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APPENDIX I

WAVE-REFRACTION DIAGRAMS

"Fundamentally, all methods of refraction analysis are based on Snell's law" (U.S. Army, Corps of Engineers, 1977, p. 2-65), that is: when a wave crosses a boundary, the wave normal changes direction so that the sine of the incident angle between wave normal and boundary normal divided by the wave velocity in the first medium equals the sine of the angle of refraction divided by the velocity in the second medium (American Geological Institute, 1962, pp. 283-284). Thus, accurate depth data are crucial to the construction of meaningful wave-refraction diagrams.

Since accurate shallow-water bathymetry was not available for most study areas, sophisticated analysis of wave refraction was not warranted. Wave-refraction diagrams were constructed by the wave-front method (see Johnson *et al.*, 1948; Wiegel, 1964, pp. 150-179) because the wave crests were actually drawn, and could be compared with field observations and air photographs. This comparison with the field situation was not possible with the other construction methods for wave-refraction diagrams. Thus, because whatever construction method was chosen, poor depth data would be used, the control afforded by the wave-front method made it the most suitable means for constructing wave-refraction diagrams in this study.

All deep-water bottom configurations were obtained from Royal Australian Navy Hydrographic charts numbers 808 and 809. The data sources for shallow water will be discussed for each beach. For all five study areas, wave crests were first drawn in deep water with the waves approaching from the north-east, east, and south-east; and, when data permitted, crests were then extended into shallow water. The refraction diagrams were constructed to obtain an indication of the *relative* energy expenditure along the boulder beaches for different directions of deep-water wave approach. The lack of shallow-water data prevents precise calculation of refraction coefficients, but the relative energy expenditure from headland to embayment can be visually assessed in Figures A1 to A12. Wave crests are presented as dashed lines, orthogonals as solid lines.

North Yacaaba Boulder Beach

Only for North Yacaaba beach were there available deep- and shallow-water Naval Hydrographic charts (#809 and #1070, respectively) from which the bottom configuration was obtained. Figures A1 to A3 present the portion of the refraction diagrams in shallow water.

It can be readily observed that, regardless of the direction of deep-water wave approach, refraction causes the waves to strike the beach in a similar pattern, and the energy expenditure is greater near the headland than near the embayment. The wave-crest configuration illustrated in Figures A2 and A3 agrees well with field observations (see Plate A1). The north-easterly wave approach depicted in Figure A1 was not observed. Figure A3 shows similar refractive qualities to those found on an aerial photograph where waves were approaching from a southerly direction (N.S.W. Coastline misc. 730, 2035/5013). Unfortunately, a cross pattern of secondary waves appears more dominant in Plate 1 (p.18), and comparisons with the wave-refraction pattern presented in this appendix cannot be made.

Copacabana Boulder Beach

No shallow-water hydrographic charts were available for the Copacabana area. The most detailed information was found to be contained in an Honours thesis by A. Short (1967). The wave-refraction diagrams prepared for that thesis are presented in Figures A4, A5, and A6. Since only the shallow-water portions of the diagrams were presented by Short, refraction coefficients could not be calculated, nor could orthogonals comparable to those constructed for North Yacaaba and Bombo boulder beaches be presented. However, these figures do illustrate the relative energy expenditure from headland to embayment.

Comparisons of these wave-refraction diagrams with aerial photographs provided little information because wave crests on the photographs were difficult to discern (*e.g.* see Plate 2, p. 19). Field observations of waves approaching from the south-east were reasonably consistent with Figure A6, however the near-perfect alignment of wave crests and embayment was not as clear in the field as it is in Figure A6. In any case, at all times, waves were observed to first strike the headland portion of the beach, and sweep along the beach toward the embayment (Plate A2).

Bombo Boulder Beach

North Yacaaba and Bombo boulder beaches were the only study areas for which deep- and shallow-water bottom-configuration data were available. In the case of Bombo, shallow-water data were available because a study had been undertaken to determine the feasibility of constructing a breakwater and ship-loading facility on the north side of the headland. The University of New South Wales Water Research Laboratory was engaged by Maunsell and Partners to study the wave climate in the locality of the proposed breakwater (Stone and Gordon, 1970).

Manusell and Partners made available detailed sounding information to the Water Research Laboratory and the Laboratory staff performed additional sounding of the area adjacent to Bombo headland. The nearshore bottom contours used in the feasibility study are published by Stone and Gordon (1970) and provided the shallow-water data used in this work to construct wave-refraction diagrams of the Bombo beach area. Royal Australian Navy Hydrographic Chart #808 provided the offshore data.

Figures A7, A8, and A9 show the near-shore portions of these wave-refraction diagrams. It can be seen that, regardless of the direction of deep-water wave approach, energy expenditure decreases from the headland zone to the embayment zone of Bombo boulder beach. In the field, it was clear that the greatest wave energy was expended on the portion of the boulder beach nearest the headland, with energy expenditure decreasing towards the embayment (Plate A3). The wave crests presented in Figures A8 and A9 agreed with field observations and aerial photographs (see Plate 3, p.20). The north-easterly approach illustrated in Figure A7 was not observed in the field or on aerial photographs.

Kiama and Crookhaven Boulder Beaches

No nearshore bottom-configuration data were available for the areas of Kiama and Crookhaven boulder beaches. The information used to construct

Figures A10, A11, and A12 was obtained from Royal Australian Navy Hydrographic Chart number 808, which provides only offshore bathymetry. Since the scale of this chart is 1:150,000, the two boulder beaches could be merely pinpointed. The long-beach zonal divisions which were possible at larger scales (*e.g.*, Bombo, Figures A7, A8, and A9 at 1:1,600) could not be shown. Because of the small scale of available charts and lack of nearshore bathymetry, orthogonals showing energy expenditure along Kiama and Crookhaven boulder beaches could not be drawn. However, the headlands adjacent to both boulder beaches are clearly presented and it can be observed in Figures A10, A11, and A12 that, regardless of the direction of wave approach, waves first strike the headlands.

Repeated field observations of both beaches under many wave conditions found waves first striking the headland and then washing along the boulder beach toward the embayment (Plates A4 and A5). Aerial photographs also showed this situation: on Plate 4, p. 21, wave crests can be seen to first strike the headland adjacent to Kiama boulder beach. Wave crests are not so clearly defined in Plate 5, p. 22, the aerial photograph of the Crookhaven boulder beach area, but it can be observed that on this beach too, the waves are first striking the headland and then sweeping along the boulder beach.

CONCLUSION

Because data were obtained from different sources, strictly comparable wave refraction diagrams could not be constructed for the five study areas. Nearshore data were available for North Yacaaba because it is adjacent to

Port Stephens and the Navy has made detailed soundings of the area. A feasibility study for a ship-loading facility yielded nearshore bottom information for the Bombo area. These two areas were "special cases" in terms of data availability, and the only ones for which refraction coefficients could be calculated (see Tables 2 and 3). Large-scale nearshore refraction diagrams for Copacabana boulder beach were available in Short (1967), however, no deep-water continuity was possible.

Although the method of construction of the wave-refraction diagrams is crude and the data generally meagre, these diagrams illustrate that regardless of direction of wave approach, there is similar relative energy expenditure along each beach. That waves first strike the headland portion and sweep toward the embayment is a characteristic common to all five studied boulder beaches.

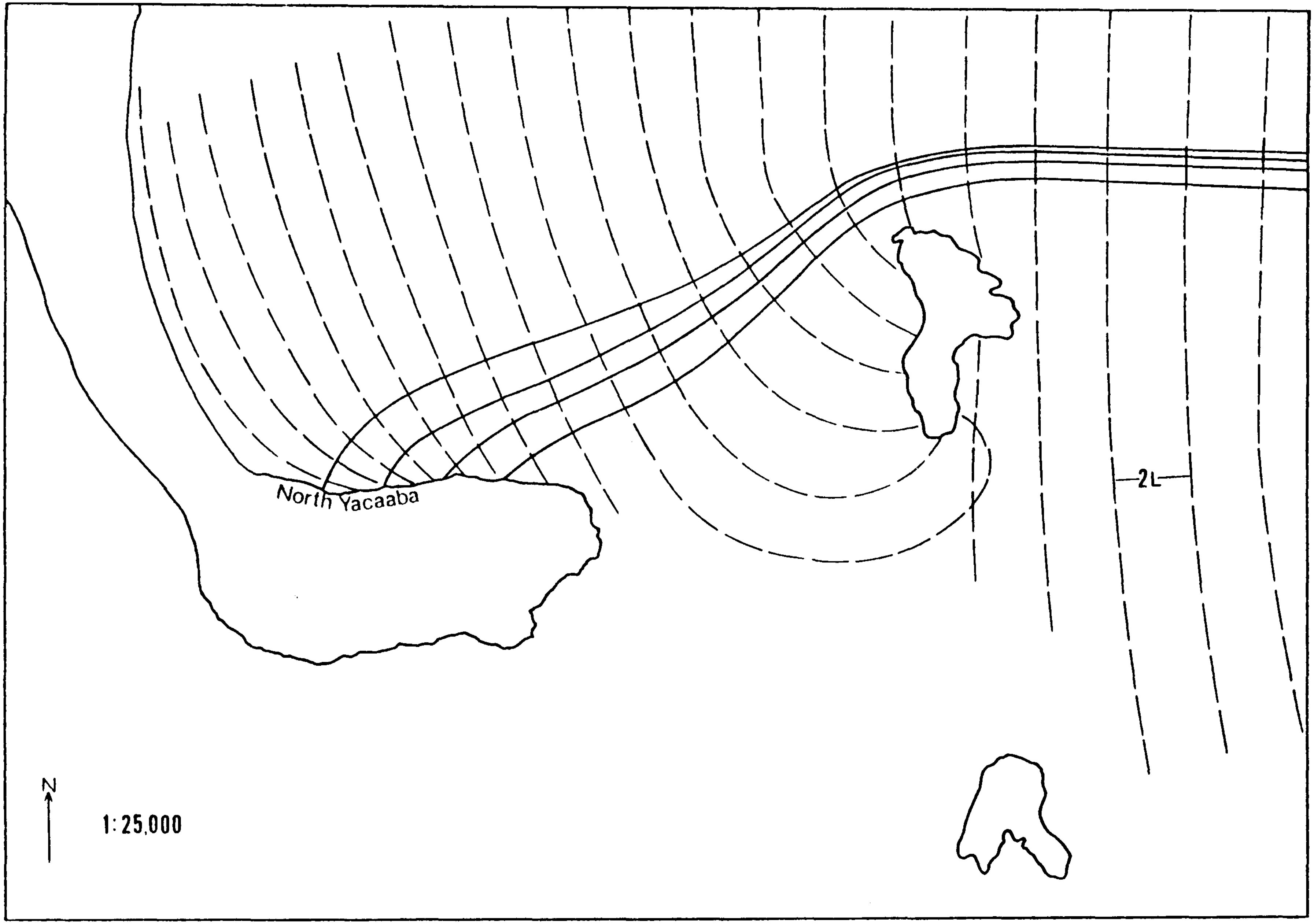

Figure A1. North-east wave approach for North Yacaaba boulder beach. Wave period = 12 sec.
(Deep water: Royal Australian Navy Hydrographic Chart #809. Shallow water: Chart #1070.)

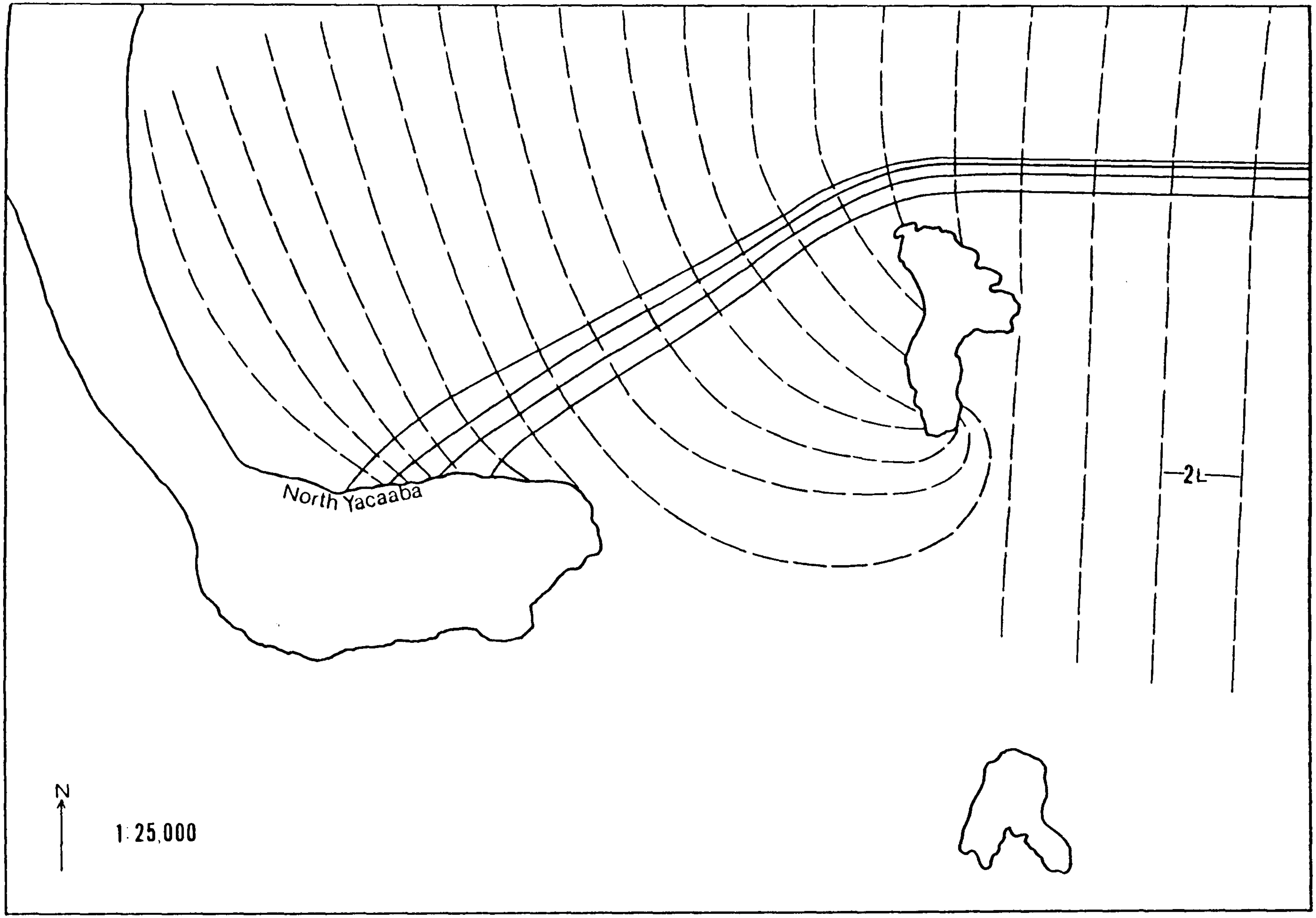

Figure A2. East wave approach for North Yacaaba boulder beach. Wave period = 12 sec.
(Deep water: Royal Australian Navy Hydrographic Chart #809. Shallow water: Chart #1070.)

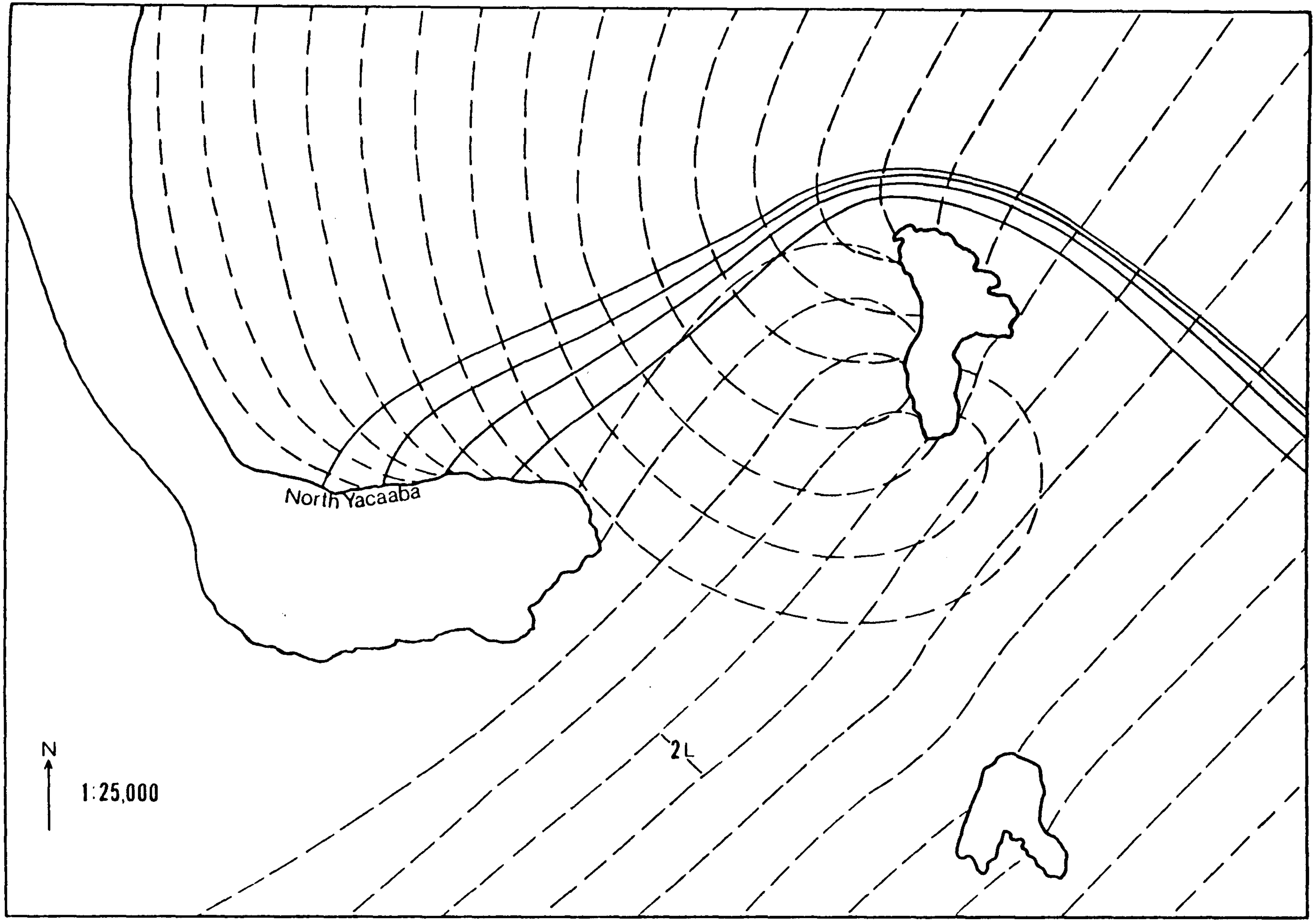

Figure A3. South-east wave approach for North Yaccaba boulder beach. Wave period = 12 sec.
(Deep water: Royal Australian Navy Hydrographic Chart #809. Shallow water: Chart #1070.)

COPACABANA BOULDER BEACH WAVE REFRACTION DIAGRAMS

The refraction coefficients for the large-scale refraction diagrams of Copacabana beach (after Short, 1967) cannot be calculated because these diagrams do not extend into deep water. They do, however, illustrate that the waves first break on the headland with the direction of drift from the headland to the embayment, regardless of the deep-water wave approach.

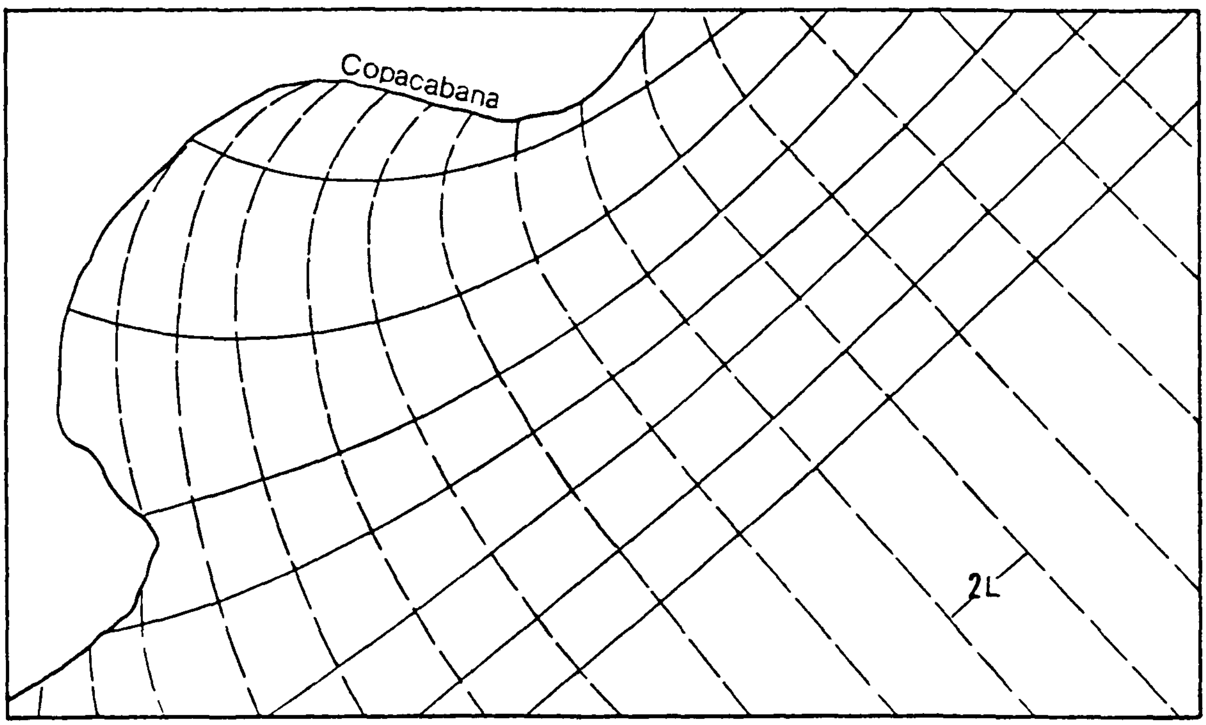

Figure A4. North-east wave approach for Copacabana boulder beach. Wave period = 10 sec. (after Short, 1967, p.19)

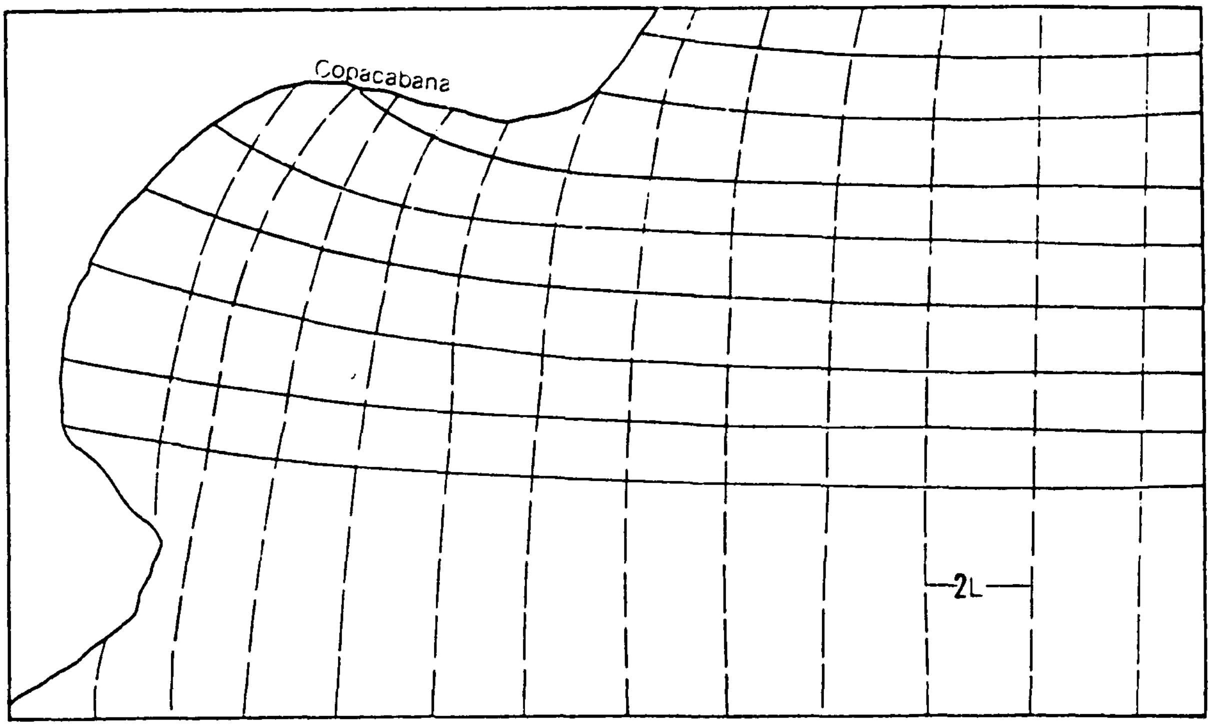

Figure A5. East wave approach for Copacabana boulder beach.
Wave period = 10 sec. (after Short, 1967, p. 19)

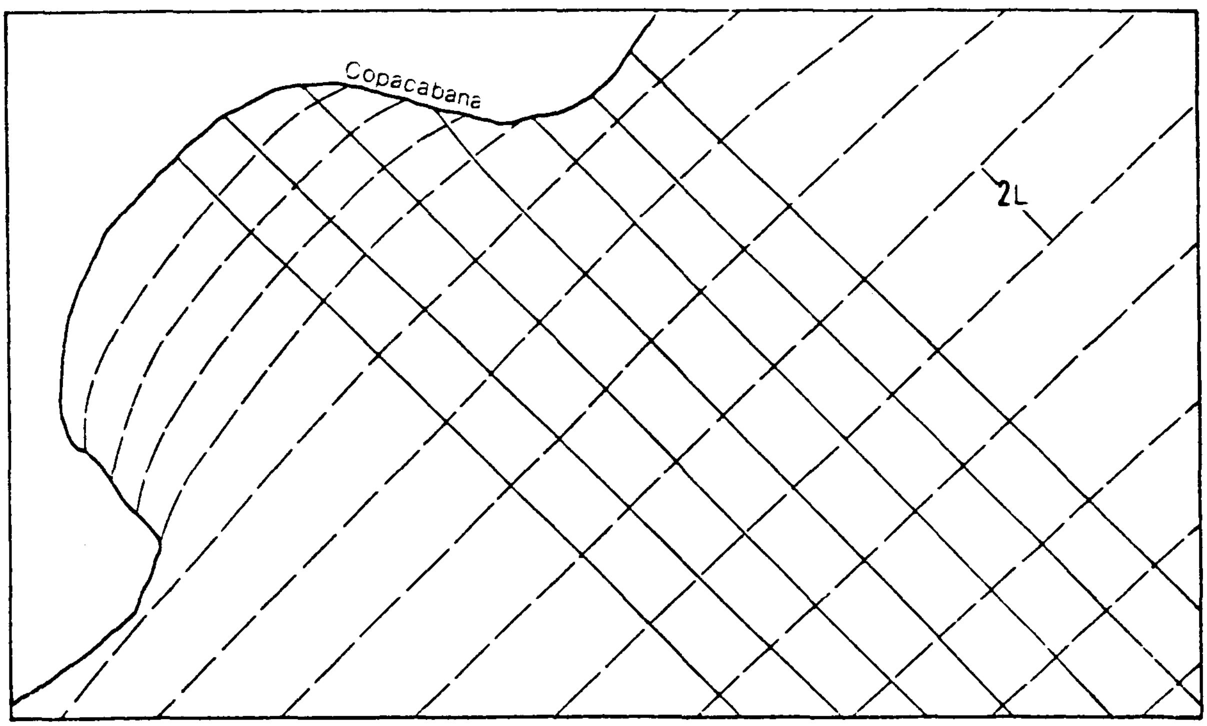

Figure A6. South-east wave approach for Copacabana boulder beach.
Wave period = 10 sec. (after Short, 1967, p. 20)

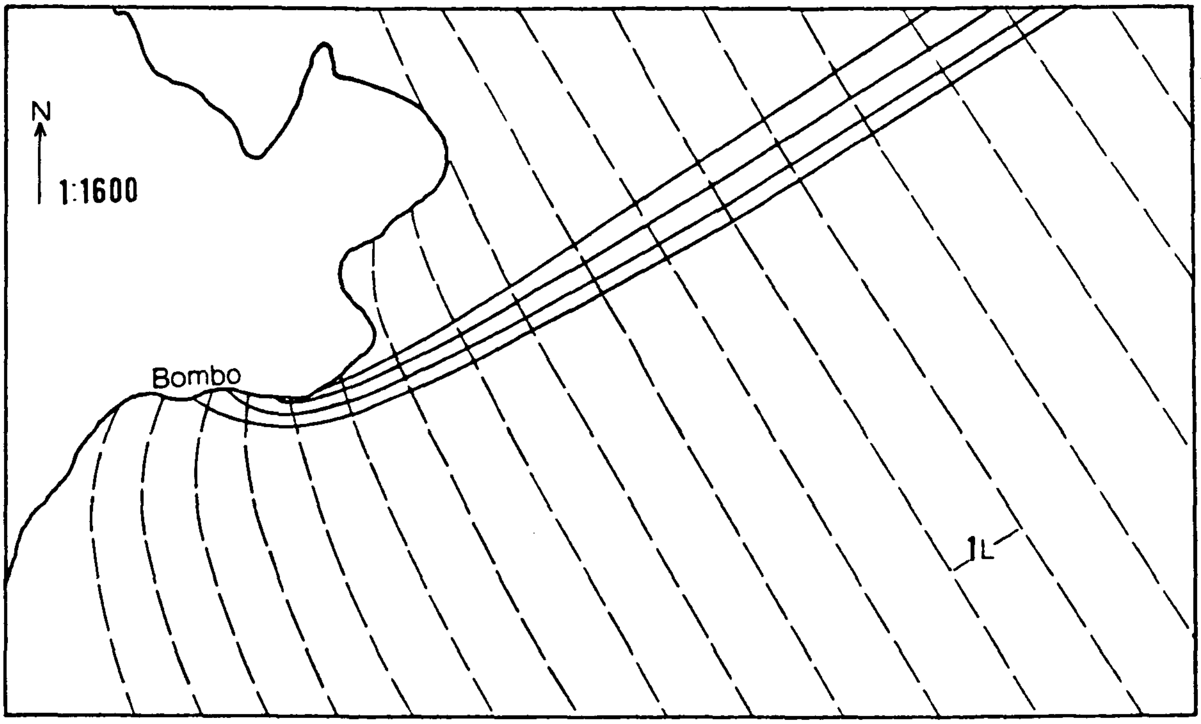

Figure A7. North-east wave approach for Bombo boulder beach.
Wave period = 12 sec. (Stone and Gordon, 1970)

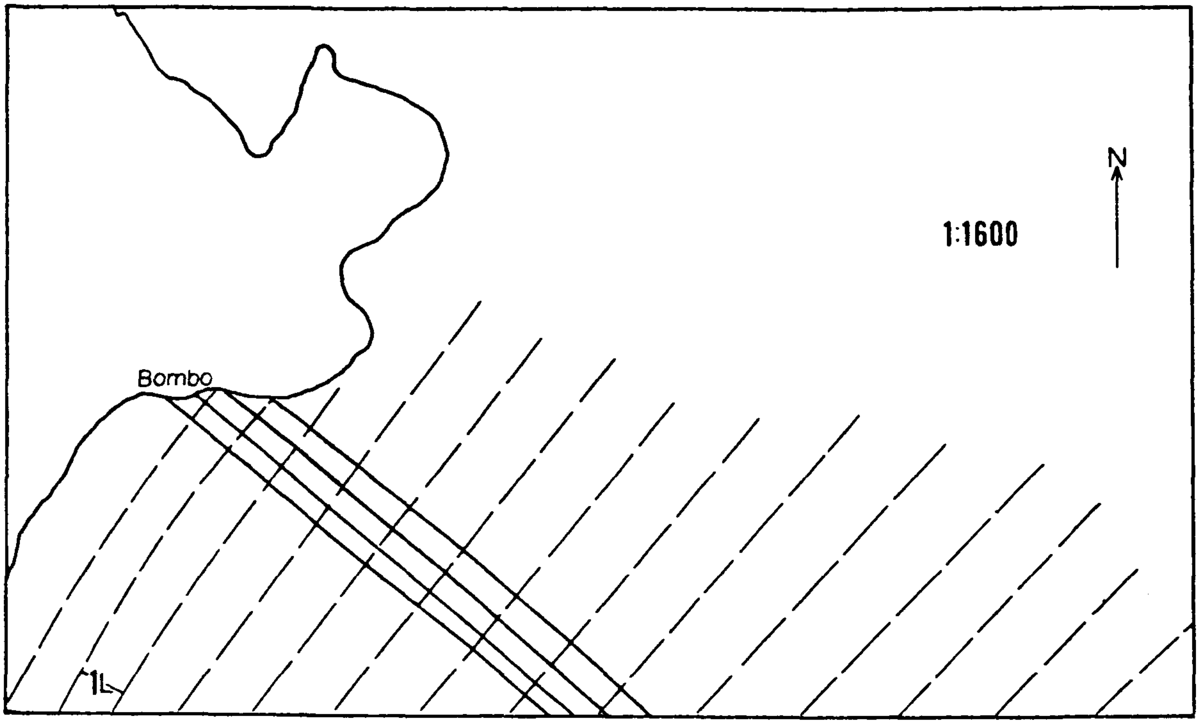

Figure A8. South-east wave approach for Bombo boulder beach.
Wave period = 12 sec. (Stone and Gordon, 1970)

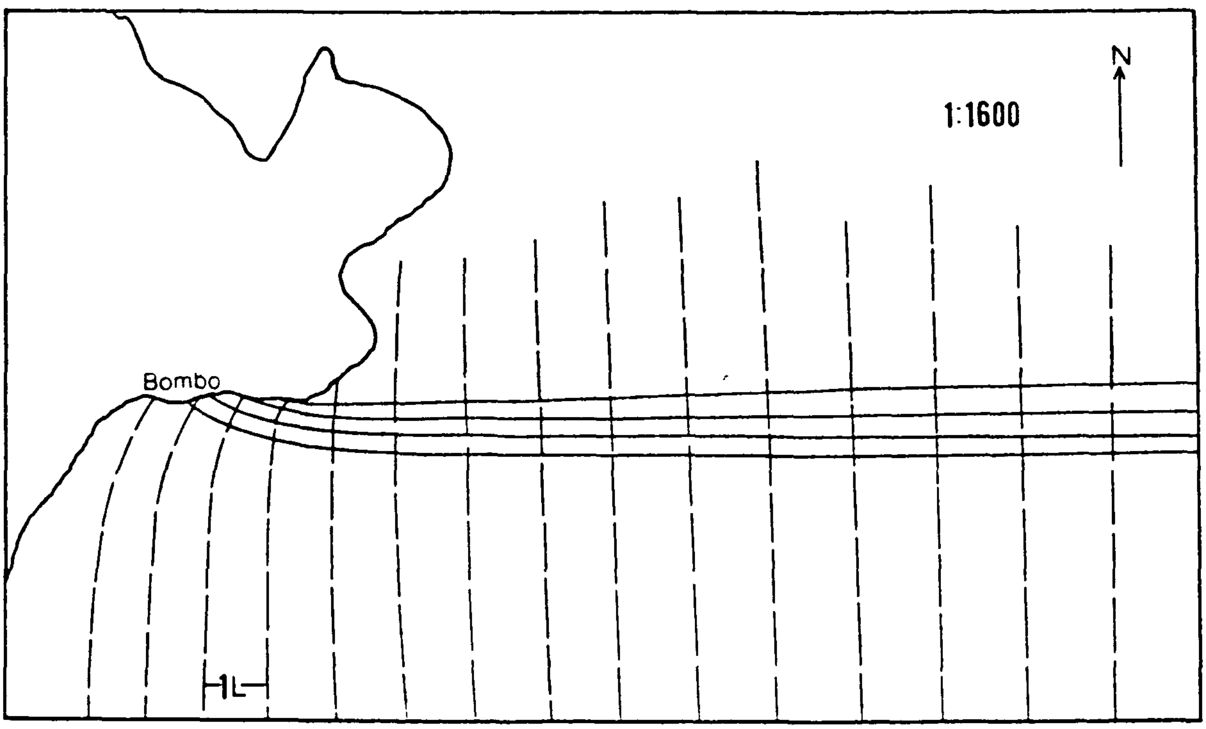

Figure A9. East wave approach for Bombo boulder beach.
Wave period = 12 sec. (Stone and Gordon, 1970)

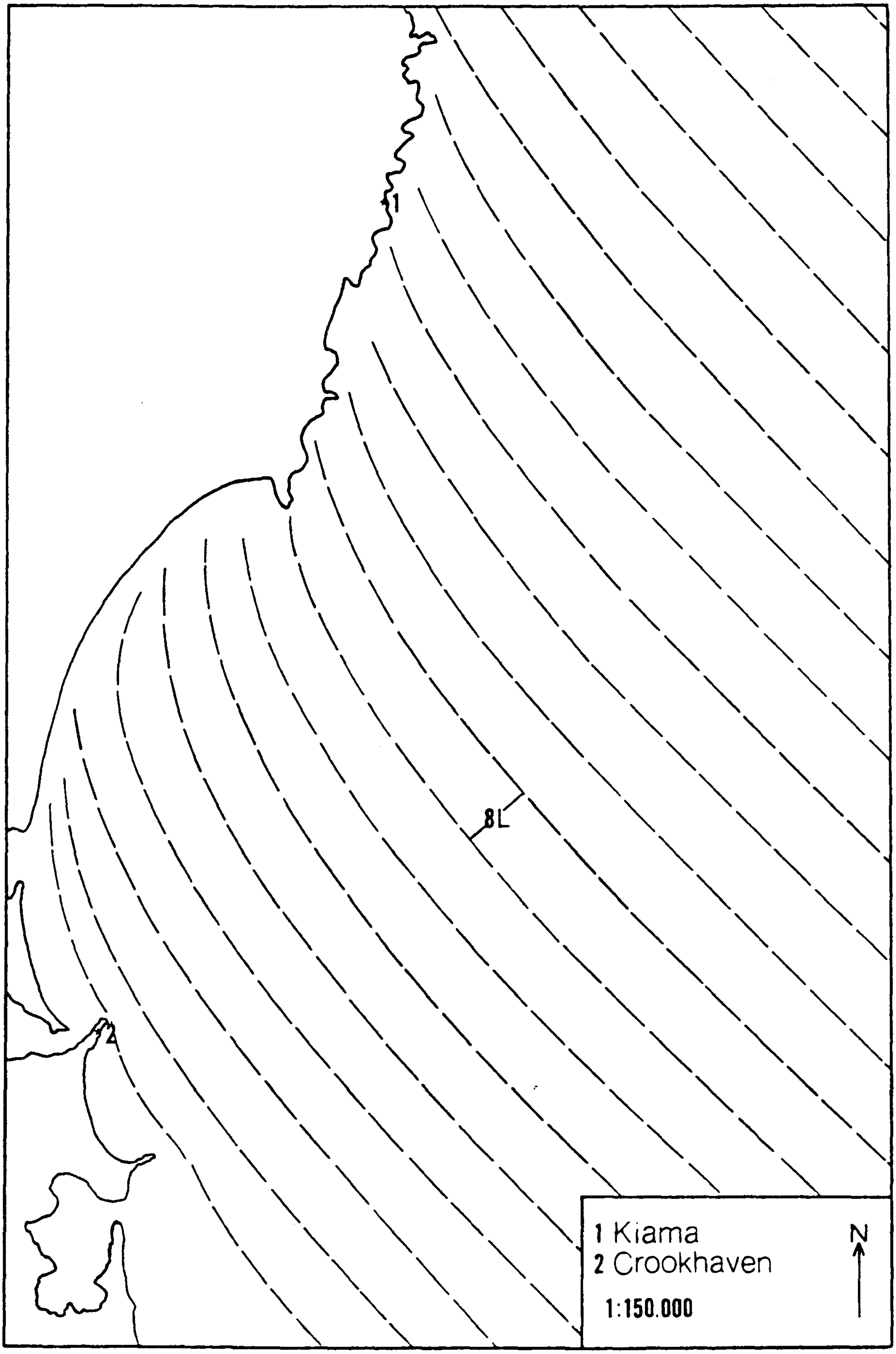

Figure A10. North-east wave approach for Kiama and Crookhaven beaches. Wave period = 12 sec. (Royal Australian Navy Hydrographic Chart #808)

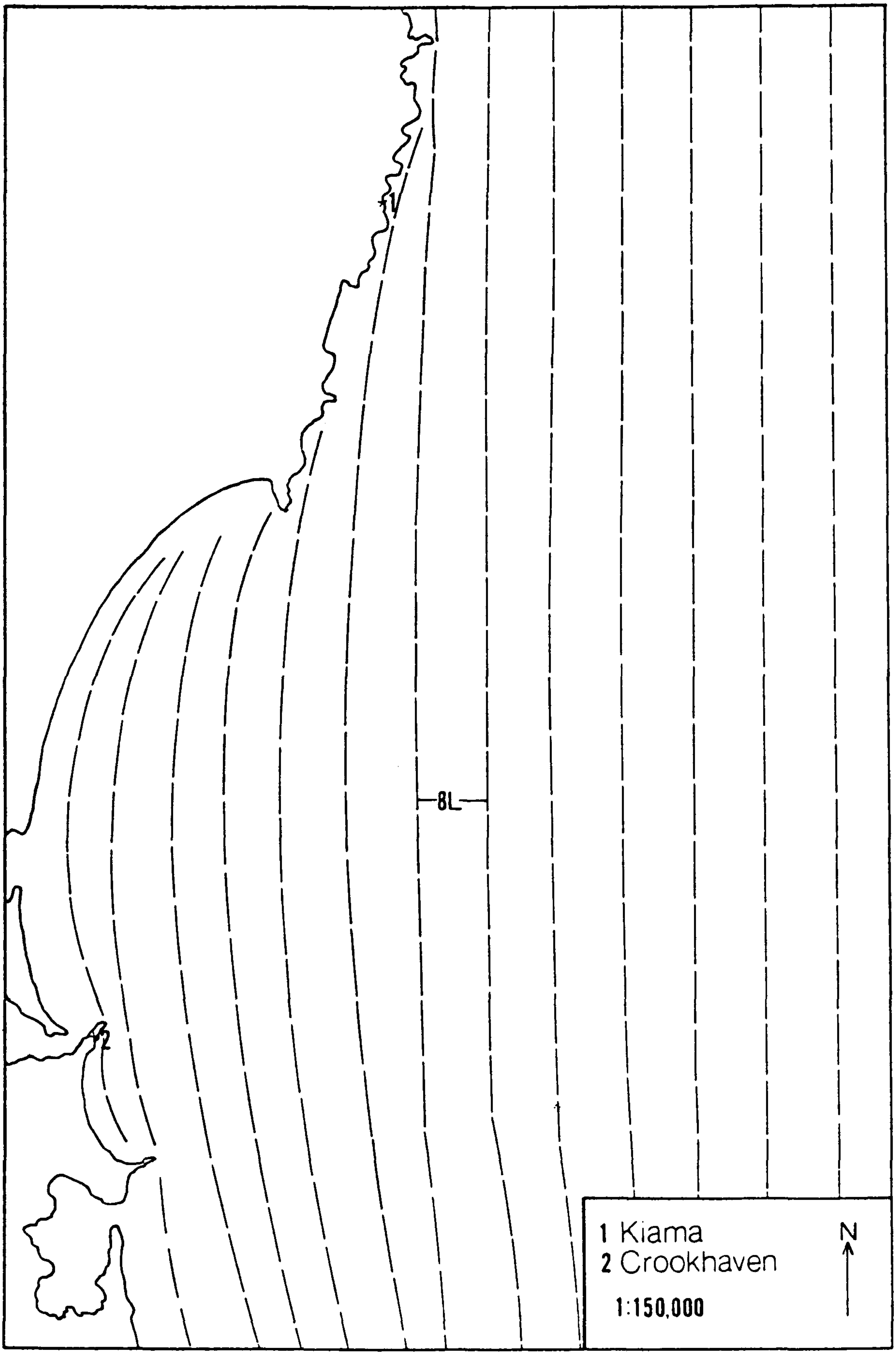

Figure A11. East wave approach for Kiama and Crookhaven boulder beaches. Wave period = 12 sec. (Royal Australian Navy Hydrographic Chart #808)

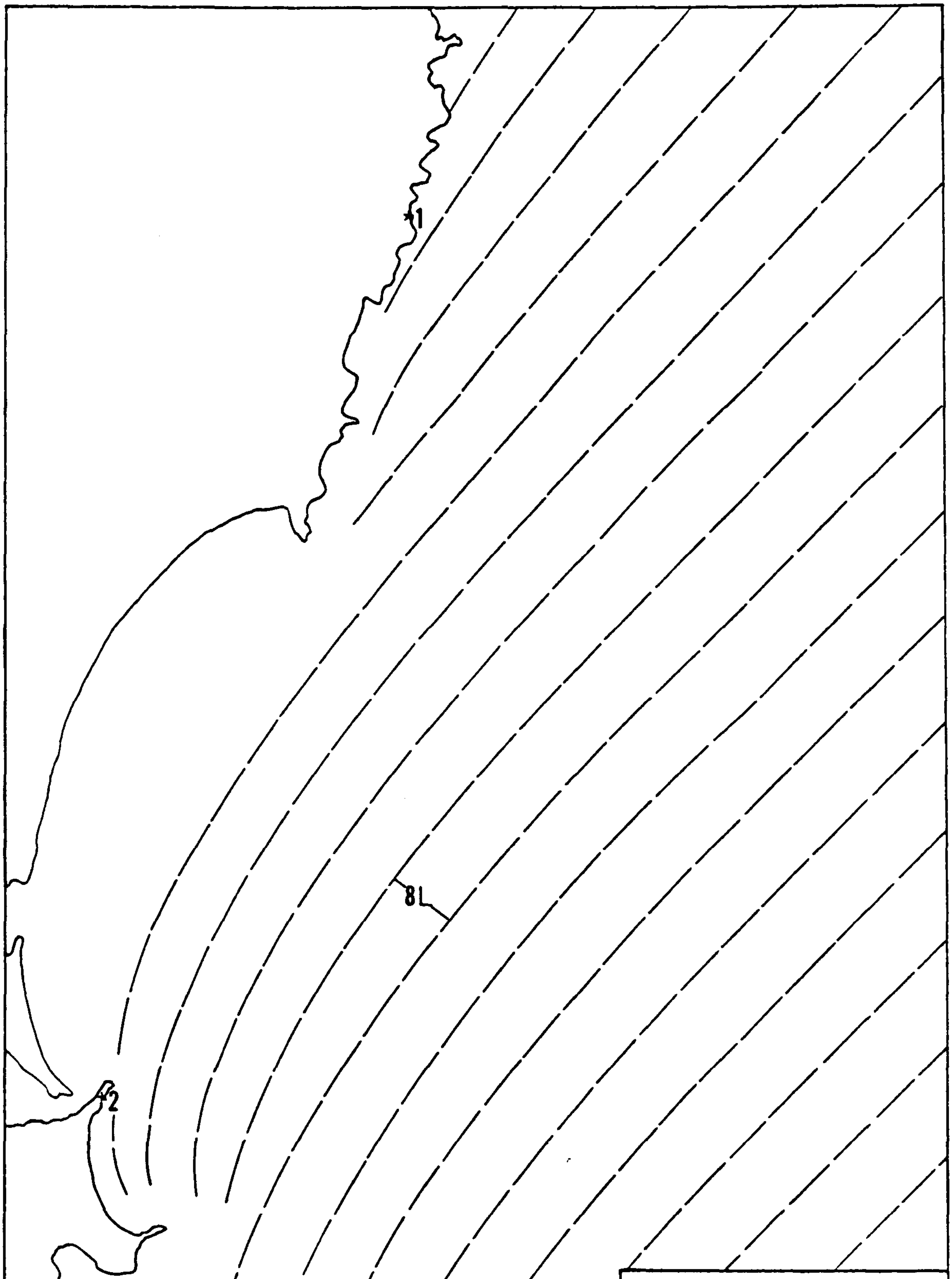

Figure A12. South-east wave approach for Kiama and Crookhaven beaches. Wave period = 12 sec. (Royal Australian Navy Hydrographic Chart #808)

Plate A1. Nearshore wave approach at North Yacaaba boulder beach.

Plate A2. Nearshore wave approach at Copacabana boulder beach.

Plate A3. Nearshore wave approach at Bombo boulder beach.

Plate A4. Nearshore wave approach at Kiama boulder beach.

Plate A5. Nearshore wave approach at Crookhaven boulder beach.

APPENDIX II

NON-PARAMETRIC STATISTICAL TESTS: METHOD AND USE

SPEARMAN RANK CORRELATION

Since the Spearman rank correlation is a measure of direction as well as significance of a relationship, this test was particularly useful in the investigation of relationships between basic sedimentary measures (size, roundness, sphericity) and between these measures and beach position. For example, not only did this test demonstrate that particle size and position up the beach were significantly related, but the negative direction of this relationship indicated that on the studied boulder beaches, particle size decreases up the beach. This characteristic is opposite to the up-beach size trend found on cobble beaches. The results of these tests are discussed in the appropriate chapters throughout the study, but are compiled in a condensed form in Appendix III, Table A6.

In all cases, correction was made for ties and the two-tailed test was used. For this test, the null hypothesis is that there is no association between two variables. Although non-parametric tests tend to be less powerful than their parametric counterparts, the results of these tests should be viewed with reasonable confidence since the Spearman rank correlation is close to 91 per cent as efficient as the product-moment correlation (Hotelling and Pabst, 1936). Siegel (1956, pp. 202-213) details the method and formula for computing the Spearman rank correlation.

The computer package, SPSS (Nie *et. al.*, 1965, pp. 288-292), was used in this study to calculate the Spearman rank correlation.

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE

The Kruskal-Wallis one-way analysis of variance (Kruskal and Wallis, 1952) was chosen for use in this study because it determines whether a number of samples are drawn from the same population. Because the five studied beaches were divided into three longshore and three up-beach zones, this test was used in the attempt to discern any particle-shape zoning by beach position. Because this test could show that on all five beaches, regardless of the areal zone, shape distributions within each beach could have been drawn from the same population, it was concluded that areal zoning by shape was not present. The Kruskal-Wallis one-way analysis of variance was also useful in investigating whether there was a significant variation among the distributions of particle roundness when the boulders were classified according to the five Zingg shapes.

The test was corrected for ties and the null hypothesis is that K samples are drawn from the same population. The Kruskal-Wallis one-way analysis of variance is 95.5 per cent as effective as the F test (Andrews, 1954) and is "more powerful than k-sample Median test since it uses the rank value of each case, not just its location relative to the median" (Tuccy, 1977, p. 324/40). The method outlined by Siegel (1956, pp. 184-194) for performing this test is that used by the SPSS computer package update (Tuccy, 1977). For more detailed information about the Kruskal-

Wallis one-way analysis of variance, see Kruskal (1952), Kruskal and Wallis (1952), and Doornkamp and King (1971, pp.343-344).

KOLMOGOROV-SMIRNOV TWO-SAMPLE TEST

The Kolmogorov-Smirnov two-sample test is a non-parametric goodness-of-fit test. In this study, the two-tailed test has been employed because it is "sensitive to any kind of difference in the distributions from which the two samples were drawn —differences in location, in dispersion, in skewness, etc" (Siegel, 1956, p. 127) (see also Doornkamp and King, 1971, p. 333). This test was useful in the investigation of beach change over time. The distributions of size, shape, and sphericity on Kiama boulder beach as measured in June 1975 were compared, using the Kolmogorov-Smirnov two-sample test, to those distributions as measured (in the same grid) in July 1977. Although much boulder movement had occurred during this period, the Kolmogorov-Smirnov two-sample test was able to determine that there had been no significant change in the distributions of the measured sedimentological characteristics. This test was also used to compare the sedimentological characteristics of the entire beach with the sedimentological characteristics of the boulders which moved during the study period.

The null hypothesis for this test is that there is no difference between the initial and subsequent distributions. Because the Kolmogorov-Smirnov two-sample test is sensitive to any type of difference in the two distributions being compared, it is more powerful than the X^2 or the Median test, and it has close to 96 per cent power-efficiency when compared with the t test (Siegel, 1956, p. 136). Again, the SPSS computer package update (Tuccy, 1977, pp. 324/32-33) was used to calculate the test on a computer, employing the method described by Siegel (1956, pp. 127-136).

APPENDIX III

DATA FOR THE STUDIED BOULDER BEACHES SUMMARIZED IN TABLES

TABLE A1

NORTH YACAABA BEACH: GENERAL DATA

	Beach Zone* 1	2	3	4	5	6	Entire Beach
Size (ϕ)							
Mean	-8.608	-8.668	-8.709	-9.257	-9.008	-7.685	-8.660
Median	-8.912	-8.994	-9.073	-9.363	-9.148	-7.837	-8.991
Standard Deviation	1.174	1.252	1.359	.828	.900	1.360	1.253
Skewness	.859	.805	.794	.993	.848	- .100	.808
Roundness (ρ)							
Mean	3.929	3.869	3.556	3.880	3.695	3.903	3.822
Standard Deviation	.939	1.036	1.146	.877	1.020	1.213	1.045
Skewness	- .309	.047	.046	.074	.049	- .244	- .095
Shape (%)							
Sphere	22.5	19.0	12.1	17.4	17.8	19.1	18.1
Disc	27.5	26.7	31.9	20.4	29.3	33.0	28.5
Rod	29.4	36.2	36.3	41.8	30.2	27.8	33.9
Blade	20.6	18.1	19.8	20.4	22.6	20.1	19.5
Maximum Projection Sphericity (ψ_p)							
Mean	.670	.677	.654	.678	.655	.671	.668
Standard Deviation	.138	.125	.107	.119	.124	.132	.125

Beach Zone:
1 = Headland
2 = Mid
3 = Embayment
4 = Tidal
5 = Supra-tidal
6 = Landward

TABLE A2

COPACABANA BEACH: GENERAL DATA

	Beach Zone* 1	2	3	4	5	6	Entire Beach
Size (ϕ)							
Mean	-9.236	-8.536	-8.350	-9.033	-8.787	-8.277	-8.674
Median	-9.513	-8.994	-8.814	-9.345	-9.074	-8.811	-9.022
Standard Deviation	1.371	1.664	1.383	- .488	1.386	1.643	1.605
Skewness	1.060	1.136	.948	.988	1.172	.973	1.325
Roundness (ρ)							
Median	3.913	4.043	4.056	3.999	3.512	3.132	3.002
Standard Deviation	1.109	1.197	1.270	1.129	1.132	1.146	1.153
Skewness	- .330	- .164	- .224	- .279	- .089	.042	- .108
Shape (%)							
Sphere	2.9	3.6	4.0	3.4	3.2	3.6	3.5
Disc	54.1	55.5	55.5	55.8	50.9	58.7	55.7
Rod	13.0	10.9	12.9	9.5	12.2	14.8	12.2
Blade	30.0	30.0	27.9	31.3	33.6	22.9	28.5
Maximum Projection Sphericity (ψ_p)							
Mean	.503	.497	.517	.480	.523	.510	.505
Standard Deviation	.125	.143	.135	.130	.139	.134	.135

*Beach Zone:
1 = Headland
2 = Mid
3 = Embayment
4 = Tidal
5 = Supra-tidal
6 = Landward

TABLE A3

BOMBO BEACH: GENERAL DATA

	Beach Zone* 1	2	3	4	5	6	Entire Beach
Size (ϕ)							
Mean	-8.108	-7.852	-7.534	-8.707	-7.884	-7.111	-7.830
Median	-8.180	-7.901	-7.717	-8.933	-7.969	-7.236	-7.910
Standard Deviation	1.392	1.142	1.206	1.132	1.119	1.119	1.266
Skewness	.336	- .029	.594	.354	.374	.467	.248
Roundness (ρ)							
Median	3.799	4.011	4.261	4.265	3.451	3.000	3.540
Standard Deviation	1.353	1.375	1.198	.950	1.213	1.352	1.303
Skewness	- .167	- .129	- .077	- .192	.045	.218	- .117
Shape (%)							
Sphere	24.2	36.6	24.8	24.0	32.8	27.5	28.9
Disc	30.5	37.6	40.8	37.7	34.5	39.1	36.6
Rod	28.8	16.4	22.4	28.2	20.2	20.2	22.2
Blade	16.5	9.4	12.0	10.1	12.5	14.2	12.3
Maximum Projection Sphericity (ψ_p)							
Mean	.672	.701	.687	.673	.685	.692	.687
Standard Deviation	.132	.124	.122	.131	.130	.133	.126

*Beach Zone:
1 = Headland
2 = Mid
3 = Embayment
4 = Tidal
5 = Supra-tidal
6 = Landward

TABLE A4

KIAMA BEACH: GENERAL DATA

	Beach Zone*						
	1	2	3	4	5	6	Entire Beach
Size (ϕ)							
Mean	-8.448	-8.906	-8.300	-9.338	-8.312	-8.147	-8.557
Median	-8.649	-8.904	-8.495	-9.565	-8.526	-8.234	-8.711
Standard Deviation	1.212	.894	1.256	1.100	1.062	.952	1.153
Skewness	.636	.292	.489	1.157	1.204	.703	.658
Roundness (ρ)							
Mean	3.814	3.924	3.468	3.667	3.134	2.983	3.246
Standard Deviation	1.010	1.078	1.164	.927	1.031	1.114	1.065
Skewness	- .223	- .457	- .190	.015	- .236	- .169	- .227
Shape (%)							
Sphere	14.1	21.4	13.1	14.1	19.0	13.4	16.4
Disc	28.2	30.6	41.2	42.6	31.2	39.3	36.5
Rod	27.0	24.8	27.2	23.8	26.0	31.5	26.6
Blade	20.6	23.1	18.4	19.5	23.7	15.6	20.5
Maximum Projection Sphericity (ψ_p)							
Mean	.623	.648	.637	.632	.635	.640	.636
Standard Deviation	.132	.130	.136	.122	.136	.138	.133

*Beach Zone: 1 = Headland
2 = Mid
3 = Embayment
4 = Tidal
5 = Surpa-tidal
6 = Landward

TABLE A5

CROOKHAVEN BEACH: GENERAL DATA

	1	2	3	4	5	6	Entire Beach
Size (ϕ)							
Mean	-9.484	-8.818	-8.640	-9.242	-8.999	-8.684	-8.970
Median	-9.589	-9.155	-9.176	-9.588	-9.318	-9.107	-9.300
Standard Deviation	.814	1.203	1.310	1.108	1.164	1.244	1.191
Skewness	1.115	1.464	1.248	2.101	1.573	.962	1.453
Roundness (ρ)							
Median	2.127	2.794	3.449	2.677	2.170	1.838	2.236
Standard Deviation	.741	1.339	1.357	1.208	1.317	1.248	1.304
Skewness	.576	.804	.519	1.072	1.022	1.105	.944
Shape (%)							
Sphere	43.5	41.2	42.6	43.5	43.4	39.3	42.2
Disc	32.1	31.2	28.3	30.2	28.8	33.1	30.2
Rod	16.4	19.0	20.5	17.2	17.4	22.1	19.1
Blade	8.0	9.5	8.3	9.1	10.4	5.5	8.5
Maximum Projection Sphericity (ψp)							
Mean	.706	.700	.734	.712	.711	.721	.715
Standard Deviation	.134	.145	.119	.137	.138	.123	.133

*Beach Zone: 1 = Headland
2 = Mid
3 = Embayment
4 = Tidal
5 = Supra-tidal
6 = Landward

TABLE A6

SPEARMAN RANK CORRELATION COEFFICIENTS

	Beach				
	North Yacaaba N=298	Copacabana N=345	Bombo N=374	Kiama N=342	Crookhaven N=350
Size *vs* Roundness	-.1449*	.1789	.2970	.1928	-.2448
Size *vs* Sphericity	-.0441	-.3166	-.0821	-.0274	.0266
Size *vs* Poslong+	.0382	-.2976	-.2157	-.0041 (-.2802)[1]	-.2802
Size *vs* Posup≠	-.5177	-.2528	-.5078	-.5539	-.2127
Roundness *vs* Sphericity	.0848	-.0070	.0723	.0120	-.0306
Roundness *vs* Poslong	.1545	.0525	.1559	.1169	.4676
Roundness *vs* Posup	-.0192	-.2061	-.4377	-.2950	-.2653
Sphericity *vs* Poslong	-.0899	.0533	-.0609	.0239	.0754
Sphericity *vs* Posup	.0020	.1257	-.0127	-.0013	.0568

*Once underlined values significant at the 0.05 level of probability.
Twice underlined values significant at the 0.001 level of probability.

+Poslong = Longshore beach position (profile by profile) with numerical increase from headland to embayment.

≠Posup = Up-beach position (grid point by grid point) with numerical increase from sea to land.

[1]Removal of profiles located on shore platform.

TABLE A7

SIZE SORTING (STANDARD DEVIATION) FOR EACH SHAPE (ZINGG CLASSIFICATION)

Shape	Standard Deviation (cm)				
	North Yacaaba	Copacabana	Bombo	Kiama	Crookhaven
Sphere	33.351	19.378	30.114	32.776	30.045
Disc	49.973	52.699	33.845	42.168	38.515
Rod	31.213	29.658	25.250	28.213	34.306
Blade	33.500	42.786	26.910	40.723	43.811

TABLE A8

ROUNDNESS SORTING (STANDARD DEVIATION) FOR EACH SHAPE (ZINGG CLASSIFICATION)

Shape	Standard Deviation (ρ)				
	North Yacaaba	Copacabana	Bombo	Kiama	Crookhaven
Sphere	1.077	1.371	1.264	1.175	1.138
Disc	1.120	1.141	1.306	1.078	1.330
Rod	.953	1.265	1.254	.987	1.453
Blade	1.076	1.082	1.389	1.055	1.520

TABLE A9

PERCENTAGE OF BOULDERS IN EACH ZONE

Zone	North Yacaaba (%)	Copacabana (%)	Bombo (%)	Kiama (%)	Crookhaven (%)
Headland	30.5	31.0	32.4	31.3	32.9
Mid	34.2	39.7	34.2	35.4	30.0
Embayment	35.3	29.3	33.4	33.3	37.1
Tidal	33.2	33.3	23.5	28.1	28.0
Supra-Tidal	34.2	33.3	44.4	45.9	40.9
Landward	32.6	33.3	32.1	26.0	31.1

APPENDIX IV

CALCULATION OF BREAKER HEIGHT (H_b) AND DEPTH AT BREAKING (d_b)

When using equations developed by coastal engineers to assess stability of protection structures composed of rubble, it is often necessary to know the breaker height and the depth of water at breaking. Since the only wave-height data available to this study was for deep water (provided by wave-rider buoys), it was necessary to calculate breaker height and breaking depth.

In deep water, the maximum possible height of a wave is limited only by the steepness at which the wave can remain stable. When the limiting steepness is reached, the wave will begin to break. From theoretical work, Michell (1893) expressed limiting steepness as:

$$\frac{H_o}{L_o} = 0.142 \simeq \frac{1}{7} \quad .$$

At this point, wave celerity and water particle velocity at the wave crest are equal; greater steepness would cause the wave celerity to be less than the particle velocities at the wave crest, thus resulting in instability.

When waves move into shoaling water, however, wave steepness is limited by depth and beach slope. Using modified solitary wave theory, Munk (1949) related breaker height, breaking depth, unrefracted deep-water wave height, and deep-water wave length as follows:

$$\frac{H_b}{L_o} = \frac{1}{3.3(H_o/L_o)^{1/3}} \quad \text{(breaker height index)},$$

$$\frac{d_b}{H_b} = 1.28.$$

More recent work (Iverson, 1952, 1953; Galvin, 1969; and Goda, 1970) has shown that H_b/H_o and d_b/H_b are dependent upon incident wave steepness and beach slope. For several beach slopes, Goda (1970) presented empirically derived relationships between H_b/H_o and H_o/L_o. The U.S. Army, Corps of Engineers recommends that this empirical information, as presented in Figures A13 and A14, be used rather than Munk's equations when finding breaker heights and breaking depths "since the figures take into consideration the observed dependence of d_b/H_b and H_b/H_o on slope" (U.S. Army, Corps of Engineers, 1977, p. 2-124). Therefore, in this study, Figure A13 was used to calculate breaker heights and Figure A14 to calculate breaking depth.

NOTE: Imperial units must be used with Figures A13 and A14.

EXAMPLES OF CALCULATIONS

1. Breaker Height (H_b)

   H_o = 6 m = 19.69 ft (obtained from buoy)

   T = 12 sec (obtained from buoy)

   m = 1:52 (obtained from hydrographic chart)

   L_o = 5.12 x T^2 = 737.28

$$\frac{H_o}{L_o} = 0.027$$

Consult Figure A13.

Where $\frac{H_o}{L_o} = 0.027, \quad \frac{H_b}{H_o} = 1.126$

Therefore, H_b = 22.17 ft = 6.76 m

2. Depth at Breaking (d_b)

H_b = 6.76 m = 22.17 ft (calculated above)

T = 12 sec

m = 1:52

g = 980.6 cm/sec^2 = 32.17 ft/sec^2

$$\frac{H_b}{gT^2} = 0.0048$$

Consult Figure A14.

Where $\frac{H_b}{gT^2} = 0.0048, \quad \frac{d_b}{H_b} = 1.16$

Therefore, d_b = 25.7 ft = 7.8 m

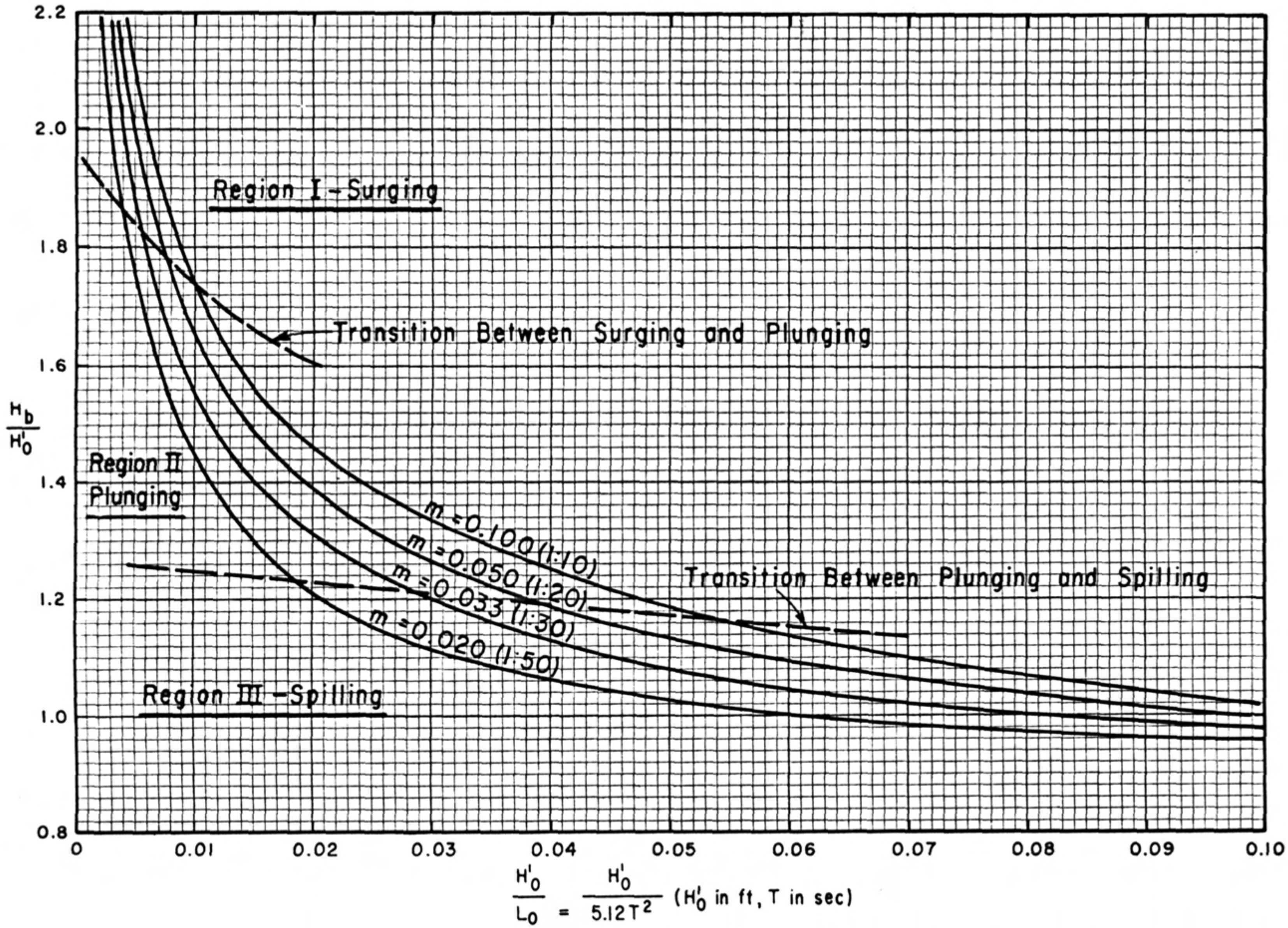

Figure A13. **Breaker Height Index Versus Deep Water Wave Steepness**

(after U.S. Army, Corps of Engineers, 1977, p. 2-122)

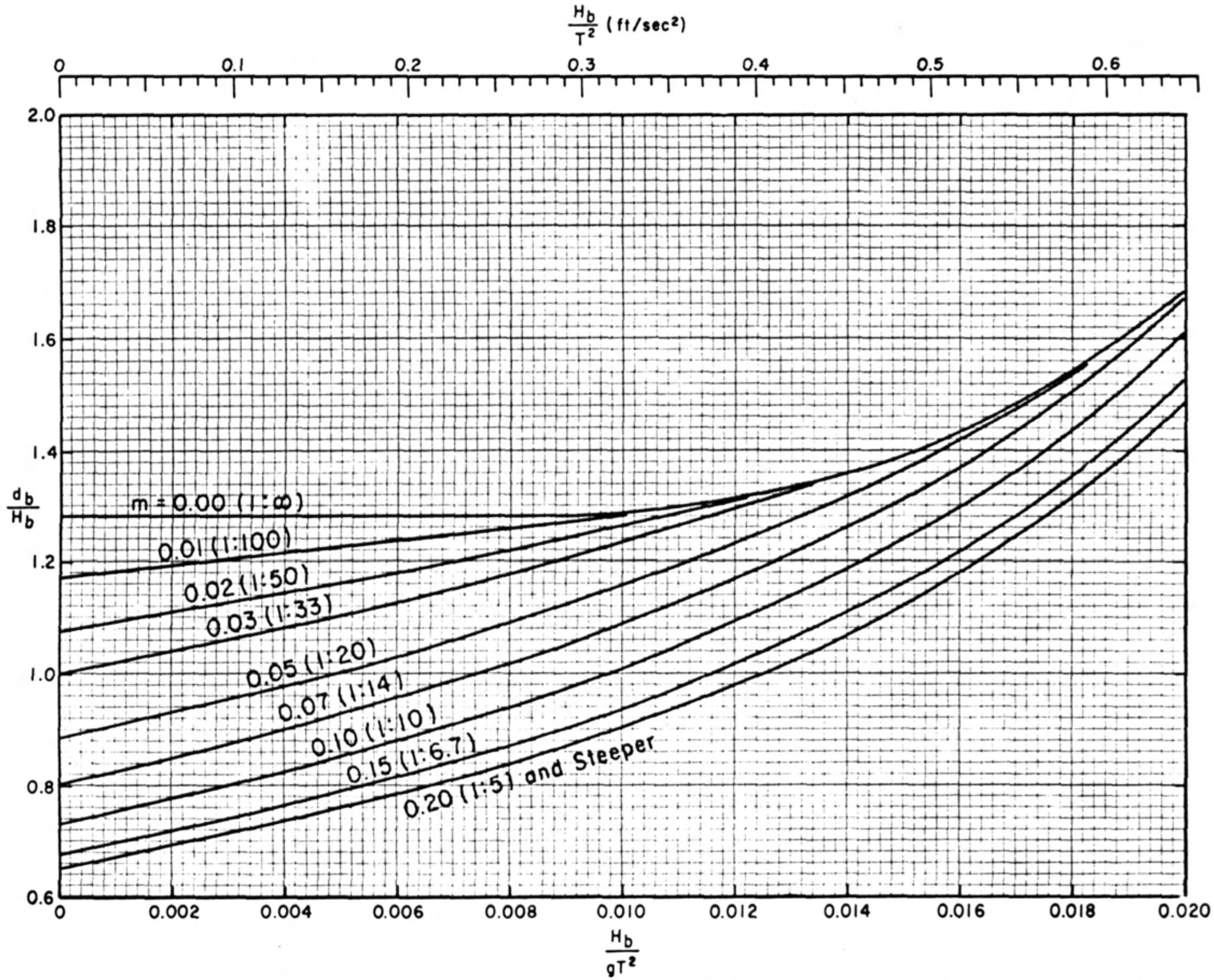

Figure A14. Dimensionless Depth at Breaking Versus Breaker Steepness
(after U.S. Army, Corps of Engineers, 1977, p. 2-123)

APPENDIX V

CALCULATION OF UPRUSH (RUNUP) HEIGHT (R)

The steps in the calculation of uprush height are as follows:

1. H_o and T are known
2. Find $\frac{H_o}{gT^2}$
3. Use Figure A15 to estimate $\frac{R}{H_o}$ from $\frac{H_o}{gT^2}$
4. Correct R for scale dffects using Figure A16. (R x k = corrected R)
5. Multiply corrected R by the roughness and porosity correction factor (r) found in Table A10.

   corrected R x r = R_{riprap}
6. R_{riprap} should approximate uprush height on a boulder beach.

NOTE: Imperial units must be used with figures A15, A16, and Table A10.

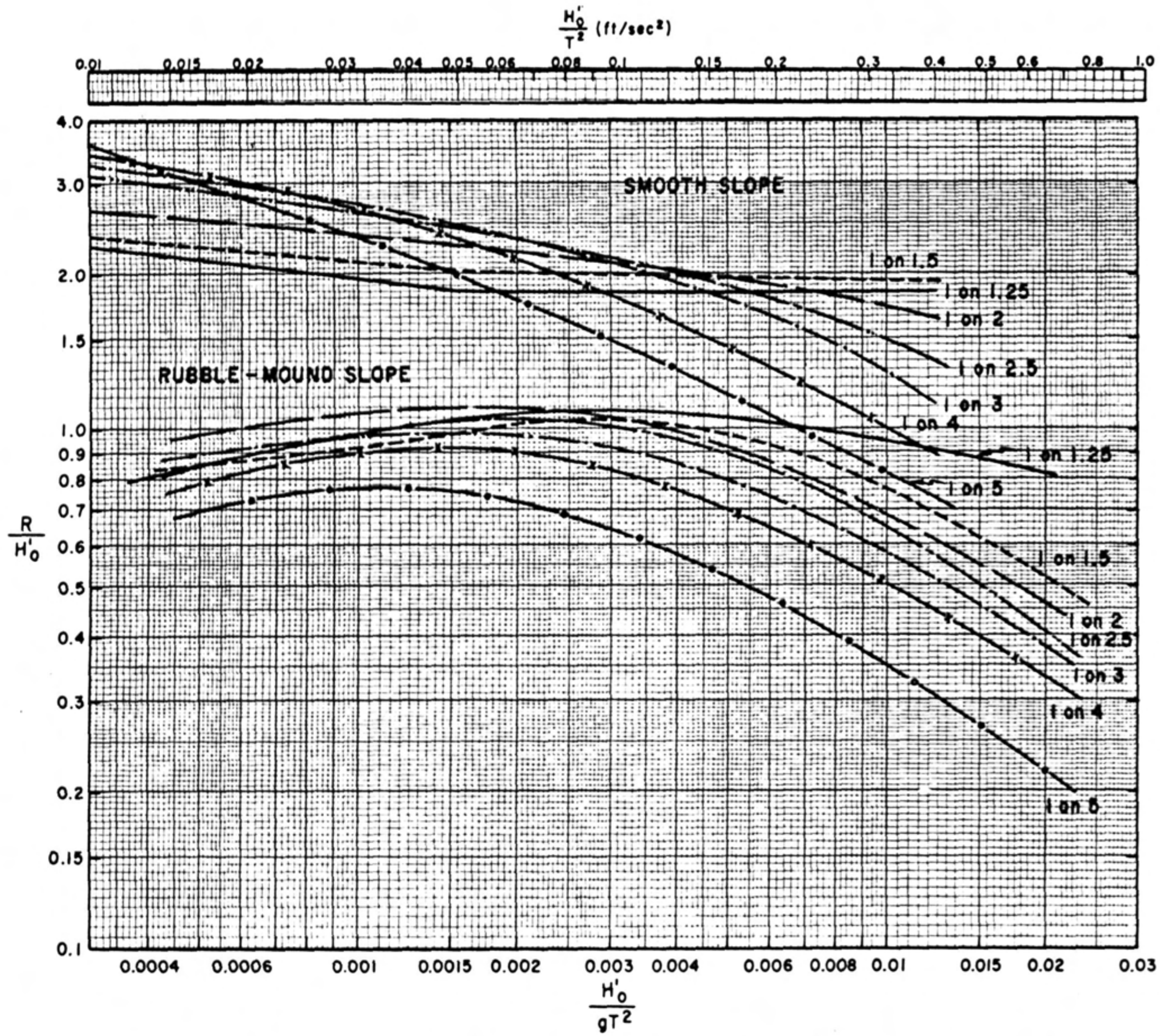

Figure A15. Comparison of Wave Runup on Smooth Slopes with Runup on Permeable Rubble Slopes (data for $d_s/H'_o > 3.0$)

(after U.S. Army, Corps of Engineers, 1977, p. 7-31)

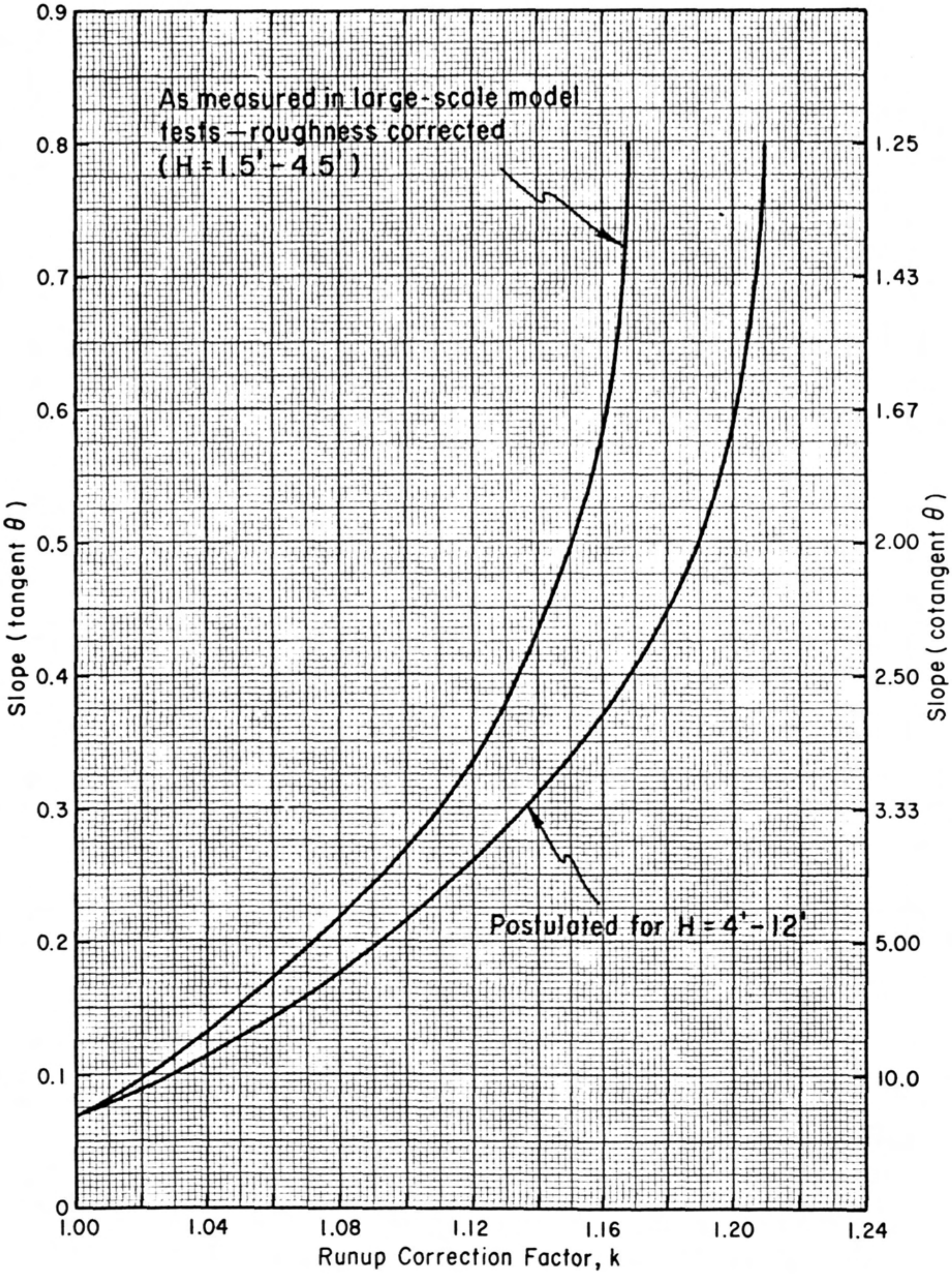

Figure A16. Runup Correction for Scale Effects

(after U.S. Army, Corps of Engineers, 1977, p. 7-23)

Table A10. Values of r for Various Slope Surface Characteristics (after Battjes, 1974).

Slope Surface Characteristics	Placement	r
Smooth, impermeable	------	1.00
Concrete blocks	Fitted	0.90
Basalt blocks	Fitted	0.85 to 0.90
Gobi blocks	Fitted	0.85 to 0.90
Grass	------	0.85 to 0.90
One layer of quarrystone (impermeable foundation)	Random	0.80
Quarrystone	Fitted	0.75 to 0.80
Rounded quarrystone	Random	0.60 to 0.65
Three layers of quarrystone (impermeable foundation)	Random	0.60 to 0.65
Quarrystone	Random	0.50 to 0.55
Concrete armor units (~50 percent void ratio)	Random	0.45 to 0.50

(after U.S. Army, Corps of Engineers, 1977, p. 7-32)

APPENDIX VI

BASIC DATA FOR EACH STUDIED BOULDER BEACH

SYMBOLS USED IN APPENDIX VI

X = profile number from headland zone to embayment zone

Y = sampling point up profile in landward direction

A = A axis of measured boulder (cm)

PHI B = B axis of measured boulder expressed in *phi* (ϕ) units

C = C axis of measured boulder (cm)

R = boulder roundness according to the *rho* (ρ) scale

SH = shape according to the Zingg classification

1 = sphere

2 = disc

3 = rod

4 = blade

SPHER = maximum projection sphericity (ψ_p)

LONG = zone along the beach

1 = headland zone

2 = mid zone

3 = embayment zone

UP = zone up the beach

4 = tidal zone

5 = supra-tidal zone

6 = landward zone

NORTH YACAABA BOULDER BEACH

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
1	2	61.0	-8.3663	31.0	4.0	3	.7820	3	4
1	3	56.0	-8.7142	23.0	2.0	2	.6080	3	4
1	4	147.0	-9.7977	50.0	5.0	4	.5760	3	4
1	6	33.0	-7.3219	10.0	5.0	4	.5750	3	4
1	7	111.0	-9.0768	49.0	3.0	3	.7370	3	5
1	8	165.0	-10.0901	55.0	3.0	4	.5520	3	5
1	9	83.0	-9.4512	52.0	4.0	1	.7750	3	5
1	10	84.0	-9.0768	30.0	3.0	4	.5840	3	6
1	11	78.0	-8.6795	32.0	2.0	3	.6840	3	6
2	2	125.0	-9.4305	65.0	4.0	3	.7880	3	4
2	6	128.0	-9.0498	47.0	3.0	3	.6880	3	4
2	7	132.0	-9.5887	56.0	2.0	3	.6760	3	5
2	8	55.0	-8.2761	24.0	2.0	3	.6970	3	5
2	9	54.0	-8.1799	23.0	4.0	3	.6970	3	6
2	10	101.0	-9.1293	36.0	2.0	4	.6120	3	6
3	4	108.0	-9.5699	30.0	3.0	2	.4790	3	4
3	5	128.0	-9.4305	57.0	3.0	3	.7170	3	4
3	6	116.0	-9.2527	28.0	4.0	4	.4810	3	4
3	7	91.0	-9.1799	31.0	3.0	4	.5670	3	5
3	8	20.0	-6.1293	4.0	3.0	4	.4860	3	5
3	9	200.0	-9.7313	83.0	2.0	3	.7400	3	5
3	10	30.0	-7.3219	14.0	6.0	3	.7420	3	6
3	11	35.0	-8.1799	26.0	5.0	1	.8730	3	6
4	4	93.0	-9.2046	53.0	3.0	3	.8000	3	4
4	6	37.0	-7.2288	14.0	6.0	3	.7070	3	4
4	7	45.0	-8.3219	18.0	2.0	2	.6090	3	5
4	9	85.0	-8.8138	25.0	3.0	4	.5470	3	5
4	10	49.0	-8.4094	20.0	4.0	2	.6220	3	5
4	11	79.0	-7.7142	18.0	3.0	3	.5810	3	6
4	12	8.0	-6.0224	4.5	5.0	1	.7300	3	6
4	13	6.5	-5.6439	2.5	4.0	2	.5780	3	6
5	3	112.0	-9.3880	66.0	5.0	3	.8340	3	4
5	5	270.0	-11.3718	138.0	4.0	2	.6440	3	4
5	6	165.0	-10.1033	88.0	3.0	3	.7530	3	4
5	7	170.0	-9.7977	67.0	3.0	3	.6670	3	5
5	8	136.0	-10.1799	50.0	4.0	2	.5410	3	5
5	9	74.0	-8.9944	27.0	4.0	2	.5780	3	5
5	10	54.0	-8.6795	17.0	3.0	2	.5080	3	6
5	11	50.0	-8.9366	37.0	2.0	1	.8240	3	6
5	12	81.0	-9.2046	29.0	5.0	2	.5610	3	6
6	3	227.0	-10.6439	97.0	3.0	2	.6380	3	4
6	4	67.0	-9.1548	35.0	4.0	2	.6850	3	4
6	5	65.0	-9.2761	30.0	4.0	2	.6070	3	4
6	6	112.0	-9.6439	76.0	3.0	1	.8640	3	4
6	7	92.0	-8.6439	26.0	5.0	3	.5690	3	5
6	8	75.0	-8.8765	35.0	4.0	3	.7030	3	5
6	9	107.0	-9.8611	70.0	2.0	1	.7900	3	5
6	10	13.0	-6.7814	8.0	6.0	1	.7650	3	6
6	11	10.0	-5.9069	4.0	4.0	3	.6440	3	6
6	12	11.0	-6.6439	5.5	2.0	2	.6510	3	6
7	4	130.0	-10.1674	105.0	5.0	1	.9040	3	4
7	5	219.0	-10.2167	72.0	4.0	4	.5840	3	4
7	6	36.0	-8.0224	11.0	3.0	2	.5060	3	4

NORTH YACAABA

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
7	7	69.0	-8.8455	18.0	3.0	4	.4680	3	5
7	8	72.0	-8.9069	43.0	5.0	3	.8120	3	5
7	9	52.0	-8.9944	20.0	2.0	2	.5330	3	5
7	10	84.0	-9.2761	36.0	5.0	2	.6290	3	5
7	11	82.0	-8.9944	42.0	4.0	3	.7500	3	6
7	12	10.0	-5.4919	3.5	1.0	3	.6480	3	6
7	13	7.0	-5.6439	3.0	2.0	2	.6360	3	6
8	3	64.0	-9.1033	28.0	4.0	2	.6060	3	4
8	4	24.0	-7.3219	14.0	4.0	3	.7990	3	4
8	5	93.0	-9.6618	44.0	5.0	2	.6360	3	4
8	6	8.5	-5.7814	3.0	5.0	4	.5780	3	4
8	7	11.0	-6.6439	4.5	4.0	2	.5690	3	5
8	8	91.0	-9.1293	29.0	3.0	4	.5490	3	5
8	9	33.0	-8.0768	18.0	5.0	2	.7140	3	5
8	10	55.0	-7.9658	24.0	5.0	3	.7480	3	6
8	11	103.0	-9.3443	61.0	3.0	3	.8220	3	6
8	12	12.0	-6.6439	6.5	3.0	2	.7060	3	6
9	4	72.0	-8.8455	33.0	4.0	3	.6900	3	4
9	5	265.0	-10.1674	68.0	3.0	4	.5340	3	4
9	6	270.0	-11.1033	70.0	3.0	2	.4360	3	4
9	7	129.0	-9.2761	40.0	3.0	4	.5850	3	5
9	8	104.0	-9.2288	40.0	4.0	4	.6360	3	5
9	9	160.0	-10.5216	55.0	4.0	2	.5050	3	5
9	10	42.0	-8.6439	29.0	3.0	1	.7940	3	6
9	11	280.0	-10.8533	89.0	4.0	4	.5350	3	6
9	12	69.0	-9.3880	49.0	2.0	1	.8040	3	6
9	13	12.0	-6.4919	4.5	3.0	2	.5730	3	6
10	3	205.0	-9.7482	65.0	4.0	3	.6210	3	4
10	4	280.0	-10.3554	97.0	4.0	3	.6360	3	4
10	5	62.0	-9.0768	25.0	4.0	2	.5720	3	4
10	6	125.0	-8.8138	41.0	5.0	3	.6690	3	4
10	7	94.0	-9.2761	39.0	2.0	4	.6390	3	5
10	8	160.0	-9.6970	78.0	3.0	3	.7710	3	5
10	9	141.0	-10.0362	42.0	1.0	2	.4920	3	5
10	10	105.0	-9.3663	54.0	4.0	3	.7500	3	5
10	11	87.0	-8.8455	44.0	3.0	3	.7850	3	6
10	12	7.0	-5.6439	3.5	5.0	1	.7050	3	6
10	13	11.5	-6.4094	3.5	6.0	2	.5010	3	6
11	3	270.0	-10.2761	77.0	3.0	4	.5620	2	4
11	4	85.0	-8.9658	42.0	5.0	3	.7460	2	4
11	5	145.0	-9.6439	62.0	4.0	3	.6920	2	4
11	6	93.0	-8.8138	25.0	3.0	4	.5310	2	4
11	7	98.0	-9.4094	65.0	2.0	1	.8590	2	5
11	8	77.0	-8.3663	27.0	4.0	3	.6600	2	5
11	9	18.0	-6.9069	5.0	5.0	4	.4880	2	5
11	10	135.0	-9.7814	86.0	4.0	3	.8540	2	6
11	11	72.0	-8.4919	20.0	3.0	4	.5370	2	6
11	12	76.0	-8.7142	26.0	3.0	4	.5960	2	6
12	3	220.0	-9.4512	60.0	5.0	3	.6160	2	4
12	4	17.0	-7.1293	9.0	2.0	2	.6980	2	4
12	6	118.0	-9.4919	52.0	5.0	3	.6830	2	4
12	7	59.0	-8.3219	14.0	4.0	4	.4700	2	5
12	8	115.0	-9.6618	40.0	3.0	2	.5560	2	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
12	9	34.0	-7.2288	8.0	3.0	4	.5010	2	5
12	10	100.0	-9.4919	45.0	2.0	2	.6550	2	5
12	11	101.0	-9.4512	15.0	2.0	2	.3170	2	6
12	12	31.0	-7.4919	15.0	3.0	3	.7390	2	6
12	13	53.0	-8.4094	17.0	4.0	4	.5440	2	6
13	3	51.0	-8.8455	19.0	5.0	2	.5360	2	4
13	4	226.0	-10.5507	100.0	3.0	2	.6660	2	4
13	5	94.0	-9.2527	51.0	4.0	3	.7690	2	4
13	6	109.0	-9.4717	70.0	4.0	3	.8590	2	4
13	8	24.0	-7.4094	10.0	6.0	2	.6260	2	5
13	9	120.0	-9.5314	26.0	3.0	4	.4240	2	5
13	10	250.0	-10.1293	90.0	3.0	3	.6620	2	5
13	11	29.0	-7.8455	15.0	5.0	2	.6960	2	6
13	13	7.5	-5.9069	3.5	5.0	2	.6480	2	6
14	3	63.0	-8.5314	23.0	6.0	4	.6100	2	4
14	4	78.0	-8.4919	23.0	5.0	4	.5740	2	4
14	5	61.0	-9.2046	34.0	3.0	2	.6850	2	4
14	6	143.0	-10.1033	66.0	4.0	2	.6520	2	4
14	7	165.0	-9.5699	48.0	2.0	4	.5690	2	5
14	8	53.0	-8.4094	24.0	4.0	3	.6840	2	5
14	9	93.0	-9.3443	63.0	3.0	1	.8690	2	5
14	10	33.0	-8.0224	20.0	4.0	1	.7760	2	5
14	11	150.0	-10.3987	78.0	5.0	2	.6700	2	6
14	12	53.0	-8.3663	28.0	6.0	3	.7660	2	6
14	13	7.0	-5.6439	2.5	2.0	2	.5630	2	6
15	1	165.0	-9.6073	59.0	2.0	3	.6470	2	4
15	2	230.0	-10.2527	84.0	4.0	3	.6310	2	4
15	3	92.0	-9.3880	45.0	4.0	1	.6900	2	4
15	4	84.0	-8.9658	26.0	4.0	4	.5440	2	4
15	6	150.0	-9.5314	52.0	2.0	3	.6250	2	4
15	7	113.0	-9.6618	75.0	4.0	1	.8500	2	5
15	8	310.0	-10.8138	137.0	4.0	3	.6960	2	5
15	9	95.0	-8.9366	32.0	2.0	4	.6040	2	5
15	10	66.0	-9.1033	34.0	2.0	2	.6830	2	5
15	12	55.0	-8.6073	37.0	4.0	1	.8610	2	6
15	13	23.0	-7.0768	9.0	4.0	4	.6390	2	6
15	14	40.0	-8.3219	22.0	6.0	1	.7230	2	6
15	15	9.5	-5.9069	4.5	3.0	3	.7080	2	6
16	1	141.0	-9.0768	51.0	2.0	3	.6990	2	4
16	2	150.0	-9.0498	50.0	3.0	3	.6800	2	4
16	3	128.0	-9.6618	49.0	3.0	4	.6140	2	4
16	6	98.0	-9.0224	45.0	4.0	3	.7350	2	4
16	7	90.0	-9.3880	33.0	4.0	2	.5660	2	5
16	8	160.0	-9.9069	73.0	3.0	3	.7030	2	5
16	9	84.0	-8.7142	35.0	4.0	3	.7030	2	5
16	10	112.0	-9.2288	43.0	3.0	3	.6510	2	5
16	11	68.0	-8.7482	30.0	4.0	3	.6750	2	5
16	12	102.0	-9.9513	71.0	5.0	1	.7930	2	6
16	13	180.0	-10.3443	78.0	4.0	2	.6390	2	6
16	14	5.5	-5.1293	3.0	5.0	3	.7760	2	6
16	15	20.5	-7.2288	5.0	4.0	2	.4340	2	6
17	1	140.0	-10.1799	96.0	4.0	1	.8280	2	4
17	5	90.0	-8.8765	43.0	3.0	3	.7590	2	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
17	7	97.0	-9.6439	47.0	5.0	2	.6580	2	5
17	8	142.0	-9.5699	36.0	4.0	4	.4940	2	5
17	9	39.0	-8.2761	21.0	3.0	1	.7150	2	5
17	10	91.0	-9.0498	49.0	3.0	3	.7930	2	5
17	11	165.0	-10.4512	73.0	3.0	2	.6140	2	6
17	12	29.0	-8.0224	14.0	4.0	2	.6380	2	6
17	13	15.5	-6.3219	7.5	5.0	3	.7690	2	6
17	14	13.5	-6.4919	6.0	5.0	4	.6670	2	6
18	2	137.0	-9.1799	57.0	4.0	3	.7420	2	4
18	4	49.0	-8.3663	32.0	4.0	1	.8590	2	4
18	6	89.0	-9.7814	42.0	4.0	2	.6090	2	4
18	7	160.0	-10.2288	54.0	3.0	2	.5340	2	5
18	8	105.0	-9.1293	34.0	5.0	4	.5820	2	5
18	9	25.0	-7.3219	15.9	3.0	3	.8580	2	5
18	10	34.0	-8.0224	25.0	4.0	1	.8910	2	5
18	11	107.0	-9.0498	41.0	4.0	3	.6670	2	6
18	12	18.0	-7.3219	15.0	5.0	1	.9210	2	6
18	13	105.5	-6.0224	3.5	4.0	3	.2620	2	6
18	14	16.0	-6.7814	10.0	3.0	1	.8280	2	6
18	15	26.0	-7.9069	16.0	4.0	2	.7430	2	6
19	6	112.0	-9.5118	64.0	4.0	3	.7940	2	4
19	7	88.0	-9.7313	65.0	3.0	1	.8270	2	5
19	8	100.0	-9.8297	40.0	5.0	2	.5610	2	5
19	10	71.0	-9.4512	48.0	4.0	1	.7740	2	5
19	11	46.0	-8.2288	28.0	4.0	3	.8280	2	6
19	12	11.0	-6.4919	7.0	6.0	1	.7910	2	6
19	13	10.5	-6.1293	6.0	5.0	3	.7880	2	6
19	14	35.0	-8.0224	19.0	4.0	1	.7350	2	6
20	5	82.0	-9.6073	70.0	4.0	1	.9150	2	4
20	8	85.0	-8.9944	39.0	4.0	3	.7060	2	5
20	9	86.0	-9.0498	45.0	4.0	3	.7630	2	5
20	10	43.0	-8.4919	24.0	6.0	2	.7190	2	5
20	11	55.0	-8.8138	37.0	4.0	1	.8210	2	6
20	12	57.0	-9.0224	25.0	3.0	2	.5960	2	6
20	13	24.0	-7.3219	15.0	5.0	3	.8370	2	6
20	14	12.5	-6.7814	3.5	5.0	2	.4470	2	6
20	15	9.5	-6.4919	4.5	4.0	2	.6190	2	6
21	6	89.0	-8.4512	31.0	4.0	3	.6760	1	4
21	7	49.0	-8.3219	17.0	3.0	4	.5690	1	5
21	8	117.0	-9.4512	51.0	4.0	3	.6830	1	5
21	9	20.0	-7.0768	12.0	5.0	1	.8110	1	5
21	10	52.0	-8.4094	33.0	3.0	3	.8510	1	6
21	11	10.5	-5.9069	4.0	3.0	4	.6340	1	6
21	12	26.0	-7.8455	13.0	5.0	2	.6570	1	6
22	3	110.0	-9.3663	58.0	4.0	3	.7740	1	4
22	4	102.0	-9.5699	55.0	3.0	1	.7310	1	4
22	5	63.0	-9.2527	50.0	5.0	1	.8670	1	4
22	6	89.0	-8.9366	35.0	4.0	3	.6550	1	4
22	7	67.0	-8.9069	43.0	4.0	1	.8320	1	5
22	8	91.0	-8.5314	33.0	6.0	3	.6870	1	5
22	9	81.0	-9.5507	38.0	4.0	2	.6200	1	5
22	10	113.0	-9.7142	35.0	5.0	2	.5060	1	5
22	11	67.0	-9.1548	40.0	4.0	1	.7480	1	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
22	12	10.5	-6.6439	3.5	4.0	2	.4890	1	6
22	13	43.0	-8.5699	11.0	5.0	2	.4200	1	6
22	14	47.0	-7.8455	20.0	3.0	3	.7180	1	6
22	15	5.5	-5.6439	3.5	2.0	1	.7640	1	6
23	3	82.0	-9.4919	41.0	4.0	2	.6580	1	4
23	4	75.0	-9.5314	64.0	3.0	1	.9040	1	4
23	5	95.0	-9.2046	37.0	6.0	4	.6250	1	4
23	6	150.0	-9.6970	75.0	4.0	3	.7680	1	4
23	7	82.0	-8.9069	27.0	5.0	4	.5700	1	5
23	8	85.0	-9.1293	55.0	4.0	3	.8600	1	5
23	9	98.0	-9.6795	37.0	5.0	2	.5550	1	5
23	10	43.0	-8.4919	16.0	3.0	2	.5490	1	5
23	11	9.5	-6.3219	5.0	5.0	2	.6910	1	6
23	12	36.0	-7.9069	17.0	4.0	3	.6940	1	6
23	13	5.0	-5.4919	3.0	3.0	2	.7370	1	6
23	14	14.0	-6.4919	5.0	4.0	4	.5840	1	6
24	2	54.0	-8.9944	38.0	3.0	1	.8070	1	4
24	4	91.0	-9.7977	86.0	4.0	1	.9700	1	4
24	5	170.0	-9.5314	68.0	4.0	3	.7170	1	4
24	6	112.0	-9.4919	30.0	4.0	4	.4820	1	4
24	7	118.0	-9.9218	7.0	4.0	2	.1630	1	5
24	8	23.0	-7.7814	8.5	3.0	2	.5230	1	5
24	9	61.0	-8.9069	47.0	4.0	1	.9100	1	5
24	10	22.0	-7.3219	15.0	4.0	1	.8620	1	6
24	11	25.0	-7.4919	10.0	2.0	2	.6060	1	6
24	12	18.0	-7.4094	11.0	5.0	2	.7340	1	6
25	3	71.0	-8.8765	15.0	3.0	4	.4070	1	4
25	4	56.0	-7.9069	17.0	5.0	3	.5990	1	4
25	5	103.0	-9.2527	49.0	4.0	3	.7260	1	4
25	6	109.0	-9.0498	36.0	3.0	3	.6080	1	4
25	7	103.0	-8.9366	34.0	3.0	3	.6120	1	5
25	8	76.0	-8.8138	23.0	4.0	4	.5370	1	5
25	9	135.0	-9.2288	34.0	4.0	4	.5230	1	5
25	10	138.0	-9.3443	42.0	4.0	4	.5820	1	6
25	11	7.0	-6.0224	2.5	4.0	2	.4150	1	6
25	12	71.0	-8.7814	26.0	2.0	4	.6010	1	6
26	3	200.0	-10.0224	73.0	4.0	3	.6350	1	4
26	4	44.0	-8.5699	36.0	4.0	1	.9190	1	4
26	5	116.0	-9.8138	62.0	3.0	1	.7170	1	4
26	6	140.0	-9.9658	53.0	3.0	2	.5860	1	4
26	7	16.0	-7.1293	9.0	6.0	2	.7130	1	5
26	8	222.0	-10.1548	85.0	4.0	3	.6590	1	5
26	9	130.0	-9.9513	60.0	4.0	2	.6540	1	5
26	10	38.0	-8.2288	17.0	4.0	2	.6330	1	6
26	12	9.0	-6.0224	6.0	1.0	1	.8510	1	6
26	12	17.0	-6.7814	6.0	1.0	4	.5780	1	6
27	2	63.0	-9.1293	42.0	4.0	1	.7940	1	4
27	3	128.0	-9.3663	30.0	4.0	4	.4740	1	4
27	4	270.0	-10.0084	98.0	4.0	3	.7020	1	4
27	6	94.0	-8.9069	28.0	4.0	4	.5580	1	4
27	7	200.0	-10.5507	123.0	4.0	1	.7960	1	5
27	8	120.0	-9.9658	50.0	3.0	2	.5930	1	5
27	9	57.0	-8.5314	33.0	3.0	3	.8020	1	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
27	10	70.0	-8.7142	41.0	5.0	3	.8300	1	6
27	11	30.0	-7.7142	12.0	3.0	2	.6120	1	6
27	12	10.0	-5.7814	4.5	4.0	3	.7170	1	6
28	2	108.0	-9.9366	67.0	3.0	1	.7520	1	4
28	3	70.0	-9.0224	44.0	4.0	1	.8100	1	4
28	4	73.0	-8.9069	28.0	5.0	2	.6070	1	4
28	5	47.0	-7.7814	17.0	5.0	3	.6540	1	4
28	6	160.0	-10.1293	64.0	3.0	2	.6120	1	4
28	7	114.0	-9.1548	36.0	5.0	4	.5850	1	5
28	8	110.0	-9.1799	41.0	4.0	3	.6410	1	5
28	9	28.0	-7.8455	16.0	5.0	1	.7360	1	5
28	10	113.0	-9.8138	60.0	4.0	2	.7080	1	6
28	11	61.0	-9.0768	32.0	3.0	2	.6780	1	6
29	2	64.0	-8.6795	35.0	4.0	3	.7760	1	4
29	3	133.0	-9.6439	38.0	5.0	4	.5140	1	4
29	5	128.0	-9.5314	50.0	4.0	3	.6420	1	4
29	6	33.0	-8.2761	11.0	3.0	2	.4910	1	4
29	7	75.0	-8.9069	22.0	3.0	4	.5130	1	5
29	8	149.0	-9.7313	68.0	4.0	3	.7150	1	5
29	9	136.0	-10.0768	44.0	4.0	2	.5090	1	5
29	10	180.0	-9.8138	60.0	4.0	4	.6060	1	5
29	11	82.0	-8.9658	18.0	4.0	4	.4290	1	6
29	12	18.0	-7.1293	8.0	5.0	2	.6340	1	6
29	13	27.0	-7.4919	8.0	4.0	4	.5090	1	6
30	5	79.0	-9.1799	55.0	5.0	1	.8710	1	4
30	6	138.0	-9.5118	70.0	4.0	3	.7870	1	4
30	7	57.0	-8.2288	29.0	3.0	3	.7900	1	5
30	8	89.0	-9.2046	58.0	4.0	3	.8620	1	5
30	9	17.0	-7.0224	10.0	4.0	1	.7680	1	5
30	10	22.0	-7.5699	15.0	3.0	1	.8140	1	5
3C	11	33.0	-7.4919	10.0	6.0	4	.5520	1	6
30	12	24.0	-7.1293	12.0	5.0	3	.7540	1	6
30	13	26.0	-7.9658	24.0	4.0	1	.9610	1	6

COPACABANA BOULDER BEACH

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
1	17	148.0	-9.9218	68.0	4.0	3	.6860	1	4
1	18	230.0	-10.9658	46.0	3.0	2	.3590	1	4
1	19	214.0	-10.0498	73.0	5.0	3	.6170	1	4
1	20	109.0	-9.2046	17.0	3.0	4	.3560	1	5
1	21	55.0	-8.2288	19.0	4.0	4	.6030	1	5
1	22	98.0	-9.1033	27.0	3.0	4	.5140	1	5
1	23	12.0	-6.3219	7.0	4.0	3	.7990	1	5
1	24	57.0	-8.5314	14.0	4.0	2	.4530	1	6
1	25	111.0	-9.1293	38.0	5.0	3	.6150	1	6
1	26	21.0	-7.3219	8.0	3.0	2	.5760	1	6
2	18	361.0	-10.8533	86.0	5.0	4	.4810	1	4
2	19	134.0	-9.8765	51.0	5.0	2	.5910	1	4
2	20	33.0	-8.0224	8.0	3.0	2	.4210	1	5
2	21	308.0	-10.4919	85.0	4.0	4	.5460	1	5
2	22	109.0	-10.0498	34.0	5.0	2	.4650	1	5
2	23	148.0	-9.8138	55.0	4.0	4	.6100	1	5
2	24	42.0	-8.3219	9.0	3.0	2	.3920	1	6
2	25	93.0	-9.0224	23.0	4.0	4	.4790	1	6
2	26	117.0	-10.0084	32.0	4.0	2	.4400	1	6
3	18	82.0	-9.6618	23.0	2.0	2	.4310	1	4
3	19	37.0	-8.3663	9.0	2.0	2	.4050	1	4
3	20	28.0	-7.9658	10.0	4.0	2	.5230	1	5
3	21	214.0	-9.9801	42.0	3.0	4	.4340	1	5
3	22	280.0	-10.1674	61.0	2.0	4	.4870	1	5
3	25	34.0	-8.0224	15.0	3.0	2	.6340	1	6
3	26	68.0	-8.7482	20.0	4.0	4	.5160	1	6
4	18	73.0	-8.6073	15.0	2.0	4	.4300	1	4
4	19	95.0	-9.6439	37.0	4.0	2	.5650	1	4
4	20	8.0	-5.9069	3.5	4.0	2	.6350	1	5
4	21	165.0	-10.1421	21.0	3.0	2	.2870	1	5
4	22	66.0	-8.6795	21.0	2.0	4	.5470	1	5
4	23	120.0	-9.2761	44.0	5.0	3	.6390	1	5
4	24	109.0	-9.5118	42.0	2.0	2	.6060	1	5
4	25	119.0	-8.2288	25.0	6.0	3	.5600	1	6
4	26	204.0	-10.9218	62.0	3.0	2	.4600	1	6
4	27	63.0	-8.5699	29.0	2.0	3	.7060	1	6
5	18	326.0	-11.3826	72.0	4.0	2	.3910	1	4
5	19	268.0	-10.6883	65.0	3.0	4	.4580	1	4
5	20	207.0	-10.8218	70.0	4.0	2	.5080	1	5
5	21	259.0	-10.3880	80.0	2.0	4	.5700	1	5
5	22	49.0	-8.7482	13.0	4.0	2	.4320	1	5
5	23	49.0	-8.6439	30.0	3.0	1	.7720	1	5
5	24	192.0	-10.3880	42.0	3.0	2	.4100	1	6
5	25	266.0	-10.0901	54.0	4.0	4	.4650	1	6
5	26	107.0	-9.4305	25.0	5.0	4	.4390	1	6
5	27	86.0	-9.3663	44.0	3.0	2	.6990	1	6
5	28	31.0	-7.3219	9.0	2.0	4	.5470	1	6
5	29	197.0	-10.7313	41.0	4.0	2	.3690	1	6
6	15	174.0	-10.5699	54.0	1.0	2	.4800	1	4
6	17	48.0	-8.4512	17.0	4.0	2	.5560	1	4
6	18	195.0	-10.8765	65.0	4.0	2	.4870	1	4
6	19	186.0	-9.9944	27.0	4.0	4	.3380	1	4
6	20	138.0	-10.2761	36.0	4.0	2	.4230	1	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
6	22	30.0	-7.4919	8.0	3.0	4	.4920	1	5
6	23	58.0	-8.7142	24.0	4.0	2	.6190	1	5
6	24	127.0	-10.2761	42.0	5.0	2	.4820	1	6
6	25	160.0	-10.5981	22.0	5.0	2	.2700	1	6
6	26	144.0	-10.1674	45.0	3.0	2	.4970	1	6
6	27	70.0	-8.9944	30.0	2.0	2	.6320	1	6
6	28	9.0	-5.3219	3.0	2.0	3	.6300	1	6
7	16	237.0	-10.0634	40.0	2.0	4	.3980	1	4
7	17	185.0	-10.8376	31.0	3.0	2	.3050	1	4
7	18	326.0	-10.8611	69.0	3.0	4	.4290	1	4
7	20	212.0	-10.3663	83.0	4.0	4	.6270	1	5
7	21	181.0	-10.6707	52.0	5.0	2	.4510	1	5
7	22	98.0	-9.6073	44.0	4.0	2	.6330	1	5
7	23	178.0	-9.7649	66.0	4.0	3	.6550	1	6
7	24	58.0	-8.8455	18.0	1.0	2	.4960	1	6
7	25	140.0	-9.6970	25.0	4.0	4	.3780	1	6
7	26	107.0	-9.5314	25.0	5.0	2	.4290	1	6
7	27	79.0	-9.2288	24.0	4.0	2	.4960	1	6
7	28	214.0	-10.3106	19.0	3.0	2	.2370	1	6
8	15	45.0	-8.0224	17.0	3.0	4	.6280	1	4
8	16	270.0	-10.4512	47.0	4.0	4	.3880	1	4
8	17	76.0	-9.5118	32.0	4.0	2	.5700	1	4
8	18	267.0	-10.1421	40.0	3.0	4	.3760	1	4
8	19	183.0	-10.4512	26.0	3.0	2	.2980	1	4
8	20	63.0	-8.9658	27.0	5.0	2	.6140	1	5
8	21	190.0	-10.6439	35.0	3.0	2	.3430	1	5
8	22	90.0	-8.6795	18.0	3.0	4	.4450	1	5
8	23	73.0	-9.0498	38.0	4.0	1	.7200	1	6
8	24	215.0	-10.6439	50.0	3.0	2	.4180	1	6
8	25	175.0	-9.9366	72.0	3.0	3	.6710	1	6
8	26	92.0	-9.2527	27.0	4.0	4	.5070	1	6
8	27	10.0	-6.1293	1.5	4.0	2	.3180	1	6
8	28	115.0	-9.6795	43.0	5.0	2	.5810	1	6
8	29	33.0	-8.3219	15.0	3.0	2	.5980	1	6
9	16	210.0	-11.0293	44.0	2.0	2	.3540	1	4
9	17	72.0	-9.2761	20.0	3.0	2	.4480	1	4
9	20	150.0	-10.4094	47.0	3.0	2	.4770	1	5
9	23	122.0	-9.3880	55.0	5.0	3	.7180	1	5
9	24	72.0	-9.2992	25.0	3.0	2	.5170	1	6
9	25	98.0	-9.6795	19.0	2.0	2	.3560	1	6
9	26	68.0	-9.1033	20.0	4.0	2	.4750	1	6
9	27	11.5	-6.1293	5.5	3.0	3	.7220	1	6
9	28	66.0	-8.8138	15.0	3.0	2	.4230	1	6
10	13	54.0	-7.9658	17.0	1.0	3	.5990	1	4
10	14	155.0	-10.4094	25.0	2.0	2	.3100	1	4
10	16	25.0	-7.3219	8.0	3.0	4	.5430	1	4
10	19	10.0	-6.1293	6.0	1.0	1	.8010	1	4
10	20	158.0	-10.2046	61.0	3.0	2	.5850	1	5
10	21	160.0	-10.3106	34.0	4.0	2	.3850	1	5
10	22	35.0	-7.7814	5.0	2.0	4	.3190	1	5
10	23	36.0	-7.4919	17.0	4.0	3	.7640	1	5
10	24	152.0	-10.1548	25.0	4.0	2	.3310	1	6
10	25	5.5	-5.3219	1.5	2.0	2	.4680	1	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
10	26	114.0	-9.5887	24.0	3.0	2	.4040	1	6
11	15	256.0	-10.0362	36.0	3.0	4	.3640	2	4
11	16	65.0	-8.6795	17.0	4.0	4	.4770	2	4
11	17	235.0	-10.5699	41.0	3.0	4	.3610	2	4
11	18	159.0	-9.9366	37.0	5.0	4	.4450	2	4
11	19	46.0	-8.4512	21.0	3.0	2	.6500	2	4
11	20	179.0	-10.5887	9.0	4.0	2	.1440	2	5
11	22	171.0	-10.1674	40.0	4.0	2	.4340	2	5
11	23	78.0	-8.5699	22.0	4.0	3	.5470	2	5
11	24	99.0	-9.7482	25.0	5.0	2	.4190	2	6
11	25	79.0	-9.5118	20.0	2.0	2	.4110	2	6
11	26	73.0	-8.5699	25.0	5.0	4	.6090	2	6
11	27	54.0	-8.7482	12.0	2.0	2	.3960	2	6
12	13	232.0	-10.8218	50.0	4.0	2	.3910	2	4
12	14	163.0	-10.0362	49.0	5.0	4	.5200	2	4
12	19	114.0	-9.9944	17.0	3.0	2	.2920	2	4
12	20	42.0	-8.3219	11.0	2.0	2	.4490	2	5
12	21	141.0	-9.9944	43.0	4.0	2	.5050	2	5
12	22	112.0	-9.8455	13.0	4.0	2	.2540	2	5
12	23	114.0	-9.5887	50.0	4.0	2	.6580	2	6
12	24	122.0	-9.6618	19.0	3.0	4	.3320	2	6
12	25	105.0	-9.0224	38.0	4.0	3	.6420	2	6
12	26	30.0	-7.9658	9.0	2.0	2	.4770	2	6
12	27	35.0	-7.8455	8.0	5.0	4	.4300	2	6
13	1	70.0	-8.9366	22.0	5.0	2	.5210	2	4
13	2	155.0	-10.3106	28.0	4.0	2	.3420	2	4
13	3	25.0	-7.6439	10.0	4.0	2	.5850	2	4
13	4	146.0	-9.8918	41.0	3.0	4	.4950	2	4
13	5	301.0	-11.1923	50.0	4.0	2	.3290	2	4
13	6	152.0	-10.3554	27.0	3.0	2	.3320	2	4
13	7	7.0	-5.3219	1.0	4.0	4	.3300	2	4
13	8	28.0	-7.6439	5.0	4.0	2	.3550	2	4
13	9	80.0	-9.4305	20.0	6.0	2	.4170	2	4
13	10	85.0	-8.8765	11.0	3.0	4	.3120	2	4
13	12	124.0	-9.2046	24.0	4.0	4	.4290	2	4
13	13	48.0	-8.6073	7.0	4.0	2	.2970	2	4
13	14	54.0	-8.5699	36.0	5.0	1	.8580	2	4
13	19	48.0	-8.1293	7.0	3.0	4	.3320	2	4
13	20	19.0	-7.1293	3.0	3.0	2	.3240	2	4
13	21	97.0	-9.0224	40.0	5.0	3	.6820	2	5
13	22	138.0	-10.0224	31.0	4.0	2	.4060	2	5
13	23	150.0	-10.3332	49.0	2.0	2	.4990	2	5
13	24	87.0	-9.1548	13.0	4.0	4	.3250	2	5
13	25	2.5	-3.9069	1.0	1.0	4	.6440	2	6
13	26	22.0	-6.4919	7.0	2.0	3	.6280	2	6
13	27	6.0	-5.3219	.7	5.0	4	.2740	2	6
13	28	8.0	-5.9069	1.0	3.0	2	.2760	2	6
14	15	130.0	-9.9069	47.0	4.0	2	.5620	2	4
14	16	19.0	-7.2288	6.0	3.0	2	.5020	2	4
14	17	122.0	-9.9218	33.0	4.0	2	.4520	2	4
14	18	41.0	-8.3219	10.0	5.0	2	.4240	2	4
14	19	120.0	-9.5314	30.0	3.0	4	.4670	2	4
14	20	85.0	-9.0768	27.0	4.0	4	.5420	2	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
14	22	46.0	-7.7814	19.0	4.0	3	.7090	2	5
14	23	125.0	-9.7977	52.0	4.0	2	.6240	2	5
14	24	116.0	-9.6257	21.0	3.0	2	.3640	2	6
14	25	72.0	-8.9944	48.0	5.0	1	.8560	2	6
14	26	125.0	-9.5507	55.0	5.0	3	.6860	2	6
14	27	3.0	-4.7549	1.0	4.0	2	.4980	2	6
14	28	84.0	-8.8138	35.0	3.0	3	.6870	2	6
15	16	186.0	-10.3880	40.0	4.0	2	.4010	2	4
15	17	109.0	-9.2761	54.0	3.0	3	.7560	2	4
15	18	38.0	-7.7814	13.0	3.0	4	.5870	2	4
15	19	215.0	-10.9293	70.0	6.0	2	.4890	2	4
15	20	122.0	-9.7313	45.0	6.0	2	.5800	2	5
15	21	150.0	-10.1293	37.0	3.0	2	.4340	2	5
15	22	115.0	-9.2761	35.0	3.0	4	.5560	2	5
15	23	95.0	-8.9944	49.0	3.0	3	.7920	2	5
15	24	13.0	-6.7814	10.0	4.0	1	.8880	2	5
15	25	86.0	-9.5118	28.0	1.0	2	.5000	2	6
15	26	43.0	-8.2288	16.0	2.0	2	.5840	2	6
15	27	30.0	-7.9069	12.0	3.0	2	.5850	2	6
15	28	1.7	-3.7004	.5	1.0	2	.4840	2	6
16	14	22.0	-7.2288	10.0	3.0	2	.6720	2	4
16	15	185.0	-10.0634	27.0	3.0	4	.3330	2	4
16	16	4.5	-5.3219	1.5	6.0	2	.5000	2	4
16	17	11.0	-6.6439	5.0	2.0	2	.6110	2	4
16	18	247.0	-10.6883	70.0	4.0	2	.4940	2	4
16	19	190.0	-9.9658	50.0	5.0	4	.5090	2	4
16	20	106.0	-9.6439	22.0	3.0	2	.3850	2	5
16	21	165.0	-10.0634	50.0	3.0	4	.5220	2	5
16	22	85.0	-9.4305	23.0	2.0	2	.4490	2	5
16	23	1.7	-3.9069	.5	5.0	2	.4610	2	5
16	24	78.0	-8.9944	21.0	1.0	4	.4810	2	5
16	25	28.0	-7.5699	8.0	2.0	2	.4940	2	6
16	26	69.0	-8.1293	27.0	2.0	3	.7230	2	6
16	27	40.0	-8.0224	14.0	2.0	4	.5740	2	6
17	14	19.0	-7.3219	12.0	4.0	1	.7800	2	4
17	15	96.0	-9.7482	22.0	3.0	2	.3890	2	4
17	16	26.0	-7.9069	12.0	5.0	2	.6140	2	4
17	17	55.0	-8.4094	10.0	4.0	4	.3770	2	4
17	18	51.0	-8.1799	14.0	4.0	4	.5100	2	4
17	19	130.0	-9.3443	50.0	6.0	3	.6670	2	4
17	20	83.0	-9.6439	25.0	4.0	2	.4550	2	5
17	22	37.0	-7.8455	18.0	3.0	3	.7250	2	5
17	23	58.0	-8.8138	26.0	1.0	2	.6380	2	5
17	24	113.0	-9.4919	29.0	3.0	4	.4700	2	6
17	21	121.0	-9.8765	17.0	3.0	2	.2940	2	5
17	25	57.0	-9.0768	20.0	2.0	2	.5070	2	6
17	26	80.0	-9.2288	27.0	4.0	2	.5340	2	6
17	27	3.5	-4.9069	1.3	2.0	2	.5440	2	6
18	14	15.0	-6.3219	7.0	4.0	3	.7420	2	4
18	16	25.0	-7.7142	11.0	4.0	2	.6130	2	4
18	17	215.0	-10.1033	33.0	1.0	4	.3590	2	4
18	18	160.0	-9.9801	33.0	5.0	4	.4070	2	4
18	20	83.0	-9.5699	22.0	2.0	2	.4250	2	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
18	21	7.5	-5.9069	2.5	3.0	2	.5180	2	5
18	22	5.5	-5.2095	2.5	4.0	1	.6750	2	5
18	23	109.0	-9.3880	24.0	4.0	4	.4290	2	5
18	24	94.0	-8.0768	22.0	2.0	3	.5760	2	5
18	25	6.5	-5.6439	2.0	3.0	2	.4980	2	6
18	26	93.0	-9.0768	14.0	3.0	4	.3400	2	6
18	27	4.5	-5.1293	.5	4.0	2	.2520	2	6
19	15	120.0	-9.6439	28.0	3.0	4	.4340	2	4
19	16	30.0	-7.9658	6.0	2.0	2	.3640	2	4
19	17	66.0	-8.8765	20.0	5.0	2	.5060	2	4
19	19	34.0	-7.1293	10.0	4.0	3	.5950	2	4
19	20	150.0	-9.7142	53.0	3.0	4	.6070	2	5
19	21	95.0	-9.6439	27.0	5.0	2	.4580	2	5
19	22	54.0	-8.4094	32.0	2.0	2	.8230	2	5
19	23	6.0	-5.3219	1.0	4.0	4	.3470	2	5
19	24	78.0	-8.8455	29.0	4.0	4	.6170	2	6
19	25	28.0	-7.8455	15.0	4.0	2	.7050	2	6
19	26	102.0	-9.3663	26.0	2.0	4	.4650	2	6
19	27	87.0	-9.4305	17.0	3.0	2	.3640	2	6
19	28	49.0	-8.8765	11.0	3.0	2	.3750	2	6
20	16	65.0	-9.1293	13.0	2.0	2	.3600	2	4
20	17	160.0	-10.1548	30.0	4.0	2	.3670	2	4
20	18	43.0	-8.2288	13.0	4.0	2	.5080	2	4
20	19	160.0	-10.3443	28.0	5.0	2	.3360	2	4
20	20	71.0	-8.6073	13.0	3.0	4	.3940	2	5
20	21	57.0	-8.6795	25.0	5.0	2	.6450	2	5
20	22	69.0	-9.3443	37.0	3.0	2	.6740	2	5
20	23	110.0	-9.4919	40.0	2.0	4	.5870	2	5
20	24	13.0	-6.7814	2.5	4.0	2	.3530	2	6
20	25	3.0	-4.6439	.7	3.0	2	.4030	2	6
20	26	2.2	-3.8074	.6	4.0	4	.4890	2	6
20	27	23.0	-7.4919	8.0	2.0	2	.5370	2	6
21	16	100.0	-9.3219	25.0	5.0	4	.4610	3	4
21	18	150.0	-10.4512	52.0	4.0	2	.5050	3	4
21	19	63.0	-9.1293	38.0	4.0	1	.7430	3	4
21	20	128.0	-9.8297	31.0	6.0	2	.4360	3	5
21	21	113.0	-9.9218	21.0	4.0	2	.3430	3	5
21	22	52.0	-7.4919	12.0	4.0	4	.5360	3	5
21	23	83.0	-8.9069	41.0	5.0	3	.7500	3	5
21	24	13.0	-6.6439	4.5	2.0	2	.5380	3	6
21	25	32.0	-7.9069	14.0	1.0	2	.6350	3	6
21	26	20.0	-7.4919	6.5	3.0	2	.4900	3	6
21	27	27.0	-7.3219	8.0	3.0	4	.5290	3	6
22	13	31.0	-7.1293	13.0	4.0	3	.7300	3	4
22	14	155.0	-9.9658	18.0	4.0	4	.2760	3	4
22	15	94.0	-9.3663	13.0	4.0	2	.3010	3	4
22	16	6.5	-5.9069	1.5	4.0	2	.3870	3	4
22	17	115.0	-9.7814	54.0	4.0	2	.6610	3	4
22	18	3.5	-4.0875	.5	2.0	4	.3480	3	4
22	19	67.0	-9.0224	21.0	2.0	2	.5020	3	4
22	20	29.0	-8.0224	15.0	2.0	2	.6690	3	5
22	21	170.0	-10.4200	52.0	4.0	2	.4880	3	5
22	22	13.0	-6.7814	2.0	3.0	2	.3040	3	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
22	23	5.0	-5.1293	.7	4.0	2	.3040	3	5
22	24	7.5	-5.6439	1.3	4.0	4	.3560	3	6
22	25	46.0	-8.0224	23.0	2.0	3	.7620	3	6
22	26	67.0	-8.8455	18.0	2.0	2	.4720	3	6
23	16	13.0	-6.7142	2.5	3.0	2	.3580	3	4
23	18	56.0	-8.6073	14.0	6.0	2	.4480	3	4
23	19	88.0	-9.4305	37.0	4.0	2	.6090	3	4
23	20	73.0	-8.6073	17.0	5.0	4	.4670	3	5
23	21	85.0	-9.7142	20.0	3.0	2	.3830	3	5
23	22	80.0	-9.4512	25.0	5.0	2	.4820	3	5
23	23	128.0	-9.2527	25.0	2.0	4	.4310	3	5
23	24	176.0	-10.3443	38.0	4.0	2	.3990	3	6
23	25	44.0	-8.4919	20.0	1.0	2	.6320	3	6
23	26	44.0	-7.8455	18.0	3.0	3	.6840	3	6
24	16	190.0	-10.0498	35.0	4.0	4	.3940	3	4
24	17	126.0	-9.3443	30.0	4.0	4	.4790	3	4
24	18	77.0	-9.5314	33.0	5.0	2	.5760	3	4
24	19	140.0	-9.2527	49.0	5.0	3	.6550	3	4
24	20	53.0	-8.8765	25.0	6.0	2	.6310	3	5
24	21	160.0	-9.2046	35.0	4.0	4	.5070	3	5
24	22	29.0	-7.9658	13.0	4.0	2	.6160	3	5
24	23	10.5	-5.9069	3.5	3.0	4	.5800	3	5
24	24	7.5	-6.0224	4.5	3.0	1	.7460	3	6
24	25	76.0	-8.8455	14.0	4.0	4	.3830	3	6
24	26	96.0	-9.6439	11.0	2.0	2	.2510	3	6
25	17	7.5	-5.4919	3.0	3.0	4	.6440	3	4
25	18	65.0	-8.8138	15.0	4.0	2	.4260	3	4
25	19	93.0	-9.2992	36.0	5.0	2	.6050	3	4
25	20	8.5	-5.7814	2.0	5.0	4	.4410	3	5
25	21	58.0	-8.1293	10.0	5.0	4	.3950	3	5
25	22	90.0	-8.6073	25.0	2.0	4	.5630	3	5
25	23	112.0	-9.5887	17.0	3.0	2	.3230	3	5
25	24	56.0	-8.9069	16.0	5.0	2	.4570	3	6
25	25	10.0	-5.9069	5.0	2.0	3	.7470	3	6
25	26	68.0	-8.8765	22.0	4.0	2	.5330	3	6
26	18	81.0	-8.4919	13.0	3.0	4	.3870	3	4
26	19	67.0	-8.8455	22.0	4.0	2	.5400	3	4
26	20	62.0	-8.1293	26.0	4.0	3	.7300	3	5
26	21	145.0	-9.1033	35.0	3.0	4	.5360	3	5
26	22	28.0	-7.7142	14.0	2.0	2	.6940	3	5
26	23	20.0	-6.9069	5.0	3.0	4	.4710	3	5
26	24	71.0	-9.1799	13.0	4.0	2	.3450	3	6
26	25	6.0	-4.9069	2.5	4.0	3	.7030	3	6
26	26	28.0	-7.5699	7.0	4.0	2	.4520	3	6
26	27	37.0	-7.4094	9.0	2.0	4	.5050	3	6
27	18	145.0	-9.6795	58.0	4.0	3	.6570	3	4
27	19	122.0	-9.7649	32.0	4.0	2	.4590	3	4
27	20	225.0	-9.9513	75.0	3.0	3	.6320	3	5
27	21	42.0	-8.4512	14.0	2.0	2	.5110	3	5
27	22	68.0	-8.9658	23.0	3.0	2	.5380	3	5
27	23	43.0	-8.0224	17.0	1.0	4	.6370	3	5
27	24	77.0	-9.2288	17.0	2.0	2	.3970	3	6
27	25	38.0	-8.2288	7.5	2.0	2	.3670	3	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
27	26	55.0	-8.6439	14.0	4.0	2	.4470	3	6
28	17	122.0	-10.1421	40.0	3.0	2	.4880	3	4
28	18	80.0	-9.1033	20.0	4.0	2	.4500	3	4
28	19	77.0	-9.5507	25.0	4.0	2	.4770	3	4
28	20	87.0	-9.0498	17.0	3.0	4	.3980	3	5
28	21	84.0	-9.2288	23.0	4.0	2	.4720	3	5
28	22	5.0	-5.6147	1.7	2.0	2	.4910	3	5
28	23	102.0	-8.9069	21.0	4.0	4	.4490	3	5
28	24	26.0	-7.9658	16.0	3.0	2	.7330	3	6
28	25	52.0	-8.1293	25.0	1.0	3	.7550	3	6
29	18	110.0	-10.0224	25.0	5.0	2	.3800	3	4
29	19	75.0	-9.0224	19.0	5.0	2	.4530	3	4
29	20	45.0	-8.0768	17.0	1.0	4	.6200	3	5
29	21	38.0	-8.3663	13.0	3.0	2	.5130	3	5
29	22	87.0	-9.3663	20.0	2.0	2	.4120	3	5
29	23	90.0	-9.6795	9.0	4.0	2	.2230	3	5
29	24	43.0	-8.3663	23.0	2.0	1	.7200	3	6
29	25	55.0	-8.8455	18.0	3.0	2	.5040	3	6
29	26	61.0	-8.5699	10.0	3.0	4	.3510	3	6
30	19	11.5	-6.1293	5.0	5.0	3	.6770	3	4
30	20	82.0	-9.0768	33.0	5.0	4	.6270	3	5
30	21	41.0	-8.2288	23.0	1.0	1	.7550	3	5
30	22	10.0	-6.1293	2.0	2.0	2	.3860	3	5
30	23	49.0	-8.2761	24.0	4.0	3	.7240	3	5
30	24	42.0	-8.2288	16.0	2.0	2	.5880	3	6
30	25	10.0	-6.2288	4.0	3.0	2	.5980	3	6
30	26	70.0	-8.8455	23.0	1.0	4	.5480	3	6

BOMBO BOULDER BEACH

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
1	1	180.0	-10.5507	100.0	4.0	2	.7180	1	4
1	2	120.0	-9.5507	59.0	3.0	3	.7290	1	4
1	3	8.0	-5.9069	2.0	2.0	2	.4370	1	4
1	4	128.0	-9.5507	74.0	4.0	3	.8290	1	4
1	5	42.0	-8.6439	20.0	4.0	2	.6200	1	4
1	6	165.0	-10.4512	75.0	4.0	2	.6250	1	4
1	7	112.0	-9.4512	48.0	5.0	3	.6650	1	5
2	3	95.0	-9.4512	38.0	3.0	2	.6010	1	4
2	4	150.0	-9.7142	43.0	4.0	4	.5280	1	4
2	5	50.0	-8.6073	30.0	2.0	1	.7730	1	4
2	6	17.0	-6.4919	7.0	5.0	3	.6840	1	4
2	7	33.0	-8.0224	13.0	3.0	2	.5820	1	5
2	8	68.0	-8.8765	37.0	3.0	1	.7540	1	5
2	9	43.0	-8.4094	26.0	2.0	1	.7730	1	5
2	10	26.0	-7.7814	17.0	5.0	1	.7970	1	5
3	5	91.0	-8.0224	25.0	3.0	3	.6420	1	4
3	6	106.0	-9.8765	59.0	4.0	2	.7050	1	4
3	7	79.0	-9.5118	72.0	4.0	1	.9650	1	5
3	8	69.0	-8.5314	36.9	2.0	3	.8110	1	5
3	9	10.0	-6.3219	6.0	2.0	1	.7670	1	5
3	10	80.0	-9.0768	47.0	4.0	1	.8000	1	5
3	11	48.0	-8.5314	20.0	4.0	2	.6090	1	5
3	12	28.0	-7.6439	11.0	5.0	2	.6000	1	5
3	13	34.0	-7.9069	22.0	5.0	1	.8400	1	5
4	4	53.0	-8.4094	27.0	4.0	3	.7400	1	4
4	5	72.0	-9.4094	45.0	3.0	2	.7450	1	4
4	6	14.0	-6.3219	6.0	4.0	3	.6850	1	4
4	7	200.0	-10.2288	90.0	5.0	3	.6960	1	5
4	8	27.0	-7.9658	8.0	2.0	2	.4560	1	5
4	9	47.0	-8.6073	32.0	4.0	1	.8240	1	5
4	10	25.0	-7.9069	12.0	3.0	2	.6220	1	5
4	11	21.0	-7.5699	6.0	5.0	2	.4490	1	5
4	12	33.0	-8.2761	20.0	3.0	2	.7310	1	5
4	13	15.0	-6.6439	6.0	2.0	4	.6220	1	5
5	3	150.0	-9.6618	58.0	5.0	3	.6520	1	4
5	4	75.0	-8.7482	30.0	2.0	3	.6540	1	4
5	5	230.0	-9.9658	70.0	4.0	3	.5980	1	4
5	6	100.0	-9.9513	68.0	5.0	1	.7760	1	4
5	7	62.0	-8.7482	38.0	1.0	1	.8150	1	5
5	8	33.0	-8.1293	27.0	2.0	1	.9240	1	5
5	9	43.0	-8.2288	25.0	3.0	1	.7860	1	5
5	10	67.0	-8.6795	24.0	2.0	4	.5940	1	5
5	11	21.0	-7.4919	14.0	4.0	1	.8040	1	5
5	12	24.0	-7.8455	11.0	4.0	2	.6030	1	5
6	3	123.0	-9.6795	64.0	5.0	3	.7410	1	4
6	4	83.0	-8.9366	41.0	3.0	3	.7450	1	4
6	5	59.0	-9.1033	25.0	3.0	2	.5780	1	4
6	6	124.0	-9.5887	42.0	4.0	2	.5700	1	4
6	7	77.0	-9.1293	21.0	2.0	2	.4680	1	5
6	8	78.0	-9.3443	38.0	5.0	2	.6580	1	5
6	9	39.0	-8.0224	15.0	2.0	4	.6060	1	5
6	10	12.0	-6.1293	3.0	3.0	4	.4750	1	5
6	11	15.0	-6.4919	4.0	2.0	4	.4920	1	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
6	12	91.0	-9.2288	32.0	2.0	4	.5730	1	5
6	13	35.0	-7.9658	7.0	2.0	2	.3830	1	5
6	14	17.0	-6.4919	8.9	4.0	3	.8030	1	5
6	15	9.0	-5.6439	4.0	2.0	3	.7090	1	6
6	16	4.0	-4.9069	1.5	1.0	2	.5730	1	6
7	4	61.0	-9.0224	28.0	5.0	2	.6280	1	4
7	5	231.0	-10.5507	60.0	5.0	4	.4700	1	4
7	6	41.0	-8.4094	23.0	4.0	1	.7240	1	4
7	7	34.0	-7.5699	14.0	3.0	3	.6720	1	5
7	8	43.0	-8.6439	23.0	1.0	2	.6750	1	5
7	9	6.0	-5.1293	3.0	1.0	3	.7540	1	5
7	10	200.0	-10.8918	100.0	4.0	2	.6410	1	5
7	11	35.0	-7.5699	10.0	3.0	4	.5320	1	5
7	12	20.0	-6.6439	7.0	5.0	3	.6260	1	5
7	13	9.0	-5.9069	4.0	1.0	4	.6670	1	5
7	14	25.0	-7.4094	9.0	3.0	2	.5760	1	5
7	15	118.0	-9.6439	44.0	4.0	2	.5900	1	5
7	16	20.0	-6.6439	5.0	3.0	4	.5000	1	6
7	17	49.0	-8.8765	41.0	3.0	1	.9000	1	6
7	18	54.0	-8.5314	18.0	3.0	2	.5460	1	6
8	4	88.0	-9.1033	47.0	4.0	1	.7700	1	4
8	5	92.0	-9.4512	60.0	4.0	1	.8240	1	4
8	6	216.0	-10.9218	100.0	4.0	2	.6210	1	4
8	7	34.0	-8.0224	18.0	3.0	1	.7160	1	5
8	8	58.0	-8.6795	36.0	5.0	1	.8170	1	5
8	9	56.0	-8.6795	37.0	2.0	1	.8420	1	5
8	10	54.0	-8.4919	29.0	2.0	3	.7570	1	5
8	11	59.0	-9.1548	30.0	4.0	2	.6450	1	5
8	12	44.0	-7.9069	20.0	3.0	3	.7240	1	5
8	13	29.0	-7.2288	14.0	3.0	3	.7670	1	5
8	14	46.0	-8.4919	35.0	4.0	1	.9040	1	5
8	15	20.0	-6.7814	7.0	2.0	4	.6060	1	5
8	16	29.0	-7.1293	12.0	2.0	3	.7080	1	5
8	17	12.0	-6.3219	7.0	6.0	3	.7990	1	6
8	18	13.0	-6.9069	6.5	1.0	2	.6470	1	6
8	19	110.0	-9.3443	40.0	3.0	4	.6070	1	6
8	20	50.0	-8.6073	26.0	2.0	2	.7030	1	6
9	4	32.0	-7.5699	15.0	5.0	3	.7180	1	4
9	5	117.0	-9.8611	50.0	5.0	2	.6130	1	4
9	6	68.0	-9.3443	45.0	5.0	1	.7710	1	4
9	7	29.0	-7.4919	16.0	3.0	3	.7890	1	5
9	8	25.0	-7.5699	13.0	4.0	1	.7090	1	5
9	9	33.0	-8.1293	10.0	3.0	2	.4770	1	5
9	10	87.0	-9.2527	14.0	4.0	2	.3330	1	5
9	11	40.0	-8.1799	17.0	4.0	2	.6300	1	5
9	12	4.5	-4.6439	.5	1.0	4	.2820	1	5
9	13	9.0	-5.4919	2.5	2.0	4	.5370	1	5
9	14	9.0	-5.7814	5.0	2.0	3	.7970	1	6
9	15	10.0	-5.7814	2.5	1.0	4	.4850	1	6
9	16	4.0	-5.1293	3.0	1.0	1	.8630	1	6
9	17	16.0	-6.6439	2.5	1.0	4	.3400	1	6
9	18	14.5	-6.4919	5.5	4.0	4	.6150	1	6
9	19	15.5	-7.2288	14.0	1.0	1	.9450	1	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
10	3	69.0	-9.1548	46.0	5.0	1	.8130	1	4
10	4	116.0	-9.5314	59.0	4.0	3	.7400	1	4
10	5	142.0	-9.8297	70.0	5.0	3	.7240	1	4
10	6	17.0	-6.7814	8.0	4.0	3	.7000	1	4
10	7	23.0	-7.5699	12.0	5.0	2	.6910	1	5
10	8	27.0	-7.1293	12.0	4.0	3	.7250	1	5
10	9	174.0	-9.4717	62.0	4.0	3	.6780	1	5
10	10	17.0	-7.3219	13.0	3.0	1	.8530	1	5
10	11	21.0	-7.4919	7.0	2.0	2	.5060	1	5
10	12	9.0	-5.4919	3.5	2.0	3	.6720	1	5
10	13	35.0	-8.1799	14.0	1.0	2	.5780	1	6
10	14	16.0	-7.1293	10.0	1.0	1	.7640	1	6
10	15	41.0	-7.7814	19.0	1.0	3	.7370	1	6
10	16	41.0	-7.9069	9.0	1.0	4	.4350	1	6
10	17	20.0	-7.1293	12.0	1.0	1	.8010	1	6
11	3	18.0	-6.9069	6.0	4.0	4	.5510	2	4
11	4	243.0	-11.1293	150.0	3.0	1	.7450	2	4
11	5	46.0	-8.2288	18.0	4.0	4	.6170	2	4
11	6	92.0	-9.3443	58.0	6.0	1	.8260	2	4
11	7	88.0	-9.6795	38.0	4.0	2	.5850	2	5
11	8	121.0	-9.1799	45.0	4.0	3	.6610	2	5
11	9	13.0	-6.4919	5.0	2.0	2	.5980	2	5
11	10	150.0	-10.5118	67.0	4.0	2	.5900	2	5
11	11	10.0	-6.1293	3.0	3.0	2	.5050	2	6
11	12	5.0	-4.9069	2.0	1.0	4	.6440	2	6
11	13	11.0	-6.6439	6.0	2.0	2	.6890	2	6
11	14	19.0	-7.2288	13.0	4.0	1	.8400	2	6
11	15	21.0	-7.3219	4.0	2.0	2	.3630	2	6
12	5	46.0	-8.5314	33.0	6.0	1	.8620	2	4
12	6	88.0	-9.3219	40.0	5.0	2	.6580	2	4
12	7	64.0	-8.8455	20.0	4.0	2	.5140	2	5
12	8	33.0	-8.2761	26.0	4.0	1	.8710	2	5
12	9	19.0	-7.4919	16.0	3.0	1	.9080	2	5
12	10	73.0	-8.9944	28.0	4.0	2	.5950	2	5
12	11	18.0	-6.7814	6.0	2.0	4	.5670	2	5
12	12	13.0	-6.3219	7.0	1.0	3	.7780	2	5
12	13	32.0	-8.0768	21.0	2.0	1	.7990	2	5
12	14	54.0	-8.6795	23.0	2.0	2	.6210	2	6
12	15	33.0	-7.7142	19.0	2.0	3	.8050	2	6
12	16	18.0	-6.7814	8.0	1.0	3	.6870	2	6
13	5	170.0	-10.5507	140.0	5.0	1	.9160	2	4
13	6	63.0	-9.1293	28.0	4.0	2	.6060	2	4
13	7	22.0	-7.0224	11.0	4.0	3	.7510	2	5
13	8	75.0	-9.4919	44.0	2.0	2	.7110	2	5
13	9	53.0	-8.3219	20.0	2.0	4	.6180	2	5
13	10	45.0	-7.9069	17.0	3.0	3	.6450	2	5
13	11	25.0	-7.7142	15.0	5.0	1	.7540	2	5
13	12	70.0	-8.5314	31.0	3.0	3	.7190	2	5
13	13	23.0	-7.2288	13.0	2.0	3	.7880	2	5
13	14	11.0	-6.4919	2.5	1.0	2	.3990	2	5
13	15	9.0	-6.4094	7.5	4.0	1	.9030	2	6
13	16	21.0	-6.9069	7.0	2.0	4	.5800	2	6
14	4	49.0	-8.3219	17.0	4.0	4	.5690	2	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
14	5	23.0	-7.6439	14.0	4.0	1	.7530	2	4
14	6	39.0	-7.3219	14.0	4.0	3	.6800	2	4
14	7	59.0	-8.6439	32.0	5.0	1	.7570	2	5
14	8	64.0	-9.1033	28.0	2.0	2	.6060	2	5
14	9	9.0	-6.1293	6.0	2.0	1	.8300	2	5
14	10	26.0	-7.5699	12.0	4.0	2	.6630	2	5
14	11	32.0	-7.9069	23.0	3.0	1	.8830	2	5
14	12	7.0	-5.6439	3.0	4.0	2	.6360	2	5
14	13	5.0	-5.1293	1.5	1.0	2	.5050	2	5
14	14	35.0	-8.0224	13.0	1.0	2	.5710	2	6
14	15	26.0	-7.8455	22.0	3.0	1	.9320	2	6
14	16	29.0	-7.4919	17.0	2.0	3	.8210	2	6
15	4	68.0	-8.8455	28.0	5.0	2	.6310	2	4
15	5	21.0	-7.3219	15.0	4.0	1	.8750	2	4
15	6	26.0	-7.5699	15.0	4.0	1	.7700	2	4
15	7	59.0	-9.0498	20.0	6.0	2	.5040	2	5
15	8	90.0	-9.2761	42.0	3.0	1	.6810	2	5
15	9	39.0	-8.3663	26.0	4.0	1	.8070	2	5
15	10	77.0	-9.1033	31.0	4.0	2	.6100	2	5
15	11	13.0	-6.4919	4.0	4.0	2	.5160	2	5
15	12	38.0	-8.0224	17.0	3.0	2	.6640	2	5
15	13	9.0	-5.9069	4.0	2.0	4	.6670	2	5
15	14	9.0	-6.3219	2.5	1.0	2	.4430	2	6
15	15	11.0	-6.3219	7.0	1.0	1	.8230	2	6
15	16	16.0	-6.7814	6.0	4.0	2	.5900	2	6
15	17	59.0	-8.4094	23.0	4.0	3	.6420	2	6
16	3	20.0	-7.1293	9.0	5.0	2	.6620	2	4
16	4	40.0	-8.4512	16.0	6.0	2	.5680	2	4
16	5	14.0	-6.7814	7.0	5.0	2	.6830	2	4
16	6	63.0	-9.0498	28.0	3.0	2	.6170	2	4
16	7	51.0	-8.1293	20.0	3.0	3	.6550	2	5
16	8	26.0	-7.7814	8.0	2.0	2	.4820	2	5
16	9	27.0	-7.9069	11.0	2.0	2	.5720	2	5
16	10	37.0	-7.8455	17.0	1.0	3	.6980	2	5
16	11	11.0	-5.7814	4.5	2.0	3	.6950	2	6
16	12	19.0	-7.2288	6.5	1.0	2	.5300	2	6
16	13	32.0	-8.1799	14.0	3.0	2	.5960	2	6
16	14	24.0	-7.7814	17.0	2.0	1	.8180	2	6
16	15	33.0	-8.0224	22.0	2.0	1	.8260	2	6
16	16	34.0	-7.9069	19.0	3.0	1	.7620	2	6
17	4	81.0	-8.9366	46.0	5.0	3	.8110	2	4
17	5	54.0	-8.9366	23.0	3.0	2	.5850	2	4
17	6	26.0	-7.6439	9.0	4.0	2	.5380	2	4
17	7	49.0	-8.8765	26.0	3.0	2	.6650	2	5
17	8	6.0	-5.6439	3.0	4.0	2	.6700	2	5
17	9	30.0	-8.0224	21.0	3.0	1	.8270	2	5
17	10	9.5	-5.9069	4.5	1.0	3	.7080	2	6
17	11	28.0	-8.0768	20.0	3.0	1	.8090	2	6
17	12	41.0	-7.8455	21.0	4.0	3	.7760	2	6
17	13	39.0	-7.9658	14.0	2.0	4	.5860	2	6
17	14	36.0	-8.2761	22.0	4.0	1	.7570	2	6
17	15	28.0	-7.8455	12.0	1.0	2	.6070	2	6
17	16	39.0	-8.2761	19.0	1.0	2	.6690	2	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
18	4	24.0	-7.7142	12.0	6.0	2	.6590	2	4
18	5	180.0	-10.3880	85.0	5.0	2	.6690	2	4
18	6	30.0	-8.1293	15.0	5.0	2	.6450	2	4
18	7	71.0	-9.0768	33.0	4.0	2	.6580	2	5
18	8	30.0	-8.0768	20.0	3.0	1	.7910	2	5
18	9	55.0	-8.6795	40.0	4.0	1	.8920	2	5
18	10	17.0	-7.3219	12.0	4.0	1	.8090	2	5
18	11	22.0	-7.2288	10.0	3.0	2	.6720	2	6
18	12	26.0	-7.9658	12.0	5.0	2	.6050	2	6
18	13	22.0	-7.5699	18.0	1.0	1	.9190	2	6
18	14	16.0	-7.0224	9.0	4.0	1	.7300	2	6
18	15	29.0	-7.6439	15.0	3.0	1	.7300	2	6
18	16	61.0	-8.8765	26.0	3.0	2	.6180	2	6
19	3	63.0	-9.2046	57.0	4.0	1	.9560	2	4
19	4	44.0	-8.2288	21.0	5.0	1	.6940	2	4
19	5	13.0	-6.3219	4.0	6.0	4	.5360	2	4
19	6	150.0	-10.5118	140.0	3.0	1	.9640	2	4
19	7	38.0	-8.3663	23.0	4.0	1	.7500	2	5
19	8	22.0	-7.4094	15.0	2.0	1	.8440	2	5
19	9	79.0	-8.4094	30.0	4.0	3	.6950	2	6
19	10	11.5	-6.4919	8.5	5.0	1	.8870	2	6
19	11	34.0	-8.3219	24.0	3.0	1	.8090	2	6
19	12	24.0	-7.2288	14.0	4.0	3	.8170	2	6
19	13	19.0	-7.4919	12.0	4.0	2	.7500	2	6
19	14	27.0	-8.0224	21.0	5.0	1	.8570	2	6
19	15	26.0	-7.9658	18.0	3.0	1	.7930	2	6
20	4	86.0	-9.3880	46.0	5.0	1	.7160	2	4
20	5	42.0	-7.5699	17.0	4.0	3	.7130	2	4
20	6	48.0	-8.2288	23.0	3.0	3	.7160	2	4
20	7	24.0	-7.3219	10.0	4.0	4	.6390	2	5
20	8	24.0	-7.4919	13.5	2.0	1	.7500	2	5
20	9	60.0	-9.1033	40.0	4.0	1	.7860	2	5
20	10	20.0	-7.5699	15.0	5.0	1	.8400	2	5
20	11	24.0	-7.4919	14.0	4.0	1	.7690	2	5
20	12	28.0	-7.7142	14.0	4.0	2	.6940	2	6
20	13	30.0	-8.2046	29.0	3.0	1	.9830	2	6
20	14	6.0	-5.3219	2.0	1.0	4	.5510	2	6
21	4	83.0	-9.3880	45.0	5.0	1	.7140	3	4
21	5	71.0	-9.0224	41.0	3.0	1	.7700	3	4
21	6	39.0	-8.0768	13.0	4.0	2	.5440	3	4
21	7	102.0	-9.6257	40.0	5.0	2	.5840	3	5
21	8	10.0	-6.0224	4.5	4.0	3	.6780	3	5
21	9	120.0	-9.3880	41.0	5.0	4	.5940	3	5
21	10	43.0	-8.5314	15.0	6.0	2	.5210	3	5
21	11	62.0	-8.8138	33.0	2.0	1	.7310	3	5
21	12	63.0	-8.9069	30.0	4.0	2	.6680	3	6
21	13	15.0	-6.7814	6.0	4.0	2	.6020	3	6
21	14	30.0	-7.3219	14.0	3.0	3	.7420	3	6
21	15	25.5	-7.7142	11.0	4.0	2	.6090	3	6
21	16	21.0	-7.2761	15.0	3.0	1	.8840	3	6
22	4	70.0	-9.2288	26.0	5.0	2	.5440	3	4
22	5	33.0	-8.0224	12.0	4.0	2	.5520	3	4
22	6	47.0	-8.5314	22.0	4.0	2	.6530	3	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
22	7	62.0	-9.2527	36.0	4.0	2	.7000	3	5
22	8	54.0	-8.6795	26.0	3.0	2	.6740	3	5
22	9	28.0	-7.4094	12.0	3.0	3	.6720	3	5
22	10	44.0	-8.1799	17.0	5.0	4	.6100	3	5
22	11	16.0	-6.1293	4.5	4.0	4	.5660	3	5
22	12	94.0	-9.3880	44.0	4.0	2	.6750	3	6
22	13	23.0	-7.4919	14.0	4.0	1	.7800	3	6
22	14	43.0	-7.7814	18.0	1.0	3	.7000	3	6
22	15	30.0	-7.7814	21.0	5.0	1	.8740	3	6
22	16	18.0	-7.3219	9.0	3.0	2	.6550	3	6
23	6	67.0	-8.7142	36.0	5.0	3	.7720	3	4
23	7	41.0	-8.0768	16.0	4.0	4	.6140	3	5
23	8	88.0	-9.1799	55.0	4.0	3	.8400	3	5
23	9	35.0	-8.1293	15.0	4.0	2	.6130	3	5
23	10	13.0	-6.6439	9.0	6.0	1	.8540	3	5
23	11	27.0	-7.9658	23.0	3.0	1	.9220	3	6
23	12	22.0	-7.0224	8.0	2.0	4	.6070	3	6
23	13	49.0	-8.8765	33.0	5.0	1	.7790	3	6
23	14	34.0	-8.2761	15.0	4.0	2	.5980	3	6
24	5	72.0	-8.8138	38.0	3.0	3	.7640	3	4
24	6	57.0	-8.9366	17.0	4.0	2	.4700	3	4
24	7	19.0	-7.1293	4.0	3.0	2	.3920	3	5
24	8	25.0	-7.6439	12.0	4.0	2	.6610	3	5
24	9	92.0	-9.1033	41.0	4.0	3	.6930	3	5
24	10	37.0	-7.5699	12.0	3.0	4	.5900	3	5
24	11	18.0	-6.4919	8.0	6.0	3	.7340	3	5
24	12	14.0	-6.7814	6.5	5.0	2	.6500	3	6
24	13	5.0	-5.3219	2.5	3.0	2	.6790	3	6
24	14	3.2	-4.3923	1.2	2.0	4	.5990	3	6
24	15	36.0	-7.8455	22.0	3.0	3	.8360	3	6
25	5	31.0	-7.9069	21.0	5.0	1	.8400	3	4
25	6	48.0	-7.7142	16.0	4.0	3	.6340	3	4
25	7	25.0	-7.8455	13.0	5.0	2	.6650	3	5
25	8	22.0	-6.4919	8.0	3.0	3	.6870	3	5
25	9	55.0	-8.2761	23.0	4.0	3	.6770	3	5
25	10	19.0	-7.2288	4.5	4.0	2	.4150	3	5
25	11	8.0	-4.9069	2.0	6.0	4	.5510	3	6
25	12	6.0	-5.1293	2.0	4.0	4	.5760	3	6
25	13	37.0	-7.5699	16.0	3.0	3	.7140	3	6
25	14	2.5	-4.5850	1.6	2.0	2	.7530	3	6
25	15	8.5	-5.7814	4.0	2.0	3	.7000	3	6
25	16	14.0	-6.5699	6.0	6.0	2	.6470	3	6
26	5	104.0	-9.2761	45.0	5.0	3	.6800	3	4
26	6	100.0	-8.9944	43.0	3.0	3	.7130	3	4
26	7	37.0	-8.1293	16.0	5.0	2	.6280	3	5
26	8	18.0	-7.2288	8.5	4.0	2	.6450	3	5
26	9	33.0	-8.0224	25.0	3.0	1	.9000	3	5
26	10	7.5	-6.0224	6.0	6.0	1	.9040	3	5
26	11	11.5	-6.4919	4.5	3.0	2	.5810	3	6
26	12	13.5	-6.8455	4.0	2.0	2	.4690	3	6
26	13	14.0	-6.7814	6.5	5.0	2	.6500	3	6
26	14	40.0	-8.2288	11.0	3.0	2	.4660	3	6
26	15	5.5	-5.6439	4.5	2.0	1	.9030	3	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
26	16	3.0	-3.9069	1.3	2.0	3	.7220	3	6
27	5	31.0	-8.0224	17.0	5.0	2	.7110	3	4
27	6	68.0	-9.2046	29.0	4.0	2	.5940	3	4
27	7	49.0	-8.8138	38.0	4.0	1	.8690	3	5
27	8	28.0	-7.7814	15.0	3.0	1	.7150	3	5
27	9	29.0	-7.7814	11.0	4.0	2	.5750	3	5
27	10	18.0	-7.3219	10.0	4.0	2	.7030	3	6
27	11	15.0	-6.4919	8.0	4.0	3	.7800	3	6
27	12	14.0	-6.5699	6.0	4.0	2	.6470	3	6
27	13	22.0	-7.7142	13.0	4.0	2	.7150	3	6
27	14	12.0	-5.3923	3.7	3.0	3	.6480	3	6
27	15	13.5	-6.7142	10.0	3.0	1	.8900	3	6
27	16	15.0	-6.6439	4.5	3.0	4	.5130	3	6
27	17	16.0	-7.0224	4.5	2.0	2	.4600	3	6
28	6	63.0	-9.0498	42.0	4.0	1	.8090	3	4
28	7	81.0	-8.7814	43.0	4.0	3	.8040	3	5
28	8	7.5	-5.6439	3.0	3.0	4	.6220	3	5
28	9	18.0	-7.2288	13.0	3.0	1	.8560	3	5
28	10	51.0	-8.5699	37.0	3.0	1	.8910	3	5
28	11	18.5	-7.1293	10.0	2.0	1	.7280	3	5
28	12	17.0	-7.3663	16.0	3.0	1	.9700	3	6
28	13	30.0	-8.1799	18.0	5.0	2	.7200	3	6
28	14	7.0	-5.4919	2.5	4.0	4	.5840	3	6
28	15	9.0	-6.4094	4.0	1.0	2	.5940	3	6
29	5	53.0	-8.2288	17.0	5.0	4	.5670	3	4
29	6	41.0	-8.3219	20.0	6.0	2	.6730	3	4
29	7	140.0	-8.8455	40.0	6.0	3	.6290	3	5
29	8	38.0	-8.2288	18.0	4.0	2	.6580	3	5
29	9	20.0	-7.4919	11.0	4.0	2	.6960	3	5
29	10	23.0	-7.7142	16.0	3.0	1	.8090	3	5
29	11	54.0	-8.4919	32.0	3.0	3	.8080	3	5
29	12	10.0	-6.1293	5.5	6.0	1	.7560	3	6
29	13	14.0	-6.7814	9.0	4.0	1	.8070	3	6
29	14	11.0	-6.3219	4.5	3.0	2	.6130	3	6
29	15	32.0	-7.8455	21.0	3.0	1	.8430	3	6
30	5	34.0	-8.2761	28.0	6.0	1	.9060	3	4
30	6	9.0	-6.0224	2.5	3.0	2	.4750	3	4
30	7	46.0	-8.6439	31.0	3.0	1	.8050	3	5
30	8	58.0	-8.8455	45.0	4.0	1	.9120	3	5
30	9	52.0	-8.6073	33.0	4.0	1	.8130	3	5
30	10	16.0	-6.7814	5.0	6.0	2	.5220	3	5
30	11	38.0	-7.5699	16.0	2.0	3	.7080	3	5
30	12	7.5	-5.7814	3.5	4.0	2	.6670	3	6
30	13	31.0	-8.2288	14.0	2.0	2	.5950	3	6
30	14	9.5	-5.7814	5.0	4.0	3	.7820	3	6
30	15	10.5	-6.0224	3.5	3.0	4	.5640	3	6
31	6	26.0	-7.5699	7.0	5.0	2	.4630	3	4
31	7	55.0	-8.6073	37.0	5.0	1	.8610	3	5
31	8	49.0	-8.0768	13.0	4.0	4	.5040	3	5
31	9	35.0	-7.8455	18.0	3.0	3	.7390	3	5
31	10	39.0	-7.9658	22.0	3.0	3	.7920	3	5
31	11	8.5	-5.9069	5.0	3.0	1	.7890	3	5
31	12	49.0	-8.7142	19.0	3.0	2	.5600	3	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
31	13	13.0	-6.9069	7.0	5.0	2	.6800	3	6
31	14	23.0	-7.6439	10.0	2.0	2	.6020	3	6
31	15	42.0	-7.6439	19.0	4.0	3	.7550	3	6

KIAMA BOULDER BEACH

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
1	8	137.0	-8.2761	31.0	4.0	4	.4260	1	4
1	9	66.0	-8.7482	23.0	4.0	4	.5720	1	5
1	10	88.0	-8.6073	33.0	3.0	3	.6820	1	5
1	11	8.0	-5.9069	4.5	1.0	1	.7500	1	5
1	12	3.0	-4.3923	1.5	2.0	1	.7100	1	5
1	13	8.5	-5.5850	2.7	4.0	4	.5640	1	5
1	14	33.0	-8.0224	10.0	1.0	2	.4890	1	6
2	7	150.0	-9.1548	53.0	4.0	3	.6900	1	4
2	8	42.0	-8.0224	12.0	2.0	4	.5090	1	4
2	9	26.0	-7.4919	11.5	3.0	2	.6560	1	5
2	10	60.0	-8.1293	20.0	4.0	3	.6200	1	5
2	11	7.0	-4.3923	1.8	1.0	3	.6040	1	5
2	12	83.0	-9.0768	29.0	4.0	4	.5730	1	5
2	13	52.0	-8.5699	8.5	2.0	2	.3320	1	5
2	14	29.0	-7.9069	5.5	3.0	2	.3520	1	5
2	15	26.0	-7.7814	12.0	3.0	2	.6320	1	6
3	7	75.0	-9.2761	21.0	4.0	2	.4560	1	4
3	8	11.5	-6.6439	7.0	2.0	1	.7530	1	4
3	9	23.0	-7.1799	14.0	2.0	3	.8380	1	5
3	10	79.0	-8.9366	21.5	1.0	4	.4930	1	5
3	11	65.0	-8.6073	24.0	1.0	4	.6110	1	5
3	12	22.0	-7.6073	5.5	1.0	2	.4130	1	5
3	13	35.0	-7.4512	17.0	4.0	3	.7790	1	6
4	8	54.0	-8.3219	17.5	3.0	4	.5620	1	4
4	9	67.0	-9.1033	39.0	3.0	1	.7450	1	5
4	10	16.0	-6.7814	8.5	3.0	1	.7430	1	5
4	11	21.5	-7.3663	5.0	4.0	2	.4130	1	5
4	12	18.0	-6.8455	7.0	3.0	4	.6190	1	5
4	13	41.0	-8.0224	23.0	4.0	3	.7920	1	6
4	14	14.0	-6.7814	5.0	3.0	2	.5460	1	6
5	8	88.0	-8.8138	24.0	4.0	4	.5260	1	4
5	9	43.0	-8.4512	29.0	2.0	1	.8240	1	5
5	10	15.0	-7.0224	6.0	1.0	2	.5700	1	5
5	11	41.0	-8.0224	16.0	2.0	4	.6220	1	6
5	12	23.0	-7.4094	10.0	3.0	2	.6350	1	6
5	13	57.0	-8.6795	26.0	4.0	2	.6620	1	6
5	14	27.0	-7.2288	13.5	3.0	3	.7670	1	6
5	15	53.0	-8.9944	32.0	3.0	2	.7240	1	6
6	8	44.0	-8.4512	22.0	2.0	2	.6800	1	4
6	9	71.0	-9.2288	19.0	1.0	2	.4400	1	5
6	10	76.0	-9.4094	23.0	1.0	2	.4680	1	6
6	11	8.5	-5.8580	2.3	1.0	2	.4760	1	6
6	12	38.0	-7.4094	14.0	2.0	3	.6720	1	6
6	13	22.0	-7.5699	10.5	1.0	2	.6420	1	6
6	14	104.0	-8.9366	47.0	4.0	3	.7570	1	6
6	15	11.5	-6.3219	7.5	1.0	1	.8490	1	6
7	8	26.0	-7.2288	12.0	3.0	3	.7180	1	4
7	9	67.0	-8.7482	33.0	3.0	3	.7230	1	5
7	10	52.0	-8.3663	25.0	4.0	3	.7140	1	5
7	11	101.0	-9.0224	36.0	2.0	3	.6280	1	6
7	12	64.0	-8.4512	32.0	3.0	3	.7710	1	6
7	13	25.0	-7.7482	9.0	2.0	2	.5320	1	6
7	14	33.0	-8.1799	14.5	2.0	2	.6040	1	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
8	8	93.0	-9.4717	42.0	4.0	2	.6440	1	4
8	9	69.0	-8.7142	26.0	4.0	4	.6160	1	5
8	10	53.0	-8.9366	36.0	5.0	1	.7930	1	6
8	11	137.0	-8.8455	27.0	4.0	4	.4880	1	6
8	12	81.0	-9.4512	24.0	4.0	2	.4670	1	6
8	13	85.0	-8.9944	22.0	2.0	4	.4820	1	6
8	14	154.0	-9.7649	22.0	1.0	4	.3310	1	6
9	8	89.0	-9.2288	41.0	4.0	1	.6810	1	4
9	9	59.0	-8.7814	23.0	2.0	2	.5890	1	5
9	10	112.0	-9.7142	62.0	4.0	1	.7420	1	6
9	11	86.0	-8.9658	44.0	4.0	3	.7670	1	6
9	12	76.0	-9.0498	33.0	2.0	2	.6470	1	6
9	13	60.0	-8.4512	34.0	3.0	3	.8200	1	6
9	14	69.0	-9.1293	14.0	3.0	2	.3710	1	6
10	1	70.0	-8.6795	37.0	3.0	3	.7820	1	4
10	2	11.0	-6.2288	4.0	3.0	2	.5790	1	4
10	3	33.0	-7.9658	11.0	4.0	2	.5280	1	4
10	4	117.0	-9.6439	43.0	4.0	2	.5830	1	4
10	5	86.0	-9.5118	52.0	4.0	1	.7550	1	4
10	6	88.0	-9.3663	52.0	4.0	1	.7750	1	4
10	7	69.0	-8.7482	32.0	3.0	3	.7020	1	4
10	8	66.0	-8.9944	31.0	4.0	2	.6590	1	4
10	9	70.0	-9.2046	40.0	2.0	1	.7290	1	5
10	10	45.0	-8.0224	25.9	3.0	3	.8310	1	6
10	11	2.0	-8.6073	37.0	3.0	3	.7010	1	6
10	12	36.0	-7.8455	7.0	2.0	4	.3900	1	6
10	13	49.0	-8.6439	13.0	3.0	2	.4420	1	6
11	2	66.0	-8.7814	22.0	5.0	4	.5510	1	4
11	3	64.0	-8.2288	29.9	5.0	3	.7750	1	4
11	4	56.0	-8.7482	11.0	5.0	2	.3690	1	4
11	5	358.0	-11.2288	96.0	2.0	2	.4750	1	4
11	6	358.0	-11.2288	96.0	2.0	2	.4750	1	4
11	7	48.0	-8.8765	23.0	3.0	2	.6170	1	4
11	8	120.0	-9.1293	43.0	3.0	3	.6510	1	4
11	9	33.0	-7.9069	14.0	4.0	2	.6280	1	5
11	10	45.0	-7.7142	19.0	2.0	3	.7260	1	5
11	11	30.0	-7.6439	19.0	2.0	3	.8440	1	5
11	12	89.0	-9.2992	32.0	3.0	2	.5680	1	6
11	13	105.0	-9.4305	60.0	3.0	3	.7920	1	6
11	14	43.0	-8.6439	14.0	2.0	2	.4850	1	6
12	3	576.0	-11.5216	159.0	3.0	4	.5310	1	4
12	4	133.0	-9.9944	70.0	5.0	1	.7120	1	4
12	5	250.0	-10.4818	125.0	2.0	3	.7590	1	4
12	6	74.0	-8.8138	29.0	4.0	4	.6320	1	4
12	7	204.0	-10.8918	92.0	3.0	2	.6020	1	4
12	8	155.0	-10.3219	72.0	4.0	2	.6400	1	4
12	9	82.0	-8.3663	28.0	5.0	3	.6620	1	5
12	10	82.0	-8.9366	29.0	1.0	4	.5940	1	5
12	11	135.0	-9.2761	53.0	4.0	3	.6950	1	5
12	12	93.0	-9.0768	26.0	3.0	2	.5130	1	5
12	13	48.0	-8.8455	28.0	3.0	2	.7080	1	5
12	14	60.0	-8.6073	17.0	3.0	4	.4980	1	6
12	15	48.0	-8.5314	36.0	2.0	1	.9000	1	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
12	16	62.0	-8.8455	14.0	1.0	2	.4100	1	6
13	4	132.0	-9.2288	46.0	4.0	3	.6440	2	4
13	5	78.0	-8.9069	46.0	3.0	3	.8270	2	4
13	6	135.0	-9.8765	86.0	3.0	1	.8350	2	4
13	7	50.0	-8.8455	17.0	5.0	2	.5010	2	4
13	8	64.0	-9.2046	25.0	2.0	2	.5490	2	4
13	9	95.0	-9.6073	63.0	4.0	1	.8120	2	5
13	10	80.0	-8.8455	23.0	4.0	4	.5240	2	5
13	11	94.0	-9.1548	33.0	3.0	4	.5880	2	5
13	12	54.0	-9.0498	37.0	2.0	1	.7820	2	5
13	13	94.0	-9.8138	58.0	5.0	2	.7360	2	6
13	14	41.0	-8.3219	28.0	3.0	1	.8420	2	6
13	15	81.0	-9.2527	25.0	2.0	2	.5020	2	6
14	5	104.0	-9.3880	65.0	4.0	3	.8470	2	4
14	6	234.0	-10.3106	46.0	2.0	3	.4150	2	4
14	7	38.0	-8.0768	12.0	4.0	4	.5200	2	4
14	8	80.0	-9.3443	38.0	4.0	2	.6530	2	4
14	9	83.0	-9.6257	45.0	4.0	2	.6760	2	5
14	10	49.0	-8.6439	18.0	4.0	2	.5490	2	5
14	11	64.0	-8.0768	21.0	3.0	3	.6350	2	5
14	12	72.0	-9.2046	30.0	5.0	2	.5960	2	5
14	13	67.0	-8.4512	29.0	2.0	3	.7110	2	5
14	14	89.0	-9.6439	24.0	4.0	2	.4330	2	6
14	15	73.0	-8.9658	48.0	5.0	1	.8580	2	6
14	16	51.0	-8.5699	25.0	3.0	2	.6860	2	6
14	17	24.0	-7.4094	15.0	1.0	1	.8200	2	6
15	4	102.0	-9.1293	36.0	4.0	4	.6100	2	4
15	5	69.0	-8.6439	26.0	4.0	4	.6260	2	4
15	6	154.0	-10.4200	49.0	5.0	2	.4850	2	4
15	7	62.0	-8.4919	28.0	3.0	3	.7060	2	4
15	8	92.0	-9.7977	44.0	4.0	2	.6190	2	4
15	9	69.0	-9.2527	28.0	5.0	2	.5710	2	5
15	10	75.0	-9.3443	32.0	4.0	2	.5950	2	5
15	11	60.0	-8.4094	25.0	5.0	3	.6740	2	5
15	12	82.0	-9.0224	12.0	4.0	4	.3240	2	5
15	13	49.0	-8.1799	14.0	4.0	4	.5170	2	6
15	14	13.0	-6.6439	8.0	1.0	1	.7900	2	6
15	15	89.0	-8.8765	46.0	4.0	3	.7970	2	6
15	16	41.0	-8.4919	22.0	2.0	2	.6900	2	6
15	17	73.0	-8.4094	22.0	5.0	4	.5800	2	6
16	2	140.0	-9.9801	55.0	5.0	2	.5980	2	4
16	3	110.0	-9.9218	70.0	5.0	1	.7720	2	4
16	4	64.0	-8.8765	27.0	3.0	2	.6240	2	4
16	5	170.0	-10.1799	95.0	4.0	1	.7710	2	4
16	6	159.0	-9.9366	82.0	5.0	3	.7560	2	4
16	7	42.0	-7.9658	22.0	4.0	3	.7730	2	4
16	8	155.0	-9.7649	45.0	3.0	4	.5320	2	4
16	9	92.0	-8.4919	21.0	3.0	4	.5110	2	5
16	10	125.0	-9.7977	62.0	1.0	1	.7020	2	5
16	11	62.0	-9.2288	47.0	3.0	1	.8410	2	5
16	12	32.0	-8.2761	20.0	3.0	2	.7390	2	5
16	13	29.0	-8.0224	20.0	3.0	1	.8100	2	6
16	14	36.0	-8.4512	12.0	1.0	2	.4860	2	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
16	15	42.0	-7.7142	14.0	3.0	4	.6060	2	6
16	16	44.0	-8.4919	20.0	4.0	2	.6320	2	6
16	17	26.0	-7.3219	13.0	3.0	3	.7410	2	6
17	5	152.0	-9.5699	56.0	5.0	3	.6480	2	4
17	6	280.0	-10.4512	107.0	4.0	3	.6640	2	4
17	7	158.0	-10.3443	67.0	4.0	2	.6030	2	4
17	8	150.0	-9.4919	37.0	4.0	4	.5030	2	4
17	9	93.0	-9.3443	50.0	4.0	1	.7450	2	5
17	10	128.0	-9.4512	29.0	4.0	4	.4550	2	5
17	11	44.0	-8.7142	25.0	3.0	2	.6970	2	5
17	12	51.0	-7.4919	17.0	4.0	3	.6810	2	5
17	13	42.0	-8.2761	22.0	2.0	1	.7190	2	5
17	14	63.0	-9.0768	47.0	1.0	1	.8660	2	5
17	15	76.0	-8.7814	38.0	3.0	3	.7560	2	6
17	16	43.0	-8.2288	11.0	3.0	2	.4550	2	6
17	17	45.0	-8.1799	20.0	4.0	3	.6750	2	6
17	18	73.0	-8.9069	39.0	3.0	3	.7570	2	6
18	5	142.0	-10.1548	60.0	3.0	2	.6060	2	4
18	6	152.0	-10.4409	94.0	5.0	1	.7480	2	4
18	7	310.0	-10.4512	84.0	3.0	4	.5460	2	4
18	8	80.0	-9.0768	33.0	4.0	2	.6320	2	4
18	9	45.0	-7.4919	17.0	4.0	3	.7100	2	5
18	10	94.0	-9.1799	27.0	4.0	4	.5120	2	5
18	11	49.0	-8.2761	30.0	2.0	3	.8400	2	5
18	12	80.0	-8.5314	22.0	2.0	4	.5470	2	5
18	13	73.0	-8.0768	16.0	2.0	4	.5070	2	5
18	14	62.0	-8.7814	42.0	3.0	1	.8650	2	5
18	15	0.0	-8.9366	24.0	3.0	2	.5810	2	5
18	16	42.0	-8.1799	20.0	3.0	1	.6900	2	6
18	17	83.0	-8.5314	30.0	2.0	3	.6650	2	6
18	18	62.0	-8.9658	18.0	2.0	2	.4710	2	6
18	19	64.0	-8.7814	36.0	3.0	1	.7720	2	6
19	6	128.0	-10.1548	72.0	5.0	2	.7080	2	4
19	7	304.0	-10.6348	59.0	4.0	4	.4160	2	4
19	8	108.0	-10.0362	89.0	3.0	1	.8870	2	4
19	9	112.0	-9.6439	53.0	4.0	2	.6800	2	5
19	10	86.0	-8.7142	34.0	3.0	3	.6840	2	5
19	11	62.0	-9.2046	46.0	3.0	1	.8330	2	5
19	12	52.0	-8.4094	15.0	3.0	4	.5030	2	5
19	13	45.0	-8.2288	26.0	4.0	3	.7940	2	5
19	14	65.0	-8.9658	39.0	3.0	1	.7770	2	5
19	15	62.0	-7.6439	19.0	2.0	3	.6630	2	5
19	16	32.0	-8.0768	8.0	4.0	2	.4200	2	6
19	17	32.0	-7.4094	14.0	3.0	3	.7120	2	6
19	18	67.0	-8.6439	21.0	4.0	4	.5480	2	6
20	4	130.0	-10.0084	90.0	5.0	1	.8460	2	4
20	5	152.0	-9.9218	68.0	4.0	3	.6800	2	4
20	6	184.0	-9.9801	37.0	4.0	4	.4200	2	4
20	7	127.0	-9.9069	53.0	3.0	2	.6130	2	4
20	8	13.0	-6.9658	10.0	3.0	1	.8510	2	4
20	9	105.0	-9.6439	54.0	3.0	1	.7030	2	5
20	10	123.0	-9.3880	65.0	4.0	3	.8010	2	5
20	11	39.0	-7.7814	8.0	3.0	4	.4330	2	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
20	12	44.0	-8.4512	24.0	2.0	1	.7210	2	5
20	13	95.0	-9.1799	19.0	3.0	4	.4040	2	5
20	14	44.0	-8.1799	23.0	3.0	3	.7460	2	5
20	15	46.0	-7.4094	8.0	2.0	4	.4350	2	5
20	16	13.0	-6.1293	5.0	1.0	3	.6500	2	6
21	6	160.0	-10.5699	46.0	4.0	2	.4430	2	4
21	7	118.0	-10.0634	55.0	4.0	2	.6210	2	4
21	8	109.0	-9.7142	32.0	3.0	2	.4820	2	4
21	9	67.0	-9.3663	25.0	4.0	2	.5210	2	5
21	10	62.0	-8.4094	19.0	4.0	4	.5560	2	5
21	11	75.0	-8.8765	41.0	2.0	3	.7810	2	5
21	12	65.0	-8.7142	25.0	4.0	4	.6120	2	5
21	13	61.0	-8.4512	18.0	3.0	4	.5340	2	5
21	14	27.0	-7.2288	10.0	2.0	4	.6280	2	5
21	15	32.0	-7.9658	16.0	3.0	2	.6840	2	5
21	16	56.0	-8.0224	20.0	2.0	3	.6500	2	6
22	7	112.0	-9.9513	66.0	3.0	2	.7330	3	4
22	8	150.0	-10.2761	56.0	4.0	2	.5530	3	4
22	9	119.0	-9.9944	97.0	4.0	1	.9190	3	5
22	10	75.0	-8.1799	22.0	5.0	3	.6060	3	5
22	11	80.0	-9.4512	28.0	3.0	2	.5200	3	5
22	12	47.0	-7.7142	19.0	4.0	3	.7150	3	5
22	13	39.0	-8.1293	20.0	3.0	1	.7160	3	5
22	14	11.0	-6.0224	5.0	5.0	3	.7050	3	5
22	15	61.0	-9.1033	26.0	3.0	2	.5870	3	6
22	16	33.0	-7.7142	15.0	3.0	3	.6880	3	6
22	17	24.0	-6.9069	7.0	2.0	4	.5540	3	6
23	6	120.0	-9.6795	80.0	3.0	1	.8670	3	4
23	7	136.0	-10.2761	64.0	5.0	2	.6240	3	4
23	8	120.0	-9.2527	55.0	4.0	3	.7450	3	4
23	9	107.0	-8.9069	43.0	5.0	3	.7120	3	5
23	10	116.0	-9.7649	75.0	3.0	1	.8230	3	5
23	11	49.0	-8.5314	11.0	3.0	2	.4060	3	5
23	12	17.0	-6.7814	6.0	3.0	4	.5780	3	5
23	13	82.0	-9.4512	35.0	4.0	2	.5980	3	5
23	14	78.0	-9.4094	38.0	4.0	2	.6480	3	5
23	15	51.0	-8.7142	24.0	1.0	2	.6460	3	5
23	16	10.0	-6.5699	3.5	3.0	2	.5060	3	5
23	17	29.0	-7.4919	17.0	4.0	3	.8210	3	6
24	5	114.0	-9.8611	57.0	5.0	2	.6740	3	4
24	6	158.0	-9.5887	76.0	3.0	3	.7800	3	4
24	7	135.0	-10.3443	85.0	4.0	2	.7440	3	4
24	8	110.0	-10.0362	45.0	3.0	2	.5600	3	4
24	9	57.0	-8.2288	18.0	4.0	4	.5750	3	5
24	10	150.0	-9.2046	52.0	5.0	3	.6740	3	5
24	11	78.0	-8.5314	26.0	4.0	3	.6170	3	5
24	12	44.0	-8.4094	13.0	3.0	2	.4840	3	5
24	13	48.0	-8.8138	32.0	3.0	1	.7800	3	5
24	14	61.0	-8.4919	29.0	3.0	3	.7260	3	5
24	15	40.0	-8.3219	11.0	2.0	2	.4560	3	5
24	16	31.0	-6.4919	8.9	3.0	3	.6580	3	5
24	17	29.0	-6.9069	10.0	3.0	3	.6600	3	6
25	7	108.0	-9.4094	67.0	4.0	3	.8490	3	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
25	8	122.0	-9.2288	34.0	3.0	4	.5410	3	4
25	9	123.0	-9.5314	36.0	3.0	4	.5230	3	5
25	10	10.0	-6.3219	5.0	4.0	2	.6790	3	5
25	11	26.0	-7.6439	8.0	5.0	2	.4980	3	5
25	12	40.0	-8.0768	24.0	4.0	1	.8110	3	5
25	13	38.0	-8.4919	20.0	4.0	2	.6640	3	5
25	14	54.0	-8.6795	20.0	2.0	2	.5660	3	5
25	15	43.0	-8.4919	9.0	2.0	2	.3740	3	5
25	16	27.0	-7.4094	11.0	3.0	4	.6410	3	5
25	17	30.0	-7.0224	11.0	2.0	3	.6770	3	5
25	18	54.0	-8.0224	17.0	4.0	4	.5910	3	6
26	7	129.0	-10.1548	84.0	3.0	1	.7830	3	4
26	8	26.0	-7.0224	7.0	5.0	4	.5260	3	4
26	9	81.0	-9.2761	17.0	4.0	2	.3860	3	5
26	10	72.0	-9.1293	52.0	3.0	1	.8750	3	5
26	11	25.0	-7.3219	8.0	4.0	4	.5430	3	5
26	12	17.0	-6.9069	2.0	4.0	2	.2700	3	5
26	13	72.0	-9.1548	45.0	3.0	1	.7900	3	5
26	14	72.0	-8.6795	19.0	3.0	4	.4970	3	5
26	15	27.0	-7.8455	9.0	4.0	2	.5070	3	5
26	16	36.0	-7.4919	9.0	2.0	4	.5000	3	5
26	17	30.0	-7.7142	17.0	5.0	1	.7710	3	6
26	18	29.0	-7.4919	9.0	4.0	4	.5380	3	6
26	19	34.0	-7.7814	20.0	4.0	3	.8120	3	6
27	6	143.0	-9.7977	87.0	3.0	3	.8410	3	4
27	7	148.0	-9.8138	83.0	2.0	3	.8030	3	4
27	8	6.0	-5.1293	1.5	5.0	4	.4750	3	4
27	9	114.0	-9.8138	60.0	3.0	2	.7060	3	5
27	10	100.0	-9.2046	51.0	3.0	3	.7610	3	5
27	11	81.0	-9.0498	16.0	4.0	4	.3910	3	5
27	12	75.0	-9.1033	40.0	3.0	1	.7300	3	5
27	13	78.0	-9.1548	22.0	3.0	2	.4780	3	5
27	14	48.0	-8.4512	30.0	4.0	1	.8120	3	5
27	15	26.0	-7.9658	23.0	1.0	1	.9340	3	5
27	16	57.0	-8.6073	26.0	2.0	2	.6730	3	5
27	17	16.0	-6.6439	9.0	4.0	3	.7970	3	6
27	18	36.0	-8.2288	19.0	3.0	2	.6940	3	6
28	6	136.0	-9.9658	49.0	4.0	2	.5610	3	4
28	7	77.0	-9.5699	26.0	3.0	2	.4870	3	4
28	8	24.0	-7.4919	8.0	3.0	2	.5290	3	4
28	9	91.0	-9.2761	23.0	4.0	2	.4550	3	5
28	10	130.0	-9.4512	49.0	2.0	3	.6420	3	5
28	11	115.0	-9.4717	43.0	2.0	4	.6100	3	5
28	12	101.0	-9.0224	34.0	3.0	4	.6040	3	5
28	13	105.0	-9.2527	28.0	2.0	4	.4970	3	5
28	14	7.0	-5.6439	3.0	4.0	2	.6360	3	5
28	15	39.0	-7.6439	19.0	3.0	3	.7740	3	5
28	16	6.0	-5.6439	2.0	4.0	2	.5110	3	5
28	17	16.0	-7.0224	7.0	4.0	2	.6180	3	6
28	18	7.0	-6.1085	2.5	4.0	2	.5060	3	6
29	6	116.0	-9.7313	36.0	3.0	2	.5090	3	4
29	7	97.0	-9.2527	37.0	3.0	4	.6140	3	4
29	8	72.0	-9.3880	35.0	3.0	2	.6340	3	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
29	9	57.0	-9.0224	34.0	3.0	2	.7310	3	5
29	10	78.0	-9.2761	24.0	5.0	2	.4920	3	5
29	11	9.0	-6.3219	5.0	3.0	2	.7030	3	5
29	12	88.0	-8.3219	29.0	3.0	3	.6690	3	5
29	13	56.0	-8.4919	32.0	3.0	3	.7980	3	5
29	14	84.0	-8.0768	23.0	2.0	3	.6160	3	5
29	15	52.0	-8.9069	28.0	2.0	2	.6800	3	5
29	16	17.0	-6.4919	7.0	4.0	3	.6840	3	5
29	17	39.0	-7.7142	17.0	3.0	3	.7070	3	6
29	18	70.0	-8.5314	16.0	2.0	4	.4630	3	6
29	19	10.0	-5.6439	4.9	1.0	3	.7830	3	6
30	7	95.0	-9.8611	33.0	2.0	2	.4980	3	4
30	8	22.0	-6.9069	8.0	6.0	4	.6240	3	4
30	9	75.0	-9.1799	55.0	4.0	1	.8860	3	5
30	10	55.0	-8.7814	8.0	3.0	2	.2980	3	5
30	11	20.0	-7.2288	10.0	3.0	2	.6940	3	5
30	12	13.0	-6.3219	7.0	4.0	3	.7780	3	5
30	13	15.0	-6.6439	7.0	4.0	3	.6890	3	5
30	14	11.0	-6.6439	7.0	2.0	1	.7640	3	5
30	15	28.0	-7.4919	7.0	3.0	4	.4600	3	5
30	16	39.0	-8.0224	22.0	3.0	3	.7820	3	5
30	17	49.0	-8.6795	16.0	4.0	2	.5040	3	6
30	18	5.0	-5.4919	1.5	4.0	2	.4650	3	6
30	19	19.0	-7.4094	10.0	2.0	2	.6770	3	6

CROOKHAVEN BOULDER BEACH

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
1	5	95.0	-9.4094	67.0	2.0	1	.8860	1	4
1	6	117.0	-9.9069	79.0	2.0	1	.8220	1	4
1	7	71.0	-9.4305	49.0	2.0	1	.7890	1	4
1	8	66.0	-9.2761	46.0	2.0	1	.8030	1	5
1	9	59.0	-8.8765	28.0	1.0	2	.6570	1	5
1	10	82.0	-9.1799	37.0	1.0	2	.6610	1	5
1	11	40.0	-8.1293	8.0	1.0	2	.3860	1	6
1	12	140.0	-9.8611	72.0	3.0	3	.7360	1	6
2	4	145.0	-10.0084	101.0	1.0	4	.8810	1	4
2	5	165.0	-9.7814	42.0	2.0	2	.4960	1	4
2	6	26.0	-7.6439	8.0	3.0	1	.4980	1	4
2	7	93.0	-9.2992	44.0	2.0	3	.6920	1	4
2	9	257.0	-10.3332	101.0	1.0	1	.6750	1	5
2	10	94.0	-9.4717	56.0	1.0	2	.7780	1	5
2	11	54.0	-8.9944	27.0	2.0	1	.6420	1	5
2	12	102.0	-9.6795	55.0	3.0	2	.7130	1	5
2	13	106.0	-9.7313	28.0	2.0	1	.4430	1	6
2	14	9.5	-6.1293	4.5	1.0	2	.6730	1	6
2	15	116.0	-9.9069	64.0	2.0	2	.7170	1	6
3	4	225.0	-10.5507	114.0	3.0	3	.7280	1	4
3	5	68.0	-9.2992	46.0	2.0	1	.7910	1	4
3	6	107.0	-10.0498	99.0	2.0	1	.9530	1	4
3	7	124.0	-9.9218	78.0	3.0	1	.7970	1	4
3	8	180.0	-10.3219	77.0	1.0	2	.6360	1	5
3	9	66.0	-8.9366	25.0	1.0	2	.5780	1	5
3	10	112.0	-10.1163	52.0	1.0	2	.6020	1	5
3	11	73.0	-9.2992	53.0	1.0	1	.8490	1	5
3	12	22.0	-7.4512	13.0	2.0	1	.7600	1	5
3	13	28.0	-8.0768	25.0	1.0	1	.9390	1	6
3	14	58.0	-8.4512	31.0	1.0	3	.7800	1	6
3	15	92.0	-9.1548	51.0	2.0	3	.7920	1	6
3	16	61.0	-8.8765	29.0	1.0	2	.6650	1	6
4	5	109.0	-9.7649	18.0	2.0	2	.3250	1	4
4	8	250.0	-10.8138	160.0	2.0	1	.8290	1	4
4	9	160.0	-10.3443	87.0	3.0	1	.7140	1	5
4	10	35.0	-8.3663	25.0	1.0	1	.8150	1	5
4	11	120.0	-9.9069	54.0	1.0	2	.6330	1	5
4	12	136.0	-10.1674	47.0	1.0	2	.5210	1	5
4	13	182.0	-10.4094	83.0	1.0	2	.6530	1	5
4	14	67.0	-9.0498	51.0	1.0	1	.9020	1	6
4	15	65.0	-8.9658	43.0	1.0	1	.8290	1	6
4	16	110.0	-9.8918	67.0	1.0	1	.7550	1	6
4	17	192.0	-9.8765	39.0	2.0	4	.4390	1	6
4	18	113.0	-9.8138	67.0	2.0	1	.7620	1	6
5	2	172.0	-9.9658	80.0	2.0	3	.7190	1	4
5	3	57.0	-8.7814	20.0	2.0	2	.5430	1	4
5	4	123.0	-9.8455	76.0	3.0	1	.7990	1	4
5	5	180.0	-10.5018	84.0	2.0	2	.6470	1	4
5	6	99.0	-9.6257	60.0	2.0	1	.7720	1	4
5	7	100.0	-9.7649	50.0	2.0	2	.6600	1	4
5	8	239.0	-10.3987	108.0	2.0	3	.7130	1	5
5	9	106.0	-10.0084	101.0	1.0	1	.9780	1	5
5	10	204.0	-10.2877	45.0	1.0	4	.4300	1	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
5	11	202.0	-10.5314	100.0	2.0	1	.6940	1	5
5	12	140.0	-9.9658	80.0	3.0	1	.7710	1	6
5	13	51.0	-8.9658	26.0	1.0	2	.6430	1	6
5	14	141.0	-9.9658	90.0	1.0	1	.8310	1	6
6	2	59.0	-8.9069	31.0	2.0	2	.6980	1	4
6	3	133.0	-10.2527	80.0	3.0	2	.7340	1	4
6	4	120.0	-10.0498	65.0	2.0	2	.6930	1	4
6	5	160.0	-9.9218	47.0	3.0	4	.5220	1	4
6	6	186.0	-10.2288	100.0	2.0	3	.7650	1	4
6	7	94.0	-9.1548	45.0	2.0	3	.7230	1	4
6	8	127.0	-10.2046	50.0	1.0	2	.5510	1	5
6	9	165.0	-10.1421	97.0	2.0	1	.7960	1	5
6	10	140.0	-10.1923	98.0	1.0	1	.8370	1	5
6	11	152.0	-10.0901	99.0	1.0	1	.8400	1	5
6	12	32.0	-7.5699	14.0	3.0	3	.6860	1	6
6	13	41.0	-7.9069	13.0	1.0	4	.5560	1	6
6	14	102.0	-9.3443	52.0	1.0	3	.7420	1	6
6	15	72.0	-9.2761	45.0	1.0	1	.7690	1	6
7	4	160.0	-10.0634	82.0	3.0	1	.7330	1	4
7	7	190.0	-10.2761	80.0	2.0	4	.6480	1	4
7	8	89.0	-9.6439	23.0	2.0	2	.4210	1	5
7	9	64.0	-8.9658	43.0	1.0	1	.8330	1	5
7	10	84.0	-9.5887	63.0	1.0	1	.8500	1	5
7	11	69.0	-9.0768	24.0	1.0	2	.5370	1	5
7	12	140.0	-10.0768	63.0	1.0	2	.6410	1	5
7	13	24.0	-7.7814	15.0	1.0	1	.7530	1	6
7	14	80.0	-9.2046	43.0	1.0	1	.7320	1	6
7	15	105.0	-9.3219	45.0	1.0	3	.6710	1	6
8	1	138.0	-10.3443	109.0	2.0	1	.8720	1	4
8	7	150.0	-9.8138	70.0	2.0	3	.7140	1	4
8	8	130.0	-9.5507	60.0	1.0	3	.7180	1	5
8	9	104.0	-9.4512	40.0	2.0	2	.6040	1	5
8	10	115.0	-9.4512	53.0	2.0	3	.7040	1	5
8	11	82.0	-9.2761	56.0	1.0	1	.8510	1	6
8	12	102.0	-9.5507	68.0	1.0	1	.8460	1	6
8	13	100.0	-9.2288	50.0	1.0	3	.7470	1	6
9	3	107.0	-10.0362	80.0	2.0	1	.8290	1	4
9	4	31.0	-8.0224	15.0	4.0	2	.6540	1	4
9	5	160.0	-10.6348	88.0	2.0	2	.6730	1	4
9	6	39.0	-8.4919	10.0	2.0	2	.4150	1	4
9	7	78.0	-9.5314	56.0	3.0	1	.8160	1	4
9	8	81.0	-9.1033	44.0	1.0	1	.7580	1	5
9	9	59.0	-9.1033	37.0	2.0	1	.7500	1	5
9	10	72.0	-9.3219	43.0	1.0	1	.7380	1	5
9	11	55.0	-8.8455	45.0	2.0	1	.9290	1	5
9	12	106.0	-9.9658	70.0	2.0	1	.7730	1	5
9	13	150.0	-10.4512	59.0	1.0	2	.5500	1	6
9	14	23.0	-7.6439	7.0	1.0	2	.4740	1	6
9	15	90.0	-9.1548	54.0	1.0	3	.8290	1	6
9	16	50.0	-8.9366	40.0	1.0	1	.8680	1	6
10	2	160.0	-10.0498	97.0	3.0	3	.8220	1	4
10	3	140.0	-10.2992	57.0	3.0	2	.5690	1	4
10	5	50.0	-8.6439	25.0	2.0	2	.6790	1	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
10	6	34.0	-8.3663	22.0	2.0	2	.7560	1	4
10	7	92.0	-9.7977	73.0	2.0	1	.8670	1	4
10	8	61.0	-8.5314	22.0	2.0	4	.5990	1	5
10	9	360.0	-10.6439	75.0	2.0	4	.4610	1	5
10	10	360.0	-10.6439	75.0	2.0	4	.4610	1	5
10	11	140.0	-9.5507	73.0	1.0	3	.7980	1	5
10	12	177.0	-10.5216	63.0	1.0	2	.5350	1	6
10	13	96.0	-9.5314	65.0	1.0	1	.8410	1	6
10	14	74.0	-9.3443	47.0	1.0	1	.7720	1	6
11	2	60.0	-9.0224	39.0	3.0	1	.7870	2	4
11	4	79.0	-9.2288	42.0	3.0	1	.7200	2	4
11	5	124.0	-10.1163	52.0	2.0	2	.5820	2	4
11	6	109.0	-9.4512	65.0	3.0	3	.8210	2	4
11	7	44.0	-8.1293	13.0	2.0	4	.5160	2	4
11	8	55.0	-8.8455	39.0	2.0	1	.8440	2	5
11	9	25.0	-7.7814	5.5	1.0	2	.3810	2	5
11	10	105.0	-9.4512	65.0	1.0	3	.8320	2	5
11	11	81.0	-9.5699	45.0	2.0	2	.6910	2	5
11	12	155.0	-10.0901	96.0	2.0	1	.8170	2	6
11	13	9.0	-5.9069	5.0	4.0	3	.7740	2	6
11	14	20.0	-7.3219	9.0	3.0	2	.6330	2	6
12	2	97.0	-9.8455	68.0	2.0	1	.8030	2	4
12	3	116.0	-9.8611	70.0	2.0	1	.7690	2	4
12	4	40.0	-8.4094	27.0	5.0	1	.8120	2	4
12	5	85.0	-9.2992	33.0	2.0	2	.5880	2	4
12	6	105.0	-9.8918	40.0	4.0	2	.5440	2	4
12	7	65.0	-9.1799	54.0	3.0	1	.9180	2	4
12	8	34.0	-8.1799	8.0	3.0	2	.4020	2	5
12	9	48.0	-8.3219	25.0	5.0	3	.7410	2	5
12	10	91.0	-9.7977	81.0	1.0	1	.9320	2	5
12	11	70.0	-9.2527	55.0	1.0	1	.8920	2	5
12	12	107.0	-9.7482	68.0	2.0	1	.7950	2	6
12	13	170.0	-10.1033	85.0	2.0	3	.7260	2	6
12	14	9.5	-6.2288	3.0	6.0	2	.5020	2	6
12	15	42.0	-8.6439	27.0	4.0	1	.7570	2	6
13	3	155.0	-10.0362	62.0	3.0	4	.6180	2	4
13	4	76.0	-9.3219	30.0	2.0	2	.5700	2	4
13	5	90.0	-9.0768	37.0	3.0	3	.6560	2	4
13	7	100.0	-9.8297	76.0	2.0	1	.8600	2	4
13	8	106.0	-9.5314	61.0	2.0	1	.7800	2	5
13	9	109.0	-9.4919	41.0	2.0	4	.5990	2	5
13	10	87.0	-9.2761	48.0	1.0	1	.7530	2	5
13	11	6.7	-5.3219	2.0	6.0	4	.5310	2	5
13	12	50.0	-8.7814	39.0	1.0	1	.8840	2	5
13	13	114.0	-9.6795	67.0	2.0	1	.7830	2	6
13	14	71.0	-9.2046	40.0	1.0	1	.7260	2	6
13	15	116.0	-9.4094	63.0	2.0	3	.7960	2	6
14	4	153.0	-10.0224	63.0	2.0	2	.6300	2	4
14	5	94.0	-9.5118	52.0	3.0	1	.7330	2	4
14	7	68.0	-9.4073	67.8	2.0	1	.9990	2	4
14	8	145.0	-9.7142	68.0	2.0	3	.7240	2	5
14	9	125.0	-9.7313	58.0	1.0	1	.6820	2	5
14	10	24.0	-7.7482	5.5	3.0	2	.3890	2	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
14	11	61.0	-8.8765	28.0	2.0	2	.6490	2	5
14	12	162.0	-9.4919	42.0	1.0	4	.5330	2	5
14	13	116.0	-10.0362	65.0	1.0	2	.7030	2	6
14	14	9.5	-5.7814	5.0	6.0	3	.7820	2	6
14	15	102.0	-9.9658	67.0	1.0	1	.7610	2	6
15	6	91.0	-9.7313	61.0	5.0	1	.7840	2	4
15	7	80.0	-9.0224	20.0	5.0	4	.4580	2	4
15	8	147.0	-10.2408	49.0	2.0	2	.5130	2	5
15	9	124.0	-9.4512	65.0	2.0	3	.7870	2	5
15	10	120.0	-9.7814	58.0	2.0	2	.6830	2	5
15	11	25.0	-7.8455	17.0	3.0	1	.7950	2	5
15	12	33.0	-7.7142	13.0	2.0	4	.6250	2	5
15	13	48.0	-8.7814	35.0	2.0	1	.8340	2	6
15	14	33.0	-8.2288	22.0	1.0	1	.7880	2	6
15	15	50.0	-8.9069	30.0	2.0	2	.7210	2	6
15	16	55.0	-8.9366	21.0	1.0	2	.5470	2	6
16	6	74.0	-9.0224	43.0	3.0	1	.7830	2	4
16	7	77.0	-9.1033	44.0	3.0	1	.7710	2	4
16	8	154.0	-9.1293	37.0	2.0	4	.5420	2	5
16	9	145.0	-10.3987	67.0	2.0	2	.6120	2	5
16	10	118.0	-9.8765	75.0	1.0	1	.7980	2	5
16	11	88.0	-9.1293	33.0	4.0	4	.6050	2	5
16	12	39.0	-8.3663	32.0	2.0	1	.9270	2	6
16	13	18.0	-6.7814	7.0	4.0	4	.6280	2	6
16	14	56.0	-8.8138	41.0	1.0	1	.8740	2	6
16	15	11.0	-6.4919	3.0	1.0	2	.4500	2	6
17	6	120.0	-9.9944	76.0	4.0	1	.7790	2	4
17	7	21.0	-7.1293	4.0	1.0	4	.3790	2	4
17	8	35.0	-8.0768	26.0	4.0	1	.8940	2	5
17	9	102.0	-9.1548	41.0	3.0	3	.6620	2	5
17	10	43.0	-8.3663	21.0	3.0	2	.6780	2	6
17	11	66.0	-9.1033	31.0	2.0	2	.6420	2	6
17	12	49.0	-8.1799	27.0	2.0	3	.8010	2	6
17	13	6.5	-5.3219	3.9	4.0	3	.8360	2	6
18	5	94.0	-9.5887	71.0	3.0	1	.8870	2	4
18	6	83.0	-9.5887	60.0	3.0	1	.8260	2	4
18	8	70.0	-8.7814	42.0	2.0	3	.8310	2	5
18	9	5.0	-4.7549	2.0	6.0	3	.6670	2	5
18	10	103.0	-9.4305	35.0	2.0	2	.5570	2	6
18	11	18.5	-7.1293	7.0	5.0	2	.5740	2	6
18	12	72.0	-9.3443	48.0	2.0	1	.7900	2	6
19	6	85.0	-9.5887	69.0	2.0	1	.8990	2	4
19	7	51.0	-8.5314	18.0	3.0	2	.5560	2	4
19	8	144.0	-9.7814	68.0	2.0	3	.7150	2	5
19	9	63.0	-9.0224	35.0	3.0	1	.7210	2	5
19	10	83.0	-9.4094	32.0	2.0	2	.5660	2	5
19	11	93.0	-9.2992	52.0	1.0	1	.7730	2	5
19	12	25.0	-7.8455	17.0	1.0	1	.7950	2	5
19	13	78.0	-9.5118	46.0	5.0	2	.7190	2	6
19	14	75.0	-9.4305	52.0	1.0	1	.8060	2	6
19	15	13.5	-6.4919	7.0	4.0	3	.7390	2	6
20	5	65.0	-8.9366	25.0	4.0	2	.5810	2	4
20	6	14.0	-7.0224	4.0	3.0	2	.4450	2	4

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
20	7	85.0	-9.0224	48.0	2.0	3	.8050	2	4
20	8	90.0	-8.9069	47.0	3.0	3	.8000	2	5
20	9	69.0	-9.3663	33.0	4.0	2	.6210	2	5
20	10	54.0	-8.7142	30.0	2.0	1	.7350	2	5
20	11	110.0	-9.9801	74.0	1.0	2	.1700	2	5
20	12	72.0	-8.6439	39.0	3.0	3	.8080	2	6
20	13	7.0	-5.9069	3.5	1.0	2	.6630	2	6
20	14	135.0	-9.9069	39.0	5.0	2	.4900	2	6
21	3	160.0	-9.7313	42.0	3.0	4	.5070	3	4
21	4	70.0	-9.2288	50.0	2.0	1	.8410	3	4
21	5	113.0	-9.1293	19.0	2.0	4	.3850	3	4
21	6	140.0	-9.9801	77.0	3.0	1	.7490	3	4
21	7	107.0	-9.5887	72.0	5.0	1	.8570	3	4
21	8	83.0	-9.2992	37.0	3.0	2	.6400	3	5
21	9	10.0	-5.9773	2.2	6.0	4	.4250	3	5
21	10	107.0	-9.8138	77.0	2.0	1	.8510	3	6
21	11	48.0	-8.0768	23.0	3.0	3	.7420	3	6
21	12	104.0	-9.6073	56.0	2.0	1	.7290	3	6
21	13	12.0	-6.1293	6.9	1.0	3	.8280	3	6
21	14	34.0	-7.7814	14.0	1.0	4	.6400	3	6
22	3	127.0	-10.1421	67.0	2.0	2	.6790	3	4
22	4	150.0	-9.5887	65.0	4.0	3	.7150	3	4
22	5	110.0	-9.0768	45.0	3.0	3	.6990	3	4
22	6	59.0	-9.0768	35.0	3.0	2	.7270	3	4
22	7	43.0	-7.5699	18.0	4.0	3	.7350	3	4
22	8	65.0	-9.3219	35.0	4.0	2	.6660	3	5
22	9	30.0	-7.7814	15.0	2.0	1	.6990	3	5
22	10	82.0	-9.3219	62.0	2.0	1	.9020	3	5
22	11	16.0	-6.7814	5.5	6.0	2	.5560	3	5
22	12	63.0	-9.1033	37.0	2.0	1	.7340	3	6
22	13	46.0	-8.2288	28.0	1.0	3	.8280	3	6
22	14	97.0	-9.7814	45.0	3.0	2	.6190	3	6
22	15	45.0	-8.3663	30.0	2.0	1	.8460	3	6
23	4	34.0	-8.3663	18.0	6.0	2	.6610	3	4
23	5	56.0	-8.8455	35.0	3.0	1	.7810	3	4
23	6	7.5	-5.4263	4.0	6.0	3	.7920	3	4
23	7	6.0	-5.3219	2.5	6.0	4	.6390	3	4
23	8	140.0	-10.0498	52.0	3.0	2	.5670	3	5
23	9	101.0	-9.6257	64.0	4.0	1	.8010	3	5
23	10	6.0	-5.6439	4.0	6.0	1	.8110	3	5
23	12	53.0	-8.4919	21.0	2.0	2	.6140	3	6
23	13	58.0	-8.5314	30.0	2.0	3	.7490	3	6
23	14	25.0	-7.9069	12.0	1.0	2	.6220	3	6
23	15	104.0	-9.0768	49.0	2.0	3	.7540	3	6
24	5	55.0	-8.2288	22.0	6.0	3	.6650	3	4
24	6	47.0	-8.8138	34.0	4.0	1	.8180	3	4
24	7	7.3	-4.9069	2.7	6.0	3	.6930	3	4
24	8	42.0	-8.2288	11.0	3.0	2	.4580	3	5
24	9	29.0	-8.1293	21.0	6.0	1	.8160	3	5
24	10	105.0	-9.8918	89.0	2.0	1	.9260	3	5
24	11	60.0	-9.1033	45.0	3.0	1	.8500	3	5
24	12	8.0	-5.6439	4.9	4.0	3	.8440	3	5
24	13	130.0	-9.4717	55.0	2.0	3	.6900	3	5

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
24	14	137.0	-9.7313	72.0	2.0	3	.7640	3	6
24	15	119.0	-9.8455	73.0	1.0	1	.7870	3	6
24	16	86.0	-9.4305	55.0	2.0	1	.7990	3	6
24	17	137.0	-10.3106	94.0	2.0	1	.7980	3	6
24	18	87.0	-9.3443	48.0	3.0	1	.7420	3	6
24	19	64.0	-9.2046	55.0	3.0	1	.9290	3	6
25	5	113.0	-9.8611	50.0	3.0	2	.6200	3	4
25	6	77.0	-9.0498	25.0	4.0	2	.5350	3	4
25	7	110.0	-9.6970	63.0	3.0	1	.7580	3	4
25	8	6.5	-5.3219	3.0	6.0	3	.7020	3	5
25	9	86.0	-9.2527	54.0	4.0	1	.8220	3	5
25	10	67.0	-9.2288	55.0	4.0	1	.9100	3	5
25	11	36.0	-8.4512	25.0	2.0	1	.7920	3	5
25	12	71.0	-8.7142	23.0	3.0	4	.5620	3	5
25	13	100.0	-9.7313	52.0	1.0	2	.6830	3	5
25	14	18.0	-7.1293	13.0	3.0	1	.8750	3	6
25	15	11.0	-6.6439	8.0	2.0	1	.8350	3	6
25	16	21.0	-7.6439	12.0	3.0	2	.7000	3	6
25	17	116.0	-10.1421	56.0	1.0	2	.6210	3	6
25	18	24.0	-7.7142	13.0	1.0	2	.6950	3	6
26	5	8.0	-5.1293	3.0	4.0	3	.6850	3	4
26	6	64.0	-9.2288	48.0	4.0	1	.8440	3	4
26	7	92.0	-9.6795	74.0	2.0	1	.8990	3	4
26	8	135.0	-9.4305	43.0	2.0	4	.5840	3	5
26	9	102.0	-9.4094	56.0	2.0	3	.7680	3	5
26	10	40.0	-8.3663	32.0	4.0	1	.9190	3	5
26	11	71.0	-9.0768	26.0	3.0	2	.5610	3	5
26	12	80.0	-9.5507	72.0	3.0	1	.9520	3	5
26	13	92.0	-9.5699	62.0	3.0	1	.8190	3	5
26	14	81.0	-9.5699	43.0	2.0	2	.6700	3	5
26	15	10.5	-6.0224	4.5	5.0	3	.6670	3	5
26	16	63.0	-8.4919	35.9	2.0	3	.8280	3	5
26	17	16.0	-6.9069	6.0	2.0	2	.5730	3	6
26	18	93.0	-9.3219	40.0	2.0	2	.6460	3	6
26	19	38.0	-8.4512	34.0	1.0	1	.9540	3	6
27	6	120.0	-9.8138	89.0	5.0	1	.9020	3	4
27	7	34.0	-7.8455	13.0	6.0	2	.6000	3	4
27	8	94.0	-9.6795	54.0	3.0	2	.7230	3	5
27	9	81.0	-9.5887	59.0	3.0	1	.8230	3	5
27	10	129.0	-9.4919	42.0	2.0	4	.5750	3	5
27	11	84.0	-9.4305	65.0	2.0	1	.9000	3	5
27	12	68.0	-9.3880	46.0	1.0	1	.7750	3	5
27	13	103.0	-9.3663	59.0	3.0	3	.8000	3	5
27	14	96.0	-9.0224	36.0	4.0	3	.6380	3	6
27	15	84.0	-9.4717	69.0	3.0	1	.9280	3	6
28	7	134.0	-9.2992	55.0	4.0	3	.7110	3	4
28	8	80.0	-8.6795	40.0	2.0	3	.7870	3	5
28	9	74.0	-9.1799	41.0	3.0	1	.7320	3	5
28	10	15.0	-6.9069	10.0	3.0	1	.8220	3	5
28	11	55.0	-8.9069	27.0	1.0	2	.6510	3	5
28	12	21.0	-7.6439	14.0	2.0	1	.7760	3	5
28	13	44.0	-8.6073	24.0	3.0	2	.6950	3	5
28	14	7.5	-6.1293	4.5	5.0	2	.7280	3	6

X	Y	A	PHI B	C	R	SH	SPHER	LONG	UP
29	7	103.0	-9.8455	65.0	3.0	1	.7640	3	4
29	8	57.0	-8.8765	25.0	4.0	2	.6160	3	5
29	9	17.0	-7.2288	8.0	4.0	2	.6310	3	5
29	10	89.0	-9.1799	56.0	5.0	3	.8470	3	5
29	11	64.0	-8.6073	37.0	2.0	3	.8190	3	5
29	12	36.0	-8.0768	23.0	3.0	1	.8170	3	5
29	13	130.0	-9.7814	65.0	2.0	1	.7180	3	5
29	14	10.0	-6.2288	5.5	4.0	1	.7390	3	5
29	15	90.0	-9.3219	36.0	4.0	2	.6090	3	6
29	16	30.0	-7.9069	12.0	4.0	2	.5850	3	6
29	17	114.0	-9.5314	36.0	2.0	4	.5360	3	6
30	7	81.0	-9.6439	44.0	5.0	2	.6690	3	4
30	8	16.0	-6.7814	10.5	4.0	1	.8560	3	5
30	9	78.0	-9.3219	57.0	3.0	1	.8670	3	5
30	10	88.0	-9.3663	47.0	3.0	1	.7250	3	5
30	11	7.0	-6.1085	4.0	4.0	2	.6920	3	5
30	12	102.0	-9.8765	93.0	3.0	1	.9660	3	5
30	13	123.0	-9.7482	77.0	3.0	1	.8250	3	5
30	14	73.0	-9.1293	31.0	2.0	2	.6170	3	6
30	15	165.0	-10.2046	45.0	2.0	2	.4710	3	6
30	16	91.0	-9.2527	56.0	3.0	1	.8270	3	6
30	17	107.0	-9.4717	51.0	3.0	3	.7000	3	6
31	7	96.0	-9.6618	77.0	5.0	1	.9140	3	4
31	8	76.0	-9.3219	49.0	3.0	1	.7900	3	5
31	9	122.0	-9.8918	57.0	3.0	2	.6550	3	5
31	10	132.0	-9.5507	56.0	3.0	3	.6820	3	5
31	11	57.0	-8.9069	46.0	2.0	1	.9180	3	5
31	12	109.0	-9.4919	46.0	4.0	4	.6460	3	5
31	13	66.0	-8.8765	29.0	3.0	2	.6480	3	5
31	14	13.0	-6.7814	9.0	4.0	1	.8280	3	6
31	16	80.0	-9.5507	65.0	4.0	1	.8900	3	6
31	17	9.5	-5.6439	3.0	4.0	3	.5750	3	6
31	18	69.0	-9.4094	44.0	2.0	2	.7450	3	6