



รายการอ้างอิง

ภาษาไทย

ชูเกียรติ วิเชียรเจริญ. ยี่ห้อเดซีเบื้องต้น. หนังสือประกอบการสอน หมายเลข ส.31-01.

จุฬาลงกรณ์มหาวิทยาลัย :

..... เอกสารประกอบการอบรม การสำรวจด้วยเทคโนโลยีใหม่ กองสำรวจ
การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย. กทม : 2535 (อัดสำเนา)

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ทวีเดช สีสะวัตน์วัฒนา. หลักเบื้องต้นของ ดาราศาสตร์ปฏิบัติ สำหรับนักจีโอเดซี วิศวกร และ
ช่างสำรวจ. กทม : โรงพิมพ์จุฬาลงกรณ์มหาวิทยาลัย, 2525

วิชา จิวาลย์. การคำนวณปรับแก้. เอกสารประกอบการสอน หมายเลข ส24-03. จุฬาลงกรณ์
มหาวิทยาลัย :

สวัสดีชัย เกரியงไกรเพชร. การใช้ระบบพิกัด UTM ในงานรังวัด. กทม : 2524 (อัดสำเนา)

..... เส้นโครงแผนที่. กทม : สำนักพิมพ์จุฬาลงกรณ์มหาวิทยาลัย, 2533

สัญญา เสาวภาพ และ ชูเกียรติ วิเชียรเจริญ. งานรังวัดบนพื้นระนาบ : งานระดับ. หนังสือประกอบ
การสอน หมายเลข ส.22-01. จุฬาลงกรณ์มหาวิทยาลัย : 2522

ภาษาอังกฤษ

Chrzanowski, A. , Chen yong-qi , Leeman, R.W. and Leal, J. Integration of the global positioning system with geodetic leveling surveys in ground subsidence studies. CISM Journal ACSCG. Vol.43 No 4. Winter 1989 : pp. 377-386

Dodson, A.H. and Gerrard, S.M.E. Leveling with GPS. FIG XIX Congress. Commission 5. Finland :1990 pp. 608-613

Hurn, J. GPS A guide to the next utility. USA : Trimble Navigation Ltd, 1989

Kearsley, A.H.W. Geodetic sueveying. Australia : The school of surveying. The university of new south wales, 1988

- King, R.W. , Master, E.G. , Rizos, C. , Stolz, A. and Collins, J. **Surveying with GPS**. Australia :
The school of surveying. The university of new south wales, 1985
- Leick, A. **GPS satellite surveying**. USA : John Wiley & Sons, 1990
- Mainville, A. and Ve'ronneau, M. Orthometric heights using GPS. **FIG XIX Congress**.
Commission 5 Finland : 1990 pp. 572-588
- Mikhail, E.D. and Ackermann, F. **Observations and least squares**. USA : Thomas Y. Crowell
Company, 1976
- Milbert, D.G. GPS and geoid 90 - the new level rod. **GPS world**. February 1992 : pp. 38-49
- Mueller, I.I. **Introduction to satellite geodesy**. New york USA : Frederick Ungar Publishing,
1964
- Shiffer, D.A. **GPS Surveyor's field guide. A field guide book for Pseudo static and
Kinematic surveying**. USA : Trimble navigation Ltd., 1991 (Mimeographed)
- Torge, W. **Geodesy**. New york USA : Walter de Gruyter, 1980
- Trimble navigation Ltd. **Introduction to GPS Static surveying**. USA : Trimble navigation Ltd.,
(Mineographed)
- ____. **Trimnet survey network software user's manual**. USA : Trimble navigation Ltd., 1991
- ____. **Trimvec plus GPS survey software release notes**. USA : Trimble navigation Ltd., 1991
- ____. **4000 SE Land surveyor operation manual**. USA : Trimble navigation Ltd., 1991
- Zilkoski, D.B. Establishing vertical control using GPS satellite surveys **FIG XIX Congress**.
Commission 5. Finland : 1990 pp. 280-294

ภาคผนวก ก.

ผลลัพธ์การประมวลผลเบื้องต้น

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
026-0	MB06	MB09	0.108	0.056	n/a	11015.244	1.614	1.614
026-0	DSLK	MB06	0.081	0.040	4.900	15370.837	1.740	1.614
026-0	DSLK	MB09	0.074	0.038	8.150	13119.466	1.740	1.614

เลือกเส้นฐาน DSLK - MB06 และ เส้นฐาน DSLK - MB09 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
026-1	MB06	MB09	0.095	0.154	n/a	11015.073	1.614	1.614
026-1	MB06	MB11	0.067	0.140	n/a	15433.287	1.614	1.622
026-1	MB09	MB11	0.073	0.122	n/a	13192.506	1.614	1.622

เลือกเส้นฐาน MB06 - MB11 และ เส้นฐาน MB09 - MB11 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
027-0	MB11	NYP2	0.042	0.040	19.140	8909.607	1.319	1.449
027-0	DSLK	MB11	0.023	0.034	20.250	74.541	1.534	1.319
027-0	DSLK	NYP2	0.039	0.048	22.680	8977.066	1.534	1.449

เลือกเส้นฐาน MB11 - NYP2 และ เส้นฐาน DSLK - NYP2 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
027-1	DSLK	NYP3	0.052	0.185	n/a	8961.882	1.534	1.460
027-1	MB11	NYP3	0.048	0.157	n/a	8894.145	1.319	1.460
027-1	DSLK	MB11	0.034	0.040	18.200	74.541	1.534	1.319

เลือกเส้นฐาน DSLK - MB11 มาใช้ในโครงข่าย (หมุด NYP3 รับสัญญาณดาวเทียมไม่ได้ไม่ดี)

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
210-0	MB04	MB05	0.036	0.035	7.160	2436.618	1.467	1.529
210-0	MB04	MB07	0.030	0.037	8.460	1188.412	1.467	1.449
210-0	MB05	MB07	0.027	0.034	34.120	1258.142	1.529	1.449

เลือกเส้นฐาน MB04 - MB05 และ เส้นฐาน MB05 - MB07 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
210-1	MB05	MB07	0.033	0.035	4.440	1258.139	1.529	1.449
210-1	MB07	MB08	0.035	0.046	8.220	2941.250	1.449	1.571
210-1	MB05	MB08	0.033	0.042	10.780	1689.551	1.529	1.571

เลือกเส้นฐาน MB07 - MB08 และ เส้นฐาน MB05 - MB08 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
211-0	BMN4	MB08	0.066	0.250	n/a	14883.819	1.464	1.569
211-0	BMN4	MB09	0.048	0.238	n/a	7959.085	1.464	1.422
211-0	MB08	MB09	0.051	0.156	n/a	6985.783	1.569	1.422

เลือกเส้นฐาน BMN4 - MB09 และ เส้นฐาน MB08 - MB09 มาใช้ในโครงข่าย (หมุด BMN4 และ MB09
รับสัญญาณดาวเทียมได้ไม่ดี)

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
211-1	ONGD	MB09	0.094	0.086	n/a	7981.114	1.496	1.422
211-1	BMN4	MB09	0.071	0.130	n/a	7959.121	1.464	1.422
211-1	ONGD	BMN4	0.068	0.048	3.280	479.125	1.496	1.464

เลือกเส้นฐาน ONGD - MB09 และ เส้นฐาน ONGD - BMN4 มาใช้ในโครงข่าย (หมุด BMN4 รับสัญญาณ
ดาวเทียมได้ไม่ดี)

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
212-0	1136	NYP1	0.028	0.035	26.520	999.841	1.248	1.436
212-0	0776	1136	0.025	0.030	49.560	2251.214	1.599	1.248
212-0	0776	NYP1	0.023	0.035	50.490	1343.928	1.599	1.436

เลือกเส้นฐาน 1136 - NYP1 และ เส้นฐาน 0776 - NYP1 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
212-1	1136	MB02	0.046	0.137	n/a	14270.894	1.248	1.376
212-1	BMH8	MB02	0.070	0.040	5.710	7725.150	1.197	1.376
212-1	1136	BMH8	0.045	0.033	10.350	6579.209	1.248	1.197

เลือกเส้นฐาน BMH8 - MB02 และ เส้นฐาน 1136 - BMH8 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
213-0	0776	1132	0.068	0.106	n/a	19871.988	1.513	1.381
213-0	0776	1133	0.079	0.113	n/a	15107.676	1.513	1.398
213-0	1132	1133	0.036	0.033	9.240	4800.092	1.381	1.398

เลือกเส้นฐาน 0776 - 1133 และ เส้นฐาน 1132 - 1133 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
213-1	1133	MB01	0.089	0.098	n/a	14391.019	1.398	1.600
213-1	1133	NYP1	0.077	0.098	n/a	14620.289	1.398	1.391
213-1	MB01	NYP1	0.042	0.035	6.070	4625.972	1.600	1.391

เลือกเส้นฐาน 1133 - MB01 และ เส้นฐาน MB01 - NYP1 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
214-0	MB01	MB02	0.047	0.109	n/a	10640.603	1.646	1.328
214-0	MB01	MB06	0.045	0.262	n/a	18613.945	1.646	1.579
214-0	MB02	MB06	0.042	0.205	n/a	7974.082	1.328	1.579

เลือกเส้นฐาน MB01 - MB02 และ เส้นฐาน MB02 - MB06 มาใช้ในโครงข่าย (หมุด MB06 รับสัญญาณดาวเทียมได้ไม่ดี)

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
214-1	BMH8	MB03	0.084	0.099	n/a	14269.500	1.213	1.612
214-1	BMH8	MB06	0.041	0.049	6.680	15669.498	1.213	1.579
214-1	MB03	MB06	0.046	0.043	15.530	1407.486	1.612	1.579

เลือกเส้นฐาน BMH8 - MB06 และ เส้นฐาน MB03 - MB06 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
215-0	1132	1136	0.085	0.105	n/a	19548.884	1.384	1.300
215-0	1133	1136	0.077	0.132	n/a	14890.933	1.551	1.300
215-0	1132	1133	0.045	0.032	7.600	4800.081	1.384	1.551

เลือกเส้นฐาน 1132 - 1136 และ เส้นฐาน 1133 - 1136 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
216-0	MB03	MB06	0.032	0.346	n/a	1407.473	1.634	1.534
216-0	MB04	MB06	0.020	0.332	n/a	787.041	1.574	1.534
216-0	MB03	MB04	0.029	0.037	6.160	1597.254	1.634	1.574

เลือกเส้นฐาน MB04 - MB06 และ เส้นฐาน MB03 - MB04 มาใช้ในโครงข่าย (หมุด MB06 รับสัญญาณดาวเทียมได้ไม่ดี)

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
216-1	MB04	MB06	0.054	0.110	n/a	787.126	1.574	1.534
216-1	MB04	MB07	0.046	0.040	7.650	1188.414	1.574	1.521
216-1	MB06	MB07	0.035	0.046	19.470	1757.354	1.534	1.521

เลือกเส้นฐาน MB04 - MB06 และ เส้นฐาน MB03 - MB04 มาใช้ในโครงข่าย

Session	From	To	rms	rdop	ratio	distance (m)	ah1 (m)	ah2 (m)
217-0	MB06	MB09	0.054	0.274	n/a	11015.257	1.552	1.581
217-0	MB06	NYP1	0.119	0.193	n/a	23184.995	1.552	1.476
217-0	MB09	NYP1	0.162	0.104	n/a	33548.448	1.581	1.476

เลือกเส้นฐาน MB06 - MB09 และ เส้นฐาน MB06 - NYP1 มาใช้ในโครงข่าย

ภาคผนวก ข.

รายละเอียดผลลัพธ์การปรับแก้โดยใช้สมุดควบคุมหลัก 5 หมุด

ADJUSTMENT ACTIVITY LOG
NETWORK = NAMUYUAM
TIME = Sun Jan 02 10:33:06 1994

Adjustment process underway.

Computing closures.

Closures have been computed.

Indexing observation equations and unknowns.

Number of sub-networks = 1.

Number of inner constraints sub-network 1 = 2.

Sub-network 1: Fixed $y = 0$ Fixed $x = 0$ Fixed $h = 5$.

y rotation parameter = 56

x rotation parameter = 57

Points included in sub-network 1:

0776

0NGD

1132

1133

1136

BMH8

BMN4

DSLK

MB01

MB02

MB03

MB04

MB05

MB06

MB07

MB08

MB09

MB11

NYP1

NYP2

Number of fixed horizontal coordinates = 0.

Number of fixed vertical coordinates = 5.

Number of observation equations = 104.

Number of vertical observation equations = 34.

Number of unknowns = 57.

Number of inner constraint equations = 2.

The following observations are excluded from the adjustment:



83

The following points were excluded from the adjustment:

none

Proceeding with observation equations.

Turning on graphics before going into adjustment iteration.

Beginning adjustment iteration 1.

Forming observation equations.

Performing observation covariance inverses.

Forming constants and normal equations.

Working on inner constraint equation 1.

Working on inner constraint equation 2.

Computing normals inverse.

Computing solutions vector.

Computing observation residuals.

Solutions from iteration 1:

1 -1.916016e-005
2 -1.293455e-004
3 8.162836e-004
4 -1.111368e-005
5 -1.466089e-004
6 -7.860846e-004
7 -1.933532e-005
8 -1.435508e-004
9 -1.768748e-005
10 -1.831325e-004
11 -1.768474e-002
12 -3.464390e-005
13 -2.006195e-004
14 -2.286309e-002
15 6.958350e-005
16 2.548084e-004
17 3.909952e-003
18 4.890586e-005
19 3.181355e-004
20 -7.003147e-006
21 -1.227754e-004
22 -7.343155e-003
23 -5.533393e-005
24 -2.048382e-004
25 -5.053831e-002
26 -4.948595e-005
27 -2.074867e-004

28 -1.444121e-002
 29 -1.875633e-005
 30 -1.375768e-004
 31 -3.812223e-002
 32 -5.292248e-005
 33 -2.238901e-004
 34 -1.261861e-002
 35 -4.352451e-005
 36 -2.448424e-004
 37 2.803956e-004
 38 1.270955e-003
 39 -8.088251e-005
 40 -2.170004e-004
 41 -5.978195e-002
 42 -8.081370e-005
 43 -2.222438e-004
 44 -6.255274e-002
 45 -7.640168e-005
 46 -2.363590e-004
 47 -6.592838e-002
 48 -7.791814e-005
 49 -2.194673e-004
 50 -5.955324e-002
 51 3.504262e-004
 52 1.212560e-003
 53 -1.425138e-002
 54 -1.043282e-004
 55 -2.167214e-004
 56 -1.075355e+001
 57 4.520595e-001

Recomputing closures for check on residuals

Iteration check on residuals (tolerance = 1.0e-005):

eq # 1 obs # 0 = +8.097647e-002 - +8.100484e-002 = +2.837285e-005
 eq # 2 obs # 1 = -2.915042e-002 - -2.915043e-002 = +7.515601e-009
 eq # 3 obs # 2 = -1.483946e-002 - -1.483789e-002 = +1.573377e-006
 eq # 4 obs # 3 = -6.990250e-002 - -6.989781e-002 = +4.689166e-006
 eq # 5 obs # 4 = +2.310381e-002 - +2.310370e-002 = +1.134498e-007
 eq # 6 obs # 5 = +3.680369e-004 - +3.700049e-004 = +1.968034e-006
 eq # 7 obs # 6 = -1.554334e+000 - -1.554341e+000 = +7.010248e-006
 eq # 8 obs # 7 = +4.325566e-002 - +4.325570e-002 = +3.009417e-008
 eq # 9 obs # 8 = +9.380612e-002 - +9.380573e-002 = +3.954685e-007
 eq # 10 obs # 9 = +1.239517e-001 - +1.239502e-001 = +1.531102e-006
 eq # 11 obs # 10 = +3.230757e-002 - +3.230771e-002 = +1.362086e-007
 eq # 12 obs # 11 = -5.226630e-003 - -5.227279e-003 = +6.494441e-007

eq # 13 obs # 12 = -2.188229e-001 - -2.188229e-001 = +1.616488e-008
eq # 14 obs # 13 = +6.971892e-003 - +6.971949e-003 = +5.699093e-008
eq # 15 obs # 14 = -1.137727e-002 - -1.137727e-002 = +3.463458e-010
eq # 16 obs # 15 = +2.282219e-001 - +2.282219e-001 = +2.121317e-008
eq # 17 obs # 16 = -2.641937e-003 - -2.641905e-003 = +3.157678e-008
eq # 18 obs # 17 = +1.300299e-002 - +1.300299e-002 = +1.086654e-009
eq # 19 obs # 18 = +9.301697e+000 - +9.301403e+000 = +2.935713e-004
eq # 20 obs # 19 = +5.412977e-003 - +5.413002e-003 = +2.544370e-008
eq # 21 obs # 20 = +5.281720e-003 - +5.281085e-003 = +6.356894e-007
eq # 22 obs # 21 = +1.840673e-001 - +1.838361e-001 = +2.312585e-004
eq # 23 obs # 22 = +1.731278e-002 - +1.731275e-002 = +2.197267e-008
eq # 24 obs # 23 = -3.817721e-003 - -3.815939e-003 = +1.781751e-006
eq # 25 obs # 24 = -3.436912e-001 - -3.432871e-001 = +4.040843e-004
eq # 26 obs # 25 = +4.020015e-003 - +4.020011e-003 = +3.996610e-009
eq # 27 obs # 26 = +2.099223e-003 - +2.097324e-003 = +1.898766e-006
eq # 28 obs # 27 = -4.434301e-001 - -4.437143e-001 = +2.841709e-004
eq # 29 obs # 28 = +7.935803e-003 - +7.935795e-003 = +8.602866e-009
eq # 30 obs # 29 = +7.213891e-004 - +7.234680e-004 = +2.078841e-006
eq # 31 obs # 30 = +3.224370e-001 - +3.222694e-001 = +1.675532e-004
eq # 32 obs # 31 = +4.357038e-003 - +4.357034e-003 = +4.509137e-009
eq # 33 obs # 32 = -1.575055e-003 - -1.573047e-003 = +2.007631e-006
eq # 34 obs # 33 = +3.935715e+000 - +3.935765e+000 = +5.020558e-005
eq # 35 obs # 34 = -1.281306e-001 - -1.281284e-001 = +2.182733e-006
eq # 36 obs # 35 = -8.577866e-003 - -8.578301e-003 = +4.348504e-007
eq # 37 obs # 36 = +1.059302e+000 - +1.059244e+000 = +5.857858e-005
eq # 38 obs # 37 = +5.783084e-002 - +5.783072e-002 = +1.262666e-007
eq # 39 obs # 38 = +1.000874e-002 - +1.000890e-002 = +1.565769e-007
eq # 40 obs # 39 = -4.084402e+000 - -4.084428e+000 = +2.577203e-005
eq # 41 obs # 40 = +3.998180e-002 - +3.998171e-002 = +8.464595e-008
eq # 42 obs # 41 = -4.043296e-004 - -4.043095e-004 = +2.009398e-008
eq # 43 obs # 42 = -1.510282e-002 - -1.505257e-002 = +5.025970e-005
eq # 44 obs # 43 = -8.385731e-002 - -8.385522e-002 = +2.097689e-006
eq # 45 obs # 44 = -5.535249e-003 - -5.535577e-003 = +3.280505e-007
eq # 46 obs # 45 = -1.853741e-002 - -1.854405e-002 = +6.642316e-006
eq # 47 obs # 46 = +1.330199e-003 - +1.330225e-003 = +2.594513e-008
eq # 48 obs # 47 = +6.574941e-004 - +6.574958e-004 = +1.651494e-009
eq # 49 obs # 48 = +5.037855e-001 - +5.037931e-001 = +7.613611e-006
eq # 50 obs # 49 = -1.448985e-002 - -1.448984e-002 = +4.169603e-009
eq # 51 obs # 50 = -3.664108e-004 - -3.663981e-004 = +1.269791e-008
eq # 52 obs # 51 = -7.873180e-002 - -7.876061e-002 = +2.881193e-005
eq # 53 obs # 52 = +4.806165e-003 - +4.806226e-003 = +6.066591e-008
eq # 54 obs # 53 = -2.412555e-003 - -2.412658e-003 = +1.025926e-007
eq # 55 obs # 54 = -5.660427e-002 - -5.663610e-002 = +3.182862e-005
eq # 56 obs # 55 = +3.355193e-003 - +3.355221e-003 = +2.791430e-008

eq # 57 obs # 56 = -1.295327e-003 - -1.295294e-003 = +3.311827e-008
 eq # 58 obs # 57 = +1.529132e-001 - +1.529143e-001 = +1.074118e-006
 eq # 59 obs # 58 = +2.108426e-002 - +2.108367e-002 = +5.942179e-007
 eq # 60 obs # 59 = -1.127463e-001 - -1.127464e-001 = +1.929852e-007
 eq # 61 obs # 60 = +1.815686e-002 - +1.815355e-002 = +3.309939e-006
 eq # 62 obs # 61 = +4.914745e-003 - +4.914840e-003 = +9.549050e-008
 eq # 63 obs # 62 = +1.266590e-003 - +1.266781e-003 = +1.908734e-007
 eq # 64 obs # 63 = +1.074722e+000 - +1.074721e+000 = +1.035387e-006
 eq # 65 obs # 64 = +2.961399e-002 - +2.961458e-002 = +5.847036e-007
 eq # 66 obs # 65 = +1.108474e-001 - +1.108470e-001 = +3.750637e-007
 eq # 67 obs # 66 = -2.730991e-002 - -2.730809e-002 = +1.819742e-006
 eq # 68 obs # 67 = +2.032560e-002 - +2.032564e-002 = +3.680200e-008
 eq # 69 obs # 68 = +3.584512e-003 - +3.584508e-003 = +4.449708e-009
 eq # 70 obs # 69 = +1.064567e+000 - +1.064544e+000 = +2.300971e-005
 eq # 71 obs # 70 = +1.199427e-002 - +1.199439e-002 = +1.214581e-007
 eq # 72 obs # 71 = +1.586012e-002 - +1.585999e-002 = +1.324703e-007
 eq # 73 obs # 72 = +2.779139e+000 - +2.779071e+000 = +6.785338e-005
 eq # 74 obs # 73 = -1.747717e-002 - -1.747716e-002 = +8.176537e-009
 eq # 75 obs # 74 = +2.351883e-002 - +2.351859e-002 = +2.439894e-007
 eq # 76 obs # 75 = -3.192237e-002 - -3.195704e-002 = +3.466957e-005
 eq # 77 obs # 76 = +5.299772e-003 - +5.299808e-003 = +3.604502e-008
 eq # 78 obs # 77 = -2.737640e-003 - -2.737725e-003 = +8.550382e-008
 eq # 79 obs # 78 = -9.801709e-001 - -9.805555e-001 = +3.845707e-004
 eq # 80 obs # 79 = +5.936879e-002 - +5.936877e-002 = +2.146531e-008
 eq # 81 obs # 80 = +2.213965e-003 - +2.213631e-003 = +3.337273e-007
 eq # 82 obs # 81 = +3.441757e-001 - +3.441756e-001 = +1.767913e-008
 eq # 83 obs # 83 = -1.334295e-001 - -1.334295e-001 = +2.715211e-009
 eq # 84 obs # 84 = +3.993797e-001 - +3.993797e-001 = +4.013911e-008
 eq # 85 obs # 85 = -1.151676e-001 - -1.151670e-001 = +6.164353e-007
 eq # 86 obs # 86 = -9.317046e-002 - -9.317046e-002 = +3.016763e-009
 eq # 87 obs # 87 = +3.201711e-001 - +3.197589e-001 = +4.121823e-004
 eq # 88 obs # 88 = +4.607308e-003 - +4.607336e-003 = +2.789797e-008
 eq # 89 obs # 89 = -5.012405e-004 - -4.999445e-004 = +1.295975e-006
 eq # 90 obs # 90 = -5.032590e+000 - -5.032515e+000 = +7.534028e-005
 eq # 91 obs # 91 = +2.384680e-002 - +2.384675e-002 = +4.953553e-008
 eq # 92 obs # 92 = +9.626444e-002 - +9.626182e-002 = +2.620463e-006
 eq # 93 obs # 93 = -1.676257e-001 - -1.680998e-001 = +4.741124e-004
 eq # 94 obs # 94 = +2.657839e-002 - +2.657836e-002 = +2.613456e-008
 eq # 95 obs # 95 = -5.545677e-004 - -5.530899e-004 = +1.477772e-006
 eq # 96 obs # 96 = +4.739109e-002 - +4.715626e-002 = +2.348284e-004
 eq # 97 obs # 97 = -3.382944e-002 - -3.382941e-002 = +2.322212e-008
 eq # 98 obs # 98 = +3.542466e-004 - +3.566264e-004 = +2.379780e-006
 eq # 99 obs # 99 = +1.762932e+000 - +1.762897e+000 = +3.499769e-005
 eq # 100 obs # 100 = -3.807812e-003 - -3.807919e-003 = +1.068940e-007

eq # 101 obs # 101 = -1.613709e-002 - -1.613640e-002 = +6.846813e-007
eq # 102 obs # 102 = +2.146372e+000 - +2.146373e+000 = +3.270264e-007
eq # 103 obs # 103 = +1.554309e-001 - +1.554308e-001 = +9.221509e-008
eq # 104 obs # 104 = +5.027033e-002 - +5.027033e-002 = +4.575902e-009

Going to next iteration.

Beginning adjustment iteration 2.

Forming observation equations.

Performing observation covariance inverses.

Forming constants and normal equations.

Working on inner constraint equation 1.

Working on inner constraint equation 2.

Computing normals inverse.

Computing solutions vector.

Computing observation residuals.

Solutions from iteration 2:

1 -3.829686e-009
2 -7.709078e-008
3 8.783441e-008
4 -3.533212e-009
5 -7.685468e-008
6 -1.941830e-008
7 -3.338384e-009
8 -7.798491e-008
9 -1.548624e-009
10 -4.873338e-008
11 -1.228929e-007
12 4.177373e-010
13 -1.127555e-008
14 6.867032e-008
15 8.359569e-010
16 -5.707444e-008
17 3.148964e-007
18 1.204070e-009
19 -4.388866e-008
20 -3.561338e-009
21 -7.579294e-008
22 -1.265043e-007
23 1.058498e-009
24 3.997101e-008
25 -6.014551e-007
26 -4.378297e-009
27 -3.095005e-008
28 -6.854591e-007
29 -8.468862e-009

30 4.470219e-008
 31 -3.398333e-006
 32 9.587250e-010
 33 -1.575637e-008
 34 -7.749854e-007
 35 -2.019541e-009
 36 -2.394092e-008
 37 -2.826735e-009
 38 2.611513e-008
 39 1.441218e-008
 40 2.236817e-007
 41 -6.338870e-007
 42 5.557626e-009
 43 8.654580e-008
 44 -6.256529e-007
 45 3.175985e-009
 46 1.698983e-008
 47 5.098960e-008
 48 1.009125e-008
 49 1.563156e-007
 50 -3.368465e-007
 51 -2.166877e-009
 52 2.596511e-008
 53 -5.553396e-007
 54 -2.040474e-009
 55 -8.094366e-008
 56 -2.990012e-005
 57 -5.042091e-007

Recomputing closures for check on residuals

Iteration check on residuals (tolerance = 1.0e-005):

eq # 1 obs # 0 = +8.098271e-002 - +8.098272e-002 = +1.236127e-009
 eq # 2 obs # 1 = -2.914912e-002 - -2.914912e-002 = +1.076970e-010
 eq # 3 obs # 2 = -1.483921e-002 - -1.483921e-002 = +1.219181e-009
 eq # 4 obs # 3 = -6.990655e-002 - -6.990655e-002 = +6.282278e-009
 eq # 5 obs # 4 = +2.310284e-002 - +2.310284e-002 = +1.102163e-010
 eq # 6 obs # 5 = +3.678245e-004 - +3.678235e-004 = +1.016745e-009
 eq # 7 obs # 6 = -1.554358e+000 - -1.554358e+000 = +1.342758e-008
 eq # 8 obs # 7 = +4.325429e-002 - +4.325429e-002 = +7.899921e-011
 eq # 9 obs # 8 = +9.380485e-002 - +9.380485e-002 = +1.675999e-009
 eq # 10 obs # 9 = +1.239407e-001 - +1.239407e-001 = +7.297784e-009
 eq # 11 obs # 10 = +3.230846e-002 - +3.230846e-002 = +9.449152e-011
 eq # 12 obs # 11 = -5.228873e-003 - -5.228874e-003 = +1.076234e-009
 eq # 13 obs # 12 = -2.188203e-001 - -2.188203e-001 = +4.384757e-009
 eq # 14 obs # 13 = +6.971763e-003 - +6.971763e-003 = +3.692854e-012

eq # 15 obs # 14 = -1.137707e-002 - -1.137707e-002 = +1.374835e-009
eq # 16 obs # 15 = +2.282194e-001 - +2.282194e-001 = +2.042024e-008
eq # 17 obs # 16 = -2.641992e-003 - -2.641992e-003 = +1.203780e-011
eq # 18 obs # 17 = +1.300277e-002 - +1.300277e-002 = +1.768263e-009
eq # 19 obs # 18 = +9.301575e+000 - +9.301556e+000 = +1.972158e-005
eq # 20 obs # 19 = +5.412903e-003 - +5.412905e-003 = +2.212992e-009
eq # 21 obs # 20 = +5.281653e-003 - +5.281635e-003 = +1.848309e-008
eq # 22 obs # 21 = +1.839831e-001 - +1.839832e-001 = +4.141565e-008
eq # 23 obs # 22 = +1.731229e-002 - +1.731229e-002 = +2.101367e-010
eq # 24 obs # 23 = -3.817090e-003 - -3.817087e-003 = +2.965543e-009
eq # 25 obs # 24 = -3.435628e-001 - -3.435625e-001 = +2.536871e-007
eq # 26 obs # 25 = +4.020181e-003 - +4.020181e-003 = +6.986571e-011
eq # 27 obs # 26 = +2.098555e-003 - +2.098554e-003 = +5.135802e-010
eq # 28 obs # 27 = -4.433356e-001 - -4.433356e-001 = +4.613457e-008
eq # 29 obs # 28 = +7.935960e-003 - +7.935960e-003 = +2.787447e-010
eq # 30 obs # 29 = +7.208313e-004 - +7.208343e-004 = +3.018809e-009
eq # 31 obs # 30 = +3.223795e-001 - +3.223796e-001 = +7.733400e-008
eq # 32 obs # 31 = +4.357030e-003 - +4.357030e-003 = +1.054396e-010
eq # 33 obs # 32 = -1.574304e-003 - -1.574307e-003 = +2.901802e-009
eq # 34 obs # 33 = +3.935752e+000 - +3.935752e+000 = +3.620225e-008
eq # 35 obs # 34 = -1.281322e-001 - -1.281322e-001 = +2.465092e-011
eq # 36 obs # 35 = -8.577967e-003 - -8.577965e-003 = +1.605787e-009
eq # 37 obs # 36 = +1.059087e+000 - +1.059087e+000 = +1.117861e-008
eq # 38 obs # 37 = +5.782809e-002 - +5.782809e-002 = +2.745416e-010
eq # 39 obs # 38 = +1.000882e-002 - +1.000883e-002 = +1.901220e-009
eq # 40 obs # 39 = -4.084441e+000 - -4.084441e+000 = +2.944206e-007
eq # 41 obs # 40 = +3.998233e-002 - +3.998233e-002 = +4.263085e-010
eq # 42 obs # 41 = -4.043304e-004 - -4.043281e-004 = +2.254147e-009
eq # 43 obs # 42 = -1.506571e-002 - -1.506570e-002 = +8.369414e-009
eq # 44 obs # 43 = -8.385836e-002 - -8.385836e-002 = +2.559884e-011
eq # 45 obs # 44 = -5.535251e-003 - -5.535250e-003 = +6.851897e-010
eq # 46 obs # 45 = -1.853807e-002 - -1.853811e-002 = +3.576993e-008
eq # 47 obs # 46 = +1.330166e-003 - +1.330166e-003 = +2.897529e-011
eq # 48 obs # 47 = +6.574954e-004 - +6.574966e-004 = +1.186928e-009
eq # 49 obs # 48 = +5.037802e-001 - +5.037801e-001 = +9.952654e-008
eq # 50 obs # 49 = -1.448982e-002 - -1.448982e-002 = +7.732952e-011
eq # 51 obs # 50 = -3.664133e-004 - -3.664129e-004 = +3.996645e-010
eq # 52 obs # 51 = -7.873293e-002 - -7.873292e-002 = +1.393934e-008
eq # 53 obs # 52 = +4.806057e-003 - +4.806057e-003 = +4.768756e-011
eq # 54 obs # 53 = -2.412546e-003 - -2.412546e-003 = +3.126477e-010
eq # 55 obs # 54 = -5.660586e-002 - -5.660581e-002 = +4.066703e-008
eq # 56 obs # 55 = +3.355512e-003 - +3.355512e-003 = +5.764028e-011
eq # 57 obs # 56 = -1.295316e-003 - -1.295314e-003 = +1.622808e-009
eq # 58 obs # 57 = +1.529181e-001 - +1.529181e-001 = +9.959615e-009

eq # 59 obs # 58 = +2.108605e-002 - +2.108605e-002 = +3.045218e-011
eq # 60 obs # 59 = -1.127472e-001 - -1.127472e-001 = +1.043018e-011
eq # 61 obs # 60 = +1.815703e-002 - +1.815703e-002 = +4.045446e-009
eq # 62 obs # 61 = +4.914488e-003 - +4.914488e-003 = +4.579829e-011
eq # 63 obs # 62 = +1.266570e-003 - +1.266572e-003 = +1.603468e-009
eq # 64 obs # 63 = +1.074721e+000 - +1.074721e+000 = +1.865798e-008
eq # 65 obs # 64 = +2.961211e-002 - +2.961211e-002 = +1.389207e-011
eq # 66 obs # 65 = +1.108465e-001 - +1.108465e-001 = +1.307788e-010
eq # 67 obs # 66 = -2.730808e-002 - -2.730815e-002 = +7.130214e-008
eq # 68 obs # 67 = +2.032566e-002 - +2.032566e-002 = +1.513158e-012
eq # 69 obs # 68 = +3.584507e-003 - +3.584508e-003 = +4.378719e-010
eq # 70 obs # 69 = +1.064581e+000 - +1.064581e+000 = +6.145235e-008
eq # 71 obs # 70 = +1.199451e-002 - +1.199451e-002 = +1.000399e-010
eq # 72 obs # 71 = +1.586024e-002 - +1.586024e-002 = +1.077687e-009
eq # 73 obs # 72 = +2.779110e+000 - +2.779110e+000 = +6.713266e-008
eq # 74 obs # 73 = -1.747787e-002 - -1.747787e-002 = +8.046977e-011
eq # 75 obs # 74 = +2.351869e-002 - +2.351869e-002 = +2.727161e-010
eq # 76 obs # 75 = -3.192240e-002 - -3.192241e-002 = +1.433265e-008
eq # 77 obs # 76 = +5.299389e-003 - +5.299389e-003 = +1.356945e-010
eq # 78 obs # 77 = -2.737671e-003 - -2.737669e-003 = +1.467725e-009
eq # 79 obs # 78 = -9.800336e-001 - -9.800338e-001 = +2.164934e-007
eq # 80 obs # 79 = +5.936815e-002 - +5.936815e-002 = +1.649255e-010
eq # 81 obs # 80 = +2.214033e-003 - +2.214033e-003 = +2.997528e-010
eq # 82 obs # 81 = +3.441781e-001 - +3.441781e-001 = +7.054218e-009
eq # 83 obs # 83 = -1.334305e-001 - -1.334305e-001 = +6.518726e-010
eq # 84 obs # 84 = +3.993817e-001 - +3.993817e-001 = +1.085609e-008
eq # 85 obs # 85 = -1.151695e-001 - -1.151695e-001 = +4.161714e-011
eq # 86 obs # 86 = -9.317104e-002 - -9.317104e-002 = +1.713194e-009
eq # 87 obs # 87 = +3.201089e-001 - +3.201088e-001 = +4.082406e-008
eq # 88 obs # 88 = +4.607486e-003 - +4.607486e-003 = +1.781275e-010
eq # 89 obs # 89 = -5.010087e-004 - -5.010096e-004 = +9.044044e-010
eq # 90 obs # 90 = -5.032509e+000 - -5.032509e+000 = +1.539393e-007
eq # 91 obs # 91 = +2.384598e-002 - +2.384598e-002 = +6.263823e-012
eq # 92 obs # 92 = +9.626252e-002 - +9.626252e-002 = +6.864605e-010
eq # 93 obs # 93 = -1.674658e-001 - -1.674659e-001 = +1.724585e-007
eq # 94 obs # 94 = +2.657807e-002 - +2.657807e-002 = +1.657479e-010
eq # 95 obs # 95 = -5.550139e-004 - -5.550136e-004 = +2.860925e-010
eq # 96 obs # 96 = +4.742880e-002 - +4.742882e-002 = +1.589717e-008
eq # 97 obs # 97 = -3.382895e-002 - -3.382895e-002 = +1.650973e-010
eq # 98 obs # 98 = +3.540644e-004 - +3.540634e-004 = +9.572723e-010
eq # 99 obs # 99 = +1.762897e+000 - +1.762897e+000 = +1.862910e-008
eq # 100 obs # 100 = -3.810080e-003 - -3.810080e-003 = +1.430271e-013
eq # 101 obs # 101 = -1.613674e-002 - -1.613674e-002 = +9.530329e-010
eq # 102 obs # 102 = +2.146403e+000 - +2.146403e+000 = +9.148566e-009

eq # 103 obs # 103 = +1.554314e-001 - +1.554314e-001 = +1.784283e-010

eq # 104 obs # 104 = +5.027056e-002 - +5.027056e-002 = +5.703007e-010

Going to next iteration.

Beginning adjustment iteration 3.

Forming observation equations.

Performing observation covariance inverses.

Forming constants and normal equations.

Working on inner constraint equation 1.

Working on inner constraint equation 2.

Computing normals inverse.

Computing solutions vector.

Computing observation residuals.

Solutions from iteration 3:

1 5.335354e-011
2 -8.876838e-011
3 1.425286e-009
4 1.938330e-011
5 -7.832392e-011
6 7.551626e-010
7 6.380561e-012
8 -6.892764e-011
9 2.982834e-011
10 -8.802380e-011
11 1.555291e-010
12 9.358296e-013
13 -1.433353e-010
14 -1.937887e-009
15 9.143973e-011
16 1.041625e-010
17 2.011678e-009
18 6.487108e-011
19 1.863973e-010
20 3.828589e-013
21 -1.356595e-011
22 5.700552e-011
23 -1.091477e-011
24 -5.344501e-011
25 -1.294673e-009
26 -5.923190e-011
27 -8.034846e-011
28 2.557635e-010
29 -3.496634e-011
30 -1.046188e-010
31 -5.218341e-009

32 -8.608295e-012
 33 4.585378e-010
 34 -6.918729e-009
 35 -5.155503e-011
 36 1.789247e-010
 37 -1.409170e-011
 38 2.213213e-010
 39 -3.383910e-011
 40 -1.039241e-010
 41 -3.386752e-009
 42 -2.728666e-011
 43 -1.349221e-010
 44 -3.154611e-009
 45 1.223342e-011
 46 -1.343543e-010
 47 -1.207443e-009
 48 -1.717758e-011
 49 -7.283526e-011
 50 -2.383473e-009
 51 -3.329864e-012
 52 1.332256e-010
 53 -2.839638e-009
 54 -1.780743e-011
 55 -1.171763e-010
 56 -1.472410e-007
 57 -4.014800e-008

Recomputing closures for check on residuals

Iteration check on residuals (tolerance = 1.0e-005):

eq # 1 obs # 0 = +8.098272e-002 - +8.098271e-002 = +4.993081e-009
 eq # 2 obs # 1 = -2.914912e-002 - -2.914912e-002 = +3.265790e-014
 eq # 3 obs # 2 = -1.483922e-002 - -1.483922e-002 = +7.999615e-010
 eq # 4 obs # 3 = -6.990654e-002 - -6.990654e-002 = +9.879021e-010
 eq # 5 obs # 4 = +2.310284e-002 - +2.310284e-002 = +9.189524e-014
 eq # 6 obs # 5 = +3.678240e-004 - +3.678234e-004 = +5.530245e-010
 eq # 7 obs # 6 = -1.554358e+000 - -1.554358e+000 = +2.235459e-009
 eq # 8 obs # 7 = +4.325428e-002 - +4.325428e-002 = +7.369355e-012
 eq # 9 obs # 8 = +9.380486e-002 - +9.380486e-002 = +2.766077e-009
 eq # 10 obs # 9 = +1.239407e-001 - +1.239407e-001 = +4.866523e-009
 eq # 11 obs # 10 = +3.230845e-002 - +3.230845e-002 = +5.454664e-014
 eq # 12 obs # 11 = -5.228857e-003 - -5.228856e-003 = +5.759666e-010
 eq # 13 obs # 12 = -2.188202e-001 - -2.188202e-001 = +1.117316e-008
 eq # 14 obs # 13 = +6.971760e-003 - +6.971760e-003 = +2.477315e-013
 eq # 15 obs # 14 = -1.137707e-002 - -1.137707e-002 = +2.855226e-010
 eq # 16 obs # 15 = +2.282193e-001 - +2.282193e-001 = +7.722080e-009

eq # 17 obs # 16 = -2.641988e-003 - -2.641988e-003 = +1.651023e-011
eq # 18 obs # 17 = +1.300276e-002 - +1.300276e-002 = +1.922948e-009
eq # 19 obs # 18 = +9.301570e+000 - +9.301595e+000 = +2.530291e-005
eq # 20 obs # 19 = +5.412898e-003 - +5.412895e-003 = +2.571738e-009
eq # 21 obs # 20 = +5.281650e-003 - +5.281676e-003 = +2.583054e-008
eq # 22 obs # 21 = +1.839831e-001 - +1.839832e-001 = +1.031789e-007
eq # 23 obs # 22 = +1.731229e-002 - +1.731229e-002 = +4.572611e-011
eq # 24 obs # 23 = -3.817088e-003 - -3.817090e-003 = +1.853039e-009
eq # 25 obs # 24 = -3.435628e-001 - -3.435629e-001 = +1.201115e-007
eq # 26 obs # 25 = +4.020181e-003 - +4.020181e-003 = +1.062475e-013
eq # 27 obs # 26 = +2.098556e-003 - +2.098556e-003 = +8.348255e-010
eq # 28 obs # 27 = -4.433355e-001 - -4.433356e-001 = +1.157441e-007
eq # 29 obs # 28 = +7.935961e-003 - +7.935961e-003 = +1.997534e-014
eq # 30 obs # 29 = +7.208335e-004 - +7.208314e-004 = +2.045718e-009
eq # 31 obs # 30 = +3.223795e-001 - +3.223794e-001 = +1.069684e-007
eq # 32 obs # 31 = +4.357031e-003 - +4.357031e-003 = +4.470046e-011
eq # 33 obs # 32 = -1.574307e-003 - -1.574304e-003 = +2.593303e-009
eq # 34 obs # 33 = +3.935753e+000 - +3.935753e+000 = +8.883947e-010
eq # 35 obs # 34 = -1.281322e-001 - -1.281322e-001 = +7.028544e-012
eq # 36 obs # 35 = -8.577967e-003 - -8.577967e-003 = +2.551383e-010
eq # 37 obs # 36 = +1.059087e+000 - +1.059087e+000 = +4.031102e-008
eq # 38 obs # 37 = +5.782809e-002 - +5.782809e-002 = +6.093737e-014
eq # 39 obs # 38 = +1.000883e-002 - +1.000883e-002 = +3.016176e-011
eq # 40 obs # 39 = -4.084441e+000 - -4.084441e+000 = +6.861404e-008
eq # 41 obs # 40 = +3.998234e-002 - +3.998234e-002 = +4.260022e-010
eq # 42 obs # 41 = -4.043306e-004 - -4.043312e-004 = +6.260796e-010
eq # 43 obs # 42 = -1.506552e-002 - -1.506552e-002 = +2.467222e-009
eq # 44 obs # 43 = -8.385836e-002 - -8.385836e-002 = +3.305828e-013
eq # 45 obs # 44 = -5.535251e-003 - -5.535251e-003 = +6.810927e-010
eq # 46 obs # 45 = -1.853808e-002 - -1.853810e-002 = +2.762885e-008
eq # 47 obs # 46 = +1.330166e-003 - +1.330166e-003 = +2.857160e-011
eq # 48 obs # 47 = +6.574955e-004 - +6.574966e-004 = +1.082421e-009
eq # 49 obs # 48 = +5.037801e-001 - +5.037804e-001 = +2.382960e-007
eq # 50 obs # 49 = -1.448982e-002 - -1.448982e-002 = +7.215582e-014
eq # 51 obs # 50 = -3.664132e-004 - -3.664126e-004 = +6.415268e-010
eq # 52 obs # 51 = -7.873293e-002 - -7.873300e-002 = +6.732272e-008
eq # 53 obs # 52 = +4.806058e-003 - +4.806058e-003 = +1.374404e-013
eq # 54 obs # 53 = -2.412546e-003 - -2.412546e-003 = +6.819944e-010
eq # 55 obs # 54 = -5.660586e-002 - -5.660585e-002 = +7.073298e-009
eq # 56 obs # 55 = +3.355512e-003 - +3.355512e-003 = +8.910104e-014
eq # 57 obs # 56 = -1.295315e-003 - -1.295314e-003 = +7.706450e-010
eq # 58 obs # 57 = +1.529181e-001 - +1.529181e-001 = +3.256398e-009
eq # 59 obs # 58 = +2.108606e-002 - +2.108606e-002 = +1.314915e-011
eq # 60 obs # 59 = -1.127472e-001 - -1.127472e-001 = +2.521703e-009

eq # 61 obs # 60 = +1.815703e-002 - +1.815705e-002 = +2.000368e-008
eq # 62 obs # 61 = +4.914486e-003 - +4.914486e-003 = +8.182517e-014
eq # 63 obs # 62 = +1.266570e-003 - +1.266568e-003 = +2.405405e-009
eq # 64 obs # 63 = +1.074721e+000 - +1.074721e+000 = +1.440782e-009
eq # 65 obs # 64 = +2.961210e-002 - +2.961210e-002 = +3.535713e-014
eq # 66 obs # 65 = +1.108465e-001 - +1.108465e-001 = +1.673954e-009
eq # 67 obs # 66 = -2.730807e-002 - -2.730804e-002 = +3.573465e-008
eq # 68 obs # 67 = +2.032566e-002 - +2.032566e-002 = +2.938056e-012
eq # 69 obs # 68 = +3.584507e-003 - +3.584507e-003 = +8.439707e-011
eq # 70 obs # 69 = +1.064581e+000 - +1.064581e+000 = +3.041892e-008
eq # 71 obs # 70 = +1.199451e-002 - +1.199451e-002 = +2.797224e-013
eq # 72 obs # 71 = +1.586024e-002 - +1.586023e-002 = +2.589257e-009
eq # 73 obs # 72 = +2.779110e+000 - +2.779110e+000 = +3.586942e-008
eq # 74 obs # 73 = -1.747786e-002 - -1.747786e-002 = +2.582018e-012
eq # 75 obs # 74 = +2.351869e-002 - +2.351869e-002 = +2.305891e-010
eq # 76 obs # 75 = -3.192240e-002 - -3.192237e-002 = +2.216738e-008
eq # 77 obs # 76 = +5.299391e-003 - +5.299391e-003 = +1.278023e-013
eq # 78 obs # 77 = -2.737671e-003 - -2.737672e-003 = +1.556998e-009
eq # 79 obs # 78 = -9.800335e-001 - -9.800336e-001 = +7.197462e-008
eq # 80 obs # 79 = +5.936815e-002 - +5.936815e-002 = +1.855091e-011
eq # 81 obs # 80 = +2.214033e-003 - +2.214033e-003 = +3.688461e-010
eq # 82 obs # 81 = +3.441781e-001 - +3.441781e-001 = +3.625310e-009
eq # 83 obs # 83 = -1.334305e-001 - -1.334305e-001 = +1.207933e-009
eq # 84 obs # 84 = +3.993818e-001 - +3.993818e-001 = +4.014737e-009
eq # 85 obs # 85 = -1.151695e-001 - -1.151695e-001 = +1.149358e-013
eq # 86 obs # 86 = -9.317105e-002 - -9.317104e-002 = +2.166266e-009
eq # 87 obs # 87 = +3.201088e-001 - +3.201086e-001 = +2.733114e-007
eq # 88 obs # 88 = +4.607486e-003 - +4.607486e-003 = +1.135350e-013
eq # 89 obs # 89 = -5.010086e-004 - -5.010068e-004 = +1.779991e-009
eq # 90 obs # 90 = -5.032509e+000 - -5.032509e+000 = +1.038575e-007
eq # 91 obs # 91 = +2.384598e-002 - +2.384598e-002 = +2.575095e-010
eq # 92 obs # 92 = +9.626253e-002 - +9.626253e-002 = +1.774130e-009
eq # 93 obs # 93 = -1.674657e-001 - -1.674654e-001 = +3.579684e-007
eq # 94 obs # 94 = +2.657807e-002 - +2.657807e-002 = +1.387085e-013
eq # 95 obs # 95 = -5.550154e-004 - -5.550165e-004 = +1.132616e-009
eq # 96 obs # 96 = +4.742877e-002 - +4.742882e-002 = +5.796051e-008
eq # 97 obs # 97 = -3.382895e-002 - -3.382895e-002 = +8.886364e-011
eq # 98 obs # 98 = +3.540636e-004 - +3.540633e-004 = +3.266032e-010
eq # 99 obs # 99 = +1.762897e+000 - +1.762897e+000 = +6.584340e-010
eq # 100 obs # 100 = -3.810079e-003 - -3.810079e-003 = +6.280544e-012
eq # 101 obs # 101 = -1.613674e-002 - -1.613673e-002 = +2.933918e-009
eq # 102 obs # 102 = +2.146403e+000 - +2.146403e+000 = +5.443118e-009
eq # 103 obs # 103 = +1.554314e-001 - +1.554314e-001 = +6.661338e-014
eq # 104 obs # 104 = +5.027056e-002 - +5.027056e-002 = +1.466598e-010

Going to next iteration.

Beginning adjustment iteration 4.

Forming observation equations.

Performing observation covariance inverses.

Forming constants and normal equations.

Working on inner constraint equation 1.

Working on inner constraint equation 2.

Computing normals inverse.

Computing solutions vector.

Computing observation residuals.

Solutions from iteration 4:

1 1.734288e-011
2 9.783758e-011
3 -1.426258e-009
4 -1.689259e-011
5 1.201096e-010
6 -6.521613e-010
7 -2.023594e-011
8 7.432356e-011
9 2.917679e-012
10 1.520356e-010
11 -1.410691e-011
12 1.553885e-011
13 1.460756e-010
14 9.737738e-010
15 -8.338537e-011
16 -1.252362e-010
17 -2.549744e-009
18 -6.593961e-011
19 -2.467877e-010
20 -2.901964e-011
21 8.315993e-011
22 7.251524e-011
23 3.445303e-011
24 9.964490e-011
25 1.459695e-009
26 5.018912e-011
27 1.336625e-010
28 -4.258264e-010
29 7.377375e-012
30 1.020475e-010
31 6.521030e-009
32 -8.789385e-012
33 -6.096893e-010

34 8.441661e-009
 35 5.727741e-011
 36 -2.092391e-010
 37 -4.897395e-011
 38 -2.251771e-010
 39 4.760764e-011
 40 1.394672e-010
 41 4.471094e-009
 42 1.669848e-011
 43 1.289376e-010
 44 3.576249e-009
 45 1.520661e-011
 46 1.736772e-010
 47 1.494521e-009
 48 3.366781e-011
 49 8.212749e-011
 50 2.701229e-009
 51 -5.964316e-011
 52 -1.947045e-010
 53 3.144859e-009
 54 3.460276e-011
 55 7.772773e-011
 56 1.838003e-007
 57 4.458859e-008

Recomputing closures for check on residuals

Iteration check on residuals (tolerance = 1.0e-005):

eq # 1 obs # 0 = +8.098272e-002 - +8.098273e-002 = +4.434613e-009
 eq # 2 obs # 1 = -2.914912e-002 - -2.914912e-002 = +1.099468e-014
 eq # 3 obs # 2 = -1.483922e-002 - -1.483921e-002 = +4.549783e-010
 eq # 4 obs # 3 = -6.990656e-002 - -6.990655e-002 = +2.523283e-009
 eq # 5 obs # 4 = +2.310284e-002 - +2.310284e-002 = +3.365017e-014
 eq # 6 obs # 5 = +3.678247e-004 - +3.678249e-004 = +2.441261e-010
 eq # 7 obs # 6 = -1.554358e+000 - -1.554358e+000 = +8.357569e-009
 eq # 8 obs # 7 = +4.325429e-002 - +4.325429e-002 = +7.135244e-012
 eq # 9 obs # 8 = +9.380485e-002 - +9.380485e-002 = +1.284993e-009
 eq # 10 obs # 9 = +1.239406e-001 - +1.239407e-001 = +4.316454e-009
 eq # 11 obs # 10 = +3.230846e-002 - +3.230846e-002 = +4.331951e-014
 eq # 12 obs # 11 = -5.228878e-003 - -5.228877e-003 = +8.238467e-010
 eq # 13 obs # 12 = -2.188204e-001 - -2.188204e-001 = +1.457844e-008
 eq # 14 obs # 13 = +6.971764e-003 - +6.971764e-003 = +1.589802e-011
 eq # 15 obs # 14 = -1.137707e-002 - -1.137707e-002 = +1.058901e-009
 eq # 16 obs # 15 = +2.282195e-001 - +2.282195e-001 = +2.098153e-008
 eq # 17 obs # 16 = -2.641992e-003 - -2.641992e-003 = +2.741175e-013
 eq # 18 obs # 17 = +1.300277e-002 - +1.300277e-002 = +1.015140e-009

eq # 19 obs # 18 = +9.301575e+000 - +9.301575e+000 = +4.448144e-007
 eq # 20 obs # 19 = +5.412904e-003 - +5.412904e-003 = +3.978572e-012
 eq # 21 obs # 20 = +5.281655e-003 - +5.281653e-003 = +1.800350e-009
 eq # 22 obs # 21 = +1.839831e-001 - +1.839831e-001 = +4.411112e-009
 eq # 23 obs # 22 = +1.731229e-002 - +1.731229e-002 = +3.149911e-014
 eq # 24 obs # 23 = -3.817089e-003 - -3.817090e-003 = +7.999097e-010
 eq # 25 obs # 24 = -3.435628e-001 - -3.435628e-001 = +1.014451e-008
 eq # 26 obs # 25 = +4.020181e-003 - +4.020181e-003 = +9.929824e-011
 eq # 27 obs # 26 = +2.098555e-003 - +2.098555e-003 = +2.112810e-010
 eq # 28 obs # 27 = -4.433355e-001 - -4.433354e-001 = +1.171228e-007
 eq # 29 obs # 28 = +7.935960e-003 - +7.935960e-003 = +8.045849e-011
 eq # 30 obs # 29 = +7.208320e-004 - +7.208315e-004 = +4.787112e-010
 eq # 31 obs # 30 = +3.223795e-001 - +3.223795e-001 = +6.124271e-008
 eq # 32 obs # 31 = +4.357030e-003 - +4.357030e-003 = +9.190131e-014
 eq # 33 obs # 32 = -1.574305e-003 - -1.574307e-003 = +2.011190e-009
 eq # 34 obs # 33 = +3.935752e+000 - +3.935752e+000 = +2.279478e-009
 eq # 35 obs # 34 = -1.281322e-001 - -1.281322e-001 = +7.048639e-012
 eq # 36 obs # 35 = -8.577966e-003 - -8.577968e-003 = +1.184502e-009
 eq # 37 obs # 36 = +1.059087e+000 - +1.059087e+000 = +4.682024e-008
 eq # 38 obs # 37 = +5.782809e-002 - +5.782809e-002 = +1.261283e-013
 eq # 39 obs # 38 = +1.000882e-002 - +1.000882e-002 = +1.724962e-009
 eq # 40 obs # 39 = -4.084441e+000 - -4.084441e+000 = +9.874775e-008
 eq # 41 obs # 40 = +3.998233e-002 - +3.998233e-002 = +8.326673e-015
 eq # 42 obs # 41 = -4.043303e-004 - -4.043297e-004 = +6.663302e-010
 eq # 43 obs # 42 = -1.506575e-002 - -1.506574e-002 = +1.365739e-008
 eq # 44 obs # 43 = -8.385836e-002 - -8.385836e-002 = +4.441308e-013
 eq # 45 obs # 44 = -5.535251e-003 - -5.535252e-003 = +4.460052e-010
 eq # 46 obs # 45 = -1.853807e-002 - -1.853816e-002 = +8.657219e-008
 eq # 47 obs # 46 = +1.330166e-003 - +1.330166e-003 = +2.856430e-011
 eq # 48 obs # 47 = +6.574955e-004 - +6.574966e-004 = +1.179462e-009
 eq # 49 obs # 48 = +5.037802e-001 - +5.037802e-001 = +2.161712e-008
 eq # 50 obs # 49 = -1.448982e-002 - -1.448982e-002 = +5.289692e-014
 eq # 51 obs # 50 = -3.664131e-004 - -3.664136e-004 = +5.171871e-010
 eq # 52 obs # 51 = -7.873294e-002 - -7.873288e-002 = +5.425579e-008
 eq # 53 obs # 52 = +4.806057e-003 - +4.806057e-003 = +3.114236e-012
 eq # 54 obs # 53 = -2.412545e-003 - -2.412543e-003 = +1.966011e-009
 eq # 55 obs # 54 = -5.660586e-002 - -5.660585e-002 = +5.152073e-009
 eq # 56 obs # 55 = +3.355511e-003 - +3.355511e-003 = +1.358288e-015
 eq # 57 obs # 56 = -1.295314e-003 - -1.295314e-003 = +4.005614e-010
 eq # 58 obs # 57 = +1.529180e-001 - +1.529180e-001 = +2.243857e-009
 eq # 59 obs # 58 = +2.108605e-002 - +2.108605e-002 = +1.320210e-011
 eq # 60 obs # 59 = -1.127472e-001 - -1.127472e-001 = +3.046236e-009
 eq # 61 obs # 60 = +1.815702e-002 - +1.815701e-002 = +1.102623e-008
 eq # 62 obs # 61 = +4.914488e-003 - +4.914488e-003 = +6.636445e-014

eq # 63 obs # 62 = +1.266570e-003 - +1.266572e-003 = +2.096086e-009
 eq # 64 obs # 63 = +1.074721e+000 - +1.074721e+000 = +4.876342e-010
 eq # 65 obs # 64 = +2.961211e-002 - +2.961211e-002 = +4.281644e-014
 eq # 66 obs # 65 = +1.108465e-001 - +1.108465e-001 = +6.781109e-010
 eq # 67 obs # 66 = -2.730808e-002 - -2.730803e-002 = +4.576600e-008
 eq # 68 obs # 67 = +2.032566e-002 - +2.032566e-002 = +3.072060e-012
 eq # 69 obs # 68 = +3.584507e-003 - +3.584506e-003 = +8.093672e-010
 eq # 70 obs # 69 = +1.064581e+000 - +1.064581e+000 = +1.563027e-008
 eq # 71 obs # 70 = +1.199451e-002 - +1.199451e-002 = +1.104776e-013
 eq # 72 obs # 71 = +1.586024e-002 - +1.586024e-002 = +4.157865e-009
 eq # 73 obs # 72 = +2.779110e+000 - +2.779110e+000 = +3.434530e-008
 eq # 74 obs # 73 = -1.747787e-002 - -1.747787e-002 = +2.486830e-012
 eq # 75 obs # 74 = +2.351869e-002 - +2.351868e-002 = +3.335438e-009
 eq # 76 obs # 75 = -3.192240e-002 - -3.192241e-002 = +1.523212e-008
 eq # 77 obs # 76 = +5.299389e-003 - +5.299389e-003 = +1.173809e-013
 eq # 78 obs # 77 = -2.737671e-003 - -2.737669e-003 = +1.835008e-009
 eq # 79 obs # 78 = -9.800335e-001 - -9.800336e-001 = +9.423420e-008
 eq # 80 obs # 79 = +5.936815e-002 - +5.936815e-002 = +1.157408e-014
 eq # 81 obs # 80 = +2.214033e-003 - +2.214030e-003 = +2.874281e-009
 eq # 82 obs # 81 = +3.441781e-001 - +3.441781e-001 = +6.110131e-009
 eq # 83 obs # 83 = -1.334305e-001 - -1.334305e-001 = +7.547421e-010
 eq # 84 obs # 84 = +3.993817e-001 - +3.993817e-001 = +1.347061e-009
 eq # 85 obs # 85 = -1.151695e-001 - -1.151695e-001 = +1.532108e-014
 eq # 86 obs # 86 = -9.317104e-002 - -9.317104e-002 = +1.548735e-009
 eq # 87 obs # 87 = +3.201088e-001 - +3.201088e-001 = +2.764669e-008
 eq # 88 obs # 88 = +4.607486e-003 - +4.607486e-003 = +9.977782e-014
 eq # 89 obs # 89 = -5.010084e-004 - -5.010067e-004 = +1.712169e-009
 eq # 90 obs # 90 = -5.032509e+000 - -5.032509e+000 = +5.550089e-008
 eq # 91 obs # 91 = +2.384598e-002 - +2.384598e-002 = +2.575281e-010
 eq # 92 obs # 92 = +9.626253e-002 - +9.626253e-002 = +5.674741e-010
 eq # 93 obs # 93 = -1.674657e-001 - -1.674657e-001 = +4.804517e-009
 eq # 94 obs # 94 = +2.657807e-002 - +2.657807e-002 = +7.504067e-014
 eq # 95 obs # 95 = -5.550146e-004 - -5.550136e-004 = +9.673274e-010
 eq # 96 obs # 96 = +4.742878e-002 - +4.742878e-002 = +2.009707e-009
 eq # 97 obs # 97 = -3.382895e-002 - -3.382895e-002 = +1.777479e-010
 eq # 98 obs # 98 = +3.540638e-004 - +3.540634e-004 = +4.087540e-010
 eq # 99 obs # 99 = +1.762897e+000 - +1.762897e+000 = +1.292846e-009
 eq # 100 obs # 100 = -3.810080e-003 - -3.810080e-003 = +6.339341e-012
 eq # 101 obs # 101 = -1.613673e-002 - -1.613674e-002 = +2.027007e-009
 eq # 102 obs # 102 = +2.146403e+000 - +2.146403e+000 = +5.431689e-009
 eq # 103 obs # 103 = +1.554314e-001 - +1.554314e-001 = +8.076873e-015
 eq # 104 obs # 104 = +5.027056e-002 - +5.027056e-002 = +2.021509e-010

Successful adjustment 4 iterations

Beginning adjustment summary in stats.log.

Beginning coordinate adjustment in coords.log.
Coordinate adjustment summary complete.
Beginning plots of error ellipses.
Ellipse plotting complete.
Proceeding with adjustment of observations.
Statistics summary complete.
Observation adjustment complete.
Plot histograms.
Histogram plotting complete.
Computing covariances in azimuth, distance and height.
Covariance processing complete.
Iterations complete, so turning graphics off.
Graphics turned off.
Closing activity log.
TIME = Sun Jan 02 10:34:34 1994

CLOSURES LOG

NETWORK = NAMUYUAM

TIME = Sun Jan 02 10:33:41 1994

OBS#	TYPE	FROM	TO	CLOSURE	TRANSFORM
1	gpsaz	DSLK	MB06	0.080983"	-0.080403"
2	gpsht	DSLK	MB06	-0.029149m	0.478426m
3	gpsds	DSLK	MB06	-0.014839m	-0.004454m
4	gpsaz	DSLK	MB09	-0.069907"	-0.016327"
5	gpsht	DSLK	MB09	0.023103m	0.676103m
6	gpsds	DSLK	MB09	0.000368m	-0.006785m
7	gpsaz	MB06	MB11	-1.554358"	0.378800"
8	gpsht	MB06	MB11	0.043254m	-0.482391m
9	gpsds	MB06	MB11	0.093805m	0.021206m
10	gpsaz	MB09	MB11	0.123941"	0.084602"
11	gpsht	MB09	MB11	0.032308m	-0.679872m
12	gpsds	MB09	MB11	-0.005229m	0.035237m
13	gpsaz	DSLK	NYP2	-0.218820"	0.060333"
14	gpsht	DSLK	NYP2	0.006972m	-0.333444m
15	gpsds	DSLK	NYP2	-0.011377m	0.002668m
16	gpsaz	MB11	NYP2	0.228219"	0.061086"
17	gpsht	MB11	NYP2	-0.002642m	-0.329801m
18	gpsds	MB11	NYP2	0.013003m	0.002662m
19	gpsaz	DSLK	MB11	9.301575"	34.989812"
20	gpsht	DSLK	MB11	0.005413m	-0.003642m
21	gpsds	DSLK	MB11	0.005282m	0.034098m
22	gpsaz	MB04	MB05	0.183983"	0.892983"
23	gpsht	MB04	MB05	0.017312m	0.069464m
24	gpsds	MB04	MB05	-0.003817m	-0.006882m
25	gpsaz	MB05	MB07	-0.343563"	-1.073983"
26	gpsht	MB05	MB07	0.004020m	-0.040043m
27	gpsds	MB05	MB07	0.002099m	0.005049m
28	gpsaz	MB05	MB08	-0.443335"	0.778697"
29	gpsht	MB05	MB08	0.007936m	0.058724m
30	gpsds	MB05	MB08	0.000721m	-0.005701m
31	gpsaz	MB07	MB08	0.322380"	0.457641"
32	gpsht	MB07	MB08	0.004357m	0.098772m
33	gpsds	MB07	MB08	-0.001574m	-0.005487m
34	gpsaz	BMN4	MB09	3.935752"	-0.183036"
35	gpsht	BMN4	MB09	-0.128132m	-0.106297m
36	gpsds	BMN4	MB09	-0.008578m	0.001870m
37	gpsaz	MB08	MB09	1.059087"	0.216828"

38	gpsht	MB08	MB09	0.057828m	0.028342m
39	gpsds	MB08	MB09	0.010009m	-0.000573m
40	gpsaz	ONGD	BMN4	-4.084441"	-1.061482"
41	gpsht	ONGD	BMN4	0.039982m	0.023132m
42	gpsds	ONGD	BMN4	-0.000404m	-0.008418m
43	gpsaz	ONGD	MB09	-0.015066"	-0.185016"
44	gpsht	ONGD	MB09	-0.083858m	-0.083174m
45	gpsds	ONGD	MB09	-0.005535m	0.001459m
46	gpsaz	0776	NYP1	-0.018538"	1.685025"
47	gpsht	0776	NYP1	0.001330m	0.013210m
48	gpsds	0776	NYP1	0.000657m	-0.002106m
49	gpsaz	1136	NYP1	0.503780"	-2.141687"
50	gpsht	1136	NYP1	-0.014490m	0.019389m
51	gpsds	1136	NYP1	-0.000366m	-0.004156m
52	gpsaz	1136	BMH8	-0.078733"	0.315101"
53	gpsht	1136	BMH8	0.004806m	-0.036680m
54	gpsds	1136	BMH8	-0.002413m	0.001080m
55	gpsaz	BMH8	MB02	-0.056606"	0.284482"
56	gpsht	BMH8	MB02	0.003356m	0.012129m
57	gpsds	BMH8	MB02	-0.001295m	-0.000321m
58	gpsaz	0776	1133	0.152918"	0.174459"
59	gpsht	0776	1133	0.021086m	0.767308m
60	gpsds	0776	1133	-0.112747m	-0.055973m
61	gpsaz	1132	1133	0.018157"	-0.849557"
62	gpsht	1132	1133	0.004914m	-0.235598m
63	gpsds	1132	1133	0.001267m	0.054787m
64	gpsaz	1133	MB01	1.074721"	0.026386"
65	gpsht	1133	MB01	0.029612m	-0.737269m
66	gpsds	1133	MB01	0.110846m	0.010085m
67	gpsaz	MB01	NYP1	-0.027308"	-0.493658"
68	gpsht	MB01	NYP1	0.020326m	-0.016812m
69	gpsds	MB01	NYP1	0.003585m	0.000773m
70	gpsaz	MB01	MB02	1.064581"	0.201142"
71	gpsht	MB01	MB02	0.011995m	-0.060795m
72	gpsds	MB01	MB02	0.015860m	0.001143m
73	gpsaz	MB02	MB06	2.779110"	0.210435"
74	gpsht	MB02	MB06	-0.017478m	-0.038559m
75	gpsds	MB02	MB06	0.023519m	0.000757m
76	gpsaz	BMH8	MB06	-0.031922"	0.097645"
77	gpsht	BMH8	MB06	0.005299m	-0.026418m
78	gpsds	BMH8	MB06	-0.002738m	0.000240m
79	gpsaz	MB03	MB06	-0.980034"	1.224783"
80	gpsht	MB03	MB06	0.059368m	-0.009369m
81	gpsds	MB03	MB06	0.002214m	0.001075m

82	gpsaz	1132	1136	0.344178"	-0.013849"
83	gpsht	1132	1136	-0.136578m	-1.008883m
84	gpsds	1132	1136	-0.133430m	0.009233m
85	gpsaz	1133	1136	0.399382"	-0.010378"
86	gpsht	1133	1136	-0.115169m	-0.773334m
87	gpsds	1133	1136	-0.093171m	0.009954m
88	gpsaz	MB03	MB04	0.320109"	1.063360"
89	gpsht	MB03	MB04	0.004607m	0.031471m
90	gpsds	MB03	MB04	-0.000501m	-0.003358m
91	gpsaz	MB04	MB06	-5.032509"	-0.233703"
92	gpsht	MB04	MB06	0.023846m	-0.040840m
93	gpsds	MB04	MB06	0.096263m	0.008382m
94	gpsaz	MB04	MB07	-0.167466"	1.262106"
95	gpsht	MB04	MB07	0.026578m	0.029416m
96	gpsds	MB04	MB07	-0.000555m	-0.003918m
97	gpsaz	MB06	MB07	0.047429"	0.622510"
98	gpsht	MB06	MB07	-0.033829m	0.070258m
99	gpsds	MB06	MB07	0.000354m	-0.006323m
100	gpsaz	MB06	MB09	1.762897"	0.124294"
101	gpsht	MB06	MB09	-0.003810m	0.197442m
102	gpsds	MB06	MB09	-0.016137m	-0.002428m
103	gpsaz	MB06	NYP1	2.146403"	-0.079657"
104	gpsht	MB06	NYP1	0.155431m	0.082488m
105	gpsds	MB06	NYP1	0.050271m	-0.000612m

ADJUSTMENT STATISTICS SUMMARY

NETWORK = NAMUYUAM

TIME = Sun Jan 02 10:33:42 1994

ADJUSTMENT SUMMARY

Reference Factor = 0.77

Chi-Square Test ($\alpha = 95\%$) = PASS

Degrees of Freedom = 49

Reference Factor for GPS Solution # 1 = 0.82	r = 1.07
Reference Factor for GPS Solution # 2 = 0.49	r = 0.89
Reference Factor for GPS Solution # 3 = 1.05	r = 2.76
Reference Factor for GPS Solution # 4 = 0.20	r = 2.72
Reference Factor for GPS Solution # 5 = 1.17	r = 1.18
Reference Factor for GPS Solution # 6 = 1.24	r = 1.16
Reference Factor for GPS Solution # 7 = 0.88	r = 0.84
Reference Factor for GPS Solution # 8 = 0.59	r = 1.22
Reference Factor for GPS Solution # 9 = 0.42	r = 0.97
Reference Factor for GPS Solution # 10 = 0.45	r = 1.20
Reference Factor for GPS Solution # 11 = 0.33	r = 1.43
Reference Factor for GPS Solution # 12 = 0.72	r = 1.26
Reference Factor for GPS Solution # 13 = 0.48	r = 1.99
Reference Factor for GPS Solution # 14 = 0.99	r = 0.37
Reference Factor for GPS Solution # 15 = 0.58	r = 1.88
Reference Factor for GPS Solution # 16 = 0.86	r = 0.03
Reference Factor for GPS Solution # 17 = 1.65	r = 0.18
Reference Factor for GPS Solution # 18 = 0.54	r = 0.40
Reference Factor for GPS Solution # 19 = 0.14	r = 1.06
Reference Factor for GPS Solution # 20 = 0.82	r = 2.26
Reference Factor for GPS Solution # 21 = 0.62	r = 0.11
Reference Factor for GPS Solution # 22 = 1.23	r = 2.07
Reference Factor for GPS Solution # 23 = 1.16	r = 0.36
Reference Factor for GPS Solution # 24 = 0.68	r = 1.75
Reference Factor for GPS Solution # 25 = 0.79	r = 2.16
Reference Factor for GPS Solution # 26 = 0.39	r = 0.61
Reference Factor for GPS Solution # 27 = 1.06	r = 1.63
Reference Factor for GPS Solution # 28 = 0.69	r = 1.56
Reference Factor for GPS Solution # 29 = 0.49	r = 2.32
Reference Factor for GPS Solution # 30 = 0.35	r = 0.69
Reference Factor for GPS Solution # 31 = 0.89	r = 2.26
Reference Factor for GPS Solution # 32 = 0.49	r = 1.95

Reference Factor for GPS Solution # 33 =	0.86	r =	1.19
Reference Factor for GPS Solution # 34 =	0.32	r =	2.58
Reference Factor for GPS Solution # 35 =	0.99	r =	<u>2.88</u>
			49.00

WEIGHTING STRATEGIES:

SCALAR WEIGHTING STRATEGY

User-Defined Scalar Set Applied Globally = 10.00

No summation weighting strategy was used

STATION ERROR STRATEGY

H.I. error = 0.0020

Tribach error = 0.0020

COORDINATE ADJUSTMENT SUMMARY

NETWORK = NAMUYUAM

TIME = Sun Jan 02 10:33:42 1994

Datum = WGS-84

Coordinate System = Geographic

Zone = Global

Network Adjustment Constraints:

Inner constraints in y

Inner constraints in x

5 fixed coordinates in h

POINT	NAME	OLD COORDS	ADJUST	NEW COORDS	1.00 σ
1	LAT	= 18 ^o 10' 42.616519"	+0.000019"	18 ^o 10' 42.616538"	0.010483m
0776	LON	= 97 ^o 55' 50.672399"	+0.000129"	97 ^o 55' 50.672528"	0.014375m
	HEIGHT	= 214.3146m	+0.0008m	214.3154m	0.020535m
2	LAT	= 17 ^o 47' 43.305506"	-0.000350"	17 ^o 47' 43.305156"	0.026953m
0NGD	LON	= 97 ^o 59' 08.896677"	-0.001213"	97 ^o 59' 08.895465"	0.054310m
	HEIGHT	= 299.7826m	-0.0143m	299.7683m	0.047067m
3	LAT	= 18 ^o 08' 26.911412"	-0.000049"	18 ^o 08' 26.911363"	0.019195m
1132	LON	= 98 ^o 06' 50.998369"	-0.000318"	98 ^o 06' 50.998051"	0.039233m
	HEIGHT	= 1073.5180m	+0.0000m	1073.5180m	0.000000m
4	LAT	= 18 ^o 09' 13.652893"	-0.000070"	18 ^o 09' 13.652824"	0.018312m
1133	LON	= 98 ^o 04' 15.221941"	-0.000255"	98 ^o 04' 15.221687"	0.038086m
	HEIGHT	= 1117.7951m	+0.0039m	1117.7990m	0.019919m
5	LAT	= 18 ^o 09' 29.401103"	+0.000019"	18 ^o 09' 29.401122"	0.009311m
1136	LON	= 97 ^o 55' 49.859334"	+0.000144"	97 ^o 55' 49.859478"	0.012544m
	HEIGHT	= 208.6030m	+0.0000m	208.6030m	0.000000m
6	LAT	= 18 ^o 05' 55.866483"	+0.000018"	18 ^o 05' 55.866501"	0.008319m
BMH8	LON	= 97 ^o 55' 35.317459"	+0.000183"	97 ^o 55' 35.317642"	0.011322m
	HEIGHT	= 197.1414m	-0.0177m	197.1237m	0.020300m
7	LAT	= 17 ^o 47' 47.966872"	-0.000280"	17 ^o 47' 47.966592"	0.024160m
BMN4	LON	= 97 ^o 59' 23.756903"	-0.001271"	97 ^o 59' 23.755632"	0.053787m
	HEIGHT	= 167.5990m	+0.0000m	167.5990m	0.000000m
8	LAT	= 17 ^o 50' 33.257963"	+0.000049"	17 ^o 50' 33.258013"	0.010834m

DSLK	LON	=	97° 50' 46.764563"	+0.000208"	97° 50' 46.764770"	0.014313m
	HEIGHT	=	693.1143m	-0.0144m	693.0999m	0.021519m
9	LAT	=	18° 07' 30.551798"	+0.000007"	18° 07' 30.551805"	0.011037m
MB01	LON	=	97° 56' 18.710954"	+0.000123"	97° 56' 18.711077"	0.015460m
	HEIGHT	=	212.6273m	-0.0073m	212.6200m	0.026170m
10	LAT	=	18° 01' 45.259079"	+0.000035"	18° 01' 45.259113"	0.010420m
MB02	LON	=	97° 55' 54.238985"	+0.000201"	97° 55' 54.239186"	0.017427m
	HEIGHT	=	208.9935m	-0.0229m	208.9706m	0.032169m
11	LAT	=	17° 58' 11.833563"	+0.000104"	17° 58' 11.833668"	0.008412m
MB03	LON	=	97° 55' 44.586154"	+0.000217"	97° 55' 44.586371"	0.012569m
	HEIGHT	=	196.6930m	+0.0000m	196.6930m	0.000000m
12	LAT	=	17° 57' 24.601430"	+0.000076"	17° 57' 24.601506"	0.007846m
MB04	LON	=	97° 56' 07.174640"	+0.000236"	97° 56' 07.174877"	0.012287m
	HEIGHT	=	170.6591m	-0.0659m	170.5932m	0.015588m
13	LAT	=	17° 56' 20.138152"	+0.000081"	17° 56' 20.138233"	0.008194m
MB05	LON	=	97° 56' 55.279863"	+0.000222"	97° 56' 55.280085"	0.012310m
	HEIGHT	=	241.8186m	-0.0626m	241.7560m	0.022069m
14	LAT	=	17° 57' 26.237681"	+0.000055"	17° 57' 26.237737"	0.006482m
MB06	LON	=	97° 55' 40.481520"	+0.000205"	97° 55' 40.481725"	0.010510m
	HEIGHT	=	161.6333m	-0.0505m	161.5828m	0.018233m
15	LAT	=	17° 56' 51.375178"	+0.000078"	17° 56' 51.375256"	0.007861m
MB07	LON	=	97° 56' 27.807540"	+0.000219"	97° 56' 27.807759"	0.011856m
	HEIGHT	=	158.4574m	-0.0596m	158.3978m	0.021129m
16	LAT	=	17° 55' 40.799803"	+0.000081"	17° 55' 40.799883"	0.008873m
MB08	LON	=	97° 57' 35.279661"	+0.000217"	97° 57' 35.279877"	0.013483m
	HEIGHT	=	164.1250m	-0.0598m	164.0652m	0.027416m
17	LAT	=	17° 51' 55.211383"	+0.000019"	17° 51' 55.211402"	0.011407m
MB09	LON	=	97° 58' 03.648253"	+0.000138"	97° 58' 03.648391"	0.017949m
	HEIGHT	=	145.0389m	-0.0381m	145.0008m	0.032649m
18	LAT	=	17° 50' 32.322996"	+0.000053"	17° 50' 32.323048"	0.012163m
MB11	LON	=	97° 50' 44.433325"	+0.000224"	97° 50' 44.433549"	0.015397m
	HEIGHT	=	696.7463m	-0.0126m	696.7337m	0.022033m
19	LAT	=	18° 10' 00.071881"	+0.000011"	18° 10' 00.071892"	0.009656m

NYP1	LON	=	97° 56' 01.164156"	+0.000147"	97° 56' 01.164303"	0.013560m
	HEIGHT	=	214.3653m	-0.0008m	214.3645m	0.015784m
20	LAT	=	17° 47' 00.595682"	+0.000044"	17° 47' 00.595726"	0.012368m
NYP2	LON	=	97° 47' 18.950208"	+0.000245"	97° 47' 18.950453"	0.015811m
	HEIGHT	=	77.9560m	+0.0000m	77.9560m	0.000000m

OBSERVATION ADJUSTMENT SUMMARY

NETWORK = NAMUYUAM

TIME = Sun Jan 02 10:34:23 1994

OBSERVATION ADJUSTMENT (Tau = 3.32)

Deflection in latitude = -0.4521 seconds 1.00 σ = 0.2859 secondsDeflection in longitude = +10.7536 seconds 1.00 σ = 0.4388 seconds

OBS#	TYPE	OBSERVED	1.00 σ	CORR	ADJUSTED	1.00 σ	TAU
1	gpsaz	34 ^o 14' 20.6624"	0.2124	+0.0810	34 ^o 14' 20.7434"	0.1897	0.25
2	gpsht	-531.0096	0.0564	-0.0291	-531.0387	0.0350	0.20
3	gpsds	15360.7062	0.0157	-0.0148	15360.6914	0.0133	0.53
4	gpsaz	78 ^o 53' 54.8519"	0.2133	-0.0699	78 ^o 53' 54.7820"	0.1800	0.18
5	gpsht	-547.4461	0.0490	+0.0231	-547.4230	0.0337	0.20
6	gpsds	13107.2422	0.0147	+0.0004	13107.2425	0.0139	0.02
7	gpsaz	214 ^o 24' 55.6327"	1.9158	-1.5544	214 ^o 24' 54.0784"	0.2023	0.25
8	gpsht	+534.6252	0.1133	+0.0433	+534.6685	0.0370	0.12
9	gpsds	15423.0601	0.0538	+0.0938	15423.1539	0.0146	0.55
10	gpsaz	258 ^o 52' 14.1144"	1.5937	+0.1239	258 ^o 52' 14.2383"	0.2023	0.02
11	gpsht	+551.0207	0.0876	+0.0323	+551.0530	0.0358	0.12
12	gpsds	13180.1892	0.1104	-0.0052	13180.1840	0.0149	0.01
13	gpsaz	223 ^o 07' 00.2313"	0.1877	-0.2188	223 ^o 07' 00.0125"	0.1495	0.58
14	gpsht	-615.4843	0.0323	+0.0070	-615.4773	0.0234	0.09
15	gpsds	8955.4430	0.0090	-0.0114	8955.4317	0.0072	0.63
16	gpsaz	222 ^o 55' 12.1768"	0.1997	+0.2282	222 ^o 55' 12.4050"	0.1521	0.53
17	gpsht	-619.1048	0.0299	-0.0026	-619.1075	0.0228	0.04
18	gpsds	8887.5735	0.0094	+0.0130	8887.5865	0.0073	0.66
19	gpsaz	247 ^o 17' 05.2703"	20.7848	+9.3016	247 ^o 17' 14.5719"	16.8609	0.23
20	gpsht	+3.6247	0.0239	+0.0054	+3.6301	0.0196	0.12
21	gpsds	74.4451	0.0067	+0.0053	74.4504	0.0059	0.48
22	gpsaz	144 ^o 27' 41.4265"	0.7055	+0.1840	144 ^o 27' 41.6105"	0.5395	0.12
23	gpsht	+71.2150	0.0211	+0.0173	+71.2324	0.0162	0.38
24	gpsds	2435.5094	0.0075	-0.0038	2435.5055	0.0056	0.23
25	gpsaz	319 ^o 54' 36.1964"	0.9371	-0.3436	319 ^o 54' 35.8528"	0.7787	0.20
26	gpsht	-83.4023	0.0147	+0.0040	-83.3983	0.0124	0.15
27	gpsds	1255.3405	0.0056	+0.0021	1255.3426	0.0045	0.18
28	gpsaz	135 ^o 46' 24.3319"	1.1003	-0.4433	135 ^o 46' 23.8886"	0.8334	0.19
29	gpsht	-77.6401	0.0241	+0.0079	-77.6321	0.0184	0.15

30	gpsds	1687.7205	0.0068	+0.0007	1687.7212	0.0055	0.05
31	gpsaz	137° 32' 07.1389"	0.6512	+0.3224	137° 32' 07.4613"	0.4814	0.22
32	gpsht	+5.7618	0.0277	+0.0044	+5.7661	0.0189	0.06
33	gpsds	2941.1841	0.0080	-0.0016	2941.1825	0.0057	0.08
34	gpsaz	342° 45' 43.5981"	4.3203	+3.9358	342° 45' 47.5338"	1.5170	0.29
35	gpsht	-22.5764	0.1287	-0.1281	-22.7045	0.0395	0.31
36	gpsds	7958.8950	0.0304	-0.0086	7958.8864	0.0224	0.13
37	gpsaz	173° 07' 59.7264"	3.6092	+1.0591	173° 08' 00.7854"	0.6464	0.09
38	gpsht	-19.0939	0.0903	+0.0578	-19.0360	0.0320	0.21
39	gpsds	6985.6201	0.0272	+0.0100	6985.6301	0.0140	0.13
40	gpsaz	71° 52' 09.0488"	8.7926	-4.0844	71° 52' 04.9644"	8.0477	0.35
41	gpsht	-132.1862	0.0543	+0.0400	-132.1462	0.0472	0.45
42	gpsds	460.5152	0.0161	-0.0004	460.5148	0.0159	0.06
43	gpsaz	346° 04' 12.5918"	2.5855	-0.0151	346° 04' 12.5767"	1.5360	0.00
44	gpsht	-154.7668	0.1006	-0.0839	-154.8507	0.0527	0.29
45	gpsds	7979.3714	0.0491	-0.0055	7979.3658	0.0248	0.04
46	gpsaz	166° 44' 08.7530"	0.8258	-0.0185	166° 44' 08.7345"	0.8246	0.13
47	gpsht	+0.0609	0.0128	+0.0013	+0.0623	0.0127	0.24
48	gpsds	1343.8888	0.0045	+0.0007	1343.8894	0.0045	0.37
49	gpsaz	19° 24' 31.8260"	1.3991	+0.5038	19° 24' 32.3298"	1.3703	0.54
50	gpsht	+5.7954	0.0164	-0.0145	+5.7809	0.0157	0.91
51	gpsds	999.7955	0.0053	-0.0004	999.7951	0.0052	0.09
52	gpsaz	183° 43' 34.4727"	0.2799	-0.0787	183° 43' 34.3939"	0.2761	0.52
53	gpsht	-11.5208	0.0258	+0.0048	-11.5160	0.0225	0.11
54	gpsds	6579.0199	0.0082	-0.0024	6579.0175	0.0077	0.24
55	gpsaz	175° 52' 07.0878"	0.3872	-0.0566	175° 52' 07.0312"	0.3767	0.19
56	gpsht	+11.8557	0.0463	+0.0034	+11.8590	0.0311	0.03
57	gpsds	7724.9301	0.0137	-0.0013	7724.9288	0.0098	0.04
58	gpsaz	100° 25' 44.1382"	0.7757	+0.1529	100° 25' 44.2911"	0.2993	0.06
59	gpsht	+904.2298	0.1128	+0.0211	+904.2509	0.0438	0.06
60	gpsds	15079.0909	0.1172	-0.1127	15078.9781	0.0409	0.31
61	gpsaz	287° 25' 51.6869"	0.3580	+0.0182	287° 25' 51.7051"	0.3510	0.08
62	gpsht	+44.0405	0.0202	+0.0049	+44.0454	0.0196	0.30
63	gpsds	4799.0876	0.0079	+0.0013	4799.0888	0.0078	0.35
64	gpsaz	257° 16' 07.6739"	0.6591	+1.0747	257° 16' 08.7486"	0.2604	0.53
65	gpsht	-905.9459	0.1422	+0.0296	-905.9162	0.0464	0.07
66	gpsds	14361.0472	0.0585	+0.1108	14361.1581	0.0415	0.81
67	gpsaz	353° 35' 56.5150"	0.4098	-0.0273	353° 35' 56.4877"	0.4039	0.12
68	gpsht	+1.7073	0.0255	+0.0203	+1.7277	0.0232	0.58
69	gpsds	4625.8377	0.0083	+0.0036	4625.8413	0.0076	0.34
70	gpsaz	183° 52' 43.2201"	1.3682	+1.0646	183° 52' 44.2847"	0.3732	0.24
71	gpsht	-3.7222	0.0637	+0.0120	-3.7102	0.0316	0.07
72	gpsds	10640.3003	0.0231	+0.0159	10640.3161	0.0121	0.24
73	gpsaz	182° 54'	3.6019	+2.7791	182° 54' 36.4377"	0.4403	0.23
		33.0.2993.6019					

74	gpsht	-47.4089	0.0918	-0.0175	-47.4264	0.0352	0.06
75	gpsds	7973.7464	0.0294	+0.0235	7973.7699	0.0116	0.26
76	gpsaz	179 ^o 26' 39.8064"	0.1310	-0.0319	179 ^o 26' 39.7745"	0.1300	0.61
77	gpsht	-35.5727	0.0335	+0.0053	-35.5674	0.0270	0.08
78	gpsds	15669.0929	0.0111	-0.0027	15669.0901	0.0095	0.14
79	gpsaz	184 ^o 55' 30.0283"	1.6675	-0.9800	184 ^o 55' 29.0483"	1.2631	0.27
80	gpsht	-35.1790	0.0344	+0.0594	-35.1196	0.0178	0.61
81	gpsds	1407.0132	0.0096	+0.0022	1407.0155	0.0067	0.10
82	gpsaz	275 ^o 40' 29.0217"	0.5317	+0.3442	275 ^o 40' 29.3659"	0.2194	0.21
84	gpsds	19527.8377	0.1217	-0.1334	19527.7042	0.0418	0.35
85	gpsaz	271 ^o 53' 19.5286"	0.6509	+0.3994	271 ^o 53' 19.9280"	0.2615	0.20
86	gpsht	-909.8541	0.1260	-0.1152	-909.9693	0.0421	0.29
87	gpsds	14861.6376	0.1418	-0.0932	14861.5445	0.0410	0.21
88	gpsaz	155 ^o 24' 19.3957"	1.0589	+0.3201	155 ^o 24' 19.7158"	0.9283	0.19
89	gpsht	-26.0730	0.0175	+0.0046	-26.0684	0.0151	0.16
90	gpsds	1597.0024	0.0067	-0.0005	1597.0019	0.0059	0.05
91	gpsaz	273 ^o 40' 01.3301"	5.7754	-5.0325	273 ^o 39' 56.2976"	1.6088	0.27
92	gpsht	-9.0751	0.0765	+0.0238	-9.0512	0.0178	0.10
93	gpsds	786.9717	0.1027	+0.0963	787.0680	0.0084	0.28
94	gpsaz	149 ^o 16' 27.5728"	1.8253	-0.1675	149 ^o 16' 27.4053"	1.1242	0.04
95	gpsht	-12.1925	0.0318	+0.0266	-12.1659	0.0167	0.30
96	gpsds	1188.3263	0.0090	-0.0006	1188.3258	0.0055	0.02
97	gpsaz	127 ^o 34' 54.7152"	0.9808	+0.0474	127 ^o 34' 54.7626"	0.7880	0.02
98	gpsht	-3.0809	0.0278	-0.0338	-3.1147	0.0195	0.51
99	gpsds	1757.3153	0.0084	+0.0004	1757.3156	0.0068	0.02
100	gpsaz	157 ^o 30' 06.3449"	4.7624	+1.7629	157 ^o 30' 08.1078"	0.3608	0.11
101	gpsht	-16.3807	0.1174	-0.0038	-16.3845	0.0337	0.01
102	gpsds	11015.0324	0.0766	-0.0161	11015.0162	0.0136	0.06
103	gpsaz	1 ^o 30' 06.4141"	3.2735	+2.1464	1 ^o 30' 08.5605"	0.1315	0.20
104	gpsht	+52.7088	0.2452	+0.1554	+52.8642	0.0328	0.19
105	gpsds	23184.3709	0.0739	+0.0503	23184.4212	0.0123	0.21

The following observations were excluded from the adjustment:

83 type= gps delta height

SUMMARY OF COVARIANCES

NETWORK = NAMUYUAM

TIME = Sun Jan 02 10:34:31 1994

FROM	TO	AZIMUTH	1.00 σ	DISTANCE	1.00 σ	DELTA H	1.00 σ	HOR PREC
0776	ONGD	172° 09' 40"	0.31	42805.37	0.0311	+ 85.45	0.0522	1: 1378344
0776	1132	102° 06' 15"	0.24	19851.34	0.0409	+859.20	0.0205	1: 485665
0776	1133	100° 25' 44"	0.30	15079.03	0.0400	+903.48	0.0267	1: 377285
0776	1136	180° 36' 30"	0.79	2251.14	0.0067	- 5.71	0.0205	1: 336944
0776	BMH8	182° 55' 53"	0.29	8827.67	0.0098	- 17.19	0.0281	1: 900622
0776	BMN4	171° 33' 13"	0.31	42725.35	0.0285	- 46.72	0.0205	1: 1501107
0776	DSLK	193° 31' 57"	0.12	38240.87	0.0183	+478.78	0.0299	1: 2092598
0776	MB01	172° 03' 13"	0.37	5962.27	0.0088	- 1.70	0.0270	1: 680510
0776	MB02	179° 38' 10"	0.23	16521.32	0.0123	- 5.34	0.0372	1: 1347418
0776	MB03	180° 26' 40"	0.16	23083.35	0.0146	- 17.62	0.0205	1: 1584749
0776	MB04	178° 51' 58"	0.15	24539.59	0.0143	- 43.72	0.0264	1: 1713529
0776	MB05	175° 53' 56"	0.14	26584.65	0.0147	+ 27.44	0.0314	1: 1808819
0776	MB06	180° 42' 06"	0.13	24486.32	0.0130	- 52.73	0.0282	1: 1882459
0776	MB07	177° 33' 06"	0.14	25579.63	0.0144	- 55.92	0.0304	1: 1770216
0776	MB08	173° 39' 50"	0.14	27896.26	0.0152	- 50.25	0.0357	1: 1834497
0776	MB09	173° 33' 21"	0.15	34881.64	0.0184	- 69.31	0.0402	1: 1894434
0776	MB11	193° 37' 21"	0.12	38284.90	0.0193	+482.42	0.0301	1: 1987136
0776	NYP1	166° 44' 07"	0.83	1343.89	0.0045	+ 0.05	0.0129	1: 296801
0776	NYP2	199° 01' 26"	0.10	46238.99	0.0197	- 136.36	0.0205	1: 2346680
ONGD	1132	19° 33' 23"	0.32	40579.61	0.0468	+773.75	0.0471	1: 866819
ONGD	1133	12° 47' 12"	0.34	40681.98	0.0421	+818.03	0.0520	1: 965551
ONGD	1136	351° 42' 41"	0.32	40580.00	0.0305	- 91.17	0.0471	1: 1332534
ONGD	BMH8	349° 24' 41"	0.38	34173.04	0.0295	- 102.64	0.0511	1: 1156953
ONGD	BMN4	71° 52' 06"	8.04	460.52	0.0159	- 132.17	0.0471	1: 28907
ONGD	DSLK	289° 28' 58"	0.51	15682.72	0.0541	+393.33	0.0503	1: 289882
ONGD	MB01	352° 11' 44"	0.36	36843.11	0.0312	- 87.15	0.0537	1: 1181558
ONGD	MB02	347° 31' 41"	0.50	26511.71	0.0302	- 90.80	0.0556	1: 878068
ONGD	MB03	342° 43' 13"	0.63	20237.92	0.0292	- 103.08	0.0471	1: 692867
ONGD	MB04	343° 20' 36"	0.69	18654.96	0.0289	- 129.18	0.0484	1: 646470
ONGD	MB05	346° 06' 04"	0.79	16369.25	0.0285	- 58.01	0.0496	1: 574674
ONGD	MB06	341° 06' 38"	0.67	18942.89	0.0289	- 138.19	0.0489	1: 654407
ONGD	MB07	344° 17' 17"	0.73	17504.58	0.0286	- 141.37	0.0495	1: 611451
ONGD	MB08	349° 22' 15"	0.87	14936.64	0.0283	- 135.70	0.0511	1: 527296
ONGD	MB09	346° 04' 13"	1.54	7979.36	0.0248	- 154.77	0.0501	1: 321292
ONGD	MB11	289° 18' 03"	0.52	15737.96	0.0549	+396.97	0.0508	1: 286913
ONGD	NYP1	352° 21' 14"	0.32	41467.70	0.0307	- 85.40	0.0501	1: 1350101
ONGD	NYP2	266° 26' 13"	0.28	20951.03	0.0612	- 221.81	0.0471	1: 342472
1132	1133	287° 25' 53"	0.36	4799.03	0.0083	+ 44.28	0.0199	1: 576445

1132	1136	275 ⁰ 40' 29"	0.22	19527.70	0.0419	- 864.92	0.0000	1: 465556
1132	BMH8	256 ⁰ 52' 14"	0.20	20399.34	0.0441	- 876.39	0.0203	1: 462237
1132	BMN4	199 ⁰ 04' 40"	0.33	40299.71	0.0448	- 905.92	0.0000	1: 898777
1132	DSLK	220 ⁰ 42' 59"	0.17	43523.40	0.0394	- 380.42	0.0215	1: 1103530
1132	MB01	264 ⁰ 42' 04"	0.21	18667.25	0.0429	- 860.90	0.0262	1: 435200
1132	MB02	237 ⁰ 25' 52"	0.24	22921.97	0.0434	- 864.55	0.0322	1: 528662
1132	MB03	226 ⁰ 03' 08"	0.24	27234.17	0.0398	- 876.83	0.0000	1: 684221
1132	MB04	222 ⁰ 56' 49"	0.25	27805.73	0.0388	- 902.92	0.0156	1: 716718
1132	MB05	218 ⁰ 07' 36"	0.26	28394.62	0.0371	- 831.76	0.0221	1: 764325
1132	MB06	224 ⁰ 10' 52"	0.23	28310.02	0.0386	- 911.94	0.0182	1: 733371
1132	MB07	220 ⁰ 37' 37"	0.25	28163.98	0.0380	- 915.12	0.0211	1: 741712
1132	MB08	214 ⁰ 46' 56"	0.27	28669.51	0.0363	- 909.45	0.0274	1: 790264
1132	MB09	206 ⁰ 59' 25"	0.26	34209.14	0.0353	- 928.52	0.0326	1: 969469
1132	MB11	220 ⁰ 45' 37"	0.17	43589.93	0.0401	- 376.78	0.0220	1: 1088174
1132	NYP1	278 ⁰ 33' 23"	0.23	19313.77	0.0415	- 859.15	0.0158	1: 464844
1132	NYP2	221 ⁰ 08' 24"	0.14	52471.86	0.0402	- 995.56	0.0000	1: 1305234
1133	1136	271 ⁰ 53' 20"	0.26	14861.53	0.0412	- 909.20	0.0199	1: 360911
1133	BMH8	248 ⁰ 19' 35"	0.25	16448.93	0.0422	- 920.68	0.0283	1: 390167
1133	BMN4	192 ⁰ 15' 11"	0.34	40447.28	0.0399	- 950.20	0.0199	1: 1012747
1133	DSLK	214 ⁰ 39' 29"	0.18	41859.06	0.0363	- 424.70	0.0299	1: 1152763
1133	MB01	257 ⁰ 16' 09"	0.26	14361.15	0.0416	- 905.18	0.0321	1: 345079
1133	MB02	226 ⁰ 55' 07"	0.31	20174.98	0.0391	- 908.83	0.0385	1: 515727
1133	MB03	216 ⁰ 26' 59"	0.28	25288.71	0.0354	- 921.11	0.0199	1: 715088
1133	MB04	213 ⁰ 22' 55"	0.28	26100.34	0.0342	- 947.21	0.0262	1: 763120
1133	MB05	208 ⁰ 34' 06"	0.29	27073.45	0.0324	- 876.04	0.0314	1: 835212
1133	MB06	214 ⁰ 51' 39"	0.27	26498.81	0.0341	- 956.22	0.0281	1: 776590
1133	MB07	211 ⁰ 04' 59"	0.29	26641.48	0.0333	- 959.40	0.0303	1: 800219
1133	MB08	205 ⁰ 13' 22"	0.29	27620.80	0.0315	- 953.73	0.0359	1: 877998
1133	MB09	198 ⁰ 54' 55"	0.27	33745.68	0.0311	- 972.80	0.0406	1: 1085358
1133	MB11	214 ⁰ 42' 47"	0.19	41921.71	0.0369	- 421.07	0.0303	1: 1135571
1133	NYP1	275 ⁰ 38' 04"	0.28	14590.98	0.0407	- 903.43	0.0242	1: 358146
1133	NYP2	216 ⁰ 09' 29"	0.15	50732.86	0.0375	-1039.84	0.0199	1: 1352489
1136	BMH8	183 ⁰ 43' 34"	0.28	6579.02	0.0077	- 11.48	0.0203	1: 856514
1136	BMN4	171 ⁰ 03' 09"	0.32	40503.81	0.0278	- 41.00	0.0000	1: 1455555
1136	DSLK	194 ⁰ 19' 58"	0.11	36050.28	0.0173	+484.50	0.0215	1: 2078058
1136	MB01	166 ⁰ 55' 55"	0.61	3751.15	0.0088	+ 4.02	0.0262	1: 427678
1136	MB02	179 ⁰ 28' 58"	0.24	14270.56	0.0112	+ 0.37	0.0322	1: 1275314
1136	MB03	180 ⁰ 25' 36"	0.16	20832.22	0.0134	- 11.91	0.0000	1: 1552479
1136	MB04	178 ⁰ 41' 25"	0.15	22289.59	0.0131	- 38.01	0.0156	1: 1695404
1136	MB05	175 ⁰ 27' 49"	0.13	24341.81	0.0135	+ 33.15	0.0221	1: 1797385
1136	MB06	180 ⁰ 42' 40"	0.12	22235.18	0.0117	- 47.02	0.0182	1: 1899229
1136	MB07	177 ⁰ 15' 24"	0.13	23332.00	0.0133	- 50.21	0.0211	1: 1756735
1136	MB08	173 ⁰ 03' 23"	0.13	25663.07	0.0141	- 44.54	0.0274	1: 1823228
1136	MB09	173 ⁰ 04' 15"	0.15	32648.70	0.0175	- 63.60	0.0326	1: 1866648

1136	MB11	194 ⁰ 25' 38"	0.12	36095.14	0.0184	+488.13	0.0220	1: 1962921
1136	NYP1	19 ⁰ 24' 34"	1.37	999.80	0.0052	+ 5.76	0.0158	1: 192287
1136	NYP2	199 ⁰ 56' 52"	0.10	44108.86	0.0188	- 130.65	0.0000	1: 2345060
BMH8	BMN4	168 ⁰ 37' 34"	0.38	34115.64	0.0269	- 29.52	0.0203	1: 1266005
BMH8	DSLK	196 ⁰ 40' 32"	0.12	29608.44	0.0159	+495.98	0.0287	1: 1862551
BMH8	MB01	23 ⁰ 39' 46"	0.85	3178.36	0.0118	+ 15.50	0.0310	1: 269477
BMH8	MB02	175 ⁰ 52' 07"	0.38	7724.93	0.0098	+ 11.85	0.0328	1: 790775
BMH8	MB03	178 ⁰ 54' 18"	0.19	14269.14	0.0116	- 0.43	0.0203	1: 1234606
BMH8	MB04	176 ⁰ 35' 14"	0.17	15746.56	0.0112	- 26.53	0.0240	1: 1400805
BMH8	MB05	172 ⁰ 25' 38"	0.15	17856.13	0.0117	+ 44.63	0.0282	1: 1524088
BMH8	MB06	179 ⁰ 26' 40"	0.13	15669.09	0.0095	- 35.54	0.0230	1: 1647515
BMH8	MB07	174 ⁰ 43' 42"	0.15	16811.23	0.0114	- 38.73	0.0272	1: 1474314
BMH8	MB08	169 ⁰ 25' 28"	0.15	19236.41	0.0123	- 33.06	0.0326	1: 1562610
BMH8	MB09	170 ⁰ 24' 34"	0.17	26211.36	0.0161	- 52.12	0.0375	1: 1624840
BMH8	MB11	196 ⁰ 47' 12"	0.13	29655.71	0.0170	+499.61	0.0292	1: 1743247
BMH8	NYP1	5 ⁰ 46' 38"	0.30	7546.43	0.0088	+ 17.24	0.0249	1: 853270
BMH8	NYP2	202 ⁰ 43' 50"	0.10	37836.43	0.0174	- 119.17	0.0203	1: 2169526
BMN4	DSLK	288 ⁰ 28' 50"	0.47	16049.97	0.0540	+525.50	0.0215	1: 296969
BMN4	MB01	351 ⁰ 29' 27"	0.36	36763.35	0.0286	+ 45.02	0.0262	1: 1285773
BMN4	MB02	346 ⁰ 32' 15"	0.50	26470.26	0.0278	+ 41.37	0.0322	1: 951699
BMN4	MB03	341 ⁰ 25' 04"	0.62	20236.32	0.0272	+ 29.09	0.0000	1: 744981
BMN4	MB04	341 ⁰ 55' 48"	0.68	18648.79	0.0268	+ 2.99	0.0156	1: 696986
BMN4	MB05	344 ⁰ 29' 31"	0.78	16341.72	0.0262	+ 74.16	0.0221	1: 623793
BMN4	MB06	339 ⁰ 43' 11"	0.66	18954.57	0.0270	- 6.02	0.0182	1: 701217
BMN4	MB07	342 ⁰ 46' 55"	0.72	17491.19	0.0265	- 9.20	0.0211	1: 660161
BMN4	MB08	347 ⁰ 36' 51"	0.86	14883.51	0.0258	- 3.53	0.0274	1: 577577
BMN4	MB09	342 ⁰ 45' 48"	1.52	7958.88	0.0224	- 22.60	0.0326	1: 354785
BMN4	MB11	288 ⁰ 18' 23"	0.47	16106.08	0.0548	+529.13	0.0220	1: 293784
BMN4	NYP1	351 ⁰ 43' 41"	0.31	41386.36	0.0281	+ 46.77	0.0158	1: 1473104
BMN4	NYP2	266 ⁰ 07' 41"	0.25	21397.06	0.0607	- 89.64	0.0000	1: 352402
DSLK	MB01	17 ⁰ 19' 37"	0.14	32765.48	0.0190	- 480.48	0.0336	1: 1722045
DSLK	MB02	23 ⁰ 38' 20"	0.20	22554.86	0.0185	- 484.13	0.0380	1: 1221743
DSLK	MB03	31 ⁰ 51' 33"	0.20	16601.55	0.0149	- 496.41	0.0215	1: 1112428
DSLK	MB04	36 ⁰ 42' 01"	0.20	15775.90	0.0151	- 522.51	0.0250	1: 1044644
DSLK	MB05	45 ⁰ 28' 19"	0.21	15211.98	0.0157	- 451.34	0.0283	1: 969492
DSLK	MB06	34 ⁰ 14' 21"	0.19	15360.70	0.0133	- 531.52	0.0254	1: 1154298
DSLK	MB07	40 ⁰ 47' 52"	0.20	15359.52	0.0150	- 534.70	0.0277	1: 1021841
DSLK	MB08	51 ⁰ 48' 22"	0.20	15297.42	0.0169	- 529.03	0.0317	1: 904352
DSLK	MB09	78 ⁰ 53' 55"	0.18	13107.25	0.0139	- 548.10	0.0329	1: 944403
DSLK	MB11	247 ⁰ 16' 40"	17.00	74.42	0.0059	+ 3.63	0.0196	1: 12562
DSLK	NYP1	14 ⁰ 26' 37"	0.12	37046.26	0.0178	- 478.74	0.0267	1: 2083113
DSLK	NYP2	223 ⁰ 06' 60"	0.15	8955.43	0.0072	- 615.14	0.0215	1: 1251781
MB01	MB02	183 ⁰ 52' 44"	0.37	10640.31	0.0121	- 3.65	0.0322	1: 878294
MB01	MB03	183 ⁰ 20' 43"	0.23	17206.92	0.0150	- 15.93	0.0262	1: 1144286

MB01	MB04	181° 02' 38"	0.21	18632.84	0.0148	- 42.03	0.0299	1: 1263122
MB01	MB05	177° 00' 40"	0.19	20639.68	0.0150	+ 29.14	0.0335	1: 1372906
MB01	MB06	183° 27' 53"	0.19	18613.44	0.0135	- 51.04	0.0303	1: 1375065
MB01	MB07	179° 13' 10"	0.20	19653.09	0.0148	- 54.22	0.0328	1: 1325157
MB01	MB08	174° 06' 15"	0.19	21936.98	0.0155	- 48.55	0.0372	1: 1415871
MB01	MB09	173° 52' 05"	0.19	28921.84	0.0186	- 67.62	0.0414	1: 1551121
MB01	MB11	197° 27' 18"	0.14	32813.41	0.0200	+484.11	0.0341	1: 1642622
MB01	NYP1	353° 35' 57"	0.41	4625.84	0.0076	+ 1.74	0.0233	1: 607458
MB01	NYP2	202° 48' 24"	0.11	41014.40	0.0205	- 134.66	0.0262	1: 1996596
MB02	MB03	182° 28' 42"	0.60	6567.81	0.0133	- 12.28	0.0322	1: 492861
MB02	MB04	177° 16' 50"	0.49	8022.83	0.0129	- 38.38	0.0336	1: 622791
MB02	MB05	169° 48' 43"	0.39	10155.72	0.0133	+ 32.79	0.0358	1: 766072
MB02	MB06	182° 54' 36"	0.44	7973.77	0.0116	- 47.39	0.0321	1: 688302
MB02	MB07	173° 45' 39"	0.42	9089.13	0.0130	- 50.57	0.0354	1: 701045
MB02	MB08	165° 08' 13"	0.35	11592.75	0.0138	- 44.91	0.0390	1: 837074
MB02	MB09	168° 08' 21"	0.29	18536.04	0.0173	- 63.97	0.0431	1: 1070463
MB02	MB11	203° 47' 43"	0.20	22608.77	0.0194	+487.76	0.0387	1: 1165085
MB02	NYP1	0° 45' 59"	0.24	15214.31	0.0115	+ 5.39	0.0341	1: 1322257
MB02	NYP2	209° 10' 04"	0.15	31141.27	0.0202	- 131.01	0.0322	1: 1543068
MB03	MB04	155° 24' 19"	0.93	1597.01	0.0059	- 26.10	0.0156	1: 271913
MB03	MB05	148° 47' 27"	0.44	4014.93	0.0078	+ 45.06	0.0221	1: 513394
MB03	MB06	184° 55' 28"	1.26	1407.01	0.0067	- 35.11	0.0182	1: 210664
MB03	MB07	152° 47' 20"	0.62	2781.43	0.0075	- 38.30	0.0211	1: 370582
MB03	MB08	144° 56' 46"	0.38	5672.01	0.0090	- 32.63	0.0274	1: 632777
MB03	MB09	160° 31' 37"	0.35	12281.05	0.0147	- 51.69	0.0326	1: 833107
MB03	MB11	212° 01' 58"	0.21	16662.25	0.0160	+500.04	0.0220	1: 1038654
MB03	NYP1	1° 16' 55"	0.16	21780.08	0.0139	+ 17.67	0.0158	1: 1566389
MB03	NYP2	215° 49' 28"	0.14	25444.80	0.0166	- 118.74	0.0000	1: 1531979
MB04	MB05	144° 27' 41"	0.54	2435.51	0.0057	+ 71.16	0.0169	1: 430759
MB04	MB06	273° 39' 57"	1.61	787.06	0.0084	- 9.01	0.0177	1: 93522
MB04	MB07	149° 16' 26"	1.13	1188.33	0.0055	- 12.20	0.0169	1: 214258
MB04	MB08	140° 54' 17"	0.44	4111.77	0.0072	- 6.53	0.0238	1: 569180
MB04	MB09	161° 17' 35"	0.41	10691.37	0.0142	- 25.59	0.0320	1: 751907
MB04	MB11	216° 51' 52"	0.22	15840.02	0.0162	+526.14	0.0257	1: 979127
MB04	NYP1	359° 33' 51"	0.15	23227.42	0.0136	+ 43.77	0.0225	1: 1702818
MB04	NYP2	219° 03' 01"	0.14	24695.52	0.0167	- 92.64	0.0156	1: 1478215
MB05	MB06	312° 43' 07"	0.53	2995.74	0.0075	- 80.17	0.0207	1: 397739
MB05	MB07	319° 54' 37"	0.78	1255.34	0.0045	- 83.36	0.0126	1: 281138
MB05	MB08	135° 46' 23"	0.83	1687.73	0.0055	- 77.69	0.0186	1: 308806
MB05	MB09	166° 07' 08"	0.52	8389.89	0.0140	- 96.76	0.0312	1: 598080
MB05	MB11	225° 36' 25"	0.22	15281.10	0.0167	+454.98	0.0291	1: 916669
MB05	NYP1	356° 23' 23"	0.14	25258.82	0.0140	- 27.39	0.0277	1: 1801962
MB05	NYP2	224° 37' 50"	0.14	24162.65	0.0171	- 163.80	0.0221	1: 1415119
MB06	MB07	127° 34' 54"	0.79	1757.32	0.0068	- 3.18	0.0194	1: 259535

MB06	MB08	133 ⁰ 48' 46"	0.41	4681.94	0.0085	+ 2.48	0.0259	1: 552912
MB06	MB09	157 ⁰ 30' 08"	0.36	11015.02	0.0136	- 16.58	0.0323	1: 808513
MB06	MB11	214 ⁰ 24' 54"	0.20	15423.13	0.0145	+535.15	0.0266	1: 1062607
MB06	NYP1	1 ⁰ 30' 09"	0.13	23184.42	0.0123	+ 52.78	0.0243	1: 1891283
MB06	NYP2	217 ⁰ 31' 54"	0.13	24248.26	0.0151	- 83.63	0.0182	1: 1608589
MB07	MB08	137 ⁰ 32' 07"	0.48	2941.19	0.0057	+ 5.67	0.0195	1: 516417
MB07	MB09	162 ⁰ 46' 57"	0.45	9532.30	0.0140	- 13.40	0.0316	1: 681815
MB07	MB11	220 ⁰ 57' 01"	0.21	15426.17	0.0161	+538.34	0.0285	1: 959743
MB07	NYP1	358 ⁰ 09' 01"	0.14	24260.92	0.0138	+ 55.97	0.0267	1: 1762973
MB07	NYP2	221 ⁰ 40' 51"	0.14	24310.32	0.0166	- 80.44	0.0211	1: 1468735
MB08	MB09	173 ⁰ 08' 01"	0.65	6985.63	0.0140	- 19.06	0.0307	1: 499865
MB08	MB11	231 ⁰ 54' 54"	0.22	15369.16	0.0178	+532.67	0.0324	1: 864559
MB08	NYP1	354 ⁰ 01' 22"	0.14	26562.67	0.0145	+ 50.30	0.0323	1: 1827135
MB08	NYP2	228 ⁰ 38' 04"	0.14	24187.93	0.0181	- 86.11	0.0274	1: 1338026
MB09	MB11	258 ⁰ 52' 14"	0.20	13180.15	0.0148	+551.73	0.0341	1: 890632
MB09	NYP1	353 ⁰ 50' 24"	0.15	33547.64	0.0179	+ 69.36	0.0370	1: 1878812
MB09	NYP2	244 ⁰ 31' 16"	0.13	21034.50	0.0153	- 67.04	0.0326	1: 1376092
MB11	NYP1	14 ⁰ 32' 06"	0.12	37091.26	0.0188	- 482.37	0.0270	1: 1973513
MB11	NYP2	222 ⁰ 55' 12"	0.15	8887.58	0.0073	- 618.78	0.0220	1: 1220991
NYP1	NYP2	199 ⁰ 56' 12"	0.10	45108.62	0.0192	- 136.41	0.0158	1: 2343342



ประวัติผู้เขียน

เกิดเมื่อ วันที่ 8 กรกฎาคม พ.ศ. 2501 ที่ กรุงเทพมหานคร สำเร็จการศึกษาระดับปริญญาตรี
ที่ ภาควิชาวิศวกรรมสำรวจ คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา พ.ศ.2523
ปัจจุบันทำหน้าที่ หัวหน้าแผนกสำรวจสายส่งและสถานีไฟฟ้าแรงสูง กองสำรวจ ฝ่ายสำรวจและที่ดิน
การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย