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Report 30-TR

PRACTICAL FIELD ACCURACY LIMITS FOR A WILD T-2 THEODOLITE

by

Peter J. Cervarich, II

August 1966

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FORT BELVOIR, VIRGINIA

Report 30-TR

PRACTICAL FIELD ACCURACY LIMITS

FOR A WILD T-2 THEODOLITE

Task 4A623501A85201

August 1966

Distributed by

The Commanding Officer
U. S. Army Engineer
Geodesy, Intelligence and Mapping Research and Development Agency

Prepared by

Peter J. Cervarich, II
Geodetic and Astronomic Branch
Surveying and Geodesy Division
Development Laboratories for Mapping and Geodetic Systems

SUMMARY

This report covers the results of field tests of the Wild T-2 Theodolite performed to determine the field accuracy limits of this instrument, thereby establishing the design goal for an All-Weather Angle-Measuring Instrument under consideration. Analyses of data indicate that this particular test instrument is capable of measuring an angle 90 percent of the time to an accuracy of $\pm$ 2".5 when 16 D&R readings are observed during daylight hours; the accuracy of angular measurement is $\pm$ 2".0 during nighttime, 90 percent of the time; and the accuracy limits are reduced from $\pm$ 2".5 to $\pm$ 2".0 and from $\pm$ 2".0 to $\pm$ 1".5 if data are gathered when the atmosphere is "quiet." The report concludes that angular accuracy is not improved by employing "horizon closure" techniques, and that proper selection of the survey sites is one of the more important factors to consider when the mission requires high accuracy.

FOREWORD

The investigations described in this report were accomplished under the authority of Task 4A623501A85201, "Research for Surveying and Geodesy," and Subtask 4A623501A85201011, "All-Weather Angle Measuring Equipment."

The period covered by this report is from 11 October 1965 through 14 November 1965.

The work accomplished on this project was carried out by Peter J. Cervarich, II and Donald P. Dere under the supervision of Melvin Crowell, Jr., Chief, Geodetic and Astronomic Branch, and at the direction of Charles R. Manor, Chief, Surveying and Geodesy Division.

Appreciation is given to SP/5 R. A. Janes; SP/4 C. A. Ronnquist; PFCs J. E. Wincler; D. O. Hardy; R. T. Stone, Jr.; and Pvt. C. D. Hinnant who, under the command of Capt. W. A. Hansen, Commanding Officer, 537th Engineer Company (Survey Base), 30th Engineer Battalion (Base Topo), collected the field data analyzed within this report.

Contributions of J. B. Duff, H. H. Smith, C. A. Martin, H. E. Mohr, and Frank L. Robertson, Chief of the Computation and Analysis Division, Technical Service Department, U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia, are appreciated for their assistance in programming the field data for solution on their RCA-301 Computer and their assistance in the statistical evaluation of the data.

Appreciation is also given to R. Taylor Hoskins, Superintendent, Shenandoah National Park, National Park Service, Department of the Interior, for his cooperation in permitting the test team to utilize sites located on the Skyline Drive.

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PRACTICAL FIELD ACCURACY LIMITS

FOR A WILD T-2 THEODOLITE

I. INTRODUCTION

1. Subject. This report covers tests conducted to establish definite design goals for the development of an All-Weather Angle-Measuring Instrument by determining the accuracy characteristics of an accepted high-order optical theodolite (the Wild T-2). The parameters of the theodolite's field survey data that were examined included the following:

a. The practicable accuracy limits of horizontal angle determinations.

b. The effect of daytime and nighttime operations upon survey accuracy.

c. The effect of "Horizon Closure" upon survey accuracy.

d. The effect upon accuracy of reducing the number of direct and reverse (D&R) readings that would constitute a set of data.

e. The effect upon accuracy of the atmospheric "seeing" conditions.

2. Background. In June 1964, a contract was awarded to the Cubic Corporation for the design, fabrication, test, and delivery of a microwave pointing system. This system is being investigated to determine the best and most practicable approach to the development of an all-weather angle-measuring instrument. The microwave system that was developed was tested in the vicinity of San Diego, California, from 15 February through 2 April 1965; was tested at Boulder, Colorado, from 18 through 30 July 1965; and has been tested intermittently at Fort Belvoir, Virginia, from 1 September 1965, to the present time. In order to evaluate the microwave approach to the all-weather angle-measuring problem, one must know the field accuracy of angle determinations obtained with an accepted high-order optical instrument, as high-order accuracy is the goal for the microwave system. Although great amounts of data are available on the controlled test features of optical theodolites, sufficient data could not be found to determine the practical limits of field accuracy for this type instrument. It was determined, therefore, to be worthwhile to measure the field

parameters of the Wild T-2 Theodolite, as it was felt that this instrument is representative of several well-made instruments which receive extensive military use in the field today.

3. Definitions. To insure that certain terms are not misunderstood the following definitions are given:

a. Reading: An entry into the field book as determined by one sighting on one target.

b. Direction: The mean of a direct and a reverse reading to a target.

c. Standard Deviation (SD): The positive value of the square root of the sum of squares of the deviations from the mean divided by one less than the number of observations. $SD = \sqrt{\Sigma v^2/n-1}$.

d. Angle: An angle determined by the difference in two directions.

e. Mean Angle: The angle determined by the mean of 4, 8, 12, or 16 angles.

II. INVESTIGATIONS

4. Test Site. These tests were performed in the vicinity of Sperryville, Virginia (Fig. 1), from 11 October through 14 November 1965. The field party was composed of personnel of the 537th Engineer Company (Survey Base), 30th Engineer Battalion (Base Topo). The instrument operator was experienced in the proper use and operation of the instrument. Three of the four test sites, that is, RED OAK KNOB, THORO, and OVERLOOK, are first-order stations established by the U. S. Coast and Geodetic Survey (Appendix A). The fourth station, JEREMY, was established by the field party and monumented for future recovery. All stations are intervisible and did not require the use of towers or other raised platforms. (Figure 2 shows profiles of test paths.)

5. Equipment Employed in the Field. The major equipment used during the field portion of this test consisted of the following:

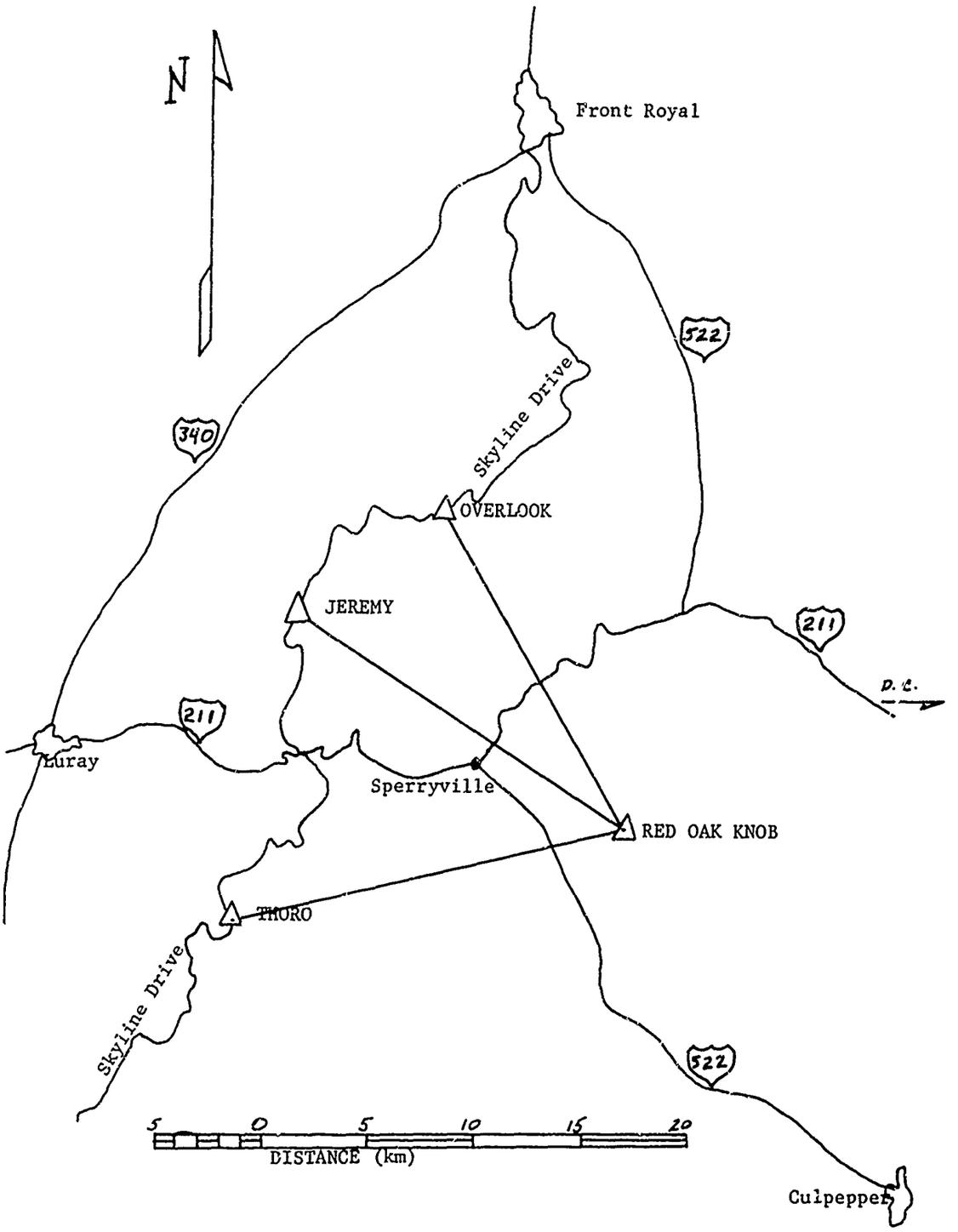


Fig. 1. Map of test site area.

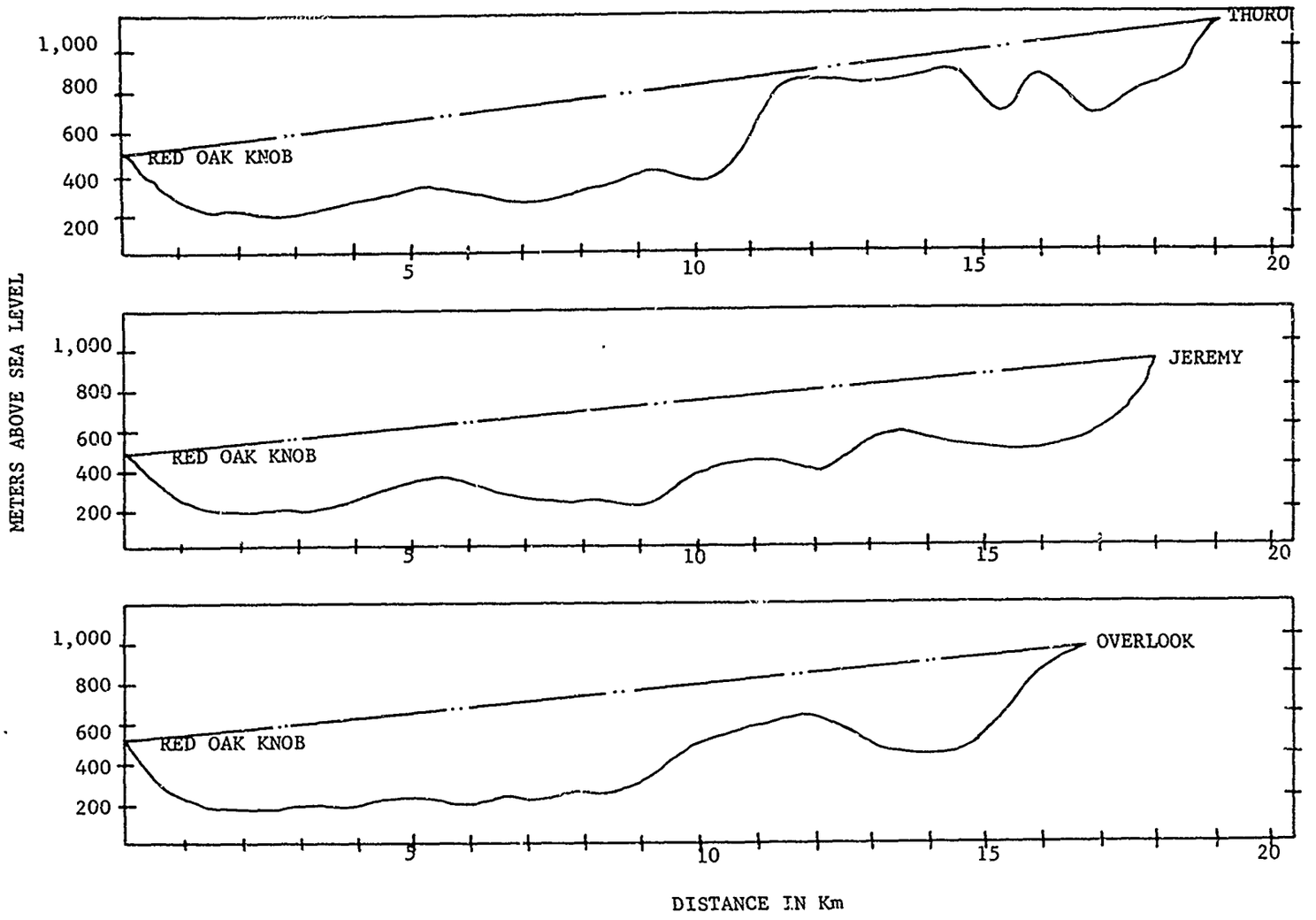


Fig. 2. Profiles of test paths.

Observation Station (1)

1 ea Theodolite, Wild T-2, Serial No. 27382
1 ea Fixed-Leg Tripod
2 ea AN/PRC-10 Radios

Target Stations (3)

1 ea Signal Light, 5-In. (Nighttime Work)
1 ea Collapsible Tripod, Wild III-b
1 ea Heliotrope (Daytime Work)
2 ea AN/PRC-10 Radios

6. Field Test Procedure. The field test team adhered to the following procedure in obtaining the raw data that are analyzed within this report.

a. The theodolite was set up over station RED OAK KNOB, and the targets were set up over Stations THORO, JEREMY, and OVERLOOK. The theodolite and targets were tripod mounted and plumbed over their points. The instrument was leveled.

b. The initial direct reading was taken to Station THORO, followed by direct readings to Stations JEREMY, OVERLOOK, and again at THORO.

c. The instrument was reversed, and reverse readings were taken in the opposite sequence of b.

d. The theodolite's glass circle was displaced by approximately 11 degrees, and b and c were repeated in sequence.

e. This procedure (b, c, and d) was continued until a total of 16 D&R readings had been observed and recorded.

f. The mean angle was determined, and any angle that differed from the mean by more than $\pm$ 5".0 was rejected and reobserved.

g. The theodolite was removed from the tripod.

This complete sequence was repeated until a total of 50 sets of 16 D&R readings had been observed during daylight hours, and 50 sets had been observed during nighttime hours. All angular data were recorded in

Horizontal Direction or Angle Book, DA Form 5-69. Weather conditions (calm, breezy, gusty, cool, hot, and the like) and apparent atmospheric seeing conditions (clear, cloudy, hazy, and heat waves) were also recorded. A list of atmospheric seeing conditions (daytime and nighttime observations) is given in Appendix B to this report. The instrument operator was instructed to turn angles whenever the target image remained in the field-of-view of the theodolite, that is, to make a judgment on the center position of the shimmering, blurred image provided it did not "dance" out of the field-of-view.

This field observation procedure has an inherent disadvantage when one attempts to compare angular accuracy with and without horizon closure because angles normally turned without horizon closure would follow a different station observation sequence. This difference, however, is considered to be so small as to be insignificant. For this reason, it is felt that the procedure followed was adequate. It should be noted that the field observer used the same position on the micrometer of the theodolite during each directional measurement. Therefore, some error may have been introduced as a result of the micrometer run. This value again, however, was considered negligible because of the inherent quality recognized in this model Wild instrument. The same individual was employed throughout these tests as the theodolite operator because it was believed that as a result of the great amount of data being collected, any personal error or bias would be found in the data analyses, and could, if found, be separated from the other data prior to final analysis. A different logic was applied to the selection of the observation instrument, that is, the random selection of the instrument is assumed to account for typical internal instrumental errors, and the procedure of use is assumed to account for the external instrumental errors.

7. Daytime Tests.

a. Objective. This test was performed to permit evaluation of data gathered during daylight hours under various atmospheric seeing conditions.

b. Method. The raw data that were obtained during daylight hours were extracted from the DA Forms 5-69 and were entered into an RCA-301 electronic computer. The computer then performed the following actions:

(1) The angles, THORO-RED OAK KNOB-JEREMY and THORO-RED OAK KNOB-OVERLOOK, were computed with and without horizon closure for each setting of the theodolite's glass circle.

(2) The mean angle and standard deviation (SD) for both angles were computed with and without horizon closure for each set.

(3) The deviations from the mean angle for each angle were computed. These results were examined to determine whether any of the deviations were greater than $\pm$ 5".0. When such deviations were found, this angle was rejected and the mean angle was substituted. These data were then reentered into the computer and steps 1, 2, and 3, were recomputed.

The final computer tab runs (Appendix C) were then examined, and the following actions were performed:

(1) The mean angles as determined using 16, 12, 8, and 4 D&R readings were computed, and graphs were prepared. The procedure used for determining the mean using 12, 8, and 4 D&R readings was as follows:

12 D&R Readings:	Positions 1, 2, 4, 5, 6, 8, 9, 10, 12, 13, 14, and 16
8 D&R Readings:	Positions 1, 3, 5, 7, 9, 11, 13, and 15
4 D&R Readings:	Positions 1, 5, 9, and 13

(2) An examination was made for data normality.

(3) The data were examined to determine whether any correlation with weather or atmospheric seeing conditions could be found.

c. Results. The results of the computed mean angles* using 16, 12, 8, and 4 positions are presented in Tables I through IV. These

* The angle for THORO-RED OAK KNOB-JEREMY is approximately 45° 53' 48", and the angle for THORO-RED OAK KNOB-OVERLOOK is approximately 72° 29' 35". For the purpose of ease of writing, and because the mean angle never deviated by more than 5".0 throughout this report, the degrees and minutes figures have been omitted.

data were plotted in the form of frequency histograms and are presented in Figs. 3 through 6. These histograms were examined for normality and yielded the conclusion that although the data for the THORO-RED OAK KNOB-JEREMY angle was normal, the data for the THORO-RED OAK KNOB-OVERLOOK angle appeared to be bimodal. The data obtained from the OVERLOOK-RED OAK KNOB-JEREMY angle was examined for atmospheric dependence by plotting the data obtained when the target was "poor" because of atmospheric heat waves, and by plotting the data obtained when the target lights appeared to be steady or quiet. These results are presented in Fig. 7.

8. Nighttime Tests.

a. Objective. This test was performed to permit evaluation of data gathered during nighttime hours under various atmospheric seeing conditions.

b. Method. The same method of data analysis that was used in conjunction with the daytime tests was employed for this test with the exception that the data extracted from DA Forms 5-69 were obtained during nighttime hours.

c. Results. The results of the computed mean angles using 16, 12, 8, and 4 positions are presented in Tables V through VIII. These data were also plotted as frequency histograms and are presented in Figs. 8 through 11. The check for data normality indicated that the data from the THORO-RED OAK KNOB-JEREMY angle was normally distributed, but that the THORO-RED OAK KNOB-OVERLOOK data appeared to be rectangularly distributed. No test could be performed relative to atmospheric seeing condition correlation because the observer could not "see" the apparent condition through the telescope.

Table I. Mean and Standard Deviations of 16 Positions - Daytime

Survey	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	49.5	2.7	33.8	2.8	49.9	2.3	34.3	2.5
2	49.9	2.7	33.7	2.2	49.8	2.6	33.5	2.0
3	48.6	2.7	32.9	2.4	48.0	2.5	32.3	2.2
4	48.1	2.0	36.9	2.3	47.7	2.1	37.1	2.9
5	48.8	2.2	32.5	2.5	48.6	2.2	32.7	2.2
6	51.9	1.8	36.4	2.7	51.4	2.1	35.9	3.0
7	46.8	2.5	34.8	2.4	46.5	2.3	34.5	2.3
8	52.1	2.3	37.7	2.5	51.2	2.5	36.4	2.4
9	50.7	2.3	35.8	2.0	49.8	2.4	35.0	2.0
10	49.9	2.8	35.3	2.0	49.2	2.7	34.5	1.9
11	48.8	2.5	33.8	2.5	48.1	2.5	33.1	2.5
12	49.2	2.6	33.8	2.4	48.4	2.5	33.0	2.4
13	50.3	1.9	35.1	3.0	49.5	2.0	34.3	3.0
14	48.8	2.1	35.1	2.6	48.4	2.2	34.7	2.4
15	49.8	1.6	35.6	1.8	49.3	1.6	35.1	1.7
16	49.6	2.1	33.8	2.6	49.1	2.1	33.4	2.4
17	48.6	2.3	33.5	1.7	48.2	2.3	33.1	1.7
18	48.4	2.3	33.6	3.1	48.0	2.3	33.6	3.0
19	47.9	2.2	33.2	2.0	47.7	2.1	32.9	1.9
20	49.0	2.8	33.4	2.4	48.8	2.9	33.3	2.4
21	49.0	1.5	33.1	1.9	48.2	2.2	32.7	1.8
22	47.6	1.3	32.3	1.7	47.2	1.4	31.8	1.8
23	48.8	2.6	33.4	2.3	48.3	2.6	32.9	2.2
24	49.4	2.0	34.0	2.6	48.9	1.9	33.5	2.5
25	49.1	2.4	31.1	2.5	48.4	2.7	30.7	2.4
26	50.1	2.2	32.2	2.8	49.8	2.1	31.8	2.8
27	49.7	2.7	32.8	2.4	49.3	2.7	32.4	2.4
28	50.0	2.5	35.3	2.0	49.7	2.6	35.0	2.1
29	50.9	2.1	36.2	2.0	50.6	2.4	35.9	2.1
30	50.5	1.9	36.6	2.4	50.1	1.7	36.2	2.4
31	49.5	2.3	35.7	2.5	49.2	2.3	35.4	2.7
32	49.9	1.7	33.4	2.8	49.4	1.8	32.9	2.9
33	50.2	2.0	35.2	2.2	49.8	2.1	34.8	2.3
34	48.7	2.4	33.5	2.2	48.4	2.4	33.2	2.2
35	49.3	2.3	35.2	1.9	48.9	2.2	34.8	1.9
36	49.5	1.8	34.6	1.7	49.3	1.8	34.4	1.7

Table I (cont'd)

Survey	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
37	49.3	1.9	34.2	3.1	48.9	2.0	33.8	3.1
38	49.5	1.9	33.8	1.9	49.3	1.9	33.6	1.9
39	50.3	2.3	35.0	2.3	50.1	2.3	34.7	2.3
40	50.6	1.9	34.3	2.0	49.9	2.3	33.9	1.9
41	49.3	3.1	35.1	2.2	49.4	2.7	34.9	2.3
42	49.5	2.1	33.8	2.3	49.3	2.0	33.9	2.7
43	50.0	1.7	33.7	1.7	49.9	1.7	33.5	1.9
44	50.0	2.2	34.7	2.3	49.5	2.5	34.5	2.3
45	49.0	1.8	35.8	2.3	48.8	1.7	35.5	2.4
46	49.9	2.2	37.5	1.5	49.7	2.3	37.3	1.5
47	48.3	1.9	35.7	2.1	48.2	2.0	35.5	2.1
48	47.8	2.2	33.8	1.8	47.6	2.1	33.6	1.8
49	48.3	2.3	35.1	2.4	48.1	2.3	34.8	2.6
50	49.3	2.7	34.0	1.4	49.1	2.7	34.2	1.9

Note: A rejection limit of ± 5".0 was used, and THORO (USAERDL) was employed as the initial station with ET27 WCE USGS (RED OAK KNOB) as the instrument station.

Table II. Mean and Standard Deviations of 12 Positions - Daytime

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
D01	48.6	2.4	33.4	2.4	49.2	2.0	34.1	2.1
D02	49.8	2.7	33.4	2.1	49.7	2.5	33.3	2.0
D03	48.8	2.7	33.1	2.5	48.1	2.4	32.4	2.2
D04	48.5	2.1	37.1	2.1	48.0	2.0	37.6	2.9
D05	48.1	1.9	32.8	2.5	47.8	1.9	32.9	2.1
D06	51.8	1.9	35.9	2.7	51.2	2.1	35.3	3.0
D07	46.7	2.5	35.1	2.6	46.5	2.3	34.9	2.5
D08	52.2	2.3	37.3	2.0	51.3	2.3	36.4	2.0
D09	51.0	2.4	35.8	2.2	50.2	2.4	35.0	2.2
D10	50.5	2.4	35.3	2.2	49.7	2.3	34.5	2.1
D11	48.5	2.7	33.4	2.5	47.7	2.7	32.6	2.4
D12	49.3	2.8	34.1	2.3	48.6	2.8	33.4	2.2
D13	50.4	2.1	34.9	3.1	49.6	2.2	34.2	3.3
D14	48.6	2.1	35.3	2.5	48.1	2.2	34.8	2.4
D15	49.9	1.5	35.3	1.6	49.4	1.5	34.8	1.5
D16	49.2	2.0	33.3	2.6	48.8	2.0	33.0	2.4
D17	48.3	2.4	33.3	1.3	47.9	2.4	32.9	1.3
D18	48.5	2.5	33.8	3.3	48.2	2.5	33.5	3.3
D19	47.7	2.1	33.0	2.1	47.4	2.0	32.8	2.0
D20	49.1	2.6	33.8	2.2	49.0	2.7	33.6	2.2
D21	49.1	1.7	33.5	2.0	48.7	2.0	33.1	1.8
D22	47.5	1.4	32.0	1.7	46.9	1.5	31.5	1.9
D23	48.5	2.8	33.5	2.1	48.1	2.8	33.0	2.1
D24	49.3	1.8	33.8	2.7	48.8	1.5	33.3	2.6
D25	49.1	2.4	31.0	2.8	48.2	2.9	30.6	2.7
D26	50.1	2.4	32.3	3.1	49.7	2.4	32.0	3.1
D27	49.7	2.4	32.6	2.6	49.4	2.4	32.3	2.6
D28	50.1	2.3	35.1	2.2	49.8	2.5	34.8	2.3
D29	51.2	1.9	36.0	2.3	51.0	2.1	35.8	2.3
D30	50.2	1.9	36.6	2.3	49.8	1.7	36.2	2.4
D31	49.1	2.4	35.5	2.4	48.8	2.3	35.2	2.6
D32	49.9	1.6	33.5	2.7	49.5	1.7	33.2	2.8
D33	50.3	1.9	34.8	2.4	50.0	2.0	34.5	2.6
D34	48.5	2.3	33.2	2.5	48.3	2.2	32.9	2.5
D35	49.0	2.5	35.3	2.0	48.6	2.4	34.9	2.0
D36	49.4	1.7	34.5	1.7	49.3	1.7	34.3	1.7
D37	49.1	2.2	34.2	3.1	48.7	2.2	33.8	3.2

Table II (cont'd)

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
D38	49.7	2.1	33.4	1.9	49.5	2.0	33.3	1.9
D39	50.1	2.5	34.5	2.5	49.8	2.5	34.2	2.3
D40	50.7	2.0	34.1	2.0	50.0	2.4	33.8	2.0
D41	49.5	2.8	35.5	1.9	49.9	2.0	34.6	1.0
D42	49.9	2.0	33.4	2.1	49.6	1.9	33.6	2.7
D43	49.9	1.8	33.5	1.9	49.8	1.8	33.4	2.2
D44	50.3	2.2	34.9	2.1	49.7	2.7	34.7	2.1
D45	49.2	1.1	36.0	2.5	49.0	1.3	35.8	2.6
D46	49.8	2.5	37.7	1.5	49.7	2.5	37.6	1.4
D47	48.7	2.0	35.7	2.2	48.6	2.1	35.6	2.1
D48	47.8	2.5	33.3	1.6	47.6	2.4	33.1	1.5
D49	47.9	1.9	34.3	2.2	47.6	1.8	33.9	2.3
D50	49.4	3.0	33.6	1.2	49.3	2.9	34.0	2.0
Mean	49.4		34.3		49.0		34.0	

Table III. Mean and Standard Deviations of 8 Positions - Daytime

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
D01	50.9	2.2	34.7	3.0	51.0	1.8	34.9	2.9
D02	51.0	2.4	34.8	2.2	50.7	2.5	34.5	1.9
D03	48.3	3.2	33.0	2.5	47.4	2.7	32.2	2.1
D04	47.6	1.9	37.6	2.3	46.9	2.0	37.7	2.9
D05	49.9	1.9	33.1	2.3	49.5	2.4	32.6	2.1
D06	51.2	1.4	37.0	1.9	50.9	1.7	36.6	2.2
D07	47.0	2.7	34.8	1.4	46.8	2.3	34.6	1.7
D08	52.6	2.4	39.0	2.6	51.7	2.8	37.5	2.6
D09	50.3	2.1	36.2	1.6	49.5	2.2	35.3	1.6
D10	49.6	3.0	36.3	2.0	49.0	2.9	35.6	1.8
D11	48.6	1.9	34.8	2.0	47.8	2.0	34.1	2.0
D12	49.7	3.0	33.5	2.6	48.9	2.6	32.7	3.0
D13	49.9	1.2	35.3	3.1	49.1	1.4	34.4	3.1
D14	48.9	1.8	35.1	2.6	48.6	2.0	34.8	2.5
D15	49.5	1.5	36.7	1.8	49.0	1.5	36.1	1.7
D16	49.4	2.3	35.0	1.6	48.8	2.3	34.5	1.6
D17	48.9	1.9	34.1	1.9	48.3	1.8	33.5	1.8
D18	48.2	2.0	34.0	3.3	47.7	2.0	34.2	2.8
D19	48.1	2.0	33.5	2.1	47.8	1.9	33.2	1.9
D20	48.9	3.2	33.5	2.7	48.6	3.4	33.2	2.7
D21	48.4	1.7	33.0	1.9	47.1	2.4	32.4	1.7
D22	46.9	1.5	32.7	1.4	46.7	1.6	32.5	1.5
D23	47.9	2.2	33.1	2.5	47.7	2.2	32.8	2.4
D24	48.9	2.2	35.1	2.4	48.4	2.3	34.6	2.4
D25	49.7	2.1	32.1	2.1	49.4	2.1	31.7	2.2
D26	50.5	1.8	33.1	3.1	50.1	1.7	32.6	3.1
D27	49.4	2.6	33.3	2.5	49.1	2.7	32.9	2.5
D28	49.9	2.8	35.3	2.5	49.8	2.9	35.2	2.4
D29	50.0	1.9	37.2	1.7	49.8	2.2	36.9	2.0
D30	50.9	1.6	36.8	2.3	50.5	1.6	36.4	2.4
D31	48.9	2.4	35.9	3.1	48.7	2.4	35.6	3.2
D32	50.0	1.7	34.1	2.6	49.4	1.7	33.5	2.8
D33	50.0	1.8	36.2	1.5	49.6	2.0	35.8	1.7
D34	49.3	2.9	34.3	2.0	48.8	3.0	33.8	2.0
D35	49.0	1.9	35.2	1.4	48.8	1.7	34.9	1.5
D36	49.4	2.2	35.3	1.7	49.1	2.2	35.0	1.8
D37	48.8	1.3	34.6	2.7	48.4	1.5	34.3	2.5

Table III (cont'd)

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
D38	49.4	1.8	34.2	2.2	49.0	1.7	33.8	2.2
D39	50.1	2.5	35.6	2.1	49.9	2.5	35.4	2.1
D40	50.4	2.2	34.8	1.7	50.0	1.7	34.5	1.6
D41	48.8	3.2	35.4	2.9	48.5	3.0	34.0	1.9
D42	49.1	2.3	34.2	2.0	49.1	2.3	35.0	2.5
D43	50.1	1.4	34.5	1.1	50.3	1.5	34.7	1.5
D44	50.3	2.2	34.9	3.0	49.4	3.0	34.7	3.0
D45	48.9	2.4	36.3	3.0	48.7	2.3	36.1	3.1
D46	49.8	1.8	37.4	1.7	49.4	2.0	37.1	1.6
D47	48.0	1.8	36.7	2.4	47.9	1.9	36.6	2.4
D48	47.1	1.3	34.1	2.1	47.0	1.3	34.0	2.1
D49	48.8	2.7	36.4	1.7	48.7	2.6	36.3	1.9
D50	49.3	1.9	34.3	1.4	49.0	1.8	34.7	2.4
Mean	49.3		35.0		48.9		34.6	

Table IV. Mean and Standard Deviations of 4 Positions - Daytime

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
D01	49.8	1.9	34.3	2.3	50.1	1.8	34.6	2.7
D02	51.6	1.8	35.0	1.8	51.2	1.7	34.5	2.0
D03	48.4	3.8	33.5	3.1	47.3	3.0	32.4	2.5
D04	48.0	2.4	38.9	2.0	47.2	2.2	39.5	2.7
D05	48.9	2.1	34.3	1.6	47.9	2.5	33.3	2.0
D06	50.1	.9	36.3	1.9	49.5	1.0	35.7	2.3
D07	47.0	2.9	35.9	.5	46.9	1.9	35.8	1.4
D08	53.5	2.3	39.3	1.3	52.7	2.3	38.4	1.5
D09	51.0	2.1	36.5	1.9	50.2	2.4	35.7	2.1
D10	51.0	1.9	37.4	2.2	50.2	1.7	36.5	1.9
D11	47.4	1.3	34.4	1.7	46.5	1.4	33.5	1.6
D12	50.6	3.5	34.3	3.0	50.0	3.1	33.6	3.3
D13	49.6	1.3	35.0	3.8	48.7	1.5	34.1	4.0
D14	48.3	1.5	35.5	2.3	48.0	1.7	35.2	2.4
D15	49.6	1.8	36.8	1.7	48.9	1.7	36.0	1.7
D16	48.0	1.5	34.6	1.1	47.5	1.5	34.1	1.1
D17	48.0	1.6	34.0	1.2	47.5	1.4	33.5	1.2
D18	48.3	2.5	34.9	3.9	47.8	2.6	34.5	4.0
D19	47.4	1.3	33.3	2.4	47.2	1.3	33.1	2.1
D20	49.3	3.1	34.6	2.3	48.9	3.5	34.3	2.8
D21	48.1	2.6	34.0	1.9	47.4	2.9	33.3	1.6
D22	45.9	1.1	32.5	1.5	45.5	1.1	32.1	1.7
D23	46.4	1.0	33.0	2.5	46.2	1.6	32.8	2.6
D24	48.3	1.4	35.8	2.5	47.8	1.2	35.3	2.5
D25	50.0	2.1	32.6	2.6	49.8	2.2	32.5	2.6
D26	50.9	2.4	34.5	3.7	50.3	2.3	33.9	3.9
D27	49.1	1.1	33.4	3.4	49.0	1.3	33.3	3.2
D28	50.1	2.8	34.9	3.4	50.0	2.8	34.8	3.2
D29	49.9	.9	37.9	1.9	49.9	.9	37.9	1.9
D30	50.1	1.7	36.8	1.9	49.8	1.7	36.4	2.2
D31	47.1	.9	35.5	3.3	46.8	.6	35.1	3.5
D32	50.0	1.5	35.0	1.3	49.8	1.3	34.8	1.4
D33	50.1	1.6	36.0	1.9	49.8	2.1	35.9	2.3
D34	49.4	3.1	34.0	3.0	48.9	3.3	33.5	3.0
D35	47.8	1.3	35.5	.9	47.6	1.0	35.4	1.1
D36	49.1	2.5	35.6	1.8	48.9	2.4	35.4	2.1
D37	47.8	.6	35.3	2.3	47.3	.3	34.8	2.3

Table IV (cont'd)

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
D38	49.9	2.2	33.4	2.6	49.6	1.9	33.1	2.7
D39	49.1	3.1	34.6	2.8	49.0	3.0	34.5	2.6
D40	50.4	1.8	34.8	1.8	50.1	1.5	34.6	1.9
D41	48.9	2.6	36.9	2.3	48.9	2.3	34.5	.6
D42	49.9	2.6	33.3	1.1	49.9	2.4	34.8	2.9
D43	50.0	1.5	34.9	1.4	50.4	1.5	35.3	1.9
D44	51.5	2.1	35.5	3.3	50.1	4.1	35.5	3.2
D45	49.4	1.7	37.6	3.5	49.3	1.8	37.5	3.8
D46	49.6	2.2	37.9	1.7	49.3	2.4	37.6	1.3
D47	48.8	2.2	37.8	2.3	48.6	2.3	37.6	2.2
D48	46.5	1.3	32.9	1.8	46.2	1.3	32.6	1.7
D49	47.8	2.2	35.3	1.6	47.5	1.8	35.0	1.8
D50	49.8	1.8	33.5	1.5	49.3	1.9	34.5	3.4
Mean	49.2		35.2		48.7		34.9	

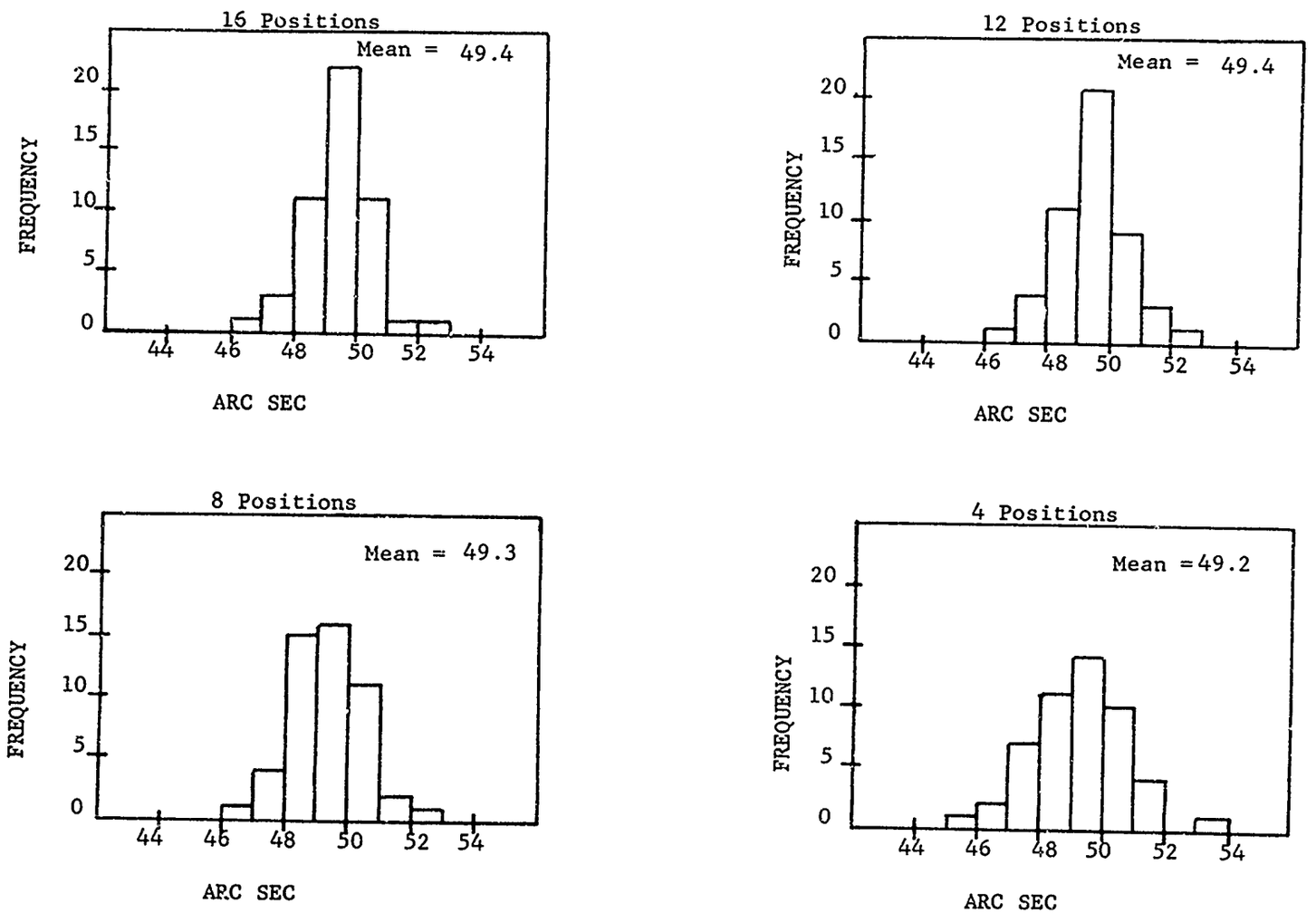


Fig. 3. Frequency histogram. Angle: THORO-RED OAK KNOB-JEREMY. Daytime determinations, without closure, using 16, 12, 8, and 4 positions.

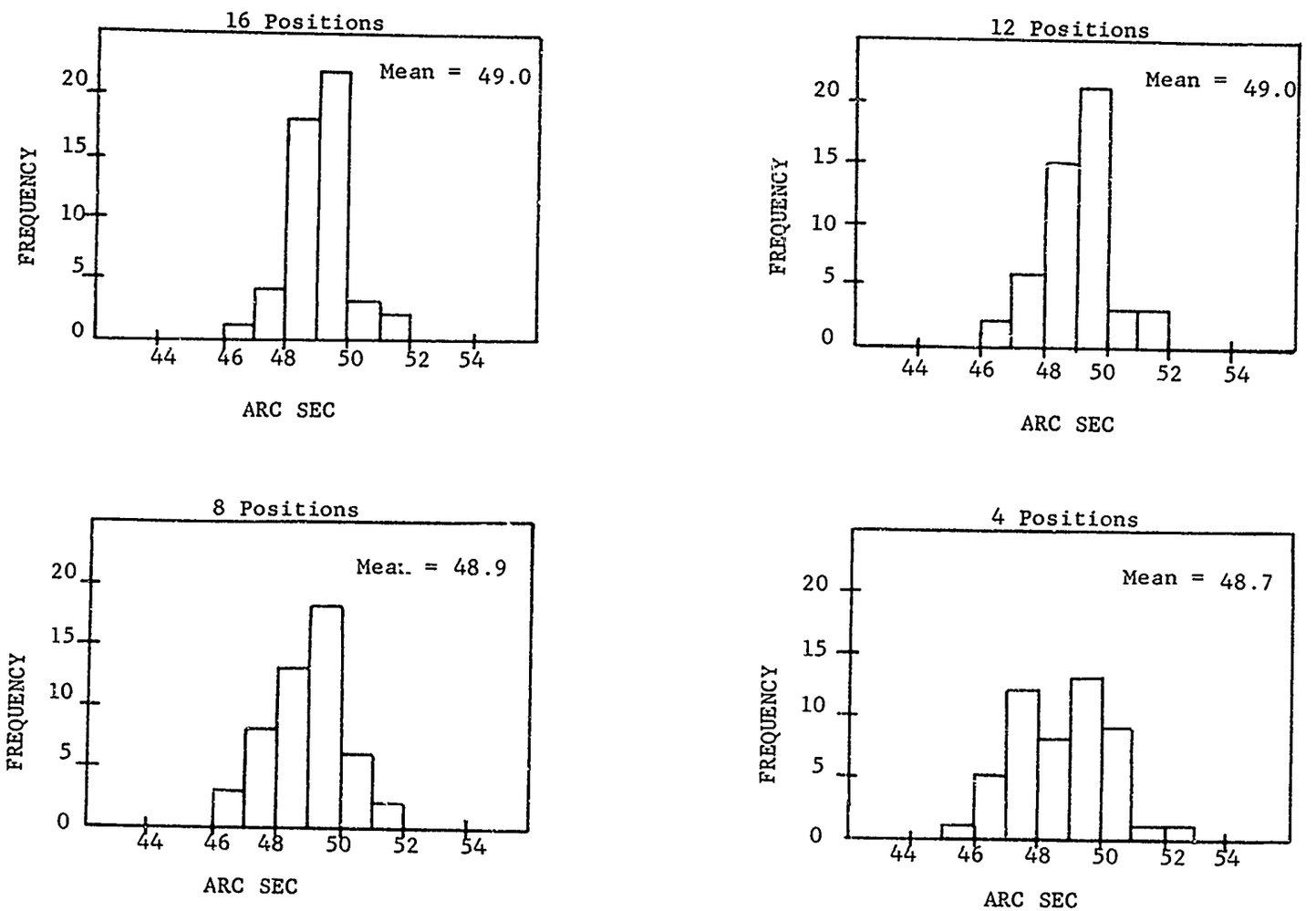


Fig. 4. Frequency histogram. Angle: THORO-RED OAK KNOB-JEREMY. Daytime determinations, with closure, using 16, 12, 8, and 4 positions.

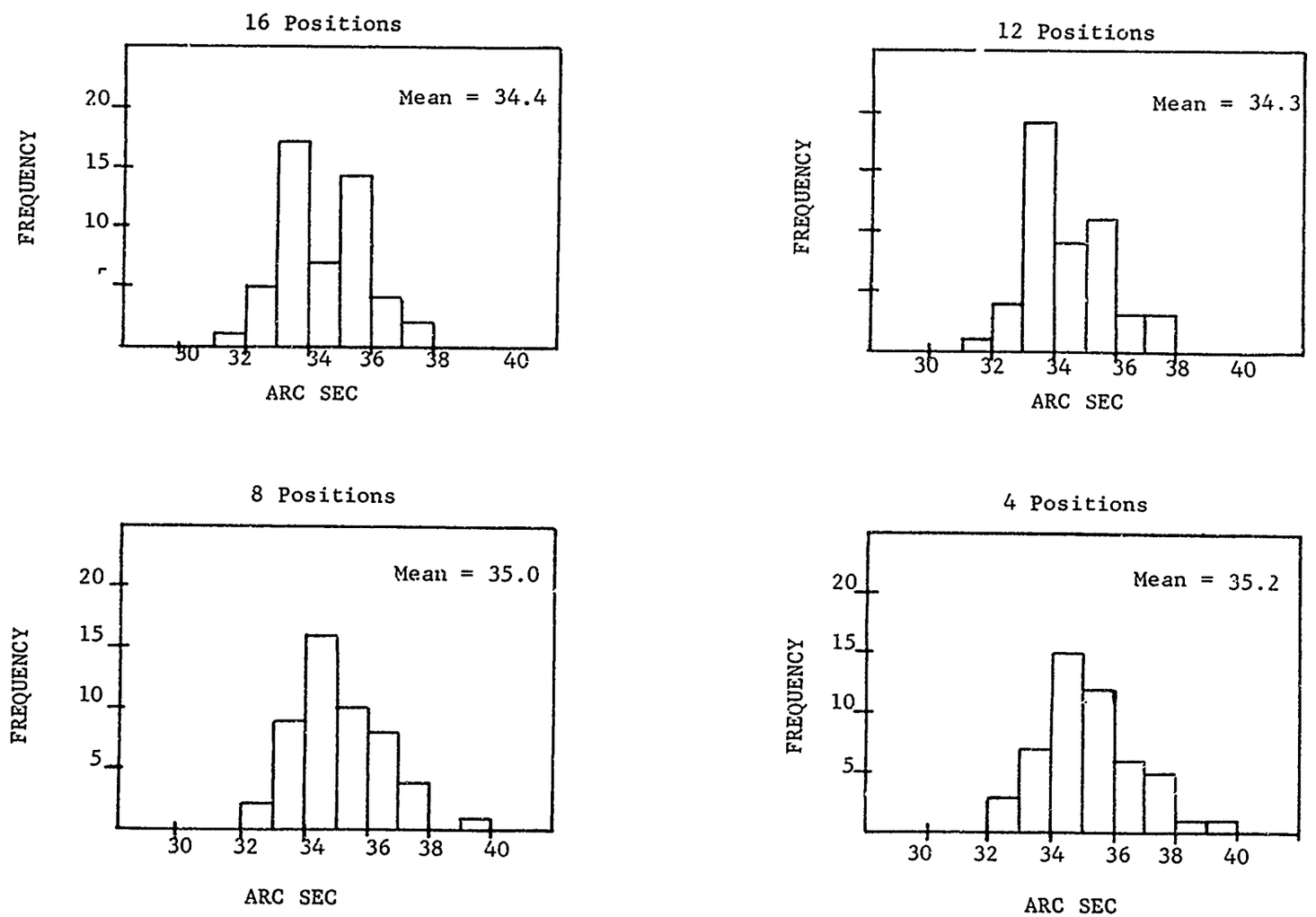


Fig. 5. Frequency histogram. Angle: THORO-RED OAK KNOB-OVERLOOK. Daytime determinations, without closure, using 16, 12, 8, and 4 positions.

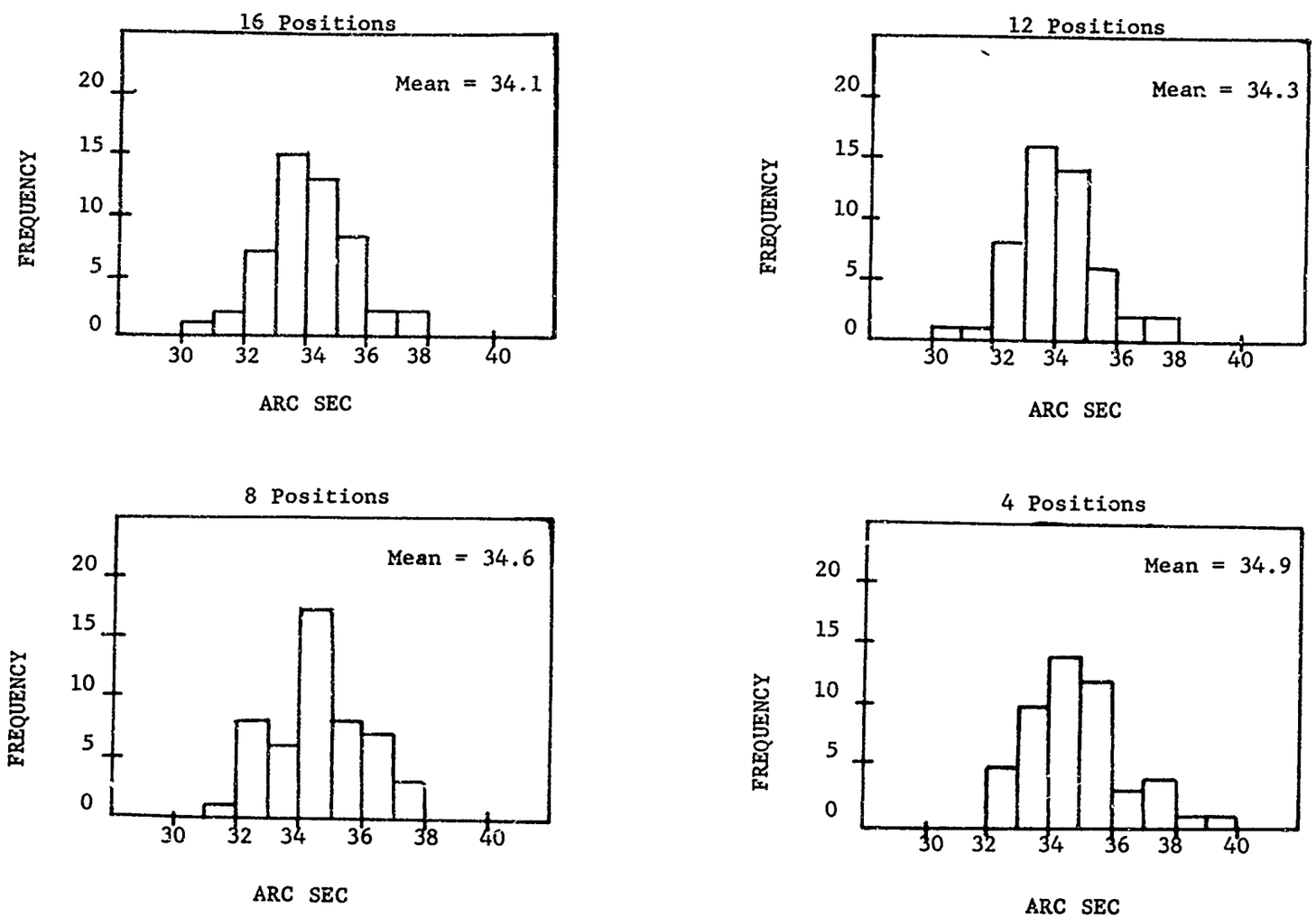


Fig. 6. Frequency histogram. Angle: THORO-RED OAK KNOB-OVERLOOK. Daytime determinations, with closure, using 16, 12, 8, and 4 positions.

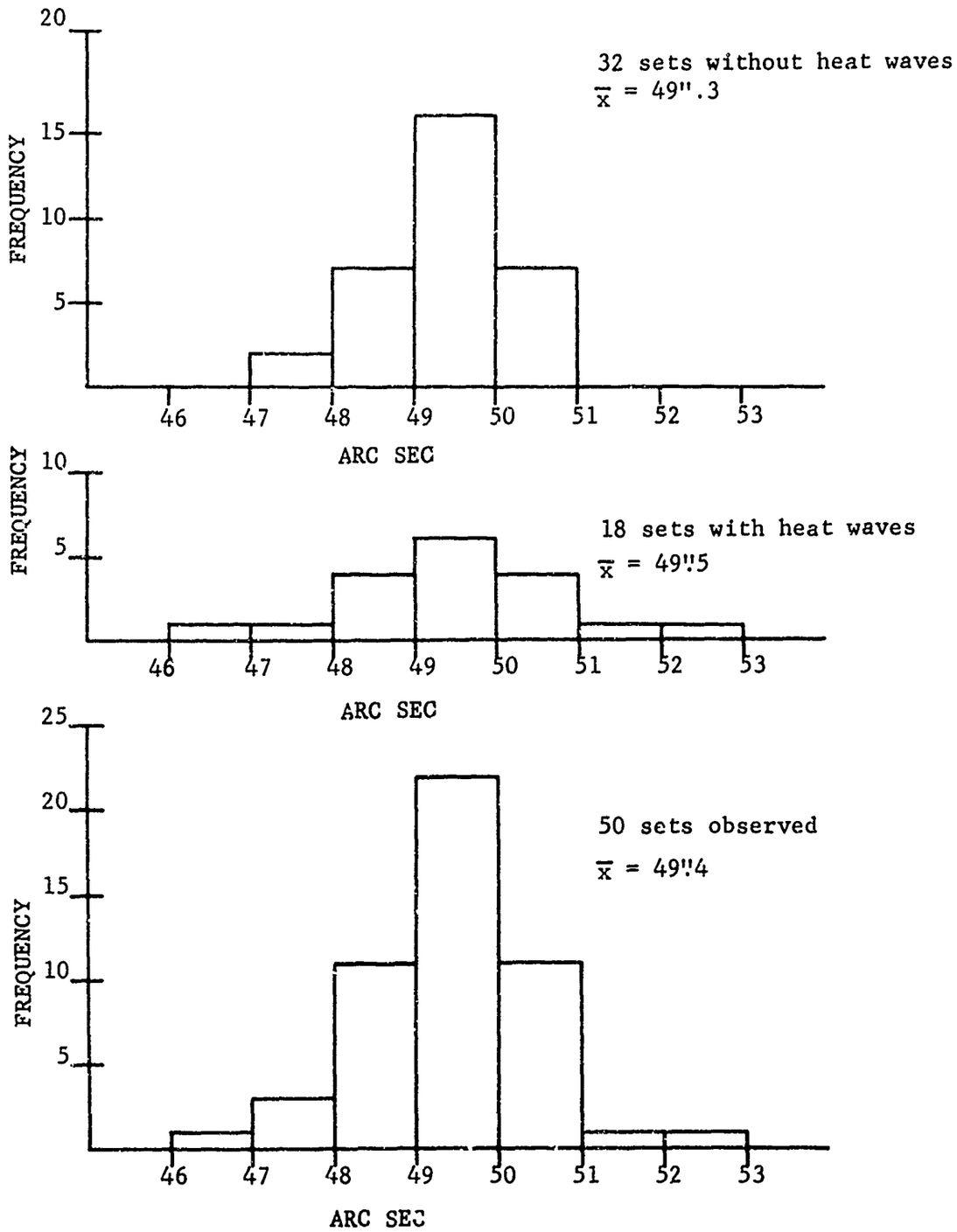


Fig. 7. Atmospheric dependence histogram. Angle: THORO-RED OAK KNOB-JEREMY. Daytime determinations, without closure.

Table V. Mean and Standard Deviations of 16 Positions - Nighttime

Survey	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	48.3	2.4	33.2	2.2	48.7	2.4	33.6	2.2
2	46.5	1.9	32.7	1.8	45.8	2.1	32.0	1.5
3	48.8	2.4	35.2	1.8	47.9	2.5	34.4	1.9
4	47.7	2.1	34.2	2.1	46.7	2.0	33.2	2.2
5	49.9	2.4	32.6	2.3	49.0	2.5	31.8	2.1
6	45.0	3.3	32.0	2.3	44.5	3.2	31.4	2.3
7	47.7	2.6	31.4	2.6	47.2	2.4	30.6	2.7
8	49.6	2.1	33.8	2.8	48.7	2.1	32.9	2.8
9	47.7	1.9	32.5	2.5	47.1	2.0	31.9	2.6
10	47.4	2.4	32.8	1.8	46.9	2.2	32.3	1.8
11	48.2	2.1	31.8	2.1	46.9	2.6	31.3	2.3
12	48.2	2.2	33.7	2.3	47.6	2.5	33.1	2.3
13	48.0	2.0	33.2	1.6	47.5	2.0	32.7	1.9
14	48.6	1.6	35.2	2.1	48.4	1.9	34.6	1.9
15	49.3	2.5	32.6	2.6	48.9	2.3	32.1	2.5
16	48.9	2.2	34.0	2.9	48.5	2.1	33.1	3.1
17	49.4	2.9	34.3	2.6	49.4	2.9	33.9	2.7
18	48.6	2.5	32.5	2.5	48.1	2.5	31.6	2.2
19	48.2	2.0	29.6	3.1	47.7	1.9	28.4	2.6
20	48.7	2.0	33.8	2.5	48.5	2.0	33.5	2.5
21	47.6	1.8	31.5	2.2	47.2	1.9	31.1	2.3
22	46.6	1.8	31.2	2.4	46.2	1.9	30.7	2.5
23	46.8	1.4	31.5	2.2	46.4	1.4	31.1	2.2
24	47.1	2.2	31.4	2.0	46.4	2.5	31.0	2.0
25	48.0	1.9	32.9	2.0	47.5	1.9	32.4	2.1
26	46.6	2.5	31.3	2.8	46.2	2.6	30.6	3.0
27	48.4	2.4	33.2	1.3	48.1	2.6	32.9	1.4
28	48.9	2.1	32.4	2.0	48.4	2.2	31.9	2.1
29	48.8	1.8	32.6	1.7	48.4	1.9	32.3	1.9
30	48.3	2.3	32.8	1.8	48.3	2.2	32.5	1.7
31	48.8	2.0	34.2	2.4	48.5	2.1	33.8	2.4
32	49.4	2.3	34.9	1.6	49.1	2.4	34.6	1.6
33	49.9	2.1	34.0	2.1	49.6	1.8	33.8	2.1
34	49.6	2.1	34.4	2.7	49.6	1.9	34.3	2.5
35	48.8	1.8	33.3	1.9	48.6	1.8	33.2	2.1
36	49.1	2.3	34.9	2.1	48.9	2.2	34.4	2.5

Table V (cont'd)

Survey	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
37	49.1	2.0	34.8	2.9	48.9	2.1	34.5	2.9
38	47.3	1.7	33.9	2.0	47.1	1.7	33.6	1.9
39	47.8	1.7	34.9	2.0	47.7	1.7	34.9	1.8
40	48.6	2.1	33.0	2.2	48.4	2.2	32.8	2.2
41	47.8	1.4	34.3	2.0	47.6	1.2	34.1	2.1
42	48.6	1.5	34.1	2.3	48.5	1.6	34.0	2.3
43	49.4	1.8	35.3	2.0	49.3	1.7	35.2	2.0
44	48.5	1.8	34.3	2.7	48.3	1.9	34.2	2.7
45	47.7	1.8	35.5	2.4	47.6	1.8	35.4	2.4
46	48.1	1.5	35.2	2.5	48.1	1.6	34.9	2.7
47	47.2	1.3	34.9	1.4	47.0	1.3	34.7	1.5
48	48.4	2.4	35.9	1.5	48.4	2.4	35.9	1.6
49	47.5	2.0	34.3	1.8	47.4	1.9	34.6	2.1
50	47.5	2.3	34.6	2.2	47.6	2.4	34.7	2.3

Note: A rejection limit of $\pm$ 5".0 was used, and THORO (USAERDL) was employed as the initial station with ET27 WCE USGS (RED OAK KNOB) as the instrument station.

Table VI. Mean and Standard Deviations of 12 Positions - Nighttime

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
N01	48.0	2.6	33.1	1.8	48.5	2.6	33.6	2.1
N02	46.5	2.1	32.6	1.9	45.9	2.3	32.1	1.5
N03	48.7	2.7	35.5	1.8	47.9	2.8	34.7	1.9
N04	47.8	2.3	34.5	1.7	46.8	2.2	33.6	1.7
N05	49.5	2.4	32.4	2.4	48.7	2.5	31.7	2.2
N06	44.8	3.6	32.0	2.4	44.1	3.5	31.4	2.4
N07	47.6	2.1	31.5	2.9	46.9	2.2	30.8	2.9
N08	49.7	2.0	34.3	2.6	48.9	1.9	33.5	2.6
N09	47.8	1.8	32.8	2.7	47.3	1.9	32.2	2.7
N10	47.3	2.7	32.6	1.5	46.8	2.5	32.1	1.4
N11	48.1	1.9	31.7	2.4	46.6	2.8	31.2	2.6
N12	48.3	2.1	33.9	2.4	47.7	2.4	33.3	2.5
N13	48.2	1.4	33.4	1.8	47.6	1.6	32.8	2.1
N14	48.3	1.3	34.9	2.2	48.2	1.9	34.4	2.0
N15	49.3	2.4	32.3	2.6	48.9	2.1	31.9	2.4
N16	49.1	2.2	33.3	2.9	48.7	2.1	33.4	3.2
N17	49.5	3.0	35.0	2.6	49.5	2.7	34.6	2.7
N18	48.5	2.2	32.5	2.4	48.0	2.3	31.6	2.0
N19	47.6	1.8	29.8	3.3	47.3	1.8	28.5	2.5
N20	48.0	1.4	33.3	2.6	47.8	1.6	33.1	2.6
N21	47.4	1.6	31.7	2.2	47.0	1.7	31.3	2.4
N22	46.7	1.6	31.3	2.3	46.3	1.6	30.8	2.4
N23	47.0	1.2	31.5	2.2	46.7	1.2	31.2	2.2
N24	47.3	2.1	31.8	1.9	46.9	2.1	31.4	1.9
N25	48.2	2.2	33.2	2.2	47.7	2.1	32.7	2.3
N26	46.5	2.5	31.3	3.0	46.1	2.6	30.4	3.3
N27	48.0	2.2	33.1	1.4	47.7	2.5	32.8	1.5
N28	48.5	2.2	32.5	2.1	48.3	2.3	32.3	2.2
N29	49.1	1.7	32.8	1.9	48.8	1.7	32.4	2.1
N30	48.0	2.5	32.9	1.8	48.0	2.2	32.4	1.8
N31	48.8	2.2	34.3	2.4	48.5	2.3	33.9	2.4
N32	49.2	2.3	35.0	1.6	48.9	2.4	34.7	1.7
N33	49.9	2.2	34.1	2.2	49.7	2.0	33.9	2.2
N34	49.6	2.4	34.6	2.8	49.6	2.2	34.6	2.6
N35	48.5	1.7	33.3	2.2	48.3	1.8	33.1	2.3
N36	49.0	2.4	35.0	1.8	48.7	2.2	34.3	2.4
N37	48.9	2.2	35.1	2.9	48.7	2.2	34.9	2.9

Table VI (cont'd)

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
N38	47.2	1.9	33.8	2.1	46.9	1.7	33.5	1.9
N39	47.7	1.8	35.0	1.6	47.6	1.8	35.0	1.4
N40	49.1	1.7	33.5	2.3	48.8	1.8	33.2	2.3
N41	47.7	1.4	34.9	1.9	47.6	1.2	34.8	1.9
N42	48.3	1.5	34.5	2.2	48.2	1.6	34.4	2.2
N43	49.6	2.0	35.4	2.0	49.6	1.8	35.3	2.0
N44	48.7	1.6	35.1	2.5	48.6	1.7	35.1	2.4
N45	47.5	1.8	35.9	2.4	47.5	1.9	35.9	2.3
N46	47.9	1.6	35.7	2.6	47.9	1.7	35.6	2.5
N47	47.3	1.4	35.1	1.3	47.0	1.4	34.9	1.5
N48	47.8	2.2	35.7	1.7	47.8	2.3	35.7	1.6
N49	47.5	1.9	34.6	1.4	47.4	1.9	34.9	1.9
N50	47.2	2.6	35.3	1.8	47.4	2.7	35.5	1.9
Mean	48.1		33.6		47.8		33.2	

Table VII. Mean and Standard Deviations of 8 Positions - Nighttime

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
N01	48.7	1.7	33.9	2.7	49.1	1.9	34.3	2.5
N02	47.0	2.0	33.4	2.0	46.0	2.5	32.4	1.6
N03	49.2	2.2	34.9	1.6	48.3	2.4	33.9	1.7
N04	48.1	1.4	33.8	2.1	46.9	1.4	32.6	2.2
N05	50.1	1.9	32.8	1.8	49.2	2.0	31.9	1.9
N06	45.7	2.8	32.7	1.4	44.9	2.6	32.0	1.4
N07	47.5	2.8	32.4	2.3	47.3	2.2	31.8	2.4
N08	48.7	2.5	32.9	3.0	48.0	2.4	32.1	3.1
N09	47.3	2.1	32.9	2.6	46.5	2.1	32.2	2.6
N10	46.7	1.6	33.2	2.2	46.2	1.5	32.7	2.2
N11	48.2	2.4	33.0	1.6	47.6	2.3	32.4	1.9
N12	48.8	2.6	33.9	2.0	48.1	3.0	33.2	2.2
N13	47.6	2.5	33.1	1.7	47.3	2.7	32.8	1.9
N14	48.7	1.7	35.7	1.7	48.2	1.8	35.2	1.7
N15	48.6	2.7	32.5	2.8	48.4	2.3	32.3	2.5
N16	49.2	2.4	34.1	2.8	48.6	2.6	33.5	2.7
N17	48.7	2.5	33.8	2.7	48.5	2.7	33.5	2.9
N18	48.3	2.5	32.6	2.7	47.7	2.7	31.3	2.1
N19	48.9	1.8	30.2	2.4	48.3	1.8	29.4	2.5
N20	49.4	2.4	34.4	2.7	49.1	2.2	34.1	2.5
N21	47.7	1.8	31.6	2.2	47.4	1.8	31.3	2.2
N22	45.9	2.2	31.3	2.9	45.4	2.3	30.8	3.1
N23	46.3	1.3	31.5	1.6	45.9	1.5	31.1	1.7
N24	46.6	2.0	31.0	1.9	45.4	2.6	30.6	2.0
N25	47.1	1.7	33.1	1.7	46.6	1.7	32.6	1.6
N26	46.0	2.9	31.6	2.4	45.9	3.0	30.8	3.0
N27	48.6	2.4	33.7	1.4	48.1	2.6	33.3	1.6
N28	48.8	1.9	32.2	2.2	48.4	1.9	31.8	2.2
N29	48.1	1.6	33.2	2.0	48.0	1.6	33.1	2.0
N30	48.1	2.4	33.3	1.7	47.9	2.5	33.1	1.5
N31	48.3	1.1	34.5	2.4	48.0	1.3	34.2	2.4
N32	48.9	2.4	34.9	1.8	48.6	2.5	34.5	1.7
N33	49.7	1.9	34.4	2.3	49.6	1.8	34.3	2.4
N34	49.3	2.2	34.3	3.4	49.4	1.9	34.4	3.2
N35	48.6	2.2	33.5	1.8	48.6	2.1	33.5	1.9
N36	48.7	2.2	35.4	2.6	48.7	2.2	34.7	3.3
N37	49.2	1.7	34.1	3.6	49.0	1.8	33.9	3.5

Table VII (cont'd)

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
N38	47.3	1.5	33.8	2.3	47.3	1.5	33.7	2.2
N39	48.3	1.4	34.8	2.7	48.1	1.6	34.6	2.5
N40	47.9	2.1	33.5	2.5	47.7	2.3	33.3	2.5
N41	47.8	1.2	33.6	2.2	47.6	1.2	33.5	2.3
N42	49.1	1.1	34.7	2.6	49.1	1.0	34.6	2.5
N43	49.3	1.9	35.4	2.5	49.1	1.9	35.2	2.4
N44	47.9	1.9	33.6	2.9	47.7	2.0	33.4	2.9
N45	48.0	1.7	34.5	2.2	48.1	1.8	34.6	2.2
N46	47.8	1.5	34.8	2.8	47.8	1.6	34.1	3.1
N47	46.9	1.1	34.9	1.5	46.8	1.1	34.7	1.5
N48	48.1	2.9	35.6	2.2	48.0	2.8	35.5	1.9
N49	46.7	2.2	34.0	2.2	46.7	2.2	34.0	2.2
N50	47.4	1.5	33.9	2.4	47.6	1.6	34.1	2.5
Mean	48.1		33.5		47.7		33.1	

Table VIII. Mean and Standard Deviations of 4 Positions - Nighttime

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
N01	48.3	2.1	34.5	2.1	48.7	2.5	35.0	2.1
N02	47.3	2.7	33.9	2.5	46.2	3.4	32.8	1.8
N03	49.4	3.1	35.3	1.7	48.4	3.3	34.3	1.8
N04	48.6	1.1	34.1	.7	47.4	.9	32.9	.3
N05	49.3	.9	32.3	2.3	48.3	.8	31.4	2.3
N06	45.1	3.4	33.4	1.7	44.2	3.0	32.7	1.7
N07	47.1	1.7	33.8	2.1	46.3	1.7	32.9	2.2
N08	48.1	2.3	33.6	3.0	47.6	2.4	33.1	3.2
N09	47.4	2.1	34.0	2.9	46.5	2.2	33.2	2.7
N10	45.8	1.2	33.0	1.8	45.3	1.0	32.5	1.7
N11	47.8	2.6	33.9	1.7	47.3	2.5	33.4	2.0
N12	49.5	2.3	34.8	1.7	48.8	3.0	34.0	2.3
N13	47.8	1.8	33.6	2.3	47.5	2.4	33.3	2.5
N14	47.9	.6	35.5	1.8	47.2	.6	34.8	1.7
N15	47.8	2.2	31.8	3.0	47.8	1.8	31.8	2.5
N16	50.1	2.3	35.5	2.3	49.5	2.7	34.8	2.5
N17	48.0	2.0	35.1	3.1	48.0	2.0	35.1	3.2
N18	47.5	1.8	33.0	2.9	46.9	2.2	31.0	1.1
N19	48.1	1.4	31.5	2.0	47.5	1.7	30.9	2.4
N20	48.0	1.5	33.6	3.4	47.8	1.7	33.4	3.3
N21	47.3	.9	32.0	2.4	47.1	.7	31.9	2.5
N22	45.4	1.9	31.8	3.2	44.9	2.1	31.3	3.5
N23	46.4	.9	31.4	1.0	46.3	1.0	31.3	1.0
N24	46.1	1.7	31.5	1.4	45.8	1.6	31.1	1.8
N25	46.8	2.4	34.1	1.7	46.3	2.3	33.6	1.3
N26	45.4	3.1	31.8	2.9	45.1	3.4	30.3	3.9
N27	47.4	1.7	33.9	1.9	46.9	1.8	33.4	2.0
N28	47.6	1.7	32.3	2.7	47.4	1.8	32.0	2.9
N29	48.5	1.1	34.1	2.4	48.6	.6	34.3	2.3
N30	46.8	2.5	33.8	1.7	46.4	2.7	33.4	1.3
N31	47.9	.2	35.1	2.5	47.5	.6	34.8	2.5
N32	47.9	1.8	35.1	2.4	47.5	1.6	34.7	2.5
N33	49.6	2.4	35.3	2.8	49.6	2.4	35.3	2.8
N34	48.9	3.2	34.9	4.6	49.1	2.8	35.1	4.2
N35	47.6	2.3	33.4	2.4	47.8	2.5	33.5	2.5
N36	47.8	2.0	36.1	2.0	47.8	2.0	34.8	3.9
N37	48.6	1.9	34.4	4.5	48.4	1.8	34.2	4.3

Table VIII (cont'd)

	Without Closure				With Closure			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
N38	46.9	1.9	33.3	2.7	46.9	1.7	33.2	2.6
N39	48.4	1.7	35.1	2.6	48.3	1.8	35.0	2.3
N40	48.6	1.3	35.4	2.1	48.3	1.7	35.0	2.5
N41	47.4	.9	34.8	2.3	47.5	.9	34.9	2.2
N42	48.9	.9	36.6	.5	48.8	.8	36.5	.4
N43	49.8	2.5	35.5	3.0	49.5	2.5	35.3	3.0
N44	48.1	1.3	35.5	2.7	47.9	1.3	35.3	2.8
N45	47.9	1.8	34.9	2.6	48.0	2.1	35.0	2.3
N46	46.9	1.2	35.8	3.6	46.7	1.1	35.5	3.5
N47	46.9	.7	35.5	.9	46.7	1.0	35.3	1.4
N48	45.9	1.7	34.4	1.8	46.0	1.9	34.5	1.7
N49	46.0	2.1	34.4	1.9	46.0	1.9	34.4	1.8
N50	46.6	1.7	35.6	1.7	47.0	1.9	36.0	1.9
Mean	47.7		34.1		47.3		33.7	

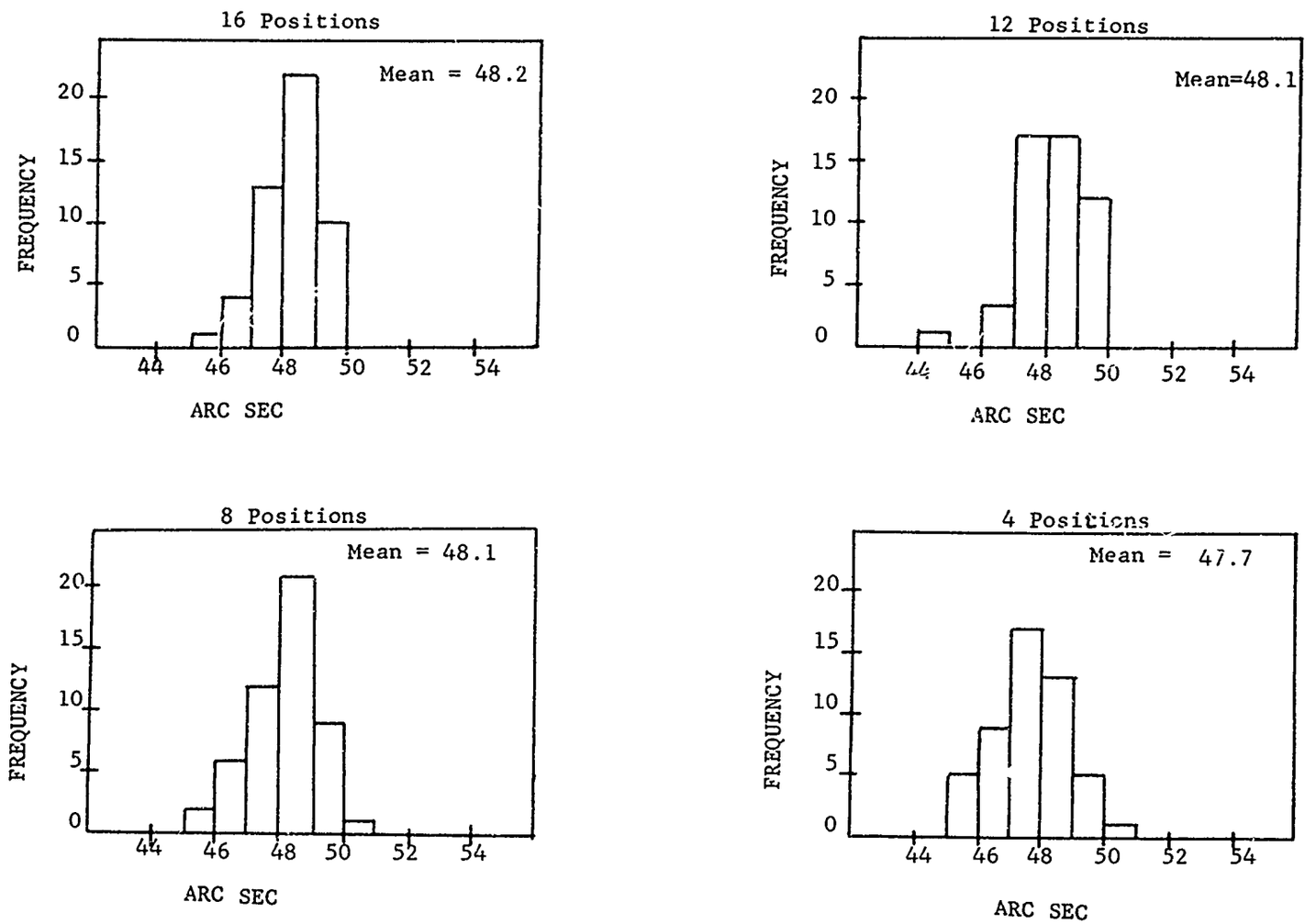


Fig. 8. Frequency histogram. Angle: THORO-RED OAK KNOB-JEREMY. Nighttime determinations, without closure, using 16, 12, 8, and 4 positions.

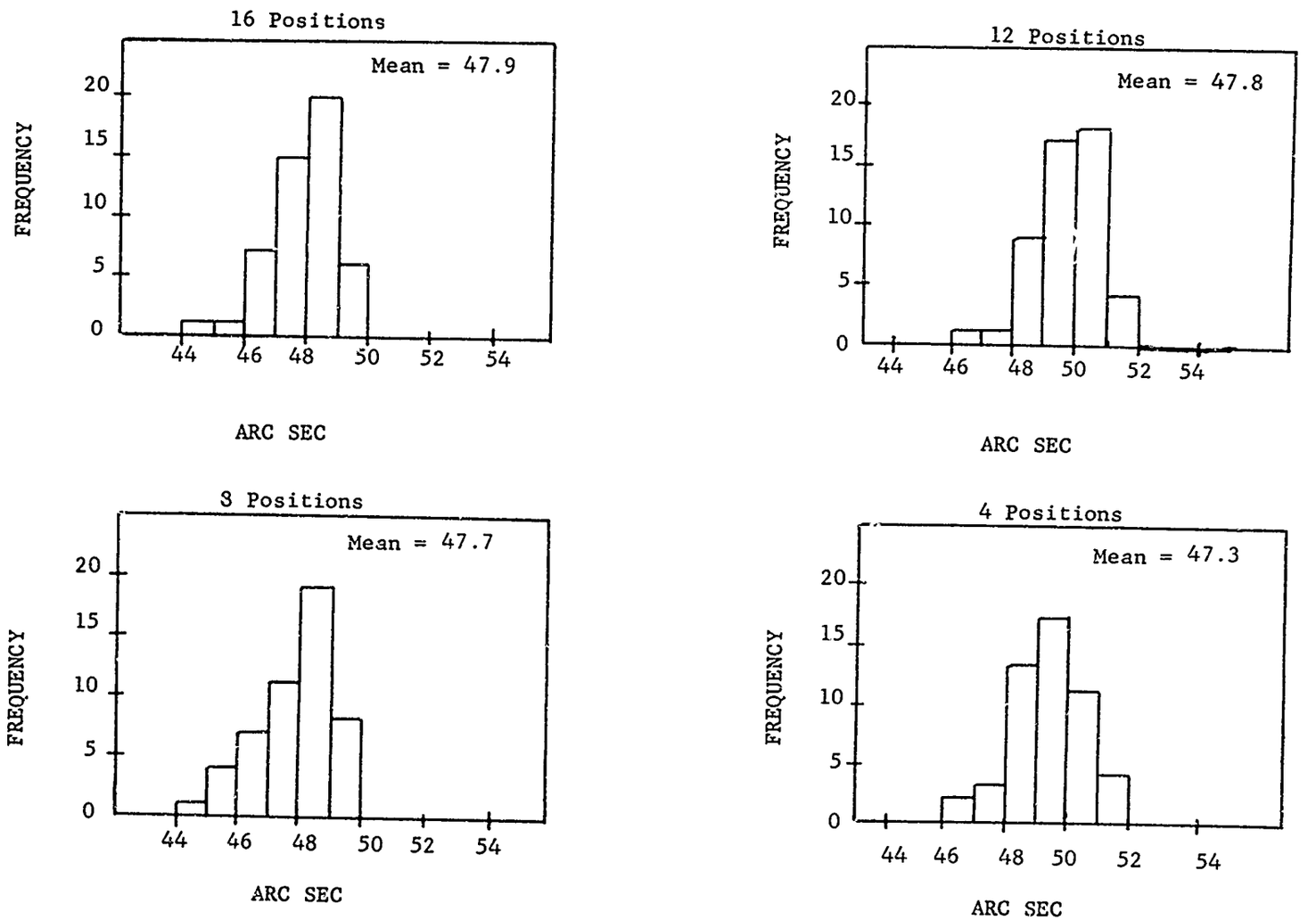


Fig. 9. Frequency histogram. Angle: TI ORO-RED OAK KNOB-JEREMY. Nighttime determinations, with closure, using 16, 12, 8, and 4 positions.

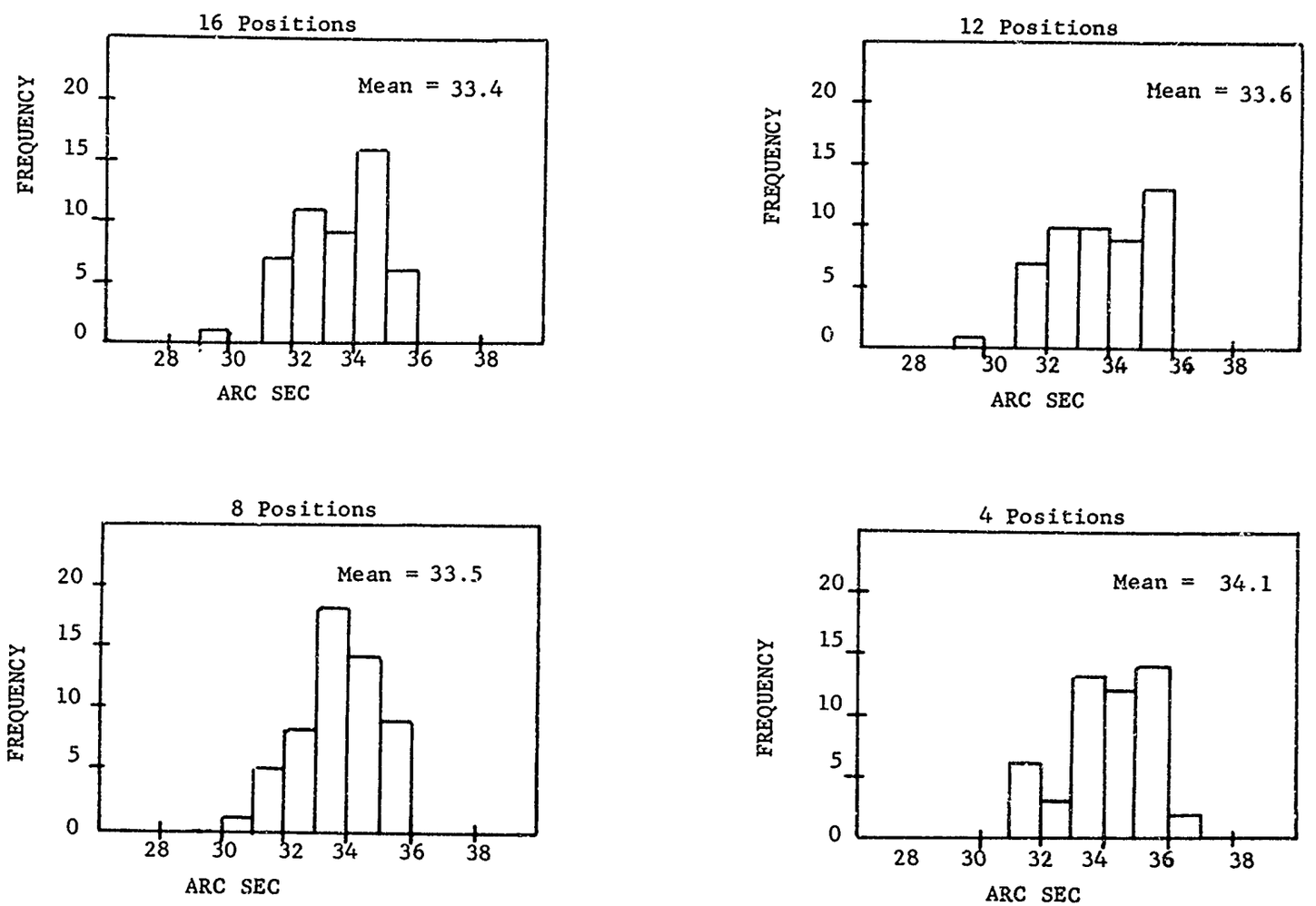


Fig. 10. Frequency histogram. Angle: THORO-RED OAK KNOB-OVERLOOK. Nighttime determinations, without closure, using 16, 12, 8, and 4 positions.

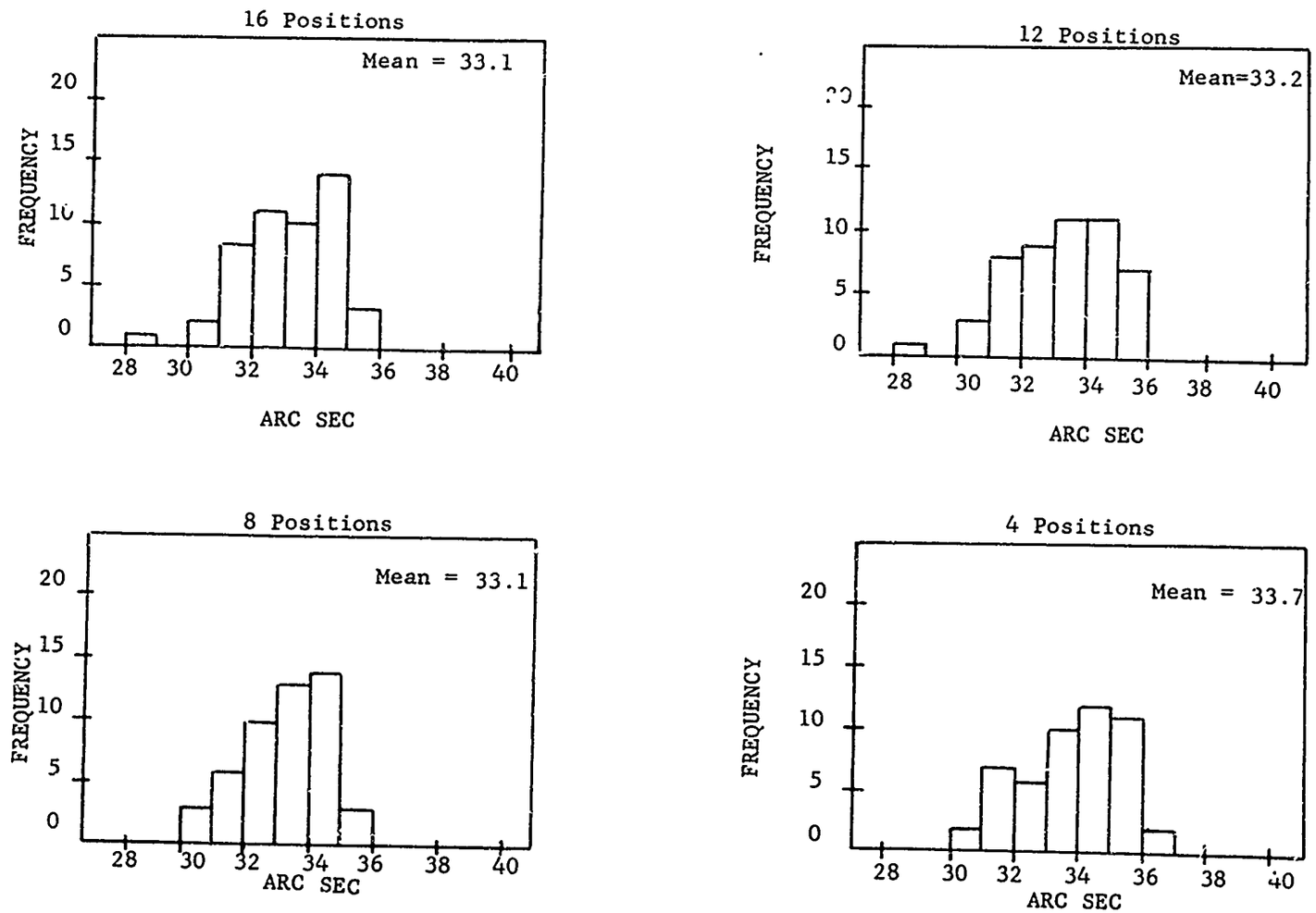


Fig. 11. Frequency histogram. Angle: THORO-RED OAK KNOB--OVERLOOK. Nighttime determinations, with closure, using 16, 12, 8, and 4 positions.

III. DISCUSSION

9. Instrumental Errors. The quality of an instrument is a factor in the variability of the angles in each set of 16 circle settings. Throughout this test, the same instrument and the same segments or positions on the circle were used for the corresponding 16 positions within each set of angles. The 1,600 angles measured were grouped according to position or circle setting and whether measured during day or night.

a. The data for Fig. 12 were formed from the average angle variations for each of the 16 circle settings. These variations were determined by taking the average angle for each of the 16 positions, from the combined average angle of all positions. The day and night angle variations versus circle setting were plotted on the same table to show the correlation with circle setting and angle measured.

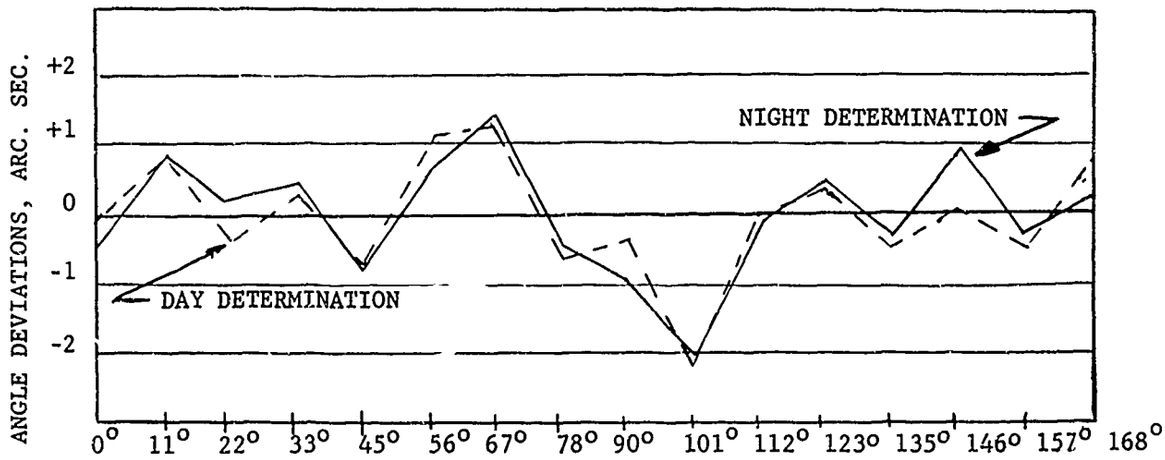
b. Tables IX and X contain nighttime and daytime data for the instrument error versus position or circle setting. The angle THORO-RED OAK KNOB-JEREMY was used because this angle is approximately 45° which is a multiple of 180° and a multiple of the circle setting. The angles were grouped in the following manner: Positions 1, 5, 9, and 13; 2, 6, 10, and 14; 3, 7, 11, and 15; and 4, 8, 12, and 16. The mean angle for each group was determined and variation from these mean angles for each circle setting was determined. The graphs at the bottoms of Tables IX and X, that is, Figs. 13 and 14, are the apparent instrument circle error in arc seconds plotted against the circle setting in degrees. The procedure used in determining the error for each circle setting was the procedure outlined in the Military Specification MIL-T-52035A, THEODOLITE, SURVEYING, DIRECTIONS, FIRST ORDER; Page 40, Theodolite Circle Test Instructions, with the following exceptions:

(1) Terrestial targets were used in lieu of collimators.

(2) The angle between targets was 45° in lieu of 36°.

(3) Only one micrometer coincidence was made to each target.

c. Examination of Tables IX and X leads to the conclusion that the graduation errors of the horizontal circle can be neglected for all practical purposes because they are smaller than the observation errors encountered in the field. This does not mean that observations should be taken using just one part of the circle, but does conclude that applying a



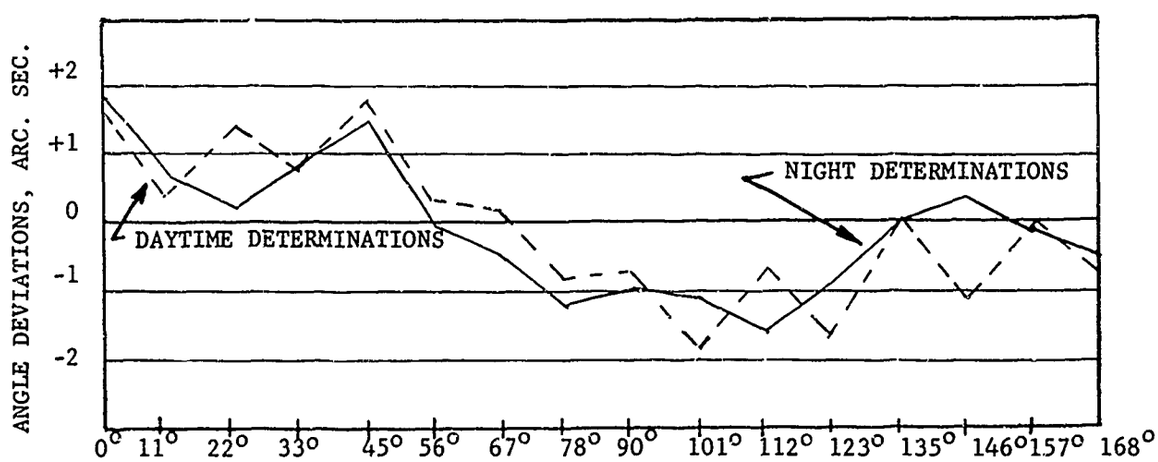


Fig. 12. Average angle deviation vs circle setting. Top: Angle, THORO-RED OAK KNOB-JEREMY. Bottom: Angle, THORO-RED OAK KNOB-OVERLOOK.

Table IX. Field Circle Test
Angle: THORO-RED OAK KNOB-JEREMY
Nighttime Data, without Closure

GROUP #1				GROUP #2			
DIAMETERS	I	II	III	DIAMETERS	I	II	III
DEGREES	VARIATIONS	ACCUM. ERROR	ERROR	DEGREES	VARIATIONS	ACCUM. ERROR	ERROR
0	+.09	0.	0	11	+.72	0	-.30
45	+.00	+.09	+.09	56	+.65	+.72	+.42
90	-.30	+.09	+.09	101	-2.26	+1.37	+1.06
135	+.21	-.21	-.21	146	+.89	-.89	-1.19
Σ/-4	0	0	-.00	Σ/-4	0	-.30	+0

GROUP #3				GROUP #4			
22	-.11	0	-.42	33	+.29	0	+.02
67	+1.27	-.11	-.53	78	-.64	+.29	+.31
112	-.53	+1.16	+.74	123	+.31	-.35	-.32
157	-.63	+.63	+.21	168	+.04	-.04	-.01
Σ/-4	-.00	-.42	0	Σ/-4	+0	+.02	+.00

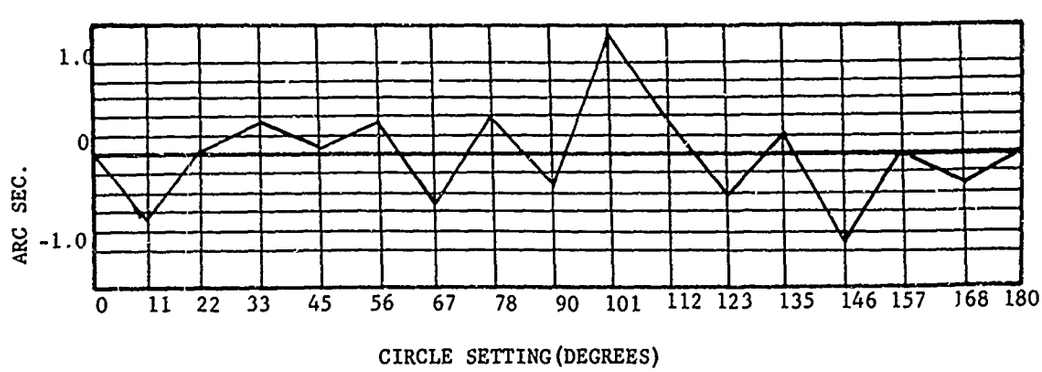


Fig. 13. Field circle test, mean instrument errors. Angle: THORO-RED OAK KNOB-JEREMY. Nighttime data, without closure.

Table X. Field Circle Test
Angle: THORO-RED OAK KNOB-JEREMY
Daytime Data, without Closure

GROUP #1				GROUP #2			
DIAMETERS	I	II	III	DIAMETERS	I	II	III
DEGREES	VARIATIONS	ACCUM. ERROR	ERROR	DEGREES	VARIATIONS	ACCUM. ERROR	ERROR
0	+.03	0	+.05	11	+.99	0	-.72
45	-.43	+.03	+.08	56	+1.07	+.99	-.27
90	+.58	-.40	-.35	101	-2.25	+2.06	+1.34
135	-.18	+.18	+.21	146	+.19	-.19	-.91
Σ/-4	0	+.05	+.00	Σ/-4	0	-.72	-.00

GROUP #3				GROUP #4			
22	-.74	0	+.17	33	+.05	0	+.35
67	+.93	-.74	-.57	78	-.86	.05	+.40
112	-.33	+.19	+.36	123	+.17	-.81	-.46
157	+.14	-.14	+.03	168	+.64	-.64	-.29
Σ/-4	0	+.17	-.01	Σ/-4	0	+.35	+.00

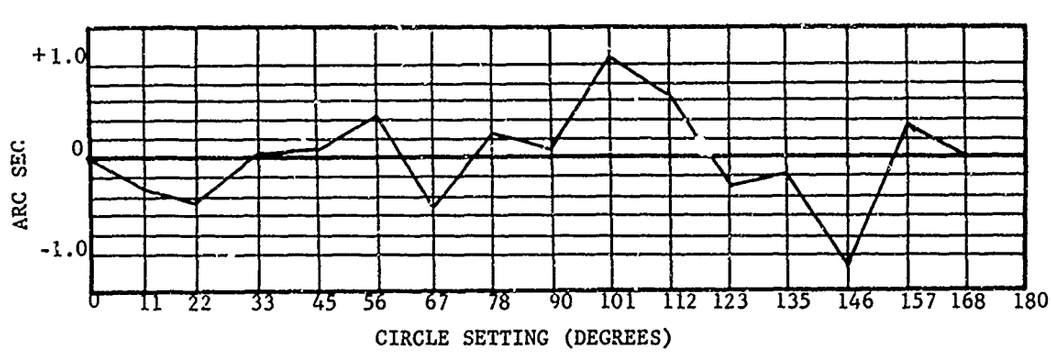


Fig. 14. Field circle test, mean instrument errors. Angle: THORO-RED OAK KNOB-JEREMY. Daytime data, without closure.

correction to a field observation to remove the error in the circle would be impracticable.

10. Angular Measurement. Because the data obtained from the THORO-RED OAK KNOB-JEREMY angle appear to be of significantly better quality than the data obtained from the THORO-RED OAK KNOB-OVERLOOK angle, it is felt that some discussion is warranted pertaining to this difference. Station JEREMY was established by the test team. This station was placed at the edge of a ridge-line in such a position that the line-of-sight to Station RED OAK KNOB was essentially down the middle of a V-shaped cut in the side of the mountain's face and then along a small stream. This placement permitted the line-of-sight to run either between intervening terrain or at right angles to the terrain. The Station OVERLOOK is placed at the ridge-line of the same mountain range but the line-of-sight from OVERLOOK to RED OAK KNOB passes along the side of an intervening knoll. This condition could cause horizontal refraction of the path which is a result of the prevailing wind currents sweeping up the face of the knoll. It is, therefore, believed that the apparent difference in the consistency of data is the result of station location and the effect upon the line-of-sight brought about by the terrain between the stations.

11. Comparison of Daytime and Nighttime Data. The mean angles for the daytime and nighttime were grouped according to condition and were algebraically meaned as shown in Table XI. Obviously, these data show a shift of approximately 1".0 from daytime to nighttime data. The exact reason for this shift is not known but it could have been caused by a semifixed change in atmospheric conditions from day to night or by a change, perhaps resulting from thermal gradients, within the instrument from day to night. As the data that were observed during nighttime showed less variability between the angles within sets and the data observed during daytime showed less variability between sets of angles, it is concluded that the majority of the errors are caused by the atmosphere that lies between the stations. This conclusion is based upon the correlation of variability to atmospheric conditions; that is, the more dynamic daytime atmosphere would cause the variability to appear from angle to angle within the sets, and the slower changing nighttime atmosphere would cause the variability to appear from set to set.

12. Accuracy Analyses. The data obtained were examined to determine the overall (day and night) accuracy limits of the test instrument. It was noticed that the mean of the daytime data without closure and the nighttime data without closure, yielded the value of 33".9 for the THORO-RED OAK KNOB-OVERLOOK angle. This value is exactly equal to the computed

Table XI. Daytime Angular Measurements vs Nighttime Angular Measurements

Test Site	Daytime		Nighttime	
	With Closure	Without Closure	With Closure	Without Closure
Angle:				
THORO-RED OAK KNOB-JEREMY	49".0	49".4	47".9	48".2
THORO-RED OAK KNOB-OVERLOOK	34".1	34".4	33".1	33".4

	Daytime and Nighttime	
	With Closure	Without Closure
Angle:		
THORO-RED OAK KNOB-JEREMY	48".5	48".8
THORO-RED OAK KNOB-OVERLOOK	33".6	33".9

angle between these first-order stations as determined by obtaining the difference between the first-order geodetic azimuths from Station RED OAK KNOB to THORO and to OVERLOOK. The analysis for accuracy was, therefore, based upon the assumption that the true angle was the mean of all data observed without closure for each of the angles involved. This assumption was utilized to generate the data in Table XII. Analyses of these data show that more than 90 percent of the observations fell within ± 2".5 for the THORO-RED OAK KNOB-OVERLOOK angle and within ± 2".0 for the THORO-RED OAK KNOB-JEREMY angle. It is significant that no observations were rejected for this analysis. These data include those angles observed during daytime under conditions of extreme heat waves, haze, and the like. When data observed during conditions of poor target image are rejected, the accuracy limit for the THORO-RED OAK KNOB-JEREMY improves from ± 2".0 to ± 1".5, and the accuracy limit for the angle including Station OVERLOOK improves from ± 2".5 to ± 2".0. Table XIII was formed by plotting the mean angle from the nighttime observation of the THORO-RED OAK KNOB-JEREMY angle when the targets were steady, as determined from 16, 12, 8, and 4 D&R readings. Analyses of these data show

Table XII. Accuracy Comparison

Test Site		No. of Observations					
		All Data			Data w/Good Targets		
		Day	Night	Total	Day	Night	Total
Angle: THORO-RED OAK KNOB-JEREMY							
Assumed True Value: 48".8							
True	± 1".0	32	33	65	22	20	42
	± 1".5	44	43	87	28	25	53
	± 2".0	47	46	93	30	29	59
	± 2".5	48	49	97	31	31	62
	± 3".0	48	49	97			
	± 3".5	50	50	100			
Angle: THORO-RED OAK KNOB-OVERLOOK							
Assumed True Value: 33".9							
True	± 1".0	25	26	51	18	17	35
	± 1".5	36	39	75	24	24	48
	± 2".0	43	42	85	29	26	55
	± 2".5	45	47	92	30	29	59
	± 3".0	48	49	97	31	31	62
	± 3".5	48	49	97			
	± 4".0	50	49	99			
	± 4".5	50	50	100			

Table XIII. Accuracy vs D&R Readings - Nighttime

Test Site		No. of Surveys That Fall within Stated Limits			
		No. of D&R Readings			
		16	12	8	4
Angle: THORO-RED OAK KNOB-JEREMY					
Assumed True Angle					
True	± 1".0	19	18	20	14
	± 1".5	26	26	24	18
	± 2".0	29	29	26	24
	± 2".5	31	31	29	26
	± 3".0			31	29
	± 3".5				31

that as the number of D&R readings is reduced, the range of the mean angles increases.

13. Horizon Closure Technique Analyses. The comparative analysis of data observed with and without horizon closure shows that applying horizon closure causes a negative shift of the mean of the mean angles of approximately 0".3. It is believed that this shift is caused by a combination of events that are taking place within the instrument (creep, axis strain, drag, and the like), the total effect of which results in a "wind-up" of the instrument, that is, as the instrument is rotated in azimuth, a second pointing to a given target will be slightly lower in value than the initial pointing. The amount of this difference will yield an indication of the quality of the instrument being used. From a statistical point of view, however, the amount of difference that was experienced with this particular test instrument is insignificant. This conclusion was reached after testing the hypothesis that the difference between angles measured with and without horizon closure should be equal to zero. A test on paired differences was used so that if the paired measurements tend to be large or small together, an increase in the ability of the test to detect a small difference is possible. The results of this test indicate that, at the 0.05 level of significance (95 percent confidence level), no evidence exists to indicate any paramount difference.

IV. CONCLUSIONS

14. Conclusions. It is concluded that:

a. The test instrument is capable of a field accuracy of $\pm 2''.5$, and this accuracy is obtainable 90 percent of the time.

b. The difference between observations made during daytime and nighttime is not so great as anticipated (an improvement of only two to four percent favors the nighttime observations), and the apparent accuracy to a good station site observed during daytime is better than the accuracy to a questionable station site observed during nighttime.

c. Use of the observation technique of horizon closure gives the operator some idea of the quality of the instrument, but it is inappropriate to include the horizon closure data in determining the angular value sought.

d. Reduction of the number of D&R readings that constitute a set increases the spread of angular accuracy and, therefore, increases the probability that a set of data will have to be rejected.

e. The accuracy obtained under good seeing conditions ($\pm 2''.5$, 90 percent) is appreciably better than the accuracy obtained when the target image is poor ($\pm 2''.5$, 80 percent).

On the basis of the facts just presented, it can now be concluded that a successful microwave angle-measuring system must consider the following:

(1) The microwave system must be capable of measuring an angle with an error of not more than $2''.5$ for 90 percent of the time.

(2) Particular attention must be given to the instrumentation, observing procedure, and observational data processing to insure that the daytime variations do not preclude attainment of the desired accuracy and operational reliability because the variations in individual pointings with microwave systems have been noted as extreme under certain daytime conditions.

(3) The instrumentation and observational procedure must provide for D&R pointing and angle measurements in a technique similar to that used with optical theodolites to eliminate or reduce the systematic instrumental types of error. The exact number of D&R observations required per set is not necessarily the same as that indicated for an optical theodolite, and the determination of the proper number must be arrived at through experimentation and tests.

(4) Seeing defined in terms of visible image motion, shimmer, and dancing can be equated to similar nonvisible effects of atmospheric refraction instability and can be expected to contribute errors in angle measurements made with microwave. The magnitude of these errors must be determined and instrumentation and procedures must be established accordingly, so that the required accuracy is achieved in both good and poor seeing conditions.

APPENDIX A

FIRST-ORDER ABSTRACT - USC&GS FORM 470

STATION	FORM 470 (3-31-58)	U.S. DEPARTMENT OF COMMERCE COAST AND GEODETIC SURVEY
ET 27 WCE (USGS)	ABSTRACT OF DIRECTIONS	

STATE	COMPUTED BY	DATE	VOLUME NO.
VIRGINIA	D.J.N.	5-5-59	4
OBSERVER	**CHECKED BY**	**INSTRUMENT NO.**	**SHEET 2 OF 4**
G.B.L.	MEZ	18523	

POSITION NO.	STATIONS OBSERVED							
	THORO (ERDL) (INITIAL)	OVERLOOK (ERDL) ~~HOT BACK~~	ET 27 WCE (USGS)	MT. MARSHALL 1963-1973	TAPP (ERDL)			
	0° 00′	0 ′	0 ′	0 ′	0 ′	0 ′	0 ′	0 ′
		61 21	72 29	89 15	169 08			
	″	″	″	″	″	″	″	″
1	0.00	00.2′	31.6′	03.6′	37.7′			
2	0.00	01.8′ (38.4)R (57.8)L	33.8′ (29.2)R	00.6′	35.8′			
3	0.00	03.8′	33.9′	05.4′	39.3′			
4	0.00	04.6′	36.5′	06.1′	40.1′			
5	0.00	03.2′	37.9′	05.3′	41.9′			
6	0.00	03.6′	33.1′	04.4′	36.0′			
7	0.00	04.7′	36.7′	03.3′	39.2′			
8	0.00	07.3′	36.0′ (40.5)R	06.4′	39.0′			
9	0.00	00.5′	36.1′	05.5′	36.2			
10	0.00	06.5′	37.1′	04.0′	38.9′			
11	0.00	07.0′ (07.6)R	(40.2)R (90.0)R	07.3′	42.1′ (44.0)R			
12	0.00	03.9′	35.5′	05.8′	39.3′			
13	0.00	05.1′	35.5′	01.8′	38.6′			
14	0.00	03.5′	35.7′	01.0′	35.0′			
15	0.00	02.9′ (59.3)R	34.4′ (30.4)R	04.3′ (59.4)R	38.2′			
16	0.00	03.1′	32.2′	01.8′	38.2′			
SUM,		57.9′	76.8′	65.6	135.5′			
MEAN,		03.62′	35.12′	04.10	38.47′			
COR. FOR ECC.,								
DIRECTION,								

USCOMM-DC 8284

Note: This form supplied by USC&GS contains data taken in 1959 from a First-Order Survey on three of the four test sites used in this report.

APPENDIX B

LIST OF ATMOSPHERIC SEEING CONDITIONS

DAYTIME OBSERVATIONS

SURVEY	SEEING CONDITIONS
1	Hazy with Heat Waves
2	Hazy with Heat Waves
3	Hazy with Heat Waves
4	Hazy with Heat Waves
5	Hazy with Heat Waves
6	Hazy with Heat Waves
7	Hazy with Heat Waves
8	Hazy with Heat Waves
9	Hazy with Heat Waves
10	Hazy with Heat Waves
11	Hazy and Breezy
12	Hazy and Breezy
13	Hazy with Heat Waves
14	Cloudy and Calm
15	Hazy with Heat Waves
16	Cloudy and Breezy
17	Cloudy with Heat Waves
18	Clear and Breezy
19	Clear with Heat Waves
20	Clear with Heat Waves
21	Clear and Calm, Good Targets
22	Hazy and Breezy
23	Hazy and Breezy
24	Hazy and Breezy
25	Hazy with Heat Waves
26	Hazy and Breezy
27	Hazy and Breezy
28	Hazy with Heat Waves
29	Cloudy and Breezy
30	Cloudy and Breezy
31	Cloudy and Breezy
32	Hazy and Breezy
33	Hazy and Breezy
34	Hazy and Breezy

SURVEY	SEEING CONDITIONS
35	Hazy and Breezy
36	Hazy and Breezy
37	Hazy and Breezy
38	Hazy and Breezy
39	Hazy with Heat Waves
40	Hazy and Breezy
41	Hazy and Breezy
42	Hazy and Breezy
43	Hazy and Breezy
44	Hazy and Calm
45	Hazy and Breezy
46	Hazy and Calm with Heat Waves
47	Clear and Breezy
48	Clear and Breezy
49	Clear and Breezy
50	Clear and Breezy

NIGHTTIME OBSERVATIONS

SURVEY	SEEING CONDITIONS
1	Hazy and Breezy
2	Hazy and Breezy
3	Hazy and Gusty
4	Hazy and Gusty
5	Clear and Calm
6	Clear and Calm
7	Hazy and Calm
8	Hazy and Calm
9	Hazy and Gusty
10	Hazy and Gusty
11	Hazy and Gusty
12	Hazy and Gusty
13	Gusty, Good Targets
14	Gusty, Good Targets
15	Hazy and Breezy, Good Targets
16	Hazy and Breezy, Good Targets
17	Hazy and Calm
18	Hazy and Gusty
19	Hazy and Gusty
20	Hazy and Gusty
21	Hazy and Gusty, Good Targets
22	Hazy and Gusty, Good Targets
23	Hazy and Breezy, Good Targets
24	Hazy and Breezy, Good Targets
25	Gusty, Good Targets
26	Gusty, Good Targets
27	Gusty, Good Targets
28	Gusty, Good Targets
29	Hazy and Breezy, Good Targets
30	Gusty, Good Targets
31	Hazy and Breezy
32	Hazy and Breezy
33	Hazy and Breezy, Good Targets
34	Cloudy and Breezy, Good Targets
35	Hazy and Breezy
36	Hazy and Breezy, Good Targets
37	Hazy and Breezy, Good Targets
38	Hazy and Breezy, Good Targets
39	Cloudy and Breezy, Good Targets
40	Cloudy and Gusty, Good Targets

SURVEY	SEEING CONDITIONS
41	Gusty, Good Targets
42	Gusty, Good Targets
43	Hazy and Breezy, Good Targets
44	Gusty, Good Targets
45	Hazy and Breezy, Good Targets
46	Hazy and Breezy, Good Targets
47	Hazy and Breezy, Good Targets
48	Hazy and Breezy, Good Targets
49	Hazy and Breezy, Good Targets
50	Hazy and Breezy, Good Targets

APPENDIX C

COMPUTER TAB RUNS

DAY READINGS - SURVEY NUMBER 1

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	49.0	-.5	37.0	3.2	50.3	.4	38.5	4.0
2	50.5	1.0	34.5	.7	50.5	.6	34.5	.2
3	53.5	4.0	38.0	4.2	53.3	3.4	37.8	3.5
4	52.0	2.5	37.0	3.2	51.8	1.9	36.8	2.5
5	52.5	3.0	34.0	.2	52.3	2.4	33.8	-.5
6	49.0	-.5	33.5	-.3	49.3	-.6	33.8	-.5
7	49.0	-.5	36.0	2.2	50.8	.9	37.8	3.5
8	49.0	-.5	33.0	-.8	48.5	-1.4	32.5	-1.8
9	48.0	-1.5	34.5	.7	48.0	-1.9	34.5	.2
10	47.5	-2.0	33.0	-.8	47.0	-2.9	32.5	-1.8
11	52.5	3.0	29.5	-4.3	53.3	3.4	30.3	-4.0
12	46.0	-3.5	29.0	-4.8	~~49.9~~	~~.0~~ R	~~34.3~~	~~-.0~~ R
13	49.5	.0	31.5	-2.3	49.8	-.1	31.8	-2.5
14	44.5	-5.0	34.0	.2	45.5	-4.4	35.0	.7
15	53.0	3.5	37.0	3.2	50.5	.6	34.5	.2
16	46.0	-3.5	30.0	-3.8	47.0	-2.9	31.0	-3.3
MEAN	49.5		33.8		49.9		34.3	
S.D.	2.7		2.8		2.3		2.4	

DAY READINGS - SURVEY NUMBER 2

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	52.5	2.6	35.0	1.3	51.3	1.5	33.8	.2
2	49.0	-.9	33.0	-.7	48.8	-1.0	32.8	-.8
3	52.0	2.1	37.0	3.3	51.0	1.2	36.0	2.4
4	47.0	-2.9	29.5	-4.2	46.8	-3.0	29.3	-4.3
5	49.5	-.4	33.5	-.2	49.5	-.3	33.5	-.1
6	53.5	3.6	35.5	1.8	53.5	3.7	35.5	1.9
7	54.0	4.1	31.0	-2.7	54.3	4.5	31.3	-2.3
8	46.5	-3.4	32.0	-1.7	47.0	-2.8	32.5	-1.1
9	53.5	3.6	37.5	3.8	53.5	3.7	37.5	3.9
10	46.0	-3.9	34.0	.3	46.0	-3.8	34.0	.4
11	47.5	-2.4	36.5	2.8	46.3	-3.5	35.3	1.7
12	51.5	1.6	32.5	-1.2	51.5	1.7	32.5	-1.1
13	51.0	1.1	34.0	.3	50.3	.5	33.3	-.3
14	47.5	-2.4	31.5	-2.2	47.8	-2.0	31.8	-1.8
15	48.0	-1.9	34.0	.3	49.0	-.8	35.0	1.4
16	50.0	.1	32.5	-1.2	50.5	.7	33.0	-.6
MEAN	49.9		33.7		49.8		33.6	
S.D.	2.7		2.2		2.6		2.0	

DAY READINGS - SURVEY NUMBER 3

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	52.5	3.9	37.0	4.1	~~48.0~~	~~-.0~~ R	~~32.3~~	~~-.0~~ R
2	52.5	3.9	36.5	3.6	51.5	3.5	35.5	3.2
3	51.5	2.9	33.0	.1	50.5	2.5	32.0	-.3
4	50.0	1.4	34.0	1.1	49.8	1.8	33.6	1.5
5	50.5	1.9	35.0	2.1	51.0	3.0	35.5	3.2
6	50.5	1.9	34.0	1.1	49.8	1.8	33.3	1.0
7	49.5	.9	29.5	-3.4	49.3	1.3	29.3	-3.0
8	49.5	.9	33.0	.1	49.3	1.3	32.8	.5
9	44.5	-4.1	30.0	-2.9	43.8	-4.2	29.3	-3.0
10	47.0	-1.6	31.5	-1.4	48.3	.3	32.8	.5
11	47.0	-1.6	33.5	.6	45.8	-2.2	32.3	-.0
12	50.0	1.4	34.5	1.6	48.8	.8	33.3	1.0
13	46.0	-2.6	32.0	-.9	46.3	-1.7	32.3	-.0
14	46.5	-2.1	29.0	-3.9	46.3	-1.7	28.8	-3.5
15	44.5	-4.1	34.0	1.1	44.8	-3.2	34.3	2.0
16	46.0	-2.6	30.5	-2.4	44.8	-3.2	29.3	-3.0
MEAN	48.6		32.9		48.0		32.3	
S.D.	2.7		2.4		2.4		2.1	

DAY READINGS - SURVEY NUMBER 4

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	49.5	1.4	~~36.9~~	~~.0~~	48.0	.3	41.5	4.4
2	47.5	-.6	~~36.9~~	~~.0~~	49.0	1.3	~~37.1~~	~~-.0~~
3	48.0	-.1	35.5	-1.4	49.3	1.6	36.8	-.3
4	49.0	.9	34.0	-2.9	50.3	2.6	35.3	-1.8
5	50.5	2.4	40.0	3.1	49.8	2.1	39.3	2.2
6	52.0	3.9	~~36.9~~	~~.0~~	50.8	3.1	41.8	4.7
7	48.0	-.1	37.0	.1	46.3	-1.4	35.3	-1.8
8	48.0	-.1	36.5	-.4	48.0	.3	36.5	-.6
9	46.5	-1.6	37.5	.6	44.8	-2.9	35.8	-1.3
10	47.0	-1.1	36.0	-.9	46.3	-1.4	35.3	-1.8
11	47.5	-.6	38.5	1.6	46.5	-1.2	37.5	.4
12	49.5	1.4	36.5	-.4	48.0	.3	35.0	-2.1
13	45.5	-2.6	41.0	4.1	46.0	-1.7	41.5	4.4
14	51.0	2.9	34.0	-2.9	50.0	2.3	33.0	-4.1
15	45.0	-3.1	34.0	-2.9	44.5	-3.2	33.5	-3.6
16	45.5	-2.6	39.0	2.1	45.3	-2.4	38.8	1.7
MEAN	48.1		36.9		47.7		37.1	
S.D.	2.0		2.0		2.1		2.8	

DAY READINGS - SURVEY NUMBER 5

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	47.5	-1.3	35.0	2.5	46.5	-2.1	34.0	1.3
2	49.5	.7	34.0	1.5	48.0	-.6	32.5	-.2
3	52.0	3.2	34.0	1.5	51.8	3.2	33.8	1.1
4	50.0	1.2	35.5	3.0	50.0	1.4	35.5	2.8
5	49.5	.7	33.5	1.0	48.8	.2	32.8	.1
6	45.0	-3.8	29.5	-3.0	45.3	-3.3	29.8	-2.9
7	50.5	1.7	29.0	-3.5	50.8	2.2	29.3	-3.4
8	47.0	-1.8	34.5	2.0	48.3	-.3	35.8	3.1
9	47.0	-1.8	32.5	-.0	45.3	-3.3	30.8	-1.9
10	46.5	-2.3	28.0	-4.5	45.8	-2.8	~~32.7~~	~~.0~~
11	50.0	1.2	30.5	-2.0	50.3	1.7	30.8	-1.9
12	50.0	1.2	31.5	-1.0	49.8	1.2	31.3	-1.4
13	51.5	2.7	36.0	3.5	51.0	2.4	35.5	2.8
14	47.0	-1.8	33.0	.5	48.3	-.3	34.3	1.6
15	51.5	2.7	34.0	1.5	51.5	2.9	34.0	1.3
16	46.5	-2.3	30.0	-2.5	46.8	-1.8	30.3	-2.4
MEAN	48.8		32.5		48.6		32.7	
S.D.	2.2		2.5		2.2		2.1	

DAY READINGS - SURVEY NUMBER 6

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	50.0	-1.9	37.0	.6	49.5	-1.9	36.5	.6
2	55.0	3.1	38.5	2.1	54.8	3.4	38.3	2.4
3	51.5	-.4	39.5	3.1	51.3	-.1	39.3	3.4
4	50.5	-1.4	35.5	-.9	49.3	-2.1	34.3	-1.6
5	51.0	-.9	38.5	2.1	50.8	-.6	38.3	2.4
6	53.5	1.6	39.5	3.1	53.5	2.1	39.5	3.6
7	53.0	1.1	39.0	2.6	53.3	1.9	39.3	3.4
8	52.0	.1	33.5	-2.9	51.3	-.1	32.8	-3.1
9	50.5	-1.4	34.0	-2.4	49.5	-1.9	33.0	-2.9
10	~~51.9~~	~~-.0~~	31.5	-4.9	~~51.4~~	~~-.0~~	31.3	-4.6
11	~~51.9~~	~~-.0~~	36.4	.0	~~51.4~~	~~-.0~~	~~35.9~~	~~.0~~
12	51.5	-.4	33.5	-2.9	49.8	-1.6	31.8	-4.1
13	49.0	-2.9	35.5	-.9	48.3	-3.1	34.8	-1.1
14	51.5	-.4	34.0	-2.4	51.3	-.1	33.8	-2.1
15	53.0	1.1	36.0	-.4	52.8	1.4	35.8	-.1
16	55.0	3.1	40.0	3.6	54.5	3.1	39.5	3.6
MEAN	51.9		36.4		51.4		35.9	
S.D.	1.7		2.6		1.9		2.9	

DAY READINGS - SURVEY NUMBER 7

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	47.0	.2	36.5	1.8	46.3	-.2	35.8	1.3
2	46.0	-.8	37.5	2.8	45.5	-1.0	37.0	2.5
3	50.0	3.2	35.5	.7	49.5	3.0	35.0	.5
4	50.0	3.2	38.5	3.8	49.3	2.8	37.8	3.3
5	48.0	1.2	35.5	.7	47.3	.8	34.8	.3
6	46.0	-.8	38.5	3.8	45.0	-1.5	37.5	3.0
7	49.0	2.2	33.5	-1.3	48.8	2.3	33.3	-1.2
8	50.5	3.7	35.0	.2	50.3	3.8	34.8	.3
9	50.0	3.2	35.5	.7	49.3	2.8	34.8	.3
10	44.5	-2.3	31.5	-3.3	43.8	-2.7	30.8	-3.7
11	44.0	-2.8	33.0	-1.8	43.8	-2.7	32.8	-1.7
12	46.0	-.8	33.5	-1.3	45.5	-1.0	33.0	-1.5
13	43.0	-3.8	36.0	1.3	44.8	-1.7	37.8	3.3
14	45.5	-1.3	32.0	-2.8	47.5	1.0	34.0	-.5
15	45.0	-1.8	33.0	-1.8	44.5	-2.0	32.5	-2.0
16	44.0	-2.8	31.0	-3.8	43.3	-3.2	30.3	-4.2
MEAN	46.8		34.8		46.5		34.5	
S.D.	2.5		2.4		2.3		2.3	

DAY READINGS - SURVEY NUMBER 8

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	51.0	-1.1	41.0	3.3	50.5	-.7	40.5	4.1
2	55.0	2.9	38.0	.3	54.0	2.8	37.0	.6
3	49.5	-2.6	41.5	3.8	48.3	-2.9	40.3	3.9
4	48.0	-4.1	36.5	-1.2	47.3	-3.9	35.8	-.6
5	53.0	.9	39.5	1.8	51.8	.6	38.3	1.9
6	53.0	.9	34.5	-3.2	52.3	1.1	33.8	-2.6
7	49.5	-2.6	34.0	-3.7	47.8	-3.4	32.3	-4.1
8	~~52.1~~	~~.0~~	~~37.7~~	~~.0~~	~~51.2~~	~~.0~~	~~36.4~~	~~.0~~
9	56.5	4.4	38.5	.8	55.8	4.6	37.8	1.4
10	50.0	-2.1	37.0	-.7	49.0	-2.2	36.0	-.4
11	54.5	2.4	42.0	4.3	54.5	3.3	~~36.4~~	~~.0~~
12	50.5	-1.6	34.0	-3.7	49.3	-1.9	32.8	-3.6
13	53.5	1.4	38.0	.3	52.5	1.3	37.0	.6
14	51.5	-.6	37.5	-.2	50.0	-1.2	36.0	-.4
15	53.0	.9	37.5	-.2	52.5	1.3	37.0	.6
16	52.5	.4	35.5	-2.2	52.0	.8	35.0	-1.4
MEAN	52.1		37.7		51.2		36.4	
S.D.	2.3		2.5		2.5		2.3	

DAY READINGS - SURVEY NUMBER 9

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	51.5	.8	37.0	1.2	50.8	1.0	36.3	1.3
2	50.5	-.2	35.5	-.3	50.0	.2	35.0	.0
3	50.5	-.2	36.0	.2	49.3	-.5	34.8	-.2
4	52.5	1.8	38.0	2.2	51.8	2.0	37.3	2.3
5	51.5	.8	39.0	3.2	50.8	1.0	38.3	3.3
6	54.5	3.8	35.5	-.3	53.5	3.7	34.5	-.5
7	47.5	-3.2	34.0	-1.8	46.8	-3.0	33.3	-1.7
8	50.0	-.7	32.0	-3.8	49.3	-.5	31.3	-3.7
9	48.0	-2.7	35.0	-.8	46.8	-3.0	33.8	-1.2
10	46.0	-4.7	32.0	-3.8	45.0	-4.8	31.0	-4.0
11	48.5	-2.2	36.5	.7	47.5	-2.3	35.5	.5
12	54.0	3.3	36.5	.7	52.8	3.0	35.3	.3
13	53.0	2.3	35.0	-.8	52.3	2.5	34.3	-.7
14	50.0	-.7	38.0	2.2	49.3	-.5	37.3	2.3
15	52.0	1.3	37.0	1.2	51.3	1.5	36.3	1.3
16	51.0	.3	36.5	.7	50.0	.2	35.5	.5
MEAN	50.7		35.8		49.8		35.0	
S.D.	2.3		2.0		2.4		2.0	

DAY READINGS - SURVEY NUMBER 10

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	48.5	-1.4	35.5	.2	48.0	-1.3	35.0	.4
2	47.5	-2.4	36.0	.7	47.0	-2.3	35.5	.9
3	46.0	-3.9	36.5	1.3	45.3	-4.0	35.8	1.2
4	48.5	-1.4	32.5	-2.8	48.5	-.7	32.5	-2.1
5	50.5	.6	39.0	3.8	49.5	.2	38.0	3.4
6	54.0	4.1	36.5	1.3	53.5	4.3	36.0	1.4
7	53.0	3.1	35.0	-.2	52.8	3.6	34.8	.2
8	52.0	2.1	33.5	-1.8	50.8	1.6	32.3	-2.3
9	52.5	2.6	35.5	.2	51.8	2.6	34.8	.2
10	46.0	-3.9	33.5	-1.8	45.0	-4.3	32.5	-2.1
11	48.5	-1.4	33.5	-1.8	48.0	-1.3	33.0	-1.6
12	52.0	2.1	33.5	-1.8	51.0	1.8	32.5	-2.1
13	52.5	2.6	39.5	4.3	51.3	2.1	38.3	3.7
14	50.0	.1	34.5	-.7	49.5	.2	34.0	-.6
15	45.5	-4.4	35.5	.2	45.0	-4.3	35.0	.4
16	52.0	2.1	34.0	-1.3	51.0	1.8	33.0	-1.6
MEAN	49.9		35.3		49.3		34.6	
S.D.	2.8		2.0		2.7		1.9	

DAY READINGS - SURVEY NUMBER 11

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	47.0	-1.8	35.5	1.7	46.3	-1.8	34.8	1.7
2	48.0	-.8	32.5	-1.3	46.5	-1.6	31.0	-2.1
3	50.0	1.2	38.0	4.2	49.5	1.4	37.5	4.4
4	51.0	2.2	37.0	3.2	50.3	2.2	36.3	3.2
5	47.5	-1.3	35.5	1.7	46.5	-1.6	34.5	1.4
6	53.0	4.2	37.0	3.2	52.3	4.2	36.3	3.2
7	48.5	-.3	35.5	1.7	47.8	-.3	34.8	1.7
8	50.5	1.7	32.5	-1.3	50.0	1.9	32.0	-1.1
9	49.0	.2	32.0	-1.8	48.3	.2	31.3	-1.8
10	44.5	-4.3	29.5	-4.3	44.3	-3.8	29.3	-3.8
11	48.5	-.3	32.0	-1.8	48.0	-.1	31.5	-1.6
12	49.0	.2	31.0	-2.8	48.0	-.1	30.0	-3.1
13	46.0	-2.8	34.5	.7	45.0	-3.1	33.5	.4
14	45.0	-3.8	32.0	-1.8	44.3	-3.8	31.3	-1.8
15	52.0	3.2	35.5	1.7	51.3	3.2	34.8	1.7
16	51.5	2.7	31.5	-2.3	51.0	2.9	31.0	-2.1
MEAN	46.8		33.8		48.1		33.1	
S.D.	2.5		2.5		2.5		2.5	

DAY READINGS - SURVEY NUMBER 12

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	49.5	.3	38.5	4.7	48.5	.1	37.5	4.5
2	49.0	-.2	35.5	1.7	48.5	.1	35.0	2.0
3	48.0	-1.2	36.5	2.7	47.5	-.9	36.0	3.0
4	51.0	1.8	34.5	.7	49.8	1.4	33.3	.3
5	52.5	3.3	32.5	-1.3	53.3	3.9	32.3	-.7
6	48.0	-1.2	35.5	1.7	47.3	-1.1	34.8	1.8
7	49.0	-.2	32.5	-1.3	48.0	-.4	31.5	-1.5
8	53.0	3.8	34.5	.7	52.0	3.6	33.5	.5
9	53.5	4.3	35.5	1.7	52.8	4.4	34.8	1.8
10	45.5	-3.7	35.0	1.2	44.5	-3.9	34.0	1.0
11	46.5	-2.7	30.0	-3.8	46.0	-2.4	29.5	-3.5
12	47.5	-1.7	30.5	-3.3	46.5	-1.9	29.5	-3.5
13	47.0	-2.2	30.5	-3.3	46.3	-2.1	29.8	-3.2
14	45.5	-3.7	32.5	-1.3	45.3	-3.1	32.3	-.7
15	51.5	2.3	32.0	-1.8	50.0	1.6	30.5	-2.5
16	50.0	.8	34.5	.7	49.5	1.1	34.0	1.0
MEAN	49.2		33.8		48.4		33.0	
S.D.	2.6		2.4		2.5		2.4	

DAY READINGS - SURVEY NUMBER 13

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	51.0	.7	38.5	3.4	50.3	.7	37.8	3.5
2	49.0	-1.3	30.5	-4.6	48.3	-1.3	29.8	-4.5
3	48.5	-1.8	39.0	3.9	47.5	-2.1	38.0	3.7
4	50.0	-.3	39.0	3.9	49.5	-.1	38.5	4.2
5	50.5	.2	38.0	2.9	49.8	.2	37.3	3.0
6	52.5	2.2	36.0	.9	52.3	2.7	35.8	1.5
7	51.5	1.2	36.0	.9	50.5	.9	35.0	.7
8	49.5	-.8	34.0	-1.1	49.0	-.6	33.5	-.8
9	48.5	-1.8	31.5	-3.6	47.3	-2.3	30.3	-4.0
10	46.5	-3.8	31.5	-3.6	45.5	-4.1	30.5	-3.8
11	50.0	-.3	32.0	-3.1	50.0	.4	32.0	-2.3
12	53.0	2.7	34.5	-.6	51.8	2.2	33.3	-1.0
13	48.5	-1.8	32.0	-3.1	47.5	-2.1	31.0	-3.3
14	53.5	3.2	38.5	3.4	52.8	3.2	37.8	3.5
15	50.5	.2	35.0	-.1	49.5	-.1	34.0	-.3
16	52.0	1.7	35.0	-.1	51.3	1.7	34.3	-.0
MEAN	50.3		35.1		49.6		34.3	
S.D.	1.9		3.0		2.0		3.0	

DAY READINGS - SURVEY NUMBER 14

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	49.5	.7	39.0	3.9	49.3	.9	38.8	4.1
2	50.0	1.2	35.5	.4	50.0	1.6	35.5	.8
3	50.0	1.2	38.0	2.9	49.3	.9	37.3	2.6
4	49.0	.2	36.5	1.4	48.3	-.1	35.8	1.1
5	47.5	-1.3	34.5	-.6	47.0	-1.4	34.0	-.7
6	48.5	-.3	37.0	1.9	47.8	-.6	36.3	1.6
7	51.5	2.7	34.5	-.6	51.3	2.9	34.3	-.4
8	46.0	-2.8	33.0	-2.1	45.5	-2.9	32.5	-2.2
9	46.5	-2.3	34.0	-1.1	46.0	-2.4	33.5	-1.2
10	44.5	-4.3	39.5	4.4	43.8	-4.6	38.8	4.1
11	50.0	1.2	30.5	-4.6	50.0	1.6	30.5	-4.2
12	51.5	2.7	33.0	-2.1	50.5	2.1	32.0	-2.7
13	49.5	.7	34.5	-.6	49.5	1.1	34.5	-.2
14	49.5	.7	31.0	-4.1	49.5	1.1	31.0	-3.7
15	46.5	-2.3	36.0	.9	46.0	-2.4	35.5	.8
16	51.0	2.2	35.5	.4	50.5	2.1	35.0	.3
MEAN	48.8		35.1		48.4		34.7	
S.D.	2.1		2.6		2.2		2.5	

DAY READINGS - SURVEY NUMBER 15

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	50.5	.7	39.0	3.4	49.8	.5	38.3	3.2
2	50.0	.2	36.5	.9	49.8	.5	36.3	1.2
3	47.5	-2.3	35.0	-.6	47.0	-2.3	34.5	-.6
4	49.0	-.8	35.0	-.6	48.8	-.5	34.6	-.3
5	47.0	-2.8	35.5	-.1	46.3	-3.0	34.8	-.3
6	51.0	1.2	34.0	-1.6	50.5	1.2	33.5	-1.6
7	~~49.8~~	~~.0~~	38.5	2.9	~~49.3~~	~~.0~~	37.8	2.7
8	48.0	-1.8	34.5	-1.1	47.3	-2.0	33.8	-1.3
9	50.0	.2	35.5	-.1	49.3	.0	34.8	-.3
10	~~49.8~~	~~.0~~	34.0	-1.6	~~49.3~~	~~.0~~	34.0	-1.1
11	50.5	.7	34.5	-1.1	50.5	1.2	34.5	-.6
12	53.0	3.2	34.5	-1.1	52.5	3.2	34.0	-1.1
13	51.0	1.2	37.0	1.4	50.0	.7	36.0	.9
14	50.5	.7	34.0	-1.6	49.8	.5	33.3	-1.8
15	50.0	.2	38.5	2.9	49.5	.2	38.0	2.9
16	49.0	-.8	33.5	-2.1	49.0	-.3	33.5	-1.6
MEAN	49.8		35.6		49.3		35.1	
S.D.	1.5		1.8		1.5		1.7	

DAY READINGS - SURVEY NUMBER 16

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	46.0	-3.6	35.5	1.7	45.5	-3.6	35.0	1.6
2	49.5	-.1	33.5	-.3	49.0	-.1	33.0	-.4
3	47.5	-2.1	32.5	-1.3	47.0	-2.1	32.0	-1.4
4	50.5	.9	34.5	.7	50.0	.9	34.0	.6
5	48.0	-1.6	35.0	1.2	47.5	-1.6	34.5	1.1
6	53.0	3.4	38.0	4.2	52.3	3.2	37.3	3.9
7	52.5	2.9	36.0	2.2	52.3	3.2	35.8	2.4
8	50.0	.4	32.5	-1.3	50.0	.9	32.5	-.9
9	49.5	-.1	33.0	-.8	49.0	-.1	32.5	-.9
10	45.5	-4.1	29.0	-4.8	45.3	-3.8	28.8	-4.6
11	51.0	1.4	37.5	3.7	50.5	1.4	37.0	3.6
12	49.0	-.6	30.0	-3.8	49.0	-.1	30.0	-3.4
13	48.5	-1.1	35.0	1.2	47.8	-1.3	34.3	.9
14	51.0	1.4	34.0	.2	50.5	1.4	33.5	.1
15	52.0	2.4	35.5	1.7	51.0	1.9	34.5	1.1
16	49.5	-.1	30.0	-3.8	49.5	.4	30.0	-3.4
MEAN	49.6		33.8		49.1		33.4	
S.D.	2.1		2.6		2.1		2.4	

DAY READINGS - SURVEY NUMBER 17

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	46.0	-2.6	35.0	1.5	45.5	-2.7	34.5	1.4
2	47.5	-1.1	31.5	-2.0	47.5	-.7	31.5	-1.6
3	49.0	.4	38.0	4.5	48.3	.1	37.3	4.2
4	47.0	-1.6	34.0	.5	46.5	-1.7	33.5	.4
5	49.0	.4	35.0	1.5	48.5	.3	34.5	1.4
6	48.0	-.6	32.0	-1.5	47.8	-.4	31.6	-1.3
7	49.5	.9	33.0	-.5	48.5	.3	32.0	-1.1
8	49.5	.9	34.0	.5	49.3	1.1	33.8	.7
9	47.5	-1.1	32.5	-1.0	47.3	-.9	32.3	-.8
10	44.5	-4.1	31.5	-2.0	44.0	-4.2	31.0	-2.1
11	46.0	-.6	32.0	-1.5	46.0	-.2	32.0	-1.1
12	46.0	-2.6	32.0	-1.5	45.5	-2.7	31.5	-1.6
13	49.5	.9	33.5	.0	48.5	.3	32.5	-.6
14	52.5	3.9	34.5	1.0	52.0	3.8	34.0	.9
15	52.5	3.9	~~33.5~~	~~.0~~	52.0	3.8	~~33.1~~	~~.0~~
16	52.0	3.4	34.0	.5	52.0	3.8	34.0	.9
MEAN	48.6		33.5		48.2		33.1	
S.D.	2.3		1.7		2.3		1.6	

DAY READINGS - SURVEY NUMBER 18

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	49.5	1.1	38.0	4.4	49.5	1.5	38.0	4.4
2	51.0	2.6	35.0	1.4	50.5	2.5	34.5	.9
3	47.0	-1.4	36.0	2.4	46.5	-1.5	35.5	1.9
4	50.5	2.1	38.0	4.4	50.0	2.0	37.5	3.9
5	49.5	1.1	38.0	4.4	49.0	1.0	37.5	3.9
6	53.0	4.6	37.0	3.4	53.0	5.0	37.0	3.4
7	48.0	-.4	29.0	-4.6	47.0	-1.0	~~33.6~~	~~-.0~~
8	47.0	-1.4	31.5	-2.1	47.0	-1.0	31.5	-2.1
9	49.5	1.1	33.5	-.1	48.8	.8	32.8	-.8
10	44.5	-3.9	31.0	-2.6	44.5	-3.5	31.0	-2.6
11	47.0	-1.4	34.5	.9	47.0	-1.0	34.5	.9
12	47.5	-.9	29.5	-4.1	47.0	-1.0	29.0	-4.6
13	44.5	-3.9	30.0	-3.6	44.0	-4.0	29.5	-4.1
14	48.0	-.4	32.0	-1.6	48.0	-.0	32.0	-1.6
15	50.5	2.1	33.0	-.6	50.0	2.0	32.5	-1.1
16	47.5	-.9	32.0	-1.6	46.8	-1.2	31.3	-2.3
MEAN	48.4		33.6		48.0		33.6	
S.D.	2.3		3.1		2.3		2.9	

DAY READINGS - SURVEY NUMBER 19

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	47.0	-.9	34.5	1.3	47.0	-.7	34.5	1.6
2	50.5	2.6	35.0	1.8	49.5	1.8	34.0	1.1
3	47.5	-.4	36.5	3.3	47.0	-.7	36.0	3.1
4	47.0	-.9	34.0	.8	47.0	-.7	34.0	1.1
5	47.5	-.4	36.0	2.8	46.8	-.9	35.5	2.4
6	52.0	4.1	35.5	2.3	52.0	4.3	35.5	2.6
7	52.0	.1	34.0	.8	51.5	3.6	33.5	.6
8	48.0	.1	34.0	.8	48.0	.3	34.0	1.1
9	49.0	1.1	31.0	-2.2	49.0	1.3	31.0	-1.9
10	46.0	-1.9	31.0	-2.2	45.5	-2.2	30.5	-2.4
11	49.5	1.6	32.5	-.7	49.0	1.3	32.0	-.9
12	46.0	-1.9	31.0	-2.2	46.0	-1.7	31.0	-1.9
13	46.0	-1.9	31.5	-1.7	46.0	-1.7	31.5	-1.4
14	44.5	-3.4	30.0	-3.2	44.5	-3.2	30.0	-2.9
15	46.0	-1.9	32.0	-1.2	46.0	-1.7	32.0	-.9
16	48.5	.6	32.5	-.7	48.0	.3	32.0	-.9
MEAN	47.9		33.2		47.7		32.9	
S.D.	2.2		2.0		2.1		1.9	

DAY READINGS - SURVEY NUMBER 20

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	53.0	4.0	37.5	4.1	53.0	4.2	37.5	4.3
2	53.0	4.0	34.0	.6	53.0	4.2	34.0	.7
3	44.5	-4.5	32.0	-1.4	44.5	-4.3	32.0	-1.3
4	50.5	1.5	36.0	2.6	50.5	1.7	36.0	2.8
5	48.5	-.5	35.5	2.1	48.5	-.3	35.5	2.3
6	51.5	2.5	35.0	1.6	51.5	2.7	35.0	1.8
7	49.0	.0	35.5	2.1	48.0	-.8	34.5	1.3
8	48.0	-1.0	32.5	-.9	48.0	-.8	32.5	-.7
9	50.0	1.0	33.0	-.4	49.5	.7	32.5	-.7
10	47.0	-2.0	35.0	1.6	47.0	-1.8	35.0	1.8
11	47.0	-2.0	28.5	-4.9	47.0	-1.8	28.5	-4.8
12	46.0	-3.0	30.0	-3.4	46.0	-2.8	30.0	-3.3
13	45.5	-3.5	32.5	-.9	44.5	-4.3	31.5	-1.8
14	47.0	-2.0	33.0	-.4	47.0	-1.8	33.0	-.2
15	53.5	4.5	33.5	.1	53.5	4.7	33.5	.2
16	49.5	.5	31.0	-2.4	49.5	.7	31.0	-2.3
MEAN	49.0		33.4		48.8		33.3	
S.D.	2.8		2.4		2.9		2.4	

DAY READINGS - SURVEY NUMBER 21

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	45.0	-4.0	36.5	3.4	44.0	-4.2	35.5	2.8
2	48.0	-1.0	36.0	2.9	47.5	-.7	35.5	2.8
3	48.5	-.5	34.0	.9	48.5	.3	34.0	1.3
4	51.0	2.0	36.0	2.9	51.0	2.8	36.0	3.3
5	47.0	-2.0	34.0	.9	46.0	-2.2	33.0	.3
6	49.5	.5	33.5	.4	48.8	.6	32.8	.1
7	~~49.0~~	~~.0~~	30.5	-2.6	43.5	-4.7	30.5	-2.2
8	50.5	1.5	33.0	-.1	50.5	2.3	33.0	.3
9	50.5	1.5	32.0	-1.1	50.5	2.3	32.0	-.7
10	49.0	.0	34.0	.9	49.0	.8	34.0	1.3
11	48.5	-.5	32.0	-1.1	47.5	-.7	31.0	-1.7
12	49.5	.5	30.5	-2.6	49.5	1.3	30.5	-2.2
13	50.0	1.0	33.5	.4	49.0	.8	32.5	-.2
14	49.5	.5	31.0	-2.1	49.5	1.3	31.0	-1.7
15	48.5	-.5	31.5	-1.6	48.0	-.2	31.0	-1.7
16	49.5	.5	32.0	-1.1	49.0	.8	31.5	-1.2
MEAN	49.0		33.1		48.2		32.7	
S.D.	1.5		1.9		2.2		1.8	

DAY READINGS - SURVEY NUMBER 22

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	44.5	-3.1	34.5	2.3	44.5	-2.7	34.5	2.7
2	48.5	.9	34.0	1.8	47.5	.3	33.0	1.2
3	47.0	-.6	35.0	2.8	47.0	-.2	35.0	3.2
4	48.5	.9	33.0	.7	48.5	1.3	33.0	1.2
5	45.5	-2.1	32.5	.2	45.0	-2.2	32.0	.2
6	49.5	1.9	29.5	-2.8	49.0	1.8	29.0	-2.8
7	49.0	1.4	31.5	-.7	49.0	1.8	31.5	-.3
8	47.5	-.1	34.0	1.8	46.5	-.7	33.0	1.2
9	47.0	-.6	31.0	-1.3	47.0	-.2	31.0	-.8
10	47.0	-.6	29.5	-2.8	46.0	-1.2	28.5	-3.3
11	47.0	-.6	32.5	.2	47.0	-.2	32.5	.7
12	48.0	.4	30.0	-2.3	47.0	-.2	29.0	-2.8
13	46.5	-1.1	32.0	-.2	45.5	-1.7	31.0	-.8
14	48.5	.9	32.0	-.2	48.5	1.3	32.0	.2
15	48.5	.9	32.5	.2	48.5	1.3	32.5	.7
16	48.5	.9	32.5	.2	48.0	.8	32.0	.2
MEAN	47.6		32.3		47.2		31.8	
S.D.	1.3		1.7		1.4		1.6	

DAY READINGS - SURVEY NUMBER 23

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	45.0	-3.8	33.0	-.4	44.0	-4.3	32.0	-.9
2	51.5	2.7	37.0	3.6	51.5	3.2	37.0	4.1
3	50.0	1.2	37.0	3.6	49.5	1.2	36.5	3.6
4	48.0	-.8	34.5	1.1	47.0	-1.3	33.5	.6
5	46.5	-2.3	35.0	1.6	46.5	-1.8	35.0	2.1
6	52.0	3.2	34.0	.6	51.0	2.7	33.0	.1
7	51.0	2.2	31.5	-1.9	51.0	2.7	31.5	-1.4
8	49.0	.2	32.5	-.9	48.0	-.3	31.5	-1.4
9	46.5	-2.3	29.5	-3.9	46.5	-1.8	29.5	-3.4
10	44.0	-4.8	30.5	-2.9	43.5	-4.8	30.0	-2.9
11	50.5	1.7	33.5	.1	49.5	1.2	32.5	-.4
12	52.0	3.2	32.5	-.9	52.0	3.7	32.5	-.4
13	47.5	-1.3	34.5	1.1	47.8	-.5	34.8	1.9
14	48.5	-.3	~~33.4~~	~~.0~~	48.0	-.3	32.9	-.0
15	46.5	-2.3	30.5	-2.9	46.5	-1.8	30.5	-2.4
16	52.0	3.2	35.0	1.6	51.0	2.7	34.0	1.1
MEAN	48.8		33.4		48.3		32.9	
S.D.	2.6		2.2		2.6		2.2	

DAY READINGS - SURVEY NUMBER 24

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	48.0	-1.4	35.0	1.0	47.0	-1.9	34.0	.5
2	49.0	-.4	33.5	-.5	49.0	.1	33.5	.0
3	46.5	-2.9	38.0	4.0	46.0	-2.9	37.5	4.0
4	51.5	2.1	36.5	2.5	50.5	1.6	35.5	2.0
5	48.5	-.9	38.0	4.0	48.5	-.4	38.0	4.5
6	52.0	2.6	33.0	-1.0	51.0	2.1	32.0	-1.5
7	53.5	4.1	33.5	-.5	53.5	4.6	33.5	.0
8	48.0	-1.4	32.5	-1.5	47.8	-1.1	32.3	-1.2
9	46.5	-2.9	32.5	-1.5	46.5	-2.4	32.5	-1.0
10	48.0	-1.4	30.0	-4.0	47.5	-1.4	29.5	-4.0
11	49.0	-.4	32.5	-1.5	48.0	-.9	31.5	-2.0
12	48.5	-.9	29.5	-4.5	48.5	-.4	29.5	-4.0
13	50.0	.6	37.5	3.5	49.0	.1	36.5	3.0
14	50.0	.6	35.0	1.0	50.0	1.1	35.0	1.5
15	49.5	.1	33.5	-.5	49.0	.1	33.0	-.5
16	52.0	2.6	33.0	-1.0	50.5	1.6	31.5	-2.0
MEAN	49.4		34.0		48.9		33.5	
S.D.	2.0		2.6		1.9		2.5	

DAY READINGS - SURVEY NUMBER 25

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	50.5	1.4	35.0	3.9	50.5	2.1	35.0	4.3
2	48.0	-1.1	32.5	1.4	47.0	-1.4	31.5	.8
3	47.0	-2.1	32.0	.9	47.0	-1.4	32.0	1.3
4	52.0	2.9	28.5	-2.6	51.5	3.1	28.0	-2.7
5	52.5	3.4	34.0	2.9	52.3	3.7	33.8	3.1
6	51.5	2.4	34.5	3.4	50.5	2.1	33.5	2.8
7	52.0	2.9	31.5	.4	51.5	3.1	31.0	.3
8	49.5	.4	31.5	.4	49.0	.6	31.0	.3
9	49.5	.4	29.0	-2.1	49.5	1.1	29.0	-1.7
10	45.5	-3.6	30.0	-1.1	44.5	-3.9	29.0	-1.7
11	48.0	-1.1	29.5	-1.6	47.0	-1.4	28.5	-2.2
12	45.0	-4.1	26.5	-4.6	45.0	-3.4	26.5	-4.2
13	47.5	-1.6	32.5	1.4	47.0	-1.4	32.0	1.3
14	48.0	-1.1	29.5	-1.6	48.0	-.4	29.5	-1.2
15	50.5	1.4	33.0	1.9	50.0	1.6	32.5	1.8
16	~~49.1~~	~~-.8~~	28.0	-3.1	43.5	-4.9	28.0	-2.7
MEAN	49.1		31.1		48.4		30.7	
S.D.	2.3		2.5		2.7		2.4	

DAY READINGS - SURVEY NUMBER 26

POSITION	WITHOUT CLOSURE				WITH CLOSURE			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
NUMBER	ANGLE	DEV.	ANGLE	DEV.	ANGLE	DEV.	ANGLE	DEV.
1	50.0	-.1	36.5	4.3	49.5	-.2	36.0	4.2
2	48.5	-1.6	29.5	-2.7	48.5	-1.3	29.5	-2.3
3	50.0	-.1	34.0	1.8	49.5	-.2	33.5	1.7
4	53.0	2.9	35.0	2.8	53.0	3.3	35.0	3.2
5	48.0	-2.1	36.5	4.3	47.5	-2.3	36.0	4.2
6	49.0	-1.1	31.5	-.7	48.0	-1.8	30.5	-1.3
7	49.0	-1.1	30.5	-1.7	49.0	-.7	30.5	-1.3
8	47.0	-3.1	30.5	-1.7	46.5	-3.3	30.0	-1.8
9	52.0	1.9	29.0	-3.2	51.0	1.3	28.0	-3.8
10	46.5	-3.6	27.5	-4.7	46.5	-3.3	27.5	[illegible]
11	52.0	1.9	30.0	-2.2	51.5	1.8	29.5	-2.3
12	51.5	1.4	32.5	.3	51.5	1.8	32.5	.7
13	53.5	3.4	36.0	3.8	53.0	3.3	35.5	3.7
14	53.0	2.9	31.5	-.7	52.5	2.8	31.0	-.8
15	49.5	-.6	32.0	-.2	49.5	-.2	32.0	.2
16	49.0	-1.1	32.0	-.2	49.0	-.7	32.0	.2
MEAN	50.1		32.2		49.8		31.8	
S.D.	2.2		2.8		2.1		2.8	

DAY READINGS - SURVEY NUMBER 27

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	48.0	-1.7	37.0	4.3	47.5	-1.8	36.5	4.1
2	54.0	4.3	34.5	1.8	54.0	4.7	34.5	2.1
3	52.0	2.3	34.0	1.3	51.0	1.7	33.0	.6
4	48.0	-1.7	31.5	-1.3	47.5	-1.8	31.0	-1.4
5	50.5	.8	35.5	2.8	50.5	1.2	35.5	3.1
6	51.5	1.8	35.5	2.8	51.0	1.7	35.0	2.6
7	54.0	4.3	32.5	-.2	54.0	4.7	32.5	.1
8	49.0	-.7	33.0	.2	48.5	-.8	32.5	.1
9	49.5	-.2	30.0	-2.8	49.5	.2	30.0	-2.4
10	46.0	-3.7	28.5	-4.3	45.5	-3.8	28.0	-4.4
11	46.5	-3.2	31.0	-1.8	45.5	-3.8	30.0	-2.4
12	52.0	2.3	31.0	-1.8	51.5	2.2	30.5	-1.9
13	48.5	-1.2	31.0	-1.8	48.5	-.8	31.0	-1.4
14	47.0	-2.7	30.5	-2.3	47.0	-2.3	30.5	-1.9
15	46.5	-3.2	35.0	2.3	46.5	-2.8	35.0	2.6
16	52.0	2.3	33.5	.7	51.5	2.2	33.0	.6
MEAN	49.7		32.8		49.3		32.4	
S.D.	2.7		2.4		2.7		2.4	

DAY READINGS - SURVEY NUMBER 28

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	50.0	-.0	38.0	2.7	49.5	-.2	37.5	2.5
2	50.0	-.0	35.0	-.3	50.0	.3	35.0	.0
3	47.0	-3.0	36.0	.7	47.0	-2.7	36.0	1.0
4	50.0	-.0	34.0	-1.3	49.0	-.7	33.0	-2.0
5	47.5	-2.5	34.0	-1.3	47.5	-2.2	34.0	-1.0
6	51.0	1.0	37.5	2.2	51.0	1.3	37.5	2.5
7	53.5	3.5	33.5	-1.8	53.5	3.8	33.5	-1.5
8	47.5	-2.5	35.0	-.3	46.5	-3.2	34.0	-1.0
9	54.0	4.0	37.0	1.7	54.0	4.3	37.0	2.0
10	46.5	-3.5	36.0	.7	46.0	-3.7	35.5	.5
11	47.0	-3.0	36.0	.7	46.5	-3.2	35.5	.5
12	50.5	.5	33.5	-1.8	49.8	.1	32.8	-2.2
13	49.0	-1.0	30.5	-4.8	49.0	-.7	30.5	-4.5
14	52.5	2.5	33.5	-1.8	52.0	2.3	33.0	-2.0
15	51.5	1.5	37.5	2.2	51.5	1.8	37.5	2.5
16	53.0	3.0	37.5	2.2	53.0	3.3	37.5	2.5
MEAN	50.0		35.3		49.7		35.0	
S.D.	2.5		2.0		2.6		2.1	

DAY READINGS - SURVEY NUMBER 29

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	50.0	-.9	39.5	3.3	50.0	-.6	39.5	3.6
2	53.0	2.1	34.0	-2.2	52.8	2.2	33.8	-2.1
3	48.5	-2.4	35.5	-.7	47.5	-3.2	34.5	-1.4
4	51.5	.6	35.5	-.7	51.0	.3	35.0	-.9
5	50.5	-.4	39.5	3.3	50.5	-.1	39.5	3.6
6	52.5	1.6	36.5	.3	52.3	1.7	36.3	.4
7	53.5	2.6	38.5	2.3	53.5	2.9	38.5	2.6
8	47.5	-3.4	38.5	2.3	46.5	-4.2	37.5	1.6
9	50.5	-.4	36.0	-.2	50.5	-.1	36.0	.1
10	52.5	1.6	34.5	-1.7	51.8	1.2	33.8	-2.1
11	51.0	.1	35.5	-.7	51.0	.3	35.5	-.4
12	51.5	.6	32.0	-4.2	51.5	.8	32.0	-3.9
13	48.5	-2.4	36.5	.3	48.5	-2.2	36.5	.6
14	52.0	1.1	34.5	-1.7	52.0	1.4	34.5	-1.4
15	47.5	-3.4	36.5	.3	46.5	-4.2	35.5	-.4
16	54.5	3.6	35.5	-.7	54.5	3.9	35.5	-.4
MEAN	50.9		36.2		50.7		35.9	
S.D.	2.1		2.0		2.4		2.1	

DAY READINGS - SURVEY NUMBER 30

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	50.0	-.5	39.5	2.9	50.0	-.1	39.5	3.3
2	52.5	2.0	41.0	4.4	51.5	1.4	40.0	3.8
3	52.0	1.5	40.0	3.4	52.0	1.9	40.0	3.8
4	51.0	.5	36.0	-.6	51.0	.9	36.0	-.2
5	48.0	-2.5	36.5	-.1	47.5	-2.6	36.0	-.2
6	49.5	-1.0	39.5	2.9	49.5	-.6	39.5	3.3
7	52.5	2.0	37.5	.9	51.5	1.4	36.5	.3
8	47.5	-3.0	37.0	.4	47.5	-2.6	37.0	.8
9	52.0	1.5	36.0	-.6	51.5	1.4	35.5	-.7
10	47.5	-3.0	36.0	-.6	47.0	-3.1	35.5	-.7
11	52.5	2.0	36.5	-.1	52.0	1.9	36.0	-.2
12	49.0	-1.5	33.5	-3.1	49.0	-1.1	33.5	-2.7
13	50.5	-.0	35.0	-1.6	50.0	-.1	34.5	-1.7
14	53.0	2.5	34.0	-2.6	52.0	1.9	33.0	-3.2
15	49.5	-1.0	33.0	-3.6	49.5	-.6	33.0	-3.2
16	51.5	1.0	35.0	-1.6	50.5	.4	34.0	-2.2
MEAN	50.5		36.6		50.1		36.2	
S.D.	1.9		2.4		1.7		2.4	

DAY READINGS - SURVEY NUMBER 31

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	46.0	-3.5	40.0	4.3	46.0	-3.2	40.0	4.6
2	52.0	2.5	36.0	.3	51.8	2.6	35.8	.6
3	53.5	4.0	40.5	4.8	53.0	3.8	40.0	4.6
4	51.0	1.5	37.5	1.8	50.0	.8	36.5	1.1
5	48.0	-1.5	36.0	.3	47.5	-1.7	35.5	.1
6	52.0	2.5	38.0	2.3	52.0	2.8	38.0	2.6
7	50.0	.5	37.0	1.3	50.5	1.3	37.5	2.1
8	48.0	-1.5	36.5	.8	48.5	-.7	37.0	1.6
9	47.0	-2.5	32.5	-3.2	47.0	-2.2	32.5	-2.9
10	46.0	-3.5	33.0	-2.7	45.5	-3.7	32.5	-2.9
11	50.5	1.0	33.0	-2.7	50.5	1.3	33.0	-2.4
12	52.5	3.0	37.0	1.3	52.0	2.8	36.5	1.1
13	47.5	-2.0	33.5	-2.2	46.5	-2.7	32.5	-2.9
14	49.5	-.0	33.0	-2.7	49.5	.3	33.0	-2.4
15	49.0	-.5	34.5	-1.2	48.5	-.7	34.0	-1.4
16	50.0	.5	33.5	-2.2	49.0	-.2	32.5	-2.9
MEAN	49.5		35.7		49.2		35.4	
S.D.	2.3		2.5		2.3		2.7	

DAY READINGS - SURVEY NUMBER 32

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	49.5	-.4	33.5	.1	49.0	-.4	33.0	.1
2	50.0	.1	31.5	-1.9	50.0	.6	31.5	-1.4
3	47.5	-2.4	36.0	2.6	46.5	-2.9	35.0	2.1
4	48.0	-1.9	28.5	-4.9	47.5	-1.9	28.0	-4.9
5	48.5	-1.4	34.5	1.1	48.5	-.9	34.5	1.6
6	51.0	1.1	36.5	3.1	50.5	1.1	36.0	3.1
7	52.5	2.6	36.0	2.6	51.5	2.1	35.0	2.1
8	52.0	2.1	36.5	3.1	51.5	2.1	36.0	3.1
9	52.0	2.1	35.5	2.1	51.5	2.1	35.0	2.1
10	49.5	-.4	33.5	.1	49.5	.1	33.5	.6
11	51.0	1.1	29.0	-4.4	50.0	.6	28.0	-4.9
12	51.0	1.1	32.5	-.9	50.5	1.1	32.0	-.9
13	50.0	.1	36.5	3.1	50.0	.6	36.5	3.6
14	46.5	-3.4	29.5	-3.9	45.5	-3.9	28.5	-4.4
15	49.0	-.9	31.5	-1.9	48.5	-.9	31.0	-1.9
16	50.5	.6	34.0	.6	50.0	.6	33.5	.6
MEAN	49.9		33.4		49.4		32.9	
S.D.	1.7		2.8		1.8		2.9	

DAY READINGS - SURVEY NUMBER 33

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	~~50.2~~	~~.0~~	35.5	.3	~~49.8~~	~~-.0~~	35.5	.7
2	47.0	-3.2	31.0	-4.2	46.5	-3.3	30.5	-4.3
3	47.0	-3.2	36.5	1.3	46.0	-3.8	35.5	.7
4	53.5	3.3	38.5	3.3	53.5	3.7	38.5	3.7
5	50.0	-.2	36.0	.8	49.5	-.3	35.5	.7
6	51.0	.8	35.5	.3	51.0	1.2	35.5	.7
7	52.0	1.8	37.5	2.3	51.0	1.2	36.5	1.7
8	49.5	-.7	33.5	-1.7	49.0	-.8	33.0	-1.8
9	52.0	1.8	38.5	3.3	52.5	2.7	39.0	4.2
10	48.5	-1.7	31.0	-4.2	48.5	-1.3	31.0	-3.8
11	51.0	.8	34.5	-.7	50.5	.7	34.0	-.8
12	50.0	-.2	34.5	-.7	50.0	.2	34.5	-.3
13	46.0	-2.2	34.0	-1.2	47.5	-2.3	33.5	-1.3
14	53.0	2.8	34.5	-.7	52.0	2.2	33.5	-1.3
15	50.0	-.2	37.0	1.8	50.0	.2	37.0	2.2
16	50.5	.3	35.0	-.2	50.0	.2	34.5	-.3
MEAN	50.2		35.2		49.8		34.8	
S.D.	1.9		2.2		2.0		2.3	

DAY READINGS - SURVEY NUMBER 34

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.0	-1.7	33.0	-.5	46.0	-2.4	32.0	-1.2
2	48.0	-.7	32.5	-1.0	48.0	-.4	32.5	-.7
3	50.0	1.3	34.5	1.0	49.5	1.1	34.0	.8
4	49.5	.8	37.0	3.5	49.5	1.1	37.0	3.8
5	53.5	4.8	38.5	5.0	53.0	4.6	38.0	4.8
6	48.0	-.7	35.0	1.5	48.0	-.4	35.0	1.8
7	53.0	4.3	35.0	1.5	52.5	4.1	34.5	1.3
8	49.5	.8	31.0	-2.5	49.0	.6	30.5	-2.7
9	50.0	1.3	32.5	-1.0	50.0	1.6	32.5	-.7
10	44.0	-4.7	30.0	-3.5	44.0	-4.4	30.0	-3.2
11	48.5	-.2	34.0	.5	48.5	.1	34.0	.8
12	49.5	.8	31.5	-2.0	49.0	.6	31.0	-2.2
13	47.0	-1.7	32.0	-1.5	46.5	-1.9	31.5	-1.7
14	48.5	-.2	33.0	-.5	48.5	.1	33.0	-.2
15	45.5	-3.2	34.5	1.0	44.5	-3.9	33.5	.3
16	48.0	-.7	32.5	-1.0	47.5	-.9	32.0	-1.2
MEAN	48.7		33.5		48.4		33.2	
S.D.	2.4		2.2		2.4		2.2	

DAY READINGS - SURVEY NUMBER 35

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	47.5	-1.8	36.5	1.3	47.5	-1.4	36.5	1.7
2	50.5	1.2	36.0	.8	50.0	1.1	35.5	.7
3	52.5	3.2	37.5	2.3	52.0	3.1	37.0	2.2
4	46.0	-3.3	40.0	4.8	45.0	-3.9	39.0	4.2
5	46.5	-2.8	36.0	.8	46.5	-2.4	36.0	1.2
6	52.5	3.2	34.5	-.7	52.5	3.6	34.5	-.3
7	50.5	1.2	35.0	-.2	50.0	1.1	34.5	-.3
8	50.0	.7	31.5	-3.7	49.0	.1	30.5	-4.3
9	49.5	.2	34.5	-.7	49.0	.1	34.0	-.8
10	45.0	-4.3	34.0	-1.2	45.0	-3.9	34.0	-.8
11	49.0	-.3	33.0	-2.2	48.5	-.4	32.5	-2.3
12	49.5	.2	35.0	-.2	49.0	.1	34.5	-.3
13	47.5	-1.8	35.0	-.2	47.5	-1.4	35.0	.2
14	52.5	3.2	34.5	-.7	51.5	2.6	33.5	-1.3
15	49.0	-.3	34.0	-1.2	49.0	.1	34.0	-.8
16	51.0	1.7	36.5	1.3	50.5	1.6	36.0	1.2
MEAN	49.3		35.2		48.9		34.8	
S.D.	2.3		1.9		2.2		1.9	

DAY READINGS - SURVEY NUMBER 36

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	47.0	-2.5	36.0	1.4	47.0	-2.3	36.0	1.6
2	50.5	1.0	35.0	.4	50.0	.7	34.5	.1
3	51.0	1.5	37.5	2.9	50.5	1.2	37.0	2.6
4	48.0	-1.5	32.5	-2.1	48.0	-1.3	32.5	-1.9
5	47.5	-2.0	34.5	-.1	47.0	-2.3	34.0	-.4
6	51.0	1.5	33.5	-1.1	51.0	1.7	33.5	-.9
7	52.0	2.5	34.5	-.1	52.0	2.7	34.5	.1
8	49.5	.0	34.5	-.1	49.5	.2	34.5	.1
9	52.5	3.0	34.0	-.6	52.0	2.7	33.5	-.9
10	47.0	-2.5	36.0	1.4	47.0	-2.3	36.0	1.6
11	48.5	-1.0	33.5	-1.1	48.5	-.8	33.5	-.9
12	50.0	.5	32.0	-2.6	50.0	.7	32.0	-2.4
13	49.5	.0	38.0	3.4	49.5	.2	38.0	3.6
14	49.5	.0	33.0	-1.6	49.0	-.3	32.5	-1.9
15	47.0	-2.5	34.0	-.6	46.5	-2.8	33.5	-.9
16	51.0	1.5	34.5	-.1	51.0	1.7	34.5	.1
MEAN	49.5		34.6		49.3		34.4	
S.D.	1.8		1.7		1.8		1.7	

DAY READINGS - SURVEY NUMBER 37

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.0	-2.3	37.5	3.3	47.0	-1.9	37.5	3.7
2	50.5	1.3	37.5	3.3	50.5	1.6	37.5	3.7
3	49.5	.2	39.0	4.8	49.0	.1	38.5	4.7
4	51.0	1.8	37.5	3.3	51.0	2.1	37.5	3.7
5	48.5	-.7	36.0	1.8	47.5	-1.4	35.0	1.2
6	52.0	2.8	38.0	3.8	51.5	2.6	37.5	3.7
7	50.0	.7	32.0	-2.2	50.0	1.1	32.0	-1.8
8	47.5	-1.8	29.5	-4.7	47.0	-1.9	29.0	-4.8
9	47.5	-1.8	32.0	-2.2	47.5	-1.4	32.0	-1.8
10	46.0	-3.3	32.5	-1.7	45.5	-3.4	32.0	-1.8
11	51.0	1.8	32.5	-1.7	51.0	2.1	32.5	-1.3
12	47.5	-1.8	30.0	-4.2	47.0	-1.9	29.5	-4.3
13	48.0	-1.3	35.5	1.3	47.0	-1.9	34.5	.7
14	52.0	2.8	31.5	-2.7	51.5	2.6	31.0	-2.8
15	48.5	-.7	32.5	-1.7	48.5	-.4	32.5	-1.3
16	51.5	2.3	33.0	-1.2	51.0	2.1	32.5	-1.3
MEAN	49.3		34.2		48.9		33.8	
S.D.	1.9		3.1		2.0		3.1	

DAY READINGS - SURVEY NUMBER 38

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	47.0	-2.5	31.0	-2.8	47.0	-2.3	31.0	-2.6
2	51.5	2.0	36.0	2.2	51.0	1.8	35.5	1.9
3	48.0	-1.5	37.5	3.7	47.5	-1.8	37.0	3.4
4	52.0	2.5	35.5	1.7	52.0	2.8	35.5	1.9
5	49.5	.0	37.0	3.2	49.5	.2	37.0	3.4
6	49.0	-.5	33.0	-.8	49.0	-.2	33.0	-.6
7	50.5	1.0	34.5	.7	50.0	.7	34.0	.4
8	47.0	-2.5	33.5	-.3	47.0	-2.3	33.5	-.1
9	52.0	2.5	32.5	-1.3	51.5	2.3	32.0	-1.6
10	48.0	-1.5	31.5	-2.3	48.0	-1.3	31.5	-2.1
11	49.5	.0	34.0	.2	49.0	-.2	33.5	-.1
12	47.0	-2.5	31.5	-2.3	47.0	-2.3	31.5	-2.1
13	51.0	1.5	33.0	-.8	50.5	1.3	32.5	-1.1
14	52.5	3.0	32.0	-1.8	52.5	3.3	32.0	-1.6
15	47.5	-2.0	34.0	.2	47.0	-2.3	33.5	-.1
16	49.5	.0	34.0	.2	49.5	.2	34.0	.4
MEAN	49.5		33.8		49.3		33.6	
S.D.	1.9		1.9		1.9		1.9	

DAY READINGS - SURVEY NUMBER 39

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.5	-2.8	31.0	-4.0	47.5	-2.6	31.0	-3.7
2	50.0	-.3	33.0	-2.0	49.5	-.6	32.5	-2.2
3	49.0	-1.3	37.5	2.5	49.0	-1.1	37.5	2.8
4	52.0	1.7	38.0	3.0	51.5	1.4	37.5	2.8
5	46.0	-4.3	34.0	-1.0	46.0	-4.1	34.0	-.7
6	49.0	-1.3	34.0	-1.0	48.5	-1.6	33.5	-1.2
7	52.0	1.7	36.0	1.0	52.0	1.9	36.0	1.3
8	52.0	1.7	38.0	3.0	51.5	1.4	37.5	2.8
9	53.0	2.7	36.5	1.5	53.0	2.9	36.5	1.8
10	46.0	-4.3	33.5	-1.5	45.5	-4.6	33.0	-1.7
11	52.5	2.2	37.0	2.0	52.5	2.4	37.0	2.3
12	52.5	2.2	31.5	-3.5	52.5	2.4	31.5	-3.2
13	50.0	-.3	37.0	2.0	49.5	-.6	36.5	1.8
14	52.5	2.2	32.0	-3.0	52.5	2.4	32.0	-2.7
15	51.0	.7	35.5	.5	50.0	-.1	34.5	-.2
16	50.5	.2	35.0	.0	50.5	.4	35.0	.3
MEAN	50.3		35.0		50.1		34.7	
S.D.	2.3		2.3		2.3		2.3	

DAY READINGS - SURVEY NUMBER 40

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	52.5	1.0	34.3	.0	51.8	1.9	33.9	-.0
2	50.5	-.1	35.5	1.2	50.0	.1	35.0	1.1
3	48.5	-2.1	34.0	-.3	48.8	-1.1	34.3	.4
4	49.0	-1.6	36.0	1.7	49.0	-.9	36.0	2.1
5	48.5	-2.1	36.5	2.2	48.5	-1.4	36.5	2.6
6	54.5	3.9	34.0	-.3	53.8	3.9	33.3	-.6
7	54.5	3.9	37.5	3.2	53.0	3.1	36.0	2.1
8	48.0	-2.6	31.0	-3.3	47.8	-2.1	30.6	-3.1
9	51.0	.4	32.5	-1.8	50.8	.9	32.3	-1.5
10	50.6	-.0	31.5	-2.8	45.0	-4.9	31.5	-2.4
11	50.0	-.6	33.0	-1.3	49.5	-.4	32.5	-1.4
12	53.0	2.4	35.0	.7	52.8	2.9	34.8	.9
13	49.5	-1.1	36.0	1.7	49.3	-.6	35.8	1.9
14	49.0	-1.6	31.5	-2.8	48.8	-1.1	31.3	-2.6
15	48.5	-2.1	34.5	.2	48.3	-1.6	34.3	.4
16	52.5	1.9	35.5	1.2	51.8	1.9	34.6	.9
MEAN	50.6		34.3		49.9		33.9	
S.D.	2.2		1.9		2.3		1.8	

DAY READINGS - SURVEY NUMBER 41

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	50.5	1.3	38.5	3.4	50.8	1.4	34.3	.0
2	53.5	4.3	36.0	.9	53.0	3.6	35.5	1.2
3	45.0	-4.3	30.5	-4.6	44.5	-4.9	30.0	-4.3
4	47.5	-1.8	34.0	-1.1	48.5	-.9	34.3	.0
5	45.0	-4.3	39.0	3.9	45.5	-3.9	34.3	.0
6	49.0	-.2	36.5	1.4	49.3	-.1	36.8	2.5
7	54.0	4.8	37.5	2.4	53.0	3.6	36.5	2.2
8	48.0	-1.3	34.0	-1.1	48.8	-.6	34.8	.5
9	49.5	.2	34.0	-1.1	49.5	.1	34.0	-.3
10	44.5	-4.8	34.0	-1.1	49.4	-.0	33.5	-.8
11	49.5	.2	34.0	-1.1	49.5	.1	34.0	-.3
12	50.5	1.3	34.5	-.6	50.0	.6	34.0	-.3
13	50.5	1.3	36.0	.9	49.8	.4	35.3	1.0
14	53.0	3.8	33.0	-2.1	53.0	3.6	33.0	-1.3
15	46.0	-3.3	34.0	-1.1	45.5	-3.9	33.5	-.8
16	52.0	2.8	36.0	.9	51.0	1.6	35.0	.7
MEAN	49.3		35.1		49.4		34.3	
S.D.	3.1		2.2		2.6		1.5	

DAY READINGS - SURVEY NUMBER 42

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	52.5	3.0	32.0	-1.8	52.8	3.5	32.3	-1.7
2	51.0	1.5	37.5	3.7	51.0	1.7	37.5	3.6
3	46.0	-3.5	32.5	-1.3	46.0	-3.3	32.5	-1.5
4	51.0	1.5	37.0	3.2	50.5	1.2	36.5	2.6
5	46.5	-3.0	34.5	.7	47.0	-2.3	35.0	1.1
6	49.0	-.5	31.0	-2.8	49.3	.0	31.3	-2.7
7	51.0	1.5	36.0	2.2	51.0	1.7	36.0	2.1
8	51.5	2.0	31.5	-2.3	51.0	1.7	31.0	-3.0
9	49.5	-.0	33.0	-.8	49.5	.2	33.0	-.9
10	46.5	-3.0	31.5	-2.3	46.0	-3.3	31.0	-3.0
11	47.5	-2.0	34.0	.2	47.5	-1.8	34.0	.0
12	52.0	2.5	33.5	-.3	50.3	1.0	31.8	-2.2
13	51.0	1.5	~~33.8~~	~~-.0~~	50.3	1.0	38.8	4.9
14	48.0	-1.5	32.0	-1.8	47.5	-1.8	31.5	-2.5
15	49.0	-.5	38.0	4.2	49.0	-.3	38.0	4.1
16	50.5	1.0	33.5	-.3	50.0	.7	33.0	-.9
MEAN	49.5		33.8		49.3		34.0	
S.D.	2.1		2.2		2.0		2.7	

DAY READINGS - SURVEY NUMBER 43

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	50.0	.0	36.0	2.3	51.3	1.4	37.3	3.7
2	51.0	1.0	34.0	.3	51.0	1.1	34.0	.4
3	50.0	.0	34.5	.8	49.8	-.1	34.3	.7
4	50.5	.5	35.5	1.8	49.5	-.4	34.5	.9
5	48.5	-1.5	36.0	2.3	48.8	-1.1	36.3	2.7
6	50.0	.0	32.0	-1.7	49.8	-.1	31.6	-1.8
7	52.0	2.0	34.5	.8	52.5	2.6	35.0	1.4
8	49.5	-.5	30.5	-3.2	49.5	-.4	30.5	-3.1
9	52.0	2.0	34.5	.8	52.0	2.1	34.5	.9
10	46.0	-4.0	31.0	-2.7	46.0	-3.9	31.0	-2.6
11	50.5	.5	33.5	-.2	50.0	.1	33.0	-.6
12	53.0	3.0	33.5	-.2	52.3	2.4	32.6	-.8
13	49.5	-.5	33.0	-.7	49.5	-.4	33.0	-.6
14	48.5	-1.5	31.5	-2.2	47.8	-2.1	30.6	-2.8
15	48.5	-1.5	34.0	.3	48.5	-1.4	34.0	.4
16	50.5	.5	34.5	.8	50.3	.4	34.3	.7
MEAN	50.0		33.7		49.9		33.6	
S.D.	1.7		1.7		1.7		1.9	

DAY READINGS - SURVEY NUMBER 44

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	54.0	4.0	38.0	3.3	53.5	4.0	37.5	3.0
2	52.0	2.0	36.0	1.3	51.3	1.8	35.3	.8
3	50.0	.0	33.0	-1.7	50.0	.5	33.0	-1.5
4	50.5	.5	36.0	1.3	51.0	1.5	36.5	2.0
5	49.5	-.5	38.5	3.8	49.5	.0	38.5	4.0
6	50.0	.0	36.0	1.3	50.0	.5	36.0	1.5
7	50.0	.0	38.5	3.8	49.5	.0	38.0	3.5
8	46.5	-3.5	32.0	-2.7	46.5	-3.0	32.0	-2.5
9	50.0	.0	31.5	-3.2	44.5	-5.0	31.5	-3.0
10	47.0	-3.0	33.5	-1.2	47.0	-2.5	33.5	-1.0
11	49.5	-.5	31.5	-3.2	48.5	-1.0	30.5	-4.0
12	50.5	.5	34.0	-.7	49.3	-.2	32.8	-1.7
13	52.5	2.5	34.0	-.7	52.8	3.3	34.3	-.2
14	49.0	-1.0	34.5	-.2	49.0	-.5	34.5	-.0
15	46.5	-3.5	34.0	-.7	46.5	-3.0	34.0	-.5
16	52.5	2.5	34.5	-.2	52.5	3.0	34.5	-.0
MEAN	50.0		34.7		49.5		34.5	
S.D.	2.1		2.3		2.5		2.3	

DAY READINGS - SURVEY NUMBER 45

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	51.0	2.0	38.0	2.3	51.0	2.2	38.0	2.4
2	49.5	.5	34.0	-1.8	49.5	.7	34.0	-1.6
3	44.0	-5.0	32.5	-3.3	44.0	-4.8	32.5	-3.1
4	46.0	-1.0	36.5	.7	47.3	-1.5	35.6	.2
5	50.5	1.5	40.0	4.3	50.3	1.5	39.8	4.2
6	49.5	.5	35.0	-.7	49.0	.2	34.5	-1.1
7	50.5	1.5	36.5	.7	50.5	1.7	36.5	.9
8	48.0	-1.0	35.0	-.7	47.8	-1.0	34.6	-.8
9	47.5	-1.5	32.5	-3.3	47.0	-1.8	32.0	-3.6
10	50.5	1.5	32.5	-3.3	50.5	1.7	32.5	-3.1
11	51.0	2.0	36.0	.2	50.0	1.2	35.0	-.6
12	49.5	.5	35.5	-.2	49.5	.7	35.5	-.1
13	48.5	-.5	40.0	4.3	48.8	.0	40.3	4.7
14	48.5	-.5	37.5	1.8	48.3	-.5	37.3	1.7
15	48.0	-1.0	35.0	-.7	48.0	-.8	35.0	-.6
16	49.0	.0	35.5	-.2	49.0	.2	35.5	-.1
MEAN	49.0		35.8		48.8		35.6	
S.D.	1.8		2.3		1.7		2.4	

DAY READINGS - SURVEY NUMBER 46

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	52.0	2.1	39.0	1.5	51.5	1.8	38.5	1.2
2	54.5	4.6	38.0	.5	54.5	4.8	38.0	.7
3	50.0	.1	39.5	2.0	49.5	-.2	39.0	1.7
4	49.5	-.4	37.5	-.0	49.8	.1	37.8	.5
5	47.5	-2.4	39.0	1.5	47.0	-2.7	38.5	1.2
6	48.5	-1.4	37.0	-.5	48.5	-1.2	37.0	-.3
7	49.5	-.4	35.0	-2.5	49.5	-.2	35.0	-2.3
8	50.0	.1	35.5	-2.0	49.8	.1	35.3	-2.0
9	48.0	-1.9	38.0	.5	47.5	-2.2	37.5	.2
10	53.0	3.1	40.0	2.5	52.8	3.1	39.8	2.5
11	48.5	-1.4	36.5	-1.0	47.3	-2.4	35.3	-2.0
12	45.5	-4.4	38.0	.5	45.8	-3.9	38.3	1.0
13	51.0	1.1	35.5	-2.0	51.3	1.6	35.8	-1.5
14	49.5	-.4	39.0	1.5	49.5	-.2	39.0	1.7
15	52.0	2.1	37.0	-.5	51.8	2.1	36.8	-.5
16	49.0	-.9	36.0	-1.5	48.8	-.9	35.8	-1.5
MEAN	49.9		37.5		49.7		37.3	
S.D.	2.2		1.5		2.3		1.5	

DAY READINGS -- SURVEY NUMBER 47

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	46.5	-1.8	38.5	2.8	46.5	-1.7	38.5	2.9
2	49.0	.7	35.5	-.2	48.5	.3	35.0	-.6
3	46.5	-1.8	35.5	-.2	46.5	-1.7	35.5	-.1
4	49.0	.7	35.5	-.2	48.3	.1	34.8	-.8
5	47.5	-.8	40.0	4.3	47.0	-1.2	39.5	3.9
6	46.0	-2.3	33.0	-2.7	46.0	-2.2	33.0	-2.6
7	46.0	-2.3	34.0	-1.7	46.0	-2.2	34.0	-1.6
8	45.5	-2.8	34.0	-1.7	45.5	-2.7	34.0	-1.6
9	51.5	3.2	38.0	2.3	51.5	3.3	38.0	2.4
10	48.5	.2	33.5	-2.2	48.3	.1	33.3	-2.3
11	48.5	.2	39.0	3.3	48.5	.3	39.0	3.4
12	51.5	3.2	36.5	.8	51.5	3.3	36.5	.9
13	49.5	1.2	34.5	-1.2	49.5	1.3	34.5	-1.1
14	49.0	.7	34.5	-1.2	49.5	1.3	35.0	-.6
15	48.0	-.3	34.0	-1.7	47.5	-.7	33.5	-2.1
16	51.0	2.7	34.5	-1.2	51.3	3.1	34.8	-.8
MEAN	48.3		35.7		48.2		35.6	
S.D.	1.9		2.1		2.0		2.1	

DAY READINGS - SURVEY NUMBER 48

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	46.0	-1.8	33.5	-.2	45.5	-2.1	33.0	-.6
2	50.5	2.8	35.5	1.8	50.3	2.7	35.3	1.7
3	47.5	-.2	37.0	3.3	47.5	-.1	37.0	3.4
4	46.5	-1.3	32.5	-1.3	46.0	-1.6	32.0	-1.6
5	47.0	-.7	35.0	1.3	46.8	-.8	34.8	1.2
6	43.0	-4.8	32.0	-1.8	43.3	-4.3	32.3	-1.3
7	48.0	.2	36.5	2.8	48.0	.4	36.5	2.9
8	49.5	1.8	32.5	-1.3	49.5	1.9	32.5	-1.1
9	45.0	-2.8	31.0	-2.8	44.8	-2.8	30.8	-2.8
10	47.0	-.7	32.0	-1.8	47.0	-.6	32.0	-1.8
11	49.0	1.3	34.5	.7	48.8	1.2	34.3	.7
12	51.0	3.3	36.0	2.3	50.5	2.9	35.5	1.9
13	48.0	.2	32.0	-1.8	47.8	.2	31.8	-1.8
14	49.0	1.3	34.5	.7	49.0	1.4	34.5	.9
15	46.5	-1.3	33.0	-.7	47.0	-.6	33.5	-.1
16	50.5	2.8	32.5	-1.3	50.5	2.9	32.5	-1.1
MEAN	47.8		33.8		47.6		33.6	
S.D.	2.2		1.8		2.1		1.8	

DAY READINGS - SURVEY NUMBER 49

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	50.0	1.7	37.5	2.4	49.8	1.7	37.3	2.4
2	48.5	.2	35.0	-.1	48.3	.1	34.8	-.1
3	51.5	3.2	37.0	1.9	51.5	3.4	37.0	2.1
4	48.0	-.3	32.0	-3.1	47.5	-.6	31.5	-3.4
5	45.0	-3.3	34.5	-.6	45.5	-2.7	35.0	.1
6	46.5	-1.8	31.5	-3.6	46.5	-1.7	31.5	-3.4
7	46.0	-2.3	38.5	3.4	46.3	-1.9	38.8	3.9
8	46.0	-2.3	31.0	-4.1	45.8	-2.4	30.8	-4.1
9	49.0	.7	34.0	-1.1	47.8	-.3	32.8	-2.1
10	49.0	.7	33.5	-1.6	48.3	.1	32.8	-2.1
11	53.0	4.7	38.0	2.9	53.0	4.9	38.0	3.1
12	45.5	-2.8	33.0	-2.1	45.0	-3.2	32.5	-2.4
13	47.0	-1.3	35.0	-.1	47.0	-1.2	35.0	.1
14	49.0	.7	38.0	2.9	48.3	.1	37.3	2.4
15	48.5	.2	36.5	1.4	48.8	.6	36.8	1.9
16	51.0	2.7	36.0	.9	51.0	2.9	36.0	1.1
MEAN	48.3		35.1		48.2		34.9	
S.D.	2.3		2.4		2.3		2.6	

DAY READINGS - SURVEY NUMBER 50

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	50.5	1.3	34.0	.0	50.0	.8	39.0	4.8
2	51.5	2.3	34.0	.0	51.5	2.4	34.0	-.2
3	46.0	-3.3	33.5	-.5	46.0	-3.2	33.5	-.7
4	47.5	-1.8	33.0	-1.0	49.0	-.1	34.5	.3
5	47.0	-2.3	33.5	-.5	46.5	-2.7	33.0	-1.2
6	47.0	-2.3	35.0	1.0	45.8	-3.4	33.8	-.4
7	49.0	-.2	36.0	2.0	49.5	.3	36.5	2.3
8	45.5	-3.8	32.0	-2.0	45.8	-3.4	32.3	-1.9
9	51.0	1.8	31.5	-2.5	50.5	1.4	31.0	-3.2
10	44.5	-4.8	33.0	-1.0	44.5	-4.7	33.0	-1.2
11	51.0	1.8	35.0	1.0	50.0	.8	34.0	-.2
12	53.5	4.3	35.0	1.0	53.0	3.9	34.5	.3
13	50.5	1.3	35.0	1.0	50.3	1.2	34.8	.6
14	51.5	2.3	35.0	1.0	51.5	2.4	35.0	.8
15	49.0	-.2	35.5	1.5	49.5	.3	36.0	1.8
16	53.0	3.8	32.5	-1.5	53.0	3.9	32.5	-1.7
MEAN	49.3		34.0		49.2		34.2	
S.D.	2.7		1.3		2.7		1.9	

NIGHT READINGS - SURVEY NUMBER 1

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	49.5	1.2	37.0	3.8	50.3	1.6	37.6	4.2
2	49.5	1.2	33.0	-.2	50.3	1.6	33.6	.2
3	49.0	.7	34.0	.8	48.0	-.7	33.0	-.6
4	49.5	1.2	34.0	.8	50.3	1.6	34.6	1.2
5	46.0	-2.3	35.5	2.3	45.8	-3.0	35.3	1.7
6	44.5	-3.8	33.5	.3	44.5	-4.3	33.5	-.1
7	51.0	2.7	34.5	1.3	51.0	2.3	34.5	.9
8	44.0	-4.3	31.5	-1.7	45.3	-3.5	32.8	-.8
9	50.5	2.2	32.5	-.7	51.3	2.6	33.3	-.3
10	45.0	-3.3	31.5	-1.7	46.3	-2.5	32.6	-.8
11	48.0	-.3	28.5	-4.7	49.5	.7	30.0	-3.6
12	50.0	1.7	33.0	-.2	50.8	2.1	33.6	.2
13	47.0	-1.3	33.0	-.2	47.5	-1.3	33.5	-.1
14	52.0	3.7	32.5	-.7	52.3	3.6	32.8	-.8
15	48.5	.2	36.5	3.3	49.0	.2	37.0	3.4
16	49.0	.7	30.0	-3.2	47.8	-.9	28.6	-4.8
MEAN	48.3		33.2		48.8		33.6	
S.D.	2.4		2.2		2.4		2.2	

NIGHT READINGS - SURVEY NUMBER 2

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	48.0	1.5	37.0	4.3	46.3	.4	35.3	3.3
2	49.0	2.5	35.0	2.3	48.3	2.4	34.3	2.3
3	47.0	.5	31.0	-1.7	46.0	.1	30.0	-2.0
4	44.0	-2.5	31.0	-1.7	43.5	-2.4	30.5	-1.5
5	46.5	-.0	34.5	1.8	44.8	-1.1	32.0	.8
6	45.5	-1.0	32.0	-.7	45.8	-.1	32.3	.3
7	47.5	1.0	33.0	.3	47.0	1.1	32.5	.5
8	45.0	-1.5	32.0	-.7	44.5	-1.4	31.5	-.5
9	50.5	4.0	31.0	-1.7	50.8	4.9	31.3	-.7
10	43.5	-3.0	32.0	-.7	43.5	-2.4	32.0	-.0
11	45.0	-1.5	33.0	.3	43.5	-2.4	31.5	-.5
12	47.5	1.0	30.5	-2.2	47.0	1.1	30.0	-2.0
13	44.0	-2.5	33.0	.3	42.5	-3.1	31.8	-.2
14	47.0	.5	32.0	-.7	46.0	.1	31.0	-1.0
15	47.5	1.0	34.5	1.8	46.8	.9	33.8	1.8
16	47.0	.5	31.5	-1.2	47.3	1.4	31.8	-.2
MEAN	46.5		32.7		45.9		32.0	
S.D.	1.9		1.8		2.1		1.5	

NIGHT READINGS - SURVEY NUMBER 3

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	49.0	.2	35.5	.3	48.3	.3	34.8	.4
2	49.0	.2	35.0	-.2	48.8	.8	34.8	.4
3	48.5	-.2	33.0	-2.2	47.8	-.2	32.3	-2.1
4	49.5	.7	36.0	.8	48.5	.5	35.0	.6
5	53.5	4.8	37.5	2.3	52.5	4.5	36.5	2.1
6	52.0	3.3	38.5	3.3	51.8	3.8	38.3	3.9
7	49.5	.7	35.5	.3	48.3	.3	34.3	-.1
8	46.5	-2.3	35.5	.3	46.0	-2.0	35.0	.6
9	46.0	-2.8	34.0	-1.2	44.3	-3.7	32.3	-2.1
10	46.0	-2.8	33.0	-2.2	45.0	-3.0	32.0	-2.4
11	50.5	1.8	36.5	1.3	49.8	1.8	35.8	1.4
12	50.5	1.8	37.0	1.8	49.8	1.8	36.3	1.9
13	49.0	.2	34.0	-1.2	48.5	.5	33.5	-.9
14	49.0	.2	36.5	1.3	48.3	.3	35.6	1.4
15	47.5	-1.3	33.0	-2.2	46.5	-1.5	32.0	-2.4
16	44.0	-4.8	33.0	-2.2	43.3	-4.7	32.3	-2.1
MEAN	48.8		35.2		48.0		34.4	
S.D.	2.4		1.8		2.5		1.9	

NIGHT READINGS - SURVEY NUMBER 4

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	47.5	-.2	33.5	-.7	46.8	.1	32.8	-.4
2	49.5	1.8	34.5	.3	48.3	1.6	33.3	.1
3	47.0	-.7	34.0	-.2	45.5	-1.2	32.5	-.7
4	46.0	-1.7	33.0	-1.2	45.0	-1.7	32.0	-1.2
5	48.0	.3	33.5	-.7	47.0	.3	32.5	-.7
6	50.0	2.3	35.5	1.3	49.5	2.8	35.0	1.8
7	49.0	1.3	31.5	-2.7	47.8	1.1	30.3	-2.9
8	46.0	-1.7	36.5	2.3	45.3	-1.4	35.8	2.6
9	50.0	2.3	34.5	.3	48.8	2.1	33.3	.1
10	43.0	-4.7	34.5	.3	42.3	-4.4	33.8	.6
11	45.5	-2.2	30.5	-3.7	44.5	-2.2	29.5	-3.7
12	49.0	1.3	32.5	-1.7	48.3	1.6	31.8	-1.4
13	49.0	1.3	35.0	.8	47.0	.3	33.0	-.2
14	50.0	2.3	38.5	4.3	48.8	2.1	37.3	4.1
15	48.5	.8	37.5	3.3	48.0	1.3	37.0	3.8
16	45.0	-2.7	32.5	-1.7	44.5	-2.2	32.0	-1.2
MEAN	47.7		34.2		46.7		33.2	
S.D.	2.1		2.1		2.0		2.2	

NIGHT READINGS - SURVEY NUMBER 5

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	49.5	-.4	~~32.6~~	~~-.0~~	48.3	-.8	~~31.8~~	~~-.8~~
2	47.5	-2.4	35.5	2.9	46.5	-2.6	34.5	2.7
3	51.5	1.6	34.5	1.9	50.5	1.4	33.5	1.7
4	53.5	3.6	36.5	3.9	52.5	3.4	35.5	3.7
5	50.0	.1	35.0	2.4	49.3	.2	34.3	2.5
6	54.0	4.1	31.5	-1.1	53.8	4.7	31.3	-.5
7	54.0	4.1	34.5	1.9	53.3	4.2	33.8	2.0
8	49.5	-.4	32.0	-.6	49.0	-.1	31.5	-.3
9	48.0	-1.9	29.5	-3.1	47.3	-1.8	28.8	-3.0
10	45.5	-4.4	30.5	-2.1	44.8	-4.3	29.8	-2.0
11	50.0	.1	33.0	.4	49.0	-.1	32.0	.2
12	48.5	-1.4	29.5	-3.1	48.3	-.8	29.3	-2.5
13	49.5	-.4	32.0	-.6	48.3	-.8	30.8	-1.0
14	47.5	-2.4	30.0	-2.6	46.8	-2.3	29.3	-2.5
15	48.5	-1.4	31.5	-1.1	47.3	-1.8	30.3	-1.5
16	51.0	1.1	34.0	1.4	50.0	.9	33.0	1.2
MEAN	49.9		32.6		49.1		31.8	
S.D.	2.4		2.2		2.5		2.1	

NIGHT READINGS - SURVEY NUMBER 6

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	48.5	3.3	~~32.0~~	~~-.0~~	46.5	2.0	~~31.4~~	~~.0~~
2	49.5	4.3	32.5	.5	48.8	4.3	31.8	.4
3	49.0	3.8	33.0	1.0	47.8	3.3	31.8	.4
4	44.0	-1.2	29.5	-2.5	43.0	-1.5	28.5	-2.9
5	47.5	2.3	35.5	3.5	47.0	2.5	35.0	3.6
6	49.0	3.8	33.0	1.0	48.3	3.8	32.3	.9
7	47.5	2.3	32.0	-.0	47.3	2.8	31.8	.4
8	44.5	-.7	29.0	-3.0	44.3	-.2	28.8	-2.6
9	42.0	-3.2	~~32.0~~	~~-.0~~	41.8	-2.7	~~31.4~~	~~.0~~
10	41.0	-4.2	29.5	-2.5	40.3	-4.2	28.8	-2.6
11	44.0	-1.2	31.0	-1.0	43.5	-1.0	30.5	-.9
12	40.5	-4.7	29.0	-3.0	40.0	-4.5	28.5	-2.9
13	42.5	-2.7	34.0	2.0	41.3	-3.2	32.8	1.4
14	48.5	3.3	35.5	3.5	48.3	3.8	35.3	3.9
15	44.5	-.7	~~32.0~~	~~-.0~~	43.8	-.7	~~31.4~~	~~.0~~
16	40.5	-4.7	33.0	1.0	39.8	-4.7	32.3	.9
MEAN	45.2		32.0		44.5		31.4	
S.D.	3.3		2.1		3.2		2.1	

NIGHT READINGS - SURVEY NUMBER 7

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	49.0	1.3	36.0	4.6	48.0	.8	35.0	4.4
2	49.5	1.8	32.5	1.1	48.8	1.6	31.8	1.2
3	47.0	-.7	32.0	.6	46.0	-1.2	31.0	.4
4	45.0	-2.7	29.0	-2.4	44.0	-3.2	28.0	-2.6
5	45.0	-2.7	32.0	.6	44.0	-3.2	31.0	.4
6	51.0	3.3	35.0	3.6	50.5	3.3	34.5	3.9
7	52.0	4.3	33.0	1.6	51.3	4.1	32.3	1.7
8	50.5	2.8	31.5	.1	49.5	2.3	30.5	-.1
9	47.0	-.7	32.0	.6	46.0	-1.2	31.0	.4
10	47.7	.8	27.0	-4.4	47.2	-.0	26.8	-3.8
11	43.0	-4.7	28.5	-2.9	47.2	-.0	27.3	-3.3
12	47.5	-.2	28.0	-3.4	46.8	-.4	27.3	-3.3
13	47.5	-.2	35.0	3.6	47.0	-.2	34.5	3.9
14	44.5	-3.2	29.0	-2.4	43.5	-3.7	28.0	-2.6
15	49.5	1.8	31.0	-.4	48.8	1.6	30.3	-.3
16	47.5	-.2	31.5	.1	47.0	-.2	31.0	.4
MEAN	47.7		31.4		47.2		30.6	
S.D.	2.5		2.6		2.3		2.6	

NIGHT READINGS - SURVEY NUMBER 8

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	50.5	.9	37.5	3.8	50.3	1.6	37.3	4.4
2	52.0	2.4	36.0	2.3	51.3	2.6	35.3	2.4
3	47.5	-2.1	31.0	-2.8	46.5	-2.2	30.0	-2.9
4	50.5	.9	35.0	1.3	49.5	.8	34.0	1.1
5	45.0	-4.6	34.0	.2	44.5	-4.2	33.5	.6
6	52.0	2.4	36.0	2.3	51.0	2.3	35.0	2.1
7	50.0	.4	30.0	-3.8	49.0	.3	29.0	-3.9
8	50.0	.4	32.5	-1.3	49.0	.3	31.5	-1.4
9	48.5	-1.1	30.5	-3.3	48.0	-.7	30.0	-2.9
10	49.0	-.6	31.0	-2.8	48.0	-.7	30.0	-2.9
11	46.5	-3.1	30.5	-3.3	45.8	-2.9	29.8	-3.1
12	48.5	-1.1	32.0	-1.8	47.8	-.9	31.3	-1.6
13	48.5	-1.1	32.5	-1.3	47.5	-1.2	31.5	-1.4
14	51.5	1.9	36.5	2.8	51.0	2.3	36.0	3.1
15	53.0	3.4	37.0	3.3	52.0	3.3	36.0	3.1
16	50.0	.4	38.0	4.3	48.5	-.2	36.5	3.6
MEAN	49.6		33.8		48.7		32.9	
S.D.	2.1		2.8		2.1		2.8	

NIGHT READINGS - SURVEY NUMBER 9

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	45.0	-2.7	33.0	.5	43.8	-3.3	31.8	-.2
2	49.0	1.3	34.0	1.5	48.8	1.7	33.8	1.8
3	50.5	2.8	31.5	-1.0	49.8	2.7	30.8	-1.2
4	49.0	1.3	35.5	3.0	49.0	1.9	35.5	3.5
5	48.0	.3	35.5	3.0	47.3	.2	34.8	2.8
6	47.5	-.2	30.5	-2.0	47.5	.4	30.5	-1.5
7	47.0	-.7	33.0	.5	46.5	-.6	32.5	.5
8	46.0	-1.7	30.0	-2.5	45.0	-2.1	29.0	-3.0
9	46.5	-1.2	30.5	-2.0	46.0	-1.1	30.0	-2.0
10	45.0	-2.7	30.5	-2.0	44.8	-2.3	30.3	-1.7
11	45.0	-2.7	29.0	-3.5	44.0	-3.1	28.0	-4.0
12	49.5	1.8	28.5	-4.0	48.8	1.7	27.8	-4.2
13	50.0	2.3	37.0	4.5	49.0	1.9	36.0	4.0
14	49.5	1.8	33.5	1.0	48.8	1.7	32.8	.8
15	46.0	-1.7	33.5	1.0	45.8	-1.3	33.3	1.3
16	49.0	1.3	34.5	2.0	49.0	1.9	34.5	2.5
MEAN	47.7		32.5		47.1		32.0	
S.D.	1.9		2.5		2.0		2.6	

NIGHT READINGS - SURVEY NUMBER 10

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	47.0	-.4	31.5	-1.3	46.3	-.6	30.8	-1.5
2	50.0	2.6	34.5	1.7	49.5	2.6	34.0	1.7
3	48.0	.6	34.0	1.2	47.5	.6	33.5	1.2
4	52.0	4.6	33.5	.7	51.0	4.1	32.5	.2
5	44.5	-2.9	32.0	-.8	44.5	-2.4	32.0	-.3
6	49.0	1.6	34.0	1.2	48.0	1.1	33.0	.7
7	48.5	1.1	31.0	-1.8	47.8	.9	30.3	-2.0
8	47.0	-.4	30.5	-2.3	46.3	-.6	29.8	-2.5
9	46.5	-.9	33.0	.2	46.0	-.9	32.5	.2
10	43.0	-4.4	32.0	-.8	42.8	-4.1	31.8	-.5
11	45.5	-1.9	31.5	-1.3	45.0	-1.9	31.0	-1.3
12	45.5	-1.9	31.0	-1.8	45.3	-1.6	30.8	-1.5
13	45.0	-2.4	35.5	2.7	44.3	-2.6	34.8	2.5
14	50.5	3.1	31.5	-1.3	50.0	3.1	31.0	-1.3
15	48.5	1.1	37.0	4.2	48.3	1.4	36.8	4.5
16	47.5	.1	32.0	-.8	47.5	.6	32.0	-.3
MEAN	47.4		32.8		46.9		32.3	
S.D.	2.4		1.8		2.2		1.8	

NIGHT READINGS - SURVEY NUMBER 11

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	44.5	-3.7	31.5	-.3	43.8	-3.2	30.8	-.5
2	45.0	-3.2	27.5	-4.3	43.8	-3.2	26.3	-5.0
3	47.0	-1.2	32.5	.7	46.5	-.5	32.0	.7
4	48.0	-.2	32.0	.2	48.0	1.0	32.0	.7
5	47.0	-1.2	34.5	2.7	47.0	.0	34.5	3.2
6	~~48.2~~	~~-.0~~	29.0	-2.8	42.5	-4.5	29.0	-2.3
7	51.0	2.8	31.0	-.8	50.3	3.3	30.3	-1.0
8	47.5	-.7	30.5	-1.3	46.5	-.5	29.5	-1.8
9	50.5	2.3	34.0	2.2	49.5	2.5	33.0	1.7
10	~~48.2~~	~~-.0~~	31.5	-.3	42.5	-4.5	31.5	.2
11	50.5	2.3	31.5	-.3	49.3	2.3	30.3	-1.0
12	50.0	1.8	34.0	2.2	49.5	2.5	33.5	2.2
13	49.0	.8	35.5	3.7	48.8	1.8	35.3	4.0
14	50.0	1.8	30.5	-1.3	49.3	2.3	29.8	-1.5
15	46.0	-2.2	33.5	1.7	45.5	-1.5	33.0	1.7
16	49.0	.8	30.0	-1.8	48.5	1.5	29.5	-1.8
MEAN	48.2		31.8		47.0		31.3	
S.D.	2.0		2.1		2.6		2.3	

NIGHT READINGS - SURVEY NUMBER 12

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1*	46.5	-1.7	34.5	.8	44.5	-3.1	32.5	-.6
2	50.0	1.8	36.0	2.3	49.8	2.2	35.8	2.7
3	51.5	3.3	34.5	.8	51.3	3.7	34.3	1.2
4	47.5	-.7	37.5	3.8	47.0	-.6	37.0	3.9
5	50.0	1.8	36.5	2.8	50.5	2.9	37.0	3.9
6	46.0	-2.2	32.5	-1.2	44.5	-3.1	31.0	-2.1
7	49.5	1.3	34.5	.8	48.8	1.2	33.8	.7
8	46.0	-2.2	31.0	-2.7	45.5	-2.1	30.5	-2.6
9	49.5	1.3	32.5	-1.2	49.0	1.4	32.0	-1.1
10	47.0	-1.2	29.5	-4.2	47.0	-.6	29.5	-3.6
11	45.0	-3.2	33.5	-.2	43.5	-4.1	32.0	-1.1
12	50.5	2.3	33.5	-.2	50.0	2.4	33.0	-.1
13	52.0	3.8	35.5	1.8	51.0	3.4	34.5	1.4
14	46.0	-2.2	33.0	-.7	45.5	-2.1	32.5	-.6
15	46.0	-2.2	30.0	-3.7	45.8	-1.8	29.8	-3.3
16	48.5	.3	35.0	1.3	47.8	.2	34.3	1.2
MEAN	48.2		33.7		47.6		33.1	
S.D.	2.2		2.3		2.5		2.3	

NIGHT READINGS - SURVEY NUMBER 13

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	45.5	-2.5	32.5	-.7	44.0	-3.5	31.0	-1.7
2	49.0	1.0	34.0	.8	48.5	1.0	33.5	.8
3	52.0	4.0	34.0	.8	51.5	4.0	33.5	.8
4	48.5	.5	35.0	1.8	48.8	1.3	35.3	2.6
5	48.0	-.0	35.0	1.8	48.5	1.0	35.5	2.8
6	48.5	.5	31.0	-2.2	46.8	-.7	29.3	-3.4
7	48.0	-.0	33.0	-.2	47.5	.0	32.5	-.2
8	46.5	-1.5	34.5	1.3	45.5	-2.0	33.5	.8
9	47.5	-.5	31.0	-2.2	47.8	.3	31.3	-1.4
10	47.0	-1.0	31.0	-2.2	46.8	-.7	30.8	-1.9
11	44.5	-3.5	31.5	-1.7	44.0	-3.5	31.0	-1.7
12	50.5	2.5	32.5	-.7	49.5	2.0	31.5	-1.2
13	50.0	2.0	36.0	2.8	49.5	2.0	35.5	2.8
14	48.5	.5	33.5	.3	47.5	.0	32.5	-.2
15	45.5	-2.5	32.0	-1.2	45.5	-2.0	32.0	-.7
16	49.0	1.0	35.0	1.8	48.0	.5	34.0	1.3
MEAN	48.0		33.2		47.5		32.7	
S.D.	2.0		1.6		2.0		1.8	

NIGHT READINGS - SURVEY NUMBER 14

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	47.0	-1.6	33.5	-1.7	46.3	-2.2	32.0	-1.9
2	48.0	-.6	33.5	-1.7	48.0	-.5	33.5	-1.2
3	52.0	3.4	38.0	2.8	51.0	3.3	37.0	3.1
4	49.0	.4	36.0	.8	48.0	-.5	35.0	.3
5	48.5	-.1	37.0	1.8	47.3	-1.2	35.0	1.1
6	49.0	.4	32.0	-3.2	48.8	.3	31.0	-2.9
7	50.0	1.4	36.0	.8	49.8	1.3	35.0	1.1
8	48.0	-.6	31.0	-4.2	47.8	-.7	30.0	-3.9
9	48.0	-.6	34.5	-.7	47.5	-1.0	34.0	-.7
10	45.5	-3.1	34.5	-.7	45.3	-3.2	34.3	-.4
11	49.0	.4	36.0	.8	48.3	-.2	35.3	.6
12	50.5	1.9	37.0	1.8	49.8	1.3	36.3	1.6
13	48.0	-.6	37.0	1.8	47.5	-1.0	36.5	1.8
14	48.6	-.0	38.5	3.3	52.8	4.3	37.3	2.6
15	47.0	-1.6	33.5	-1.7	46.8	-1.7	33.3	-1.4
16	50.0	1.4	34.5	-.7	49.8	1.3	34.3	-.4
MEAN	48.6		35.2		48.5		34.7	
S.D.	1.5		2.1		1.9		1.9	

NIGHT READINGS - SURVEY NUMBER 15

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	46.0	-3.3	30.0	-2.6	46.0	-2.9	30.0	-2.1
2	49.0	-.3	32.5	-.1	48.0	-.9	31.5	-.6
3	47.0	-2.3	35.5	2.9	47.0	-1.9	35.5	3.4
4	50.0	.7	34.5	1.9	49.0	.1	33.5	1.4
5	50.5	1.2	34.5	1.9	50.0	1.1	34.0	1.9
6	52.5	3.2	36.5	3.9	52.5	3.6	36.5	4.4
7	54.0	4.7	35.5	2.9	53.0	4.1	34.5	2.4
8	50.0	.7	32.0	-.6	50.0	1.1	32.0	-.1
9	46.0	-3.3	28.5	-4.1	46.8	-2.1	29.3	-2.8
10	46.0	-3.3	29.5	-3.1	46.0	-2.9	29.5	-2.6
11	49.0	-.3	29.5	-3.1	49.0	.1	29.5	-2.6
12	49.0	-.3	29.0	-3.6	48.0	-.9	28.0	-4.1
13	48.5	-.8	34.0	1.4	48.5	-.4	34.0	1.9
14	52.0	2.7	34.0	1.4	51.0	2.1	33.0	.9
15	47.5	-1.8	32.5	-.1	46.5	-2.4	31.5	-.6
16	52.5	3.2	33.0	.4	51.5	2.6	32.0	-.1
MEAN	49.3		32.6		48.9		32.1	
S.D.	2.5		2.6		2.2		2.4	

NIGHT READINGS - SURVEY NUMBER 16

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	49.5	.6	38.0	4.8	48.8	.3	37.3	4.2
2	49.0	.1	34.5	1.3	49.0	.5	34.5	1.4
3	47.5	-1.4	34.0	.8	46.5	-2.0	33.0	-.1
4	53.0	4.1	33.2	.8	52.0	3.5	38.0	4.9
5	53.0	4.1	36.0	2.8	53.0	4.5	36.0	2.9
6	48.5	-.4	30.0	-3.2	47.8	-.7	29.3	-3.8
7	49.0	.1	29.5	-3.7	49.0	.5	29.5	-3.6
8	46.5	-2.4	29.0	-4.2	46.5	-2.0	29.0	-4.1
9	47.5	-1.4	32.5	-.7	46.5	-2.0	31.5	-1.6
10	47.0	-1.9	31.0	-2.2	47.0	-1.5	31.0	-2.1
11	45.5	-3.4	31.5	-1.7	45.0	-3.5	31.0	-2.1
12	48.0	-.9	30.0	-3.2	48.0	-.5	30.0	-3.1
13	50.5	1.6	35.5	2.3	49.5	1.0	34.5	1.4
14	49.5	.6	37.0	3.8	49.5	1.0	37.0	3.9
15	51.0	2.1	36.0	2.8	50.5	2.0	35.5	2.4
16	47.0	-1.9	33.0	-.2	47.0	-1.5	33.0	-.1
MEAN	48.9		33.2		48.5		33.1	
S.D.	2.2		2.8		2.1		3.1	

NIGHT READINGS - SURVEY NUMBER 17

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	46.0	-3.4	38.5	4.2	46.0	-3.4	38.5	4.6
2	53.0	3.6	39.0	4.7	52.0	2.6	38.0	4.1
3	52.5	3.1	33.0	-1.3	52.5	3.1	33.0	-.9
4	52.5	3.1	37.0	2.7	52.0	2.6	36.5	2.6
5	46.5	-2.9	37.0	2.7	46.5	-2.9	37.0	3.1
6	47.5	-1.9	36.0	1.7	47.0	-2.4	35.5	1.6
7	51.5	2.1	34.0	-.3	51.5	2.1	34.0	.1
8	46.5	-2.9	35.0	.7	45.5	-3.9	34.0	.1
9	49.5	.1	32.5	-1.8	49.5	.1	32.5	-1.4
10	45.0	-4.4	30.5	-3.8	49.4	.0	29.5	-4.4
11	47.5	-1.9	31.5	-2.8	47.0	-2.4	31.0	-2.9
12	52.5	3.1	33.5	-.8	52.0	2.6	33.0	-.9
13	50.0	.6	32.5	-1.8	49.8	.4	32.3	-1.6
14	53.0	3.6	35.0	.7	53.0	3.6	35.0	1.1
15	46.0	-3.4	31.0	-3.3	45.0	-4.4	30.0	-3.9
16	51.5	2.1	33.0	-1.3	51.5	2.1	33.0	-.9
MEAN	49.4		34.3		49.4		33.9	
S.D.	2.9		2.6		2.8		2.7	

NIGHT READINGS - SURVEY NUMBER 18

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	49.0	.4	37.0	4.5	49.0	.9	31.6	.0
2	47.5	-1.1	32.5	.0	46.5	-1.6	31.5	-.1
3	49.0	.4	35.5	3.0	48.0	-.1	34.5	2.9
4	49.5	.9	32.5	.0	49.5	1.4	32.5	.9
5	45.0	-3.6	33.0	.5	44.0	-4.1	32.0	.4
6	50.5	1.9	36.0	3.5	50.5	2.4	36.0	4.4
7	53.0	4.4	29.0	-3.5	53.0	4.9	29.0	-2.6
8	50.0	1.4	30.5	-2.0	49.0	.9	29.5	-2.1
9	48.5	-.1	31.5	-1.0	48.0	-.1	31.0	-.6
10	45.0	-3.6	29.5	-3.0	45.0	-3.1	29.5	-2.1
11	49.0	.4	30.5	-2.0	47.5	-.6	29.0	-2.6
12	47.5	-1.1	30.0	-2.5	47.5	-.6	30.0	-1.6
13	47.5	-1.1	30.5	-2.0	46.5	-1.6	29.5	-2.1
14	53.0	4.4	35.0	2.5	52.0	3.9	34.0	2.4
15	45.5	-3.1	34.0	1.5	45.5	-2.6	34.0	2.4
16	48.6	-.8	32.5	.0	~~48.1~~	.0	31.5	-.1
MEAN	48.6		32.5		48.1		31.6	
S.D.	2.4		2.5		2.4		2.2	

NIGHT READINGS - SURVEY NUMBER 19

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	48.5	.3	32.5	2.9	48.5	.8	32.5	4.1
2	48.5	.3	26.5	-3.1	48.0	.3	26.0	-2.4
3	51.0	2.8	29.6	-.8	50.5	2.8	28.4	.0
4	45.0	-3.2	30.0	.4	45.0	-2.7	30.0	1.6
5	46.0	-2.2	32.0	2.4	45.0	-2.7	31.0	2.6
6	50.0	1.8	34.0	4.4	50.0	2.3	28.4	.0
7	49.0	.8	31.0	1.4	48.0	.3	30.0	1.6
8	45.0	-3.2	27.0	-2.6	45.0	-2.7	27.0	-1.4
9	49.0	.8	28.5	-1.1	48.0	.3	27.5	-.9
10	46.5	-1.7	26.5	-3.1	46.5	-1.2	26.5	-1.9
11	47.5	-.7	26.0	-3.6	47.0	-.7	25.5	-2.9
12	48.5	.3	28.5	-1.1	47.5	-.2	27.5	-.9
13	49.0	.8	33.0	3.4	48.5	.8	32.5	4.1
14	46.0	-2.2	25.0	-4.6	46.0	-1.7	25.0	-3.4
15	51.5	3.3	29.0	-.6	50.5	2.8	28.0	-.4
16	49.5	1.3	34.5	4.9	49.5	1.8	28.4	.0
MEAN	48.2		29.6		47.7		28.4	
S.D.	2.0		3.0		1.9		2.3	

NIGHT READINGS - SURVEY NUMBER 20

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.5	-1.2	35.0	1.2	46.5	-2.0	34.0	.4
2	50.5	1.8	34.0	.2	50.5	2.0	34.0	.4
3	52.0	3.3	37.5	3.7	51.0	2.5	36.5	3.0
4	46.5	-2.2	29.5	-4.3	46.0	-2.5	29.0	-4.6
5	46.5	-2.2	29.5	-4.3	46.5	-2.0	29.5	-4.1
6	49.5	.8	37.0	3.2	49.0	.5	36.5	3.0
7	53.5	4.8	35.5	1.7	53.0	4.5	35.0	1.5
8	48.0	-.7	31.0	-2.8	47.5	-1.0	30.5	-3.1
9	50.0	1.3	37.5	3.7	50.0	1.5	37.5	4.0
10	47.5	-1.2	32.5	-1.3	47.5	-1.0	32.5	-1.1
11	48.5	-.2	35.0	1.2	48.5	.0	35.0	1.5
12	48.5	-.2	33.5	-.3	49.0	.5	34.0	.4
13	48.0	-.7	32.5	-1.3	48.0	-.5	32.5	-1.1
14	46.0	-2.7	32.5	-1.3	45.8	-2.7	32.3	-1.3
15	49.5	.8	33.0	-.8	49.5	1.0	33.0	-.5
16	47.5	-1.2	35.5	1.7	47.0	-1.5	35.0	1.5
MEAN	48.7		33.8		48.5		33.6	
S.D.	2.0		2.5		2.0		2.5	

NIGHT READINGS - SURVEY NUMBER 21

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.5	-.1	35.5	4.0	47.5	.3	35.5	4.4
2	48.5	.9	35.0	3.5	47.5	.3	34.0	2.9
3	46.5	-1.1	33.5	2.0	46.0	-1.2	33.0	1.9
4	49.0	1.4	32.5	1.0	48.5	1.3	32.0	.9
5	47.5	-.1	31.5	-.0	47.5	.3	31.5	.4
6	48.5	.9	31.5	-.0	48.0	.8	31.0	-.1
7	49.5	1.9	28.5	-3.0	49.5	2.3	28.5	-2.0
8	47.5	-.1	29.0	-2.5	46.5	-.7	28.0	-3.1
9	46.0	-1.6	30.5	-1.0	46.0	-1.2	30.5	-.6
10	43.5	-4.1	27.5	-4.0	42.5	-4.7	26.5	-4.6
11	51.0	3.4	32.5	1.0	50.5	3.3	32.0	.9
12	48.5	.9	32.0	.5	48.3	1.1	31.8	.7
13	48.0	.4	30.5	-1.0	47.5	.3	30.0	-1.1
14	49.0	1.4	32.0	.5	49.0	1.8	32.0	.9
15	45.5	-2.1	30.0	-1.5	45.0	-2.2	29.5	-1.6
16	45.5	-2.1	32.5	1.0	45.5	-1.7	32.5	1.4
MEAN	47.6		31.5		47.2		31.1	
S.D.	1.8		2.2		1.9		2.3	

NIGHT READINGS - SURVEY NUMBER 22

POSITION	WITHOUT CLOSURE				WITH CLOSURE			
	JEREMY		OVERLOOK		JEREMY		OVERLOOK	
NUMBER	ANGLE	DEV.	ANGLE	DEV.	ANGLE	DEV.	ANGLE	DEV.
1	46.0	-.6	33.5	2.3	45.5	-.7	33.0	2.3
2	47.5	.9	31.5	.3	47.5	1.3	31.5	.8
3	46.0	-.6	31.5	.3	45.0	-1.2	30.5	-.2
4	49.0	2.4	31.0	-.2	48.5	2.3	30.5	-.2
5	45.0	-1.6	33.0	1.8	45.0	-1.2	33.0	2.3
6	48.0	1.4	28.5	-2.7	47.0	.8	27.5	-3.2
7	43.5	-3.1	26.5	-4.7	43.0	-3.2	26.0	-4.7
8	46.5	-.1	29.0	-2.2	46.0	-.2	28.5	-2.2
9	43.0	-3.6	27.0	-4.2	42.0	-4.2	26.0	-4.7
10	46.0	-.6	30.0	-1.2	46.0	-.2	30.0	-.7
11	50.0	3.4	33.0	1.8	49.5	3.3	32.5	1.8
12	46.5	-.1	33.5	2.3	46.5	.3	33.5	2.8
13	47.5	.9	33.5	2.3	47.0	.8	33.0	2.3
14	48.0	1.4	33.5	2.3	47.0	.8	32.5	1.8
15	46.0	-.6	32.5	1.3	46.0	-.2	32.5	1.8
16	47.5	.9	31.5	.3	47.0	.8	31.0	.3
MEAN	46.6		31.2		46.2		30.7	
S.D.	1.8		2.4		1.9		2.5	

NIGHT READINGS - SURVEY NUMBER 23

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	47.5	.7	32.5	1.0	47.5	1.1	32.5	1.4
2	47.5	.7	32.5	1.0	47.0	.6	32.0	.9
3	45.5	-1.3	34.0	2.5	45.0	-1.4	33.5	2.4
4	47.0	.2	33.5	2.0	47.0	.6	33.5	2.4
5	45.5	-1.3	31.5	-.0	45.0	-1.4	31.0	-.1
6	48.0	1.2	32.0	.5	48.0	1.6	32.0	.9
7	48.0	1.2	30.5	-1.0	47.5	1.1	30.0	-1.1
8	49.0	2.2	35.5	4.0	48.0	1.6	34.5	3.4
9	46.5	-.3	31.5	-.0	46.5	.1	31.5	.4
10	44.5	-2.3	27.0	-4.5	44.0	-2.4	26.5	-4.6
11	44.0	-2.8	29.0	-2.5	43.0	-3.4	28.0	-3.1
12	47.5	.7	28.5	-3.0	47.0	.6	28.0	-3.1
13	46.0	-.8	30.0	-1.5	46.0	-.4	30.0	-1.1
14	47.5	.7	31.0	-.5	47.0	.6	30.5	-.6
15	47.5	.7	33.0	1.5	46.5	.1	32.0	.9
16	47.0	.2	32.5	1.0	47.0	.6	32.5	1.4
MEAN	46.8		31.5		46.4		31.1	
S.D.	1.4		2.2		1.4		2.2	

NIGHT READINGS - SURVEY NUMBER 24

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	44.0	-3.2	32.5	1.1	44.0	-2.4	32.5	1.5
2	49.5	2.3	35.0	3.6	49.0	2.6	34.5	3.5
3	47.2	.0	27.5	-3.9	41.5	-4.9	27.5	-3.5
4	48.0	.8	34.0	2.6	47.5	1.1	33.5	2.5
5	46.5	-.7	32.0	.6	46.5	.1	32.0	1.0
6	49.5	2.3	31.5	.1	49.0	2.6	31.0	-.0
7	50.5	3.3	31.5	.1	50.0	3.6	31.0	-.0
8	46.5	-.7	30.5	-.9	46.5	.1	30.5	-.5
9	46.0	-1.2	29.5	-1.9	45.0	-1.4	28.5	-2.5
10	43.0	-4.2	28.0	-3.4	42.5	-3.9	27.5	-3.5
11	45.0	-2.2	30.0	-1.4	44.0	-2.4	29.0	-2.0
12	48.5	1.3	31.5	.1	48.0	1.6	31.0	-.0
13	48.0	.8	32.0	.6	47.5	1.1	31.5	.5
14	48.0	.8	32.0	.6	48.0	1.6	32.0	1.0
15	45.5	-1.7	33.0	1.6	45.0	-1.4	32.5	1.5
16	49.5	2.3	32.5	1.1	49.0	2.6	32.0	1.0
MEAN	47.2		31.4		46.4		31.0	
S.D.	2.1		2.0		2.5		2.0	

NIGHT READINGS - SURVEY NUMBER 25

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	45.0	-3.0	36.5	3.6	44.0	-3.5	35.5	3.1
2	49.0	1.0	34.5	1.6	48.5	1.0	34.0	1.6
3	47.0	-1.0	32.0	-.9	47.0	-.5	32.0	-.4
4	49.0	1.0	34.0	1.1	48.5	1.0	33.5	1.1
5	44.5	-3.5	33.5	.6	44.5	-3.0	33.5	1.1
6	48.5	.5	31.5	-1.4	48.0	.5	31.0	-1.4
7	48.5	.5	30.5	-2.4	48.0	.5	30.0	-2.4
8	47.0	-1.0	29.0	-3.9	46.5	-1.0	28.5	-3.9
9	48.0	.0	32.5	-.4	48.0	.5	32.5	.1
10	46.0	-2.0	34.0	1.1	46.0	-1.5	34.0	1.6
11	47.5	-.5	32.5	-.4	47.0	-.5	32.0	-.4
12	49.5	1.5	29.5	-3.4	48.5	1.0	28.5	-3.9
13	49.5	1.5	34.0	1.1	48.5	1.0	33.0	.6
14	50.5	2.5	34.0	1.1	50.0	2.5	33.5	1.1
15	46.5	-1.5	33.0	.1	46.0	-1.5	32.5	.1
16	51.5	3.5	35.0	2.1	51.5	4.0	35.0	2.6
MEAN	48.0		32.9		47.5		32.4	
S.D.	1.9		2.0		1.9		2.1	

NIGHT READINGS - SURVEY NUMBER 26

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	47.5	.9	28.0	-3.3	47.5	1.3	28.0	-2.6
2	47.0	.4	34.0	2.7	46.5	.3	33.5	2.9
3	43.5	-3.1	33.0	1.7	43.5	-2.7	33.0	2.4
4	46.5	-.1	32.0	.7	46.0	-.2	31.5	.9
5	43.5	-3.1	33.5	2.2	42.5	-3.7	32.5	1.9
6	48.5	1.9	26.5	-4.8	48.0	1.8	26.0	-4.6
7	50.5	3.9	30.0	-1.3	50.5	4.3	30.0	-.6
8	48.0	1.4	32.0	.7	47.5	1.3	31.5	.9
9	42.0	-4.6	~~31.3~~	~~-.0~~	42.0	-4.2	26.0	-4.6
10	42.5	-4.1	29.0	-2.3	41.5	-4.7	28.0	-2.6
11	47.0	.4	29.0	-2.3	47.0	.8	29.0	-1.6
12	46.5	-.1	27.0	-4.3	46.0	-.2	26.5	-4.1
13	48.5	1.9	34.5	3.2	48.5	2.3	34.5	3.9
14	49.0	2.4	34.5	3.2	48.3	2.1	33.5	3.2
15	45.5	-1.1	33.5	2.2	45.5	-.7	33.5	2.9
16	49.0	2.4	33.5	2.2	48.5	2.3	33.0	2.4
MEAN	46.6		31.3		46.2		30.0	
S.D.	2.5		2.7		2.6		3.0	

NIGHT READINGS - SURVEY NUMBER 27

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	48.5	.1	35.5	2.3	48.5	.4	35.5	2.6
2	47.5	-.9	32.0	-1.2	47.0	-1.1	31.5	-1.4
3	49.5	1.1	33.0	-.2	49.0	.9	32.5	-.4
4	50.0	1.6	35.0	1.8	50.0	1.9	35.0	2.1
5	45.5	-2.9	32.0	-1.2	44.5	-3.6	31.0	-1.9
6	51.0	2.6	33.0	-.2	51.0	2.9	33.0	.1
7	53.0	4.6	35.0	1.8	53.0	4.9	35.0	2.1
8	46.0	-2.4	31.5	-1.7	45.5	-2.6	31.0	-1.9
9	46.5	-1.9	32.5	-.7	46.5	-1.6	32.5	-.4
10	44.0	-4.4	32.5	-.7	43.5	-4.6	32.0	-.9
11	50.0	1.6	32.5	-.7	49.5	1.4	32.0	-.9
12	47.0	-1.4	32.0	-1.2	47.0	-1.1	32.0	-.9
13	49.0	.6	35.5	2.3	48.0	-.1	34.5	1.6
14	51.0	2.6	33.0	-.2	51.0	2.9	33.0	.1
15	46.5	-1.9	33.5	.3	46.0	-2.1	33.0	.1
16	49.5	1.1	33.0	-.2	49.5	1.4	33.0	.1
MEAN	48.4		33.2		48.1		32.9	
S.D.	2.4		1.3		2.6		1.4	

NIGHT READINGS - SURVEY NUMBER 28

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	46.5	-2.4	35.5	3.1	46.5	-2.1	35.5	3.4
2	47.5	-1.4	33.0	.6	47.0	-1.6	32.5	.4
3	47.5	-1.4	33.5	1.1	47.0	-1.6	33.0	.9
4	50.5	1.6	35.0	2.6	50.5	1.9	35.0	2.9
5	46.5	-2.4	32.5	.1	46.0	-2.6	32.0	-.1
6	53.0	4.1	32.0	-.4	53.0	4.4	32.0	-.1
7	51.0	2.1	31.0	-1.4	50.5	1.9	30.5	-1.6
8	49.0	.1	32.5	.1	49.0	.4	32.5	.4
9	47.5	-1.4	29.0	-3.4	47.0	-1.6	28.5	-3.6
10	46.0	-2.9	31.0	-1.4	46.0	-2.6	31.0	-1.1
11	50.0	1.1	30.0	-2.4	50.0	1.4	30.0	-2.1
12	48.5	-.4	30.5	-1.9	48.0	-.6	30.0	-2.1
13	50.0	1.1	32.0	-.4	50.0	1.4	32.0	-.1
14	46.5	-2.4	31.0	-1.4	46.0	-2.6	30.5	-1.6
15	51.0	2.1	34.0	1.6	50.0	1.4	33.0	.9
16	51.0	2.1	36.0	3.6	50.5	1.9	35.5	3.4
MEAN	48.9		32.4		48.6		32.1	
S.D.	2.1		2.0		2.1		2.0	

NIGHT READINGS - SURVEY NUMBER 29

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	48.5	-.2	37.0	4.4	48.5	.1	37.0	4.7
2	50.0	1.3	33.0	.4	49.5	1.1	32.5	.2
3	46.0	-2.8	34.0	1.4	45.0	-3.4	33.0	.7
4	49.5	.7	34.0	1.4	49.5	1.1	34.0	1.7
5	49.0	.2	35.0	2.4	48.5	.1	34.5	2.2
6	50.0	1.3	33.0	.4	49.0	.6	32.0	-.3
7	50.0	1.3	31.5	-1.1	49.5	1.1	31.0	-1.3
8	49.0	.2	31.0	-1.6	48.5	.1	30.5	-1.8
9	49.5	.7	31.5	-1.1	49.5	1.1	31.5	-.8
10	45.0	-3.8	31.5	-1.1	44.0	-4.4	30.5	-1.8
11	49.0	.2	31.5	-1.1	49.0	.6	31.5	-.8
12	49.5	.7	31.5	-1.1	49.0	.6	31.0	-1.3
13	47.0	-1.8	33.0	.4	48.0	-.4	34.0	1.7
14	50.5	1.8	30.0	-2.6	50.0	1.6	29.5	-2.8
15	46.0	-2.8	32.0	-.6	46.0	-2.4	32.0	-.3
16	51.5	2.8	32.5	-.1	51.0	2.6	32.0	-.3
MEAN	48.8		32.6		48.4		32.3	
S.D.	1.8		1.7		1.9		1.9	

NIGHT READINGS - SURVEY NUMBER 30

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	47.5	-.8	33.5	.7	47.5	-.8	33.5	1.0
2	50.5	2.2	36.0	3.2	50.0	1.7	35.5	3.0
3	50.5	2.2	35.0	2.2	50.5	2.2	35.0	2.5
4	50.0	1.7	34.0	1.2	49.5	1.2	33.5	1.0
5	44.5	-3.8	36.0	3.2	43.5	-4.8	35.0	2.5
6	51.5	3.2	31.0	-1.8	51.5	3.2	31.0	-1.5
7	50.5	2.2	33.5	.7	50.5	2.2	33.5	1.0
8	47.0	-1.3	31.5	-1.3	46.5	-1.8	31.0	-1.5
9	50.0	1.7	33.5	.7	49.5	1.2	33.0	.5
10	44.0	-4.3	32.0	-.8	~~48.3~~	~~-.4~~	31.0	-1.5
11	49.0	.7	31.0	-1.8	49.0	.7	31.0	-1.5
12	49.5	1.2	30.0	-2.8	49.0	.7	29.5	-3.0
13	45.0	-3.3	32.0	-.8	45.0	-3.3	32.0	-.5
14	47.5	-.8	32.0	-.8	47.0	-1.3	31.5	-1.0
15	47.5	-.8	31.5	-1.3	47.5	-.8	31.5	-1.0
16	49.0	.7	33.0	.2	48.5	.2	32.5	.0
MEAN	48.3		32.8		48.3		32.5	
S.D.	2.3		1.8		2.1		1.7	

NIGHT READINGS - SURVEY NUMBER 31

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	48.0	-.8	38.0	3.8	48.0	-.5	38.0	4.2
2	51.0	2.2	35.5	1.3	50.5	2.0	35.0	1.2
3	48.0	-.8	35.5	1.3	47.5	-1.0	35.0	1.2
4	51.5	2.7	36.5	2.3	51.5	3.0	36.5	2.7
5	47.5	-1.3	34.5	.3	47.0	-1.5	34.0	.2
6	49.5	.7	34.5	.3	49.5	1.0	34.5	.7
7	51.0	2.2	32.0	-2.2	51.0	2.5	32.0	-1.8
8	47.5	-1.3	32.5	-1.7	47.0	-1.5	32.0	-1.8
9	48.0	-.8	32.0	-2.2	48.0	-.5	32.0	-1.8
10	44.5	-4.3	31.0	-3.2	44.0	-4.5	30.5	-3.3
11	48.0	-.8	31.5	-2.7	47.5	-1.0	31.0	-2.8
12	52.0	3.2	30.0	-4.2	52.0	3.5	30.0	-3.8
13	48.0	-.8	36.0	1.8	47.0	-1.5	35.0	1.2
14	51.0	2.2	36.5	2.3	50.5	2.0	36.0	2.2
15	48.0	-.8	36.5	2.3	48.0	-.5	36.5	2.7
16	47.5	-1.3	34.0	-.2	47.0	-1.5	33.5	-.3
MEAN	48.8		34.2		48.5		33.8	
S.D.	2.0		2.4		2.1		2.4	

NIGHT READINGS - SURVEY NUMBER 32

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	46.0	-3.4	38.0	3.1	45.8	-3.3	37.8	3.2
2	51.5	2.1	36.5	1.6	51.5	2.4	36.5	1.9
3	49.5	.1	36.5	1.6	48.5	-.6	35.5	.9
4	49.0	-.4	35.5	.6	49.0	-.1	35.5	.9
5	50.0	.6	36.0	1.1	49.5	.4	35.5	.9
6	51.5	2.1	36.0	1.1	51.5	2.4	36.0	1.4
7	54.0	4.6	34.5	-.4	54.0	4.9	34.5	-.1
8	49.5	.1	34.5	-.4	49.5	.4	34.5	-.1
9	47.0	-2.4	32.5	-2.4	46.5	-2.6	32.0	-2.6
10	45.0	-4.4	32.5	-2.4	44.5	-4.6	32.0	-2.6
11	48.5	-.9	33.5	-1.4	48.5	-.6	33.5	-1.1
12	50.0	.6	34.9	.8	49.5	.4	34.6	-.8
13	48.5	-.9	34.0	-.9	48.0	-1.1	33.5	-1.1
14	50.0	.6	35.0	.1	49.5	.4	34.5	-.1
15	48.0	-1.4	34.0	-.9	48.0	-1.1	34.0	-.6
16	52.5	3.1	34.0	-.9	52.5	3.4	34.0	-.6
MEAN	49.4		34.9		49.1		34.6	
S.D.	2.3		1.5		2.4		1.5	

NIGHT READINGS - SURVEY NUMBER 33

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	52.5	2.6	38.5	4.5	52.5	2.9	38.5	4.8
2	51.0	1.1	34.5	.5	50.5	.9	34.0	.2
3	49.0	-.9	33.0	-1.0	49.0	-.6	33.0	-.7
4	51.0	1.1	36.5	2.5	50.5	.9	36.0	2.3
5	48.5	-1.4	36.5	2.5	48.5	-1.1	36.5	2.8
6	52.5	2.6	35.0	1.0	52.0	2.4	34.5	.7
7	52.0	2.1	35.5	1.5	51.5	1.9	35.0	1.3
8	48.0	-1.9	31.5	-2.5	48.0	-1.6	31.5	-2.3
9	50.5	.6	32.5	-1.5	50.5	.9	32.5	-1.3
10	46.0	-3.9	32.0	-2.0	46.5	-3.1	32.5	-1.3
11	50.0	.1	31.5	-2.5	49.5	-.1	31.0	-2.8
12	52.0	2.1	33.0	-1.0	51.0	1.4	32.0	-1.8
13	47.0	-2.9	33.5	-.5	47.0	-2.6	33.5	-.2
14	48.5	-1.4	31.5	-2.5	48.0	-1.6	31.0	-2.8
15	48.0	-1.9	34.5	.5	48.0	-1.6	34.5	.7
16	51.5	1.6	34.5	.5	51.0	1.4	34.0	.2
MEAN	49.9		34.0		49.6		33.6	
S.D.	2.1		2.1		1.8		2.1	

NIGHT READINGS - SURVEY NUMBER 34

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	52.5	2.9	39.0	4.6	52.5	2.9	39.0	4.6
2	52.0	2.4	34.5	.1	52.0	2.4	34.5	.1
3	50.5	.9	34.0	-.4	50.3	.7	33.8	-.6
4	52.0	2.4	36.0	1.6	51.8	2.2	35.8	1.4
5	50.0	.4	38.5	4.1	49.8	.2	38.3	3.9
6	50.0	.4	36.0	1.6	49.8	.2	35.8	1.4
7	50.0	.4	36.5	2.1	50.0	.4	36.5	2.1
8	46.5	-3.1	30.5	-3.9	46.5	-3.1	30.5	-3.9
9	45.0	-4.6	30.0	-4.4	46.0	-3.6	31.0	-3.4
10	47.5	-2.1	33.5	-.9	47.5	-2.1	33.5	-.9
11	49.0	-.6	30.5	-3.9	49.3	-.3	30.8	-3.6
12	50.5	.9	34.0	-.4	50.3	.7	33.8	-.6
13	48.0	-1.6	32.0	-2.4	48.0	-1.6	32.0	-2.4
14	50.5	.9	35.5	1.1	50.0	.4	35.0	.6
15	49.0	-.6	34.0	-.4	49.0	-.6	34.0	-.4
16	51.0	1.4	35.5	1.1	51.0	1.4	35.5	1.1
MEAN	49.6		34.4		49.6		34.4	
S.D.	2.1		2.7		1.9		2.5	

NIGHT READINGS - SURVEY NUMBER 35

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	47.5	-1.3	36.5	3.2	47.5	-1.1	36.5	3.3
2	50.5	1.8	34.0	.7	50.0	1.4	33.5	.3
3	49.5	.7	33.0	-.3	49.5	.9	33.0	-.2
4	48.0	-.7	33.0	-.3	47.5	-1.1	32.5	-.7
5	45.0	-3.8	32.0	-1.3	45.0	-3.6	32.0	-1.2
6	48.5	-.2	31.5	-1.8	47.5	-1.1	30.5	-2.7
7	52.0	3.3	33.0	-.3	51.5	2.9	32.5	-.7
8	47.5	-1.3	33.0	-.3	47.5	-1.1	33.0	-.2
9	47.5	-1.3	31.0	-2.3	47.5	-1.1	31.0	-2.2
10	47.5	-1.3	30.5	-2.8	47.0	-1.6	30.0	-3.2
11	49.0	.2	33.0	-.3	49.0	.4	33.0	-.2
12	51.0	2.3	31.5	-1.8	51.0	2.4	31.5	-1.7
13	50.5	1.8	34.0	.7	51.0	2.4	34.5	1.3
14	50.0	1.3	37.5	4.2	50.0	1.4	37.5	4.3
15	47.5	-1.3	35.5	2.2	47.5	-1.1	35.5	2.3
16	48.5	-.2	34.5	1.2	48.5	-.1	34.5	1.3
MEAN	48.8		33.3		48.6		33.2	
S.D.	1.8		1.9		1.8		2.1	

NIGHT READINGS - SURVEY NUMBER 36

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	46.5	-2.6	35.0	.1	46.5	-2.4	35.0	.6
2	49.5	.4	34.5	-.4	49.3	.4	34.3	-.1
3	51.0	1.9	31.5	-3.4	51.3	2.4	31.8	-2.6
4	52.5	3.4	33.0	-1.9	51.8	2.9	32.3	-2.1
5	50.5	1.4	39.0	4.1	50.5	1.6	39.0	4.6
6	49.0	-.1	36.0	1.1	48.3	-.6	35.3	.9
7	51.9	2.4	39.0	4.1	51.3	2.4	38.8	4.4
8	49.0	-.1	32.0	-2.9	48.5	-.4	31.5	-2.9
9	46.0	-3.1	~~34.9~~	~~-.0~~	46.0	-2.9	29.5	-4.9
10	48.0	-1.1	35.0	.1	47.8	-1.1	34.8	.4
11	46.5	-2.6	34.5	-.4	46.8	-2.1	34.8	.4
12	52.0	2.9	36.5	1.6	51.8	2.9	36.3	1.9
13	48.0	-1.1	35.5	.6	48.0	-.9	35.5	1.1
14	51.5	2.4	35.0	.1	51.0	2.1	34.5	.1
15	49.5	.4	33.5	-1.4	49.0	.1	33.0	-1.4
16	45.0	-4.1	34.0	-.9	45.0	-3.9	34.0	-.4
MEAN	49.1		34.9		48.9		34.4	
S.D.	2.3		2.1		2.2		2.5	

NIGHT READINGS - SURVEY NUMBER 37

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	50.5	1.4	37.5	2.8	50.5	1.6	37.5	2.9
2	49.5	.4	34.5	-.2	49.0	.1	34.0	-.6
3	51.5	2.4	32.5	-2.3	51.5	2.6	32.5	-2.1
4	52.5	3.4	39.0	4.3	52.5	3.6	39.0	4.4
5	50.0	.9	39.0	4.3	49.3	.4	38.3	3.7
6	48.5	-.6	34.5	-.2	48.3	-.6	34.3	-.3
7	50.5	1.4	37.5	2.8	50.5	1.6	37.5	2.9
8	45.0	-4.1	33.0	-1.8	44.5	-4.4	32.5	-2.1
9	46.5	-2.6	30.5	-4.3	46.5	-2.4	30.5	-4.1
10	46.5	-2.6	34.0	-.7	46.8	-2.1	34.3	-.3
11	48.5	-.6	30.5	-4.3	48.5	-.4	30.5	-4.1
12	50.0	.9	34.5	-.2	49.8	.9	34.3	-.3
13	47.5	-1.6	30.5	-4.3	47.3	-1.6	30.3	-4.3
14	50.5	1.4	37.0	2.3	50.0	1.1	36.5	1.9
15	48.5	-.6	34.5	-.2	47.8	-1.1	33.8	-.8
16	50.0	.9	37.0	2.3	50.3	1.4	37.3	2.7
MEAN	49.1		34.8		48.9		34.6	
S.D.	2.0		2.9		2.0		2.9	

NIGHT READINGS - SURVEY NUMBER 38

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	48.0	.7	37.0	3.1	47.8	.7	36.8	3.1
2	46.0	-1.3	34.5	.6	45.8	-1.3	34.3	.6
3	46.5	-.8	35.0	1.1	45.8	-1.3	34.3	.6
4	47.5	.2	34.0	.1	47.3	.2	33.8	.1
5	47.5	.2	33.0	-.9	47.3	.2	32.8	-.9
6	43.0	-4.3	30.0	-3.9	42.8	-4.3	29.8	-3.9
7	48.5	1.2	36.5	2.6	48.5	1.4	36.5	2.8
8	48.0	.7	33.5	-.4	47.5	.4	33.0	-.7
9	44.0	-3.3	32.5	-1.4	44.3	-2.8	32.8	-.9
10	49.0	1.7	35.5	1.6	48.8	1.7	35.3	1.6
11	48.5	1.2	33.5	-.4	49.0	1.9	34.0	.3
12	47.5	.2	33.5	-.4	47.8	.7	33.8	.1
13	48.0	.7	30.5	-3.4	48.0	.9	30.5	-3.2
14	48.5	1.2	35.0	1.1	47.8	.7	34.3	.6
15	47.5	.2	32.0	-1.9	47.3	.2	31.8	-1.9
16	49.0	1.7	36.0	2.1	47.8	.7	34.8	1.1
MEAN	47.3		33.9		47.1		33.7	
S.D.	1.7		2.0		1.7		1.9	

NIGHT READINGS - SURVEY NUMBER 39

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	48.0	.2	37.0	2.1	47.8	.1	36.6	2.1
2	46.0	-1.8	34.5	-.4	45.8	-1.9	34.3	-.4
3	50.0	2.2	35.0	.1	50.0	2.3	35.0	.2
4	51.5	3.7	36.0	1.1	51.3	3.6	35.8	1.1
5	50.5	2.7	37.0	2.1	50.3	2.6	36.8	2.1
6	46.5	-1.3	33.5	-1.4	46.5	-1.2	33.5	-1.3
7	48.0	.2	38.0	3.1	47.3	-.4	37.3	2.6
8	48.0	.2	35.0	.1	47.5	-.2	34.5	-.2
9	46.5	-1.3	35.0	.1	46.0	-1.7	34.5	-.2
10	45.5	-2.3	35.0	.1	45.5	-2.2	35.0	.2
11	48.5	.7	30.5	-4.4	48.0	.3	30.0	-4.8
12	46.5	-1.3	34.5	-.4	47.0	-.7	35.0	.2
13	48.5	.7	31.5	-3.4	49.0	1.3	32.0	-2.8
14	48.5	.7	37.0	2.1	48.0	.3	36.5	1.8
15	46.5	-1.3	34.5	-.4	46.0	-1.7	34.0	-.7
16	46.5	-1.3	34.5	-.4	47.0	-.7	35.0	.2
MEAN	47.8		34.9		47.7		34.8	
S.D.	1.7		2.0		1.7		1.9	

NIGHT READINGS - SURVEY NUMBER 40

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	48.5	-.1	37.0	4.0	48.5	.1	37.0	4.2
2	50.5	1.9	35.5	2.5	50.0	1.6	35.0	2.2
3	44.5	-4.1	30.5	-2.5	44.5	-3.9	30.5	-2.3
4	49.5	.9	33.5	.5	49.0	.6	33.0	.2
5	48.0	-.6	37.0	4.0	47.5	-.9	36.5	3.7
6	50.5	1.9	32.5	-.5	50.5	2.1	32.5	-.3
7	50.5	1.9	31.5	-1.5	51.0	2.6	32.0	-.8
8	49.0	.4	31.0	-2.0	49.0	.6	31.0	-1.8
9	50.5	1.9	35.0	2.0	50.5	2.1	35.0	2.2
10	45.0	-3.6	31.5	-1.5	44.5	-3.9	31.0	-1.8
11	48.0	-.6	33.0	.0	48.0	-.4	33.0	.2
12	51.0	2.4	32.0	-1.0	50.5	2.1	31.5	-1.3
13	47.5	-1.1	32.5	-.5	46.5	-1.9	31.5	-1.3
14	49.0	.4	30.0	-3.0	49.0	.6	30.0	-2.8
15	45.5	-3.1	31.5	-1.5	45.0	-3.4	31.0	-1.8
16	50.0	1.4	34.0	1.0	50.0	1.6	34.0	1.2
MEAN	48.6		33.0		48.4		32.8	
S.D.	2.1		2.2		2.2		2.2	

NIGHT READINGS - SURVEY NUMBER 41

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	48.0	.2	35.5	1.2	48.3	.7	35.8	1.7
2	49.5	1.7	35.0	.7	49.0	1.4	34.5	.4
3	46.0	-1.8	34.5	.2	45.3	-2.3	33.8	-.3
4	48.0	.2	35.5	1.2	48.3	.7	35.8	1.7
5	48.0	.2	37.0	2.7	48.0	.4	37.0	2.9
6	50.5	2.7	36.5	2.2	49.8	2.2	35.8	1.7
7	48.5	.7	31.5	-2.8	48.5	.9	31.5	-2.6
8	48.0	.2	32.0	-2.3	47.5	-.1	31.5	-2.6
9	47.5	-.3	35.0	.7	47.3	-.3	34.8	.7
10	46.0	-1.8	36.5	2.2	46.0	-1.6	36.5	2.4
11	49.0	1.2	31.0	-3.3	48.5	.9	30.5	-3.6
12	45.5	-2.3	35.0	.7	46.0	-1.6	35.5	1.4
13	46.0	-1.8	31.5	-2.8	46.3	-1.3	31.8	-2.3
14	48.0	.2	36.5	2.2	47.5	-.1	36.0	1.9
15	49.0	1.2	33.0	-1.3	48.5	.9	32.5	-1.6
16	47.0	-.8	32.5	-1.8	47.0	-.6	32.5	-1.6
MEAN	47.8		34.3		47.6		34.1	
S.D.	1.4		2.0		1.2		2.1	

NIGHT READINGS - SURVEY NUMBER 42

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	48.0	-.6	36.0	1.9	48.5	.0	36.5	2.5
2	48.5	-.1	36.0	1.9	48.5	.0	36.0	2.0
3	47.5	-1.1	34.5	.4	47.8	-.7	34.8	.8
4	45.5	-3.1	34.0	-.1	45.0	-3.5	33.5	-.5
5	49.0	.4	37.0	2.9	48.8	.3	36.6	2.8
6	50.0	1.4	30.0	-4.1	50.3	1.8	30.3	-3.7
7	49.5	.9	33.0	-1.1	49.0	.5	32.5	-1.5
8	48.5	-.1	33.5	-.6	48.5	.0	33.5	-.5
9	50.0	1.4	37.0	2.9	49.8	1.3	36.8	2.8
10	49.5	.9	34.0	-.1	49.3	.8	33.8	-.2
11	50.0	1.4	29.5	-4.6	50.3	1.8	29.8	-4.2
12	49.5	.9	32.0	-2.1	49.3	.8	31.8	-2.2
13	48.5	-.1	36.5	2.4	48.0	-.5	36.0	2.0
14	47.5	-1.1	32.5	-1.6	47.0	-1.5	32.0	-2.0
15	50.5	1.9	34.0	-.1	50.3	1.8	33.8	-.2
16	45.5	-3.1	36.0	1.9	45.5	-3.0	36.0	2.0
MEAN	48.6		34.1		48.5		34.0	
S.D.	1.5		2.3		1.6		2.3	

NIGHT READINGS - SURVEY NUMBER 43

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	50.0	.6	36.0	.7	49.8	.5	35.6	.6
2	51.5	2.1	34.5	-.8	51.3	2.0	34.3	-.9
3	50.0	.6	34.5	-.8	49.8	.5	34.3	-.9
4	48.0	-1.4	38.0	2.7	48.0	-1.3	38.0	2.8
5	53.0	3.6	39.5	4.2	52.8	3.5	39.3	4.1
6	51.0	1.6	34.5	-.8	51.0	1.7	34.5	-.7
7	50.0	.6	38.5	3.2	49.5	.2	38.0	2.8
8	49.0	-.4	34.5	-.8	48.8	-.5	34.3	-.9
9	47.0	-2.4	32.5	-2.8	47.0	-2.3	32.5	-2.7
10	46.0	-3.4	34.5	-.8	46.8	-2.5	35.3	.1
11	48.0	-1.4	33.5	-1.8	48.5	-.8	34.0	-1.2
12	51.0	1.6	33.5	-1.8	50.8	1.5	33.3	-1.9
13	49.0	-.4	34.0	-1.3	48.5	-.8	33.5	-1.7
14	49.5	.1	35.5	.2	49.3	-.0	35.3	.1
15	47.5	-1.9	34.5	-.8	46.8	-2.5	33.8	-1.4
16	50.5	1.1	37.5	2.2	50.5	1.2	37.5	2.3
MEAN	49.4		35.3		49.3		35.2	
S.D.	1.8		2.0		1.7		2.0	

NIGHT READINGS - SURVEY NUMBER 44

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	50.0	1.5	39.0	4.7	49.8	1.4	38.8	4.6
2	48.5	.0	35.5	1.2	48.5	.1	35.5	1.3
3	45.0	-3.5	33.0	-1.3	44.5	-3.9	32.5	-1.7
4	46.0	-2.5	38.5	4.2	45.5	-2.9	38.0	3.8
5	48.0	-.5	36.0	1.7	47.8	-.6	35.8	1.6
6	49.5	1.0	35.0	.7	50.0	1.6	35.5	1.3
7	46.5	-2.0	30.0	-4.3	46.3	-2.1	29.8	-4.4
8	52.0	3.5	37.0	2.7	51.5	3.1	36.5	2.3
9	47.0	-1.5	34.5	.2	47.0	-1.4	34.5	.3
10	49.5	1.0	32.0	-2.3	49.5	1.1	32.0	-2.2
11	51.0	2.5	33.0	-1.3	50.8	2.4	32.8	-1.4
12	49.5	1.0	36.0	1.7	50.0	1.6	36.5	2.3
13	47.5	-1.0	32.5	-1.8	47.0	-1.4	32.0	-2.2
14	48.0	-.5	31.0	-3.3	47.8	-.6	30.8	-3.4
15	48.5	.0	31.0	-3.3	48.5	.1	31.0	-3.2
16	49.0	.5	34.5	.2	49.3	.9	34.8	.6
MEAN	48.5		34.3		48.4		34.2	
S.D.	1.8		2.7		2.0		2.7	

NIGHT READINGS - SURVEY NUMBER 45

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	OVERLOOK ANGLE	DEV.
1	47.5	-.2	37.5	2.0	47.5	-.2	37.5	2.1
2	48.0	.3	34.0	-1.5	47.8	.1	33.8	-1.6
3	45.5	-2.2	35.5	.0	45.8	-1.9	35.8	.4
4	45.5	-2.2	37.5	2.0	45.0	-2.7	37.0	1.6
5	47.0	-.7	36.0	.5	46.8	-.9	35.8	.4
6	47.5	-.2	37.5	2.0	47.5	-.2	37.5	2.1
7	48.0	.3	35.0	-.5	48.0	.3	35.0	-.4
8	48.5	.8	32.5	-3.0	48.3	.6	32.3	-3.1
9	46.5	-1.2	34.5	-1.0	46.5	-1.2	34.5	-.9
10	48.5	.8	40.0	4.5	48.0	.3	39.5	4.1
11	50.0	2.3	35.0	-.5	50.0	2.3	35.0	-.4
12	43.5	-4.2	36.5	1.0	43.8	-3.9	36.8	1.4
13	50.5	2.8	31.5	-4.0	51.0	3.3	32.0	-3.4
14	49.5	1.8	38.0	2.5	49.5	1.8	38.0	2.6
15	49.0	1.3	31.0	-4.5	48.8	1.1	30.8	-4.0
16	48.0	.3	35.5	.0	48.3	.6	35.0	.4
MEAN	47.7		35.5		47.7		35.4	
S.D.	1.8		2.4		1.8		2.4	

NIGHT READINGS - SURVEY NUMBER 46

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	DEV.	WITH CLOSURE JEREMY ANGLE	DEV.	WITH CLOSURE OVERLOOK ANGLE	DEV.
1	46.0	-2.1	35.5	.3	46.0	-2.1	35.5	.6
2	48.5	.4	37.0	1.8	49.3	1.2	37.8	2.9
3	48.0	-.1	34.5	-.7	47.8	-.3	34.3	-.6
4	45.0	-3.1	33.5	-1.7	45.8	-2.3	34.3	-.6
5	48.5	.4	37.0	1.8	48.3	.2	36.8	1.9
6	48.0	-.1	35.5	.3	46.8	-1.3	34.3	-.6
7	47.5	-.6	31.5	-3.7	48.0	-.1	32.0	-2.9
8	50.0	1.9	32.0	-3.2	50.5	2.4	32.5	-2.4
9	47.0	-1.1	39.5	4.3	46.5	-1.6	39.0	4.1
10	50.0	1.9	39.0	3.8	50.0	1.9	39.0	4.1
11	50.0	1.9	34.5	-.7	50.0	1.9	34.5	-.4
12	48.5	.4	36.5	1.3	48.5	.4	36.5	1.6
13	46.0	-2.1	31.0	-4.2	45.8	-2.3	30.8	-4.1
14	49.5	1.4	37.0	1.8	49.0	.9	36.5	1.6
15	49.5	1.4	35.2	-.8	50.0	1.9	30.0	-4.9
16	48.0	-.1	34.5	-.7	47.8	-.3	34.3	-.6
MEAN	48.1		35.2		48.1		34.9	
S.D.	1.5		2.5		1.6		2.7	

NIGHT READINGS - SURVEY NUMBER 47

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.5	.3	36.0	1.1	47.0	.0	35.5	.8
2	47.5	.3	35.0	.1	47.3	.3	34.8	.1
3	48.0	.8	35.5	.6	48.0	1.0	35.5	.8
4	48.0	.8	36.0	1.1	47.5	.5	35.5	.8
5	47.5	.3	36.5	1.6	47.8	.8	36.8	2.1
6	44.5	-2.7	32.5	-2.4	44.3	-2.7	32.3	-2.4
7	45.0	-2.2	33.0	-1.9	45.0	-2.0	33.0	-1.7
8	48.5	1.3	33.5	-1.4	47.5	.5	32.5	-2.2
9	46.5	-.7	34.5	-.4	45.5	-1.5	33.5	-1.2
10	48.0	.8	37.0	2.1	47.5	.5	36.5	1.8
11	47.0	-.2	32.5	-2.4	47.0	.0	32.5	-2.2
12	47.0	-.2	36.0	1.1	47.3	.3	36.3	1.6
13	46.0	-1.2	35.0	.1	46.5	-.5	35.5	.8
14	50.0	2.8	35.0	.1	50.0	3.0	35.0	.3
15	48.0	.8	36.0	1.1	47.5	.5	35.5	.8
16	46.5	-.7	34.5	-.4	46.0	-1.0	34.0	-.7
MEAN	47.2		34.9		47.0		34.7	
S.D.	1.3		1.4		1.3		1.5	

NIGHT READINGS - SURVEY NUMBER 48

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	47.5	-.9	37.0	1.1	47.5	-.9	37.0	1.1
2	47.5	-.9	34.5	-1.4	47.5	-.9	34.5	-1.4
3	51.0	2.6	36.0	.1	51.0	2.6	36.0	.1
4	50.5	2.1	36.5	.6	50.5	2.1	36.5	.6
5	44.0	-4.4	34.0	-1.9	43.5	-4.9	33.5	-2.4
6	47.5	-.9	36.5	.6	47.5	-.9	36.5	.6
7	50.5	2.1	40.0	4.1	49.5	1.1	39.0	3.1
8	47.5	-.9	38.5	2.6	47.5	-.9	38.5	2.6
9	47.0	-1.4	33.0	-2.9	47.3	-1.1	33.3	-2.6
10	46.0	-2.4	36.5	.6	45.3	-3.1	35.8	-.1
11	52.0	3.6	35.5	-.4	52.0	3.6	35.5	-.4
12	50.0	1.6	37.0	1.1	50.0	1.6	37.0	1.1
13	45.0	-3.4	33.5	-2.4	45.5	-2.9	34.0	-1.9
14	49.5	1.1	34.5	-1.4	49.8	1.4	34.8	-1.1
15	47.5	-.9	35.5	-.4	48.0	-.4	36.0	.1
16	51.5	3.1	36.5	.6	51.5	3.1	36.5	.6
MEAN	48.4		35.9		48.4		35.9	
S.D.	2.4		1.8		2.4		1.6	

NIGHT READINGS - SURVEY NUMBER 49

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	WITHOUT CLOSURE JEREMY DEV.	WITHOUT CLOSURE OVERLOOK ANGLE	WITHOUT CLOSURE OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	WITH CLOSURE JEREMY DEV.	WITH CLOSURE OVERLOOK ANGLE	WITH CLOSURE OVERLOOK DEV.
1	45.5	-2.0	33.5	-.8	45.5	-1.9	33.5	-1.1
2	49.5	2.0	35.5	1.2	49.0	1.6	35.0	.4
3	44.5	-3.0	37.0	2.7	44.5	-2.9	37.0	2.4
4	47.5	.0	33.0	-1.3	47.5	.1	33.0	-1.6
5	48.5	1.0	37.0	2.7	48.5	1.1	37.0	2.4
6	46.0	-1.5	35.5	1.2	46.0	-1.4	35.5	.9
7	47.5	.0	30.5	-3.8	47.5	.1	30.5	-4.1
8	50.0	2.5	34.0	-.3	50.3	2.9	34.3	-.3
9	46.5	-1.0	34.5	.2	46.0	-1.4	34.0	-.6
10	48.5	1.0	35.0	.7	48.5	1.1	35.0	.4
11	47.0	-.5	33.0	-1.3	46.8	-.6	32.8	-1.8
12	46.5	-1.0	36.5	2.2	46.0	-1.4	36.0	1.4
13	43.5	-4.0	32.5	-1.8	44.0	-3.4	33.0	-1.6
14	49.5	2.0	34.3	-.0	49.0	1.6	39.5	4.9
15	50.5	3.0	34.0	-.3	50.5	3.1	34.0	-.6
16	48.5	1.0	33.5	-.8	48.5	1.1	33.5	-1.1
MEAN	47.5		34.3		47.4		34.6	
S.D.	2.0		1.7		1.9		2.1	

NIGHT READINGS - SURVEY NUMBER 50

POSITION NUMBER	WITHOUT CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.	WITH CLOSURE JEREMY ANGLE	JEREMY DEV.	OVERLOOK ANGLE	OVERLOOK DEV.
1	47.0	-.5	37.0	2.4	47.5	-.1	37.5	2.8
2	48.0	.5	35.0	.4	48.0	.4	35.0	.3
3	48.0	.5	34.5	-.1	47.5	-.1	34.0	-.7
4	45.0	-2.5	36.0	1.4	45.0	-2.6	36.0	1.3
5	48.5	1.0	35.0	.4	49.0	1.4	35.5	.8
6	44.5	-3.0	33.5	-1.1	44.5	-3.1	33.5	-1.2
7	47.5	.0	32.0	-2.6	47.5	-.1	32.0	-2.7
8	50.0	2.5	34.5	-.1	50.5	2.9	35.0	.3
9	44.5	-3.0	33.5	-1.1	44.5	-3.1	33.5	-1.2
10	49.0	1.5	37.5	2.9	49.3	1.7	37.8	3.1
11	48.0	.5	31.0	-3.6	48.0	.4	31.0	-3.7
12	48.5	1.0	33.5	-1.1	48.5	.9	33.5	-1.2
13	46.5	-1.0	37.0	2.4	46.8	-.8	37.3	2.6
14	52.0	4.5	38.5	3.9	52.0	4.4	38.5	3.8
15	49.5	2.0	31.5	-3.1	49.8	2.2	31.8	-2.9
16	43.0	-4.5	33.0	-1.6	43.3	-4.3	33.3	-1.4
MEAN	47.5		34.6		47.6		34.7	
S.D.	2.3		2.2		2.4		2.3	

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3. REPORT TITLE

PRACTICAL FIELD ACCURACY LIMITS FOR A WILD T-2 THEODOLITE

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Technical report

5. AUTHOR(S) *(Last name, first name, initial)*

Cervarich, Peter J., II

6. REPORT DATE August 1966	7a. TOTAL NO. OF PAGES 160	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO. b. PROJECT NO. 4A623501A85201 c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) 30-TR 9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*	

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This report covers the results of field tests of the Wild T-2 Theodolite performed from 11 October 1965 through 14 November 1965. These tests were conducted to determine the field accuracy limits of this instrument. Analyses of data indicate that this particular test instrument is capable of measuring an angle 90 percent of the time to an accuracy of ± 2".5 when 16 D&R readings are observed during daylight hours; the accuracy of angular measurement during nighttime is ± 2".0, 90 percent of the time; and the accuracy limits are reduced from ± 2".5 to ± 2".0 and from ± 2".0 to ± 1".5 if data are collected when the atmosphere is quiet. The report concludes that angular accuracy is not improved by employing "horizon closure" techniques, and that proper selection of the survey sites is one of the more important factors to consider when the mission requires high accuracy.

DD FORM 1 JAN 64 1473

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