

METHODOLOGY:

Data was input as presented in Sperry-Sun reports for the Gyroscopic and Single-shot surveys. Entry of Total Depth down the hole, Direction and Angle was entered for all four holes and the two methods. As the data for the two different surveys were measured at different depths down the hole, and the regression program requires both sets of data to have measurements at the same points (i.e. drillhole depth), the data were standardized by correcting to true depth and x,y displacements using program DDHCOR. This program also generates data at 20 meter intervals down the hole (Type "X" data). Only this generated data was used as input to the regression program.

Least-squares estimation of the gyroscopic data using the information available from the Single-shot runs was done using SPSS (Statistical Program for the Social Sciences) as supported at Computer Sciences Canada. All single shot data were presented for evaluation with each equation, allowing the statistical selection process complete latitude to develop the best predictive equations.

The Regression program of SPSS was used, utilizing step-wise regression until the best fit between the two data sets was reached. Least-squares estimation minimizes the square of the residuals (i.e. the differences between predicted and actual values). The X, Y (North and East), and Z (true depth) as well as Zenith Angle and Azimuth were regressed separately. As the X, Y, and Z equations more than met threshold F-Ratio levels, selection of the best equation was based on minimizing the standard error of estimate. This is a measure of average error in predicting the true value from the regression equation.

All data were initially used, but inspection of the residuals for hole two in both X and Y showed a strong deviation from the patterns of the other three holes due to a dog-leg which occurs toward the bottom half of that hole which was measured by the Gyro survey, but missed by the Single-shot. For this reason, hole 2 was removed and the equations re-run with a heartening decrease in the standard

errors of both X and Y. The X values decreased from 3.01 to 1.38; the Y values from 1.93 to .86. These represent the average error of prediction in meters for the holes involved. Obviously, where the survey technique used misses a significant dog-leg, no equation can be built which will re-locate it.

The derived equations for X, Y and Z are as follows:

	Standard error
$Gx' = -1.06679 + 1.12739 * Sx - .02739 * Sy$	1.37665
$Gy' = -1.56652 + .98529 * Sy + .20607 * Sx$	0.85500
$Gz' = 0.12684 + .99875 * Sz - .01674 * Sy$	0.09668

In general, the single-shot surveys are good predictors of the gyroscopic data in X, Y and Z; adequate for Zenith Angle and very poor for Azimuth (see note below). By eliminating points where the Azimuth had not stabilized into a particular quadrant (where Zenith Angle was less than 20° from the vertical), we made marginal improvements in the estimation of one Azimuth from the other, but still not to a satisfactory degree, hence it was dropped from further consideration.

It must be noted, also that all four holes have a north-west tendency and these equations are not likely to hold for holes which trend into another quadrant.

Special problems were encountered when working with the Azimuths as the relationship between the azimuths of the two surveys is non-linear. In fact, as there is a consistent sinusoidal pattern to the residuals, one is led to consider whether the azimuths of the two surveys, taken together may not more fully describe the corkscrewing of the drillhole.

Tables 1 and 2 show the reduction in displacement errors as a result of application of the equations.

The first item of each pair for any one hole is the actual difference between the variable as measured by the Gyro survey and by the Single-shot survey. The second item of the pair represents the difference between the Gyro survey and the predicted value for that variable as determined by the equations on Page 2.

The Percent Reduction in error was calculated as
$$100 \times (1.0 - D@E2/D@)$$
(where @ is the variable in question)
hence, an error reduction of 63.3% indicates residual error is 36.7% of what it was originally.

It is of particular interest to note that Hole 2, which was dropped when developing the equations, shows an improvement in the X and Y directions of 43% and 60% respectively. Although these are smaller than for the other holes, this is the hole with a definite dog-leg which was missed by the Single-shot survey. The error in the true-depth direction is somewhat higher for the estimate than for the actual data, but this hole exhibits the smallest actual deviation in depth of the four so that change of .058 meters should be within the tolerances needed.

Tables 3 through 7 give other parameters for the two sets of residuals in case of further interest. Each hole is tabulated separately and an overall summary forms Table 7.

The Appendix contains the actual runs used to develop the equations listed on Page 2.

C. Sylvia Willie
R. Willie & Associates Ltd.
Vancouver, Canada

TABLE 1: Placement Error Reductions

	Range *	Minimum	Maximum
<u>HOLE 78X01</u>			
DZ = Gz - Sz	1.000	-.300	.700
DZE2 = Gz - Gz'	.367	-.216	.152
% reduction	63.3%		
DX = Gx - Sx	16.900	-16.900	0.000
DXE2 = Gx - Gx'	4.296	-3.232	1.064
% reduction	74.6%		
DY = Gy - Sy	20.000	-19.800	.200
DYE2 = Gy - Gy'	2.712	-.989	1.722
% reduction	86.4%		
<u>HOLE 78X02</u>			
DZ	.700	-.100	.600
DZE2	.758	-.723	.035
% reduction	-8.3%		
DX	29.600	-29.700	-.100
DXE2	16.927	-15.955	.972
% reduction	42.8%		
DY	28.400	-28.700	-.300
DYE2	11.256	-9.987	1.269
% reduction	60.4%		
<u>HOLE 78X03</u>			
DZ	1.500	0.000	1.500
DZE2	.383	-.108	.275
% reduction	74.5%		
DX	17.500	-17.500	0.000
DXE2	2.622	-.094	2.528
% reduction	85.0%		
DY	25.400	-25.600	-.200
DYE2	2.503	-.827	1.676
% reduction	90.1%		
<u>HOLE 78X04</u>			
DZ	1.000	0.000	1.000
DZE2	.352	-.239	.113
% reduction	64.8%		
DX	13.700	-13.700	0.000
DXE2	5.391	-4.318	1.072
% reduction	60.6%		
DY	13.000	-13.100	-.100
DYE2	2.980	-1.515	1.469
% reduction	77.1%		

* all entries in meters of displacement

TABLE 2: Placement Error Reductions
ALL HOLES

<u>ALL HOLES</u>	Range *	Minimum	Maximum
DZ	1.800	-.300	1.500
DZE2	.998	-.723	.275
% reduction	44.6%		
DX	29.700	-29.700	0.000
DXE2	18.483	-15.955	2.528
% reduction	37.8%		
DY	28.900	-28.700	.200
DYE2	11.709	- 9.987	1.722
% reduction	59.5%		

* all entries (except percentages) are in meters of displacement

DATA TRANSFORMATION DONE UP TO THIS POINT..

NO OF TRANSFORMATIONS	0
NO OF RECODE VALUES	0
NO OF ARITHM. OR LOG. OPERATIONS	0
THE AMOUNT OF TRANSPACE REQUIRED IS	0 BYTES

REGRESSION	VARIABLES=GZ TO GZA, SD, SZ TO SAZ/ REGRESSION= GX WITH SX,SY(1) RESID=0/ 4,5
STATISTICS	

***** REGRESSION PROBLEM REQUIRES 1680 BYTES WORKSPACE, NOT INCLUDING RESIDUALS *****

FORHALNER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1

DEPENDENT VARIABLE... GX GYRO NORTHDISTANCE - METERS

VARIABLE(S) ENTERED ON STEP NUMBER 1.. SX SINGLE SHOT NORTHDISTANCE - METERS

MULTIPLE R	.99892	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.99783	REGRESSION	1.	110362.70401	110362.70401	52516.09016
ADJUSTED R SQUARE	.99783	RESIDUAL	114.	239.57131	2.10150	
STANDARD ERROR	1.44966					

----- VARIABLES IN THE EQUATION -----

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL TOLERANCE	F
SX	1.16520	.99892	.00508	52516.090	SY	-.03578	-.32573	13.412
(CONSTANT)	-1.09497							

VARIABLE(S) ENTERED ON STEP NUMBER 2.. SY SINGLE SHOT EAST DISTANCE - METERS

MULTIPLE R	.99903	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.99806	REGRESSION	2.	110388.12258	55194.06129	29123.74098
ADJUSTED R SQUARE	.99805	RESIDUAL	113.	214.15274	1.89516	
STANDARD ERROR	1.37665					

----- VARIABLES IN THE EQUATION -----

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL TOLERANCE	F
SX	1.12739	.96650	.01140	9784.474				
SY	-.02739	-.03578	.00748	13.412				
(CONSTANT)	-1.06679							

MAXIMUM STEP REACHED

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)

SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1
 DEPENDENT VARIABLE.. GX GYRO NORTHDISTANCE - METERS

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
SX	SINGLE SHOT NORTHDISTANCE - METERS	.99892	.99783	.99783	.99892	1.12739	.96650
SY	SINGLE SHOT EAST DISTANCE - METERS	.99903	.99806	.00023	-.91127	-.02739	-.03578
(CONSTANT)						-1.06679	

FORMALINE - MOORE BUSINESS FORMS - 7

***** REGRESSION PROBLEM REQUIRES 1680 BYTES WORKSPACE INCLUDING RESIDUALS *****

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION *****

DEPENDENT VARIABLE: GX FROM VARIABLE LIST 1
 REGRESSION LIST 1

SEQNUM	OBSERVED GX	PREDICTED GX	RESIDUAL	PLOT OF STANDARDIZED RESIDUAL				
				-2.0	-1.0	0.0	1.0	2.0
1	0.	-1.064052	1.064052			*		
2	0.	-.8358347	.8358343			*		
3	.1000000	-.3821389	.4821387			*		
4	.2000000	-.3022562E-01	.2302256			*		
5	.1000000	.9620904E-01	.3790731E-02			*		
6	-.2000000	-.2834480E-02	-.1971659			*		
7	-.7000000	-.4346166	-.2653835			*		
8	-1.500000	-1.086399	-.4136012			*		
9	-2.600000	-2.081877	-.5181233			*		
10	-3.800000	-3.311051	-.4889497			*		
11	-5.000000	-4.435703	-.5642977			*		
12	-6.400000	-5.673094	-.7269067			*		
13	-8.000000	-7.028702	-.9712982			*		
14	-9.800000	-8.733484	-1.066516			*		
15	-11.90000	-10.78470	-1.115299			*		
16	-14.60000	-13.18783	-1.412168			*		
17	-17.60000	-16.28109	-1.318908			*		
18	-20.90000	-19.83627	-1.063734			*		
19	-24.40000	-23.40787	-.9921255			*		
20	-28.20000	-27.10318	-1.096821			*		
21	-32.00000	-30.91670	-1.083300			*		
22	-36.10000	-34.84844	-1.251560			*		
23	-40.40000	-39.12661	-1.273386			*		
24	-44.80000	-43.41027	-1.389734			*		
25	-49.30000	-47.47392	-1.826082			*I		
26	-53.70000	-51.87853	-1.821473			*I		
27	-57.80000	-56.28587	-1.514125			*		
28	-61.40000	-60.24501	-1.154994			*		
29	-64.40000	-63.63496	-.7650379			*		
30	-66.90000	-66.57122	-.3287767			*		
31	-69.10000	-69.38653	.2865282			*		
32	-71.20000	-71.86361	.6636150			*		
33	-73.30000	-73.90344	.6034425			*		
34	-75.30000	-75.94601	.6460075			*		
35	-77.20000	-77.65309	.4530951			*		
36	-79.20000	-78.91744	-.2825563			*		
37	-81.20000	-80.17357	-1.026425			*		
38	-83.40000	-81.53423	-1.865773			*I		
39	-86.20000	-83.68953	-2.510468			*I		
40	-90.30000	-87.09318	-3.206814			*I		
41	-94.40000	-91.16779	-3.232206			*I		

FORMALINE - MOORE BUSINESS FORMS - 7

42

0.

-1.075008

1.075008

*

43	-.1000000	-1.094182	.9941823	*
44	-.4000000	-1.242531	.8425303	*
45	-1.0000000	-1.509096	.5090958	*
46	-2.0000000	-2.122096	.1220960	*
47	-3.2000000	-3.197010	-.2990679E-02	*
48	-4.6000000	-4.505618	-.9438171E-01	*
49	-6.2000000	-6.157923	-.4207715E-01	*
50	-8.1000000	-8.151184	.5118398E-01	*
51	-10.4000000	-10.59814	.1981406	*
52	-12.8000000	-13.16058	.3605754	*
53	-15.4000000	-15.84123	.4412278	*
54	-18.1000000	-18.51914	.4191410	*
55	-20.8000000	-21.31527	.5152714	*
56	-23.5000000	-23.99866	.4986630	*
57	-26.2000000	-26.79205	.5920544	*
58	-28.8000000	-29.58271	.7827067	*
59	-31.4000000	-32.48062	1.080620	*
60	-33.9000000	-35.38127	1.481272	*
61	-36.6000000	-38.17466	1.574663	I*
62	-39.2000000	-40.96532	1.765316	I*
63	-41.7000000	-43.64323	1.943229	I*
64	-44.1000000	-46.20566	2.105664	I*
65	-46.7000000	-48.88358	2.183577	I*
66	-49.3000000	-51.55875	2.258751	I*
67	-51.8000000	-54.01392	2.213925	I*
68	-54.0000000	-56.37553	2.375534	I*
69	-56.0000000	-58.52810	2.528100	I*
70	-58.3000000	-60.57067	2.270666	I*
71	-61.2000000	-63.17693	1.976927	I*
72	-64.5000000	-66.24510	1.745101	I*
73	-68.3000000	-69.65971	1.359711	*
74	-72.4000000	-73.97075	1.570754	I*
75	-76.7000000	-78.28454	1.584537	I*
76	-81.2000000	-82.71106	1.511059	*
77	-86.0000000	-87.36306	1.363059	*
78	-91.0000000	-92.11958	1.119580	*
79	-96.2000000	-97.09884	.8988413	*
80	-101.7000000	-102.5236	.8235801	*
81	-107.6000000	-108.2783	.6783194	*
82	-113.7000000	-114.1376	.4375800	*
83	-119.9000000	-120.4314	.5313623	*
84	0.	-1.072269	1.072269	*
85	-.1000000	-.9787041	.8787040	*
86	-.7000000	-1.344313	.6443128	*
87	-1.9000000	-2.389096	.4890955	*
88	-3.2000000	-3.541139	.3411389	*
89	-4.5000000	-4.684965	.1849649	*
90	-5.8000000	-6.059748	.2597474	*
91	-7.3000000	-7.558226	.2582257	*
92	-8.9000000	-9.177660	.2776605	*
93	-10.6000000	-10.91531	.3153127	*
94	-12.4000000	-12.88118	.4811821	*

95	-14.30000	-14.96801	.6680084	*
96	-16.20000	-16.72483	.5248347	*
97	-18.00000	-18.48988	.4898782	*
98	-19.80000	-20.14218	.3421827	*
99	-21.50000	-21.79997	.2999656	*
100	-22.80000	-23.24049	.4404879	*
101	-24.00000	-24.46649	.4664883	*
102	-25.20000	-25.36523	.1652280	*
103	-26.50000	-26.60492	.1049241	*
104	-27.60000	-27.72640	.1264031	*
105	-28.70000	-28.74062	.4062116E-01	*
106	-30.00000	-29.88127	-.1187260	*
107	-31.70000	-31.04658	-.6534208	*
108	-33.90000	-32.78106	-1.118941	*
109	-36.40000	-34.85923	-1.540767	*
110	-39.20000	-37.16015	-2.039853	*I
111	-42.10000	-39.67558	-2.424418	*I
112	-44.50000	-42.07828	-2.421722	*I
113	-46.50000	-43.92550	-2.574504	*I
114	-48.50000	-45.43450	-3.065503	*I
115	-51.50000	-47.73541	-3.764589	*I
116	-55.60000	-51.28193	-4.318067	*I

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
SUBFILE H78X01 H78X03 H78X04

..... MULTIPLE REGRESSION *****

DURBIN-WATSON TEST OF RESIDUAL DIFFERENCES COMPARED BY CASE ORDER (SEQNUM).

VARIABLE LIST 1, REGRESSION LIST 1. DURBIN-WATSON TEST .12889

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1

DEPENDENT VARIABLE.. GY GYRO EAST DISTANCE - METERS

VARIABLE(S) ENTERED ON STEP NUMBER 1.. SY SINGLE SHOT EAST DISTANCE - METERS

MULTIPLE R	.99751	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.99503	REGRESSION	1.	140514.70751	140514.70751	22813.48789
ADJUSTED R SQUARE	.99503	RESIDUAL	114.	702.15816	6.15928	
STANDARD ERROR	2.48179					

----- VARIABLES IN THE EQUATION -----

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SY	.86279	.99751	.00571	22813.488	SD	-.14250	-.88123	.19014	392.736
(CONSTANT)	-2.54619				SZ	-.13976	-.87684	.19571	375.861
					SX	.15635	.93934	.17948	847.515

VARIABLE(S) ENTERED ON STEP NUMBER 2.. SX SINGLE SHOT NORTHDISTANCE - METERS

MULTIPLE R	.99971	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.99942	REGRESSION	2.	141134.26008	70567.13004	96532.03161
ADJUSTED R SQUARE	.99941	RESIDUAL	113.	82.60559	.73102	
STANDARD ERROR	.85500					

----- VARIABLES IN THE EQUATION -----

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SY	.98529	1.13913	.00465	44990.197	SD	0.	1.00000	-4.88940	-93.993
SX	.20607	.15635	.00708	847.515	SZ	0.	1.00000	-4.86391	-93.936
(CONSTANT)	-1.56652								

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1
 DEPENDENT VARIABLE.. GY GYRO EAST DISTANCE - METERS

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
SY SINGLE SHOT EAST DISTANCE - METERS	.99751	.99503	.99503	.99751	.98529	1.13913
SX SINGLE SHOT NORTHDISTANCE - METERS	.99971	.99942	.00439	-.87551	.20607	.15635
(CONSTANT)					-1.56652	

FORMALINER - MOORE BUSINESS FORMS - 7

***** REGRESSION PROBLEM REQUIRES 1840 BYTES WORKSPACE INCLUDING RESIDUALS *****

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION *****

DEPENDENT VARIABLE: GY FROM VARIABLE LIST 1
 REGRESSION LIST 1

SEQNUM	OBSERVED	PREDICTED	RESIDUAL	PLOT OF STANDARDIZED RESIDUAL				
	GY	GY		-2.0	-1.0	0.0	1.0	2.0
1	0.	-1.665050	1.665050			*		
2	0.	-1.722364	1.722365			*		
3	-.3000000	-1.738464	1.438464			*		
4	-1.000000	-2.169288	1.169288			*		
5	-1.700000	-2.641326	.9413263			*		
6	-2.600000	-3.154579	.5545794			*		
7	-3.700000	-3.926713	.2267129			*		
8	-4.900000	-4.937119	.3711934E-01			*		
9	-5.800000	-5.812289	.1228961E-01			*		
10	-6.500000	-6.433087	-.6691286E-01			*		
11	-7.100000	-6.737690	-.3623101			*		
12	-7.700000	-7.062900	-.6371000			*		
13	-8.100000	-7.211659	-.8883408			*		
14	-8.000000	-7.028123	-.9718762			*		
15	-7.600000	-6.610823	-.9891769			*		
16	-6.700000	-5.762698	-.9373012			*		
17	-5.400000	-4.545573	-.8544271			*		
18	-3.800000	-3.016759	-.7832402			*		
19	-1.700000	-.8967717	-.8032282			*		
20	.8000000	1.596726	-.7967254			*		
21	3.500000	4.266674	-.7666735			*		
22	6.300000	7.113073	-.8130726			*		
23	9.400000	10.19324	-.7932369			*		
24	12.70000	13.47046	-.7704597			*		
25	16.10000	16.98596	-.8859554			*		
26	19.70000	20.53816	-.8381582			*		
27	23.60000	24.18889	-.5888900			*		
28	27.70000	28.02058	-.3205805			*		
29	31.70000	31.75825	-.5824963E-01			*		
30	35.50000	35.47982	.2018106E-01			*		
31	39.10000	38.92641	.1735918			*		
32	43.00000	42.43482	.5651805			*		
33	47.00000	46.51831	.4816941			*		
34	51.10000	50.70032	.3996788			*		
35	55.50000	55.04269	.4573124			*		
36	59.80000	59.76307	.3692837E-01			*		
37	63.80000	64.18787	-.3878687			*		
38	67.60000	68.29647	-.6964702			*		
39	71.50000	72.45788	-.9578782			*		
40	75.70000	76.68819	-.9881927			*		
41	79.80000	80.59780	-.7978053			*		

FORMALINER - MOORE BUSINESS FORMS - 7

42

.1000000

-1.270933

1.370934

*

43	.600000	-.5812293	1.181230	*
44	1.300000	.6790422	.6209580	*
45	2.400000	2.115765	.2842355	*
46	3.900000	3.786252	.1137477	*
47	5.800000	5.768427	.3157269E-01	*
48	7.900000	8.004975	-.1049750	*
49	10.10000	10.37676	-.2767590	*
50	12.60000	12.78525	-.1852500	*
51	15.20000	15.20984	-.9840498E-02	*
52	17.80000	17.71235	.8764703E-01	*
53	20.60000	20.39132	.2086835	*
54	23.60000	22.97175	.6282491	*
55	26.50000	25.72864	.7713640	*
56	29.20000	28.50613	.6938714	*
57	31.70000	31.16448	.5355155	*
58	34.10000	33.72431	.3756888	*
59	36.50000	36.06647	.4335275	*
60	38.90000	38.50716	.3928367	*
61	41.40000	41.16552	.2344804	*
62	44.00000	43.72535	.2746540	*
63	46.60000	46.30578	.2942196	*
64	49.10000	48.80829	.2917072	*
65	51.70000	51.38873	.3112729	*
66	54.50000	53.87063	.6293685	*
67	57.80000	56.59081	1.209189	*
68	61.30000	60.02130	1.278700	*
69	65.00000	64.08418	.9158213	*
70	69.00000	68.26619	.7338053	*
71	73.20000	72.34517	.8548269	*
72	77.80000	76.73584	1.064160	*
73	82.50000	81.36027	1.139730	*
74	87.10000	85.62279	1.477214	*
75	91.60000	89.98383	1.616171	*
76	96.00000	94.32426	1.675736	*
77	100.1000	98.62348	1.476515	*
78	103.9000	102.6065	1.293488	*
79	107.4000	106.4498	.9502058	*
80	110.6000	110.0136	.5864104	*
81	113.3000	113.2200	.8002564E-01	*
82	115.6000	116.1102	-.5101646	*
83	117.5000	118.3268	-.8267499	*
84	.1000000	-1.369463	1.469463	*
85	.5000000	-.6591511	1.159151	*
86	1.300000	.2643183	1.035682	*
87	1.900000	1.162673	.7373276	*
88	2.300000	1.843361	.4566388	*
89	2.600000	2.228463	.3715376	*
90	3.000000	2.769407	.2305927	*
91	3.700000	3.683862	.1613860E-01	*
92	4.800000	4.873296	-.7329559E-01	*
93	6.000000	6.239181	-.2391806	*
94	7.300000	7.662380	-.3623802	*

95	9.000000	9.360560	-.3605597	*
96	11.10000	11.41615	-.3161490	*
97	13.30000	13.76733	-.4673253	*
98	15.50000	16.13911	-.6391093	*
99	18.00000	18.70795	-.7079515	*
100	20.90000	21.61360	-.7135961	*
101	24.20000	24.95457	-.7545717	*
102	27.90000	28.75149	-.8514860	*
103	31.50000	32.58511	-1.085107	*
104	35.30000	36.24228	-.9422780	*
105	39.30000	40.11711	-.8171141	*
106	43.70000	44.46399	-.7639884	*
107	48.60000	49.69763	-1.097625	*
108	54.00000	55.02528	-1.025284	*
109	59.40000	60.48818	-1.088178	*
110	64.60000	65.81133	-1.211329	*
111	69.30000	70.69915	-1.399148	*
112	74.20000	75.60757	-1.407575	*
113	79.40000	80.91463	-1.514626	*
114	84.90000	86.28350	-1.383499	*
115	90.30000	91.60665	-1.306650	*
116	95.60000	96.90018	-1.300178	*

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
SUBFILE H78X01 H78X03 H78X04

M U L T I P L E R E G R E S S I O N * * * * *

DURBIN-WATSON TEST OF RESIDUAL DIFFERENCES COMPARED BY CASE ORDER (SEQNUM).

VARIABLE LIST 1, REGRESSION LIST 1. DURBIN-WATSON TEST .18422

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1

DEPENDENT VARIABLE.. GZA GYRO ZENITH ANGLE - DEGREES

VARIABLE(S) ENTERED ON STEP NUMBER 1.. SZA SINGLE SHOT ZENITH ANGLE - DEGREES

MULTIPLE R	.99390	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.98784	REGRESSION	1.	3238.33838	3238.33838	9259.18809
ADJUSTED R SQUARE	.98784	RESIDUAL	114.	39.87073	.34974	
STANDARD ERROR	.59139					

----- VARIABLES IN THE EQUATION -----

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SZA	.96324	.99390	.01001	9259.188					
(CONSTANT)	6.51148								

MAXIMUM STEP REACHED

FORMALINE - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 ***** REGRESSION LIST 1
 DEPENDENT VARIABLE.. GZA GYRO ZENITH ANGLE - DEGREES

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
SZA SINGLE SHOT ZENITH ANGLE - DEGREES	.99390	.98784	.98784	.99390	.96324	.99390
(CONSTANT)					6.51148	

FORMALINER - MOORE BUSINESS FORMS - 7

***** REGRESSION PROBLEM REQUIRES 1600 BYTES WORKSPACE INCLUDING RESIDUALS *****

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION *****

DEPENDENT VARIABLE: GZA FROM VARIABLE LIST 1
 REGRESSION LIST 1

SEQNUM	OBSERVED	PREDICTED	RESIDUAL	PLOT OF STANDARDIZED RESIDUAL				
	GZA	GZA		-2.0	-1.0	0.0	1.0	2.0
1	179.9000	179.5089	.3911459			I*		
2	179.3000	179.0272	.2727641			I*		
3	178.2000	178.4493	-.2492956			*		
4	178.0000	178.3530	-.3529703			*I		
5	177.6000	178.7383	-1.138266			* I		
6	177.1000	177.9677	-.8676774			* I		
7	176.2000	177.1971	-.9970863			* I		
8	175.7000	176.6191	-.9191436			* I		
9	176.1000	176.8118	-.7117922			*I		
10	176.2000	176.9081	-.7081159			*I		
11	176.0000	177.0044	-1.004439			* I		
12	175.3000	176.8118	-1.511791			* I		
13	175.0000	176.0412	-1.041202			* I		
14	174.4000	175.0780	-.6779650			*I		
15	172.7000	173.8258	-1.125757			* I		
16	171.3000	171.8993	-.5992820			*I		
17	170.0000	170.0691	-.6913116E-01			*		
18	168.8000	168.8169	-.1692447E-01			*		
19	167.6000	167.8537	-.2536882			*		
20	166.4000	166.9868	-.5867722			*I		
21	166.1000	166.3125	-.2125085			*		
22	165.2000	165.4456	-.2455951			*		
23	164.2000	164.6750	-.4750043			*I		
24	163.8000	164.4824	-.6823577			*I		
25	163.5000	163.9044	-.4044143			*I		
26	163.3000	163.4228	-.1227965			*		
27	164.0000	163.4228	.5772043			I*		
28	164.9000	164.4824	.4176427			I*		
29	166.1000	165.6382	.4617582			I*		
30	167.4000	166.6978	.7021982			I*		
31	167.7000	167.3721	.3279308			I*		
32	167.0000	166.6978	.3021986			I*		
33	166.9000	166.4088	.4911686			I*		
34	166.5000	166.3125	.1874930			*		
35	165.8000	165.8309	-.3088918E-01			*		
36	166.7000	166.1199	.5801401			I*		
37	167.3000	166.7941	.5058738			I*		
38	167.4000	167.0831	.3169037			I*		
39	164.2000	165.0603	-.8602988			* I		
40	162.5000	163.7118	-1.211766			* I		
41	164.0000	163.3265	.6735283			I*		

FORMALINER - MOORE BUSINESS FORMS - 7

42

179.2000

178.4493

.7507044

I*

43	178.3000	177.1008	1.199238	I *
44	177.3000	176.0412	1.258798	I *
45	175.5000	175.0780	.4220353	I *
46	174.1000	174.0184	.8159496E-01	*
47	173.1000	172.8625	.2374802	*
48	172.4000	171.8030	.5970425	I *
49	171.6000	171.1287	.4713062	I *
50	170.6000	170.4544	.1455729	*
51	169.9000	169.7802	.1198388	*
52	169.3000	169.2022	.9778107E-01	*
53	168.6000	169.0096	-.4095715	*I
54	168.5000	168.9132	-.4132459	*I
55	168.7000	168.7206	-.2060077E-01	*
56	169.3000	168.6243	.6757237	I *
57	169.6000	169.0096	.5904285	I *
58	169.8000	169.2022	.5977811	I *
59	170.0000	169.1059	.8941059	I *
60	169.7000	168.8169	.8830752	I *
61	169.3000	168.8169	.4830755	I *
62	169.5000	169.2022	.2977818	I *
63	169.7000	169.3949	.3051344	I *
64	169.9000	169.2985	.6014574	I *
65	169.3000	169.2985	.1456998E-02	*
66	168.6000	169.2985	-.6985438	*I
67	168.0000	168.7206	-.7205996	*I
68	168.0000	166.6015	1.398523	I *
69	167.3000	166.4088	.8911682	I *
70	165.9000	166.0235	-.1235351	*
71	164.4000	165.1566	-.7566221	*I
72	163.1000	163.2302	-.1301491	*
73	162.0000	162.6522	-.6522050	*I
74	162.0000	162.2669	-.2669105	*
75	161.8000	161.5927	.2073536	*
76	161.3000	161.5927	-.2926464	*I
77	161.7000	161.5927	.1073532	*
78	161.9000	161.8816	.1838355E-01	*
79	161.5000	161.7853	-.2852920	*I
80	161.2000	161.1110	.8897171E-01	*
81	161.0000	161.4000	-.3999975	*I
82	161.0000	161.6890	-.6889679	*I
83	161.3000	162.0743	-.7742650	*I
84	179.3000	178.6419	.6580585	I *
85	178.1000	177.3897	.7102652	I *
86	176.1000	176.2339	-.1338496	*
87	176.0000	176.2339	-.2338480	*
88	176.2000	176.3302	-.1301733	*
89	176.6000	176.4265	.1735023	*
90	175.7000	175.5596	.1404157	*
91	174.7000	174.5000	.1999768	*
92	174.0000	173.7294	.2705687	I *
93	173.8000	173.6331	.1668902	*
94	173.3000	172.5736	.7264513	I *

95	172.0000	171.9956	.4394700E-02	*
96	171.9000	171.7066	.1933647	*
97	171.9000	171.4177	.4823369	I*
98	171.6000	171.1287	.4713062	I*
99	171.2000	170.7434	.4566010	I*
100	170.5000	170.0691	.4308688	I*
101	169.0000	168.8169	.1830763	*
102	168.8000	168.3353	.4646941	I*
103	169.1000	168.4316	.6683711	I*
104	168.3000	169.1059	-.8058949	* I
105	167.4000	167.6610	-.2610389	*
106	166.1000	165.5419	.5580823	I*
107	163.9000	163.6154	.2845576	I*
108	162.7000	163.1338	-.4338247	*I
109	162.4000	162.7485	-.3485294	*I
110	163.6000	163.1338	.4661750	I*
111	164.1000	164.0007	.9926012E-01	*
112	164.1000	163.4228	.6772027	I*
113	163.6000	163.5191	.8087866E-01	*
114	162.5000	163.2302	-.7301476	*I
115	161.0000	161.8816	-.8816161	* I
116	160.1000	160.6294	-.5294101	*I

REGRESSION VARIABLES=GAZ SD, SZ TO SAZ/
REGRESSION= GAZ WITH SZ,SX,SZA,SAZ(1) RESID=0/
STATISTICS 1,2,4,5

***** REGRESSION PROBLEM REQUIRES 1120 BYTES WORKSPACE, NOT INCLUDING RESIDUALS *****

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)

SUBFILE H78X01 H78X03 H78X04

VARIABLE	MEAN	STANDARD DEV	CASES
GAZ	309.0750	34.5974	116
SD	400.8621	230.9510	116
SZ	395.2371	225.5133	116
SX	-29.8948	26.5865	116
SY	42.2940	40.5139	116
SZA	168.8431	5.5091	116
SAZ	307.6819	64.4225	116

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

CORRELATION COEFFICIENTS

A VALUE OF 99.00000 IS PRINTED
 IF A COEFFICIENT CANNOT BE COMPUTED.

	GAZ	SD	SZ	SX	SY	SZA	SAZ
GAZ	1.00000	.32431	.32538	-.28594	.33634	-.46323	.47566
SD	.32431	1.00000	.99996	-.95481	.89992	-.90249	.44754
SZ	.32538	.99996	1.00000	-.95294	.89682	-.90311	.45031
SX	-.28594	-.95481	-.95294	1.00000	-.90583	.82561	-.34904
SY	.33634	.89992	.89682	-.90583	1.00000	-.84111	.36016
SZA	-.46323	-.90249	-.90311	.82561	-.84111	1.00000	-.54989
SAZ	.47566	.44754	.45031	-.34904	.36016	-.54989	1.00000

FORMALINE - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1

DEPENDENT VARIABLE.. GAZ GYRO AZIMUTH -- DEGREES

VARIABLE(S) ENTERED ON STEP NUMBER 1.. SAZ SINGLE SHOT AZIMUTH -- DEGREES

MULTIPLE R	.47566	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.22626	REGRESSION	1.	31144.89519	31144.89519	33.33564
ADJUSTED R SQUARE	.22626	RESIDUAL	114.	106508.16120	934.28212	
STANDARD ERROR	30.56603					

----- VARIABLES IN THE EQUATION -----					----- VARIABLES NOT IN THE EQUATION -----				
VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SAZ	.25545	.47566	.04424	33.336	SZ	.13946	.14156	.79722	2.311
(CONSTANT)	230.47742				SX	-.13655	-.14547	.87817	2.443
					SZA	-.28908	-.27449	.69762	9.208

VARIABLE(S) ENTERED ON STEP NUMBER 2.. SZA SINGLE SHOT ZENITH ANGLE - DEGREES

MULTIPLE R	.53344	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	.28456	REGRESSION	2.	39169.97245	19584.98622	22.47191
ADJUSTED R SQUARE	.27828	RESIDUAL	113.	98483.08395	871.53172	
STANDARD ERROR	29.52172					

----- VARIABLES IN THE EQUATION -----					----- VARIABLES NOT IN THE EQUATION -----				
VARIABLE	B	BETA	STD ERROR B	F	VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SAZ	.17008	.31670	.05116	11.052	SZ	0.	-1.00000	-.37191	-8.721
SZA	-1.81546	-.28908	.59828	9.208	SX	0.	1.00000	-.09890	-18.613
(CONSTANT)	563.27163								

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1
 DEPENDENT VARIABLE.. GAZ GYRO AZIMUTH -- DEGREES

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
SAZ SINGLE SHOT AZIMUTH -- DEGREES	.47566	.22626	.22626	.47566	.17008	.31670
SZA SINGLE SHOT ZENITH ANGLE - DEGREES	.53344	.28456	.05830	-.46323	-1.81546	-.28908
(CONSTANT)					563.27163	

FORMALINER - MOORE BUSINESS FORMS - 7

***** REGRESSION PROBLEM REQUIRES 1120 BYTES WORKSPACE INCLUDING RESIDUALS *****

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION *****

DEPENDENT VARIABLE: GAZ FROM VARIABLE LIST 1
 REGRESSION LIST 1

SEQNUM	OBSERVED GAZ	PREDICTED GAZ	RESIDUAL	PLOT OF STANDARDIZED RESIDUAL				
				-2.0	-1.0	0.0	1.0	2.0
1	330.0000	244.4778	85.52218			I		X
2	268.0000	252.6480	15.35197			I	*	
3	170.6000	260.9488	-90.34875	X		I		
4	180.3000	266.3688	-86.06880	X		I		
5	193.4000	268.0748	-74.67478	X		I		
6	203.3000	274.8677	-71.56770	*		I		
7	210.6000	277.9699	-67.36986		*	I		
8	220.5000	280.0286	-59.52860		*	I		
9	235.1000	283.6284	-48.52840			I		
10	241.1000	286.1682	-45.06816		*	I		
11	245.3000	287.1092	-41.80915		*	I		
12	248.8000	287.7614	-38.96138		*	I		
13	264.2000	291.4418	-27.24181		*	I		
14	279.1000	294.9921	-15.89210			I	*	
15	286.0000	298.6958	-12.69584			I	*	
16	290.3000	303.2622	-12.96220			I	*	
17	294.1000	306.7116	-12.61157			I	*	
18	298.8000	309.8370	-11.03703			I	*	
19	302.3000	312.5369	-10.23691			I	*	
20	304.7000	314.5450	-9.845010			I	*	
21	304.9000	315.9519	-11.05189			I	*	
22	305.4000	317.5008	-12.10076			I	*	
23	306.1000	318.9191	-12.81912			I	*	
24	306.6000	320.1496	-13.54962			I	*	
25	308.1000	320.9838	-12.88377			I	*	
26	310.5000	321.8405	-11.34048			I	*	
27	316.5000	322.3337	-5.833712			I	*	
28	321.1000	320.7109	.3891117			I	*	
29	324.7000	319.1616	5.538357			I	*	
30	328.1000	317.5218	10.57819			I	*	
31	330.4000	315.8938	14.50618			I	*	
32	331.7000	318.5933	13.10668			I	*	
33	333.6000	319.6652	13.93479			I	*	
34	335.3000	320.0338	15.26616			I	*	
35	336.8000	322.1662	14.63384			I	*	
36	334.3000	321.7066	12.59344			I	*	
37	331.6000	320.1806	11.41938			I	*	
38	328.8000	319.1087	9.691269			I	*	
39	319.8000	321.1864	-1.386364			I	*	
40	313.9000	322.4524	-8.552396			I	*	
41	314.6000	322.8044	-8.204399			I	*	

FORMALINER - MOORE BUSINESS FORMS - 7

141

42

354.7000

300.3056

54.39442

I

*

43	345.4000	302.6942	42.70585	I	*
44	331.8000	304.0448	27.75516	I	*
45	328.0000	304.8058	23.19421	I	*
46	326.5000	305.5612	20.93880	I	*
47	327.4000	307.0254	20.37459	I	*
48	325.8000	308.5972	17.20279	I	*
49	323.5000	309.4939	14.00615	I	*
50	320.4000	309.5231	10.87692	I	*
51	318.2000	310.6748	7.525154	I	*
52	317.0000	311.8151	5.184858	I*	
53	317.8000	311.9401	5.859877	I*	
54	317.3000	312.2407	5.059274	I*	
55	316.1000	312.7229	3.377127	I*	
56	313.9000	312.9384	.9615632	*	
57	312.7000	311.9741	.7258592	*	
58	312.2000	311.0328	1.167229	*	
59	313.2000	311.2313	1.968674	I*	
60	313.2000	312.2692	.9308018	*	
61	313.4000	312.0141	1.385925	*	
62	316.3000	311.6281	4.671946	I*	
63	316.6000	311.4521	5.147946	I*	
64	315.8000	311.3955	4.404517	I*	
65	315.9000	311.3955	4.504515	I*	
66	319.2000	311.6336	7.566401	I*	
67	324.8000	313.4202	11.37979	I*	
68	330.9000	318.9109	11.98907	I*	
69	331.1000	319.6142	11.48582	I*	
70	326.9000	319.9832	6.916800	I*	
71	325.1000	320.9028	4.197230	I*	
72	322.6000	324.5337	-1.933686	*I	
73	319.6000	324.6195	-5.019481	*I	
74	317.4000	324.7504	-7.350380	*I	
75	315.1000	326.2423	-11.14230	*I	
76	312.4000	326.0042	-13.60419	*I	
77	309.2000	325.5960	-16.39600	*I	
78	305.8000	324.7112	-18.91120	*I	
79	302.2000	324.3995	-22.19951	*I	
80	297.5000	325.0070	-27.50701	*I	
81	292.8000	324.0032	-31.20315	*I	
82	288.2000	322.7442	-34.54418	*I	
83	285.5000	320.8955	-35.39545	*I	
84	358.6000	239.8017	118.7983	I	X
85	341.1000	241.6516	99.44843	I	X
86	305.8000	299.2256	6.574382	I*	
87	290.8000	297.0146	-6.214560	*I	
88	283.0000	295.2853	-12.28527	*I	
89	283.2000	293.8621	-10.66214	*I	
90	292.2000	296.9758	-4.775754	*I	
91	300.1000	300.1973	-.9734328E-01	*	
92	305.0000	302.3130	2.686973	I*	
93	305.0000	302.3755	2.624486	I*	
94	307.5000	304.1344	3.365596	I*	

5

X

4

FORMALINER - MOORE BUSINESS FORMS - 7

95	316.7000	306.3462	10.35378	I *
96	319.0000	308.3536	10.64645	I *
97	320.3000	308.7791	11.52086	I *
98	323.1000	309.6299	13.47008	I *
99	330.6000	310.9854	19.61460	I *
100	338.2000	313.1577	25.04234	I *
101	341.5000	316.7593	24.74066	I *
102	341.5000	317.4970	24.00301	I *
103	341.0000	316.9923	24.00771	I *
104	344.5000	315.8405	28.65947	I *
105	344.7000	318.9379	25.76210	I *
106	342.9000	323.0680	19.83203	I *
107	338.7000	326.4948	12.20521	I *
108	336.3000	326.6542	9.645841	I *
109	334.5000	327.0912	7.408798	I *
110	328.8000	325.9908	2.809158	I*
111	330.5000	324.0338	6.466229	I *
112	337.7000	325.7353	11.96466	I *
113	340.6000	326.3702	14.22981	I *
114	336.2000	326.8128	9.387222	I *
115	325.0000	327.8747	-2.874707	*I
116	319.4000	328.7721	-9.372104	* I

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
SUBFILE H78X01 H78X03 H78X04

M U L T I P L E R E G R E S S I O N * * * * *

DURBIN-WATSON TEST OF RESIDUAL DIFFERENCES COMPARED BY CASE ORDER (SEQNUM).

VARIABLE LIST 1, REGRESSION LIST 1. DURBIN-WATSON TEST .56112

FORMALINER - MOORE BUSINESS FORMS - 7

FINISH

NORMAL END OF JOB.
20 CONTROL CARDS WERE PROCESSED.
0 ERRORS WERE DETECTED.

FORMALINER - MOORE BUSINESS FORMS - 7

DATA TRANSFORMATION DONE UP TO THIS POINT..

NO OF TRANSFORMATIONS	0
NO OF RECODE VALUES	0
NO OF ARITHM. OR LOG. OPERATIONS	0

THE AMOUNT OF TRANSPACE REQUIRED IS 0 BYTES

RUN SUBFILES	(H78X01, H78X03, H78X04)
REGRESSION	VARIABLES=GZ SD, SZ TO SAZ/ REGRESSION= GZ WITH SD TO SAZ(1) RESID=0/
STATISTICS	1,2,4

***** REGRESSION PROBLEM REQUIRES 1232 BYTES WORKSPACE, NOT INCLUDING RESIDUALS *****

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
SUBFILE H78X01 H78X03 H78X04

VARIABLE	MEAN	STANDARD DEV	CASES
GZ	395.5784	225.8402	116
SD	400.8621	230.9510	116
SZ	395.2371	225.5133	116
SX	-29.8948	26.5865	116
SY	42.2940	40.5139	116
SZA	168.8431	5.5091	116
SAZ	307.6819	64.4225	116

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

CORRELATION COEFFICIENTS

A VALUE OF 99.00000 IS PRINTED
 IF A COEFFICIENT CANNOT BE COMPUTED.

	GZ	SD	SZ	SX	SY	SZA	SAZ
GZ	1.00000	.99997	1.00000	-.95307	.89741	-.90316	.45023
SD	.99997	1.00000	.99996	-.95481	.89992	-.90249	.44754
SZ	1.00000	.99996	1.00000	-.95294	.89682	-.90311	.45031
SX	-.95307	-.95481	-.95294	1.00000	-.90583	.82561	-.34904
SY	.89741	.89992	.89682	-.90583	1.00000	-.84111	.36016
SZA	-.90316	-.90249	-.90311	.82561	-.84111	1.00000	-.54989
SAZ	.45023	.44754	.45031	-.34904	.36016	-.54989	1.00000

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1

DEPENDENT VARIABLE.. GZ GYRO VERTICAL DISTANCE- METERS

VARIABLE(S) ENTERED ON STEP NUMBER 1.. SZ SINGLE SHOT VERTICAL DISTANCE- METERS

MULTIPLE R	1.00000	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	1.00000	REGRESSION	1.	5865423.44467	5865423.44467	58610097.67616
ADJUSTED R SQUARE	1.00000	RESIDUAL	114.	11.40858	.10008	
STANDARD ERROR	.31635					

----- VARIABLES IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F
SZ	1.00145	1.00000	.00013	58610097.676
(CONSTANT)	-.23116			

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SD	.10366	.66520	.00008	89.686
SX	-.00140	-.30527	.09191	11.613
SY	.00300	.95259	.19571	1107.653
SZA	-.00024	-.07543	.18439	.647
SAZ	-.00010	-.06586	.79722	.492

VARIABLE(S) ENTERED ON STEP NUMBER 2.. SY SINGLE SHOT EAST DISTANCE - METERS

MULTIPLE R	1.00000	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	1.00000	REGRESSION	2.	5865433.79712	2932716.89856	313783920.72464
ADJUSTED R SQUARE	1.00000	RESIDUAL	113.	1.05613	.00935	
STANDARD ERROR	.09668					

----- VARIABLES IN THE EQUATION -----

VARIABLE	B	BETA	STD ERROR B	F
SZ	.99875	.99731	.00009*****	
SY	.01674	.00300	.00050	1107.653
(CONSTANT)	.12684			

----- VARIABLES NOT IN THE EQUATION -----

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SD	0.	-1.00000	-4.13807	-101.574
SX	0.	1.00000	-4.10073	-100.904
SZA	0.	1.00000	-3.43058	-101.784
SAZ	-.00866	-7.47914	.13443	-114.039

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION ***** VARIABLE LIST 1
 REGRESSION LIST 1
 DEPENDENT VARIABLE.. GZ GYRO VERTICAL DISTANCE- METERS

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
SZ	SINGLE SHOT VERTICAL DISTANCE- METERS	1.00000	1.00000	1.00000	1.00000	.99875	.99731
SY	SINGLE SHOT EAST DISTANCE - METERS	1.00000	1.00000	.00000	.89741	.01674	.00300
(CONSTANT)						.12684	

FORMALINER - MODRE BUSINESS FORMS - 7

***** REGRESSION PROBLEM REQUIRES 1232 BYTES WORKSPACE INCLUDING RESIDUALS *****

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

***** MULTIPLE REGRESSION *****

DEPENDENT VARIABLE: GZ FROM VARIABLE LIST 1
 REGRESSION LIST 1

SEQNUM	OBSERVED	PREDICTED	RESIDUAL	PLOT OF STANDARDIZED RESIDUAL				
	GZ	GZ		-2.0	-1.0	0.0	1.0	2.0
1	20.00000	20.10019	-.1001902			*		
2	40.00000	40.07355	-.7354498E-01			*		
3	60.00000	60.04690	-.4689979E-01			*		
4	80.00000	80.01356	-.1355841E-01			*		
5	100.00000	99.98022	.1978296E-01			*		
6	119.9000	119.9469	-.4687605E-01			*		
7	139.9000	139.9102	-.1018658E-01			*		
8	159.9000	159.7703	.1297265			*		
9	179.8000	179.7336	.6641558E-01			*		
10	199.8000	199.7019	.9808291E-01			*		
11	219.7000	219.5754	.1246032			*		
12	239.7000	239.5488	.1512484			*		
13	259.6000	259.5255	.7454516E-01			*		
14	279.5000	279.4090	.9102504E-01			*		
15	299.4000	299.2975	.1024752			*		
16	319.2000	319.0946	.1054340			*		
17	338.9000	338.9000	.2416700E-04			*		
18	358.6000	358.5123	.8766538E-01			*		
19	378.2000	378.1347	.6526384E-01			*		
20	397.6000	397.6640	-.6395720E-01			*		
21	417.1000	417.0967	.3345757E-02			*		
22	436.5000	436.5327	-.3269404E-01			*		
23	455.7000	455.7740	-.7401330E-01			*		
24	475.0000	475.1186	-.1185482			*		
25	494.2000	494.3666	-.1665636			*		
26	513.3000	513.5164	-.2163780			*		
27	532.5000	532.6679	-.1678565			*		
28	551.8000	551.9209	-.1208917			*		
29	571.1000	571.2705	-.1704526			*		
30	590.6000	590.7182	-.1182160			*		
31	610.1000	610.1609	-.6094971E-01			*		
32	629.7000	629.7036	-.3566165E-02			*		
33	649.1000	649.1547	-.5467618E-01			*		
34	668.6000	668.6075	-.7461747E-02			*		
35	688.0000	688.0619	-.6191984E-01			*		
36	707.4000	707.4215	-.2152647E-01			*		
37	726.9000	726.8760	.2401389E-01			*		
38	746.5000	746.4253	.7470889E-01			*		
39	765.9000	765.8781	.2191720E-01			*		
40	785.0000	785.1361	-.1361296			*		
41	804.1000	804.2910	-.1909698			*		

FORMALINER - MOORE BUSINESS FORMS - 7

42

20.00000

20.10689

-.1068864

*

43	40.00000	40.09364	-.9363352E-01	*
44	60.00000	59.99055	.9450566E-02	*
45	79.90000	79.99069	-.9068934E-01	*
46	99.90000	99.89598	.4024522E-02	*
47	119.7000	119.8080	-.1079586	*
48	139.6000	139.6251	-.2508977E-01	*
49	159.4000	159.3457	.5430988E-01	*
50	179.1000	179.1678	-.6784423E-01	*
51	198.8000	198.7919	.8082481E-02	*
52	218.5000	218.5175	-.1754229E-01	*
53	238.1000	238.1466	-.4664191E-01	*
54	257.7000	257.7741	-.7406749E-01	*
55	277.3000	277.4048	-.1048354	*
56	297.0000	297.0356	-.3560491E-01	*
57	316.6000	316.6647	-.6470643E-01	*
58	336.3000	336.2921	.7872185E-02	*
59	356.0000	355.9162	.8379508E-01	*
60	375.7000	375.5420	.1580439	*
61	395.4000	395.1711	.2289485	*
62	415.0000	414.8984	.1016512	*
63	434.7000	434.5258	.1742222	*
64	454.4000	454.1515	.2484749	*
65	474.0000	473.8788	.1211776	*
66	493.7000	493.5046	.1954264	*
67	513.2000	513.1337	.6632642E-01	*
68	532.8000	532.6746	.1253840	*
69	552.4000	552.1257	.2742786	*
70	571.8000	571.5785	.2214945	*
71	591.1000	591.0313	.6871199E-01	*
72	610.3000	610.2910	.8982035E-02	*
73	629.4000	629.3560	.4397871E-01	*
74	648.4000	648.4177	-.1767500E-01	*
75	667.4000	667.4810	-.8100275E-01	*
76	686.4000	686.4444	-.4445688E-01	*
77	705.4000	705.4079	-.7911004E-02	*
78	724.4000	724.3663	.3365699E-01	*
79	743.4000	743.4230	-.2297457E-01	*
80	762.3000	762.3764	-.7638291E-01	*
81	781.3000	781.2249	.7511062E-01	*
82	800.2000	800.1682	.3174656E-01	*
83	819.1000	819.2014	-.1014469	*
84	20.00000	20.10521	-.1052123	*
85	40.00000	40.09196	-.9195948E-01	*
86	60.00000	60.08373	-.8372878E-01	*
87	79.90000	79.97730	-.7729698E-01	*
88	99.90000	99.96739	-.6739224E-01	*
89	119.8000	119.8526	-.5259022E-01	*
90	139.8000	139.8410	-.4101143E-01	*
91	159.7000	159.7363	-.3625367E-01	*
92	179.6000	179.6365	-.3651806E-01	*
93	199.5000	199.5401	-.4013053E-01	*
94	219.4000	219.3455	.5445848E-01	*

95	239.2000	239.1560	.4402497E-01	*
96	259.0000	258.9714	.2857123E-01	*
97	278.8000	278.7919	.8093457E-02	*
98	298.6000	298.5125	.8748930E-01	*
99	318.4000	318.3363	.6366343E-01	*
100	338.1000	338.0653	.3469057E-01	*
101	357.8000	357.7011	.9889515E-01	*
102	377.4000	377.3436	.5640507E-01	*
103	397.1000	396.9878	.1122432	*
104	416.7000	416.6286	.7142340E-01	*
105	436.2000	436.1729	.2713442E-01	*
106	455.7000	455.7255	-.2552478E-01	*
107	475.0000	474.9936	.6377336E-02	*
108	494.2000	494.1652	.3480268E-01	*
109	513.2000	513.2402	-.4024338E-01	*
110	532.4000	532.4135	-.1349207E-01	*
111	551.6000	551.5800	.1996305E-01	*
112	570.8000	570.8465	-.4647071E-01	*
113	590.0000	590.0180	-.1803773E-01	*
114	609.2000	609.1896	.1038763E-01	*
115	628.2000	628.2630	-.6298440E-01	*
116	647.0000	647.2398	-.2398278	*

SELECT IF (SZA LE 178.0)

ERROR NUMBER.. 228. PROCESSING CEASES, ERROR SCAN CONTINUES.

REGRESSION VARIABLES=GZ SD, SZ TO SAZ/
REGRESSION= GZ WITH SD TO SAZ(1) RESID=0/
STATISTICS 1,2,4

***** REGRESSION PROBLEM REQUIRES 1232 BYTES WORKSPACE, NOT INCLUDING RESIDUALS *****

FINISH

***** LIST OF SPSS ERROR MESSAGES ENCOUNTERED DURING THE RUN *****

ERRNO= 228
THE DECK PLACEMENT OF THE 'COMPUTE' OR 'IF' CARD IS INCORRECT

NORMAL END OF JOB.
14 CONTROL CARDS WERE PROCESSED.
1 ERRORS WERE DETECTED.

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
SUBFILE H78X01 H78X03 H78X04

VARIABLE	MEAN	STANDARD DEV	CASES
GZ	395.5784	225.8402	116
GX	-35.9284	31.0122	116
GY	33.9448	35.0424	116
GZA	169.1474	5.3391	116
SD	400.8621	230.9510	116
SZ	395.2371	225.5133	116
SX	-29.8948	26.5865	116
SY	42.2940	40.5139	116
SZA	168.8431	5.5091	116
SAZ	307.6819	64.4225	116

FORMALINER - MOORE BUSINESS FORMS - 7

FILE 78XSPS.3 (CREATION DATE = 06/22/78)
 SUBFILE H78X01 H78X03 H78X04

CORRELATION COEFFICIENTS

A VALUE OF 99.00000 IS PRINTED
 IF A COEFFICIENT CANNOT BE COMPUTED.

	GZ	GX	GY	GZA	SD	SZ	SX	SY	SZA	SAZ
GZ	1.00000	-.96143	.86790	-.90814	.99997	1.00000	-.95307	.89741	-.90316	.45023
GX	-.96143	1.00000	-.88106	.83680	-.96315	-.96131	.99892	-.91127	.83781	-.35464
GY	.86790	-.88106	1.00000	-.81826	.87058	.86724	-.87551	.99751	-.82207	.34642
GZA	-.90814	.83680	-.81826	1.00000	-.90743	-.90812	.82319	-.83792	.99390	-.53168
SD	.99997	-.96315	.87058	-.90743	1.00000	.99996	-.95481	.89992	-.90249	.44754
SZ	1.00000	-.96131	.86724	-.90812	.99996	1.00000	-.95294	.89682	-.90311	.45031
SX	-.95307	.99892	-.87551	.82319	-.95481	-.95294	1.00000	-.90583	.82561	-.34904
SY	.89741	-.91127	.99751	-.83792	.89992	.89682	-.90583	1.00000	-.84111	.36016
SZA	-.90316	.83781	-.82207	.99390	-.90249	-.90311	.82561	-.84111	1.00000	-.54989
SAZ	.45023	-.35464	.34642	-.53168	.44754	.45031	-.34904	.36016	-.54989	1.00000

FORMALINER - MODRE BUSINESS FORMS - 7