deg)
Date Installed : 1997-12-17T23:00Z
Date Removed : 1999-07-20T19:19Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : Receiver swap

3.15 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : LP03085
Firmware Version : CC00
Elevation Cutoff Setting: 10
Date Installed : 1999-07-20T19:19Z
Date Removed : 2002-02-13T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : Receiver swap for GPS week rollover-compliance.

3.16 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : LP03085
Firmware Version : CC00
Elevation Cutoff Setting: 10
Date Installed : 2002-02-13T00:00Z
Date Removed : 2006-04-03T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : Sampling interval increased to 5 seconds. Raw
: files are decimated to 30 seconds upon rinex
: translation. Receiver upgrade.

3.17 Receiver Type : ASHTECH Z-XII3
Satellite System : GPS
Serial Number : LP02912
Firmware Version : CC00
Elevation Cutoff Setting: 10
Date Installed : 2006-04-03T00:00Z
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : Died @ PIN2 (wouldn't boot). Returned from
: Thales 1-7-05, tested in Telemetry Lab: fine.

3.x Receiver Type : (A20, from rcvr_ant.tab; see instructions)
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : (A5)
Firmware Version : (A11)

Elevation Cutoff Setting: (deg)
Date Installed : (CCYY-MM-DDThh:mmZ)
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (multiple lines)

4. GPS Antenna Information

4.1 Antenna Type : ASH700228A
Serial Number : 700228 A1723
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.1190
Marker->ARP North Ecc(m): 0.0000
Marker->ARP East Ecc(m) : 0.0000
Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : SNOW
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1994-03-31T00:00Z
Date Removed : 1994-07-20T00:00Z
Additional Information : ASHTECH GEODETIC L1/L2 P rev B

4.2 Antenna Type : ASH700718A
Serial Number : 700718A 10018
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.1190
Marker->ARP North Ecc(m): 0.0000
Marker->ARP East Ecc(m) : 0.0000
Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : SNOW
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1994-07-20T00:00Z
Date Removed : 1994-10-06T00:00Z
Additional Information : ASHTECH GEODETIC L1/L2 P rev D (Large Ground
: Plane).

4.3 Antenna Type : ASH700228A
Serial Number : 700228 A1723
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.1207
Marker->ARP North Ecc(m): 0.0000
Marker->ARP East Ecc(m) : 0.0000

Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : SNOW
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1994-10-06T00:00Z
Date Removed : 1995-06-18T00:00Z
Additional Information : ASHTECH GEODETIC L1/L2 P rev D. PFJ,
: 23-APR-1999: is this rev D or B (see 4.1)

4.4 Antenna Type : ASH700228B
Serial Number : B1163 (SIOA)
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.1196
Marker->ARP North Ecc(m): 0.0000
Marker->ARP East Ecc(m) : 0.0000
Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : SNOW
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1995-06-18T00:00Z
Date Removed : 1995-08-01T19:00Z
Additional Information : ASHTECH GEODETIC L1/L2 P rev D 700228B (SIOA).

4.5 Antenna Type : ASH700936B_M
Serial Number : CR11489
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.1186
Marker->ARP North Ecc(m): 0.0000
Marker->ARP East Ecc(m) : 0.0000
Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : SNOW
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1995-08-01T19:00Z
Date Removed : 2000-03-22T22:16Z
Additional Information : ASHTECH 700936-B (Ashtech w/ Choke Ring);
: 10/10/1999 (14:45 - 19:45 Z):
: antenna removed + replaced

4.6 Antenna Type : ASH701945B_M
Serial Number : CR519991751
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.1176

Marker->ARP North Ecc(m): 0.0000
Marker->ARP East Ecc(m) : 0.0000
Alignment from True N : 0
Antenna Radome Type : SCIS
Radome Serial Number : 098
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 2000-03-22T22:16Z
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : Antenna, dome type changed. Note
: antenna height change.

4.x Antenna Type : (A20, from rcvr_ant.tab; see instructions)
Serial Number : (A*, but note the first A5 is used in SINEX)
Antenna Reference Point : (BPA/BCR/XXX from "antenna.gra"; see instr.)
Marker->ARP Up Ecc. (m) : (F8.4)
Marker->ARP North Ecc(m): (F8.4)
Marker->ARP East Ecc(m) : (F8.4)
Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : (A4 from rcvr_ant.tab; see instructions)
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : (CCYY-MM-DDThh:mmZ)
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : (multiple lines)

5. Surveyed Local Ties

5.1 Tied Marker Name :
Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
Tied Marker CDP Number : (A4)
Tied Marker DOMES Number: (A9)
Differential Components from GNSS Marker to the tied monument (ITRS)
dx (m) : (m)
dy (m) : (m)
dz (m) : (m)
Accuracy (mm) : (mm)
Survey method : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
Date Measured : (CCYY-MM-DDThh:mmZ)
Additional Information : (multiple lines)

5.x Tied Marker Name :
Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
Tied Marker CDP Number : (A4)

Tied Marker DOMES Number: (A9)
Differential Components from GNSS Marker to the tied monument (ITRS)
dx (m) : (m)
dy (m) : (m)
dz (m) : (m)
Accuracy (mm) : (mm)
Survey method : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
Date Measured : (CCYY-MM-DDThh:mmZ)
Additional Information : (multiple lines)

6. Frequency Standard

6.1 Standard Type : INTERNAL
Input Frequency : (if external)
Effective Dates : 1994-03-31/CCYY-MM-DD
Notes : (multiple lines)

6.x Standard Type : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
Input Frequency : (if external)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

7. Collocation Information

7.1 Instrumentation Type : SLR
Status : (PERMANENT/MOBILE)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : NASA SLR facility

7.x Instrumentation Type : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
Status : (PERMANENT/MOBILE)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8. Meteorological Instrumentation

8.1.1 Humidity Sensor Model : MET3
Manufacturer : Paroscientific
Serial Number : 67631
Data Sampling Interval : 600 sec.
Accuracy (% rel h) : 2.
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)

Calibration Date : (CCYY-MM-DD)
Effective Dates : 1997-12-17/1999-04-21
Notes : (multiple lines)

8.1.2 Humidity Sensor Model : MET3
Manufacturer : Paroscientific
Serial Number : 69824
Data Sampling Interval : 600 sec.
Accuracy (% rel h) : 2.
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : 1999-04-21/CCYY-MM-DD
Notes : Previous unit ceased operating on
: 24-AUG-1998 due to lightning
: strike

8.1.x Humidity Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval : (sec)
Accuracy (% rel h) : (% rel h)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.2.1 Pressure Sensor Model : MET3
Manufacturer : Paroscientific
Serial Number : 67631
Data Sampling Interval : 600 sec.
Accuracy : .5
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : 1997-12-17/1999-04-21
Notes : (multiple lines)

8.2.2 Pressure Sensor Model : MET3
Manufacturer : Paroscientific
Serial Number : 69824
Data Sampling Interval : 600 sec.
Accuracy : .5
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)

Effective Dates : 1999-04-21/CCYY-MM-DD
Notes : See humidity sensor addl. info.

8.2.x Pressure Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval : (sec)
Accuracy : (hPa)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.3.1 Temp. Sensor Model : MET3
Manufacturer : Paroscientific
Serial Number : 67631
Data Sampling Interval : 600 sec.
Accuracy : .5
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : 1997-12-17/1999-04-21
Notes : (multiple lines)

8.3.2 Temp. Sensor Model : MET3
Manufacturer : Paroscientific
Serial Number : 69824
Data Sampling Interval : 600 sec.
Accuracy : .5
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : 1999-04-21/CCYY-MM-DD
Notes : See humidity sensor addl. info.

8.3.x Temp. Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval : (sec)
Accuracy : (deg C)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.4.1 Water Vapor Radiometer :
Manufacturer :
Serial Number :
Distance to Antenna : (m)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.4.x Water Vapor Radiometer :
Manufacturer :
Serial Number :
Distance to Antenna : (m)
Height Diff to Ant : (m)
Calibration Date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.5.1 Other Instrumentation : (multiple lines)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)

8.5.x Other Instrumentation : (multiple lines)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)

9. Local Ongoing Conditions Possibly Affecting Computed Position

9.1.1 Radio Interferences : (TV/CELL PHONE ANTENNA/RADAR/etc)
Observed Degradations : (SN RATIO/DATA GAPS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.1.x Radio Interferences : (TV/CELL PHONE ANTENNA/RADAR/etc)
Observed Degradations : (SN RATIO/DATA GAPS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.2.1 Multipath Sources : (METAL ROOF/DOME/VLBI ANTENNA/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.2.x Multipath Sources : (METAL ROOF/DOME/VLBI ANTENNA/etc)

Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.3.1 Signal Obstructions : (TREES/BUILDINGS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.3.x Signal Obstructions : (TREES/BUILDINGS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

10. Local Episodic Effects Possibly Affecting Data Quality

10.1 Date : (CCYY-MM-DD/CCYY-MM-DD)
Event : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date : (CCYY-MM-DD/CCYY-MM-DD)
Event : (TREE CLEARING/CONSTRUCTION/etc)

11. On-Site, Point of Contact Agency Information

Agency : Scripps Orbit and Permanent Array Center
Preferred Abbreviation : SOPAC / SIO
Mailing Address : Institute of Geophysics and Planetary Physics,
: Scripps Institution of Oceanography, MC 0225,
: University of California San Diego, 9500
: Gilman Dr., La Jolla CA 92093-0225
Primary Contact
Contact Name : Paul Jamason
Telephone (primary) : 858-822-4472
Telephone (secondary) : 858-663-3508
Fax : 858-534-9873
E-mail : devel@gpsmail.ucsd.edu
Secondary Contact
Contact Name : Glen Offield
Telephone (primary) : 858-534-7274
Telephone (secondary) : 858-663-3508
Fax : 858-534-9873
E-mail : goffield@ucsd.edu
Additional Information : P-O-C updated 04-24-2008.

12. Responsible Agency (if different from 11.)

Agency : SOPAC
Preferred Abbreviation : (A10)
Mailing Address : 9500 Gilman Drive / Dept. 0225
: La Jolla, CA 92093-0225
Primary Contact
Contact Name : Keith Stark, Stark Consulting, LLC
Telephone (primary) : 800-957-8275
Telephone (secondary) : 818-789-8275
Fax : 626-583-7827
E-mail : stark@dukester.com
Secondary Contact
Contact Name :
Telephone (primary) :
Telephone (secondary) :
Fax :
E-mail :
Additional Information : Secondary SCIGN Network Coordinator

13. More Information

Primary Data Center : Scripps Orbit and Permanent Array Center
Secondary Data Center : Crustal Dynamics Data Information System
URL For More Information: http://www.scign.org
Hardcopy on File
Site Map : (Y or URL)
Site Diagram : (Y or URL)
Horizon Mask : (Y or URL)
Monument Description : (Y or URL)
Site Pictures : (Y or URL)
Additional Information : (multiple lines)
Antenna Graphics with Dimensions

Appendix D. DORIS MOOB IDS Site Log

MONUMENT PEAK DORIS site description form

0. Form

Prepared by : SIMB (DORIS installation and maintenance department)
Date prepared : 04/02/2011
Report type : UPDATE

1. Site location information

Site name : MONUMENT PEAK
Site DOMES number : 40497
Host agency : NASA
City : Mount Laguna
State or province : California
Country : USA
Tectonic plate : NOAM
Geological information :

Geographical coordinates (ITRF) :
North Latitude : 32 deg 53' 31"
East Longitude : -116 deg 25' 21"
Ellipsoid height : 1843 m
Approximate altitude : 1875 m

2. DORIS antenna and reference point information

2.1
Four character ID : MONB
Antenna model : Starec 52291 type
Antenna serial number : 102
IERS DOMES number : 40497S008
CNES/IGN number : 404971
DORIS SSALTO number : 249
Date installed (dd/mm/yy): 30/11/2005
Date removed (dd/mm/yy) : 12/12/2007
Antenna support type : 1.5 m high, 0.46 m diameter concrete pillar
Installed on : ground (the pillar foundations are 3 m deep)
Height above ground mark : 0.490 m
Ground mark type : Domed brass screw
Ground mark DOMES number : 40497M005
Notes :

2.2
Four character ID : MOOB
Antenna model : Starec 52291 type
Antenna serial number : 102
IERS DOMES number : 40497S009
CNES/IGN number : 404972
DORIS SSALTO number : 281
Date installed (dd/mm/yy): 14/12/2007
Date removed (dd/mm/yy) : 06/02/2010
Antenna support type : 1.5 m high, 0.46 m diameter concrete pillar
Installed on : ground (the pillar foundations are 3 m deep)
Height above ground mark : 0.893 m
Ground mark type : Domed brass screw
Ground mark DOMES number : 40497M005
Notes :

3. DORIS beacons information

3.1
Beacon serial number : 2819060
Beacon model : 3.0

USO serial number : 3.374
4 Char. ID of the REF point : MONB
Date installed (dd/mm/yy) : 30/11/2005
Date removed (dd/mm/yy) : 12/12/2007

3.2
Beacon serial number : 2819060
Beacon model : 3.0
USO serial number : 3.374
4 Char. ID of the REF point : MOOB
Date installed (dd/mm/yy) : 14/12/2007
Date removed (dd/mm/yy) : 07/04/2010

4. ITRF coordinates and velocities of the current DORIS ref. point (MOOB)

Solution : ITRF2005 (tie to GPS "MONP")
Epoch : 2000.0

X = -2386251.098 m Y = -4802363.919 m Z = 3444894.690 m
Sig X = 0.002 m Sig Y = 0.002 m Sig Z = 0.002 m

VX = -0.0307 m/y VY = 0.0249 m/y VZ = 0.0152 m/y
Sig VX = 0.0001 m/y Sig VY = 0.0001 m/y Sig VZ = 0.0001 m/y

5. IERS colocation information

5.1
Instrument type : GPS
Status : Permanent
DOMES number of the
instrument ref. point : 40497M004
Notes : IGS station MONP

5.2
Instrument type : SLR
Status : Permanent
DOMES number of the
instrument ref. point : 40497M001
Notes : CDP station 7110

6. Tide Gauge colocation information

7. Local site ties

7.1
Point description : SLR mark CDP 7110
DOMES number : 40497M001
Differential components from the current DORIS ref. point (MOOB)
to the above point (in the ITRS) :
dX (m) : -27.200
dY (m) : 9.854
dZ (m) : -13.042

Accuracy (m) : 0.002
Date measured : 01/10/1999
Additional information : SLR-IGS survey by Honeywell

7.2
Point description : IGS station "MONP"
DOMES number : 40497M004
Differential components from the current DORIS ref. point (MOOB)
to the above point (in the ITRS) :
dX (m) : 4.165
dY (m) : 4.398
dZ (m) : 7.484
Accuracy (m) : 0.001
Date measured : 01/12/2005
Additional information : Survey by IGN-F

7.3
Point description : Domed mark on the DORIS concrete pillar
DOMES number : 40497M005
Differential components from the current DORIS ref. point (MOOB)
to the above point (in the ITRS) :
dX (m) : 0.337
dY (m) : 0.668
dZ (m) : -0.487
Accuracy (m) : 0.001
Date measured : 01/12/2007
Additional information : Survey by IGN-F

7.4
Point description : DORIS starec antenna reference point (MONB)
DOMES number : 40497S008
Differential components from the current DORIS ref. point (MOOB)
to the above point (in the ITRS) :
dX (m) : 0.154
dY (m) : 0.299
dZ (m) : -0.221
Accuracy (m) : 0.001
Date measured : 01/12/2007
Additional information : Survey by IGN-F

8. Meteorological Instrumentation

8.1 Humidity sensor
Model : HMP45D
Manufacturer : VAISALA
Accuracy : +/- 3 percents
Notes :

8.2 Pressure sensor
Model : PTU200 class B
Manufacturer : VAISALA
Accuracy : +/- 0.25 hPa
Height : 0.9 m below the current DORIS ref. point (MOOB)
Notes : long term stability = +/- 0.1 hPa/year

8.3 Temperature sensor
Model : HMP45D
Manufacturer : VAISALA
Accuracy : +/- 0.5 deg C
Notes :

9. DORIS network contacts

Primary contact:

Name : Jerome SAUNIER
Agency : Institut Geographique National
Mailing address : Service de Geodesie et de Nivellement
: 73 avenue de PARIS
: 94165 SAINT-MANDE CEDEX FRANCE
Telephone : + 33 1 43 98 83 63
Fax : + 33 1 43 98 84 50
E-mail : jerome (.) saunier (@) ign.fr

Secondary contact:

Name : Francois BOLDO
Agency : Institut Geographique National
Mailing address : CNES (DCT/ME/OT)
: 18 Avenue Edouard BELIN
: 31401 TOULOUSE Cedex FRANCE
Telephone : + 33 5 61 27 40 72
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