The BSC Group

VOLUME III :
OUTPUT FROM THE
LOCALIZATION AND ANALYSIS
OF
DEFORMATIONS

APPENDIX III A

Horizontal Deformation Analysis

Epoch 1 vs. Epoch 6

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**                **        *****
**              ****       **  **
**            **  **      **    **
**           **    **     **    **
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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*******************************************
*                                         *
*                                         *
*          PROJECT INFORMATION            *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HORIZONTAL DEFORMATION ANALYSIS         *
*                                         *
*                                         *
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*******************************************
*                                         *
*    DATE: 11-OCT-1987   TIME: 14:25:58   *
*                                         *
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*                                         *
* NETWORK: 1165400H   EPOCHS    1 AND    6 *
*                                         *
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THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:25:58
OPTION: ZFA1:[207,101]1165400H.PAR;3

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 1 EPOCH 2: 6

PROGRAM CONTROL:

EXAMINE FIXED POINTS	RESERVED
EPOCH ORDERING	NONE
CONFIDENCE LEVEL	95%
EPOCH CENTRING UNCERTAINTY	0 cm
EXAMINE BASE POINTS	YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:25:58
OPTION: ZFA1:[207,101]1165400H.PAR;3

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS

164
161
163

EXCLUDED POINTS

*** NO EXCLUDED POINTS DEFINED ***

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:25:59
OPTION: ZFA1:[207,101]1165400H.PAR;3

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:26:02
OPTION: ZFA1:[207,101]1165400H.PAR;3

3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 6	TOTAL
REDUNDANCY :	78.00	59.00	137.00
STD. DEV. UNIT WEIGHT :	0.9278523	1.2283866	1.0677012
WEIGHTED QUADRATIC RESIDUALS :	67.1509721	89.0270835	156.1780556
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:26:02
OPTION: ZFA1:[207,101]1165400H.PAR;3

3.1 INPUT COORDINATE REPORT

EPOCH: 1

POINT NUMBER	X	Y	Z
164	10000.0377	10273.8091	1006.1799
161	9884.6206	9926.4518	1000.9704
163	10203.6869	10080.8551	925.0641
162	10087.6880	9917.4346	1014.7672
165	9843.3682	10241.7497	1009.5622
11	9977.1192	10173.6777	1000.3702
12	9979.0467	10174.9262	1000.4113
13	9980.7113	10173.6617	1000.1971
14	9995.5502	10177.1434	992.6488
15	10022.2472	10176.3899	977.7838
16	10026.6273	10176.3835	975.2242
17	10039.5999	10175.6059	966.8988
18	10050.7145	10174.8444	960.4771
19	10076.4310	10173.1724	946.8237
21	9977.1005	10124.0793	1000.2713
22	9979.5689	10123.5307	1000.3987
23	9981.5818	10124.0299	1000.2412
24	9996.6703	10128.3890	991.8373
25	10020.8889	10129.7551	978.2093
26	10028.1531	10129.6703	974.0470
27	10040.6822	10130.6486	965.8831
28	10050.4780	10130.9387	960.6518
29	10075.9146	10132.3600	946.7466
31	9981.3281	10075.7317	1000.4710
32	9983.6879	10076.4455	1000.4770
33	9986.1737	10076.5779	1000.0984
34	10000.9422	10074.1680	992.1012
35	10025.8939	10077.3707	977.7904
36	10032.7421	10077.9094	973.9514
37	10046.3977	10079.8491	965.3917
38	10055.2805	10081.0761	960.6633
39	10080.0094	10084.1935	946.9470
166	10000.0377	9999.9561	1000.0000

EPOCH: 6

X	Y	Z
10000.1147	10273.8888	1006.4650
9884.6974	9926.5291	1001.4850
10203.7663	10080.9328	925.3040
10087.7686	9917.5119	1014.9810
9843.4435	10241.8284	1009.7800
9977.1946	10173.7568	1000.2730
9979.1222	10175.0058	1000.3150
9980.7928	10173.7407	1000.1030
9995.6322	10177.2212	992.5700
10022.3300	10176.4673	977.7050
10026.7107	10176.4626	975.1380
10039.6830	10175.6841	966.8130
10050.7973	10174.9232	960.3930
10076.4723	10173.2787	946.7430
9977.1777	10124.1587	1000.1760
9979.6481	10123.6097	1000.3040
9981.6653	10124.1115	1000.1480
9996.7533	10128.4680	990.2490
10020.9719	10129.8345	978.1230
10028.2371	10129.7488	973.9620
10040.7650	10130.7265	965.8000
10050.5619	10131.0186	960.5700
10075.9969	10132.4393	946.6670
9981.4062	10075.8122	1000.3780
9983.7725	10076.5253	1000.3840
9986.2588	10076.6580	1000.0010
10001.0242	10074.2486	992.0120
10025.9766	10077.4498	977.7070
10032.8256	10077.9886	973.8690
10046.4805	10079.9297	965.3180
10055.3631	10081.1554	960.5840
10080.0905	10084.2724	946.8710
10000.1153	10000.0338	1000.0000

DELTA CPU TIME = 0:00:02.66

number of fixed points in net	1	1
number of analyzed fixed points	1	1
fixed points net 1	166	
fixed points net 2	166	

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:26:03
OPTION: ZFA1:[207,101]1165400H.PAR;3

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	-0.1386	0.0178	0.0000	-8.4744
161	0.0830	0.1558	0.0000	-8.4744
163	0.0812	-0.1082	0.0000	-8.4744

SUMMARY

REDUNDANCY FROM CONDITIONS: 2.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 3.06239

SUM OF OMEGA: -8.4744 BOUNDARY VALUE: 6.1248 TEST PASSES

MAX. SINGLE OMEGA: -8.4744 BOUNDARY VALUE: 6.1248 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -7.7532 PPM DELTA CPU TIME = 0:00:00.62

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:26:14
OPTION: ZFA1:[207,101]1165400H.PAR;3

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
164	277- 19	0.0519	1.3619	-0.0515	-32.5881	0.0066	99.9751		
161	28- 2	0.0411	1.3619	0.0193	-2195.2319	0.0363	34.8711		
163	143- 7	0.0536	1.3619	0.0322	24.9512	-0.0429	-92.0549		
162	80- 13	0.2424	3.0565	0.2389	43.6687	0.0412	8.0717		
165	238- 57	0.1212	1.5838	-0.1038	-20.5503	-0.0625	-24.5864		
11	276- 54	0.1969	3.4034	-0.1955	-56.7493	0.0236	4.0320		
12	291- 2	0.2001	3.4663	-0.1868	-54.7653	0.0719	12.2093		
13	87- 38	0.4052	6.9141	0.4049	119.2567	0.0168	3.9318		
14	103- 13	0.4644	6.7104	0.4521	127.5066	-0.1061	-12.2703		
15	105- 53	0.5329	8.7381	0.5126	170.2937	-0.1459	-20.3650		
16	88- 2	0.5644	10.5994	0.5641	196.8349	0.0194	3.1734		
17	97- 43	0.5300	8.9337	0.5252	162.2629	-0.0712	-12.9885		
18	90- 56	0.4943	8.5330	0.4942	148.5326	-0.0080	-1.7344		
19	306- 47	4.5959	57.1625	-3.6808	-561.3272	2.7521	330.7270		
21	349- 49	0.0914	0.9591	-0.0161	-4.3373	0.0899	9.7058		
22	73- 3	0.1922	2.9088	0.1839	50.3217	0.0561	6.1959		
23	63- 29	0.6935	9.5945	0.6205	167.2167	0.3097	33.0905		
24	84- 49	0.5582	8.8093	0.5559	143.9114	0.0504	5.8059		
25	80- 30	0.5311	8.5129	0.5238	147.2698	0.0876	12.3291		
26	90- 55	0.6199	10.3419	0.6198	171.3450	-0.0100	-1.6675		
27	96- 53	0.5051	8.6601	0.5014	140.8982	-0.0606	-12.0770		
28	77- 43	0.6108	9.4440	0.5969	153.2800	0.1300	31.9462		
29	79- 40	0.4300	5.2438	0.4230	69.8326	0.0771	11.2617		
31	16- 53	0.2492	2.8447	0.0724	15.9675	0.2385	30.9456		
32	76- 44	0.7341	11.2147	0.7145	181.7927	0.1684	31.5298		
33	76- 9	0.7893	11.9564	0.7664	195.9671	0.1889	46.1090		
34	61- 52	0.5155	7.0755	0.4546	110.6615	0.2430	51.6769		
35	79- 6	0.5057	7.5733	0.4966	129.2321	0.0957	26.6960		
36	80- 10	0.5742	8.6144	0.5657	145.3243	0.0980	29.9122		
37	64- 16	0.5486	7.8020	0.4942	129.8096	0.2382	81.8665		
38	75- 40	0.4744	6.6388	0.4597	103.9351	0.1175	43.6806		
39	76- 34	0.3034	3.4254	0.2951	48.4348	0.0705	14.4108		
166	12- 46	0.0166	0.3305	0.0037	0.7640	0.0162	9.2514		

DELTA CPU TIME = 0:00:10.81

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:26:14
OPTION: ZFA1:[207,101]1165400H.PAR;3

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
164	255 - 51	0.0410	0.1015	0.0060	0.0150		
161	186 - 34	0.0325	0.0803	0.0048	0.0118		
163	121 - 39	0.0424	0.1048	0.0062	0.0155		
162	227 - 8	0.0882	0.2182	0.0529	0.1309		
165	243 - 30	0.0767	0.1898	0.0414	0.1024		
11	192 - 16	0.0773	0.1914	0.0577	0.1427		
12	192 - 46	0.0776	0.1920	0.0572	0.1417		
13	203 - 35	0.0668	0.1654	0.0565	0.1398		
14	159 - 39	0.0973	0.2408	0.0523	0.1293		
15	169 - 59	0.0854	0.2114	0.0536	0.1327		
16	171 - 34	0.0787	0.1948	0.0528	0.1308		
17	160 - 28	0.0762	0.1886	0.0540	0.1336		
18	153 - 49	0.0711	0.1760	0.0539	0.1335		
19	200 - 19	0.0927	0.2295	0.0792	0.1961		
21	180 - 30	0.0963	0.2382	0.0610	0.1510		
22	184 - 48	0.0953	0.2359	0.0601	0.1488		
23	184 - 52	0.0969	0.2399	0.0606	0.1499		
24	187 - 16	0.0936	0.2317	0.0615	0.1522		
25	191 - 14	0.0852	0.2108	0.0584	0.1445		
26	196 - 50	0.0789	0.1952	0.0581	0.1439		
27	202 - 54	0.0730	0.1807	0.0569	0.1409		
28	221 - 19	0.0683	0.1690	0.0574	0.1421		
29	218 - 53	0.0912	0.2256	0.0678	0.1677		
31	187 - 32	0.0881	0.2181	0.0669	0.1656		
32	200 - 49	0.0747	0.1849	0.0608	0.1504		
33	222 - 11	0.0703	0.1741	0.0553	0.1369		
34	218 - 29	0.0756	0.1872	0.0556	0.1375		
35	227 - 12	0.0735	0.1819	0.0450	0.1113		
36	230 - 10	0.0728	0.1802	0.0432	0.1070		
37	232 - 31	0.0713	0.1765	0.0404	0.0999		
38	238 - 52	0.0736	0.1822	0.0412	0.1019		
39	229 - 15	0.0977	0.2419	0.0378	0.0936		
166	248 - 19	0.0733	0.1814	0.0343	0.0849		

DELTA CPU TIME = 0:00:00.34

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:26:15
OPTION: ZFA1:[207,101]1165400H.PAR;3

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
164	255 - 51	0.1104	0.2733	0.0163	0.0403		
161	186 - 34	0.1395	0.3453	0.0206	0.0509		
163	121 - 39	0.1069	0.2647	0.0158	0.0390		

DELTA CPU TIME = 0:00:00.38

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:26:25
OPTION: ZFA1:[207,101]1165400H.PAR;3

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	28.3409	6.1248	***
165	9.3177	6.1248	***
11	6.2427	6.1248	***
12	9.0471	6.1248	***
13	60.0769	6.1248	***
14	118.4514	6.1248	***
15	172.8842	6.1248	***
16	243.2015	6.1248	***
17	188.2093	6.1248	***
18	171.2900	6.1248	***
19	3437.4597	6.1248	***
21	12.2829	6.1248	***
22	28.0833	6.1248	***
23	97.6512	6.1248	***
24	107.9000	6.1248	***
25	128.4793	6.1248	***
26	166.4129	6.1248	***
27	127.5355	6.1248	***
28	163.0629	6.1248	***
29	35.6804	6.1248	***
31	20.9347	6.1248	***
32	151.8015	6.1248	***
33	185.0770	6.1248	***
34	80.7568	6.1248	***
35	125.6429	6.1248	***
36	157.1103	6.1248	***
37	134.9145	6.1248	***
38	88.0046	6.1248	***
39	18.3477	6.1248	***
166	13.1288	6.1248	***

DELTA CPU TIME = 0:00:13.99

THE BSC GROUP - PROJECT 1-1654.00 DATE: 11-OCT-1987 TIME: 14:26:40
INPUT: ZFA1:[207,101]1165400H.INP;1 OUTPUT: ZFA1:[207,101]1165416H.OUT;1 OPTION: ZFA1:[207,101]1165400H.PAR;3

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 125.2114 MAX. CHANGE OMEGA: 125.2114 BOUNDARY VALUE: 3.9100

SIGNIFICANT X-TRANSLATION OF 0.284564 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 191.0426 MAX. CHANGE OMEGA: 65.8312 BOUNDARY VALUE: 3.9100

SIGNIFICANT X-TRANSLATION OF 0.446574 cm

SIGNIFICANT Z-ROTATION OF -0.000016 radian

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999

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MAXIMUM OMEGA:      257.7865      MAX. CHANGE OMEGA:      66.7439    BOUNDARY VALUE:      3.9100

SIGNIFICANT X-TRANSLATION    OF   0.493977    cm

SIGNIFICANT Z-ROTATION       OF  -0.000016    radian

SIGNIFICANT Y-TRANSLATION    OF   0.223748    cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION
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9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000016 radian	YES
Y-TRANSLATION	0.223748 cm	YES
X-TRANSLATION	0.493977 cm	YES

DELTA CPU TIME = 0:00:19.38

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987

TIME: 14:26:49
OPTION: ZFA1:[207,101]1165400H.PAR;3

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	253- 51	0.7165	11.4326	-0.6882	-199.7396	-0.1993	-33.9888		
12	257- 28	0.6960	11.3241	-0.6794	-199.2060	-0.1511	-25.6680		
13	203- 3	0.2241	3.3538	-0.0878	-25.8509	-0.2062	-48.3892		
14	187- 0	0.3318	3.6999	-0.0405	-11.4147	-0.3293	-38.0720		
15	176- 54	0.3701	4.3512	0.0200	6.6361	-0.3695	-51.5835		
16	160- 43	0.2164	2.7770	0.0715	24.9453	-0.2043	-33.3710		
17	173- 42	0.2969	3.9488	0.0326	10.0739	-0.2951	-53.8374		
18	179- 37	0.2322	3.4040	0.0016	0.4726	-0.2321	-50.0349		
21	255- 23	0.5267	8.2260	-0.5096	-136.9045	-0.1330	-14.3504		
22	241- 41	0.3517	4.8543	-0.3096	-84.7309	-0.1669	-18.4384		
23	55- 41	0.1538	1.9924	0.1270	34.2271	0.0867	9.2642		
24	160- 7	0.1837	2.0895	0.0625	16.1731	-0.1728	-19.8855		
25	167- 22	0.1393	1.7118	0.0305	8.5644	-0.1360	-19.1269		
26	151- 36	0.2657	3.8397	0.1264	34.9423	-0.2337	-39.0614		
27	178- 23	0.2846	4.0367	0.0081	2.2669	-0.2845	-56.7335		
28	132- 17	0.1399	2.4353	0.1035	26.5779	-0.0941	-23.1227		
29	205- 30	0.1633	1.8135	-0.0703	-11.6096	-0.1474	-21.5350		
31	272- 7	0.4222	6.2890	-0.4219	-93.0623	0.0155	2.0161		
32	103- 55	0.2269	3.7207	0.2203	56.0395	-0.0545	-10.2100		
33	97- 9	0.2742	4.5199	0.2721	69.5802	-0.0341	-8.3362		
34	296- 25	0.0443	0.7837	-0.0397	-9.6681	0.0197	4.1965		
35	178- 56	0.1280	2.1574	0.0024	0.6166	-0.1280	-35.7164		
36	150- 23	0.1447	3.2529	0.0715	18.3655	-0.1258	-38.3812		
37	359- 50	0.0141	0.2624	0.0000	-0.0109	0.0141	4.8562		
38	197- 56	0.1121	1.8148	-0.0345	-7.8056	-0.1067	-39.6768		
39	232- 16	0.2517	2.5785	-0.1991	-32.6788	-0.1541	-31.4990		

DELTA CPU TIME = 0:00:01.09

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:26:51
OPTION: ZFA1:[207,101]1165400H.PAR;3

10.0 SUMMARY REPORT

PROGRAM SUMMARY

33 POINTS INPUT FROM EPOCH 1

34 POINTS INPUT FROM EPOCH 6

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 3 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:58.95

TOTAL CPU TIME = 0:00:52.30

```
**            **       *****
**           ****      **  **
**          **  **     **   **
**         **    **    **    **
**        **      **   **    **
**        **      **   **    **
**        **********   **    **
**        **********   **    **
**        **      **   **   **
*******   **      **   **  **
*******   **      **   *****
```

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

```
*******************************************
*                                         *
*                                         *
*          PROJECT INFORMATION            *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HORIZONTAL DEFORMATION ANALYSIS         *
*                                         *
*                                         *
*******************************************
```

```
*******************************************
*                                         *
*    DATE: 11-OCT-1987   TIME: 14:31:10   *
*                                         *
*******************************************
```

```
*******************************************
*                                         *
* NETWORK: 1165400H   EPOCHS    1 AND   6 *
*                                         *
*******************************************
```

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:31:10
OPTION: ZFA1:[207,101]1165400H.PAR;3

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 1 EPOCH 2: 6

PROGRAM CONTROL:

EXAMINE FIXED POINTS	RESERVED
EPOCH ORDERING	NONE
CONFIDENCE LEVEL	95%
EPOCH CENTRING UNCERTAINTY	0 cm
EXAMINE BASE POINTS	YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS

164
161
163

EXCLUDED POINTS

*** NO EXCLUDED POINTS DEFINED ***

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK TWO

11
12
13
14
21
22
23
24
31
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33
34

GROUP # 2 BLOCK THREE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 6	TOTAL
REDUNDANCY :	78.00	59.00	137.00
STD. DEV. UNIT WEIGHT :	0.9278523	1.2283866	1.0677012
WEIGHTED QUADRATIC RESIDUALS :	67.1509721	89.0270835	156.1780556
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987
OUTPUT: ZFA1:[207,101]1165416H.OUT;1

TIME: 14:31:14
OPTION: ZFA1:[207,101]1165400H.PAR;3

3.1 INPUT COORDINATE REPORT

	EPOCH: 1			EPOCH: 6		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1799	10000.1147	10273.8888	1006.4650
161	9884.6206	9926.4518	1000.9704	9884.6974	9926.5291	1001.4850
163	10203.6869	10080.8551	925.0641	10203.7663	10080.9328	925.3040
162	10087.6880	9917.4346	1014.7672	10087.7686	9917.5119	1014.9810
165	9843.3682	10241.7497	1009.5622	9843.4435	10241.8284	1009.7800
11	9977.1192	10173.6777	1000.3702	9977.1946	10173.7568	1000.2730
12	9979.0467	10174.9262	1000.4113	9979.1222	10175.0058	1000.3150
13	9980.7113	10173.6617	1000.1971	9980.7928	10173.7407	1000.1030
14	9995.5502	10177.1434	992.6488	9995.6322	10177.2212	992.5700
15	10022.2472	10176.3899	977.7838	10022.3300	10176.4673	977.7050
16	10026.6273	10176.3835	975.2242	10026.7107	10176.4626	975.1380
17	10039.5999	10175.6059	966.8988	10039.6830	10175.6841	966.8130
18	10050.7145	10174.8444	960.4771	10050.7973	10174.9232	960.3930
19	10076.4310	10173.1724	946.8237	10076.4723	10173.2787	946.7430
21	9977.1005	10124.0793	1000.2713	9977.1777	10124.1587	1000.1760
22	9979.5689	10123.5307	1000.3987	9979.6481	10123.6097	1000.3040
23	9981.5818	10124.0299	1000.2412	9981.6653	10124.1115	1000.1480
24	9996.6703	10128.3890	991.8373	9996.7533	10128.4680	990.2490
25	10020.8889	10129.7551	978.2093	10020.9719	10129.8345	978.1230
26	10028.1531	10129.6703	974.0470	10028.2371	10129.7488	973.9620
27	10040.6822	10130.6486	965.8831	10040.7650	10130.7265	965.8000
28	10050.4780	10130.9387	960.6518	10050.5619	10131.0186	960.5700
29	10075.9146	10132.3600	946.7466	10075.9969	10132.4393	946.[illegible]670
31	9981.3281	10075.7317	1000.4710	9981.4062	10075.8122	1000.[illegible]780
32	9983.6879	10076.4455	1000.4770	9983.7725	10076.5253	1000.[illegible]840
33	9986.1737	10076.5779	1000.0984	9986.2588	10076.6580	1000.0010
34	10000.9422	10074.1680	992.1012	10001.0242	10074.2486	992.0120
35	10025.8939	10077.3707	977.7904	10025.9766	10077.4498	977.7070
36	10032.7421	10077.9094	973.9514	10032.8256	10077.9886	973.8690
37	10046.3977	10079.8491	965.3917	10046.4805	10079.9297	965.3180
38	10055.2805	10081.0761	960.6633	10055.3631	10081.1554	960.5840
39	10080.0094	10084.1935	946.9470	10080.0905	10084.2724	946.8710
166	10000.0377	9999.9561	1000.0000	10000.1153	10000.0338	1000.0000

DELTA CPU TIME = 0:00:02.53

number of fixed points in net 1 1
number of analyzed fixed points 1 1
fixed points net 1 166
fixed points net 2 166

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	-0.1386	0.0178	0.0000	-8.4744
161	0.0830	0.1558	0.0000	-8.4744
163	0.0812	-0.1082	0.0000	-8.4744

SUMMARY

REDUNDANCY FROM CONDITIONS: 2.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 3.06239

SUM OF OMEGA: -8.4744 BOUNDARY VALUE: 6.1248 TEST PASSES

MAX. SINGLE OMEGA: -8.4744 BOUNDARY VALUE: 6.1248 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -7.7532 PPM DELTA CPU TIME = 0:00:00.62

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:31:25
OPTION: ZFA1:[207,101]1165400H.PAR;3

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
164	277- 19	0.0519	1.3619	-0.0515	-32.5881	0.0066	99.9751		
161	28- 2	0.0411	1.3619	0.0193	-2195.2319	0.0363	34.8711		
163	143- 7	0.0536	1.3619	0.0322	24.9512	-0.0429	-92.0549		
162	80- 13	0.2424	3.0565	0.2389	43.6687	0.0412	8.0717		
165	238- 57	0.1212	1.5838	-0.1038	-20.5503	-0.0625	-24.5864		
11	276- 54	0.1969	3.4034	-0.1955	-56.7493	0.0236	4.0320		
12	291- 2	0.2001	3.4663	-0.1868	-54.7653	0.0719	12.2093		
13	87- 38	0.4052	6.9141	0.4049	119.2567	0.0168	3.9318		
14	103- 13	0.4644	6.7104	0.4521	127.5066	-0.1061	-12.2703		
15	105- 53	0.5329	8.7381	0.5126	170.2937	-0.1459	-20.3650		
16	88- 2	0.5644	10.5994	0.5641	196.8349	0.0194	3.1734		
17	97- 43	0.5300	8.9337	0.5252	162.2629	-0.0712	-12.9885		
18	90- 56	0.4943	8.5330	0.4942	148.5326	-0.0080	-1.7344		
19	306- 47	4.5959	57.1625	-3.6808	-561.3272	2.7521	330.7270		
21	349- 49	0.0914	0.9591	-0.0161	-4.3373	0.0899	9.7058		
22	73- 3	0.1922	2.9088	0.1839	50.3217	0.0561	6.1959		
23	63- 29	0.6935	9.5945	0.6205	167.2167	0.3097	33.0905		
24	84- 49	0.5582	8.8093	0.5559	143.9114	0.0504	5.8059		
25	80- 30	0.5311	8.5129	0.5238	147.2698	0.0876	12.3291		
26	90- 55	0.6199	10.3419	0.6198	171.3450	-0.0100	-1.6675		
27	96- 53	0.5051	8.6601	0.5014	140.8982	-0.0606	-12.0770		
28	77- 43	0.6108	9.4440	0.5969	153.2800	0.1300	31.9462		
29	79- 40	0.4300	5.2438	0.4230	69.8326	0.0771	11.2617		
31	16- 53	0.2492	2.8447	0.0724	15.9675	0.2385	30.9456		
32	76- 44	0.7341	11.2147	0.7145	181.7927	0.1684	31.5298		
33	76- 9	0.7893	11.9564	0.7664	195.9671	0.1889	46.1090		
34	61- 52	0.5155	7.0755	0.4546	110.6615	0.2430	51.6769		
35	79- 6	0.5057	7.5733	0.4966	129.2321	0.0957	26.6960		
36	80- 10	0.5742	8.6144	0.5657	145.3243	0.0980	29.9122		
37	64- 16	0.5486	7.8020	0.4942	129.8096	0.2382	81.8665		
38	75- 40	0.4744	6.6388	0.4597	103.9351	0.1175	43.6806		
39	76- 34	0.3034	3.4254	0.2951	48.4348	0.0705	14.4108		
166	12- 46	0.0166	0.3305	0.0037	0.7640	0.0162	9.2514		

DELTA CPU TIME = 0:00:10.82

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
164	255 - 51	0.0410	0.1015	0.0060	0.0150		
161	186 - 34	0.0325	0.0803	0.0048	0.0118		
163	121 - 39	0.0424	0.1048	0.0062	0.0155		
162	227 - 8	0.0882	0.2182	0.0529	0.1309		
165	243 - 30	0.0767	0.1898	0.0414	0.1024		
11	192 - 16	0.0773	0.1914	0.0577	0.1427		
12	192 - 46	0.0776	0.1920	0.0572	0.1417		
13	203 - 35	0.0668	0.1654	0.0565	0.1398		
14	159 - 39	0.0973	0.2408	0.0523	0.1293		
15	169 - 59	0.0854	0.2114	0.0536	0.1327		
16	171 - 34	0.0787	0.1948	0.0528	0.1308		
17	160 - 28	0.0762	0.1886	0.0540	0.1336		
18	153 - 49	0.0711	0.1760	0.0539	0.1335		
19	200 - 19	0.0927	0.2295	0.0792	0.1961		
21	180 - 30	0.0963	0.2382	0.0610	0.1510		
22	184 - 48	0.0953	0.2359	0.0601	0.1488		
23	184 - 52	0.0969	0.2399	0.0606	0.1499		
24	187 - 16	0.0936	0.2317	0.0615	0.1522		
25	191 - 14	0.0852	0.2108	0.0584	0.1445		
26	196 - 50	0.0789	0.1952	0.0581	0.1439		
27	202 - 54	0.0730	0.1807	0.0569	0.1409		
28	221 - 19	0.0683	0.1690	0.0574	0.1421		
29	218 - 53	0.0912	0.2256	0.0678	0.1677		
31	187 - 32	0.0881	0.2181	0.0669	0.1656		
32	200 - 49	0.0747	0.1849	0.0608	0.1504		
33	222 - 11	0.0703	0.1741	0.0553	0.1369		
34	218 - 29	0.0756	0.1872	0.0556	0.1375		
35	227 - 12	0.0735	0.1819	0.0450	0.1113		
36	230 - 10	0.0728	0.1802	0.0432	0.1070		
37	232 - 31	0.0713	0.1765	0.0404	0.0999		
38	238 - 52	0.0736	0.1822	0.0412	0.1019		
39	229 - 15	0.0977	0.2419	0.0378	0.0936		
166	248 - 19	0.0733	0.1814	0.0343	0.0849		

DELTA CPU TIME = 0:00:00.33

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987 TIME: 14:31:26
OPTION: ZFA1:[207,101]1165400H.PAR;3

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
164	255 - 51	0.1104	0.2733	0.0163	0.0403		
161	186 - 34	0.1395	0.3453	0.0206	0.0509		
163	121 - 39	0.1069	0.2647	0.0158	0.0390		

DELTA CPU TIME = 0:00:00.36

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	28.3409	6.1248	***
165	9.3177	6.1248	***
11	6.2427	6.1248	***
12	9.0471	6.1248	***
13	60.0769	6.1248	***
14	118.4514	6.1248	***
15	172.8842	6.1248	***
16	243.2015	6.1248	***
17	188.2093	6.1248	***
18	171.2900	6.1248	***
19	3437.4597	6.1248	***
21	12.2829	6.1248	***
22	28.0833	6.1248	***
23	97.6512	6.1248	***
24	107.9000	6.1248	***
25	128.4793	6.1248	***
26	166.4129	6.1248	***
27	127.5355	6.1248	***
28	163.0629	6.1248	***
29	35.6804	6.1248	***
31	20.9347	6.1248	***
32	151.8015	6.1248	***
33	185.0770	6.1248	***
34	80.7568	6.1248	***
35	125.6429	6.1248	***
36	157.1103	6.1248	***
37	134.9145	6.1248	***
38	88.0046	6.1248	***
39	18.3477	6.1248	***
166	13.1288	6.1248	***

DELTA CPU TIME = 0:00:13.98

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK TWO

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 125.5205 MAX. CHANGE OMEGA: 125.5205 BOUNDARY VALUE: 3.9100

SIGNIFICANT Z-ROTATION OF -0.000027 radian

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 220.4258 MAX. CHANGE OMEGA: 94.9053 BOUNDARY VALUE: 3.9100

SIGNIFICANT Z-ROTATION OF -0.000036 radian

SIGNIFICANT X-TRANSLATION OF 0.399584 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 348.0138 MAX. CHANGE OMEGA: 127.5880 BOUNDARY VALUE: 3.9100

SIGNIFICANT Z-ROTATION OF -0.000045 radian

SIGNIFICANT X-TRANSLATION OF 0.698178 cm

SIGNIFICANT Y-TRANSLATION OF 0.578411 cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000045 radian	YES
Y-TRANSLATION	0.578411 cm	YES
X-TRANSLATION	0.698178 cm	YES

DELTA CPU TIME = 0:00:13.32

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987

TIME: 14:31:54
OPTION: ZFA1:[207,101]1165400H.PAR;3

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	238- 11	1.0476	15.4257	-0.8901	-258.3436	-0.5524	-94.2329		
12	240- 13	1.0154	15.0850	-0.8813	-258.3964	-0.5043	-85.6857		
13	207- 22	0.6300	9.4345	-0.2897	-85.3227	-0.5595	-131.2944		
14	199- 32	0.7247	8.8568	-0.2423	-68.3296	-0.6830	-78.9604		
21	235- 43	0.8629	11.6074	-0.7130	-191.5276	-0.4861	-52.4677		
22	224- 36	0.7305	8.8293	-0.5130	-140.3813	-0.5201	-57.4722		
23	195- 59	0.2773	2.8933	-0.0763	-20.5703	-0.2666	-28.4898		
24	194- 58	0.5450	5.8501	-0.1407	-36.4358	-0.5265	-60.5992		
31	241- 40	0.7118	9.5085	-0.6266	-138.2194	-0.3377	-43.8242		
32	177- 49	0.4082	5.6109	0.0156	3.9600	-0.4079	-76.3501		
33	170- 8	0.3934	6.4038	0.0674	17.2390	-0.3876	-94.6106		
34	216- 12	0.4140	5.4747	-0.2445	-59.5136	-0.3341	-71.0491		

DELTA CPU TIME = 0:00:00.45

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 2 BLOCK THREE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 309.4550 MAX. CHANGE OMEGA: 309.4550 BOUNDARY VALUE: 3.9100

SIGNIFICANT X-TRANSLATION OF 0.490318 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 323.7618 MAX. CHANGE OMEGA: 14.3068 BOUNDARY VALUE: 3.9100

SIGNIFICANT X-TRANSLATION OF 0.496318 cm

SIGNIFICANT Y-TRANSLATION OF 0.110688 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 137.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90999
MAXIMUM OMEGA: 324.0943 MAX. CHANGE OMEGA: 0.3325 BOUNDARY VALUE: 3.9100

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

CONT'D

GROUP 2 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000001 radian	NO
Y-TRANSLATION	0.110688 cm	YES
X-TRANSLATION	0.496318 cm	YES

DELTA CPU TIME = 0:00:03.27

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

OUTPUT: ZFA1:[207,101]1165416H.OUT;1

DATE: 11-OCT-1987
TIME: 14:31:58
OPTION: ZFA1:[207,101]1165400H.PAR;3

9.1 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
15	176- 22	0.2571	3.0209	0.0163	5.4065	-0.2566	-35.8169		
16	143- 24	0.1137	1.5419	0.0678	23.6540	-0.0913	-14.9088		
17	170- 58	0.1842	2.4375	0.0289	8.9345	-0.1819	-33.1813		
18	181- 1	0.1188	1.7492	-0.0021	-0.6320	-0.1187	-25.5913		
25	129- 56	0.0359	0.5477	0.0275	7.7396	-0.0230	-3.2419		
26	134- 21	0.1726	2.7346	0.1235	34.1316	-0.1207	-20.1679		
27	178- 17	0.1713	2.4306	0.0051	1.4384	-0.1712	-34.1502		
28	79- 8	0.1024	1.5890	0.1005	25.8194	0.0193	4.7458		
29	245- 23	0.0806	0.9267	-0.0733	-12.1010	-0.0336	-4.9075		
35	178- 52	0.0150	0.2531	0.0003	0.0774	-0.0150	-4.1873		
36	100- 20	0.0706	1.2325	0.0694	17.8309	-0.0127	-3.8642		
37	359- 2	0.1275	2.3868	-0.0022	-0.5659	0.1275	43.8171		
38	280- 29	0.0373	0.6067	-0.0367	-8.2879	0.0068	2.5221		
39	258- 42	0.2052	2.3559	-0.2013	-33.0374	-0.0402	-8.2165		

DELTA CPU TIME = 0:00:00.60

THE BSC GROUP - PROJECT 1-1654.00
INPUT: ZFA1:[207,101]1165400H.INP;1

DATE: 11-OCT-1987 TIME: 14:32:00
OUTPUT: ZFA1:[207,101]1165416H.OUT;1 OPTION: ZFA1:[207,101]1165400H.PAR;3

10.0 SUMMARY REPORT

PROGRAM SUMMARY

33 POINTS INPUT FROM EPOCH 1

34 POINTS INPUT FROM EPOCH 6

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 3 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 2 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:56.03

TOTAL CPU TIME = 0:00:49.15

APPENDIX III B

Horizontal Deformation Analysis

Epoch 3 vs. Epoch 4

```
**            **      *****
**           ****     **  **
**          **  **    **   **
**         **    **   **    **
**        **      **  **    **
**        **      **  **    **
**        **********  **    **
**        **********  **    **
**        **      **  **   **
*******   **      **  **  **
*******   **      **  *****
```

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

```
*********************************************
*                                           *
*                                           *
*            PROJECT INFORMATION            *
*                                           *
* THE BSC GROUP - PROJECT 1-1654.00         *
*                                           *
* BALL MOUNTAIN DAM MONITORING NETWORK      *
*                                           *
* HORIZONTAL DEFORMATION ANALYSIS           *
*                                           *
*                                           *
*********************************************
```

```
*********************************************
*                                           *
*    DATE: 19-MAY-1987   TIME: 20:23:25     *
*                                           *
*********************************************
```

```
*********************************************
*                                           *
* NETWORK: 1165400H   EPOCHS    3 AND    4 *
*                                           *
*********************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 3 EPOCH 2: 4

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....ASCENDING
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
162	*** NO EXCLUDED POINTS DEFINED ***
164	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 3	EPOCH: 4	TOTAL
REDUNDANCY :	60.00	56.00	116.00
STD. DEV. UNIT WEIGHT :	1.1301514	1.1270186	1.1286401
WEIGHTED QUADRATIC RESIDUALS :	76.6345353	71.1295675	147.7641028
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 3			EPOCH: 4		
POINT NUMBER	X	Y	Z	X	Y	Z
162	10087.6914	9917.4400	1014.9810	10087.3843	9917.1376	1014.9810
164	10000.0399	10273.8216	1006.4650	9999.7346	10273.5083	1006.4650
165	9843.3633	10241.7629	1009.7800	9843.0639	10241.4514	1009.7800
161	9884.6163	9926.4551	1001.4850	9884.3138	9926.1479	1001.4850
163	10203.6913	10080.8592	925.3040	10203.3804	10080.5553	925.3040
1218	9846.9428	10016.2136	1015.0000	9846.6449	10015.9052	1015.0000
11	9977.1186	10173.6879	1000.2730	9976.8158	10173.3775	1000.2730
12	9979.0466	10174.9377	1000.3150	9978.7430	10174.6280	1000.3150
13	9980.7118	10173.6727	1000.1030	9980.4140	10173.3611	1000.1030
14	9995.5514	10177.1532	992.5700	9995.2495	10176.8434	992.5700
15	10022.2491	10176.3998	977.7050	10021.9469	10176.0882	977.7050
16	10026.6291	10176.3942	975.1380	10026.3275	10176.0833	975.1380
17	10039.6022	10175.6160	966.8130	10039.2985	10175.3052	966.8130
18	10050.7183	10174.8546	960.3930	10050.4132	10174.5432	960.3930
19	10076.4338	10173.1810	946.7430	10076.1271	10172.8706	946.7430
21	9977.1005	10124.0895	1000.1760	9976.7969	10123.7797	1000.1760
22	9979.5685	10123.5401	1000.3040	9979.2672	10123.2315	1000.3040
23	9981.5835	10124.0408	1000.1480	9981.2844	10123.7316	1000.1480
24	9996.6714	10128.3983	990.2490	9996.3717	10128.0897	990.2490
25	10020.8899	10129.7645	978.1230	10020.5886	10129.4556	978.1230
26	10028.1557	10129.6779	973.9620	10027.8546	10129.3659	973.9620
27	10040.6848	10130.6561	965.8000	10040.3811	10130.3484	965.8000
28	10050.4804	10130.9473	960.5700	10050.1768	10130.6392	960.5700
29	10075.9171	10132.3681	946.6670	10075.6114	10132.0602	946.6670
31	9981.3282	10075.7376	1000.3780	9981.0263	10075.4298	1000.3780
32	9983.6888	10076.4550	1000.3840	9983.3918	10076.1477	1000.3840
33	9986.1751	10076.5866	1000.0010	9985.8789	10076.2793	1000.0010
34	10000.9430	10074.1757	992.0120	10000.6435	10073.8700	992.0120
35	10025.8953	10077.3784	977.7070	10025.5930	10077.0724	977.7070
36	10032.7433	10077.9165	973.8690	10032.4416	10077.6104	973.8690
37	10046.3992	10079.8566	965.3180	10046.0963	10079.5514	965.3180
38	10055.2839	10081.0830	960.5840	10054.9788	10080.7771	960.5840
39	10080.0120	10084.2000	946.8710	10079.7064	10083.8942	946.8710

DELTA CPU TIME = 0:00:02.19

number of fixed points in net 1 1
number of analyzed fixed points 1 1
fixed points net 1 1663
fixed points net 2 166

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
162	0.2792	-0.2480	0.0000	3.2916
164	-0.1354	-0.0574	0.0000	3.2916
165	0.1128	0.1173	0.0000	3.2916

SUMMARY

REDUNDANCY FROM CONDITIONS: 2.0000 REDUNDANCY FROM ADJUSTMENTS: 116.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 3.07490

SUM OF OMEGA: 3.2916 BOUNDARY VALUE: 6.1498 TEST PASSES

MAX. SINGLE OMEGA: 3.2916 BOUNDARY VALUE: 6.1498 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: 30.4672 PPM DELTA CPU TIME = 0:00:00.58

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
162	131- 37	0.0294	1.7636	0.0220	90.8346	-0.0195	-48.7335		
164	247- 3	0.0746	1.7636	-0.0687	-30.9413	-0.0291	-15.1534		
165	43- 52	0.0674	1.7636	0.0467	22.3245	0.0486	37.7070		
161	195- 14	0.4952	3.2118	-0.1301	-8.7775	-0.4778	-21.3601		
163	359- 55	0.3305	3.2183	-0.0005	-0.1899	0.3305	31.3366		
1218	146- 36	0.3872	2.6013	0.2131	20.8258	-0.3232	-12.2899		
11	112- 50	0.1243	1.8108	0.1145	33.2377	-0.0482	-8.9269		
12	50- 17	0.0502	0.9204	0.0386	12.8489	0.0321	6.3364		
13	103- 54	0.6493	9.8209	0.6303	205.5301	-0.1559	-10.5824		
14	84- 48	0.2717	4.2638	0.2705	59.0364	0.0246	2.2722		
15	116- 52	0.3555	4.0108	0.3171	91.4439	-0.1606	-13.8408		
16	102- 43	0.3974	5.3974	0.3876	109.4808	-0.0875	-7.6143		
17	109- 11	0.2367	2.7930	0.2235	52.7604	-0.0778	-7.3108		
18	140- 56	0.1707	1.6672	0.1076	29.0639	-0.1325	-13.7080		
19	137- 50	0.0564	0.6127	0.0379	10.7619	-0.0418	-5.2191		
21	165- 59	0.1448	1.3935	0.0351	9.9489	-0.1405	-13.8257		
22	93- 29	0.2817	4.5883	0.2812	81.5776	-0.0171	-2.0913		
23	98- 27	0.4978	8.3392	0.4924	157.6640	-0.0732	-17.4904		
24	90- 53	0.4930	7.9326	0.4929	129.8269	-0.0076	-1.2492		
25	94- 25	0.4011	6.4836	0.3999	114.8480	-0.0309	-4.9664		
26	127- 48	0.5556	3.5786	0.4390	76.2566	-0.3405	-9.5689		
27	65- 8	0.2426	4.0744	0.2201	43.5145	0.1021	17.2307		
28	78- 32	0.2663	2.8563	0.2610	24.0773	0.0529	7.2032		
29	55- 2	0.1520	3.0939	0.1245	39.0681	0.0871	14.6930		
31	110- 47	0.2316	3.0563	0.2165	60.9825	-0.0821	-11.9034		
32	92- 7	0.7214	11.7862	0.7209	203.9245	-0.0266	-3.7349		
33	91- 58	0.7980	13.7290	0.7976	243.1249	-0.0273	-7.4458		
34	76- 18	0.5303	10.7937	0.5152	169.3873	0.1257	29.1527		
35	72- 43	0.3313	7.2574	0.3164	114.1736	0.0985	21.3818		
36	77- 50	0.4065	8.9734	0.3974	161.4438	0.0856	19.4663		
37	59- 29	0.3754	8.5428	0.3234	143.4119	0.1907	42.4135		
38	46- 39	0.1818	2.9099	0.1322	28.8043	0.1248	27.3307		
39	47- 7	0.2106	3.2637	0.1544	30.9872	0.1433	29.7239		

DELTA CPU TIME = 0:00:10.79

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
162	191 - 46	0.0202	0.0501	0.0153	0.0380		
164	127 - 12	0.0513	0.1271	0.0389	0.0964		
165	104 - 2	0.0463	0.1149	0.0351	0.0872		
161	202 - 35	0.1548	0.3838	0.1151	0.2854		
163	179 - 21	0.1027	0.2547	0.0524	0.1301		
1218	177 - 14	0.1623	0.4025	0.1010	0.2504		
11	152 - 53	0.0781	0.1936	0.0525	0.1301		
12	159 - 37	0.0734	0.1820	0.0517	0.1283		
13	173 - 28	0.1220	0.3026	0.0540	0.1338		
14	157 - 15	0.1103	0.2736	0.0570	0.1413		
15	160 - 8	0.1133	0.2809	0.0474	0.1175		
16	159 - 24	0.1131	0.2806	0.0473	0.1172		
17	155 - 43	0.1108	0.2748	0.0510	0.1265		
18	156 - 16	0.1054	0.2613	0.0476	0.1182		
19	155 - 59	0.0955	0.2368	0.0490	0.1216		
21	163 - 20	0.1040	0.2579	0.0536	0.1329		
22	156 - 32	0.0962	0.2387	0.0485	0.1202		
23	145 - 8	0.0720	0.1786	0.0461	0.1143		
24	149 - 31	0.0857	0.2125	0.0507	0.1256		
25	151 - 16	0.0860	0.2132	0.0480	0.1191		
26	166 - 51	0.1932	0.4790	0.0635	0.1575		
27	140 - 36	0.0878	0.2178	0.0572	0.1417		
28	125 - 39	0.1206	0.2990	0.0604	0.1499		
29	153 - 46	0.0825	0.2046	0.0481	0.1192		
31	151 - 4	0.0915	0.2269	0.0456	0.1130		
32	151 - 16	0.0930	0.2306	0.0447	0.1109		
33	138 - 50	0.0701	0.1739	0.0450	0.1117		
34	146 - 21	0.0729	0.1809	0.0451	0.1118		
35	150 - 46	0.0738	0.1830	0.0440	0.1091		
36	154 - 26	0.0705	0.1749	0.0434	0.1077		
37	158 - 42	0.0700	0.1735	0.0431	0.1068		
38	134 - 30	0.0725	0.1798	0.0625	0.1549		
39	131 - 56	0.0752	0.1864	0.0644	0.1598		

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
162	191 - 46	0.2566	0.6364	0.1947	0.4829		
164	127 - 12	0.1011	0.2506	0.0767	0.1902		
165	104 - 2	0.1118	0.2773	0.0848	0.2104		

DELTA CPU TIME = 0:00:00.37

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
161	10.5409	6.1498	***
163	9.7019	6.1498	***
1218	6.9717	6.1498	***
11	6.4996	6.1498	***
12	2.0464	6.1498	
13	184.1129	6.1498	***
14	28.1827	6.1498	***
15	44.1160	6.1498	***
16	70.7094	6.1498	***
17	17.7243	6.1498	***
18	4.6828	6.1498	
19	0.8547	6.1498	
21	2.1863	6.1498	
22	36.1865	6.1498	***
23	102.3041	6.1498	***
24	92.5673	6.1498	***
25	64.8776	6.1498	***
26	40.8363	6.1498	***
27	21.0944	6.1498	***
28	15.5348	6.1498	***
29	11.7618	6.1498	***
31	18.5795	6.1498	***
32	246.1650	6.1498	***
33	263.2682	6.1498	***
34	148.9335	6.1498	***
35	61.8735	6.1498	***
36	93.6578	6.1498	***
37	79.6514	6.1498	***
38	9.4772	6.1498	***
39	11.0712	6.1498	***

DELTA CPU TIME = 0:00:13.92

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 116.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92232
MAXIMUM OMEGA: 146.9910 MAX. CHANGE OMEGA: 146.9910 BOUNDARY VALUE: 3.9223

SIGNIFICANT X-TRANSLATION OF 0.353486 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 116.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92232
MAXIMUM OMEGA: 247.7224 MAX. CHANGE OMEGA: 100.7314 BOUNDARY VALUE: 3.9223

SIGNIFICANT X-TRANSLATION OF 0.299528 cm

```
SIGNIFICANT Z-ROTATION      OF  -0.000019   radian

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS:     1.0000      REDUNDANCY FROM ADJUSTMENTS:  116.0000
QUANTILE FROM F-DISTRIBUTION @ 95% :  3.92232
MAXIMUM OMEGA:     248.5129      MAX. CHANGE OMEGA:       0.7905    BOUNDARY VALUE:       3.9223

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION
```

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000019 radian	YES
Y-TRANSLATION	0.030697 cm	NO
X-TRANSLATION	0.299528 cm	YES

down stream. 3mm.

DELTA CPU TIME = 0:00:19.24

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	255- 21	0.1906	3.5354	-0.1844	-53.5185	-0.0482	-8.9272		
12	277- 1	0.2623	4.6016	-0.2604	-86.6660	0.0320	6.3288		
13	115- 13	0.3663	4.6407	0.3314	108.0452	-0.1560	-10.5872		
14	310- 33	0.0373	0.3667	-0.0284	-6.1918	0.0243	2.2398		
15	173- 34	0.1625	1.4680	0.0182	5.2541	-0.1615	-13.9144		
16	134- 54	0.1253	1.1953	0.0887	25.0575	-0.0884	-7.6959		
17	223- 41	0.1092	1.7348	-0.0754	-17.8053	-0.0790	-7.4220		
18	235- 1	0.2336	4.5755	-0.1914	-51.7070	-0.1339	-13.8522		
19	260- 30	0.2648	4.9795	-0.2611	-74.2382	-0.0437	-5.4539		
21	242- 3	0.2998	5.3199	-0.2648	-75.1368	-0.1405	-13.8258		
22	227- 33	0.0254	0.4570	-0.0187	-5.4300	-0.0171	-2.0972		
23	110- 50	0.2060	3.1739	0.1925	61.6412	-0.0733	-17.5110		
24	92- 23	0.1932	3.0656	0.1931	50.8554	-0.0080	-1.3099		
25	107- 34	0.1050	1.4901	0.1001	28.7441	-0.0317	-5.0999		
26	157- 49	0.3688	1.9304	0.1392	24.1810	-0.3415	-9.5960		
27	321- 42	0.1285	1.4633	-0.0796	-15.7435	0.1009	17.0275		
28	323- 3	0.0645	0.5538	-0.0388	-3.5752	0.0515	7.0142		
29	295- 57	0.1948	2.7243	-0.1752	-54.9616	0.0852	14.3774		
31	225- 43	0.1178	2.3473	-0.0843	-23.7507	-0.0822	-11.9152		
32	93- 38	0.4209	6.7368	0.4201	118.8339	-0.0267	-3.7526		
33	93- 10	0.4975	8.4831	0.4967	151.4266	-0.0275	-7.4930		
34	59- 43	0.2483	5.4933	0.2144	70.4755	0.1252	29.0477		
36	48- 48	0.1284	2.7950	0.0966	39.2468	0.0846	19.2267		
37	6- 50	0.1907	2.9355	0.0227	10.0575	0.1893	42.1215		
38	306- 12	0.2088	2.8887	-0.1685	-36.7194	0.1233	27.0065		
39	314- 1	0.2034	2.7071	-0.1463	-29.3739	0.1414	29.3199		

DELTA CPU TIME = 0:00:01.02

10.0 SUMMARY REPORT

P R O G R A M S U M M A R Y

34 POINTS INPUT FROM EPOCH 3

34 POINTS INPUT FROM EPOCH 4

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 3 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:58.11

TOTAL CPU TIME = 0:00:51.10

APPENDIX III C

Horizontal Deformation Analysis

Epoch 4 vs. Epoch 5

```
**            **      *****
**           ****     **  **
**          **  **    **   **
**         **    **   **    **
**        **      **  **    **
**        **      **  **    **
**        **********  **    **
**        **********  **    **
**        **      **  **   **
*******   **      **  **  **
*******   **      **  *****
```

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

```
*********************************************
*                                           *
*                                           *
*            PROJECT INFORMATION            *
*                                           *
* THE BSC GROUP - PROJECT 1-1654.00         *
*                                           *
* BALL MOUNTAIN DAM MONITORING NETWORK      *
*                                           *
* HORIZONTAL DEFORMATION ANALYSIS           *
*                                           *
*                                           *
*********************************************
```

```
*********************************************
*                                           *
*    DATE: 28-OCT-1987   TIME: 16:22:30     *
*                                           *
*********************************************
```

```
*********************************************
*                                           *
* NETWORK: 1165400H   EPOCHS    4 AND    5 *
*                                           *
*********************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 4 EPOCH 2: 5

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
162	*** NO EXCLUDED POINTS DEFINED ***
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

11
12
13
14
21
22
23
24
31
32
33
34

GROUP # 2 BLOCK TWO

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 4	EPOCH: 5	TOTAL
REDUNDANCY :	54.00	54.00	108.00
STD. DEV. UNIT WEIGHT :	1.1319750	1.2065667	1.1698655
WEIGHTED QUADRATIC RESIDUALS :	69.1938417	78.6133691	147.8072108
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 4			EPOCH: 5		
POINT NUMBER	X	Y	Z	X	Y	Z
162	10087.6896	9917.4400	1014.9810	10087.6580	9917.4084	1014.9810
163	10203.6860	10080.8595	925.3040	10203.6542	10080.8291	925.3040
165	9843.3654	10241.7556	1009.7800	9843.3353	10241.7237	1009.7800
164	10000.0376	10273.8133	1006.4650	10000.0074	10273.7868	1006.4650
166	10000.0376	9999.9562	1000.0000	10000.0075	9999.9318	1000.0000
1218	9846.9475	10016.2072	1015.0000	9846.9258	10016.1807	1015.0000
11	9977.1190	10173.6816	1000.2730	9977.0867	10173.6511	1000.2730
12	9979.0462	10174.9321	1000.3150	9979.0139	10174.8990	1000.3150
13	9980.7173	10173.6653	1000.1030	9980.6839	10173.6352	1000.1030
14	9995.5529	10177.1476	992.5700	9995.5234	10177.1175	992.5700
15	10022.2505	10176.3925	977.7050	10022.2206	10176.3643	977.7050
16	10026.6312	10176.3876	975.1380	10026.6016	10176.3577	975.1380
17	10039.6023	10175.6096	966.8130	10039.5740	10175.5784	966.8130
18	10050.7170	10174.8477	960.3930	10050.6874	10174.8188	960.3930
161	9884.6172	9926.4491	1001.4850	9884.5899	9926.4257	1001.4850
21	9977.1003	10124.0833	1000.1760	9977.0671	10124.0549	1000.1760
22	9979.5707	10123.5352	1000.3040	9979.5379	10123.5051	1000.3040
23	9981.5878	10124.0353	1000.1480	9981.5552	10124.0048	1000.1480
24	9996.6753	10128.3934	990.2490	9996.6435	10128.3654	990.2490
25	10020.8924	10129.7595	978.1230	10020.8623	10129.7314	978.1230
26	10028.1585	10129.6698	973.9620	10028.1265	10129.6461	973.9620
27	10040.6851	10130.6524	965.8000	10040.6548	10130.6232	965.8000
28	10050.4808	10130.9432	960.5700	10050.4510	10130.9140	960.5700
29	10075.9156	10132.3643	946.6670	10075.8864	10132.3352	946.6670
31	9981.3300	10075.7330	1000.3780	9981.2971	10075.7066	1000.3780
32	9983.6956	10076.4509	1000.3840	9983.6637	10076.4222	1000.3840
33	9986.1826	10076.5826	1000.0010	9986.1493	10076.5545	1000.0010
34	10000.9474	10074.1733	992.0120	10000.9149	10074.1456	992.0120
35	10025.8971	10077.3758	977.7070	10025.8672	10077.3465	977.7070
36	10032.7457	10077.9138	973.8690	10032.7161	10077.8857	973.8690
37	10046.4006	10079.8549	965.3180	10046.3705	10079.8255	965.3180
38	10055.2832	10081.0807	960.5840	10055.2518	10081.0516	960.5840
39	10080.0109	10084.1979	946.8710	10079.9811	10084.1685	946.8710

DELTA CPU TIME = 0:00:02.43

number of fixed points in net	1	1
number of analyzed fixed points	1	1
fixed points net 1	166	
fixed points net 2	166	

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
162	-0.0692	-0.1902	0.0000	3.2953
163	-0.0306	0.1943	0.0000	3.2953
165	0.3940	-0.0601	0.0000	3.2953

SUMMARY

REDUNDANCY FROM CONDITIONS: 2.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 3.08020

SUM OF OMEGA: 3.2953 BOUNDARY VALUE: 6.1604 TEST PASSES

MAX. SINGLE OMEGA: 3.2953 BOUNDARY VALUE: 6.1604 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: 3.1023 PPM DELTA CPU TIME = 0:00:00.59

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
162	199- 59	0.0874	1.6840	-0.0299	-14.2885	-0.0821	-39.6278		
163	351- 2	0.0899	1.6840	-0.0140	-10.4091	0.0888	29.0143		
165	98- 41	0.0444	1.6840	0.0439	69.6314	-0.0067	-15.0975		
164	8- 31	0.5442	6.2365	0.0806	21.2269	0.5382	66.8269		
166	8- 21	0.6652	10.3950	0.0966	14.9151	0.6582	141.8426		
1218	62- 18	0.9938	10.2267	0.8800	120.8108	0.4619	8.7760		
11	307- 1	0.1721	2.6238	-0.1375	-38.7153	0.1036	31.8546		
12	221- 49	0.2016	3.9783	-0.1344	-40.4301	-0.1503	-50.2805		
13	301- 58	0.2844	4.4831	-0.2412	-75.8186	0.1506	50.2660		
14	44- 4	0.2115	3.4935	0.1471	34.0996	0.1519	16.9954		
15	18- 48	0.3622	4.5582	0.1167	38.3447	0.3429	39.6231		
16	41- 58	0.2303	4.1049	0.1540	49.4608	0.1712	20.0471		
17	82- 58	0.2854	5.1753	0.2833	74.8395	0.0349	4.3551		
18	30- 20	0.3143	5.1931	0.1587	46.8920	0.2713	36.9516		
161	24- 28	0.8092	6.9515	0.3352	40.0721	0.7365	53.3920		
21	321- 46	0.3737	5.2502	-0.2313	-71.5247	0.2935	49.2990		
22	306- 6	0.2233	3.1884	-0.1804	-58.3031	0.1316	28.0933		
23	299- 4	0.1896	2.7692	-0.1657	-51.0434	0.0921	21.3968		
24	346- 3	0.3504	3.8922	-0.0844	-25.5959	0.3401	45.9889		
25	17- 39	0.3498	4.8240	0.1060	35.1371	0.3334	49.2371		
26	353- 55	0.7802	3.9765	-0.0827	-18.7866	0.7758	20.8801		
27	21- 25	0.2365	3.6761	0.0863	29.8927	0.2202	37.6731		
28	30- 50	0.2574	4.6195	0.1320	44.5346	0.2210	40.2151		
29	41- 39	0.3039	6.6118	0.2020	69.3345	0.2271	48.8110		
31	338- 56	0.5291	7.1650	-0.1903	-50.9216	0.4937	115.4456		
32	339- 42	0.2716	3.6574	-0.0943	-25.4740	0.2548	58.0372		
33	323- 26	0.3931	5.6684	-0.2343	-64.5825	0.3157	96.6026		
34	338- 32	0.3842	5.3697	-0.1406	-39.2015	0.3575	88.0788		
35	30- 22	0.2269	4.7983	0.1147	38.3931	0.1958	55.9794		
36	26- 5	0.3460	7.2213	0.1521	53.8086	0.3108	92.9716		
37	32- 1	0.2181	4.8817	0.1156	45.7488	0.1849	60.6601		
38	356- 30	0.2134	4.4996	-0.0131	-2.5784	0.2130	96.6382		
39	38- 1	0.2335	3.5772	0.1438	14.4526	0.1840	93.2817		

DELTA CPU TIME = 0:00:10.83

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
162	225 - 16	0.0552	0.1369	0.0335	0.0830		
163	196 - 19	0.0568	0.1409	0.0344	0.0854		
165	123 - 57	0.0280	0.0695	0.0170	0.0422		
164	165 - 30	0.0914	0.2269	0.0591	0.1467		
166	122 - 50	0.0882	0.2190	0.0577	0.1432		
1218	168 - 52	0.2334	0.5792	0.0739	0.1834		
11	130 - 17	0.0657	0.1630	0.0499	0.1239		
12	126 - 50	0.0613	0.1521	0.0506	0.1256		
13	132 - 19	0.0639	0.1587	0.0457	0.1134		
14	153 - 38	0.1022	0.2537	0.0530	0.1315		
15	157 - 8	0.0993	0.2466	0.0428	0.1062		
16	156 - 9	0.0993	0.2465	0.0424	0.1051		
17	151 - 16	0.0992	0.2462	0.0443	0.1100		
18	151 - 26	0.0949	0.2356	0.0415	0.1029		
161	189 - 16	0.1181	0.2931	0.0906	0.2250		
21	176 - 41	0.0772	0.1917	0.0568	0.1409		
22	150 - 30	0.0737	0.1829	0.0484	0.1202		
23	145 - 20	0.0726	0.1803	0.0477	0.1184		
24	157 - 40	0.0907	0.2251	0.0497	0.1233		
25	156 - 27	0.0875	0.2171	0.0462	0.1147		
26	166 - 50	0.1976	0.4905	0.0501	0.1242		
27	153 - 44	0.0824	0.2046	0.0440	0.1092		
28	151 - 26	0.0810	0.2011	0.0436	0.1081		
29	147 - 60	0.0759	0.1885	0.0424	0.1053		
31	139 - 8	0.0767	0.1904	0.0461	0.1145		
32	140 - 15	0.0770	0.1912	0.0464	0.1152		
33	131 - 32	0.0703	0.1744	0.0443	0.1099		
34	139 - 5	0.0741	0.1839	0.0464	0.1153		
35	140 - 34	0.0676	0.1677	0.0438	0.1088		
36	141 - 4	0.0657	0.1630	0.0431	0.1070		
37	142 - 15	0.0619	0.1536	0.0418	0.1037		
38	95 - 40	0.0713	0.1771	0.0466	0.1158		
39	95 - 23	0.1001	0.2485	0.0436	0.1082		

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
162	225 - 16	0.1278	0.3172	0.0775	0.1924		
163	196 - 19	0.1242	0.3082	0.0753	0.1869		
165	123 - 57	0.2516	0.6245	0.1526	0.3788		

DELTA CPU TIME = 0:00:00.38

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
164	41.6126	6.1604	***
166	124.6786	6.1604	***
1218	201.4043	6.1604	***
11	6.1919	6.1604	***
12	13.8259	6.1604	***
13	18.6522	6.1604	***
14	17.9515	6.1604	***
15	43.5717	6.1604	***
16	29.3682	6.1604	***
17	39.3504	6.1604	***
18	46.8298	6.1604	***
161	47.4766	6.1604	***
21	44.4183	6.1604	***
22	9.1753	6.1604	***
23	6.5196	6.1604	***
24	15.3851	6.1604	***
25	36.8391	6.1604	***
26	19.7772	6.1604	***
27	20.1913	6.1604	***
28	28.8601	6.1604	***
29	47.0099	6.1604	***
31	58.3536	6.1604	***
32	16.2447	6.1604	***
33	30.8186	6.1604	***
34	31.4549	6.1604	***
35	33.7746	6.1604	***
36	68.8295	6.1604	***
37	29.4532	6.1604	***
38	68.6417	6.1604	***
39	-129.1158	6.1604	

DELTA CPU TIME = 0:00:13.92

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92903
MAXIMUM OMEGA: 20.9119 MAX. CHANGE OMEGA: 20.9119 BOUNDARY VALUE: 3.9290

SIGNIFICANT Y-TRANSLATION OF 0.149956 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92903
MAXIMUM OMEGA: 32.8949 MAX. CHANGE OMEGA: 11.9830 BOUNDARY VALUE: 3.9290

SIGNIFICANT Y-TRANSLATION OF 0.199885 cm

SIGNIFICANT Z-ROTATION OF -0.000009 radian

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92903
MAXIMUM OMEGA: 33.0713 MAX. CHANGE OMEGA: 0.1764 BOUNDARY VALUE: 3.9290

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000009 radian	YES
Y-TRANSLATION	0.199885 cm	YES
X-TRANSLATION	-0.016201 cm	NO

DELTA CPU TIME = 0:00:13.30

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	235- 0	0.1668	3.2654	-0.1367	-38.4908	-0.0957	-29.4157		
12	200- 55	0.3743	7.2710	-0.1336	-40.1872	-0.3496	-116.9641		
13	258- 32	0.2453	4.6476	-0.2404	-75.5682	-0.0488	-16.2855		
14	107- 49	0.1554	1.9244	0.1479	34.2912	-0.0475	-5.3159		
21	292- 12	0.2494	4.0818	-0.2309	-71.4088	0.0942	15.8264		
22	249- 23	0.1924	3.9111	-0.1801	-58.1835	-0.0678	-14.4703		
23	237- 3	0.1971	4.1285	-0.1654	-50.9281	-0.1072	-24.8995		
24	329- 8	0.1638	1.8197	-0.0840	-25.4711	0.1406	19.0122		
31	327- 7	0.3506	4.5983	-0.1903	-50.9314	0.2944	68.8363		
32	300- 26	0.1094	1.4747	-0.0943	-25.4822	0.0554	12.6197		
33	296- 24	0.2616	3.8019	-0.2343	-64.5906	0.1163	35.5939		
34	318- 20	0.2116	2.8556	-0.1406	-39.2153	0.1580	38.9305		

DELTA CPU TIME = 0:00:00.49

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 2 BLOCK TWO

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92903
MAXIMUM OMEGA: 52.2865 MAX. CHANGE OMEGA: 52.2865 BOUNDARY VALUE: 3.9290

SIGNIFICANT Y-TRANSLATION OF 0.281588 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92903
MAXIMUM OMEGA: 60.7676 MAX. CHANGE OMEGA: 8.4811 BOUNDARY VALUE: 3.9290

SIGNIFICANT Y-TRANSLATION OF 0.218224 cm

SIGNIFICANT X-TRANSLATION OF 0.123348 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 108.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92903
MAXIMUM OMEGA: 62.1511 MAX. CHANGE OMEGA: 1.3835 BOUNDARY VALUE: 3.9290

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT CONT'D

GROUP 2 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	0.000003 radian	NO
Y-TRANSLATION	0.218224 cm	YES
X-TRANSLATION	0.123348 cm	YES

DELTA CPU TIME = 0:00:03.23

9.1 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
15	356- 58	0.1248	1.3201	-0.0066	-2.1747	0.1247	14.4057		
16	146- 53	0.0561	0.5710	0.0307	9.8442	-0.0470	-5.5004		
17	138- 54	0.2433	2.4982	0.1599	42.2522	-0.1833	-22.8481		
18	33- 42	0.0638	1.1107	0.0354	10.4537	0.0531	7.2265		
25	351- 27	0.1165	1.3647	-0.0173	-5.7357	0.1152	17.0077		
26	339- 43	0.5944	3.0299	-0.2060	-46.8110	0.5576	15.0069		
27	273- 3	0.0371	0.6654	-0.0370	-12.8105	0.0020	0.3365		
28	71- 57	0.0091	0.2004	0.0086	2.9132	0.0028	0.5120		
29	83- 33	0.0791	1.5710	0.0786	26.9912	0.0089	1.9103		
35	201- 6	0.0241	0.4758	-0.0087	-2.9013	-0.0225	-6.4234		
36	17- 15	0.0969	1.8943	0.0288	10.1717	0.0926	27.6880		
37	193- 4	0.0342	0.6733	-0.0077	-3.0568	-0.0333	-10.9246		
38	267- 50	0.1365	1.9234	-0.1364	-26.9454	-0.0052	-2.3496		
39	149- 8	0.0399	0.5794	0.0205	2.0576	-0.0342	-17.3643		

DELTA CPU TIME = 0:00:00.64

10.0 SUMMARY REPORT

P R O G R A M S U M M A R Y

34 POINTS INPUT FROM EPOCH 4

33 POINTS INPUT FROM EPOCH 5

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 3 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 2 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:57.18

TOTAL CPU TIME = 0:00:48.99

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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*******************************************
*                                         *
*                                         *
*            PROJECT INFORMATION          *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HORIZONTAL DEFORMATION ANALYSIS         *
*                                         *
*                                         *
*******************************************
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*******************************************
*                                         *
*    DATE: 31-JUL-1987   TIME: 17:27:59   *
*                                         *
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*******************************************
*                                         *
* NETWORK: 1165400H   EPOCHS    4 AND    5 *
*                                         *
*******************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 4 EPOCH 2: 5

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
162	*** NO EXCLUDED POINTS DEFINED ***
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK TWO

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 4	EPOCH: 5	TOTAL
REDUNDANCY :	54.00	57.00	111.00
STD. DEV. UNIT WEIGHT :	1.1319750	1.1342033	1.1331198
WEIGHTED QUADRATIC RESIDUALS :	69.1938417	73.3257724	142.5196141
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 4			EPOCH: 5		
POINT NUMBER	X	Y	Z	X	Y	Z
162	10087.6896	9917.4400	1014.9810	10087.6828	9917.4327	1014.9810
163	10203.6860	10080.8595	925.3040	10203.6789	10080.8534	925.3040
165	9843.3654	10241.7556	1009.7800	9843.3592	10241.7488	1009.7800
164	10000.0376	10273.8133	1006.4650	10000.0312	10273.8104	1006.4650
166	10000.0376	9999.9562	1000.0000	10000.0320	9999.9555	1000.0000
1218	9846.9475	10016.2072	1015.0000	9846.9493	10016.2032	1015.0000
11	9977.1190	10173.6816	1000.2730	9977.1109	10173.6754	1000.2730
12	9979.0462	10174.9321	1000.3150	9979.0381	10174.9234	1000.3150
13	9980.7173	10173.6653	1000.1030	9980.7081	10173.6593	1000.1030
14	9995.5529	10177.1476	992.5700	9995.5475	10177.1410	992.5700
15	10022.2505	10176.3925	977.7050	10022.2445	10176.3883	977.7050
16	10026.6312	10176.3876	975.1380	10026.6258	10176.3812	975.1380
17	10039.6023	10175.6096	966.8130	10039.5982	10175.6019	966.8130
18	10050.7170	10174.8477	960.3930	10050.7116	10174.8424	960.3930
161	9884.6172	9926.4491	1001.4850	9884.6128	9926.4489	1001.4850
21	9977.1003	10124.0833	1000.1760	9977.0913	10124.0790	1000.1760
22	9979.5707	10123.5352	1000.3040	9979.5622	10123.5292	1000.3040
23	9981.5878	10124.0353	1000.1480	9981.5794	10124.0289	1000.1480
24	9996.6753	10128.3934	990.2490	9996.6678	10128.3889	990.2490
25	10020.8924	10129.7595	978.1230	10020.8863	10129.7554	978.1230
26	10028.1585	10129.6698	973.9620	10028.1508	10129.6697	973.9620
27	10040.6851	10130.6524	965.8000	10040.6791	10130.6467	965.8000
28	10050.4808	10130.9432	960.5700	10050.4753	10130.9376	960.5700
29	10075.9156	10132.3643	946.6670	10075.9107	10132.3589	946.6670
31	9981.3300	10075.7330	1000.3780	9981.3214	10075.7309	1000.3780
32	9983.6956	10076.4509	1000.3840	9983.6879	10076.4463	1000.3840
33	9986.1826	10076.5826	1000.0010	9986.1744	10076.5772	1000.0010
34	10000.9474	10074.1733	992.0120	10000.9394	10074.1690	992.0120
35	10025.8971	10077.3758	977.7070	10025.8916	10077.3700	977.7070
36	10032.7457	10077.9138	973.8690	10032.7405	10077.9092	973.8690
37	10046.4006	10079.8549	965.3180	10046.3949	10079.8491	965.3180
38	10055.2832	10081.0807	960.5840	10055.2762	10081.0752	960.5840
39	10080.0109	10084.1979	946.8710	10080.0055	10084.1922	946.8710

DELTA CPU TIME = 0:00:02.49

number of fixed points in net	1	1
number of analyzed fixed points	1	1

fixed points net 1 166
fixed points net 2 166

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
162	-0.0228	-0.1626	0.0000	2.8027
163	-0.0571	0.1490	0.0000	2.8027
165	0.3227	0.0188	0.0000	2.8027

SUMMARY

REDUNDANCY FROM CONDITIONS: 2.0000 REDUNDANCY FROM ADJUSTMENTS: 111.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 3.07790

SUM OF OMEGA: 2.8027 BOUNDARY VALUE: 6.1558 TEST PASSES

MAX. SINGLE OMEGA: 2.8027 BOUNDARY VALUE: 6.1558 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: 0.6678 PPM DELTA CPU TIME = 0:00:00.59

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
162	187- 59	0.0709	1.5305	-0.0098	-11.2803	-0.0702	-35.4682		
163	339- 2	0.0729	1.5305	-0.0261	-44.1994	0.0681	28.0469		
165	86- 40	0.0360	1.5305	0.0359	63.4235	0.0021	12.3850		
164	4- 12	0.3956	6.2722	0.0290	7.2983	0.3945	94.8414		
166	10- 40	0.6041	10.5335	0.1118	21.2239	0.5937	150.2801		
1218	71- 52	0.8746	12.9597	0.8312	175.2248	0.2721	11.4054		
11	291- 25	0.1548	2.5401	-0.1442	-43.9984	0.0565	20.5472		
12	215- 53	0.2428	5.0942	-0.1423	-46.2202	-0.1967	-78.8327		
13	287- 35	0.2640	4.5304	-0.2517	-82.9891	0.0798	34.7591		
14	80- 15	0.1301	2.1831	0.1283	29.5780	0.0220	3.1565		
15	14- 33	0.2679	3.5264	0.0673	19.4376	0.2593	34.6017		
16	73- 59	0.1378	3.0204	0.1325	41.2681	0.0380	5.8231		
17	109- 46	0.2763	3.5616	0.2600	67.0837	-0.0934	-15.4128		
18	41- 50	0.1996	4.6593	0.1331	38.3739	0.1488	27.2749		
161	18- 50	0.6729	6.8094	0.2173	35.1594	0.6368	62.1106		
21	316- 8	0.3400	4.6617	-0.2356	-80.7907	0.2451	37.7996		
22	292- 56	0.2024	3.3115	-0.1864	-65.3841	0.0789	20.2596		
23	283- 27	0.1795	2.9989	-0.1746	-57.3927	0.0418	11.7651		
24	339- 17	0.2388	2.9873	-0.0845	-27.0829	0.2233	38.6917		
25	12- 27	0.2777	3.9294	0.0598	18.0208	0.2712	45.2195		
26	351- 50	0.6724	3.4872	-0.0954	-22.0536	0.6656	18.6634		
27	33- 45	0.1313	2.6170	0.0729	25.2524	0.1092	24.5703		
28	45- 17	0.1624	3.7026	0.1154	38.7039	0.1142	27.4811		
29	53- 9	0.2210	5.4760	0.1769	59.8610	0.1326	38.3610		
31	337- 36	0.5033	7.1780	-0.1918	-57.2457	0.4653	113.7233		
32	334- 9	0.2314	3.1805	-0.1009	-30.1742	0.2082	45.5862		
33	310- 56	0.2083	3.2041	-0.1574	-47.8246	0.1365	45.9391		
34	332- 33	0.2773	4.4449	-0.1278	-38.4760	0.2461	79.1613		
35	51- 32	0.1531	3.3312	0.1199	39.3982	0.0952	37.0364		
36	35- 26	0.2574	5.8826	0.1492	50.5083	0.2097	86.0471		
37	50- 43	0.1419	3.2673	0.1099	39.5439	0.0899	40.7266		
38	348- 35	0.1234	2.5518	-0.0244	-7.0021	0.1209	58.2203		
39	50- 9	0.1621	2.4704	0.1244	16.2485	0.1039	56.7537		

DELTA CPU TIME = 0:00:11.13

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
162	205 - 22	0.0480	0.1190	0.0235	0.0582		
163	176 - 25	0.0493	0.1224	0.0241	0.0599		
165	104 - 4	0.0244	0.0604	0.0119	0.0296		
164	137 - 12	0.0729	0.1808	0.0531	0.1317		
166	125 - 37	0.0816	0.2025	0.0506	0.1255		
1218	170 - 5	0.1564	0.3880	0.0643	0.1597		
11	125 - 20	0.0617	0.1531	0.0471	0.1169		
12	118 - 25	0.0576	0.1430	0.0475	0.1178		
13	121 - 52	0.0591	0.1467	0.0428	0.1061		
14	148 - 37	0.0925	0.2294	0.0526	0.1305		
15	151 - 52	0.0954	0.2368	0.0430	0.1067		
16	151 - 16	0.0892	0.2213	0.0422	0.1047		
17	145 - 5	0.0902	0.2238	0.0424	0.1053		
18	144 - 55	0.0860	0.2133	0.0392	0.0972		
161	178 - 32	0.1013	0.2513	0.0786	0.1950		
21	171 - 27	0.0810	0.2011	0.0532	0.1321		
22	148 - 38	0.0672	0.1666	0.0473	0.1173		
23	141 - 19	0.0668	0.1656	0.0462	0.1146		
24	156 - 23	0.0800	0.1985	0.0499	0.1239		
25	151 - 21	0.0845	0.2096	0.0467	0.1159		
26	166 - 59	0.1935	0.4800	0.0506	0.1255		
27	148 - 12	0.0736	0.1825	0.0438	0.1086		
28	144 - 51	0.0729	0.1808	0.0427	0.1060		
29	139 - 32	0.0692	0.1718	0.0402	0.0998		
31	142 - 49	0.0714	0.1771	0.0485	0.1202		
32	148 - 19	0.0729	0.1810	0.0509	0.1263		
33	130 - 48	0.0650	0.1613	0.0451	0.1119		
34	131 - 38	0.0642	0.1593	0.0480	0.1192		
35	126 - 28	0.0601	0.1491	0.0448	0.1110		
36	125 - 20	0.0590	0.1463	0.0438	0.1086		
37	123 - 32	0.0568	0.1409	0.0419	0.1040		
38	108 - 24	0.0605	0.1502	0.0436	0.1082		
39	99 - 15	0.0884	0.2194	0.0409	0.1014		

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
162	205 - 22	0.1111	0.2756	0.0544	0.1349		
163	176 - 25	0.1080	0.2679	0.0528	0.1311		
165	104 - 4	0.2187	0.5427	0.1070	0.2656		

DELTA CPU TIME = 0:00:00.40

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
164	45.7156	6.1558	***
166	139.0666	6.1558	***
1218	183.1833	6.1558	***
11	5.6229	6.1558	
12	24.5156	6.1558	***
13	20.0128	6.1558	***
14	8.2015	6.1558	***
15	29.0915	6.1558	***
16	14.3955	6.1558	***
17	23.5680	6.1558	***
18	30.8382	6.1558	***
161	49.1413	6.1558	***
21	24.5162	6.1558	***
22	10.8991	6.1558	***
23	8.7454	6.1558	***
24	9.5814	6.1558	***
25	24.7161	6.1558	***
26	13.8813	6.1558	***
27	9.6286	6.1558	***
28	16.0686	6.1558	***
29	31.5878	6.1558	***
31	54.3649	6.1558	***
32	9.9521	6.1558	***
33	9.5176	6.1558	***
34	20.5421	6.1558	***
35	15.4544	6.1558	***
36	37.8568	6.1558	***
37	12.4690	6.1558	***
38	6.0360	6.1558	
39	9.3261	6.1558	***

DELTA CPU TIME = 0:00:14.20

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK TWO

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 111.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92730
MAXIMUM OMEGA: 12.6181 MAX. CHANGE OMEGA: 12.6181 BOUNDARY VALUE: 3.9273

SIGNIFICANT X-TRANSLATION OF 0.103465 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 111.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92730
MAXIMUM OMEGA: 20.3750 MAX. CHANGE OMEGA: 7.7570 BOUNDARY VALUE: 3.9273

SIGNIFICANT X-TRANSLATION OF 0.117544 cm

SIGNIFICANT Z-ROTATION OF -0.000005 radian

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 111.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92730
MAXIMUM OMEGA: 20.9394 MAX. CHANGE OMEGA: 0.5644 BOUNDARY VALUE: 3.9273

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000005 radian	YES
Y-TRANSLATION	-0.019349 cm	NO
X-TRANSLATION	0.117544 cm	YES

DELTA CPU TIME = 0:00:18.78

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
12	232- 52	0.3253	6.5912	-0.2594	-84.2422	-0.1964	-78.7010		
13	282- 15	0.3773	6.5592	-0.3687	-121.5960	0.0801	34.8986		
14	26- 42	0.0249	0.3768	0.0112	2.5842	0.0223	3.1918		
15	349- 9	0.2641	2.8702	-0.0497	-14.3589	0.2594	34.6168		
16	22- 1	0.0411	0.6303	0.0154	4.7994	0.0381	5.8371		
17	123- 9	0.1708	2.0052	0.1430	36.8821	-0.0934	-15.4085		
18	6- 10	0.1496	2.1495	0.0161	4.6305	0.1487	27.2696		
21	304- 49	0.4299	6.3425	-0.3530	-121.0157	0.2455	37.8517		
22	284- 37	0.3139	5.3739	-0.3037	-106.5390	0.0792	20.3433		
23	278- 12	0.2949	5.0784	-0.2919	-95.9684	0.0421	11.8541		
24	317- 56	0.3012	3.8857	-0.2018	-64.6833	0.2236	38.7333		
25	348- 3	0.2774	3.3814	-0.0575	-17.3007	0.2713	45.2395		
26	342- 17	0.6989	3.6236	-0.2127	-49.1597	0.6657	18.6657		
27	337- 53	0.1178	1.6166	-0.0444	-15.3678	0.1092	24.5750		
28	359- 3	0.1142	1.7602	-0.0019	-0.6352	0.1142	27.4744		
29	24- 14	0.1452	3.0980	0.0596	20.1717	0.1324	38.3163		
31	326- 24	0.5590	7.8402	-0.3094	-92.3316	0.4656	113.8008		
32	313- 40	0.3020	4.2101	-0.2185	-65.3348	0.2085	45.6531		
33	296- 27	0.3070	4.8006	-0.2749	-83.5557	0.1367	46.0378		
34	315- 6	0.3476	5.4188	-0.2454	-73.8780	0.2463	79.2319		
35	1- 23	0.0953	1.8940	0.0023	0.7571	0.0953	37.0733		
36	8- 35	0.2122	4.4916	0.0317	10.7180	0.2098	86.0720		
37	355- 7	0.0902	1.8700	-0.0077	-2.7677	0.0898	40.7232		
39	3- 49	0.1039	2.5013	0.0069	0.9029	0.1037	56.6581		

DELTA CPU TIME = 0:00:01.06

10.0 SUMMARY REPORT

PROGRAM SUMMARY

34 POINTS INPUT FROM EPOCH 4

33 POINTS INPUT FROM EPOCH 5

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 3 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:01:56.70

TOTAL CPU TIME = 0:00:51.68

APPENDIX III D

Horizontal Deformation Analysis

Epoch 5 vs. Epoch 6

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**            **      *****
**          ****      **  **
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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*                                           *
*            PROJECT INFORMATION            *
*                                           *
* THE BSC GROUP - PROJECT 1-1654.00         *
*                                           *
* BALL MOUNTAIN DAM MONITORING NETWORK      *
*                                           *
* HORIZONTAL DEFORMATION ANALYSIS           *
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*    DATE: 11-OCT-1987   TIME: 18:19:14     *
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* NETWORK: 1165400H   EPOCHS    5 AND    6 *
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2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
161	*** NO EXCLUDED POINTS DEFINED ***
162	
163	
164	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 5	EPOCH: 6	TOTAL
REDUNDANCY :	54.00	59.00	113.00
STD. DEV. UNIT WEIGHT :	1.2065667	1.2283866	1.2180081
WEIGHTED QUADRATIC RESIDUALS :	78.6133691	89.0270835	167.6404526
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 5			EPOCH: 6		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6199	9926.4502	1001.4850	9884.6578	9926.4911	1001.4850
162	10087.6880	9917.4328	1014.9810	10087.7290	9917.4732	1014.9810
163	10203.6843	10080.8534	925.3040	10203.7273	10080.8936	925.3040
164	10000.0376	10273.8113	1006.4650	10000.0763	10273.8504	1006.4650
165	9843.3655	10241.7483	1009.7800	9843.4050	10241.7906	1009.7800
1218	9846.9559	10016.2053	1015.0000	9846.9893	10016.2508	1015.0000
11	9977.1169	10173.6756	1000.2730	9977.1559	10173.7185	1000.2730
12	9979.0441	10174.9235	1000.3150	9979.0835	10174.9675	1000.3150
13	9980.7140	10173.6597	1000.1030	9980.7540	10173.7024	1000.1030
14	9995.5535	10177.1420	992.5700	9995.5935	10177.1828	992.5700
15	10022.2508	10176.3888	977.7050	10022.2913	10176.4288	977.7050
16	10026.6318	10176.3821	975.1380	10026.6720	10176.4241	975.1380
17	10039.6041	10175.6028	966.8130	10039.6442	10175.6456	966.8130
18	10050.7176	10174.8432	960.3930	10050.7586	10174.8846	960.3930
21	9977.0972	10124.0793	1000.1760	9977.1388	10124.1204	1000.1760
22	9979.5681	10123.5296	1000.3040	9979.6092	10123.5714	1000.3040
23	9981.5853	10124.0292	1000.1480	9981.6264	10124.0732	1000.1480
24	9996.6736	10128.3899	990.2490	9996.7144	10128.4296	990.2490
25	10020.8925	10129.7558	978.1230	10020.9330	10129.7960	978.1230
26	10028.1567	10129.6706	973.9620	10028.1982	10129.7103	973.9620
27	10040.6849	10130.6476	965.8000	10040.7261	10130.6880	965.8000
28	10050.4811	10130.9384	960.5700	10050.5230	10130.9800	960.5700
29	10075.9165	10132.3596	946.6670	10075.9580	10132.4006	946.6670
31	9981.3272	10075.7311	1000.3780	9981.3671	10075.7738	1000.3780
32	9983.6938	10076.4467	1000.3840	9983.7334	10076.4870	1000.3840
33	9986.1794	10076.5789	1000.0010	9986.2197	10076.6196	1000.0010
34	10000.9450	10074.1701	992.0120	10000.9851	10074.2101	992.0120
35	10025.8973	10077.3709	977.7070	10025.9375	10077.4113	977.7070
36	10032.7462	10077.9101	973.8690	10032.7865	10077.9500	973.8690
37	10046.4007	10079.8499	965.3180	10046.4414	10079.8911	965.3180
38	10055.2819	10081.0760	960.5840	10055.3240	10081.1168	960.5840
39	10080.0112	10084.1929	946.8710	10080.0514	10084.2337	946.8710
166	10000.0376	9999.9562	1000.0000	10000.0759	9999.9954	1000.0000

DELTA CPU TIME = 0:00:02.40

number of fixed points in net	1	1
number of analyzed fixed points	1	1
fixed points net 1	166	
fixed points net 2	166	

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	-0.8028	0.1238	0.0000	-196.1330
162	0.0521	2.0666	0.0000	-378.4288
163	0.5725	0.0764	0.0000	-182.4579
164	-0.4125	-0.5726	0.0000	-165.2751

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.45175

SUM OF OMEGA: -163.7058 BOUNDARY VALUE: 9.8070 TEST PASSES

MAX. SINGLE OMEGA: -165.2751 BOUNDARY VALUE: 6.1535 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -3.9935 PPM DELTA CPU TIME = 0:00:00.63

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 5 EPOCH 2: 6

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
161	307- 56	0.2042	5.7146	-0.1611	-106.4364	0.1255	41.3941		
162	41- 48	0.0955	1.4358	0.0637	20.1497	0.0712	21.9056		
163	90- 39	0.2177	5.6134	0.2177	144.2444	-0.0025	-1.9278		
164	211- 46	0.2285	7.5686	-0.1203	-66.7316	-0.1942	-1454.1034		
165	7- 20	0.1442	1.8019	0.0184	4.8952	0.1430	22.0954		
1218	312- 57	0.8093	4.3063	-0.5924	-86.6929	0.5514	14.0087		
11	339- 59	0.2432	3.4454	-0.0833	-25.1411	0.2285	39.2877		
12	352- 35	0.3345	4.4675	-0.0432	-13.1713	0.3317	56.4546		
13	3- 23	0.2105	3.2515	0.0124	3.9959	0.2101	50.8624		
14	18- 45	0.0205	0.2586	0.0066	1.9117	0.0194	2.0493		
15	139- 4	0.0773	0.8505	0.0507	19.1239	-0.0584	-7.7204		
16	7- 60	0.1347	1.6981	0.0187	6.9840	0.1334	18.5847		
17	0- 47	0.2117	2.7766	0.0029	1.0508	0.2117	35.9287		
18	49- 5	0.1135	3.4288	0.0857	31.0961	0.0743	15.0234		
21	70- 31	0.1837	2.9619	0.1731	58.0790	0.0612	8.4644		
22	41- 31	0.1871	2.4628	0.1240	42.9816	0.1401	19.2304		
23	19- 1	0.3709	3.9294	0.1209	38.9464	0.3507	36.9432		
24	127- 42	0.1147	1.3874	0.0908	25.4342	-0.0702	-8.1529		
25	119- 5	0.0548	0.7783	0.0479	16.3684	-0.0267	-3.7273		
26	117- 37	0.1637	2.1826	0.1451	43.3402	-0.0759	-10.7891		
27	94- 18	0.1107	2.0544	0.1104	40.4012	-0.0083	-1.6958		
28	57- 28	0.2077	4.3481	0.1751	58.6135	0.1117	29.0254		
29	65- 24	0.1384	1.8651	0.1258	24.4683	0.0576	9.2762		
31	0- 31	0.2485	3.4186	0.0023	0.7465	0.2485	46.9903		
32	281- 8	0.0288	0.5549	-0.0283	-9.8780	0.0056	1.8506		
33	43- 51	0.0565	1.0048	0.0391	13.4247	0.0407	15.5440		
34	132- 15	0.0225	0.3805	0.0167	4.8907	-0.0151	-6.2531		
35	59- 58	0.0168	0.3568	0.0145	5.5163	0.0084	4.5737		
36	147- 56	0.0354	0.7698	0.0188	7.3209	-0.0300	-18.1535		
37	34- 7	0.1118	2.8659	0.0627	27.2489	0.0926	66.4344		
38	74- 5	0.1965	2.7953	0.1889	37.5855	0.0539	60.8814		
39	351- 37	0.0560	1.1049	-0.0082	-1.0272	0.0554	18.0595		
166	245- 9	0.1809	3.0089	-0.1642	-45.8656	-0.0760	-57.1512		

DELTA CPU TIME = 0:00:10.81

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161	203 - 52	0.0583	0.1447	0.0338	0.0839		
162	223 - 56	0.0666	0.1651	0.0445	0.1104		
163	237 - 54	0.0406	0.1007	0.0340	0.0842		
164	258 - 34	0.0433	0.1074	0.0079	0.0196		
165	177 - 50	0.0805	0.1996	0.0613	0.1521		
1218	160 - 14	0.2102	0.5214	0.0448	0.1112		
11	196 - 56	0.0779	0.1933	0.0553	0.1371		
12	197 - 7	0.0784	0.1945	0.0548	0.1361		
13	203 - 7	0.0660	0.1637	0.0538	0.1333		
14	152 - 47	0.1079	0.2676	0.0358	0.0888		
15	155 - 27	0.0941	0.2335	0.0368	0.0912		
16	153 - 53	0.0927	0.2300	0.0355	0.0881		
17	149 - 31	0.0869	0.2157	0.0329	0.0816		
18	146 - 18	0.0818	0.2030	0.0317	0.0786		
21	188 - 8	0.0856	0.2123	0.0538	0.1334		
22	185 - 27	0.0856	0.2123	0.0533	0.1323		
23	181 - 25	0.0975	0.2417	0.0557	0.1381		
24	165 - 12	0.0948	0.2351	0.0565	0.1401		
25	164 - 56	0.0865	0.2146	0.0510	0.1265		
26	157 - 46	0.0882	0.2187	0.0511	0.1267		
27	157 - 41	0.0730	0.1810	0.0479	0.1189		
28	146 - 7	0.0675	0.1674	0.0478	0.1185		
29	191 - 55	0.0791	0.1963	0.0714	0.1770		
31	173 - 58	0.0729	0.1808	0.0547	0.1356		
32	220 - 26	0.0582	0.1445	0.0498	0.1235		
33	235 - 9	0.0565	0.1402	0.0484	0.1201		
34	113 - 50	0.0604	0.1498	0.0467	0.1159		
35	106 - 28	0.0520	0.1291	0.0419	0.1040		
36	103 - 7	0.0512	0.1269	0.0400	0.0992		
37	100 - 12	0.0483	0.1198	0.0369	0.0916		
38	264 - 11	0.0712	0.1766	0.0290	0.0720		
39	249 - 43	0.0934	0.2317	0.0479	0.1188		
166	256 - 36	0.0609	0.1512	0.0346	0.0858		

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161	173 - 46	0.1047	0.2597	0.0555	0.1376		
162	261 - 29	0.0886	0.2198	0.1025	0.2542		
163	156 - 51	0.0610	0.1512	0.0405	0.1004		
164	93 - 33	0.0880	0.2182	0.0441	0.1093		

DELTA CPU TIME = 0:00:00.57

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
165	155.2800	6.1535	***
1218	262.8346	6.1535	***
11	70.9242	6.1535	***
12	97.4989	6.1535	***
13	84.6401	6.1535	***
14	189.8832	6.1535	***
15	118.0884	6.1535	***
16	88.6967	6.1535	***
17	89.7878	6.1535	***
18	113.0721	6.1535	***
21	81.7505	6.1535	***
22	29.9778	6.1535	***
23	51.8333	6.1535	***
24	116.1685	6.1535	***
25	89.9748	6.1535	***
26	94.7088	6.1535	***
27	95.7066	6.1535	***
28	77.5516	6.1535	***
29	85.5358	6.1535	***
31	11.5528	6.1535	***
32	1.3026	6.1535	
33	14.6316	6.1535	***
34	137.3947	6.1535	***
35	130.3963	6.1535	***
36	139.5473	6.1535	***
37	101.8081	6.1535	***
38	100.0257	6.1535	***
39	58.4403	6.1535	***
166	120.7699	6.1535	***

DELTA CPU TIME = 0:00:14.51

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 4.9555 MAX. CHANGE OMEGA: 4.9555 BOUNDARY VALUE: 3.9242

SIGNIFICANT Y-TRANSLATION OF 0.069806 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 9.2962 MAX. CHANGE OMEGA: 4.3407 BOUNDARY VALUE: 3.9242

SIGNIFICANT Y-TRANSLATION OF 0.068625 cm

SIGNIFICANT Z-ROTATION OF 0.000003 radian

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417

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MAXIMUM OMEGA:        15.0143      MAX. CHANGE OMEGA:        5.7181    BOUNDARY VALUE:        3.9242

SIGNIFICANT Y-TRANSLATION    OF    0.072199    cm

SIGNIFICANT Z-ROTATION       OF    0.000005    radian

SIGNIFICANT X-TRANSLATION    OF   -0.068194    cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION
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9.0 LOCALIZATION OF GROUP PARAMETERS REPORT CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	0.000005 radian	YES
Y-TRANSLATION	0.072199 cm	YES
X-TRANSLATION	-0.068194 cm	YES

DELTA CPU TIME = 0:00:19.66

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	354- 14	0.1567	2.0898	-0.0157	-4.7489	0.1559	26.8105		
12	5- 22	0.2603	3.3554	0.0243	7.4143	0.2591	44.1072		
13	30- 11	0.1591	2.4168	0.0800	25.6722	0.1376	33.3023		
14	125- 36	0.0911	0.9362	0.0741	21.4941	-0.0530	-5.6006		
15	137- 53	0.1762	1.9486	0.1182	44.6126	-0.1307	-17.2776		
16	54- 42	0.1057	2.7779	0.0863	32.1480	0.0611	8.5098		
17	26- 47	0.1562	2.8642	0.0704	25.6180	0.1395	23.6715		
18	89- 12	0.1533	2.9587	0.1533	55.5856	0.0021	0.4338		
21	92- 41	0.2412	4.4543	0.2409	80.8211	-0.0113	-1.5630		
22	70- 36	0.2034	3.3725	0.1918	66.4770	0.0676	9.2745		
23	34- 9	0.3361	3.8488	0.1887	60.7916	0.2782	29.3029		
24	131- 58	0.2132	2.5055	0.1585	44.4260	-0.1426	-16.5727		
25	130- 33	0.1523	1.9784	0.1157	39.5080	-0.0990	-13.8408		
26	124- 51	0.2593	3.2807	0.2128	63.5881	-0.1482	-21.0661		
27	114- 19	0.1955	3.1320	0.1781	65.2047	-0.0805	-16.4727		
28	80- 46	0.2461	4.7568	0.2429	81.2928	0.0395	10.2708		
29	94- 15	0.1941	2.7147	0.1936	37.6415	-0.0144	-2.3202		
31	21- 47	0.1895	2.7327	0.0703	23.3244	0.1759	33.2730		
32	149- 17	0.0779	1.5351	0.0398	13.8955	-0.0670	-22.2588		
33	106- 31	0.1118	2.1619	0.1072	36.7702	-0.0318	-12.1289		
34	135- 57	0.1218	2.0777	0.0847	24.8645	-0.0876	-36.1742		
35	127- 44	0.1044	2.0541	0.0826	31.3653	-0.0639	-34.8230		
36	139- 40	0.1341	2.8238	0.0868	33.8486	-0.1022	-61.9128		
37	81- 8	0.1323	2.8031	0.1307	56.8106	0.0204	14.6331		
38	94- 4	0.2576	3.6632	0.2570	51.1174	-0.0183	-20.6415		
39	105- 32	0.0621	0.7690	0.0598	7.5246	-0.0166	-5.4235		

DELTA CPU TIME = 0:00:01.06

10.0 SUMMARY REPORT

P R O G R A M S U M M A R Y

33 POINTS INPUT FROM EPOCH 5

34 POINTS INPUT FROM EPOCH 6

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 4 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:01:00.78

TOTAL CPU TIME = 0:00:53.00

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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*********************************************
*                                           *
*                                           *
*            PROJECT INFORMATION            *
*                                           *
* THE BSC GROUP - PROJECT 1-1654.00         *
*                                           *
* BALL MOUNTAIN DAM MONITORING NETWORK      *
*                                           *
* HORIZONTAL DEFORMATION ANALYSIS           *
*                                           *
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*    DATE: 11-OCT-1987   TIME: 16:44:30     *
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*                                           *
* NETWORK: 1165400H   EPOCHS    5 AND    6 *
*                                           *
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400H EPOCH 1: 5 EPOCH 2: 6

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	YES
Y-TRANSLATION	--------->	YES
X-TRANSLATION	--------->	YES
Z-TRANSLATION	--------->	NO

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS

161
162
163
164

EXCLUDED POINTS

*** NO EXCLUDED POINTS DEFINED ***

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK TWO

11
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GROUP # 2 BLOCK THREE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 5	EPOCH: 6	TOTAL
REDUNDANCY :	54.00	59.00	113.00
STD. DEV. UNIT WEIGHT :	1.2065667	1.2283866	1.2180081
WEIGHTED QUADRATIC RESIDUALS :	78.6133691	89.0270835	167.6404526
NUMBER OF RANK DEFECTS :	3	4	
	Z-ROTATION	SCALE	
	Y-TRANSLATION	Z-ROTATION	
	X-TRANSLATION	Y-TRANSLATION	
		X-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 5			EPOCH: 6		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6199	9926.4502	1001.4850	9884.6578	9926.4911	1001.4850
162	10087.6880	9917.4328	1014.9810	10087.7290	9917.4732	1014.9810
163	10203.6843	10080.8534	925.3040	10203.7273	10080.8936	925.3040
164	10000.0376	10273.8113	1006.4650	10000.0763	10273.8504	1006.4650
165	9843.3655	10241.7483	1009.7800	9843.4050	10241.7906	1009.7800
1218	9846.9559	10016.2053	1015.0000	9846.9893	10016.2508	1015.0000
11	9977.1169	10173.6756	1000.2730	9977.1559	10173.7185	1000.2730
12	9979.0441	10174.9235	1000.3150	9979.0835	10174.9675	1000.3150
13	9980.7140	10173.6597	1000.1030	9980.7540	10173.7024	1000.1030
14	9995.5535	10177.1420	992.5700	9995.5935	10177.1828	992.5700
15	10022.2508	10176.3888	977.7050	10022.2913	10176.4288	977.7050
16	10026.6318	10176.3821	975.1380	10026.6720	10176.4241	975.1380
17	10039.6041	10175.6028	966.8130	10039.6442	10175.6456	966.8130
18	10050.7176	10174.8432	960.3930	10050.7586	10174.8846	960.3930
21	9977.0972	10124.0793	1000.1760	9977.1388	10124.1204	1000.1760
22	9979.5681	10123.5296	1000.3040	9979.6092	10123.5714	1000.3040
23	9981.5853	10124.0292	1000.1480	9981.6264	10124.0732	1000.1480
24	9996.6736	10128.3899	990.2490	9996.7144	10128.4296	990.2490
25	10020.8925	10129.7558	978.1230	10020.9330	10129.7960	978.1230
26	10028.1567	10129.6706	973.9620	10028.1982	10129.7103	973.9620
27	10040.6849	10130.6476	965.8000	10040.7261	10130.6880	965.8000
28	10050.4811	10130.9384	960.5700	10050.5230	10130.9800	960.5700
29	10075.9165	10132.3596	946.6670	10075.9580	10132.4006	946.6670
31	9981.3272	10075.7311	1000.3780	9981.3671	10075.7738	1000.3780
32	9983.6938	10076.4467	1000.3840	9983.7334	10076.4870	1000.3840
33	9986.1794	10076.5789	1000.0010	9986.2197	10076.6196	1000.0010
34	10000.9450	10074.1701	992.0120	10000.9851	10074.2101	992.0120
35	10025.8973	10077.3709	977.7070	10025.9375	10077.4113	977.7070
36	10032.7462	10077.9101	973.8690	10032.7865	10077.9500	973.8690
37	10046.4007	10079.8499	965.3180	10046.4414	10079.8911	965.3180
38	10055.2819	10081.0760	960.5840	10055.3240	10081.1168	960.5840
39	10080.0112	10084.1929	946.8710	10080.0514	10084.2337	946.8710
166	10000.0376	9999.9562	1000.0000	10000.0759	9999.9954	1000.0000

DELTA CPU TIME = 0:00:02.39

number of fixed points in net	1	1
number of analyzed fixed points	1	1
fixed points net 1	166	
fixed points net 2	166	

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	-0.8028	0.1238	0.0000	-196.1330
162	0.0521	2.0666	0.0000	-378.4288
163	0.5725	0.0764	0.0000	-182.4579
164	-0.4125	-0.5726	0.0000	-165.2751

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.45175

SUM OF OMEGA: -163.7058 BOUNDARY VALUE: 9.8070 TEST PASSES

MAX. SINGLE OMEGA: -165.2751 BOUNDARY VALUE: 6.1535 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -3.9935 PPM DELTA CPU TIME = 0:00:00.62

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
161	307- 56	0.2042	5.7146	-0.1611	-106.4364	0.1255	41.3941		
162	41- 48	0.0955	1.4358	0.0637	20.1497	0.0712	21.9056		
163	90- 39	0.2177	5.6134	0.2177	144.2444	-0.0025	-1.9278		
164	211- 46	0.2285	7.5686	-0.1203	-66.7316	-0.1942	-1454.1034		
165	7- 20	0.1442	1.8019	0.0184	4.8952	0.1430	22.0954		
1218	312- 57	0.8093	4.3063	-0.5924	-86.6929	0.5514	14.0087		
11	339- 59	0.2432	3.4454	-0.0833	-25.1411	0.2285	39.2877		
12	352- 35	0.3345	4.4675	-0.0432	-13.1713	0.3317	56.4546		
13	3- 23	0.2105	3.2515	0.0124	3.9959	0.2101	50.8624		
14	18- 45	0.0205	0.2586	0.0066	1.9117	0.0194	2.0493		
15	139- 4	0.0773	0.8505	0.0507	19.1239	-0.0584	-7.7204		
16	7- 60	0.1347	1.6981	0.0187	6.9840	0.1334	18.5847		
17	0- 47	0.2117	2.7766	0.0029	1.0508	0.2117	35.9287		
18	49- 5	0.1135	3.4288	0.0857	31.0961	0.0743	15.0234		
21	70- 31	0.1837	2.9619	0.1731	58.0790	0.0612	8.4644		
22	41- 31	0.1871	2.4628	0.1240	42.9816	0.1401	19.2304		
23	19- 1	0.3709	3.9294	0.1209	38.9464	0.3507	36.9432		
24	127- 42	0.1147	1.3874	0.0908	25.4342	-0.0702	-8.1529		
25	119- 5	0.0548	0.7783	0.0479	16.3684	-0.0267	-3.7273		
26	117- 37	0.1637	2.1826	0.1451	43.3402	-0.0759	-10.7891		
27	94- 18	0.1107	2.0544	0.1104	40.4012	-0.0083	-1.6958		
28	57- 28	0.2077	4.3481	0.1751	58.6135	0.1117	29.0254		
29	65- 24	0.1384	1.8651	0.1258	24.4683	0.0576	9.2762		
31	0- 31	0.2485	3.4186	0.0023	0.7465	0.2485	46.9903		
32	281- 8	0.0288	0.5549	-0.0283	-9.8780	0.0056	1.8506		
33	43- 51	0.0565	1.0048	0.0391	13.4247	0.0407	15.5440		
34	132- 15	0.0225	0.3805	0.0167	4.8907	-0.0151	-6.2531		
35	59- 58	0.0168	0.3568	0.0145	5.5163	0.0084	4.5737		
36	147- 56	0.0354	0.7698	0.0188	7.3209	-0.0300	-18.1535		
37	34- 7	0.1118	2.8659	0.0627	27.2489	0.0926	66.4344		
38	74- 5	0.1965	2.7953	0.1889	37.5855	0.0539	60.8814		
39	351- 37	0.0560	1.1049	-0.0082	-1.0272	0.0554	18.0595		
166	245- 9	0.1809	3.0089	-0.1642	-45.8656	-0.0760	-57.1512		

DELTA CPU TIME = 0:00:10.81

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161	203 - 52	0.0583	0.1447	0.0338	0.0839		
162	223 - 56	0.0666	0.1651	0.0445	0.1104		
163	237 - 54	0.0406	0.1007	0.0340	0.0842		
164	258 - 34	0.0433	0.1074	0.0079	0.0196		
165	177 - 50	0.0805	0.1996	0.0613	0.1521		
1218	160 - 14	0.2102	0.5214	0.0448	0.1112		
11	196 - 56	0.0779	0.1933	0.0553	0.1371		
12	197 - 7	0.0784	0.1945	0.0548	0.1361		
13	203 - 7	0.0660	0.1637	0.0538	0.1333		
14	152 - 47	0.1079	0.2676	0.0358	0.0888		
15	155 - 27	0.0941	0.2335	0.0368	0.0912		
16	153 - 53	0.0927	0.2300	0.0355	0.0881		
17	149 - 31	0.0869	0.2157	0.0329	0.0816		
18	146 - 18	0.0818	0.2030	0.0317	0.0786		
21	188 - 8	0.0856	0.2123	0.0538	0.1334		
22	185 - 27	0.0856	0.2123	0.0533	0.1323		
23	181 - 25	0.0975	0.2417	0.0557	0.1381		
24	165 - 12	0.0948	0.2351	0.0565	0.1401		
25	164 - 56	0.0865	0.2146	0.0510	0.1265		
26	157 - 46	0.0882	0.2187	0.0511	0.1267		
27	157 - 41	0.0730	0.1810	0.0479	0.1189		
28	146 - 7	0.0675	0.1674	0.0478	0.1185		
29	191 - 55	0.0791	0.1963	0.0714	0.1770		
31	173 - 58	0.0729	0.1808	0.0547	0.1356		
32	220 - 26	0.0582	0.1445	0.0498	0.1235		
33	235 - 9	0.0565	0.1402	0.0484	0.1201		
34	113 - 50	0.0604	0.1498	0.0467	0.1159		
35	106 - 28	0.0520	0.1291	0.0419	0.1040		
36	103 - 7	0.0512	0.1269	0.0400	0.0992		
37	100 - 12	0.0483	0.1198	0.0369	0.0916		
38	264 - 11	0.0712	0.1766	0.0290	0.0720		
39	249 - 43	0.0934	0.2317	0.0479	0.1188		
166	256 - 36	0.0609	0.1512	0.0346	0.0858		

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161	173 - 46	0.1047	0.2597	0.0555	0.1376		
162	261 - 29	0.0886	0.2198	0.1025	0.2542		
163	156 - 51	0.0610	0.1512	0.0405	0.1004		
164	93 - 33	0.0880	0.2182	0.0441	0.1093		

DELTA CPU TIME = 0:00:00.58

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
165	155.2800	6.1535	***
1218	262.8346	6.1535	***
11	70.9242	6.1535	***
12	97.4989	6.1535	***
13	84.6401	6.1535	***
14	189.8832	6.1535	***
15	118.0884	6.1535	***
16	88.6967	6.1535	***
17	89.7878	6.1535	***
18	113.0721	6.1535	***
21	81.7505	6.1535	***
22	29.9778	6.1535	***
23	51.8333	6.1535	***
24	116.1685	6.1535	***
25	89.9748	6.1535	***
26	94.7088	6.1535	***
27	95.7066	6.1535	***
28	77.5516	6.1535	***
29	85.5358	6.1535	***
31	11.5528	6.1535	***
32	1.3026	6.1535	
33	14.6316	6.1535	***
34	137.3947	6.1535	***
35	130.3963	6.1535	***
36	139.5473	6.1535	***
37	101.8081	6.1535	***
38	100.0257	6.1535	***
39	58.4403	6.1535	***
166	120.7699	6.1535	***

DELTA CPU TIME = 0:00:14.51

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK TWO

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 10.5986 MAX. CHANGE OMEGA: 10.5986 BOUNDARY VALUE: 3.9242

SIGNIFICANT Y-TRANSLATION OF 0.101913 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 16.5972 MAX. CHANGE OMEGA: 5.9986 BOUNDARY VALUE: 3.9242

SIGNIFICANT Y-TRANSLATION OF 0.081363 cm

SIGNIFICANT Z-ROTATION OF 0.000006 radian

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 16.9266 MAX. CHANGE OMEGA: 0.3294 BOUNDARY VALUE: 3.9242

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT CONT'D

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	0.000006 radian	YES
Y-TRANSLATION	0.081363 cm	YES
X-TRANSLATION	-0.019466 cm	NO

DELTA CPU TIME = 0:00:12.68

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	330- 13	0.1690	2.5277	-0.0840	-25.3573	0.1467	25.2291		
12	350- 2	0.2538	3.4231	-0.0439	-13.3918	0.2499	42.5422		
13	5- 13	0.1289	1.9847	0.0117	3.7661	0.1284	31.0765		
21	96- 46	0.1739	3.2325	0.1727	57.9348	-0.0205	-2.8338		
22	64- 43	0.1367	2.1572	0.1236	42.8337	0.0584	8.0127		
23	24- 7	0.2947	3.1884	0.1204	38.8080	0.2690	28.3344		
31	0- 43	0.1668	2.2946	0.0021	0.6965	0.1667	31.5344		
32	200- 28	0.0813	1.4179	-0.0284	-9.9321	-0.0761	-25.3149		
33	136- 26	0.0565	1.1635	0.0390	13.3714	-0.0410	-15.6368		

DELTA CPU TIME = 0:00:00.35

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 2 BLOCK THREE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 4.4233 MAX. CHANGE OMEGA: 4.4233 BOUNDARY VALUE: 3.9242

SIGNIFICANT Y-TRANSLATION OF -0.085055 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 113.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.92417
MAXIMUM OMEGA: 6.4232 MAX. CHANGE OMEGA: 2.0000 BOUNDARY VALUE: 3.9242

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 2 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	0.000001 radian	NO
Y-TRANSLATION	-0.085055 cm	YES
X-TRANSLATION	0.034472 cm	NO

DELTA CPU TIME = 0:00:03.67

9.1 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
14	3- 37	0.1047	1.1084	0.0066	1.9117	0.1045	11.0294		
15	62- 16	0.0572	1.5432	0.0507	19.1239	0.0266	3.5207		
16	4- 54	0.2192	2.6884	0.0187	6.9840	0.2184	30.4385		
17	0- 33	0.2968	3.8845	0.0029	1.0508	0.2968	50.3638		
18	28- 17	0.1810	3.8051	0.0857	31.0961	0.1594	32.2194		
24	80- 41	0.0920	1.6151	0.0908	25.4342	0.0149	1.7317		
25	39- 23	0.0756	1.1590	0.0479	16.3684	0.0584	8.1667		
26	86- 23	0.1453	2.5964	0.1451	43.3402	0.0092	1.3039		
27	55- 11	0.1344	2.7231	0.1104	40.4012	0.0768	15.7080		
28	41- 40	0.2634	5.3520	0.1751	58.6135	0.1967	51.1301		
29	41- 25	0.1902	2.4605	0.1258	24.4683	0.1427	22.9698		
34	13- 24	0.0719	1.5223	0.0167	4.8907	0.0699	28.8847		
35	8- 50	0.0946	2.2443	0.0145	5.5163	0.0934	50.9239		
36	18- 50	0.0582	1.4507	0.0188	7.3209	0.0551	33.3552		
37	19- 27	0.1884	5.0560	0.0627	27.2489	0.1776	127.4706		
38	53- 40	0.2345	3.7172	0.1889	37.5855	0.1389	157.0006		
39	356- 40	0.1407	2.6394	-0.0082	-1.0272	0.1404	45.7975		

DELTA CPU TIME = 0:00:00.72

10.0 SUMMARY REPORT

PROGRAM SUMMARY

33 POINTS INPUT FROM EPOCH 5

34 POINTS INPUT FROM EPOCH 6

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 4 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 2 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:57.86

TOTAL CPU TIME = 0:00:49.57

APPENDIX III E

Vertical Deformation Analysis

Epoch 1 vs. Epoch 6

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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*******************************************
*                                         *
*                                         *
*            PROJECT INFORMATION          *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HEIGHT DEFORMATION ANALYSIS             *
*                                         *
*                                         *
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*******************************************
*                                         *
*    DATE: 11-OCT-1987   TIME: 14:05:04   *
*                                         *
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*******************************************
*                                         *
* NETWORK: 1165400Z   EPOCHS    1 AND   6 *
*                                         *
*******************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400Z EPOCH 1: 1 EPOCH 2: 6

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	YES

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS

164
161
162
163
165

EXCLUDED POINTS

*** NO EXCLUDED POINTS DEFINED ***

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 6	TOTAL
REDUNDANCY :	96.00	87.00	183.00
STD. DEV. UNIT WEIGHT :	0.9102741	1.2085835	1.0625882
WEIGHTED QUADRATIC RESIDUALS :	79.5454900	127.0786523	206.6241423
NUMBER OF RANK DEFECTS :	1	2	
	Z-TRANSLATION	SCALE	
		Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 1			EPOCH: 6		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1913	10000.0376	10273.8112	1006.1181
161	9884.6202	9926.4518	1000.9764	9884.6196	9926.4517	1000.9018
162	10087.6880	9917.4346	1014.7729	10087.6908	9917.4341	1014.7018
163	10203.6869	10080.8551	925.0731	10203.6849	10080.8548	925.0017
165	9843.3682	10241.7497	1009.5776	9843.3663	10241.7512	1009.5068
36	10032.7422	10077.9094	973.9532	10032.7481	10077.9109	973.8786
35	10025.8939	10077.3707	977.7919	10025.8991	10077.3721	977.7171
34	10000.9422	10074.1680	992.1020	10000.9467	10074.1710	992.0239
39	10080.0094	10084.1935	946.9514	10080.0130	10084.1946	946.8767
33	9986.1737	10076.5779	1000.0987	9986.1812	10076.5804	1000.0201
32	9983.6879	10076.4455	1000.4773	9983.6449	10076.4478	1000.4049
38	10055.2805	10081.0761	960.6659	10055.2856	10081.0777	960.5934
31	9981.3281	10075.7317	1000.4714	9981.3287	10075.7346	1000.3999
29	10075.9146	10132.3600	946.7502	10075.9195	10132.3616	946.6770
166	10000.0377	9999.9561	1000.0000	10000.0376	9999.9562	1000.0000
28	10050.4780	10130.9387	960.6544	10050.4845	10130.9409	960.5808
27	10040.6822	10130.6486	965.8854	10040.6876	10130.6489	965.8120
26	10028.1531	10129.6703	974.0488	10028.1597	10129.6711	973.9737
37	10046.3977	10079.8491	965.3940	10046.4030	10079.8520	965.3219
25	10020.8889	10129.7551	978.2109	10020.8945	10129.7568	978.1349
24	9996.6703	10128.3890	991.8381	9996.6759	10128.3904	991.7585
11	9977.1192	10173.6777	1000.3708	9977.1173	10173.6793	1000.2978
12	9979.0467	10174.9262	1000.4117	9979.0449	10174.9282	1000.3410
13	9980.7113	10173.6617	1000.1974	9980.7154	10173.6632	1000.1211
14	9995.5502	10177.1434	992.6496	9995.5549	10177.1436	992.5709
15	10022.2472	10176.3899	977.7855	10022.2527	10176.3897	977.7109
16	10026.6273	10176.3835	975.2261	10026.6334	10176.3850	975.1518
17	10039.5999	10175.6059	966.9012	10039.6057	10175.6064	966.8274
18	10050.7145	10174.8444	960.4799	10050.7200	10174.8455	960.4062
23	9981.5818	10124.0299	1000.2415	9981.5879	10124.0340	1000.1671
21	9977.1005	10124.0793	1000.2722	9977.1003	10124.0811	1000.2009
22	9979.5689	10123.5307	1000.3990	9979.5707	10123.5322	1000.3276

DELTA CPU TIME = 0:00:01.08

number of fixed points in net	1	1
number of analyzed fixed points	1	1
fixed points net 1	166	
fixed points net 2	166	

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	0.0000	0.0000	-0.1190	0.3532
161	0.0000	0.0000	-0.2875	1.9117
162	0.0000	0.0000	0.1871	0.7873
163	0.0000	0.0000	2.3676	2.4965
165	0.0000	0.0000	0.2028	0.8832

SUMMARY

REDUNDANCY FROM CONDITIONS: 3.0000 REDUNDANCY FROM ADJUSTMENTS: 183.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.65403

SUM OF OMEGA: 3.0344 BOUNDARY VALUE: 7.9621 TEST PASSES

MAX. SINGLE OMEGA: 2.4965 BOUNDARY VALUE: 3.8941 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: 7.1611 PPM DELTA CPU TIME = 0:00:00.58

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
164	180 - 0	0.0881	0.5781					-0.0881	-0.5781
161	180 - 0	0.2292	1.4066					-0.2292	-1.4066
162	180 - 0	0.1277	0.8624					0.1277	0.8624
163	180 - 0	0.0347	1.6005					0.0347	1.6005
165	180 - 0	0.1549	0.9693					0.1549	0.9693
36	180 - 0	0.2480	1.7842					-0.2480	-1.7842
35	180 - 0	0.2771	2.0286					-0.2771	-2.0286
34	180 - 0	0.5873	4.4144					-0.5873	-4.4144
39	180 - 0	0.2825	1.6587					-0.2825	-1.6587
33	180 - 0	0.6402	4.7510					-0.6402	-4.7510
32	180 - 0	0.0142	0.1054					-0.0142	-0.1054
38	180 - 0	0.0575	0.3803					-0.0575	-0.3803
31	180 - 0	0.0828	0.6137					0.0828	0.6137
29	180 - 0	0.1320	0.7775					-0.1320	-0.7775
166	180 - 0	7.2274	1.3536					7.2274	1.3536
28	180 - 0	0.1655	1.0871					-0.1655	-1.0871
27	180 - 0	0.1356	0.9223					-0.1356	-0.9223
26	180 - 0	0.3079	2.1901					-0.3079	-2.1901
37	180 - 0	0.0077	0.0528					-0.0077	-0.0528
25	180 - 0	0.3883	2.8106					-0.3883	-2.8106
24	180 - 0	0.7341	5.4301					-0.7341	-5.4301
11	180 - 0	0.0673	0.4920					-0.0673	-0.4920
12	180 - 0	0.1613	1.1806					0.1613	1.1806
13	180 - 0	0.4105	3.0073					-0.4105	-3.0073
14	180 - 0	0.6463	4.8002					-0.6463	-4.8002
15	180 - 0	0.2419	1.7531					-0.2419	-1.7531
16	180 - 0	0.2162	1.5501					-0.2162	-1.5501
17	180 - 0	0.1758	1.1983					-0.1758	-1.1983
18	180 - 0	0.1627	1.0645					-0.1627	-1.0645
23	180 - 0	0.2178	1.5995					-0.2178	-1.5995
21	180 - 0	0.1041	0.7571					0.1041	0.7571
22	180 - 0	0.0836	0.6111					0.0836	0.6111

DELTA CPU TIME = 0:00:01.65

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
36	3.2112	3.8941	
35	4.1447	3.8941	***
34	19.5479	3.8941	***
39	2.7878	3.8941	
33	22.6299	3.8941	***
32	0.0113	3.8941	
38	0.1518	3.8941	
31	0.3767	3.8941	
29	0.6217	3.8941	
166	1.8323	3.8941	
28	1.2024	3.8941	
27	0.8667	3.8941	
26	4.8312	3.8941	***
37	0.0038	3.8941	
25	7.9421	3.8941	***
24	29.5693	3.8941	***
11	0.2432	3.8941	
12	1.3954	3.8941	
13	9.0678	3.8941	***
14	23.1092	3.8941	***
15	3.0981	3.8941	
16	2.4257	3.8941	
17	1.4563	3.8941	
18	1.1532	3.8941	
23	2.5661	3.8941	
21	0.5736	3.8941	
22	0.3735	3.8941	

DELTA CPU TIME = 0:00:02.54

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
164						0.2002	0.3950
161						0.2079	0.4103
162						0.2109	0.4161
163						1.4985	2.9570
165						0.2157	0.4257

DELTA CPU TIME = 0:00:00.16

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
164						0.1523	0.3006
161						0.1630	0.3216
162						0.1481	0.2922
163						0.0217	0.0428
165						0.1598	0.3153
36						0.1390	0.2742
35						0.1366	0.2696
34						0.1330	0.2625
39						0.1703	0.3361
33						0.1347	0.2659
32						0.1350	0.2663
38						0.1511	0.2982
31						0.1349	0.2662
29						0.1698	0.3351
166						5.3392	10.5361
28						0.1523	0.3005
27						0.1470	0.2901
26						0.1406	0.2774
37						0.1462	0.2884
25						0.1382	0.2726
24						0.1352	0.2668
11						0.1367	0.2698
12						0.1366	0.2696
13						0.1365	0.2693
14						0.1346	0.2657
15						0.1380	0.2723
16						0.1395	0.2753
17						0.1467	0.2895
18						0.1528	0.3016
23						0.1361	0.2687
21						0.1375	0.2713
22						0.1368	0.2700

DELTA CPU TIME = 0:00:00.23

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 183.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89410
MAXIMUM OMEGA: 2.4571 MAX. CHANGE OMEGA: 2.4571 BOUNDARY VALUE: 3.8941

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	-0.206264 cm	NO

DELTA CPU TIME = 0:00:03.13

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	180 - 0	0.0673	0.4920					-0.0673	-0.4920
12	180 - 0	0.1613	1.1806					0.1613	1.1806
13	180 - 0	0.4105	3.0073					-0.4105	-3.0073
14	180 - 0	0.6463	4.8002					-0.6463	-4.8002
15	180 - 0	0.2419	1.7531					-0.2419	-1.7531
16	180 - 0	0.2162	1.5501					-0.2162	-1.5501
17	180 - 0	0.1758	1.1983					-0.1758	-1.1983
18	180 - 0	0.1627	1.0645					-0.1627	-1.0645
21	180 - 0	0.1041	0.7571					0.1041	0.7571
22	180 - 0	0.0836	0.6111					0.0836	0.6111
23	180 - 0	0.2178	1.5995					-0.2178	-1.5995
24	180 - 0	0.7341	5.4301					-0.7341	-5.4301
25	180 - 0	0.3883	2.8106					-0.3883	-2.8106
26	180 - 0	0.3079	2.1901					-0.3079	-2.1901
27	180 - 0	0.1356	0.9223					-0.1356	-0.9223
28	180 - 0	0.1655	1.0871					-0.1655	-1.0871
29	180 - 0	0.1320	0.7775					-0.1320	-0.7775
31	180 - 0	0.0828	0.6137					0.0828	0.6137
32	180 - 0	0.0142	0.1054					-0.0142	-0.1054
33	180 - 0	0.6402	4.7510					-0.6402	-4.7510
34	180 - 0	0.5873	4.4144					-0.5873	-4.4144
35	180 - 0	0.2771	2.0286					-0.2771	-2.0286
36	180 - 0	0.2480	1.7842					-0.2480	-1.7842
37	180 - 0	0.0077	0.0528					-0.0077	-0.0528
38	180 - 0	0.0575	0.3803					-0.0575	-0.3803
39	180 - 0	0.2825	1.6587					-0.2825	-1.6587

DELTA CPU TIME = 0:00:01.00

10.0 SUMMARY REPORT

PROGRAM SUMMARY

49 POINTS INPUT FROM EPOCH 1

47 POINTS INPUT FROM EPOCH 6

A TOTAL OF 32 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 5 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:20.43

TOTAL CPU TIME = 0:00:13.35

APPENDIX III F

Vertical Deformation Analysis

Epoch 3 vs. Epoch 4

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**            **      *****
**           ****     **  **
**          **  **    **   **
**         **    **   **    **
**        **      **  **    **
**        **      **  **    **
**        **********  **    **
**        **********  **    **
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*******   **      **  **  **
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```

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*******************************************
*                                         *
*                                         *
*            PROJECT INFORMATION          *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HEIGHT DEFORMATION ANALYSIS             *
*                                         *
*                                         *
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*******************************************
*                                         *
*    DATE: 20-MAY-1987   TIME: 15:26:13   *
*                                         *
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*******************************************
*                                         *
* NETWORK: 1165400Z   EPOCHS    3 AND    4 *
*                                         *
*******************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400Z EPOCH 1: 3 EPOCH 2: 4

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....ASCENDING
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	YES

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
161	*** NO EXCLUDED POINTS DEFINED ***
162	
163	
164	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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GROUP # 2 BLOCK TWO

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 3	EPOCH: 4	TOTAL
REDUNDANCY :	81.00	108.00	189.00
STD. DEV. UNIT WEIGHT :	1.0958811	1.3806357	1.2664622
WEIGHTED QUADRATIC RESIDUALS :	97.2773855	205.8647280	303.1421135
NUMBER OF RANK DEFECTS :	1	2	
	Z-TRANSLATION	SCALE	
		Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 3			EPOCH: 4		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6165	9926.4538	1000.9760	9884.6184	9926.4499	1000.9715
162	10087.6923	9917.4407	1014.7738	10087.6890	9917.4406	1014.7683
163	10203.6906	10080.8608	925.0741	10203.6843	10080.8588	925.0720
164	10000.0376	10273.8214	1006.1901	10000.0376	10273.8108	1006.1842
165	9843.3615	10241.7614	1009.5797	9843.3671	10241.7532	1009.5737
37	10046.3985	10079.8569	965.3973	10046.4002	10079.8541	965.3898
36	10032.7426	10077.9167	973.9545	10032.7455	10077.9130	973.9464
35	10025.8948	10077.3785	977.7935	10025.8970	10077.3750	977.7852
39	10080.0113	10084.2006	946.9522	10080.0130	10084.1971	946.9454
34	10000.9424	10074.1756	992.1034	10000.9474	10074.1725	992.0922
33	9986.1746	10076.5864	1000.1003	9986.1828	10076.5818	1000.0880
32	9983.6881	10076.4549	1000.4806	9983.6958	10076.4502	1000.4730
38	10055.2827	10081.0833	960.6688	10055.2828	10081.0799	960.6615
31	9981.3276	10075.7375	1000.4755	9981.3302	10075.7322	1000.4679
29	10075.9160	10132.3685	946.7550	10075.9150	10132.3631	946.7455
28	10050.4796	10130.9475	960.6558	10050.4805	10130.9420	960.6480
166	10000.0376	9999.9562	1000.0000	10000.0376	9999.9562	1000.0000
27	10040.6833	10130.6563	965.8881	10040.6848	10130.6512	965.8797
26	10028.1539	10129.6781	974.0533	10028.1583	10129.6686	974.0429
25	10020.8893	10129.7642	978.2128	10020.8923	10129.7582	978.2033
24	9996.6704	10128.3981	991.8396	9996.6754	10128.3922	991.8271
23	9981.5825	10124.0405	1000.2441	9981.5881	10123.0341	1000.2446
22	9979.5674	10123.5400	1000.4024	9979.5709	10123.5340	1000.3960
11	9977.1172	10173.6877	1000.3732	9977.1193	10173.6799	1000.3663
12	9979.0451	10174.9374	1000.4154	9979.0464	10174.9304	1000.4085
13	9980.7103	10173.6725	1000.1998	9980.7175	10173.6636	1000.1886
14	9995.5499	10177.1530	992.6504	9995.5530	10177.1459	992.6391
15	10022.2476	10176.3998	977.7869	10022.2504	10176.3908	977.7781
16	10026.6277	10176.3942	975.2279	10026.6310	10176.3859	975.2194
17	10039.6007	10175.6162	966.9041	10039.6020	10175.6079	966.8957
18	10050.7168	10174.8548	960.4814	10050.7166	10174.8460	960.4734
19	10076.4323	10173.1814	946.8291	10076.4306	10173.1735	946.8247
21	9977.0994	10124.0894	1000.2752	9977.1006	10124.0821	1000.2690

DELTA CPU TIME = 0:00:01.08

number of fixed points in net	1	1
number of analyzed fixed points	1	1

fixed points net 1 166
fixed points net 2 166

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	0.0000	0.0000	0.0924	0.1406
162	0.0000	0.0000	0.0495	0.0709
163	0.0000	0.0000	0.0096	0.0000
164	0.0000	0.0000	-0.0682	0.1206
165	0.0000	0.0000	-0.0480	0.0572

SUMMARY

REDUNDANCY FROM CONDITIONS: 3.0000 REDUNDANCY FROM ADJUSTMENTS: 189.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.65219

SUM OF OMEGA: 0.3023 BOUNDARY VALUE: 7.9566 TEST PASSES

MAX. SINGLE OMEGA: 0.1406 BOUNDARY VALUE: 3.8925 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: 41.1031 PPM DELTA CPU TIME = 0:00:00.61

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
161	0 - 0	0.0776	0.4009					0.0776	0.4009
162	0 - 0	0.0244	0.1845					0.0244	0.1845
163	180 - 0	0.0041	0.1695					-0.0041	-0.1695
164	180 - 0	0.0569	0.3740					-0.0569	-0.3740
165	180 - 0	0.0409	0.2698					-0.0409	-0.2698
37	180 - 0	0.3764	2.5181					-0.3764	-2.5181
36	180 - 0	0.4016	2.8849					-0.4016	-2.8849
35	180 - 0	0.4117	3.0134					-0.4117	-3.0134
39	180 - 0	0.3862	2.1097					-0.3862	-2.1097
34	180 - 0	0.6387	4.6370					-0.6387	-4.6370
33	180 - 0	0.7130	5.3563					-0.7130	-5.3563
32	180 - 0	0.2342	1.7604					-0.2342	-1.7604
38	180 - 0	0.3795	0.1086					-0.3795	-0.1086
31	180 - 0	0.2363	1.7811					-0.2363	-1.7811
29	180 - 0	0.6567	3.4116					-0.6567	-3.4116
28	180 - 0	0.4224	2.8181					-0.4224	-2.8181
166	180 - 0	0.5161	0.1686					0.5161	0.1686
27	180 - 0	0.4586	2.7219					-0.4586	-2.7219
26	180 - 0	0.6274	4.5183					-0.6274	-4.5183
25	180 - 0	0.5295	3.9287					-0.5295	-3.9287
24	180 - 0	0.7751	5.1665					-0.7751	-5.1665
23	180 - 0	0.5682	4.2185					0.5682	4.2185
22	180 - 0	0.1221	0.9116					-0.1221	-0.9116
11	180 - 0	0.1679	1.2774					-0.1679	-1.2774
12	180 - 0	0.1673	1.2624					-0.1673	-1.2624
13	180 - 0	0.6025	4.5477					-0.6025	-4.5477
14	180 - 0	0.6411	4.9016					-0.6411	-4.9016
15	180 - 0	0.4501	3.2956					-0.4501	-3.2956
16	180 - 0	0.4379	3.2130					-0.4379	-3.2130
17	180 - 0	0.4580	3.1736					-0.4580	-3.1736
18	180 - 0	0.4462	2.9824					-0.4462	-2.9824
19	180 - 0	0.1508	0.9008					-0.1508	-0.9008
21	180 - 0	0.0959	0.7237					-0.0959	-0.7237

DELTA CPU TIME = 0:00:01.76

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.1935	0.3818
162						0.1321	0.2606
163						0.0233	0.0460
164						0.1522	0.3003
165						0.1516	0.2991
37						0.1495	0.2949
36						0.1392	0.2747
35						0.1366	0.2695
39						0.1831	0.3612
34						0.1377	0.2717
33						0.1331	0.2626
32						0.1330	0.2625
38						3.4958	6.8971
31						0.1327	0.2618
29						0.1925	0.3798
28						0.1499	0.2957
166						3.0614	6.0400
27						0.1685	0.3324
26						0.1388	0.2739
25						0.1348	0.2659
24						0.1500	0.2960
23						0.1347	0.2657
22						0.1339	0.2642
11						0.1314	0.2593
12						0.1325	0.2615
13						0.1325	0.2614
14						0.1308	0.2580
15						0.1366	0.2695
16						0.1363	0.2689
17						0.1443	0.2847
18						0.1496	0.2952
19						0.1674	0.3303
21						0.1325	0.2614

DELTA CPU TIME = 0:00:00.24

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.2465	0.4862
162						0.1857	0.3664
163						1.5213	3.0014
164						0.1964	0.3875
165						0.2007	0.3960

DELTA CPU TIME = 0:00:00.14

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
37	6.2902	3.8925	***
36	8.3246	3.8925	***
35	9.1178	3.8925	***
39	4.6043	3.8925	***
34	21.9854	3.8925	***
33	29.6782	3.8925	***
32	3.1333	3.8925	
38	0.0244	3.8925	
31	3.2066	3.8925	
29	11.5348	3.8925	***
28	7.8765	3.8925	***
166	0.0278	3.8925	
27	7.2163	3.8925	***
26	20.5601	3.8925	***
25	15.5691	3.8925	***
24	26.5742	3.8925	***
23	18.8657	3.8925	***
22	0.8088	3.8925	
11	1.6209	3.8925	
12	1.5838	3.8925	
13	21.3317	3.8925	***
14	24.6388	3.8925	***
15	10.9101	3.8925	***
16	10.3496	3.8925	***
17	10.0389	3.8925	***
18	8.8224	3.8925	***
19	0.7716	3.8925	
21	0.4993	3.8925	

DELTA CPU TIME = 0:00:02.69

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 189.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89252
MAXIMUM OMEGA: 4.0617 MAX. CHANGE OMEGA: 4.0617 BOUNDARY VALUE: 3.8925

SIGNIFICANT Z-TRANSLATION OF -0.255325 cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	-0.255325 cm	YES

DELTA CPU TIME = 0:00:02.53

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	180 - 0	0.0874	0.6653					0.0874	0.6653
12	180 - 0	0.0880	0.6640					0.0880	0.6640
13	180 - 0	0.3471	2.6204					-0.3471	-2.6204
21	180 - 0	0.1595	1.2037					0.1595	1.2037
22	180 - 0	0.1333	0.9952					0.1333	0.9952
23	180 - 0	0.8235	6.1142					0.8235	6.1142
31	180 - 0	0.0190	0.1433					0.0190	0.1433
32	180 - 0	0.0211	0.1586					0.0211	0.1586
33	180 - 0	0.4576	3.4382					-0.4576	-3.4382

DELTA CPU TIME = 0:00:00.41

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 2 BLOCK TWO

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 189.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89252
MAXIMUM OMEGA: 66.5243 MAX. CHANGE OMEGA: 66.5243 BOUNDARY VALUE: 3.8925

SIGNIFICANT Z-TRANSLATION OF -1.275606 cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 2 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	-1.275606 cm	YES

DELTA CPU TIME = 0:00:01.08

9.1 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
14	180 - 0	0.6346	4.8519					0.6346	4.8519
15	180 - 0	0.8255	6.0434					0.8255	6.0434
16	180 - 0	0.8377	6.1470					0.8377	6.1470
17	180 - 0	0.8176	5.6661					0.8176	5.6661
18	180 - 0	0.8294	5.5435					0.8294	5.5435
19	180 - 0	1.1248	6.7177					1.1248	6.7177
24	180 - 0	0.5005	3.3366					0.5005	3.3366
25	180 - 0	0.7461	5.5355					0.7461	5.5355
26	180 - 0	0.6482	4.6687					0.6482	4.6687
27	180 - 0	0.8170	4.8493					0.8170	4.8493
28	180 - 0	0.8532	5.6918					0.8532	5.6918
29	180 - 0	0.6189	3.2148					0.6189	3.2148
34	180 - 0	0.6370	4.6246					0.6370	4.6246
35	180 - 0	0.8639	6.3237					0.8639	6.3237
36	180 - 0	0.8740	6.2782					0.8740	6.2782
37	180 - 0	0.8992	6.0150					0.8992	6.0150
38	180 - 0	0.8961	0.2563					0.8961	0.2563
39	180 - 0	0.8894	4.8588					0.8894	4.8588

DELTA CPU TIME = 0:00:00.69

10.0 SUMMARY REPORT

P R O G R A M S U M M A R Y

51 POINTS INPUT FROM EPOCH 3

49 POINTS INPUT FROM EPOCH 4

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 5 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 2 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:24.22

TOTAL CPU TIME = 0:00:13.79

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**            **      *****
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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*******************************************
*                                         *
*                                         *
*            PROJECT INFORMATION          *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HEIGHT DEFORMATION ANALYSIS             *
*                                         *
*                                         *
*******************************************
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*******************************************
*                                         *
*    DATE: 20-MAY-1987   TIME: 15:44:54   *
*                                         *
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*******************************************
*                                         *
* NETWORK: 1165400Z   EPOCHS    3 AND    4 *
*                                         *
*******************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400Z EPOCH 1: 3 EPOCH 2: 4

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	YES

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
161	*** NO EXCLUDED POINTS DEFINED ***
162	
163	
164	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK THREE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 3	EPOCH: 4	TOTAL
REDUNDANCY :	81.00	108.00	189.00
STD. DEV. UNIT WEIGHT :	1.0958811	1.3806357	1.2664622
WEIGHTED QUADRATIC RESIDUALS :	97.2773855	205.8647280	303.1421135
NUMBER OF RANK DEFECTS :	1	2	
	Z-TRANSLATION	SCALE	
		Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 3			EPOCH: 4		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6165	9926.4538	1000.9760	9884.6184	9926.4499	1000.9715
162	10087.6923	9917.4407	1014.7738	10087.6890	9917.4406	1014.7683
163	10203.6906	10080.8608	925.0741	10203.6843	10080.8588	925.0720
164	10000.0376	10273.8214	1006.1901	10000.0376	10273.8108	1006.1842
165	9843.3615	10241.7614	1009.5797	9843.3671	10241.7532	1009.5737
37	10046.3985	10079.8569	965.3973	10046.4002	10079.8541	965.3898
36	10032.7426	10077.9167	973.9545	10032.7455	10077.9130	973.9464
35	10025.8948	10077.3785	977.7935	10025.8970	10077.3750	977.7852
39	10080.0113	10084.2006	946.9522	10080.0130	10084.1971	946.9454
34	10000.9424	10074.1756	992.1034	10000.9474	10074.1725	992.0922
33	9986.1746	10076.5864	1000.1003	9986.1828	10076.5818	1000.0880
32	9983.6881	10076.4549	1000.4806	9983.6958	10076.4502	1000.4730
38	10055.2827	10081.0833	960.6688	10055.2828	10081.0799	960.6615
31	9981.3276	10075.7375	1000.4755	9981.3302	10075.7322	1000.4679
29	10075.9160	10132.3685	946.7550	10075.9150	10132.3631	946.7455
28	10050.4796	10130.9475	960.6558	10050.4805	10130.9420	960.6480
166	10000.0376	9999.9562	1000.0000	10000.0376	9999.9562	1000.0000
27	10040.6833	10130.6563	965.8881	10040.6848	10130.6512	965.8797
26	10028.1539	10129.6781	974.0533	10028.1583	10129.6686	974.0429
25	10020.8893	10129.7642	978.2128	10020.8923	10129.7582	978.2033
24	9996.6704	10128.3981	991.8396	9996.6754	10128.3922	991.8271
23	9981.5825	10124.0405	1000.2441	9981.5881	10123.0341	1000.2446
22	9979.5674	10123.5400	1000.4024	9979.5709	10123.5340	1000.3960
11	9977.1172	10173.6877	1000.3732	9977.1193	10173.6799	1000.3663
12	9979.0451	10174.9374	1000.4154	9979.0464	10174.9304	1000.4085
13	9980.7103	10173.6725	1000.1998	9980.7175	10173.6636	1000.1886
14	9995.5499	10177.1530	992.6504	9995.5530	10177.1459	992.6391
15	10022.2476	10176.3998	977.7869	10022.2504	10176.3908	977.7781
16	10026.6277	10176.3942	975.2279	10026.6310	10176.3859	975.2194
17	10039.6007	10175.6162	966.9041	10039.6020	10175.6079	966.8957
18	10050.7168	10174.8548	960.4814	10050.7166	10174.8460	960.4734
19	10076.4323	10173.1814	946.8291	10076.4306	10173.1735	946.8247
21	9977.0994	10124.0894	1000.2752	9977.1006	10124.0821	1000.2690

DELTA CPU TIME = 0:00:01.10

number of fixed points in net	1	1
number of analyzed fixed points	1	1

fixed points net 1 166
fixed points net 2 166

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	0.0000	0.0000	0.0924	0.1406
162	0.0000	0.0000	0.0495	0.0709
163	0.0000	0.0000	0.0096	0.0000
164	0.0000	0.0000	-0.0682	0.1206
165	0.0000	0.0000	-0.0480	0.0572

SUMMARY

REDUNDANCY FROM CONDITIONS: 3.0000 REDUNDANCY FROM ADJUSTMENTS: 189.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.65219

SUM OF OMEGA: 0.3023 BOUNDARY VALUE: 7.9566 TEST PASSES

MAX. SINGLE OMEGA: 0.1406 BOUNDARY VALUE: 3.8925 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: 41.1031 PPM DELTA CPU TIME = 0:00:00.66

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
161	0 - 0	0.0776	0.4009					0.0776	0.4009
162	0 - 0	0.0244	0.1845					0.0244	0.1845
163	180 - 0	0.0041	0.1695					-0.0041	-0.1695
164	180 - 0	0.0569	0.3740					-0.0569	-0.3740
165	180 - 0	0.0409	0.2698					-0.0409	-0.2698
37	180 - 0	0.3764	2.5181					-0.3764	-2.5181
36	180 - 0	0.4016	2.8849					-0.4016	-2.8849
35	180 - 0	0.4117	3.0134					-0.4117	-3.0134
39	180 - 0	0.3862	2.1097					-0.3862	-2.1097
34	180 - 0	0.6387	4.6370					-0.6387	-4.6370
33	180 - 0	0.7130	5.3563					-0.7130	-5.3563
32	180 - 0	0.2342	1.7604					-0.2342	-1.7604
38	180 - 0	0.3795	0.1086					-0.3795	-0.1086
31	180 - 0	0.2363	1.7811					-0.2363	-1.7811
29	180 - 0	0.6567	3.4116					-0.6567	-3.4116
28	180 - 0	0.4224	2.8181					-0.4224	-2.8181
166	180 - 0	0.5161	0.1686					0.5161	0.1686
27	180 - 0	0.4586	2.7219					-0.4586	-2.7219
26	180 - 0	0.6274	4.5183					-0.6274	-4.5183
25	180 - 0	0.5295	3.9287					-0.5295	-3.9287
24	180 - 0	0.7751	5.1665					-0.7751	-5.1665
23	180 - 0	0.5682	4.2185					0.5682	4.2185
22	180 - 0	0.1221	0.9116					-0.1221	-0.9116
11	180 - 0	0.1679	1.2774					-0.1679	-1.2774
12	180 - 0	0.1673	1.2624					-0.1673	-1.2624
13	180 - 0	0.6025	4.5477					-0.6025	-4.5477
14	180 - 0	0.6411	4.9016					-0.6411	-4.9016
15	180 - 0	0.4501	3.2956					-0.4501	-3.2956
16	180 - 0	0.4379	3.2130					-0.4379	-3.2130
17	180 - 0	0.4580	3.1736					-0.4580	-3.1736
18	180 - 0	0.4462	2.9824					-0.4462	-2.9824
19	180 - 0	0.1508	0.9008					-0.1508	-0.9008
21	180 - 0	0.0959	0.7237					-0.0959	-0.7237

DELTA CPU TIME = 0:00:01.79

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.1935	0.3818
162						0.1321	0.2606
163						0.0233	0.0460
164						0.1522	0.3003
165						0.1516	0.2991
37						0.1495	0.2949
36						0.1392	0.2747
35						0.1366	0.2695
39						0.1831	0.3612
34						0.1377	0.2717
33						0.1331	0.2626
32						0.1330	0.2625
38						3.4958	6.8971
31						0.1327	0.2618
29						0.1925	0.3798
28						0.1499	0.2957
166						3.0614	6.0400
27						0.1685	0.3324
26						0.1388	0.2739
25						0.1348	0.2659
24						0.1500	0.2960
23						0.1347	0.2657
22						0.1339	0.2642
11						0.1314	0.2593
12						0.1325	0.2615
13						0.1325	0.2614
14						0.1308	0.2580
15						0.1366	0.2695
16						0.1363	0.2689
17						0.1443	0.2847
18						0.1496	0.2952
19						0.1674	0.3303
21						0.1325	0.2614

DELTA CPU TIME = 0:00:00.22

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.2465	0.4862
162						0.1857	0.3664
163						1.5213	3.0014
164						0.1964	0.3875
165						0.2007	0.3960

DELTA CPU TIME = 0:00:00.13

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
37	6.2902	3.8925	***
36	8.3246	3.8925	***
35	9.1178	3.8925	***
39	4.6043	3.8925	***
34	21.9854	3.8925	***
33	29.6782	3.8925	***
32	3.1333	3.8925	
38	0.0244	3.8925	
31	3.2066	3.8925	
29	11.5348	3.8925	***
28	7.8765	3.8925	***
166	0.0278	3.8925	
27	7.2163	3.8925	***
26	20.5601	3.8925	***
25	15.5691	3.8925	***
24	26.5742	3.8925	***
23	18.8657	3.8925	***
22	0.8088	3.8925	
11	1.6209	3.8925	
12	1.5838	3.8925	
13	21.3317	3.8925	***
14	24.6388	3.8925	***
15	10.9101	3.8925	***
16	10.3496	3.8925	***
17	10.0389	3.8925	***
18	8.8224	3.8925	***
19	0.7716	3.8925	
21	0.4993	3.8925	

DELTA CPU TIME = 0:00:02.73

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK THREE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 189.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89252
MAXIMUM OMEGA: 32.0215 MAX. CHANGE OMEGA: 32.0215 BOUNDARY VALUE: 3.8925

SIGNIFICANT Z-TRANSLATION OF -0.874797 cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT

```
Z-TRANSLATION        -0.874797 cm        YES

      DELTA CPU TIME = 0:00:03.39
```

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	180 - 0	0.7069	5.3788					0.7069	5.3788
12	180 - 0	0.7075	5.3378					0.7075	5.3378
13	180 - 0	0.2723	2.0557					0.2723	2.0557
14	180 - 0	0.2337	1.7873					0.2337	1.7873
15	180 - 0	0.4247	3.1090					0.4247	3.1090
16	180 - 0	0.4369	3.2060					0.4369	3.2060
17	180 - 0	0.4168	2.8886					0.4168	2.8886
18	180 - 0	0.4286	2.8646					0.4286	2.8646
19	180 - 0	0.7240	4.3239					0.7240	4.3239
21	180 - 0	0.7789	5.8801					0.7789	5.8801
22	180 - 0	0.7527	5.6215					0.7527	5.6215
23	180 - 0	1.4430	10.7136					1.4430	10.7136
24	180 - 0	0.0997	0.6649					0.0997	0.6649
25	180 - 0	0.3453	2.5618					0.3453	2.5618
26	180 - 0	0.2474	1.7821					0.2474	1.7821
27	180 - 0	0.4162	2.4704					0.4162	2.4704
28	180 - 0	0.4524	3.0179					0.4524	3.0179
29	180 - 0	0.2180	1.1327					0.2180	1.1327
31	180 - 0	0.6385	4.8124					0.6385	4.8124
32	180 - 0	0.6406	4.8146					0.6406	4.8146
33	180 - 0	0.1618	1.2158					0.1618	1.2158
34	180 - 0	0.2361	1.7145					0.2361	1.7145
35	180 - 0	0.4631	3.3899					0.4631	3.3899
36	180 - 0	0.4732	3.3990					0.4732	3.3990
37	180 - 0	0.4984	3.3338					0.4984	3.3338
38	180 - 0	0.4953	0.1417					0.4953	0.1417
39	180 - 0	0.4886	2.6692					0.4886	2.6692

DELTA CPU TIME = 0:00:01.01

10.0 SUMMARY REPORT

PROGRAM SUMMARY

51 POINTS INPUT FROM EPOCH 3

49 POINTS INPUT FROM EPOCH 4

A TOTAL OF 33 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 5 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:31.14

TOTAL CPU TIME = 0:00:13.63

APPENDIX III G

Vertical Deformation Analysis

Epoch 4 vs. Epoch 5

```
**            **      *****
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**         **    **   **    **
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LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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*********************************************
*                                           *
*                                           *
*            PROJECT INFORMATION            *
*                                           *
* THE BSC GROUP - PROJECT 1-1654.00         *
*                                           *
* BALL MOUNTAIN DAM MONITORING NETWORK      *
*                                           *
* HEIGHT DEFORMATION ANALYSIS               *
*                                           *
*                                           *
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*********************************************
*                                           *
*    DATE: 31-JUL-1987   TIME: 17:52:38     *
*                                           *
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*                                           *
* NETWORK: 1165400Z   EPOCHS    4 AND    5 *
*                                           *
*********************************************
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400Z EPOCH 1: 4 EPOCH 2: 5

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	YES

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS	EXCLUDED POINTS
161	*** NO EXCLUDED POINTS DEFINED ***
162	
163	
164	
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2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 4	EPOCH: 5	TOTAL
REDUNDANCY :	108.00	95.00	203.00
STD. DEV. UNIT WEIGHT :	1.3806357	1.1680305	1.2855253
WEIGHTED QUADRATIC RESIDUALS :	205.8647280	129.6080445	335.4727725
NUMBER OF RANK DEFECTS :	1	2	
	Z-TRANSLATION	SCALE	
		Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 4			EPOCH: 5		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6184	9926.4499	1000.9715	9884.6187	9926.4500	1000.9718
162	10087.6890	9917.4406	1014.7683	10087.6879	9917.4328	1014.7726
163	10203.6843	10080.8588	925.0720	10203.6849	10080.8533	925.0748
164	10000.0376	10273.8108	1006.1842	10000.0376	10273.8111	1006.1882
165	9843.3671	10241.7532	1009.5737	9843.3657	10241.7499	1009.5755
1621	10087.6890	9917.4406	1015.0416	10087.6879	9917.4328	1015.0479
1622	10087.6890	9917.4406	1014.9080	10087.6879	9917.4328	1014.9107
1612	9884.6184	9926.4499	1001.1107	9884.6187	9926.4500	1001.1082
1631	10203.6843	10080.8588	925.3480	10203.6849	10080.8533	925.3529
1632	10203.6843	10080.8588	925.2128	10203.6849	10080.8533	925.2160
166	10000.0376	9999.9562	1000.0000	10000.0376	9999.9562	1000.0000
1641	10000.0376	10273.8108	1006.4592	10000.0376	10273.8111	1006.4615
1642	10000.0376	10273.8108	1006.3201	10000.0376	10273.8111	1006.3212
1611	9884.6184	9926.4499	1001.2475	9884.6187	9926.4500	1001.2510
1651	9843.3671	10241.7532	1009.8497	9843.3657	10241.7499	1009.8513
1652	9843.3671	10241.7532	1009.7080	9843.3657	10241.7499	1009.7072
1661	10000.0376	9999.9562	1001.6134	10000.0376	9999.9562	1001.6974
1662	10000.0376	9999.9562	1001.5836	10000.0376	9999.9562	1001.6011
1663	10000.0376	9999.9562	1001.5786	10000.0376	9999.9562	1001.4754
1218	9846.9491	10016.2071	1010.9078	9846.9552	10016.2046	1010.9180
11	9977.1193	10173.6799	1000.3663	9977.1169	10173.6762	1000.3677
12	9979.0464	10174.9304	1000.4085	9979.0443	10174.9242	1000.4095
13	9980.7175	10173.6636	1000.1886	9980.7142	10173.6602	1000.1903
14	9995.5530	10177.1459	992.6391	9995.5536	10177.1419	992.6406
15	10022.2504	10176.3908	977.7781	10022.2509	10176.3886	977.7798
16	10026.6310	10176.3859	975.2194	10026.6319	10176.3820	975.2199
17	10039.6020	10175.6079	966.8957	10039.6043	10175.6026	966.8956
18	10050.7166	10174.8460	960.4734	10050.7177	10174.8430	960.4742
39	10080.0130	10084.1971	946.9454	10080.0106	10084.1929	946.9487
21	9977.1006	10124.0821	1000.2690	9977.0976	10124.0804	1000.2704
22	9979.5709	10123.5340	1000.3960	9979.5682	10123.5300	1000.3972
23	9981.5881	10123.0341	1000.2446	9981.5855	10124.0297	1000.2361
24	9996.6754	10128.3922	991.8271	9996.6738	10128.3879	991.8285
25	10020.8923	10129.7582	978.2033	10020.8926	10129.7556	978.2046
26	10028.1583	10129.6686	974.0429	10028.1573	10129.6697	974.0422
27	10040.6848	10130.6512	965.8797	10040.6851	10130.6474	965.8807
28	10050.4805	10130.9420	960.6480	10050.4813	10130.9382	960.6489
29	10075.9150	10132.3631	946.7455	10075.9167	10132.3594	946.7453
31	9981.3302	10075.7322	1000.4679	9981.3276	10075.7314	1000.4691
32	9983.6958	10076.4502	1000.4730	9983.6936	10076.4463	1000.4737
33	9986.1828	10076.5818	1000.0880	9986.1802	10076.5781	1000.0893
34	10000.9474	10074.1725	992.0922	10000.9452	10074.1698	992.0938
35	10025.8970	10077.3750	977.7852	10025.8974	10077.3707	977.7877
36	10032.7455	10077.9130	973.9464	10032.7463	10077.9098	973.9486
37	10046.4002	10079.8541	965.3898	10046.4007	10079.8497	965.3919
38	10055.2828	10081.0799	960.6615	10055.2827	10081.0759	960.6638

DELTA CPU TIME = 0:00:01.13

number of fixed points in net	1	1
number of analyzed fixed points	1	1
fixed points net 1	166	
fixed points net 2	166	

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	0.0000	0.0000	-0.3156	1.8302
162	0.0000	0.0000	0.2337	1.0473
163	0.0000	0.0000	2.0230	1.5180
164	0.0000	0.0000	0.1603	0.4618
165	0.0000	0.0000	-0.1341	0.3102

SUMMARY

REDUNDANCY FROM CONDITIONS: 3.0000 REDUNDANCY FROM ADJUSTMENTS: 203.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.64963

SUM OF OMEGA: 2.7554 BOUNDARY VALUE: 7.9489 TEST PASSES

MAX. SINGLE OMEGA: 1.8302 BOUNDARY VALUE: 3.8877 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -2.1619 PPM DELTA CPU TIME = 0:00:00.63

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
161	180 - 0	0.2406	1.3149					-0.2406	-1.3149
162	180 - 0	0.1643	1.0256					0.1643	1.0256
163	180 - 0	0.0291	1.2217					0.0291	1.2217
164	180 - 0	0.1369	0.7617					0.1369	0.7617
165	180 - 0	0.0897	0.5021					-0.0897	-0.5021
1621	180 - 0	0.3612	2.6037					0.3612	2.6037
1622	180 - 0	0.0073	0.0516					0.0073	0.0516
1612	180 - 0	0.5199	3.2769					-0.5199	-3.2769
1631	180 - 0	0.2366	1.4760					0.2366	1.4760
1632	180 - 0	0.0644	0.3014					0.0644	0.3014
166	180 - 0	0.2680	0.0604					-0.2680	-0.0604
1641	180 - 0	0.0348	0.2548					-0.0348	-0.2548
1642	180 - 0	0.1560	0.9715					-0.1560	-0.9715
1611	180 - 0	0.0792	0.5778					0.0792	0.5778
1651	180 - 0	0.1127	0.7813					-0.1127	-0.7813
1652	180 - 0	0.3501	2.1683					-0.3501	-2.1683
1661	180 - 0	8.1294	50.3685					8.1294	50.3685
1662	180 - 0	1.4832	8.9251					1.4832	8.9251
1663	180 - 0	10.5889	65.8587					-10.5889	-65.8587
1218	180 - 0	0.7427	4.3747					0.7427	4.3747
11	180 - 0	0.1343	0.8284					-0.1343	-0.8284
12	180 - 0	0.1763	1.0872					-0.1763	-1.0872
13	180 - 0	0.1007	0.6217					-0.1007	-0.6217
14	180 - 0	0.1138	0.7087					-0.1138	-0.7087
15	180 - 0	0.0999	0.6036					-0.0999	-0.6036
16	180 - 0	0.2194	1.3109					-0.2194	-1.3109
17	180 - 0	0.2738	1.5601					-0.2738	-1.5601
18	180 - 0	0.1792	0.9777					-0.1792	-0.9777
39	180 - 0	0.0717	0.3459					0.0717	0.3459
21	180 - 0	0.1315	0.8019					-0.1315	-0.8019
22	180 - 0	0.1459	0.8920					-0.1459	-0.8920
23	180 - 0	1.1230	6.8380					-1.1230	-6.8380
24	180 - 0	0.1231	0.7635					-0.1231	-0.7635
25	180 - 0	0.1319	0.7963					-0.1319	-0.7963
26	180 - 0	0.3312	1.9317					-0.3312	-1.9317
27	180 - 0	0.1654	0.9361					-0.1654	-0.9361
28	180 - 0	0.1719	0.9260					-0.1719	-0.9260
29	180 - 0	0.2728	1.3262					-0.2728	-1.3262
31	180 - 0	0.1452	0.8824					-0.1452	-0.8824
32	180 - 0	0.2038	1.2467					-0.2038	-1.2467
33	180 - 0	0.1426	0.8752					-0.1426	-0.8752
34	180 - 0	0.1062	0.6378					-0.1062	-0.6378
35	180 - 0	0.0144	0.0857					-0.0144	-0.0857
36	180 - 0	0.0495	0.2901					-0.0495	-0.2901
37	180 - 0	0.0426	0.2346					-0.0426	-0.2346
38	180 - 0	0.0243	0.1313					-0.0243	-0.1313

DELTA CPU TIME = 0:00:03.99

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.1830	0.3608
162						0.1602	0.3159
163						0.0238	0.0470
164						0.1797	0.3544
165						0.1786	0.3521
1621						0.1387	0.2735
1622						0.1416	0.2793
1612						0.1587	0.3128
1631						0.1603	0.3160
1632						0.2135	0.4211
166						4.4384	8.7513
1641						0.1366	0.2694
1642						0.1606	0.3167
1611						0.1370	0.2702
1651						0.1443	0.2845
1652						0.1615	0.3184
1661						0.1614	0.3182
1662						0.1662	0.3277
1663						0.1608	0.3170
1218						0.1698	0.3347
11						0.1622	0.3198
12						0.1622	0.3197
13						0.1620	0.3194
14						0.1606	0.3166
15						0.1655	0.3263
16						0.1673	0.3300
17						0.1755	0.3460
18						0.1833	0.3614
39						0.2074	0.4089
21						0.1640	0.3234
22						0.1636	0.3226
23						0.1642	0.3238
24						0.1612	0.3178
25						0.1657	0.3267
26						0.1715	0.3381
27						0.1767	0.3484
28						0.1857	0.3661
29						0.2057	0.4055
31						0.1645	0.3244
32						0.1635	0.3223
33						0.1630	0.3213
34						0.1665	0.3283
35						0.1678	0.3309
36						0.1707	0.3365
37						0.1814	0.3577
38						0.1850	0.3647

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.2333	0.4599
162						0.2283	0.4502
163						1.6419	3.2374
164						0.2359	0.4651
165						0.2408	0.4748

DELTA CPU TIME = 0:00:00.20

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
1621	6.3430	3.8877	***
1622	0.6044	3.8877	
1612	9.7653	3.8877	***
1631	2.0090	3.8877	
1632	0.0843	3.8877	
166	0.0040	3.8877	
1641	0.6608	3.8877	
1642	1.4811	3.8877	
1611	2.0381	3.8877	
1651	0.4374	3.8877	
1652	4.7062	3.8877	***
1661	2541.4196	3.8877	***
1662	78.7739	3.8877	***
1663	4366.6938	3.8877	***
1218	18.5665	3.8877	***
11	0.8088	3.8877	
12	1.3426	3.8877	
13	0.4789	3.8877	
14	0.5936	3.8877	
15	0.4169	3.8877	
16	1.8224	3.8877	
17	2.5218	3.8877	
18	0.9948	3.8877	
39	0.1163	3.8877	
21	0.7600	3.8877	
22	0.9263	3.8877	
23	47.8921	3.8877	***
24	0.6790	3.8877	
25	0.7038	3.8877	
26	3.8761	3.8877	
27	0.9263	3.8877	
28	0.8941	3.8877	
29	1.7713	3.8877	
31	0.9073	3.8877	
32	1.7373	3.8877	
33	0.8940	3.8877	
34	0.4852	3.8877	
35	0.0161	3.8877	
36	0.1064	3.8877	
37	0.0674	3.8877	
38	0.0228	3.8877	

DELTA CPU TIME = 0:00:05.81

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 203.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.88767
MAXIMUM OMEGA: 1.0205 MAX. CHANGE OMEGA: 1.0205 BOUNDARY VALUE: 3.8877

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	-0.160239 cm	NO

DELTA CPU TIME = 0:00:05.40

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	180 - 0	0.1343	0.8284					-0.1343	-0.8284
12	180 - 0	0.1763	1.0872					-0.1763	-1.0872
13	180 - 0	0.1007	0.6217					-0.1007	-0.6217
14	180 - 0	0.1138	0.7087					-0.1138	-0.7087
15	180 - 0	0.0999	0.6036					-0.0999	-0.6036
16	180 - 0	0.2194	1.3109					-0.2194	-1.3109
17	180 - 0	0.2738	1.5601					-0.2738	-1.5601
18	180 - 0	0.1792	0.9777					-0.1792	-0.9777
21	180 - 0	0.1315	0.8019					-0.1315	-0.8019
22	180 - 0	0.1459	0.8920					-0.1459	-0.8920
23	180 - 0	1.1230	6.8380					-1.1230	-6.8380
24	180 - 0	0.1231	0.7635					-0.1231	-0.7635
25	180 - 0	0.1319	0.7963					-0.1319	-0.7963
26	180 - 0	0.3312	1.9317					-0.3312	-1.9317
27	180 - 0	0.1654	0.9361					-0.1654	-0.9361
28	180 - 0	0.1719	0.9260					-0.1719	-0.9260
29	180 - 0	0.2728	1.3262					-0.2728	-1.3262
31	180 - 0	0.1452	0.8824					-0.1452	-0.8824
32	180 - 0	0.2038	1.2467					-0.2038	-1.2467
33	180 - 0	0.1426	0.8752					-0.1426	-0.8752
34	180 - 0	0.1062	0.6378					-0.1062	-0.6378
35	180 - 0	0.0144	0.0857					-0.0144	-0.0857
36	180 - 0	0.0495	0.2901					-0.0495	-0.2901
37	180 - 0	0.0426	0.2346					-0.0426	-0.2346
38	180 - 0	0.0243	0.1313					-0.0243	-0.1313
39	180 - 0	0.0717	0.3459					0.0717	0.3459

DELTA CPU TIME = 0:00:01.33

10.0 SUMMARY REPORT

P R O G R A M S U M M A R Y

49 POINTS INPUT FROM EPOCH 4

46 POINTS INPUT FROM EPOCH 5

A TOTAL OF 46 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 5 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:01:20.80

TOTAL CPU TIME = 0:00:21.66

APPENDIX III H

Vertical Deformation Analysis

Epoch 5 vs. Epoch 6

```
**            **       *****
**           ****      **  **
**          **  **     **   **
**         **    **    **    **
**        **      **   **    **
**        **      **   **    **
**        **********   **    **
**        **********   **    **
**        **      **   **   **
*******   **      **   **  **
*******   **      **   *****
```

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

```
*********************************************
*                                           *
*                                           *
*            PROJECT INFORMATION            *
*                                           *
* THE BSC GROUP - PROJECT 1-1654.00         *
*                                           *
* BALL MOUNTAIN DAM MONITORING NETWORK      *
*                                           *
* HEIGHT DEFORMATION ANALYSIS               *
*                                           *
*                                           *
*********************************************
```

```
*********************************************
*                                           *
*    DATE: 11-OCT-1987   TIME: 12:49:48     *
*                                           *
*********************************************
```

```
*********************************************
*                                           *
* NETWORK: 1165400Z   EPOCHS    5 AND    6 *
*                                           *
*********************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

NETWORK: 1165400Z EPOCH 1: 5 EPOCH 2: 6

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....NONE
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....YES

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	YES
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	NO

GROUP PARAMETERS TO SOLVE:

SCALE	--------->	NO
Y-ROTATION	--------->	NO
X-ROTATION	--------->	NO
Z-ROTATION	--------->	NO
Y-TRANSLATION	--------->	NO
X-TRANSLATION	--------->	NO
Z-TRANSLATION	--------->	YES

2.0 BASE AND EXCLUDED POINT INPUT REPORT

STABLE BASE POINTS

161
162
163
164
165

EXCLUDED POINTS

*** NO EXCLUDED POINTS DEFINED ***

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

11
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13
14
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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 5	EPOCH: 6	TOTAL
REDUNDANCY :	95.00	87.00	182.00
STD. DEV. UNIT WEIGHT :	1.1680305	1.2085835	1.1875885
WEIGHTED QUADRATIC RESIDUALS :	129.6080445	127.0786523	256.6866968
NUMBER OF RANK DEFECTS :	1	2	
	Z-TRANSLATION	SCALE	
		Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 5			EPOCH: 6		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6187	9926.4500	1000.9718	9884.6196	9926.4517	1000.9018
162	10087.6879	9917.4328	1014.7726	10087.6908	9917.4341	1014.7018
163	10203.6849	10080.8533	925.0748	10203.6849	10080.8548	925.0017
164	10000.0376	10273.8111	1006.1882	10000.0376	10273.8112	1006.1181
165	9843.3657	10241.7499	1009.5755	9843.3663	10241.7512	1009.5068
1622	10087.6879	9917.4328	1014.9107	10087.6908	9917.4341	1014.8431
1612	9884.6187	9926.4500	1001.1082	9884.6196	9926.4517	1001.0446
1631	10203.6849	10080.8533	925.3529	10203.6880	10080.8548	925.2812
1632	10203.6849	10080.8533	925.2160	10203.6880	10080.8548	925.1450
1611	9884.6187	9926.4500	1001.2510	9884.6196	9926.4517	1001.1808
1641	10000.0376	10273.8111	1006.4615	10000.0376	10273.8112	1006.3921
1642	10000.0376	10273.8111	1006.3212	10000.0376	10273.8112	1006.2550
1621	10087.6879	9917.4328	1015.0479	10087.6908	9917.4341	1014.9783
1651	9843.3657	10241.7499	1009.8513	9843.3663	10241.7512	1009.7788
1652	9843.3657	10241.7499	1009.7072	9843.3663	10241.7512	1009.6423
1661	10000.0376	9999.9562	1001.6974	10000.0376	9999.9562	1001.5694
1662	10000.0376	9999.9562	1001.6011	10000.0376	9999.9562	1001.3531
1663	10000.0376	9999.9562	1001.4754	10000.0376	9999.9562	1001.6092
1218	9846.9552	10016.2046	1010.9180	9846.9509	10016.2114	1010.8407
11	9977.1169	10173.6762	1000.3677	9977.1173	10173.6793	1000.2978
12	9979.0443	10174.9242	1000.4095	9979.0449	10174.9282	1000.3410
13	9980.7142	10173.6602	1000.1903	9980.7154	10173.6632	1000.1211
14	9995.5536	10177.1419	992.6406	9995.5549	10177.1436	992.5709
15	10022.2509	10176.3886	977.7798	10022.2527	10176.3897	977.7109
16	10026.6319	10176.3820	975.2199	10026.6334	10176.3850	975.1518
17	10039.6043	10175.6026	966.8956	10039.6057	10175.6064	966.8274
18	10050.7177	10174.8430	960.4742	10050.7200	10174.8455	960.4062
21	9977.0976	10124.0804	1000.2704	9977.1003	10124.0811	1000.2009
22	9979.5682	10123.5300	1000.3972	9979.5707	10123.5322	1000.3276
23	9981.5855	10124.0297	1000.2361	9981.5879	10124.0340	1000.1671
24	9996.6738	10128.3879	991.8285	9996.6759	10128.3904	991.7585
25	10020.8926	10129.7556	978.2046	10020.8945	10129.7568	978.1349
26	10028.1573	10129.6697	974.0422	10028.1597	10129.6711	973.9737
27	10040.6851	10130.6474	965.8807	10040.6876	10130.6489	965.8120
28	10050.4813	10130.9382	960.6489	10050.4845	10130.9409	960.5808
29	10075.9167	10132.3594	946.7453	10075.9195	10132.3616	946.6770
31	9981.3276	10075.7314	1000.4691	9981.3287	10075.7346	1000.3999
32	9983.6936	10076.4463	1000.4737	9983.6449	10076.4478	1000.4049
33	9986.1802	10076.5781	1000.0893	9986.1812	10076.5804	1000.0201
34	10000.9452	10074.1698	992.0938	10000.9467	10074.1710	992.0239
35	10025.8974	10077.3707	977.7877	10025.8991	10077.3721	977.7171
36	10032.7463	10077.9098	973.9486	10032.7481	10077.9109	973.8786
37	10046.4007	10079.8497	965.3919	10046.4030	10079.8520	965.3219
38	10055.2827	10081.0759	960.6638	10055.2856	10081.0777	960.5934
39	10080.0106	10084.1929	946.9487	10080.0130	10084.1946	946.8767
166	10000.0376	9999.9562	1000.0000	10000.0376	9999.9562	1000.0000

DELTA CPU TIME = 0:00:01.05

number of fixed points in net	1	1
number of analyzed fixed points	1	1

fixed points net 1 166
fixed points net 2 166

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	0.0000	0.0000	0.0259	0.0153
162	0.0000	0.0000	-0.1581	0.5078
163	0.0000	0.0000	-0.5777	0.1401
164	0.0000	0.0000	-0.0170	0.0064
165	0.0000	0.0000	0.1535	0.4975

SUMMARY

REDUNDANCY FROM CONDITIONS: 3.0000 REDUNDANCY FROM ADJUSTMENTS: 182.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.65465

SUM OF OMEGA: 0.7445 BOUNDARY VALUE: 7.9640 TEST PASSES

MAX. SINGLE OMEGA: 0.5078 BOUNDARY VALUE: 3.8931 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -37.1442 PPM DELTA CPU TIME = 0:00:00.64

5.0 DISPLACEMENTS AND STANDARDIZED DIFFERENCES OF COORDINATE

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
161	0 - 0	0.0196	0.1193					0.0196	0.1193
162	180 - 0	0.1113	0.7154					-0.1113	-0.7154
163	180 - 0	0.0083	0.3718					-0.0083	-0.3718
164	180 - 0	0.0136	0.0839					-0.0136	-0.0839
165	180 - 0	0.1136	0.7051					0.1136	0.7051
1622	180 - 0	0.2000	1.4372					0.2000	1.4372
1612	180 - 0	0.6623	4.8915					0.6623	4.8915
1631	180 - 0	0.1331	0.9117					0.1331	0.9117
1632	180 - 0	0.1967	1.0841					0.1967	1.0841
1611	180 - 0	0.0013	0.0105					-0.0013	-0.0105
1641	180 - 0	0.0570	0.4661					0.0570	0.4661
1642	180 - 0	0.3728	2.6344					0.3728	2.6344
1621	180 - 0	0.0100	0.0802					0.0100	0.0802
1651	180 - 0	0.2644	2.0263					-0.2644	-2.0263
1652	180 - 0	0.4907	3.4938					0.4907	3.4938
1661	180 - 0	5.7762	40.4920					-5.7762	-40.4920
1662	180 - 0	17.7808	124.2533					-17.7808	-124.2533
1663	180 - 0	20.3951	142.8091					20.3951	142.8091
1218	180 - 0	0.7457	4.9531					-0.7457	-4.9531
11	180 - 0	0.0396	0.2757					0.0396	0.2757
12	180 - 0	0.1758	1.2237					0.1758	1.2237
13	180 - 0	0.0988	0.6879					0.0988	0.6879
14	180 - 0	0.0831	0.5873					0.0831	0.5873
15	180 - 0	0.2236	1.5378					0.2236	1.5378
16	180 - 0	0.3095	2.1049					0.3095	2.1049
17	180 - 0	0.3266	2.1074					0.3266	2.1074
18	180 - 0	0.3708	2.2965					0.3708	2.2965
21	180 - 0	0.0758	0.5234					0.0758	0.5234
22	180 - 0	0.0571	0.3965					0.0571	0.3965
23	180 - 0	0.1199	0.8358					0.1199	0.8358
24	180 - 0	0.0570	0.4006					0.0570	0.4006
25	180 - 0	0.1366	0.9371					0.1366	0.9371
26	180 - 0	0.2651	1.7659					0.2651	1.7659
27	180 - 0	0.2851	1.8348					0.2851	1.8348
28	180 - 0	0.3581	2.1997					0.3581	2.1997
29	180 - 0	0.3851	2.1217					0.3851	2.1217
31	180 - 0	0.1014	0.7022					0.1014	0.7022
32	180 - 0	0.1470	1.0262					0.1470	1.0262
33	180 - 0	0.1038	0.7272					0.1038	0.7272
34	180 - 0	0.0621	0.4402					0.0621	0.4402
35	180 - 0	0.0465	0.3196					0.0465	0.3196
36	180 - 0	0.1255	0.8481					0.1255	0.8481
37	180 - 0	0.1466	0.9433					0.1466	0.9433
38	180 - 0	0.1213	0.7553					0.1213	0.7553
39	180 - 0	0.0195	0.1086					0.0195	0.1086
166	180 - 0	7.0234	1.3985					7.0234	1.3985

DELTA CPU TIME = 0:00:03.93

6.0 COORDINATE DIFFERENCE CONFIDENCE ELLIPSE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.1644	0.3244
162						0.1556	0.3070
163						0.0223	0.0440
164						0.1621	0.3199
165						0.1611	0.3179
1622						0.1391	0.2745
1612						0.1354	0.2672
1631						0.1460	0.2881
1632						0.1815	0.3580
1611						0.1218	0.2404
1641						0.1223	0.2414
1642						0.1415	0.2792
1621						0.1251	0.2467
1651						0.1305	0.2575
1652						0.1404	0.2771
1661						0.1427	0.2815
1662						0.1431	0.2824
1663						0.1428	0.2818
1218						0.1506	0.2971
11						0.1435	0.2831
12						0.1436	0.2834
13						0.1436	0.2834
14						0.1415	0.2791
15						0.1454	0.2869
16						0.1470	0.2901
17						0.1550	0.3058
18						0.1614	0.3185
21						0.1448	0.2856
22						0.1440	0.2842
23						0.1435	0.2831
24						0.1423	0.2808
25						0.1458	0.2876
26						0.1501	0.2962
27						0.1554	0.3066
28						0.1628	0.3212
29						0.1815	0.3581
31						0.1444	0.2849
32						0.1432	0.2826
33						0.1427	0.2817
34						0.1412	0.2786
35						0.1455	0.2872
36						0.1480	0.2920
37						0.1554	0.3066
38						0.1606	0.3168
39						0.1794	0.3540
166						5.0220	9.9088

DELTA CPU TIME = 0:00:00.34

7.0 COORDINATE DIFFERENCE BOUNDARY ELLIPSE VALUE REPORT

POINT	AZIMUTH (deg-min)	SEMI-MAJOR AXIS (cm)		SEMI-MINOR AXIS (cm)		SIGMA ELEVATION (cm)	
		STD	95%	STD	95%	STD	95%
161						0.2099	0.4141
162						0.2218	0.4376
163						1.5433	3.0452
164						0.2132	0.4206
165						0.2177	0.4294

DELTA CPU TIME = 0:00:00.17

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
1622	2.7816	3.8931	
1612	25.6247	3.8931	***
1631	0.8732	3.8931	
1632	1.1974	3.8931	
1611	0.0058	3.8931	
1641	0.3419	3.8931	
1642	7.6293	3.8931	***
1621	0.2207	3.8931	
1651	7.3485	3.8931	***
1652	11.7538	3.8931	***
1661	1639.2874	3.8931	***
1662	15438.3286	3.8931	***
1663	20396.5749	3.8931	***
1218	24.4846	3.8931	***
11	0.0786	3.8931	
12	1.5086	3.8931	
13	0.4796	3.8931	
14	0.3498	3.8931	
15	2.3744	3.8931	
16	4.4431	3.8931	***
17	4.4508	3.8931	***
18	5.2825	3.8931	***
21	0.2788	3.8931	
22	0.1608	3.8931	
23	0.7063	3.8931	
24	0.1638	3.8931	
25	0.8841	3.8931	
26	3.1282	3.8931	
27	3.3748	3.8931	
28	4.8469	3.8931	***
29	4.5058	3.8931	***
31	0.4995	3.8931	
32	1.0625	3.8931	
33	0.5355	3.8931	
34	0.1974	3.8931	
35	0.1042	3.8931	
36	0.7242	3.8931	
37	0.8941	3.8931	
38	0.5734	3.8931	
39	0.0120	3.8931	
166	1.9563	3.8931	

DELTA CPU TIME = 0:00:05.57

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 182.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89310
MAXIMUM OMEGA: 0.7604 MAX. CHANGE OMEGA: 0.7604 BOUNDARY VALUE: 3.8931

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	0.121579 cm	NO

DELTA CPU TIME = 0:00:05.02

9.0 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
11	180 - 0	0.0396	0.2757					0.0396	0.2757
12	180 - 0	0.1758	1.2237					0.1758	1.2237
13	180 - 0	0.0988	0.6879					0.0988	0.6879
14	180 - 0	0.0831	0.5873					0.0831	0.5873
15	180 - 0	0.2236	1.5378					0.2236	1.5378
16	180 - 0	0.3095	2.1049					0.3095	2.1049
21	180 - 0	0.0758	0.5234					0.0758	0.5234
22	180 - 0	0.0571	0.3965					0.0571	0.3965
23	180 - 0	0.1199	0.8358					0.1199	0.8358
24	180 - 0	0.0570	0.4006					0.0570	0.4006
25	180 - 0	0.1366	0.9371					0.1366	0.9371
26	180 - 0	0.2651	1.7659					0.2651	1.7659
27	180 - 0	0.2851	1.8348					0.2851	1.8348
31	180 - 0	0.1014	0.7022					0.1014	0.7022
32	180 - 0	0.1470	1.0262					0.1470	1.0262
33	180 - 0	0.1038	0.7272					0.1038	0.7272
34	180 - 0	0.0621	0.4402					0.0621	0.4402
35	180 - 0	0.0465	0.3196					0.0465	0.3196
36	180 - 0	0.1255	0.8481					0.1255	0.8481
37	180 - 0	0.1466	0.9433					0.1466	0.9433
38	180 - 0	0.1213	0.7553					0.1213	0.7553

DELTA CPU TIME = 0:00:01.14

10.0 SUMMARY REPORT

PROGRAM SUMMARY

46 POINTS INPUT FROM EPOCH 5

47 POINTS INPUT FROM EPOCH 6

A TOTAL OF 46 POINTS ARE COMMON TO BOTH EPOCHS

A TOTAL OF 5 BASE POINTS INPUT

A TOTAL OF 0 POINT(S) REMOVED FROM BASE

A TOTAL OF 1 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:28.05

TOTAL CPU TIME = 0:00:20.91