BALL MOUNTAIN DAM
JAMAICA, VERMONT

VOLUME III: APPENDICES

Output from INTERGRAPHS' Localization and Analysis of Deformations Program (LAD) for the Epochs I, II, and III.

Prepared by:
Boston Survey Consultants
1.1654.00

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MAR 2
GEOTECHNICAL
ENGINEERING

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PART I: HORIZONTAL ANALYSIS

APPENDIX IIIA:

EPOCHS 1 AND 2,
JULY TO SEPTEMBER 1986

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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:  7-JAN-1987   TIME: 10:10:37   *
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*                                         *
* NETWORK: 1165400H   EPOCHS    1 AND    2 *
*                                         *
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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
164	*** NO EXCLUDED POINTS DEFINED ***
161	
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 2	TOTAL
REDUNDANCY :	78.00	72.00	150.00
STD. DEV. UNIT WEIGHT :	0.9278523	1.0913019	1.0096159
WEIGHTED QUADRATIC RESIDUALS :	67.1509721	85.7476716	152.8986437
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: 1			EPOCH: 2		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1799	10000.2376	10274.0138	1006.2115
161	9884.6206	9926.4518	1000.9704	9884.8180	9926.6499	1000.9619
163	10203.6869	10080.8551	925.0641	10203.8903	10081.0561	924.7435
165	9843.3682	10241.7497	1009.5622	9843.5640	10241.9540	1009.5959
162	10087.6880	9917.4346	1014.7672	10087.8909	9917.6338	1014.8176
11	9977.1192	10173.6777	1000.3702	9977.3179	10173.8806	1000.3652
12	9979.0467	10174.9262	1000.4113	9979.2456	10175.1285	1000.4073
13	9980.7113	10173.6617	1000.1971	9980.9108	10173.8656	1000.1920
14	9995.5502	10177.1434	992.6488	9995.7498	10177.3479	992.6119
15	10022.2472	10176.3899	977.7838	10022.4481	10176.5919	977.6857
16	10026.6273	10176.3835	975.2242	10026.8266	10176.5890	975.1160
17	10039.5999	10175.6059	966.8988	10039.7988	10175.8115	966.7571
18	10050.7145	10174.8444	960.4771	10050.9140	10175.0508	960.3082
19	10076.4310	10173.1724	946.8237	10076.6323	10173.3744	946.5979
21	9977.1005	10124.0793	1000.2713	9977.3002	10124.2829	1000.2669
22	9979.5689	10123.5307	1000.3987	9979.7685	10123.7331	1000.3948
23	9981.5818	10124.0299	1000.2412	9981.7820	10124.2339	1000.2361
24	9996.6703	10128.3890	991.8373	9996.8705	10128.5914	991.7977
25	10020.8889	10129.7551	978.2093	10021.0892	10129.9577	978.1127
26	10028.1531	10129.6703	974.0470	10028.3528	10129.8730	973.9339
27	10040.6822	10130.6486	965.8831	10040.8827	10130.8514	965.7364
28	10050.4780	10130.9387	960.6518	10050.6784	10131.1417	960.4833
29	10075.9146	10132.3600	946.7466	10076.1159	10132.5626	946.5199
31	9981.3281	10075.7317	1000.4710	9981.5286	10075.9320	1000.4678
32	9983.6879	10076.4455	1000.4770	9983.8870	10076.6475	1000.4731
33	9986.1737	10076.5779	1000.0984	9986.3725	10076.7789	1000.0926
34	10000.9422	10074.1680	992.1012	10001.1407	10074.3699	992.0623
35	10025.8939	10077.3707	977.7904	10026.0935	10077.5721	977.6932
36	10032.7421	10077.9094	973.9514	10032.9423	10078.1106	973.8380
37	10046.3977	10079.8491	965.3917	10046.5974	10080.0519	965.2433
38	10055.2805	10081.0761	960.6633	10055.4814	10081.2775	960.4949
39	10080.0094	10084.1935	946.9470	10080.2088	10084.3952	946.7214

DELTA CPU TIME = 0:00:02.61

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

fixed points net 1 166
fixed points net 2 1662

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	0.0779	-0.0406	0.0000	1.5892
161	0.0598	0.0438	0.0000	0.2606
163	-0.0250	0.0723	0.0000	0.3687
165	-0.1143	0.0088	0.0000	1.7998

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 150.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.43208

SUM OF OMEGA: 1.8717 BOUNDARY VALUE: 9.7283 TEST PASSES

MAX. SINGLE OMEGA: 1.7998 BOUNDARY VALUE: 6.1137 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -19.9434 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
164	111- 51	0.0489	1.0809	0.0454	22.4632	-0.0182	-13.8491		
161	55- 22	0.0261	0.4099	0.0215	6.5786	0.0148	5.0174		
163	245- 39	0.0104	0.2251	-0.0095	-4.6922	-0.0043	-1.2029		
165	277- 36	0.0579	1.0320	-0.0574	-17.8773	0.0077	5.0026		
162	48- 55	0.2180	2.3723	0.1643	33.3938	0.1433	12.5788		
11	270- 30	0.0310	0.5733	-0.0310	-10.6023	0.0003	0.0410		
12	191- 47	0.0643	0.7523	-0.0131	-2.6860	-0.0629	-7.8932		
13	20- 56	0.1101	1.5641	0.0394	13.7889	0.1029	19.4326		
14	9- 8	0.1613	1.3432	0.0256	9.0911	0.1592	10.6728		
15	133- 16	0.1339	1.2548	0.0975	28.8609	-0.0918	-6.4880		
16	343- 19	0.2632	2.2604	-0.0756	-22.7148	0.2522	19.6920		
17	333- 43	0.2982	2.6810	-0.1320	-33.7312	0.2674	23.9970		
18	345- 37	0.3598	3.4747	-0.0894	-21.4136	0.3485	36.7464		
19	160- 33	0.0892	0.8569	0.0297	6.4922	-0.0841	-8.6241		
21	21- 37	0.1830	1.9279	0.0674	19.8378	0.1701	16.1854		
22	48- 36	0.0803	1.0515	0.0602	17.8228	0.0531	4.9605		
23	29- 50	0.2356	3.1647	0.1172	35.2592	0.2044	30.6659		
24	62- 48	0.0961	1.4018	0.0855	24.4950	0.0439	3.8863		
25	38- 20	0.0723	0.9023	0.0448	13.7652	0.0567	6.2545		
26	331- 58	0.0717	0.8309	-0.0337	-10.4231	0.0633	7.6991		
27	19- 46	0.0815	1.0277	0.0276	8.4912	0.0767	10.9580		
28	359- 8	0.0915	0.9916	-0.0014	-0.2569	0.0915	10.8470		
29	37- 8	0.0656	1.0861	0.0396	11.0845	0.0523	10.6261		
31	110- 49	0.1584	2.2056	0.1481	35.4772	-0.0563	-5.5814		
32	0- 7	0.1011	1.0046	0.0002	0.0547	0.1011	9.9824		
33	264- 49	0.0357	0.6066	-0.0355	-10.4978	-0.0032	-0.5089		
34	316- 20	0.1352	1.8140	-0.0934	-28.4197	0.0978	10.5901		
35	326- 29	0.0561	0.8861	-0.0310	-9.5512	0.0467	7.1774		
36	20- 34	0.0227	0.2774	0.0080	2.4365	0.0213	3.5783		
37	341- 21	0.1814	2.8709	-0.0580	-17.2951	0.1719	33.6632		
38	36- 34	0.0509	0.6801	0.0303	8.8692	0.0409	8.6865		
39	288- 36	0.1697	2.4525	-0.1609	-27.3065	0.0541	13.3552		

DELTA CPU TIME = 0:00:10.15

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	103 - 28	0.0454	0.1123	0.0357	0.0882		
161	229 - 35	0.0639	0.1579	0.0463	0.1146		
163	173 - 10	0.0600	0.1484	0.0448	0.1107		
165	265 - 28	0.0567	0.1403	0.0390	0.0964		
162	186 - 24	0.1071	0.2648	0.0695	0.1720		
11	183 - 17	0.0813	0.2010	0.0539	0.1333		
12	159 - 22	0.0921	0.2277	0.0661	0.1635		
13	179 - 9	0.0728	0.1799	0.0534	0.1321		
14	177 - 2	0.1223	0.3024	0.0528	0.1304		
15	165 - 36	0.1221	0.3019	0.0512	0.1265		
16	164 - 44	0.1165	0.2880	0.0506	0.1252		
17	158 - 39	0.1116	0.2759	0.0511	0.1263		
18	154 - 37	0.1050	0.2597	0.0513	0.1268		
19	157 - 12	0.1042	0.2577	0.0589	0.1456		
21	173 - 48	0.1029	0.2545	0.0576	0.1423		
22	174 - 11	0.1038	0.2568	0.0575	0.1421		
23	174 - 12	0.0818	0.2024	0.0574	0.1418		
24	176 - 12	0.1065	0.2633	0.0588	0.1453		
25	175 - 51	0.0954	0.2358	0.0568	0.1405		
26	175 - 28	0.0908	0.2246	0.0566	0.1399		
27	173 - 22	0.0840	0.2076	0.0565	0.1398		
28	149 - 56	0.0998	0.2469	0.0621	0.1535		
29	154 - 54	0.0728	0.1801	0.0565	0.1398		
31	176 - 31	0.1005	0.2486	0.0644	0.1593		
32	174 - 53	0.1009	0.2495	0.0595	0.1472		
33	185 - 31	0.0798	0.1974	0.0580	0.1433		
34	187 - 55	0.0967	0.2391	0.0563	0.1392		
35	202 - 34	0.0848	0.2097	0.0506	0.1251		
36	205 - 37	0.0821	0.2030	0.0498	0.1231		
37	210 - 12	0.0775	0.1916	0.0496	0.1226		
38	212 - 46	0.0749	0.1853	0.0501	0.1239		
39	240 - 38	0.0821	0.2030	0.0566	0.1399		

DELTA CPU TIME = 0:00:00.36

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	99 - 26	0.0726	0.1794	0.0531	0.1313		
161	226 - 8	0.1462	0.3615	0.1097	0.2712		
163	166 - 24	0.1262	0.3122	0.1003	0.2480		
165	256 - 39	0.0898	0.2222	0.0615	0.1521		

DELTA CPU TIME = 0:00:00.54

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	9.7092	6.1137	***
11	1.5232	6.1137	
12	1.0196	6.1137	
13	2.4982	6.1137	
14	2.0405	6.1137	
15	2.2959	6.1137	
16	5.9800	6.1137	
17	8.7075	6.1137	***
18	13.9446	6.1137	***
19	0.5780	6.1137	
21	5.1326	6.1137	
22	1.4384	6.1137	
23	12.8815	6.1137	***
24	2.2446	6.1137	
25	0.9050	6.1137	
26	1.1831	6.1137	
27	1.1931	6.1137	
28	1.2770	6.1137	
29	1.4254	6.1137	
31	6.3233	6.1137	***
32	1.0756	6.1137	
33	0.9168	6.1137	
34	5.6199	6.1137	
35	1.3725	6.1137	
36	0.1004	6.1137	
37	11.3514	6.1137	***
38	0.5422	6.1137	
39	7.8807	6.1137	***

DELTA CPU TIME = 0:00:13.72

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: 150.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90420
MAXIMUM OMEGA: 3.0553 MAX. CHANGE OMEGA: 3.0553 BOUNDARY VALUE: 3.9042

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	0.000000 radian	NO
Y-TRANSLATION	0.053805 cm	NO
X-TRANSLATION	0.009740 cm	NO

DELTA CPU TIME = 0:00:16.49

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	270- 30	0.0310	0.5733	-0.0310	-10.6023	0.0003	0.0410		
12	191- 47	0.0643	0.7523	-0.0131	-2.6860	-0.0629	-7.8932		
13	20- 56	0.1101	1.5641	0.0394	13.7889	0.1029	19.4326		
14	9- 8	0.1613	1.3432	0.0256	9.0911	0.1592	10.6728		
15	133- 16	0.1339	1.2548	0.0975	28.8609	-0.0918	-6.4880		
16	343- 19	0.2632	2.2604	-0.0756	-22.7148	0.2522	19.6920		
17	333- 43	0.2982	2.6810	-0.1320	-33.7312	0.2674	23.9970		
18	345- 37	0.3598	3.4747	-0.0894	-21.4136	0.3485	36.7464		
19	160- 33	0.0892	0.8569	0.0297	6.4922	-0.0841	-8.6241		
21	21- 37	0.1830	1.9279	0.0674	19.8378	0.1701	16.1854		
22	48- 36	0.0803	1.0515	0.0602	17.8228	0.0531	4.9605		
23	29- 50	0.2356	3.1647	0.1172	35.2592	0.2044	30.6659		
24	62- 48	0.0961	1.4018	0.0855	24.4950	0.0439	3.8863		
25	38- 20	0.0723	0.9023	0.0448	13.7652	0.0567	6.2545		
26	331- 58	0.0717	0.8309	-0.0337	-10.4231	0.0633	7.6991		
27	19- 46	0.0815	1.0277	0.0276	8.4912	0.0767	10.9580		
28	359- 8	0.0915	0.9916	-0.0014	-0.2569	0.0915	10.8470		
29	37- 8	0.0656	1.0861	0.0396	11.0845	0.0523	10.6261		
31	110- 49	0.1584	2.2056	0.1481	35.4772	-0.0563	-5.5814		
32	0- 7	0.1011	1.0046	0.0002	0.0547	0.1011	9.9824		
33	264- 49	0.0357	0.6066	-0.0355	-10.4978	-0.0032	-0.5089		
34	316- 20	0.1352	1.8140	-0.0934	-28.4197	0.0978	10.5901		
35	326- 29	0.0561	0.8861	-0.0310	-9.5512	0.0467	7.1774		
36	20- 34	0.0227	0.2774	0.0080	2.4365	0.0213	3.5783		
37	341- 21	0.1814	2.8709	-0.0580	-17.2951	0.1719	33.6632		
38	36- 34	0.0509	0.6801	0.0303	8.8692	0.0409	8.6865		
39	288- 36	0.1697	2.4525	-0.1609	-27.3065	0.0541	13.3552		

DELTA CPU TIME = 0:00:01.09

10.0 SUMMARY REPORT

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

33 POINTS INPUT FROM EPOCH 1

34 POINTS INPUT FROM EPOCH 2

A TOTAL OF 32 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 = 00:01:22.22

TOTAL CPU TIME = 0:00:48.01

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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:  7-JAN-1987   TIME: 15:24:08     *
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*********************************************
*                                           *
* NETWORK: 1165400H   EPOCHS    1 AND    2 *
*                                           *
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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
164	*** NO EXCLUDED POINTS DEFINED ***
161	
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK TWO

17
18

3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 2	TOTAL
REDUNDANCY :	78.00	72.00	150.00
STD. DEV. UNIT WEIGHT :	0.9278523	1.0913019	1.0096159
WEIGHTED QUADRATIC RESIDUALS :	67.1509721	85.7476716	152.8986437
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: 1			EPOCH: 2		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1799	10000.2376	10274.0138	1006.2115
161	9884.6206	9926.4518	1000.9704	9884.8180	9926.6499	1000.9619
163	10203.6869	10080.8551	925.0641	10203.8903	10081.0561	924.7435
165	9843.3682	10241.7497	1009.5622	9843.5640	10241.9540	1009.5959
162	10087.6880	9917.4346	1014.7672	10087.8909	9917.6338	1014.8176
11	9977.1192	10173.6777	1000.3702	9977.3179	10173.8806	1000.3652
12	9979.0467	10174.9262	1000.4113	9979.2456	10175.1285	1000.4073
13	9980.7113	10173.6617	1000.1971	9980.9108	10173.8656	1000.1920
14	9995.5502	10177.1434	992.6488	9995.7498	10177.3479	992.6119
15	10022.2472	10176.3899	977.7838	10022.4481	10176.5919	977.6857
16	10026.6273	10176.3835	975.2242	10026.8266	10176.5890	975.1160
17	10039.5999	10175.6059	966.8988	10039.7988	10175.8115	966.7571
18	10050.7145	10174.8444	960.4771	10050.9140	10175.0508	960.3082
19	10076.4310	10173.1724	946.8237	10076.6323	10173.3744	946.5979
21	9977.1005	10124.0793	1000.2713	9977.3002	10124.2829	1000.2669
22	9979.5689	10123.5307	1000.3987	9979.7685	10123.7331	1000.3948
23	9981.5818	10124.0299	1000.2412	9981.7820	10124.2339	1000.2361
24	9996.6703	10128.3890	991.8373	9996.8705	10128.5914	991.7977
25	10020.8889	10129.7551	978.2093	10021.0892	10129.9577	978.1127
26	10028.1531	10129.6703	974.0470	10028.3528	10129.8730	973.9339
27	10040.6822	10130.6486	965.8831	10040.8827	10130.8514	965.7364
28	10050.4780	10130.9387	960.6518	10050.6784	10131.1417	960.4833
29	10075.9146	10132.3600	946.7466	10076.1159	10132.5626	946.5199
31	9981.3281	10075.7317	1000.4710	9981.5286	10075.9320	1000.4678
32	9983.6879	10076.4455	1000.4770	9983.8870	10076.6475	1000.4731
33	9986.1737	10076.5779	1000.0984	9986.3725	10076.7789	1000.0926
34	10000.9422	10074.1680	992.1012	10001.1407	10074.3699	992.0623
35	10025.8939	10077.3707	977.7904	10026.0935	10077.5721	977.6932
36	10032.7421	10077.9094	973.9514	10032.9423	10078.1106	973.8380
37	10046.3977	10079.8491	965.3917	10046.5974	10080.0519	965.2433
38	10055.2805	10081.0761	960.6633	10055.4814	10081.2775	960.4949
39	10080.0094	10084.1935	946.9470	10080.2088	10084.3952	946.7214

DELTA CPU TIME = 0:00:02.54

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

fixed points net 1 166
fixed points net 2 1662

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	0.0779	-0.0406	0.0000	1.5892
161	0.0598	0.0438	0.0000	0.2606
163	-0.0250	0.0723	0.0000	0.3687
165	-0.1143	0.0088	0.0000	1.7998

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 150.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.43208

SUM OF OMEGA: 1.8717 BOUNDARY VALUE: 9.7283 TEST PASSES

MAX. SINGLE OMEGA: 1.7998 BOUNDARY VALUE: 6.1137 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -19.9434 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
164	111- 51	0.0489	1.0809	0.0454	22.4632	-0.0182	-13.8491		
161	55- 22	0.0261	0.4099	0.0215	6.5786	0.0148	5.0174		
163	245- 39	0.0104	0.2251	-0.0095	-4.6922	-0.0043	-1.2029		
165	277- 36	0.0579	1.0320	-0.0574	-17.8773	0.0077	5.0026		
162	48- 55	0.2180	2.3723	0.1643	33.3938	0.1433	12.5788		
11	270- 30	0.0310	0.5733	-0.0310	-10.6023	0.0003	0.0410		
12	191- 47	0.0643	0.7523	-0.0131	-2.6860	-0.0629	-7.8932		
13	20- 56	0.1101	1.5641	0.0394	13.7889	0.1029	19.4326		
14	9- 8	0.1613	1.3432	0.0256	9.0911	0.1592	10.6728		
15	133- 16	0.1339	1.2548	0.0975	28.8609	-0.0918	-6.4880		
16	343- 19	0.2632	2.2604	-0.0756	-22.7148	0.2522	19.6920		
17	333- 43	0.2982	2.6810	-0.1320	-33.7312	0.2674	23.9970		
18	345- 37	0.3598	3.4747	-0.0894	-21.4136	0.3485	36.7464		
19	160- 33	0.0892	0.8569	0.0297	6.4922	-0.0841	-8.6241		
21	21- 37	0.1830	1.9279	0.0674	19.8378	0.1701	16.1854		
22	48- 36	0.0803	1.0515	0.0602	17.8228	0.0531	4.9605		
23	29- 50	0.2356	3.1647	0.1172	35.2592	0.2044	30.6659		
24	62- 48	0.0961	1.4018	0.0855	24.4950	0.0439	3.8863		
25	38- 20	0.0723	0.9023	0.0448	13.7652	0.0567	6.2545		
26	331- 58	0.0717	0.8309	-0.0337	-10.4231	0.0633	7.6991		
27	19- 46	0.0815	1.0277	0.0276	8.4912	0.0767	10.9580		
28	359- 8	0.0915	0.9916	-0.0014	-0.2569	0.0915	10.8470		
29	37- 8	0.0656	1.0861	0.0396	11.0845	0.0523	10.6261		
31	110- 49	0.1584	2.2056	0.1481	35.4772	-0.0563	-5.5814		
32	0- 7	0.1011	1.0046	0.0002	0.0547	0.1011	9.9824		
33	264- 49	0.0357	0.6066	-0.0355	-10.4978	-0.0032	-0.5089		
34	316- 20	0.1352	1.8140	-0.0934	-28.4197	0.0978	10.5901		
35	326- 29	0.0561	0.8861	-0.0310	-9.5512	0.0467	7.1774		
36	20- 34	0.0227	0.2774	0.0080	2.4365	0.0213	3.5783		
37	341- 21	0.1814	2.8709	-0.0580	-17.2951	0.1719	33.6632		
38	36- 34	0.0509	0.6801	0.0303	8.8692	0.0409	8.6865		
39	288- 36	0.1697	2.4525	-0.1609	-27.3065	0.0541	13.3552		

DELTA CPU TIME = 0:00:10.17

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	103 - 28	0.0454	0.1123	0.0357	0.0882		
161	229 - 35	0.0639	0.1579	0.0463	0.1146		
163	173 - 10	0.0600	0.1484	0.0448	0.1107		
165	265 - 28	0.0567	0.1403	0.0390	0.0964		
162	186 - 24	0.1071	0.2648	0.0695	0.1720		
11	183 - 17	0.0813	0.2010	0.0539	0.1333		
12	159 - 22	0.0921	0.2277	0.0661	0.1635		
13	179 - 9	0.0728	0.1799	0.0534	0.1321		
14	177 - 2	0.1223	0.3024	0.0528	0.1304		
15	165 - 36	0.1221	0.3019	0.0512	0.1265		
16	164 - 44	0.1165	0.2880	0.0506	0.1252		
17	158 - 39	0.1116	0.2759	0.0511	0.1263		
18	154 - 37	0.1050	0.2597	0.0513	0.1268		
19	157 - 12	0.1042	0.2577	0.0589	0.1456		
21	173 - 48	0.1029	0.2545	0.0576	0.1423		
22	174 - 11	0.1038	0.2568	0.0575	0.1421		
23	174 - 12	0.0818	0.2024	0.0574	0.1418		
24	176 - 12	0.1065	0.2633	0.0588	0.1453		
25	175 - 51	0.0954	0.2358	0.0568	0.1405		
26	175 - 28	0.0908	0.2246	0.0566	0.1399		
27	173 - 22	0.0840	0.2076	0.0565	0.1398		
28	149 - 56	0.0998	0.2469	0.0621	0.1535		
29	154 - 54	0.0728	0.1801	0.0565	0.1398		
31	176 - 31	0.1005	0.2486	0.0644	0.1593		
32	174 - 53	0.1009	0.2495	0.0595	0.1472		
33	185 - 31	0.0798	0.1974	0.0580	0.1433		
34	187 - 55	0.0967	0.2391	0.0563	0.1392		
35	202 - 34	0.0848	0.2097	0.0506	0.1251		
36	205 - 37	0.0821	0.2030	0.0498	0.1231		
37	210 - 12	0.0775	0.1916	0.0496	0.1226		
38	212 - 46	0.0749	0.1853	0.0501	0.1239		
39	240 - 38	0.0821	0.2030	0.0566	0.1399		

DELTA CPU TIME = 0:00:00.31

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	99 - 26	0.0726	0.1794	0.0531	0.1313		
161	226 - 8	0.1462	0.3615	0.1097	0.2712		
163	166 - 24	0.1262	0.3122	0.1003	0.2480		
165	256 - 39	0.0898	0.2222	0.0615	0.1521		

DELTA CPU TIME = 0:00:00.57

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	9.7092	6.1137	***
11	1.5232	6.1137	
12	1.0196	6.1137	
13	2.4982	6.1137	
14	2.0405	6.1137	
15	2.2959	6.1137	
16	5.9800	6.1137	
17	8.7075	6.1137	***
18	13.9446	6.1137	***
19	0.5780	6.1137	
21	5.1326	6.1137	
22	1.4384	6.1137	
23	12.8815	6.1137	***
24	2.2446	6.1137	
25	0.9050	6.1137	
26	1.1831	6.1137	
27	1.1931	6.1137	
28	1.2770	6.1137	
29	1.4254	6.1137	
31	6.3233	6.1137	***
32	1.0756	6.1137	
33	0.9168	6.1137	
34	5.6199	6.1137	
35	1.3725	6.1137	
36	0.1004	6.1137	
37	11.3514	6.1137	***
38	0.5422	6.1137	
39	7.8807	6.1137	***

DELTA CPU TIME = 0:00:13.78

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK TWO

17
18

STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 150.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90420
MAXIMUM OMEGA: 15.0352 MAX. CHANGE OMEGA: 15.0352 BOUNDARY VALUE: 3.9042

SIGNIFICANT Z-ROTATION OF -0.000037 radian

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 150.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90420
MAXIMUM OMEGA: 19.5737 MAX. CHANGE OMEGA: 4.5384 BOUNDARY VALUE: 3.9042

SIGNIFICANT Z-ROTATION OF -0.000053 radian

SIGNIFICANT X-TRANSLATION OF 0.102668 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 150.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90420
MAXIMUM OMEGA: 20.0405 MAX. CHANGE OMEGA: 0.4669 BOUNDARY VALUE: 3.9042

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	-0.000053 radian	YES
Y-TRANSLATION	-0.382147 cm	NO
X-TRANSLATION	0.102668 cm	YES

DELTA CPU TIME = 0:00:11.21

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
17	318- 42	0.3520	3.3113	-0.2323	-59.3569	0.2644	23.7296		
18	331- 11	0.3937	3.7540	-0.1897	-45.4551	0.3449	36.3706		

DELTA CPU TIME = 0:00:00.10

10.0 SUMMARY REPORT

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

33 POINTS INPUT FROM EPOCH 1

34 POINTS INPUT FROM EPOCH 2

A TOTAL OF 32 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 = 00:01:07.85

TOTAL CPU TIME = 0:00:41.12

PART I HORIZONTAL ANALYSIS

APPENDIX IIIB:

EPOCHS 2 AND 3,
SEPTEMBER TO NOVEMBER 1986

```
**            **      *****
**          ****      **  **
**         **  **     **   **
**        **    **    **    **
**      **      **    **    **
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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:  7-JAN-1987   TIME: 14:54:46 *
*                                       *
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*****************************************
*                                       *
* NETWORK: 1165400H   EPOCHS    2 AND  3 *
*                                       *
*****************************************
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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
161	*** NO EXCLUDED POINTS DEFINED ***
163	
164	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK FOUR

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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 2	EPOCH: 3	TOTAL
REDUNDANCY :	72.00	67.00	139.00
STD. DEV. UNIT WEIGHT :	1.0913019	1.1688058	1.1293241
WEIGHTED QUADRATIC RESIDUALS :	85.7476716	91.5291672	177.2768389
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: 2			EPOCH: 3		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6181	9926.4514	1000.9619	9884.7095	9926.5421	1001.4850
163	10203.6904	10080.8577	924.7435	10203.7832	10080.9498	925.3040
164	10000.0376	10273.8153	1006.2115	10000.1298	10273.9100	1006.4650
165	9843.3640	10241.7555	1009.5959	9843.4538	10241.8497	1009.7800
162	10087.6910	9917.4354	1014.8176	10087.7852	9917.5294	1014.9810
1218	9846.9507	10016.2126	1010.9505	9847.0352	10016.3003	1015.0000
11	9977.1179	10173.6822	1000.3652	9977.2096	10173.7762	1000.2730
12	9979.0457	10174.9300	1000.4073	9979.1376	10175.0260	1000.3150
13	9980.7108	10173.6672	1000.1920	9980.8027	10173.7611	1000.1030
14	9995.5499	10177.1495	992.6119	9995.6423	10177.2416	992.5700
15	10022.2481	10176.3935	977.6857	10022.3401	10176.4885	977.7050
16	10026.6266	10176.3906	975.1160	10026.7201	10176.4829	975.1380
17	10039.5988	10175.6131	966.7571	10039.6931	10175.7048	966.8130
18	10050.7141	10174.8524	960.3082	10050.8093	10174.9435	960.3930
19	10076.4323	10173.1760	946.5979	10076.5247	10173.2702	946.7430
21	9977.1002	10124.0845	1000.2669	9977.1920	10124.1779	1000.1760
22	9979.5686	10123.5347	1000.3948	9979.6599	10123.6286	1000.3040
23	9981.5821	10124.0354	1000.2361	9981.6750	10124.1291	1000.1480
24	9996.6706	10128.3930	991.7977	9996.7629	10128.4867	990.2490
25	10020.8893	10129.7592	978.1127	10020.9818	10129.8528	978.1230
26	10028.1528	10129.6746	973.9339	10028.2464	10129.7667	973.9620
27	10040.6828	10130.6530	965.7364	10040.7758	10130.7450	965.8000
28	10050.4785	10130.9433	960.4833	10050.5722	10131.0362	960.5700
29	10075.9160	10132.3642	946.5199	10076.0086	10132.4572	946.6670
31	9981.3287	10075.7336	1000.4678	9981.4202	10075.8260	1000.3780
32	9983.6871	10076.4490	1000.4731	9983.7808	10076.5434	1000.3840
33	9986.1726	10076.5804	1000.0926	9986.2672	10076.6750	1000.0010
34	10000.9408	10074.1715	992.0623	10001.0351	10074.2642	992.0120
35	10025.8936	10077.3737	977.6932	10025.9874	10077.4671	977.7070
36	10032.7424	10077.9122	973.8380	10032.8353	10078.0054	973.8690
37	10046.3975	10079.8534	965.2433	10046.4911	10079.9455	965.3180
38	10055.2814	10081.0791	960.4949	10055.3753	10081.1720	960.5840
39	10080.0089	10084.1968	946.7214	10080.1039	10084.2893	946.8710

DELTA CPU TIME = 0:00:02.26

number of fixed points in net 1 1
number of analyzed fixed points 1 1
fixed points net 1 1662
fixed points net 2 1663

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
161	0.1278	-0.1050	0.0000	1.5108
163	-0.1935	-0.0366	0.0000	2.8617
164	0.0892	0.0352	0.0000	1.6622
165	-0.0751	-0.0292	0.0000	0.6197

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.43681

SUM OF OMEGA: 3.3972 BOUNDARY VALUE: 9.7472 TEST PASSES

MAX. SINGLE OMEGA: 2.8617 BOUNDARY VALUE: 6.1217 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -9.1697 PPM DELTA CPU TIME = 0:00:00.69

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	114- 17	0.0777	1.3316	0.0708	16.9984	-0.0320	-7.0252		
163	244- 45	0.0875	1.6042	-0.0791	-26.4127	-0.0373	-7.5540		
164	49- 55	0.0676	1.5238	0.0517	19.2778	0.0436	23.9677		
165	300- 36	0.0505	0.9163	-0.0434	-10.9000	0.0257	11.0164		
162	28- 54	0.3534	2.8922	0.1708	25.0254	0.3094	19.9004		
1218	234- 33	0.7087	7.9427	-0.5773	-91.4767	-0.4110	-12.5767		
11	12- 41	0.0812	0.8787	0.0178	4.2249	0.0792	8.6832		
12	8- 9	0.2662	2.6966	0.0377	6.1205	0.2635	25.1164		
13	30- 42	0.0697	0.5941	0.0356	8.5292	0.0599	3.1728		
14	147- 50	0.1456	1.1296	0.0775	18.3357	-0.1233	-6.6402		
15	0- 56	0.1673	1.2267	0.0027	0.5609	0.1673	8.9182		
16	124- 27	0.1837	1.5674	0.1515	30.5673	-0.1039	-5.7514		
17	125- 46	0.2726	2.3657	0.2212	42.8362	-0.1593	-10.3081		
18	125- 40	0.3746	3.3821	0.3044	58.2117	-0.2184	-16.3532		
19	1- 49	0.0883	0.7886	0.0028	0.5349	0.0883	6.9104		
21	20- 34	0.0679	0.6392	0.0238	4.6495	0.0635	4.5514		
22	351- 14	0.1096	0.9052	-0.0167	-3.2882	0.1083	7.6564		
23	61- 28	0.1648	2.4579	0.1448	30.5851	0.0787	10.4269		
24	37- 20	0.1059	1.2106	0.0642	12.0800	0.0842	7.2564		
25	40- 57	0.0901	1.1636	0.0591	13.7543	0.0681	7.2388		
26	114- 22	0.1811	2.3741	0.1650	39.4406	-0.0747	-8.6231		
27	131- 16	0.1331	1.6225	0.1001	24.6731	-0.0878	-11.5557		
28	91- 0	0.1480	1.8270	0.1480	22.9982	-0.0026	-0.2769		
29	51- 48	0.0243	0.4169	0.0191	4.4169	0.0150	2.5580		
31	278- 2	0.0087	0.1148	-0.0086	-1.6501	0.0012	0.1014		
32	46- 14	0.2913	3.4594	0.2103	40.8453	0.2015	16.5259		
33	54- 53	0.3709	4.9216	0.3034	61.1935	0.2134	30.4661		
34	83- 20	0.2593	3.8263	0.2576	58.3335	0.0301	3.2379		
35	61- 14	0.2135	2.8549	0.1871	43.4435	0.1028	13.9437		
36	49- 56	0.1156	1.4887	0.0884	22.7266	0.0744	11.5842		
37	102- 56	0.1532	2.6006	0.1494	39.2267	-0.0343	-6.0253		
38	74- 46	0.1727	2.6237	0.1666	44.0480	0.0454	8.5115		
39	87- 57	0.2637	3.6173	0.2635	50.1530	0.0094	2.0417		

DELTA CPU TIME = 0:00:10.99

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	220 - 5	0.0740	0.1831	0.0569	0.1408		
163	166 - 40	0.0711	0.1759	0.0537	0.1328		
164	109 - 51	0.0531	0.1313	0.0411	0.1016		
165	252 - 6	0.0646	0.1599	0.0463	0.1145		
162	190 - 32	0.1259	0.3116	0.0807	0.1997		
1218	164 - 57	0.1864	0.4611	0.0652	0.1614		
11	170 - 55	0.0962	0.2380	0.0640	0.1583		
12	156 - 17	0.1074	0.2656	0.0716	0.1771		
13	174 - 21	0.1379	0.3413	0.0635	0.1570		
14	170 - 56	0.1376	0.3405	0.0621	0.1536		
15	162 - 47	0.1422	0.3519	0.0580	0.1435		
16	161 - 33	0.1404	0.3473	0.0576	0.1425		
17	158 - 20	0.1318	0.3262	0.0569	0.1408		
18	155 - 60	0.1240	0.3067	0.0567	0.1404		
19	158 - 48	0.1188	0.2939	0.0625	0.1546		
21	165 - 36	0.1208	0.2988	0.0671	0.1660		
22	165 - 58	0.1215	0.3005	0.0669	0.1656		
23	161 - 38	0.0889	0.2199	0.0662	0.1638		
24	165 - 48	0.1097	0.2714	0.0699	0.1729		
25	167 - 13	0.0984	0.2434	0.0634	0.1568		
26	166 - 19	0.0946	0.2341	0.0624	0.1545		
27	163 - 33	0.0891	0.2204	0.0610	0.1509		
28	146 - 7	0.1087	0.2689	0.0633	0.1566		
29	148 - 10	0.0827	0.2046	0.0578	0.1431		
31	168 - 26	0.1110	0.2745	0.0702	0.1738		
32	168 - 56	0.1117	0.2763	0.0698	0.1727		
33	181 - 20	0.0837	0.2071	0.0704	0.1742		
34	185 - 37	0.0967	0.2392	0.0661	0.1635		
35	191 - 59	0.0867	0.2145	0.0645	0.1596		
36	200 - 33	0.0827	0.2046	0.0590	0.1459		
37	203 - 7	0.0782	0.1935	0.0582	0.1440		
38	204 - 14	0.0756	0.1872	0.0582	0.1441		
39	235 - 18	0.0764	0.1890	0.0636	0.1573		

DELTA CPU TIME = 0:00:00.38

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	213 - 34	0.1653	0.4090	0.1344	0.3325		
163	165 - 56	0.1533	0.3792	0.1163	0.2878		
164	100 - 23	0.0829	0.2050	0.0608	0.1503		
165	248 - 38	0.1023	0.2531	0.0708	0.1752		

DELTA CPU TIME = 0:00:00.62

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	10.3643	6.1217	***
1218	155.1440	6.1217	***
11	0.2914	6.1217	
12	6.6290	6.1217	***
13	0.0831	6.1217	
14	1.2142	6.1217	
15	1.8113	6.1217	
16	3.3533	6.1217	
17	7.9288	6.1217	***
18	15.9698	6.1217	***
19	0.5507	6.1217	
21	0.0982	6.1217	
22	0.6623	6.1217	
23	5.1354	6.1217	
24	1.0332	6.1217	
25	1.0629	6.1217	
26	5.3035	6.1217	
27	2.0166	6.1217	
28	3.6911	6.1217	
29	0.2824	6.1217	
31	0.5344	6.1217	
32	15.1983	6.1217	***
33	28.4648	6.1217	***
34	15.3188	6.1217	***
35	8.4129	6.1217	***
36	1.7947	6.1217	
37	5.7936	6.1217	
38	6.7370	6.1217	***
39	12.8356	6.1217	***

DELTA CPU TIME = 0:00:14.68

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK FOUR

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STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 5.0789 MAX. CHANGE OMEGA: 5.0789 BOUNDARY VALUE: 3.9088

SIGNIFICANT Z-ROTATION OF -0.000005 radian

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 7.2706 MAX. CHANGE OMEGA: 2.1917 BOUNDARY VALUE: 3.9088

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT

Z-ROTATION	-0.000005	radian	YES
Y-TRANSLATION	0.026206	cm	NO
X-TRANSLATION	0.046654	cm	NO

DELTA CPU TIME = 0:00:19.03

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	12- 51	0.0813	0.8801	0.0181	4.2792	0.0793	8.6866		
12	8- 12	0.2662	2.6978	0.0379	6.1588	0.2635	25.1184		
13	30- 52	0.0698	0.5960	0.0358	8.5842	0.0599	3.1734		
14	147- 46	0.1458	1.1315	0.0778	18.3944	-0.1233	-6.6438		
15	1- 1	0.1671	1.2257	0.0030	0.6113	0.1671	8.9070		
16	124- 28	0.1840	1.5699	0.1518	30.6165	-0.1041	-5.7643		
17	125- 47	0.2730	2.3685	0.2215	42.8826	-0.1596	-10.3277		
18	125- 42	0.3750	3.3851	0.3046	58.2568	-0.2188	-16.3803		
19	1- 59	0.0879	0.7848	0.0030	0.5781	0.0878	6.8714		
21	20- 31	0.0679	0.6391	0.0238	4.6426	0.0636	4.5536		
22	351- 13	0.1097	0.9053	-0.0168	-3.2958	0.1084	7.6577		
23	61- 28	0.1648	2.4575	0.1447	30.5775	0.0787	10.4278		
24	37- 21	0.1058	1.2100	0.0642	12.0777	0.0841	7.2500		
25	41- 2	0.0900	1.1623	0.0591	13.7531	0.0679	7.2172		
26	114- 27	0.1812	2.3741	0.1649	39.4393	-0.0750	-8.6510		
27	131- 22	0.1333	1.6242	0.1001	24.6730	-0.0881	-11.5963		
28	91- 9	0.1480	1.8246	0.1480	22.9984	-0.0030	-0.3153		
29	52- 45	0.0240	0.4125	0.0191	4.4190	0.0145	2.4734		
31	277- 50	0.0090	0.1188	-0.0089	-1.7063	0.0012	0.1021		
32	46- 12	0.2911	3.4558	0.2100	40.7890	0.2015	16.5256		
33	54- 51	0.3707	4.9179	0.3031	61.1352	0.2134	30.4636		
34	83- 21	0.2590	3.8219	0.2573	58.2651	0.0300	3.2276		
35	61- 15	0.2131	2.8503	0.1868	43.3774	0.1025	13.9125		
36	49- 56	0.1152	1.4838	0.0882	22.6542	0.0741	11.5428		
37	103- 5	0.1531	2.5983	0.1491	39.1553	-0.0346	-6.0848		
38	74- 52	0.1723	2.6195	0.1664	43.9779	0.0450	8.4390		
39	88- 4	0.2634	3.6147	0.2633	50.1057	0.0089	1.9296		

DELTA CPU TIME = 0:00:01.18

10.0 SUMMARY REPORT

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

34 POINTS INPUT FROM EPOCH 2

34 POINTS INPUT FROM EPOCH 3

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 = 00:01:25.12

TOTAL CPU TIME = 0:00:52.16

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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:  7-JAN-1987   TIME: 14:47:19   *
*                                         *
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*                                         *
* NETWORK: 1165400H   EPOCHS    2 AND   3 *
*                                         *
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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
161	*** NO EXCLUDED POINTS DEFINED ***
163	
164	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK 1

32
33
34
35

GROUP # 2 BLOCK 2

17
18

GROUP # 3 BLOCK 3

38
39

3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 2	EPOCH: 3	TOTAL
REDUNDANCY :	72.00	67.00	139.00
STD. DEV. UNIT WEIGHT :	1.0913019	1.1688058	1.1293241
WEIGHTED QUADRATIC RESIDUALS :	85.7476716	91.5291672	177.2768389
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: 2			EPOCH: 3		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6181	9926.4514	1000.9619	9884.7095	9926.5421	1001.4850
163	10203.6904	10080.8577	924.7435	10203.7832	10080.9498	925.3040
164	10000.0376	10273.8153	1006.2115	10000.1298	10273.9100	1006.4650
165	9843.3640	10241.7555	1009.5959	9843.4538	10241.8497	1009.7800
162	10087.6910	9917.4354	1014.8176	10087.7852	9917.5294	1014.9810
1218	9846.9507	10016.2126	1010.9505	9847.0352	10016.3003	1015.0000
11	9977.1179	10173.6822	1000.3652	9977.2096	10173.7762	1000.2730
12	9979.0457	10174.9300	1000.4073	9979.1376	10175.0260	1000.3150
13	9980.7108	10173.6672	1000.1920	9980.8027	10173.7611	1000.1030
14	9995.5499	10177.1495	992.6119	9995.6423	10177.2416	992.5700
15	10022.2481	10176.3935	977.6857	10022.3401	10176.4885	977.7050
16	10026.6266	10176.3906	975.1160	10026.7201	10176.4829	975.1380
17	10039.5988	10175.6131	966.7571	10039.6931	10175.7048	966.8130
18	10050.7141	10174.8524	960.3082	10050.8093	10174.9435	960.3930
19	10076.4323	10173.1760	946.5979	10076.5247	10173.2702	946.7430
21	9977.1002	10124.0845	1000.2669	9977.1920	10124.1779	1000.1760
22	9979.5686	10123.5347	1000.3948	9979.6599	10123.6286	1000.3040
23	9981.5821	10124.0354	1000.2361	9981.6750	10124.1291	1000.1480
24	9996.6706	10128.3930	991.7977	9996.7629	10128.4867	990.2490
25	10020.8893	10129.7592	978.1127	10020.9818	10129.8528	978.1230
26	10028.1528	10129.6746	973.9339	10028.2464	10129.7667	973.9620
27	10040.6828	10130.6530	965.7364	10040.7758	10130.7450	965.8000
28	10050.4785	10130.9433	960.4833	10050.5722	10131.0362	960.5700
29	10075.9160	10132.3642	946.5199	10076.0086	10132.4572	946.6670
31	9981.3287	10075.7336	1000.4678	9981.4202	10075.8260	1000.3780
32	9983.6871	10076.4490	1000.4731	9983.7808	10076.5434	1000.3840
33	9986.1726	10076.5804	1000.0926	9986.2672	10076.6750	1000.0010
34	10000.9408	10074.1715	992.0623	10001.0351	10074.2642	992.0120
35	10025.8936	10077.3737	977.6932	10025.9874	10077.4671	977.7070
36	10032.7424	10077.9122	973.8380	10032.8353	10078.0054	973.8690
37	10046.3975	10079.8534	965.2433	10046.4911	10079.9455	965.3180
38	10055.2814	10081.0791	960.4949	10055.3753	10081.1720	960.5840
39	10080.0089	10084.1968	946.7214	10080.1039	10084.2893	946.8710

DELTA CPU TIME = 0:00:02.24

number of fixed points in net 1 1
number of analyzed fixed points 1 1
fixed points net 1 1662
fixed points net 2 1663

DATE: 7-JAN-1987
J1165400H.OUT;1

TIME: 14:47:2
OPTION: ZFA1:

	DV (cm)	DZ (cm)	OMEGA VALUE
	-0.1278	0.0000	1.5108
	-0.1935	0.0000	2.8617
	0.0892	0.0000	1.6622
	-0.0751	0.0000	0.6197

SUMMARY

REDUNDANCY FROM ADJUSTMENTS: 139.0000

REDUNDANCY FROM CONDITIONS: 4.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.43681

SUM OF OMEGA: 9.7472 TEST PASSES

MAX. SINGLE OMEGA: 6.1217 TEST PASSES

SCALE: -9.1697 PPM

BOUNDARY VALUE: 3.3972

BOUNDARY VALUE: 2.8617

NO SIGNIFICANT MOVEMENT IN BASE POINTS

DELTA CPU TIME = 0:00:00.65

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	114- 17	0.0777	1.3316	0.0708	16.9984	-0.0320	-7.0252		
163	244- 45	0.0875	1.6042	-0.0791	-26.4127	-0.0373	-7.5540		
164	49- 55	0.0676	1.5238	0.0517	19.2778	0.0436	23.9677		
165	300- 36	0.0505	0.9163	-0.0434	-10.9000	0.0257	11.0164		
162	28- 54	0.3534	2.8922	0.1708	25.0254	0.3094	19.9004		
1218	234- 33	0.7087	7.9427	-0.5773	-91.4767	-0.4110	-12.5767		
11	12- 41	0.0812	0.8787	0.0178	4.2249	0.0792	8.6832		
12	8- 9	0.2662	2.6966	0.0377	6.1205	0.2635	25.1164		
13	30- 42	0.0697	0.5941	0.0356	8.5292	0.0599	3.1728		
14	147- 50	0.1456	1.1296	0.0775	18.3357	-0.1233	-6.6402		
15	0- 56	0.1673	1.2267	0.0027	0.5609	0.1673	8.9182		
16	124- 27	0.1837	1.5674	0.1515	30.5673	-0.1039	-5.7514		
17	125- 46	0.2726	2.3657	0.2212	42.8362	-0.1593	-10.3081		
18	125- 40	0.3746	3.3821	0.3044	58.2117	-0.2184	-16.3532		
19	1- 49	0.0883	0.7886	0.0028	0.5349	0.0883	6.9104		
21	20- 34	0.0679	0.6392	0.0238	4.6495	0.0635	4.5514		
22	351- 14	0.1096	0.9052	-0.0167	-3.2882	0.1083	7.6564		
23	61- 28	0.1648	2.4579	0.1448	30.5851	0.0787	10.4269		
24	37- 20	0.1059	1.2106	0.0642	12.0800	0.0842	7.2564		
25	40- 57	0.0901	1.1636	0.0591	13.7543	0.0681	7.2388		
26	114- 22	0.1811	2.3741	0.1650	39.4406	-0.0747	-8.6231		
27	131- 16	0.1331	1.6225	0.1001	24.6731	-0.0878	-11.5557		
28	91- 0	0.1480	1.8270	0.1480	22.9982	-0.0026	-0.2769		
29	51- 48	0.0243	0.4169	0.0191	4.4169	0.0150	2.5580		
31	278- 2	0.0087	0.1148	-0.0086	-1.6501	0.0012	0.1014		
32	46- 14	0.2913	3.4594	0.2103	40.8453	0.2015	16.5259		
33	54- 53	0.3709	4.9216	0.3034	61.1935	0.2134	30.4661		
34	83- 20	0.2593	3.8263	0.2576	58.3335	0.0301	3.2379		
35	61- 14	0.2135	2.8549	0.1871	43.4435	0.1028	13.9437		
36	49- 56	0.1156	1.4887	0.0884	22.7266	0.0744	11.5842		
37	102- 56	0.1532	2.6006	0.1494	39.2267	-0.0343	-6.0253		
38	74- 46	0.1727	2.6237	0.1666	44.0480	0.0454	8.5115		
39	87- 57	0.2637	3.6173	0.2635	50.1530	0.0094	2.0417		

DELTA CPU TIME = 0:00:10.84

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	220 - 5	0.0740	0.1831	0.0569	0.1408		
163	166 - 40	0.0711	0.1759	0.0537	0.1328		
164	109 - 51	0.0531	0.1313	0.0411	0.1016		
165	252 - 6	0.0646	0.1599	0.0463	0.1145		
162	190 - 32	0.1259	0.3116	0.0807	0.1997		
1218	164 - 57	0.1864	0.4611	0.0652	0.1614		
11	170 - 55	0.0962	0.2380	0.0640	0.1583		
12	156 - 17	0.1074	0.2656	0.0716	0.1771		
13	174 - 21	0.1379	0.3413	0.0635	0.1570		
14	170 - 56	0.1376	0.3405	0.0621	0.1536		
15	162 - 47	0.1422	0.3519	0.0580	0.1435		
16	161 - 33	0.1404	0.3473	0.0576	0.1425		
17	158 - 20	0.1318	0.3262	0.0569	0.1408		
18	155 - 60	0.1240	0.3067	0.0567	0.1404		
19	158 - 48	0.1188	0.2939	0.0625	0.1546		
21	165 - 36	0.1208	0.2988	0.0671	0.1660		
22	165 - 58	0.1215	0.3005	0.0669	0.1656		
23	161 - 38	0.0889	0.2199	0.0662	0.1638		
24	165 - 48	0.1097	0.2714	0.0699	0.1729		
25	167 - 13	0.0984	0.2434	0.0634	0.1568		
26	166 - 19	0.0946	0.2341	0.0624	0.1545		
27	163 - 33	0.0891	0.2204	0.0610	0.1509		
28	146 - 7	0.1087	0.2689	0.0633	0.1566		
29	148 - 10	0.0827	0.2046	0.0578	0.1431		
31	168 - 26	0.1110	0.2745	0.0702	0.1738		
32	168 - 56	0.1117	0.2763	0.0698	0.1727		
33	181 - 20	0.0837	0.2071	0.0704	0.1742		
34	185 - 37	0.0967	0.2392	0.0661	0.1635		
35	191 - 59	0.0867	0.2145	0.0645	0.1596		
36	200 - 33	0.0827	0.2046	0.0590	0.1459		
37	203 - 7	0.0782	0.1935	0.0582	0.1440		
38	204 - 14	0.0756	0.1872	0.0582	0.1441		
39	235 - 18	0.0764	0.1890	0.0636	0.1573		

DELTA CPU TIME = 0:00:00.35

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	213 - 34	0.1653	0.4090	0.1344	0.3325		
163	165 - 56	0.1533	0.3792	0.1163	0.2878		
164	100 - 23	0.0829	0.2050	0.0608	0.1503		
165	248 - 38	0.1023	0.2531	0.0708	0.1752		

DELTA CPU TIME = 0:00:00.57

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	10.3643	6.1217	***
1218	155.1440	6.1217	***
11	0.2914	6.1217	
12	6.6290	6.1217	***
13	0.0831	6.1217	
14	1.2142	6.1217	
15	1.8113	6.1217	
16	3.3533	6.1217	
17	7.9288	6.1217	***
18	15.9698	6.1217	***
19	0.5507	6.1217	
21	0.0982	6.1217	
22	0.6623	6.1217	
23	5.1354	6.1217	
24	1.0332	6.1217	
25	1.0629	6.1217	
26	5.3035	6.1217	
27	2.0166	6.1217	
28	3.6911	6.1217	
29	0.2824	6.1217	
31	0.5344	6.1217	
32	15.1983	6.1217	***
33	28.4648	6.1217	***
34	15.3188	6.1217	***
35	8.4129	6.1217	***
36	1.7947	6.1217	
37	5.7936	6.1217	
38	6.7370	6.1217	***
39	12.8356	6.1217	***

DELTA CPU TIME = 0:00:14.63

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK 1

32
33
34
35

STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 18.2265 MAX. CHANGE OMEGA: 18.2265 BOUNDARY VALUE: 3.9088

SIGNIFICANT X-TRANSLATION OF 0.206650 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 22.4470 MAX. CHANGE OMEGA: 4.2205 BOUNDARY VALUE: 3.9088

SIGNIFICANT X-TRANSLATION OF 0.210781 cm

SIGNIFICANT Y-TRANSLATION OF 0.114629 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 23.6028 MAX. CHANGE OMEGA: 1.1558 BOUNDARY VALUE: 3.9088

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	0.000023 radian	NO
Y-TRANSLATION	0.114629 cm	YES
X-TRANSLATION	0.210781 cm	YES

DELTA CPU TIME = 0:00:12.13

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
32	359- 42	0.0868	0.7861	-0.0004	-0.0860	0.0868	7.1235		
33	43- 9	0.1354	1.7344	0.0926	18.6801	0.0988	14.1021		
34	151- 2	0.0966	1.0979	0.0468	10.5938	-0.0845	-9.0917		
35	243- 22	0.0265	0.3582	-0.0237	-5.4968	-0.0119	-1.6117		

DELTA CPU TIME = 0:00:00.21

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 2 BLOCK 2

17
18

STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 14.2629 MAX. CHANGE OMEGA: 14.2629 BOUNDARY VALUE: 3.9088

SIGNIFICANT X-TRANSLATION OF 0.169026 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 17.9817 MAX. CHANGE OMEGA: 3.7188 BOUNDARY VALUE: 3.9088

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 2 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	0.000027 radian	NO
Y-TRANSLATION	0.045388 cm	NO
X-TRANSLATION	0.169026 cm	YES

DELTA CPU TIME = 0:00:00.88

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
17	161- 51	0.1677	1.2736	0.0522	10.1094	-0.1593	-10.3081		
18	148- 13	0.2570	2.0880	0.1353	25.8836	-0.2184	-16.3532		

DELTA CPU TIME = 0:00:00.07

9.2 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 3 BLOCK 3

38
39

STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 12.3669 MAX. CHANGE OMEGA: 12.3669 BOUNDARY VALUE: 3.9088

SIGNIFICANT X-TRANSLATION OF 0.187065 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 139.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90875
MAXIMUM OMEGA: 12.5170 MAX. CHANGE OMEGA: 0.1501 BOUNDARY VALUE: 3.9088

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 3 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-ROTATION	-0.000001 radian	NO
Y-TRANSLATION	0.010849 cm	NO
X-TRANSLATION	0.187065 cm	YES

DELTA CPU TIME = 0:00:00.85

9.2 DISPLACEMENTS AFTER GROUP REDUCTION REPORT

POINT	DIRECTION	LENGTH (cm)	STD. LENGTH	DX (cm)	STD. DX	DY (cm)	STD. DY	DZ (cm)	STD. DZ
38	335- 45	0.0498	0.7488	-0.0204	-5.4028	0.0454	8.5115		
39	82- 58	0.0770	1.0434	0.0764	14.5481	0.0094	2.0417		

DELTA CPU TIME = 0:00:00.12

10.0 SUMMARY REPORT

PROGRAM SUMMARY

34 POINTS INPUT FROM EPOCH 2

34 POINTS INPUT FROM EPOCH 3

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 3 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:01:05.16

TOTAL CPU TIME = 0:00:45.46

PART I: HORIZONTAL ANALYSIS

APPENDIX IIIC:

EPOCHS 1 AND 3
JULY TO NOVEMBER 1986

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

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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

```
*******************************************
*                                         *
*    DATE:  7-JAN-1987   TIME: 14:32:25   *
*                                         *
*******************************************
```

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*******************************************
*                                         *
* NETWORK: 1165400H   EPOCHS    1 AND    3 *
*                                         *
*******************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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
164	*** NO EXCLUDED POINTS DEFINED ***
161	
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK THREE

11
12
13
14
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3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 3	TOTAL
REDUNDANCY :	78.00	67.00	145.00
STD. DEV. UNIT WEIGHT :	0.9278523	1.1688058	1.0461098
WEIGHTED QUADRATIC RESIDUALS :	67.1509721	91.5291672	158.6801393
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: 1			EPOCH: 3		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1799	10000.3298	10274.1084	1006.4650
161	9884.6206	9926.4518	1000.9704	9884.9093	9926.7406	1001.4850
163	10203.6869	10080.8551	925.0641	10203.9831	10081.1481	925.3040
165	9843.3682	10241.7497	1009.5622	9843.6538	10242.0482	1009.7800
162	10087.6880	9917.4346	1014.7672	10087.9851	9917.7278	1014.9810
11	9977.1192	10173.6777	1000.3702	9977.4095	10173.9747	1000.2730
12	9979.0467	10174.9262	1000.4113	9979.3375	10175.2244	1000.3150
13	9980.7113	10173.6617	1000.1971	9981.0027	10173.9595	1000.1030
14	9995.5502	10177.1434	992.6488	9995.8423	10177.4400	992.5700
15	10022.2472	10176.3899	977.7838	10022.5400	10176.6869	977.7050
16	10026.6273	10176.3835	975.2242	10026.9200	10176.6813	975.1380
17	10039.5999	10175.6059	966.8988	10039.8931	10175.9033	966.8130
18	10050.7145	10174.8444	960.4771	10051.0092	10175.1419	960.3930
19	10076.4310	10173.1724	946.8237	10076.7247	10173.4686	946.7430
21	9977.1005	10124.0793	1000.2713	9977.3919	10124.3764	1000.1760
22	9979.5689	10123.5307	1000.3987	9979.8598	10123.8270	1000.3040
23	9981.5818	10124.0299	1000.2412	9981.8750	10124.3275	1000.1480
24	9996.6703	10128.3890	991.8373	9996.9628	10128.6851	990.2490
25	10020.8889	10129.7551	978.2093	10021.1817	10130.0512	978.1230
26	10028.1531	10129.6703	974.0470	10028.4464	10129.9651	973.9620
27	10040.6822	10130.6486	965.8831	10040.9758	10130.9434	965.8000
28	10050.4780	10130.9387	960.6518	10050.7721	10131.2346	960.5700
29	10075.9146	10132.3600	946.7466	10076.2085	10132.6556	946.6670
31	9981.3281	10075.7317	1000.4710	9981.6201	10076.0244	1000.3780
32	9983.6879	10076.4455	1000.4770	9983.9807	10076.7419	1000.3840
33	9986.1737	10076.5779	1000.0984	9986.4671	10076.8734	1000.0010
34	10000.9422	10074.1680	992.1012	10001.2349	10074.4626	992.0120
35	10025.8939	10077.3707	977.7904	10026.1873	10077.6656	977.7070
36	10032.7421	10077.9094	973.9514	10033.0352	10078.2038	973.8690
37	10046.3977	10079.8491	965.3917	10046.6910	10080.1439	965.3180
38	10055.2805	10081.0761	960.6633	10055.5752	10081.3704	960.5840
39	10080.0094	10084.1935	946.9470	10080.3038	10084.4877	946.8710

DELTA CPU TIME = 0:00:02.59

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

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	0.1612	-0.0033	0.0000	4.5131
161	0.1862	-0.0742	0.0000	2.4398
163	-0.2111	0.0128	0.0000	3.8266
165	-0.1846	-0.0220	0.0000	3.8280

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.43398

SUM OF OMEGA: 7.6807 BOUNDARY VALUE: 9.7359 TEST PASSES

MAX. SINGLE OMEGA: 4.5131 BOUNDARY VALUE: 6.1163 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -29.1129 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
164	75- 22	0.1004	2.2073	0.0971	43.9404	0.0254	15.8287		
161	100- 30	0.0939	1.6586	0.0923	27.1855	-0.0171	-5.0762		
163	244- 51	0.0979	1.9148	-0.0886	-36.0239	-0.0416	-11.7620		
165	288- 19	0.1062	1.9437	-0.1008	-29.9380	0.0334	15.5533		
162	36- 30	0.5632	5.6551	0.3351	66.2597	0.4527	40.7492		
11	350- 38	0.0806	0.9212	-0.0131	-3.8257	0.0795	10.5104		
12	6- 59	0.2020	2.3403	0.0246	7.2799	0.2005	26.1957		
13	24- 43	0.1792	1.5028	0.0749	22.1341	0.1628	9.2190		
14	70- 46	0.1092	1.8700	0.1031	29.6219	0.0360	2.5604		
15	53- 1	0.1255	1.9504	0.1003	25.6654	0.0755	5.2144		
16	27- 8	0.1666	1.8021	0.0760	20.1015	0.1483	11.0934		
17	39- 32	0.1402	1.9510	0.0892	21.7951	0.1081	8.9432		
18	58- 49	0.2513	4.7994	0.2150	52.5012	0.1301	12.4055		
19	82- 40	0.0328	0.5662	0.0325	8.1409	0.0042	0.5202		
21	21- 20	0.2509	2.6406	0.0913	22.1895	0.2337	20.5925		
22	15- 5	0.1672	1.6733	0.0435	10.6697	0.1615	14.0499		
23	42- 47	0.3857	5.9984	0.2620	69.6192	0.2831	47.6418		
24	49- 26	0.1970	2.9028	0.1497	34.2660	0.1281	15.5519		
25	39- 47	0.1624	2.4553	0.1039	30.0866	0.1248	18.7096		
26	94- 59	0.1317	2.2134	0.1312	39.1007	-0.0114	-1.8532		
27	94- 59	0.1281	2.1932	0.1276	39.4696	-0.0111	-2.0402		
28	58- 46	0.1714	3.1981	0.1466	41.8128	0.0889	16.9958		
29	41- 4	0.0893	1.7333	0.0587	17.3604	0.0673	15.6985		
31	111- 33	0.1499	1.9620	0.1395	30.4534	-0.0551	-5.7172		
32	34- 50	0.3686	4.4932	0.2105	52.5273	0.3026	31.5319		
33	51- 53	0.3405	5.0385	0.2679	68.4074	0.2102	38.5864		
34	52- 5	0.2081	2.9524	0.1642	46.5089	0.1279	19.5421		
35	46- 15	0.2162	3.1710	0.1562	44.2331	0.1495	28.1043		
36	45- 14	0.1358	2.0285	0.0964	31.0096	0.0957	21.1888		
37	33- 35	0.1651	2.5355	0.0913	30.4910	0.1376	34.4057		
38	66- 21	0.2150	3.6566	0.1970	66.9775	0.0862	23.0843		
39	58- 14	0.1207	1.8884	0.1026	27.4815	0.0636	19.6968		

DELTA CPU TIME = 0:00:09.97

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	107 - 24	0.0477	0.1180	0.0392	0.0969		
161	225 - 39	0.0626	0.1548	0.0534	0.1320		
163	177 - 11	0.0595	0.1471	0.0496	0.1226		
165	252 - 8	0.0592	0.1465	0.0448	0.1107		
162	189 - 6	0.1062	0.2625	0.0700	0.1731		
11	171 - 45	0.0875	0.2164	0.0578	0.1429		
12	172 - 29	0.0879	0.2175	0.0575	0.1421		
13	175 - 4	0.1333	0.3296	0.0573	0.1416		
14	169 - 50	0.1200	0.2968	0.0559	0.1384		
15	162 - 22	0.1252	0.3095	0.0521	0.1290		
16	162 - 0	0.1204	0.2978	0.0515	0.1272		
17	158 - 23	0.1165	0.2882	0.0510	0.1262		
18	156 - 21	0.1095	0.2709	0.0508	0.1256		
19	152 - 56	0.0973	0.2406	0.0507	0.1253		
21	165 - 27	0.1089	0.2694	0.0599	0.1482		
22	165 - 51	0.1095	0.2708	0.0598	0.1479		
23	161 - 46	0.0788	0.1948	0.0591	0.1463		
24	161 - 55	0.0933	0.2307	0.0625	0.1546		
25	164 - 7	0.0834	0.2062	0.0563	0.1392		
26	162 - 58	0.0804	0.1988	0.0554	0.1369		
27	159 - 52	0.0761	0.1882	0.0538	0.1330		
28	152 - 27	0.0766	0.1896	0.0535	0.1323		
29	144 - 58	0.0719	0.1778	0.0500	0.1237		
31	170 - 43	0.0988	0.2444	0.0666	0.1648		
32	169 - 9	0.0990	0.2449	0.0616	0.1523		
33	182 - 35	0.0738	0.1826	0.0625	0.1547		
34	185 - 48	0.0811	0.2006	0.0591	0.1463		
35	188 - 10	0.0732	0.1810	0.0591	0.1462		
36	201 - 58	0.0692	0.1711	0.0533	0.1317		
37	204 - 59	0.0654	0.1617	0.0521	0.1289		
38	206 - 32	0.0632	0.1564	0.0517	0.1279		
39	237 - 23	0.0639	0.1581	0.0536	0.1326		

DELTA CPU TIME = 0:00:00.33

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	101 - 26	0.0767	0.1898	0.0588	0.1453		
161	220 - 26	0.1413	0.3494	0.1270	0.3141		
163	175 - 14	0.1298	0.3210	0.1077	0.2665		
165	249 - 4	0.0978	0.2418	0.0694	0.1715		

DELTA CPU TIME = 0:00:00.57

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	43.0902	6.1163	***
11	1.7657	6.1163	
12	4.3350	6.1163	
13	1.4540	6.1163	
14	1.2952	6.1163	
15	2.6881	6.1163	
16	3.9557	6.1163	
17	3.9376	6.1163	
18	20.8744	6.1163	***
19	0.1532	6.1163	
21	6.7219	6.1163	***
22	1.9101	6.1163	
23	36.1146	6.1163	***
24	6.3615	6.1163	***
25	4.9699	6.1163	
26	3.0369	6.1163	
27	3.1451	6.1163	
28	9.0229	6.1163	***
29	3.7498	6.1163	
31	2.8155	6.1163	
32	23.7134	6.1163	***
33	25.1695	6.1163	***
34	7.3319	6.1163	***
35	8.8136	6.1163	***
36	2.9081	6.1163	
37	5.9431	6.1163	
38	12.5978	6.1163	***
39	3.4591	6.1163	

DELTA CPU TIME = 0:00:13.75

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: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 6.9628 MAX. CHANGE OMEGA: 6.9628 BOUNDARY VALUE: 3.9069

SIGNIFICANT Z-ROTATION OF -0.000005 radian

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 9.8728 MAX. CHANGE OMEGA: 2.9100 BOUNDARY VALUE: 3.9069

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT

Z-ROTATION	-0.000005 radian	YES
Y-TRANSLATION	0.058325 cm	NO
X-TRANSLATION	0.045896 cm	NO

DELTA CPU TIME = 0:00:18.28

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	350- 48	0.0806	0.9211	-0.0129	-3.7580	0.0795	10.5145		
12	7- 3	0.2021	2.3413	0.0248	7.3506	0.2006	26.1984		
13	24- 47	0.1793	1.5044	0.0752	22.2026	0.1628	9.2197		
14	70- 50	0.1094	1.8749	0.1034	29.6939	0.0359	2.5555		
15	53- 10	0.1256	1.9563	0.1005	25.7285	0.0753	5.1997		
16	27- 14	0.1665	1.8035	0.0762	20.1668	0.1480	11.0758		
17	39- 41	0.1401	1.9546	0.0894	21.8544	0.1078	8.9179		
18	58- 55	0.2513	4.8034	0.2152	52.5593	0.1297	12.3706		
19	83- 36	0.0330	0.5631	0.0327	8.1983	0.0037	0.4574		
21	21- 19	0.2509	2.6406	0.0912	22.1808	0.2337	20.5953		
22	15- 4	0.1672	1.6732	0.0435	10.6602	0.1615	14.0515		
23	42- 47	0.3857	5.9980	0.2619	69.6096	0.2831	47.6430		
24	49- 27	0.1970	2.9022	0.1497	34.2632	0.1281	15.5429		
25	39- 50	0.1622	2.4536	0.1039	30.0851	0.1245	18.6788		
26	95- 5	0.1318	2.2123	0.1312	39.0990	-0.0117	-1.8928		
27	95- 7	0.1281	2.1919	0.1276	39.4695	-0.0114	-2.0975		
28	58- 52	0.1712	3.1950	0.1466	41.8132	0.0885	16.9260		
29	41- 17	0.0890	1.7276	0.0587	17.3630	0.0668	15.5815		
31	111- 35	0.1497	1.9578	0.1392	30.3886	-0.0551	-5.7163		
32	34- 48	0.3684	4.4899	0.2102	52.4542	0.3026	31.5314		
33	51- 51	0.3402	5.0345	0.2676	68.3328	0.2102	38.5831		
34	52- 3	0.2078	2.9476	0.1639	46.4224	0.1278	19.5272		
35	46- 14	0.2158	3.1655	0.1559	44.1515	0.1493	28.0607		
36	45- 13	0.1355	2.0227	0.0961	30.9179	0.0954	21.1292		
37	33- 34	0.1647	2.5287	0.0911	30.3993	0.1372	34.3200		
38	66- 25	0.2146	3.6506	0.1967	66.8863	0.0858	22.9798		
39	58- 23	0.1202	1.8807	0.1024	27.4142	0.0630	19.5343		

DELTA CPU TIME = 0:00:01.12

10.0 SUMMARY REPORT

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

33 POINTS INPUT FROM EPOCH 1

34 POINTS INPUT FROM EPOCH 3

A TOTAL OF 32 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 = 00:01:40.23

TOTAL CPU TIME = 0:00:49.69

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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:  7-JAN-1987   TIME: 14:40:22   *
*                                         *
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*******************************************
*                                         *
* NETWORK: 1165400H   EPOCHS    1 AND    3 *
*                                         *
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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
164	*** NO EXCLUDED POINTS DEFINED ***
161	
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

32
33
34
35
36

GROUP # 2 BLOCK TWO

22
23
24

3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 3	TOTAL
REDUNDANCY :	78.00	67.00	145.00
STD. DEV. UNIT WEIGHT :	0.9278523	1.1688058	1.0461098
WEIGHTED QUADRATIC RESIDUALS :	67.1509721	91.5291672	158.6801393
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: 1			EPOCH: 3		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1799	10000.3298	10274.1084	1006.4650
161	9884.6206	9926.4518	1000.9704	9884.9093	9926.7406	1001.4850
163	10203.6869	10080.8551	925.0641	10203.9831	10081.1481	925.3040
165	9843.3682	10241.7497	1009.5622	9843.6538	10242.0482	1009.7800
162	10087.6880	9917.4346	1014.7672	10087.9851	9917.7278	1014.9810
11	9977.1192	10173.6777	1000.3702	9977.4095	10173.9747	1000.2730
12	9979.0467	10174.9262	1000.4113	9979.3375	10175.2244	1000.3150
13	9980.7113	10173.6617	1000.1971	9981.0027	10173.9595	1000.1030
14	9995.5502	10177.1434	992.6488	9995.8423	10177.4400	992.5700
15	10022.2472	10176.3899	977.7838	10022.5400	10176.6869	977.7050
16	10026.6273	10176.3835	975.2242	10026.9200	10176.6813	975.1380
17	10039.5999	10175.6059	966.8988	10039.8931	10175.9033	966.8130
18	10050.7145	10174.8444	960.4771	10051.0092	10175.1419	960.3930
19	10076.4310	10173.1724	946.8237	10076.7247	10173.4686	946.7430
21	9977.1005	10124.0793	1000.2713	9977.3919	10124.3764	1000.1760
22	9979.5689	10123.5307	1000.3987	9979.8598	10123.8270	1000.3040
23	9981.5818	10124.0299	1000.2412	9981.8750	10124.3275	1000.1480
24	9996.6703	10128.3890	991.8373	9996.9628	10128.6851	990.2490
25	10020.8889	10129.7551	978.2093	10021.1817	10130.0512	978.1230
26	10028.1531	10129.6703	974.0470	10028.4464	10129.9651	973.9620
27	10040.6822	10130.6486	965.8831	10040.9758	10130.9434	965.8000
28	10050.4780	10130.9387	960.6518	10050.7721	10131.2346	960.5700
29	10075.9146	10132.3600	946.7466	10076.2085	10132.6556	946.6670
31	9981.3281	10075.7317	1000.4710	9981.6201	10076.0244	1000.3780
32	9983.6879	10076.4455	1000.4770	9983.9807	10076.7419	1000.3840
33	9986.1737	10076.5779	1000.0984	9986.4671	10076.8734	1000.0010
34	10000.9422	10074.1680	992.1012	10001.2349	10074.4626	992.0120
35	10025.8939	10077.3707	977.7904	10026.1873	10077.6656	977.7070
36	10032.7421	10077.9094	973.9514	10033.0352	10078.2038	973.8690
37	10046.3977	10079.8491	965.3917	10046.6910	10080.1439	965.3180
38	10055.2805	10081.0761	960.6633	10055.5752	10081.3704	960.5840
39	10080.0094	10084.1935	946.9470	10080.3038	10084.4877	946.8710

DELTA CPU TIME = 0:00:02.55

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

4.0 LOCALIZATION OF DISPLACEMENTS OF SINGLE POINTS

POINT	DX (cm)	DY (cm)	DZ (cm)	OMEGA VALUE
164	0.1612	-0.0033	0.0000	4.5131
161	0.1862	-0.0742	0.0000	2.4398
163	-0.2111	0.0128	0.0000	3.8266
165	-0.1846	-0.0220	0.0000	3.8280

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.43398

SUM OF OMEGA: 7.6807 BOUNDARY VALUE: 9.7359 TEST PASSES

MAX. SINGLE OMEGA: 4.5131 BOUNDARY VALUE: 6.1163 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

SCALE: -29.1129 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
164	75- 22	0.1004	2.2073	0.0971	43.9404	0.0254	15.8287		
161	100- 30	0.0939	1.6586	0.0923	27.1855	-0.0171	-5.0762		
163	244- 51	0.0979	1.9148	-0.0886	-36.0239	-0.0416	-11.7620		
165	288- 19	0.1062	1.9437	-0.1008	-29.9380	0.0334	15.5533		
162	36- 30	0.5632	5.6551	0.3351	66.2597	0.4527	40.7492		
11	350- 38	0.0806	0.9212	-0.0131	-3.8257	0.0795	10.5104		
12	6- 59	0.2020	2.3403	0.0246	7.2799	0.2005	26.1957		
13	24- 43	0.1792	1.5028	0.0749	22.1341	0.1628	9.2190		
14	70- 46	0.1092	1.8700	0.1031	29.6219	0.0360	2.5604		
15	53- 1	0.1255	1.9504	0.1003	25.6654	0.0755	5.2144		
16	27- 8	0.1666	1.8021	0.0760	20.1015	0.1483	11.0934		
17	39- 32	0.1402	1.9510	0.0892	21.7951	0.1081	8.9432		
18	58- 49	0.2513	4.7994	0.2150	52.5012	0.1301	12.4055		
19	82- 40	0.0328	0.5662	0.0325	8.1409	0.0042	0.5202		
21	21- 20	0.2509	2.6406	0.0913	22.1895	0.2337	20.5925		
22	15- 5	0.1672	1.6733	0.0435	10.6697	0.1615	14.0499		
23	42- 47	0.3857	5.9984	0.2620	69.6192	0.2831	47.6418		
24	49- 26	0.1970	2.9028	0.1497	34.2660	0.1281	15.5519		
25	39- 47	0.1624	2.4553	0.1039	30.0866	0.1248	18.7096		
26	94- 59	0.1317	2.2134	0.1312	39.1007	-0.0114	-1.8532		
27	94- 59	0.1281	2.1932	0.1276	39.4696	-0.0111	-2.0402		
28	58- 46	0.1714	3.1981	0.1466	41.8128	0.0889	16.9958		
29	41- 4	0.0893	1.7333	0.0587	17.3604	0.0673	15.6985		
31	111- 33	0.1499	1.9620	0.1395	30.4534	-0.0551	-5.7172		
32	34- 50	0.3686	4.4932	0.2105	52.5273	0.3026	31.5319		
33	51- 53	0.3405	5.0385	0.2679	68.4074	0.2102	38.5864		
34	52- 5	0.2081	2.9524	0.1642	46.5089	0.1279	19.5421		
35	46- 15	0.2162	3.1710	0.1562	44.2331	0.1495	28.1043		
36	45- 14	0.1358	2.0285	0.0964	31.0096	0.0957	21.1888		
37	33- 35	0.1651	2.5355	0.0913	30.4910	0.1376	34.4057		
38	66- 21	0.2150	3.6566	0.1970	66.9775	0.0862	23.0843		
39	58- 14	0.1207	1.8884	0.1026	27.4815	0.0636	19.6968		

DELTA CPU TIME = 0:00:10.10

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	107 - 24	0.0477	0.1180	0.0392	0.0969		
161	225 - 39	0.0626	0.1548	0.0534	0.1320		
163	177 - 11	0.0595	0.1471	0.0496	0.1226		
165	252 - 8	0.0592	0.1465	0.0448	0.1107		
162	189 - 6	0.1062	0.2625	0.0700	0.1731		
11	171 - 45	0.0875	0.2164	0.0578	0.1429		
12	172 - 29	0.0879	0.2175	0.0575	0.1421		
13	175 - 4	0.1333	0.3296	0.0573	0.1416		
14	169 - 50	0.1200	0.2968	0.0559	0.1384		
15	162 - 22	0.1252	0.3095	0.0521	0.1290		
16	162 - 0	0.1204	0.2978	0.0515	0.1272		
17	158 - 23	0.1165	0.2882	0.0510	0.1262		
18	156 - 21	0.1095	0.2709	0.0508	0.1256		
19	152 - 56	0.0973	0.2406	0.0507	0.1253		
21	165 - 27	0.1089	0.2694	0.0599	0.1482		
22	165 - 51	0.1095	0.2708	0.0598	0.1479		
23	161 - 46	0.0788	0.1948	0.0591	0.1463		
24	161 - 55	0.0933	0.2307	0.0625	0.1546		
25	164 - 7	0.0834	0.2062	0.0563	0.1392		
26	162 - 58	0.0804	0.1988	0.0554	0.1369		
27	159 - 52	0.0761	0.1882	0.0538	0.1330		
28	152 - 27	0.0766	0.1896	0.0535	0.1323		
29	144 - 58	0.0719	0.1778	0.0500	0.1237		
31	170 - 43	0.0988	0.2444	0.0666	0.1648		
32	169 - 9	0.0990	0.2449	0.0616	0.1523		
33	182 - 35	0.0738	0.1826	0.0625	0.1547		
34	185 - 48	0.0811	0.2006	0.0591	0.1463		
35	188 - 10	0.0732	0.1810	0.0591	0.1462		
36	201 - 58	0.0692	0.1711	0.0533	0.1317		
37	204 - 59	0.0654	0.1617	0.0521	0.1289		
38	206 - 32	0.0632	0.1564	0.0517	0.1279		
39	237 - 23	0.0639	0.1581	0.0536	0.1326		

DELTA CPU TIME = 0:00:00.35

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	101 - 26	0.0767	0.1898	0.0588	0.1453		
161	220 - 26	0.1413	0.3494	0.1270	0.3141		
163	175 - 14	0.1298	0.3210	0.1077	0.2665		
165	249 - 4	0.0978	0.2418	0.0694	0.1715		

DELTA CPU TIME = 0:00:00.57

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
162	43.0902	6.1163	***
11	1.7657	6.1163	
12	4.3350	6.1163	
13	1.4540	6.1163	
14	1.2952	6.1163	
15	2.6881	6.1163	
16	3.9557	6.1163	
17	3.9376	6.1163	
18	20.8744	6.1163	***
19	0.1532	6.1163	
21	6.7219	6.1163	***
22	1.9101	6.1163	
23	36.1146	6.1163	***
24	6.3615	6.1163	***
25	4.9699	6.1163	
26	3.0369	6.1163	
27	3.1451	6.1163	
28	9.0229	6.1163	***
29	3.7498	6.1163	
31	2.8155	6.1163	
32	23.7134	6.1163	***
33	25.1695	6.1163	***
34	7.3319	6.1163	***
35	8.8136	6.1163	***
36	2.9081	6.1163	
37	5.9431	6.1163	
38	12.5978	6.1163	***
39	3.4591	6.1163	

DELTA CPU TIME = 0:00:13.60

9.0 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 1 BLOCK ONE

32
33
34
35
36

STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 8.8118 MAX. CHANGE OMEGA: 8.8118 BOUNDARY VALUE: 3.9069

SIGNIFICANT Y-TRANSLATION OF 0.135262 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 18.7253 MAX. CHANGE OMEGA: 9.9135 BOUNDARY VALUE: 3.9069

SIGNIFICANT Y-TRANSLATION OF 0.148394 cm

SIGNIFICANT X-TRANSLATION OF 0.137557 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 23.5014 MAX. CHANGE OMEGA: 4.7761 BOUNDARY VALUE: 3.9069

SIGNIFICANT Y-TRANSLATION OF 0.231050 cm

SIGNIFICANT X-TRANSLATION OF 0.297089 cm

SIGNIFICANT Z-ROTATION OF 0.000029 radian

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	0.000029 radian	YES
Y-TRANSLATION	0.231050 cm	YES
X-TRANSLATION	0.297089 cm	YES

DELTA CPU TIME = 0:00:11.34

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
32	310- 5	0.1111	1.2894	-0.0850	-21.2014	0.0715	7.4545		
33	233- 6	0.0346	0.5138	-0.0277	-7.0658	-0.0208	-3.8132		
34	231- 59	0.1666	2.3623	-0.1313	-37.1857	-0.1026	-15.6768		
35	240- 3	0.1609	2.4814	-0.1394	-39.4835	-0.0803	-15.0989		
36	236- 5	0.2400	3.7139	-0.1991	-64.0312	-0.1339	-29.6591		

DELTA CPU TIME = 0:00:00.28

9.1 LOCALIZATION OF GROUP PARAMETERS REPORT

G R O U P # 2 BLOCK TWO

22
23
24

STEP 1 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 13.1621 MAX. CHANGE OMEGA: 13.1621 BOUNDARY VALUE: 3.9069

SIGNIFICANT Y-TRANSLATION OF 0.212195 cm

STEP 2 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 18.8221 MAX. CHANGE OMEGA: 5.6600 BOUNDARY VALUE: 3.9069

SIGNIFICANT Y-TRANSLATION OF 0.188135 cm

SIGNIFICANT X-TRANSLATION OF 0.105789 cm

STEP 3 OF GROUP LOCALIZATION

REDUNDANCY FROM CONDITIONS: 1.0000 REDUNDANCY FROM ADJUSTMENTS: 145.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.90694
MAXIMUM OMEGA: 20.0802 MAX. CHANGE OMEGA: 1.2581 BOUNDARY VALUE: 3.9069

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	-0.000079 radian	NO
Y-TRANSLATION	0.188135 cm	YES
X-TRANSLATION	0.105789 cm	YES

DELTA CPU TIME = 0:00:01.15

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
22	246- 48	0.0677	1.1009	-0.0623	-15.2600	-0.0267	-2.3222		
23	58- 43	0.1828	3.0308	0.1562	41.5060	0.0949	15.9763		
24	143- 49	0.0743	0.8191	0.0439	10.0493	-0.0600	-7.2827		

DELTA CPU TIME = 0:00:00.14

10.0 SUMMARY REPORT

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

33 POINTS INPUT FROM EPOCH 1

34 POINTS INPUT FROM EPOCH 3

A TOTAL OF 32 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 = 00:01:01.51

TOTAL CPU TIME = 0:00:42.70

PART II: VERTICAL ANALYSIS

APPENDIX IIID

EPOCHS 1 AND 2;
JULY TO SEPTEMBER 1986

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

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

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

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*********************************************
*                                           *
*    DATE: 14-JAN-1987   TIME: 11:13:45     *
*                                           *
*********************************************
```

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*********************************************
*                                           *
* NETWORK: 1165400Z   EPOCHS    1 AND    2 *
*                                           *
*********************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

PROGRAM CONTROL:

EXAMINE FIXED POINTS.....RESERVED
EPOCH ORDERING.....ASCENDING
CONFIDENCE LEVEL.....95%
EPOCH CENTRING UNCERTAINTY..... 0 cm
EXAMINE BASE POINTS.....NO

ADDITIONAL NETWORK PARAMETERS:

SCALE	--------->	NO
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
164	*** NO EXCLUDED POINTS DEFINED ***
161	
162	
163	
165	

2.1 POINT GROUP INPUT REPORT

*** NO GROUPS ARE DEFINED ***

3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 1	EPOCH: 2	TOTAL
REDUNDANCY :	96.00	96.00	192.00
STD. DEV. UNIT WEIGHT :	1.0857246	0.9607478	1.0251425
WEIGHTED QUADRATIC RESIDUALS :	113.1645970	88.6114823	201.7760793
NUMBER OF RANK DEFECTS :	1	1	
	Z-TRANSLATION	Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 1			EPOCH: 2		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1912	10000.0376	10273.8144	1006.1912
161	9884.6202	9926.4518	1000.9763	9884.6181	9926.4512	1000.9756
162	10087.6880	9917.4346	1014.7728	10087.6908	9917.4356	1014.7739
163	10203.6869	10080.8551	925.0730	10203.6898	10080.8577	925.0753
165	9843.3682	10241.7497	1009.5775	9843.3643	10241.7547	1009.5787
36	10032.7422	10077.9094	973.9531	10032.7422	10077.9120	973.9532
35	10025.8939	10077.3707	977.7919	10025.8935	10077.3735	977.7923
34	10000.9422	10074.1680	992.1019	10000.9407	10074.1712	992.1016
39	10080.0094	10084.1935	946.9513	10080.0085	10084.1965	946.9498
33	9986.1737	10076.5779	1000.0987	9986.1726	10076.5801	1000.0985
32	9983.6879	10076.4455	1000.4773	9983.6871	10076.4487	1000.4774
38	10055.2805	10081.0761	960.6659	10055.2812	10081.0789	960.6658
31	9981.3281	10075.7317	1000.4713	9981.3291	10075.7328	1000.4721
29	10075.9146	10132.3600	946.7501	10075.9162	10132.3641	946.7490
166	10000.0377	9999.9561	1000.0000	10000.0376	9999.9562	1000.0000
28	10050.4780	10130.9387	960.6544	10050.4782	10130.9430	960.6543
27	10040.6822	10130.6486	965.8854	10040.6825	10130.6526	965.8859
26	10028.1531	10129.6703	974.0488	10028.1527	10129.6742	974.0487
37	10046.3977	10079.8491	965.3939	10046.3973	10079.8532	965.3944
25	10020.8889	10129.7551	978.2108	10020.8892	10129.7589	978.2101
24	9996.6703	10128.3890	991.8380	9996.6705	10128.3926	991.8381
11	9977.1192	10173.6777	1000.3707	9977.1179	10173.6816	1000.3700
12	9979.0467	10174.9262	1000.4116	9979.0457	10174.9294	1000.4120
13	9980.7113	10173.6617	1000.1974	9980.7108	10173.6666	1000.1974
14	9995.5502	10177.1434	992.6496	9995.5498	10177.1489	992.6490
15	10022.2472	10176.3899	977.7854	10022.2479	10176.3930	977.7848
16	10026.6273	10176.3835	975.2260	10026.6264	10176.3901	975.2262
17	10039.5999	10175.6059	966.9011	10039.5986	10175.6126	966.9019
18	10050.7145	10174.8444	960.4798	10050.7138	10174.8519	960.4790
19	10076.4310	10173.1724	946.8272	10076.4320	10173.1754	946.8264
21	9977.1005	10124.0793	1000.2721	9977.1002	10124.0840	1000.2725
22	9979.5689	10123.5307	1000.3990	9979.5686	10123.5342	1000.3994
23	9981.5818	10124.0299	1000.2415	9981.5820	10124.0350	1000.2414

DELTA CPU TIME = 0:00:01.06

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	-0.1044	0.3094
161	0.0000	0.0000	-0.1917	0.8723
162	0.0000	0.0000	0.0377	0.0390
163	0.0000	0.0000	0.1949	1.0422
165	0.0000	0.0000	0.0486	0.0550

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 192.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.41837

SUM OF OMEGA: 1.8539 BOUNDARY VALUE: 9.6735 TEST PASSES

MAX. SINGLE OMEGA: 1.0422 BOUNDARY VALUE: 3.8902 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

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	0.0779	0.5179					-0.0779	-0.5179
161	180 - 0	0.1547	0.9412					-0.1547	-0.9412
162	180 - 0	0.0328	0.2145					0.0328	0.2145
163	180 - 0	0.1564	1.0224					0.1564	1.0224
165	180 - 0	0.0435	0.2616					0.0435	0.2616
36	180 - 0	0.0708	0.5054					-0.0708	-0.5054
35	180 - 0	0.0335	0.2395					-0.0335	-0.2395
34	180 - 0	0.1075	0.7693					-0.1075	-0.7693
39	180 - 0	0.2346	0.0782					-0.2346	-0.0782
33	180 - 0	0.0999	0.7161					-0.0999	-0.7161
32	180 - 0	0.0673	0.4825					-0.0673	-0.4825
38	180 - 0	0.0810	0.5753					-0.0810	-0.5753
31	180 - 0	0.0019	0.0136					0.0019	0.0136
29	180 - 0	0.1879	1.3364					-0.1879	-1.3364
166	180 - 0	0.0781	0.0209					-0.0781	-0.0209
28	180 - 0	0.0916	0.6483					-0.0916	-0.6483
27	180 - 0	0.0303	0.2146					-0.0303	-0.2146
26	180 - 0	0.0819	0.5771					-0.0819	-0.5771
37	180 - 0	0.0327	0.2328					-0.0327	-0.2328
25	180 - 0	0.1496	1.0605					-0.1496	-1.0605
24	180 - 0	0.0680	0.4820					-0.0680	-0.4820
11	180 - 0	0.1522	1.0817					-0.1522	-1.0817
12	180 - 0	0.0423	0.3016					-0.0423	-0.3016
13	180 - 0	0.0726	0.5169					-0.0726	-0.5169
14	180 - 0	0.1350	0.9579					-0.1350	-0.9579
15	180 - 0	0.1354	0.9601					-0.1354	-0.9601
16	180 - 0	0.0606	0.4294					-0.0606	-0.4294
17	180 - 0	0.0056	0.0390					0.0056	0.0390
18	180 - 0	0.1614	1.1381					-0.1614	-1.1381
19	180 - 0	0.1618	1.1390					-0.1618	-1.1390
21	180 - 0	0.0429	0.3034					-0.0429	-0.3034
22	180 - 0	0.0388	0.2763					-0.0388	-0.2763
23	180 - 0	0.0892	0.6340					-0.0892	-0.6340

DELTA CPU TIME = 0:00:01.62

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						0.1504	0.2966
161						0.1644	0.3243
162						0.1530	0.3017
163						0.1529	0.3016
165						0.1661	0.3276
36						0.1401	0.2764
35						0.1400	0.2760
34						0.1397	0.2755
39						3.0014	5.9199
33						0.1395	0.2751
32						0.1394	0.2750
38						0.1408	0.2777
31						0.1395	0.2751
29						0.1406	0.2774
166						3.7414	7.3795
28						0.1413	0.2786
27						0.1412	0.2785
26						0.1419	0.2799
37						0.1404	0.2769
25						0.1411	0.2782
24						0.1410	0.2782
11						0.1407	0.2775
12						0.1403	0.2767
13						0.1405	0.2771
14						0.1409	0.2779
15						0.1410	0.2782
16						0.1412	0.2784
17						0.1426	0.2813
18						0.1418	0.2797
19						0.1420	0.2802
21						0.1415	0.2791
22						0.1404	0.2769
23						0.1406	0.2774

DELTA CPU TIME = 0:00:00.26

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						0.1877	0.3703
161						0.2053	0.4049
162						0.1909	0.3766
163						0.1909	0.3765
165						0.2075	0.4092

DELTA CPU TIME = 0:00:00.16

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE
36	0.2798	3.8902
35	0.0690	3.8902
34	0.6295	3.8902
39	0.0063	3.8902
33	0.5479	3.8902
32	0.2562	3.8902
38	0.3587	3.8902
31	0.0001	3.8902
29	1.8535	3.8902
166	0.0005	3.8902
28	0.4515	3.8902
27	0.0564	3.8902
26	0.3605	3.8902
37	0.0654	3.8902
25	1.1771	3.8902
24	0.2554	3.8902
11	1.2238	3.8902
12	0.1055	3.8902
13	0.2921	3.8902
14	0.9647	3.8902
15	0.9690	3.8902
16	0.2049	3.8902
17	0.0003	3.8902
18	1.3515	3.8902
19	1.3534	3.8902
21	0.1065	3.8902
22	0.0896	3.8902
23	0.4326	3.8902

DELTA CPU TIME = 0:00:02.22

10.0 SUMMARY REPORT

PROGRAM SUMMARY

49 POINTS INPUT FROM EPOCH 0

51 POINTS INPUT FROM EPOCH 0

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 0 POINT GROUPS INPUT

TOTAL ELAPSED TIME = 00:00:19.24

TOTAL CPU TIME = 0:00:09.02

PART II: VERTICAL ANALYSIS

APPENDIX IIIE:

EPOCHS 2 AND 3,
SEPTEMBER TO NOVEMBER 1986

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

LOCALIZATION AND ANALYSIS OF DEFORMATIONS

```
*******************************************
*                                         *
*                                         *
*           PROJECT INFORMATION           *
*                                         *
* THE BSC GROUP - PROJECT 1-1654.00       *
*                                         *
* BALL MOUNTAIN DAM MONITORING NETWORK    *
*                                         *
* HEIGHT DEFORMATION ANALYSIS             *
*                                         *
*                                         *
*******************************************
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*******************************************
*                                         *
*    DATE: 14-JAN-1987   TIME: 11:45:06   *
*                                         *
*******************************************
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*******************************************
*                                         *
* NETWORK: 1165400Z   EPOCHS    2 AND    3 *
*                                         *
*******************************************
```

1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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	--------->	NO
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

11
12
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14
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39

3.0 EPOCH GLOBAL PARAMETER REPORT

	EPOCH: 2	EPOCH: 3	TOTAL
REDUNDANCY :	96.00	81.00	177.00
STD. DEV. UNIT WEIGHT :	0.9607478	1.0849882	1.0194843
WEIGHTED QUADRATIC RESIDUALS :	88.6114823	95.3531484	183.9646307
NUMBER OF RANK DEFECTS :	1	1	
	Z-TRANSLATION	Z-TRANSLATION	

3.1 INPUT COORDINATE REPORT

	EPOCH: 2			EPOCH: 3		
POINT NUMBER	X	Y	Z	X	Y	Z
161	9884.6181	9926.4512	1000.9756	9884.6165	9926.4538	1000.9760
162	10087.6908	9917.4356	1014.7739	10087.6923	9917.4407	1014.7738
163	10203.6898	10080.8577	925.0753	10203.6906	10080.8608	925.0741
164	10000.0376	10273.8144	1006.1912	10000.0376	10273.8214	1006.1901
165	9843.3643	10241.7547	1009.5787	9843.3615	10241.7614	1009.5797
37	10046.3973	10079.8532	965.3944	10046.3985	10079.8569	965.3973
36	10032.7422	10077.9120	973.9532	10032.7426	10077.9167	973.9545
35	10025.8935	10077.3735	977.7923	10025.8948	10077.3785	977.7935
39	10080.0085	10084.1965	946.9498	10080.0113	10084.2006	946.9522
34	10000.9407	10074.1712	992.1016	10000.9424	10074.1756	992.1034
33	9986.1726	10076.5801	1000.0985	9986.1746	10076.5864	1000.1003
32	9983.6871	10076.4487	1000.4774	9983.6881	10076.4549	1000.4805
38	10055.2812	10081.0789	960.6658	10055.2827	10081.0833	960.6688
31	9981.3291	10075.7328	1000.4721	9981.3276	10075.7375	1000.4755
29	10075.9162	10132.3641	946.7490	10075.9160	10132.3685	946.7550
28	10050.4782	10130.9430	960.6543	10050.4796	10130.9475	960.6558
166	10000.0376	9999.9562	1000.0000	10000.0376	9999.9562	1000.0000
27	10040.6825	10130.6526	965.8859	10040.6833	10130.6563	965.8881
26	10028.1527	10129.6742	974.0487	10028.1539	10129.6781	974.0532
25	10020.8892	10129.7589	978.2101	10020.8893	10129.7642	978.2128
24	9996.6705	10128.3926	991.8381	9996.6704	10128.3981	991.8396
23	9981.5820	10124.0350	1000.2414	9981.5825	10124.0405	1000.2441
22	9979.5686	10123.5342	1000.3994	9979.5674	10123.5400	1000.4024
11	9977.1179	10173.6816	1000.3700	9977.1172	10173.6877	1000.3732
12	9979.0457	10174.9294	1000.4120	9979.0451	10174.9374	1000.4154
13	9980.7108	10173.6666	1000.1974	9980.7103	10173.6725	1000.1998
14	9995.5498	10177.1489	992.6490	9995.5499	10177.1530	992.6503
15	10022.2479	10176.3930	977.7848	10022.2476	10176.3998	977.7869
16	10026.6264	10176.3901	975.2262	10026.6277	10176.3942	975.2279
17	10039.5986	10175.6126	966.9019	10039.6007	10175.6162	966.9041
18	10050.7138	10174.8519	960.4790	10050.7168	10174.8548	960.4814
19	10076.4320	10173.1754	946.8264	10076.4323	10173.1814	946.8291
21	9977.1002	10124.0840	1000.2725	9977.0994	10124.0894	1000.2752

DELTA CPU TIME = 0:00:01.09

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	0.0777	0.1405
162	0.0000	0.0000	0.0186	0.0172
163	0.0000	0.0000	-0.1196	0.6809
164	0.0000	0.0000	-0.1003	0.4989
165	0.0000	0.0000	0.1640	1.3005

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 177.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.42243

SUM OF OMEGA: 2.0605 BOUNDARY VALUE: 9.6897 TEST PASSES

MAX. SINGLE OMEGA: 1.3005 BOUNDARY VALUE: 3.8933 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

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
161	0 - 0	0.0625	0.3768					0.0625	0.3768
162	0 - 0	0.0057	0.0497					0.0057	0.0497
163	180 - 0	0.1016	0.8601					-0.1016	-0.8601
164	180 - 0	0.0852	0.7359					-0.0852	-0.7359
165	180 - 0	0.1185	1.0115					0.1185	1.0115
37	180 - 0	0.3087	3.0421					0.3087	3.0421
36	180 - 0	0.1553	1.5345					0.1553	1.5345
35	180 - 0	0.1407	1.3939					0.1407	1.3939
39	180 - 0	0.2684	0.0895					0.2684	0.0895
34	180 - 0	0.1999	1.9767					0.1999	1.9767
33	180 - 0	0.2048	2.0316					0.2048	2.0316
32	180 - 0	0.3372	3.3619					0.3372	3.3619
38	180 - 0	0.3199	0.0920					0.3199	0.0920
31	180 - 0	0.3540	3.5430					0.3540	3.5430
29	180 - 0	0.6223	5.1151					0.6223	5.1151
28	180 - 0	0.1765	1.7574					0.1765	1.7574
166	180 - 0	0.0222	0.2520					0.0222	0.2520
27	180 - 0	0.2450	1.9727					0.2450	1.9727
26	180 - 0	0.4747	4.6175					0.4747	4.6175
25	180 - 0	0.2910	2.8623					0.2910	2.8623
24	180 - 0	0.1725	1.3825					0.1725	1.3825
23	180 - 0	0.2998	2.9502					0.2998	2.9502
22	180 - 0	0.3267	3.2277					0.3267	3.2277
11	180 - 0	0.3413	3.4106					0.3413	3.4106
12	180 - 0	0.3651	3.6062					0.3651	3.6062
13	180 - 0	0.2601	2.5549					0.2601	2.5549
14	180 - 0	0.1578	1.5551					0.1578	1.5551
15	180 - 0	0.2252	2.1630					0.2252	2.1630
16	180 - 0	0.1987	1.9484					0.1987	1.9484
17	180 - 0	0.2343	2.2104					0.2343	2.2104
18	180 - 0	0.2700	2.6433					0.2700	2.6433
19	180 - 0	0.2931	2.8853					0.2931	2.8853
21	180 - 0	0.2925	2.9149					0.2925	2.9149

DELTA CPU TIME = 0:00:01.66

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						0.1659	0.3274
162						0.1151	0.2272
163						0.1182	0.2331
164						0.1157	0.2283
165						0.1172	0.2313
37						0.1015	0.2003
36						0.1012	0.1997
35						0.1009	0.1991
39						3.0003	5.9199
34						0.1011	0.1995
33						0.1008	0.1989
32						0.1003	0.1979
38						3.4788	6.8641
31						0.0999	0.1972
29						0.1217	0.2400
28						0.1004	0.1982
166						0.0881	0.1738
27						0.1242	0.2451
26						0.1028	0.2028
25						0.1017	0.2006
24						0.1248	0.2462
23						0.1016	0.2005
22						0.1012	0.1997
11						0.1001	0.1974
12						0.1012	0.1998
13						0.1018	0.2009
14						0.1015	0.2003
15						0.1041	0.2055
16						0.1020	0.2013
17						0.1060	0.2091
18						0.1021	0.2015
19						0.1016	0.2004
21						0.1003	0.1980

DELTA CPU TIME = 0:00:00.26

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						0.2074	0.4092
162						0.1414	0.2790
163						0.1450	0.2860
164						0.1420	0.2802
165						0.1438	0.2837

DELTA CPU TIME = 0:00:00.16

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
37	10.2569	3.8933	***
36	2.7444	3.8933	
35	2.2886	3.8933	
39	0.0078	3.8933	
34	4.4538	3.8933	***
33	4.6969	3.8933	***
32	12.4823	3.8933	***
38	0.0050	3.8933	
31	13.8264	3.8933	***
29	29.1063	3.8933	***
28	3.5569	3.8933	
166	0.0481	3.8933	
27	3.8458	3.8933	
26	23.1770	3.8933	***
25	9.1063	3.8933	***
24	1.7368	3.8933	
23	9.6592	3.8933	***
22	11.5161	3.8933	***
11	12.8481	3.8933	***
12	14.2924	3.8933	***
13	7.2946	3.8933	***
14	2.8101	3.8933	
15	5.2786	3.8933	***
16	4.3235	3.8933	***
17	5.4858	3.8933	***
18	7.7966	3.8933	***
19	9.2498	3.8933	***
21	9.4559	3.8933	***

DELTA CPU TIME = 0:00:02.22

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: 177.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89328
MAXIMUM OMEGA: 15.3335 MAX. CHANGE OMEGA: 15.3335 BOUNDARY VALUE: 3.8933

SIGNIFICANT Z-TRANSLATION OF 0.433013 cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	0.433013 cm	YES

DELTA CPU TIME = 0:00:03.15

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	0.0917	0.9166					-0.0917	-0.9166
12	180 - 0	0.0679	0.6707					-0.0679	-0.6707
13	180 - 0	0.1729	1.6978					-0.1729	-1.6978
14	180 - 0	0.2752	2.7114					-0.2752	-2.7114
15	180 - 0	0.2078	1.9955					-0.2078	-1.9955
16	180 - 0	0.2343	2.2968					-0.2343	-2.2968
17	180 - 0	0.1988	1.8755					-0.1988	-1.8755
18	180 - 0	0.1630	1.5960					-0.1630	-1.5960
19	180 - 0	0.1399	1.3778					-0.1399	-1.3778
21	180 - 0	0.1405	1.4006					-0.1405	-1.4006
22	180 - 0	0.1063	1.0500					-0.1063	-1.0500
23	180 - 0	0.1333	1.3116					-0.1333	-1.3116
24	180 - 0	0.2605	2.0878					-0.2605	-2.0878
25	180 - 0	0.1421	1.3975					-0.1421	-1.3975
26	180 - 0	0.0417	0.4052					0.0417	0.4052
27	180 - 0	0.1880	1.5133					-0.1880	-1.5133
28	180 - 0	0.2565	2.5533					-0.2565	-2.5533
29	180 - 0	0.1893	1.5557					0.1893	1.5557
31	180 - 0	0.0790	0.7904					-0.0790	-0.7904
32	180 - 0	0.0958	0.9554					-0.0958	-0.9554
33	180 - 0	0.2283	2.2649					-0.2283	-2.2649
34	180 - 0	0.2331	2.3058					-0.2331	-2.3058
35	180 - 0	0.2924	2.8971					-0.2924	-2.8971
36	180 - 0	0.2777	2.7447					-0.2777	-2.7447
37	180 - 0	0.1243	1.2244					-0.1243	-1.2244
38	180 - 0	0.1131	0.0325					-0.1131	-0.0325
39	180 - 0	0.1646	0.0549					-0.1646	-0.0549

DELTA CPU TIME = 0:00:01.07

10.0 SUMMARY REPORT

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

51 POINTS INPUT FROM EPOCH 0

51 POINTS INPUT FROM EPOCH 0

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 = 00:00:26.54

TOTAL CPU TIME = 0:00:12.19

PART II: VERTICAL ANALYSIS

APPENDIX IIIF:

EPOCHS 1 AND 3,
JULY TO NOVEMBER 1986

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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: 14-JAN-1987   TIME: 11:34:14   *
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*                                         *
* NETWORK: 1165400Z   EPOCHS    1 AND    3 *
*                                         *
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1.0 OPTIONS REPORT

OPTIONS IN EFFECT

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

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	--------->	NO
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
164	*** NO EXCLUDED POINTS DEFINED ***
161	
162	
163	
165	

2.1 POINT GROUP INPUT REPORT

GROUP # 1 BLOCK ONE

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11:34:17
OPTION: ZFA1:[207,101]1

EPOCH: 3

NK DEFECTS :	1	81.00	TOTAL
	Z-TRANSLATION	1.0849882	177.00
		95.3531484	1.0853877
		1	208.5177455
		Z-TRANSLATION	

HLS : 1.0857246
113.1645970

3.1 INPUT COORDINATE REPORT

	EPOCH: 1			EPOCH: 3		
POINT NUMBER	X	Y	Z	X	Y	Z
164	10000.0377	10273.8091	1006.1912	10000.0376	10273.8214	1006.1901
161	9884.6202	9926.4518	1000.9763	9884.6165	9926.4538	1000.9760
162	10087.6880	9917.4346	1014.7728	10087.6923	9917.4407	1014.7738
163	10203.6869	10080.8551	925.0730	10203.6906	10080.8608	925.0741
165	9843.3682	10241.7497	1009.5775	9843.3615	10241.7614	1009.5797
36	10032.7422	10077.9094	973.9531	10032.7426	10077.9167	973.9545
35	10025.8939	10077.3707	977.7919	10025.8948	10077.3785	977.7935
34	10000.9422	10074.1680	992.1019	10000.9424	10074.1756	992.1034
39	10080.0094	10084.1935	946.9513	10080.0113	10084.2006	946.9522
33	9986.1737	10076.5779	1000.0987	9986.1746	10076.5864	1000.1003
32	9983.6879	10076.4455	1000.4773	9983.6881	10076.4549	1000.4805
38	10055.2805	10081.0761	960.6659	10055.2827	10081.0833	960.6688
31	9981.3281	10075.7317	1000.4713	9981.3276	10075.7375	1000.4755
29	10075.9146	10132.3600	946.7501	10075.9160	10132.3685	946.7550
166	10000.0377	9999.9561	1000.0000	10000.0376	9999.9562	1000.0000
28	10050.4780	10130.9387	960.6544	10050.4796	10130.9475	960.6558
27	10040.6822	10130.6486	965.8854	10040.6833	10130.6563	965.8881
26	10028.1531	10129.6703	974.0488	10028.1539	10129.6781	974.0532
37	10046.3977	10079.8491	965.3939	10046.3985	10079.8569	965.3973
25	10020.8889	10129.7551	978.2108	10020.8893	10129.7642	978.2128
24	9996.6703	10128.3890	991.8380	9996.6704	10128.3981	991.8396
11	9977.1192	10173.6777	1000.3707	9977.1172	10173.6877	1000.3732
12	9979.0467	10174.9262	1000.4116	9979.0451	10174.9374	1000.4154
13	9980.7113	10173.6617	1000.1974	9980.7103	10173.6725	1000.1998
14	9995.5502	10177.1434	992.6496	9995.5499	10177.1530	992.6503
15	10022.2472	10176.3899	977.7854	10022.2476	10176.3998	977.7869
16	10026.6273	10176.3835	975.2260	10026.6277	10176.3942	975.2279
17	10039.5999	10175.6059	966.9011	10039.6007	10175.6162	966.9041
18	10050.7145	10174.8444	960.4798	10050.7168	10174.8548	960.4814
19	10076.4310	10173.1724	946.8272	10076.4323	10173.1814	946.8291
21	9977.1005	10124.0793	1000.2721	9977.0994	10124.0894	1000.2752
22	9979.5689	10123.5307	1000.3990	9979.5674	10123.5400	1000.4024
23	9981.5818	10124.0299	1000.2415	9981.5825	10124.0405	1000.2441

DELTA CPU TIME = 0:00:01.11

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	-0.2200	2.6121
161	0.0000	0.0000	-0.0980	0.2012
162	0.0000	0.0000	0.0553	0.1593
163	0.0000	0.0000	0.0735	0.2637
165	0.0000	0.0000	0.1971	1.4714

SUMMARY

REDUNDANCY FROM CONDITIONS: 4.0000 REDUNDANCY FROM ADJUSTMENTS: 177.0000

QUANTILE FROM F-DISTRIBUTION @ 95% : 2.42243

SUM OF OMEGA: 3.6417 BOUNDARY VALUE: 9.6897 TEST PASSES

MAX. SINGLE OMEGA: 2.6121 BOUNDARY VALUE: 3.8933 TEST PASSES

NO SIGNIFICANT MOVEMENT IN BASE POINTS

DELTA CPU TIME = 0:00:00.57

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	0.1630	1.4574					-0.1630	-1.4574
161	180 - 0	0.0922	0.5267					-0.0922	-0.5267
162	180 - 0	0.0385	0.3383					0.0385	0.3383
163	180 - 0	0.0547	0.4648					0.0547	0.4648
165	180 - 0	0.1620	1.2202					0.1620	1.2202
36	180 - 0	0.0844	0.7490					0.0844	0.7490
35	180 - 0	0.1071	0.9520					0.1071	0.9520
34	180 - 0	0.0924	0.8214					0.0924	0.8214
39	180 - 0	0.0338	0.2636					0.0338	0.2636
33	180 - 0	0.1049	0.9340					0.1049	0.9340
32	180 - 0	0.2699	2.4098					0.2699	2.4098
38	180 - 0	0.2390	0.0687					0.2390	0.0687
31	180 - 0	0.3559	3.1898					0.3559	3.1898
29	180 - 0	0.4343	3.2750					0.4343	3.2750
166	180 - 0	0.0559	0.0150					-0.0559	-0.0150
28	180 - 0	0.0850	0.7547					0.0850	0.7547
27	180 - 0	0.2147	1.6004					0.2147	1.6004
26	180 - 0	0.3928	3.4576					0.3928	3.4576
37	180 - 0	0.2761	2.4393					0.2761	2.4393
25	180 - 0	0.1413	1.2446					0.1413	1.2446
24	180 - 0	0.1045	0.7763					0.1045	0.7763
11	180 - 0	0.1891	1.6821					0.1891	1.6821
12	180 - 0	0.3228	2.8530					0.3228	2.8530
13	180 - 0	0.1875	1.6555					0.1875	1.6555
14	180 - 0	0.0229	0.2019					0.0229	0.2019
15	180 - 0	0.0898	0.7758					0.0898	0.7758
16	180 - 0	0.1381	1.2137					0.1381	1.2137
17	180 - 0	0.2398	2.0679					0.2398	2.0679
18	180 - 0	0.1086	0.9548					0.1086	0.9548
19	180 - 0	0.1313	1.1574					0.1313	1.1574
21	180 - 0	0.2495	2.1994					0.2495	2.1994
22	180 - 0	0.2879	2.5443					0.2879	2.5443
23	180 - 0	0.2106	1.8635					0.2106	1.8635

DELTA CPU TIME = 0:00:01.64

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						0.1119	0.2207
161						0.1751	0.3455
162						0.1139	0.2247
163						0.1177	0.2323
165						0.1328	0.2620
36						0.1128	0.2225
35						0.1125	0.2221
34						0.1125	0.2220
39						0.1283	0.2532
33						0.1123	0.2216
32						0.1120	0.2210
38						3.4791	6.8648
31						0.1116	0.2202
29						0.1326	0.2617
166						3.7417	7.3828
28						0.1126	0.2221
27						0.1342	0.2648
26						0.1136	0.2241
37						0.1132	0.2233
25						0.1136	0.2241
24						0.1347	0.2657
11						0.1124	0.2218
12						0.1131	0.2233
13						0.1133	0.2235
14						0.1133	0.2235
15						0.1158	0.2284
16						0.1138	0.2246
17						0.1160	0.2288
18						0.1138	0.2245
19						0.1134	0.2238
21						0.1135	0.2239
22						0.1132	0.2233
23						0.1130	0.2230

DELTA CPU TIME = 0:00:00.27

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						0.1361	0.2685
161						0.2185	0.4312
162						0.1387	0.2736
163						0.1432	0.2825
165						0.1625	0.3207

DELTA CPU TIME = 0:00:00.17

8.0 SIGNIFICANCE OF NON-BASE POINTS REPORT

POINT	OMEGA VALUE	BOUNDARY VALUE	
36	0.6237	3.8933	
35	0.9984	3.8933	
34	0.7479	3.8933	
39	0.1447	3.8933	
33	0.9628	3.8933	
32	6.2688	3.8933	***
38	0.0049	3.8933	
31	10.9545	3.8933	***
29	14.7578	3.8933	***
166	0.0001	3.8933	
28	0.6384	3.8933	
27	4.1719	3.8933	***
26	12.8256	3.8933	***
37	6.4122	3.8933	***
25	1.6913	3.8933	
24	1.3459	3.8933	
11	3.0862	3.8933	
12	8.7454	3.8933	***
13	2.9684	3.8933	
14	0.0507	3.8933	
15	0.6666	3.8933	
16	1.6071	3.8933	
17	4.6076	3.8933	***
18	1.0147	3.8933	
19	1.4767	3.8933	
21	5.2377	3.8933	***
22	6.9708	3.8933	***
23	3.7588	3.8933	

DELTA CPU TIME = 0:00:02.29

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: 177.0000
QUANTILE FROM F-DISTRIBUTION @ 95% : 3.89328
MAXIMUM OMEGA: 8.0217 MAX. CHANGE OMEGA: 8.0217 BOUNDARY VALUE: 3.8933

SIGNIFICANT Z-TRANSLATION OF 0.346224 cm

NO SIGNIFICANT GROUP PARAMETERS FROM THIS STEP OF LOCALIZATION

GROUP 1 SUMMARY

PARAMETER	VALUE	SIGNIFICANT
Z-TRANSLATION	0.346224 cm	YES

DELTA CPU TIME = 0:00:03.09

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	0.1571	1.3980					-0.1571	-1.3980
12	180 - 0	0.0234	0.2070					-0.0234	-0.2070
13	180 - 0	0.1587	1.4010					-0.1587	-1.4010
14	180 - 0	0.3233	2.8541					-0.3233	-2.8541
15	180 - 0	0.2564	2.2146					-0.2564	-2.2146
16	180 - 0	0.2081	1.8286					-0.2081	-1.8286
17	180 - 0	0.1064	0.9175					-0.1064	-0.9175
18	180 - 0	0.2376	2.0885					-0.2376	-2.0885
19	180 - 0	0.2149	1.8949					-0.2149	-1.8949
21	180 - 0	0.0967	0.8522					-0.0967	-0.8522
22	180 - 0	0.0583	0.5151					-0.0583	-0.5151
23	180 - 0	0.1356	1.2001					-0.1356	-1.2001
24	180 - 0	0.2417	1.7950					-0.2417	-1.7950
25	180 - 0	0.2049	1.8040					-0.2049	-1.8040
26	180 - 0	0.0465	0.4097					0.0465	0.4097
27	180 - 0	0.1315	0.9799					-0.1315	-0.9799
28	180 - 0	0.2613	2.3210					-0.2613	-2.3210
29	180 - 0	0.0881	0.6643					0.0881	0.6643
31	180 - 0	0.0097	0.0869					0.0097	0.0869
32	180 - 0	0.0763	0.6813					-0.0763	-0.6813
33	180 - 0	0.2413	2.1492					-0.2413	-2.1492
34	180 - 0	0.2538	2.2558					-0.2538	-2.2558
35	180 - 0	0.2391	2.1244					-0.2391	-2.1244
36	180 - 0	0.2618	2.3217					-0.2618	-2.3217
37	180 - 0	0.0702	0.6199					-0.0702	-0.6199
38	180 - 0	0.1073	0.0308					-0.1073	-0.0308
39	180 - 0	0.3124	2.4344					-0.3124	-2.4344

DELTA CPU TIME = 0:00:01.15

10.0 SUMMARY REPORT

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

49 POINTS INPUT FROM EPOCH 0

51 POINTS INPUT FROM EPOCH 0

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 = 00:00:24.26

TOTAL CPU TIME = 0:00:12.25