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HORIZONTAL CONTROL - ENIWETOK ATOLL M.I.
1957 EXPANSION

A network of horizontal control stations was established in 1949-50 to cover the eastern portion of the Atoll. It consisted of a primary net of second order triangulation stations, supplemental with third order stations at locations of lesser importance. Standard procedures of the U.S. Coast and Geodetic Survey were carefully followed in executing the survey. Expansion surveys were completed in 1951, 1952, 1955 and in 1957 to establish additional stations and replace stations destroyed by test operations. The network now encompasses the Atoll and includes sixteen stations to second order specifications and eleven to third order accuracy.

Some features of two previous surveys were utilized in the scheme. A third order survey had been completed in 1944 by the USS Bowditch to control hydrographic mapping of the Atoll. This was followed in 1947-48 by a second order scheme of limited area by the U.S. Coast and Geodetic Survey. As the distribution of the existing stations of these surveys did not meet project requirements, and one end station of the base line had been destroyed, a substantially new and stronger scheme was necessary which could be expanded as required.

A base line for the net extended from station RUNIT on site YVONNE to a new station NORTH BASE #2 at the north end of the island. Station RUNIT was common to both the USS Bowditch and the USC & GS surveys. The base line was established to standard

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COLLECTION RG-326 ATOMIC ENERGY COMMISSION

(1)

BOX No. 199679 (#1089) A16429 326-6SAG170
ENIWETOK 1957

FOLDER HORIZONTAL CONTROL HOLMES & NARVER JIS NO.5

procedures of the U.S. Coast and Geodetic Survey for second order base line measurement. The computed probable error of total measurement of the line was one part in 648,000. The allowable maximum probable error for second order base line measurement is one part in 500,000.

The geographic position of station RUNIT as determined by the USC & GS survey was adopted as the origin of geographic position. The azimuth values of this survey for the line, station RUNIT to station SAND were adopted as the origin of geodetic azimuth. The probable accuracy of the adopted values for position and azimuth are not known, but it was considered that the accuracy was consistent with project requirements at the time, and the expense of further refinement could not be justified.

The computed closing error of the survey before adjustment was determined as approximately one part in 25,000. An additional check was obtained in 1952 by inclusion of a first order traverse in the FLORA-GENE area. This indicated a closing error of approximately one part in 70,000 before adjustment of the adjacent quadrangle. In order that the values of a station would remain the same independent of the direction of computation through the net, an adjustment was applied to the triangulation figures. This consisted of a side equation adjustment which resulted in slight changes in the values previously reported.

A plane grid was established in 1952 which was common to the entire Atoll, and from which the inter-relation of structures and areas, and their positions could be specified by plane coordinates.

Due to the limited area, the slight additional refinement obtained by computing a Transverse Mercator Grid would not have been practical.

The origin of plane coordinates, N 100,000, E 100,000, was taken at station CORAL and the basis of bearings was a true meridian through this station as computed through the adjusted figures from the line, station RUNIT to station SAND.

The 1957 expansion survey included establishing new second order stations on sites YVONNE, SALLY and GENF and third order stations on sites GLENN, HENRY, JAMES and KEITH. The triangle closure to include station LANTANA on site GLENN exceeds the allowable closure limits. However, the triangulation towers were damaged by a storm before re-observing could be accomplished. As an evaluation of the observing results indicated the values to be within a tolerance of one part in 5,000, it was decided to defer the re-observing until such time as more precise values are required for the station.

PLANE COORDINATES

LOCATION ENHETOK 24261, M1. 1957 EXPANDED (P.P.S.)
 PROJECTION PLANE GRID JOB NO. 952 SHEET OF

STATIONS	BEARING	DISTANCE	LATITUDE		DEPARTURE		COORDINATES		
			NORTH	EAST	NORTH	EAST	NORTH	EAST	
1									1
1	CPRAL TO						100,222.00	100,222.00	2
2	NORTH						106,228.00	124,284.06	3
3	SACKET						129,914.72	113,592.61	4
4	RIVORY #2						133,222.77	107,294.19	5
5	GRAVE						152,227.87	21,408.56	6
6									7
7	NORTH TO						100,222.00	124,284.06	8
8	RUNLT						99,222.00	122,897.50	9
9	PURBAL						119,606.00	117,554.50	10
10									11
11	SACKET TO						129,914.72	113,592.61	12
12	PURBAL						119,606.00	117,554.50	13
13	RIVORY #2						132,222.77	107,294.19	14
14									15
15	CPRAL TO						122,227.87	71,408.56	16
16	GRAVE						144,227.92	21,408.56	17
17	SACKET						152,227.87	21,408.56	18
18									19
19									20
20									21
21									22
22									23
23									24
24									25
25									26
26									

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STATIONS	BEARING	DISTANCE	COORDINATES				
			LATITUDE	DEPARTURE		NORTH	EAST
1						1	
2	<u>Alice to</u>				138,931.40	52,852.20	2
3	Gail	N62-13-02.25E 20,974.16			148,707.87	71,408.50	3
4	Engebi	N80-33-30.19E 34,116.16			144,527.90	86,506.20	4
5	Coral	S50-27-08.84E 61,143.84			100,000.00	100,000.00	5
6							6
7	<u>Coral to</u>				100,000.00	100,000.00	7
8	Alice	N50-27-08.84W 61,143.84			138,931.40	52,852.20	8
9	Gail	N30-24-46.49W 56,479.46			148,707.87	71,408.50	9
10	Engebi	N16-51-32.35W 46,527.59			144,527.90	86,506.20	10
11	Rujoru-2	N12-33-58.64E 33,525.88			132,722.77	107,294.19	11
12	Sally	N24-26-09.74E 32,858.02			129,914.73	113,592.61	12
13	Piiraai	N41-50-50.54E 26,312.73			119,601.00	117,554.50	13
14	North	N75-39-35.75E 25,065.01			106,208.00	124,284.06	14
15	Runit	S89-10-25.88E 28,900.50			99,583.30	128,897.50	15
16	Lantana *	S16-04-06.30W 71,964.78			30,846.75	80,081.23	16
17	Henry *	S23-42-54.10W 72,587.18			33,542.29	70,806.31	17
18	James *	S31-44-31.30W 72,550.89			38,300.88	61,831.30	18
19	Keith *	S35-47-46.50W 72,819.62			40,935.85	57,407.47	19
20	Rigili-2	S67-27-45.60W 73,416.85			71,860.40	32,190.00	20
21							21
22	<u>Gail to</u>				148,707.87	71,408.50	22
23	Engebi	S74-31-28.65E 15,665.65			144,527.90	86,506.20	23
24	Coral	S30-24-46.49E 56,479.46			100,000.00	100,000.00	24
25	Alice	S62-13-02.25W 20,974.16			138,931.40	52,852.20	25
26							26

LOCATION Eniwetok Atoll MI
 PROJECTION Ivy Grid
 JOB NO. 942 SHEET 1 OF 3
 1957 Expansion Survey

PLANE COORDINATES

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

* Third Order Station

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STATIONS	BEARING	DISTANCE	COORDINATES		
			LATITUDE	DEPARTURE	
1					1
2	<u>Engebi to</u>				2
3	Coral	S16-51-32.35E 46,527.59			3
4	Alice	S80-33-30.19W 34,116.16			4
5	Gail	N74-31-28.65W 15,665.65			5
6					6
7	<u>Rujoru-2 to</u>				7
8	Sally	S65-58-16.06E 6,896.03			8
9	Piiraai	S38-01-22.46E 16,656.98			9
10	Coral	S12-33-58.64W 33,525.88			10
11					11
12	<u>Sally to</u>				12
13	Piiraai	S21-00-49.16E 11,048.50			13
14	Coral	S24-26-09.74W 32,858.02			14
15	Rujoru-2	N65-58-16.06W 6,896.03			15
16					16
17	<u>Piiraai to</u>				17
18	Runit	S29-32-16.78E 23,008.02			18
19	North	S26-40-41.30E 14,988.65			19
20	Coral	S41-50-50.54W 26,312.73			20
21	Rujoru-2	N38-01-22.46W 16,656.98			21
22	Sally	N21-00-49.16W 11,048.50			22
23					23
24					24
25					25
26					26

LOCATION Eniwetok Atoll MI
PROJECTION Ivy Grid

1957 Expansion Survey
JOB NO. 942 SHEET 2 OF 3

PLANE COORDINATES

HOLMES & HARVER INC. - ENGINEERS - CONSTRUCTORS

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STATIONS	BEARING	DISTANCE	COORDINATES		
			LATITUDE	DEPARTURE	
1					1
2	<u>North to</u>				2
3	Runit	S34-51-12.16E 8,072.82			3
4	Coral	S75-39-35.75W 25,065.01			4
5	Piiraal	N26-40-41.30W 14,988.65			5
6					6
7	<u>Runit to</u>				7
8	Coral	N89-10-25.88W 28,900.50			8
9	North	N34-51-12.16W 8,072.82			9
10	Piiraal	N29-32-16.78W 23,008.02			10
11					11
12	<u>Lantana to*</u>				12
13	Rigili-2	N49-25-24.70W 63,053.07			13
14	Coral	N16-04-06.30E 71,964.78			14
15					15
16	<u>Henry to *</u>				16
17	Rigili-2	N45-13-19.50W 54,401.26			17
18	Coral	N23-42-54.10E 72,587.18			18
19					19
20	<u>James to *</u>				20
21	Rigili-2	N41-27-08.70W 44,775.53			21
22	Coral	N31-44-31.30E 72,550.89			22
23					23
24	<u>Keith to *</u>				24
25	Rigili-2	N39-11-44.10W 39,902.99			25
26	Coral	N35-47-46.50E 72,819.62			26

LOCATION Eniwetok Atoll MI
 PROJECTION Ivy Grid
 JOB NO. 942 SHEET 3 OF 3
 1957 Expansion Survey

PLANE COORDINATES

HOLMES & HARVER INC. - ENGINEERS - CONSTRUCTORS

* Third Order Station

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STATION	LATITUDE LONGITUDE	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
					LOG. METERS	METERS	FEET
Alice	11-38-46.347N	242-11-26.72	62-12-04.45	Gail	3.8057004	6,392.937	20,974.16
	162-09-16.507E	260-31-54.61	80-33-03.03	Engebi	4.0169759	10,398.626	34,116.16
		309-31-15.76	129-32-51.11	Coral	4.2703685	18,636.680	61,143.84
Coral	11-32-20.254N	129-32-51.11	309-31-15.76	Alice	4.2703685	18,636.680	61,143.84
	162-17-10.944E	149-35-13.46	329-34-15.57	Gail	4.2359063	17,214.974	56,479.46
		163-08-27.60	343-08-00.30	Engebi	4.1517264	14,181.638	46,527.59
		192-33-58.52	12-34-13.27	Rujoru-2	4.0093960	10,218.709	33,525.88
		204-26-09.62	24-26-37.09	Sally	4.0006573	10,015.145	32,858.02
		221-50-50.42	41-51-25.86	Piiraai	3.9041817	8,020.136	26,312.73
		255-39-35.63	75-40-24.54	North	3.8830837	7,639.830	25,065.01
		270-49-34.00	90-50-32.20	Runit	3.9449212	8,808.890	28,900.50
		16-04-05.81	196-03-36.06	Lantana	4.3411358	21,934.909	71,964.78
		23-42-54.10	203-41-55.83	Henry	4.3448758	22,124.617	72,587.18
		31-44-31.30	211-43-15.08	James	4.3446586	22,113.556	72,550.89
		35-47-46.50	215-46-21.43	Keith	4.3462642	22,195.465	72,819.62
		67-27-45.60	247-25-29.60	Rigili-2	4.3498116	22,377.501	73,416.85
Gail	11-40-23.398N	285-27-33.34	105-28-04.08	Engebi	3.6789643	4,774.900	15,665.65
	162-12-23.207E	329-34-15.57	149-35-13.46	Coral	4.2359063	17,214.974	56,479.46
		62-12-04.45	242-11-26.72	Alice	3.8057004	6,392.937	20,974.16
Engebi	11-39-41.964N	343-08-00.30	163-08-27.60	Coral	4.1517264	14,181.638	46,527.59
	162-14-55.151E	80-33-03.03	260-31-51.61	Alice	4.0169759	10,398.626	34,116.16
		105-28-04.08	285-27-33.34	Gail	3.6789643	4,774.900	15,665.65

LOCATION
 Eniwetok Atoll
 Eniwetok Astronomic 1944
 Second
 JOB NO. 942
 ORDER TRIANGULATION SHEET 1 OF 4

GEOGRAPHIC POSITIONS

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

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STATION	LATITUDE LONGITUDE	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
					LOG. METERS	METERS	FEET
Rujoru-2	11-37-44.863N	294-01-58.55	114-02-11.32	Sally	3.3226150	2,101.914	6,896.03
	162-18-24.339E	321-58-52.12	141-59-12.91	Piiraa	3.7056121	5,077.058	16,656.98
		12-34-13.27	192-33-58.52	Coral	4.0093960	10,218.709	33,525.88
Sally	11-37-17.000N	338-59-38.16	158-59-46.19	Piiraa	3.5273179	3,367.590	11,048.50
	162-19-27.711E	24-26-37.09	204-26-09.62	Coral	4.0006573	10,015.145	32,858.02
		114-02-11.32	294-01-58.55	Rujoru-2	3.3226150	2,101.914	6,896.03
Piiraa	11-35-34.682N	330-28-18.47	150-28-41.37	Runit	3.8458951	7,012.859	23,008.02
	162-20-07.557E	333-19-53.98	153-20-07.53	North	3.6597784	4,568.550	14,988.65
		41-51-25.86	221-50-50.42	Coral	3.9041817	8,020.136	26,312.73
		141-59-12.91	321-58-52.12	Rujoru-2	3.7056121	5,077.058	16,656.98
		158-59-46.19	338-59-38.16	Sally	3.5273179	3,367.590	11,048.50
North	11-33-21.810N	325-09-36.63	145-09-45.94	Runit	3.3910410	2,460.600	8,072.82
	162-21-15.230E	75-40-24.54	255-39-35.63	Coral	3.8830837	7,639.830	25,065.01
		153-20-07.53	333-19-53.98	Piiraa	3.6597784	4,568.550	14,988.65
Runit	11-32-16.080N	90-50-32.20	270-49-34.00	Coral	3.9449212	8,808.890	28,900.50
	162-22-01.621E	145-09-45.94	325-09-36.63	North	3.3910410	2,460.600	8,072.82
		150-28-41.37	330-28-18.47	Piiraa	3.8458951	7,012.859	23,008.02
Lantana	11-20-54.223	130-33-54.57	310-32-19.30	Rigili-2	4.2837221	19,218.614	63,053.07
	162-13-50.718	196-03-36.06	16-04-05.81	Coral	4.3411358	21,934.909	71,964.78

LOCATION
 DATUM
 Eniwetok Atoll
 Eniwetok Astronomic 1944
 JOB NO. 942
 Second
 ORDER TRIANGULATION
 SHEET 2 OF 4

GEOGRAPHIC POSITIONS

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

Third Order Station

STATION	LATITUDE LONGITUDE	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
					LOG. METERS	METERS	FEET
Henry ?	11-21-20.941N	134-45-41.79	314-44-24.93	Rigili-2	4.2196248	16,581.537	54,401.26
	162-12-17.475E	203-41-55.83	23-42-54.10	Coral	4.3448758	22,124.617	72,587.18
James ?	11-22-08.118N	138-31-34.71	318-30-35.67	Rigili-2	4.1350566	13,647.609	44,775.53
	162-10-47.238E	211-43-15.08	31-44-31.30	Coral	4.3446586	22,113.556	72,550.89
Keith ?	11-22-34.240N	140-46-50.49	320-46-00.23	Rigili-2	4.0850213	12,162.456	39,902.99
	162-10-02.755E	215-46-21.43	35-47-46.50	Coral	4.3462642	22,195.465	72,819.62
Aitsu ?	11-37-59.151N						
	162-17-42.440E						
Aniyaani	11-28-19.253N						
	162-23-58.730E						
Bokon	11-38-22.046N						
	162-16-35.139E						
Eniwetok	11-21-51.469N						
	162-21-14.730E						
Islet	11-30-43.856N						
	162-22-52.543E						
Ivy	11-24-29.334N						
	162-22-37.224E						

LOCATION
Eniwetok Atoll
Eniwetok Astronomic 1944
Second
JOB NO. 942
ORDER TRIANGULATION
SHEET 3 OF 4

GEOGRAPHIC POSITIONS

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

? Third Order Station

GEOGRAPHIC POSITIONS

STATION	LATITUDE LONGITUDE	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
					LOG. METERS	METERS	FEET
Japtan ♀	11-25-41.449N 162-23-11.664E						
Lilac ♀	11-25-38.264N 162-22-22.842E						
Mack	11-32-57.854 162-14-54.033						
Muzin	11-39-20.189N 162-15-10.227E						
Ruchi ♀	11-38-26.544N 162-10-50.892E						
Sand	11-30-18.986N 162-23-06.870E						
Yeiri ♀	11-38-07.928N 162-17-16.650E						

LOCATION Eniwetok Atoll
 DATUM Eniwetok Astronomic 1944
 JOB NO. 942
 ORDER TRIANGULATION SHEET 4 OF 4

♀ Third Order Station

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STATION	BEARING	DISTANCE	COSINE	SINE	CO-ORDINATES		LATITUDE	DEPARTURE	NORTH	EAST
1										
2	<u>SOAR TO</u>								100,000.00	100,000.00
3									106,208.02	124,284.05
4	SALLY	N75-39-35.75E 25,065.01	24767663	96884277	+6208.02	+24,284.05			129,914.72	113,592.61
5									132,722.77	107,294.19
6	RUJOKU-2	N24-26-07.74E 32,858.02	91042364	41367716	+29,914.72	+13,592.61			148,707.86	71,402.51
7										
8	<u>NORTH TO</u>								106,208.00	124,284.26
9									99,583.30	128,897.50
10	PITRAAI	N12-35-58.64E 33,525.88	97604474	21756901	+32,722.77	+7,294.19			119,601.00	117,554.48
11										
12	<u>SALLY TO</u>								129,914.73	113,592.61
13	PITRAAI	N35-24-46.49N 56,179.46	86239958	50622815	+42,707.86	-23,591.49			119,601.01	117,554.50
14									132,722.77	107,294.19
15										
16	<u>GALE TO</u>								148,707.87	71,402.50
17	ENGERI	S74-31-28.65E 15,665.65	26622419	96374523	-4179.97	+15,097.70			144,527.90	86,506.20
18	ALICE	S62-13-02.25W 20,974.16	46611965	88472167	-9776.47	-18,556.27			132,931.40	52,052.21
19										
20	<u>PITRAAI TO</u>								117,601.00	117,554.50
21	RUJOKU-2	N 33-01-22.46W 16,655.93	78776456	61597645	+13,121.78	-10,260.31			132,722.78	107,294.19
22										
23										
24										
25										
26										
27										
28	15									

CHKD. BY E.R.G. DATE 12-26-57 F.B. REF. SHEET NO. 1 OF 1
CALC. BY LSH DATE 12-14-57 TRAVERSE LOCATIONS OF STATIONS NORTH, SALLY, RUJOKU-2, GAJOKU-2
HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-12-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

SALLY to 3 CORAL	24° 26'	37.09"	α	3 CORAL to 2 SALLY	204° 26'	09.62"
8	+ 89 35	34.23	3 ^d L	8	- 11 52	11.10
SALLY to 1 RVJOKU-2	114 02	11.32	α	3 CORAL to 1 RVJOKU-2	192 33	58.52
-		12.75	Δα	+		14.73
	180 00	00.0			180 00	00.0
RVJOKU-2 to 1 SALLY	294 01	58.57 ⁵	α'	1 RVJOKU-2 to 3 CORAL	12 34	13.25 ⁷

FIRST ANGLE OF TRIANGLE 78-32-14.72

11 37 17.000 SALLY	λ	162 19 27.711	φ	11 32 20.254 ³ CORAL	λ	162 17 10.944
+ 0 27.862	Δλ	- 01 03.372	Δφ	+ 05 24.609	Δλ	+ 01 13.395
11 37 44.862 RVJOKU-2	λ'	162 18 24.339	φ'	11 37 44.863 RVJOKU-2	λ'	162 18 24.339

Logarithms	Values in seconds		Logarithms	Values in seconds	Logarithms	Values in seconds			
3.3226150		$\frac{1}{2}(\phi + \phi')$	s	4.0093960		$\frac{1}{2}(\phi + \phi')$			
9.0099338		Logarithms	Values in seconds	9.9894698		Logarithms	Values in seconds		
8.5124980		s	3.3226150	B	8.5124997	s	4.0093960		
1.4450468	1st term -27.8642	Sin α	9.9606070	h	2.5113655	1st term -324.6127	Sin α	9.3375959	
6.64523		A'	8.5096669	s ²	8.01879		A'	8.5096669	
9.92121		Sec φ'	0.0090068	Sin ² α	8.67519		Sec φ'	0.0090068	
0.71877		Δλ	1.8018957	63.3717	C	0.71669	Δλ	1.8656656	73.3948
7.28420	2d term +0.0019	Sin $\frac{1}{2}(\phi + \phi')$	9.3036294		7.41067	2d term +0.0026	Sin $\frac{1}{2}(\phi + \phi')$	9.3026316	14.733
2.8901		-Δα	1.1055251	12.750	n ²	5.0227	-Δα	1.1682972	
1.9864					D	1.9845			
4.8765	3d term +0.0000					7.0072	3d term +0.0010		
-Δφ	-27.8623						-Δφ	-324.6090	

HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LES DATE 12-12-57 JOB NO. 942 LOCATION ENIWEJOK ATOLL

2	3	α	3	to 2				
α	β	+	3 ^d L	β	-			
PIIRAAI	to RVJORU-2	141 59 12.91	α	3	to 1			
Δα		- 0 20.78	Δα					
RVJORU-2	to PIIRAAI	180 00 00.0	α'	1	to 3	180	00	00.0

FIRST ANGLE OF TRIANGLE 50-35-21.15

11 55 34.682	PIIRAAI	λ	162 20 07.557	φ	3	λ		
+ 02 10.181		Δλ	- 01 43.218	Δφ		Δλ		
11 57 44.863	RVJORU-2	λ'	162 18 24.339	φ'	1	λ'		

Logarithms	Values in seconds	Logarithms	Values in seconds	Logarithms	Values in seconds	
3.7056121	$\frac{1}{2}(\phi + \phi')$ 11-36-39.772	s		$\frac{1}{2}(\phi + \phi')$		
9.8964546	Logarithms	Values in seconds	Cos α		Logarithms	Values in seconds
8.5124980	s	3.7056121	B		s	
2.1145647	1st term -130.1861	Sin α	9.7894689	h	1st term	"
7.41122	A'	8.5096669	s ²		A'	
9.57894	Sec φ'	0.0090068	Sin ² α		Sec φ'	
0.71877	Δλ	2.0137547	103.2178	C	Δλ	"
7.70893	2d term + 0.0051	Sin $\frac{1}{2}(\phi + \phi')$	9.3037722		2d term +	Sin $\frac{1}{2}(\phi + \phi')$
4.2291	-Δα	1.3175269	20.775	n ²	-Δα	
1.9864				D		
6.2155	3d term + 0.0000				3d term +	
-Δφ	-130.1810				-Δφ	

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POSITION COMPUTATION SECOND ORDER TRIANGULATION

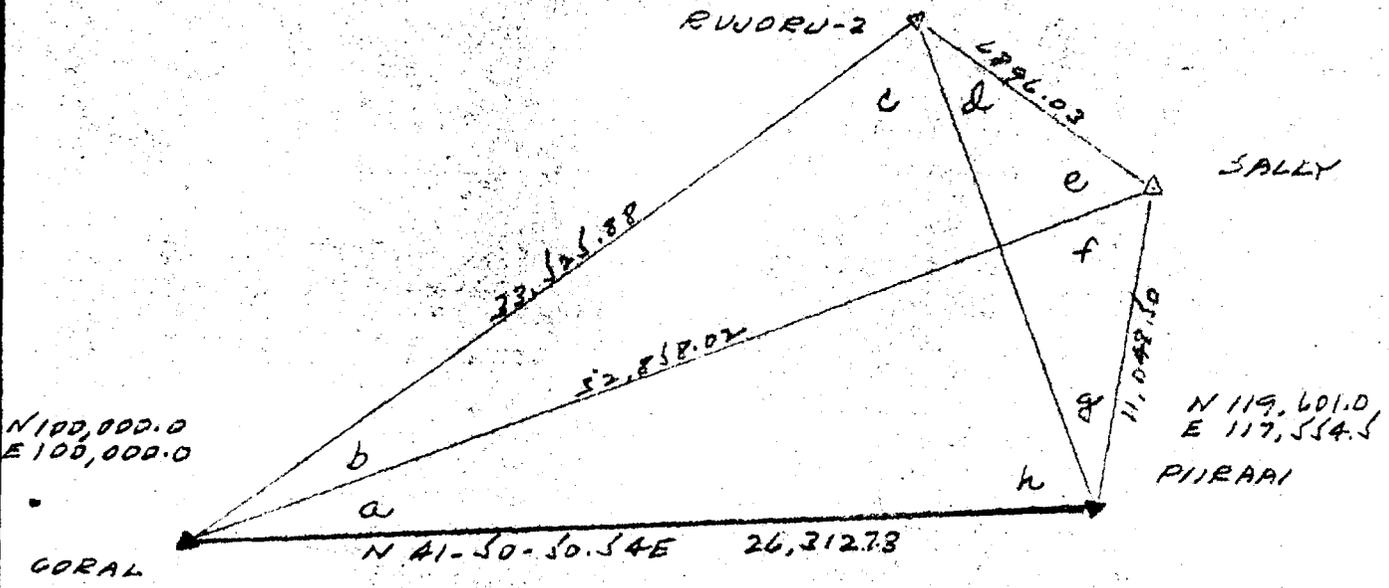
COMPUTED BY LSH DATE 12-11-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

2	RUNIT to 3 CORAL	90° 50' 32.20"	x	3	CORAL to 2 RUNIT	270° 49' 34.00"
		+ 59 38 09.17	3 ^d L			- 48 58 43.58
	RUNIT to 1 PIIRAAI	150 28 41.37	α	3	CORAL to 1 PIIRAAI	221 50 50.42
		- 0 22.87	Δα			+ 0 35.41
		180 00 00.0				180 00 00.0
	PIIRAAI to 2 RUNIT	330 28 18.47	α'	1	PIIRAAI to 3 CORAL	41 51 25.86

FIRST ANGLE OF TRIANGLE 71-23-07.39

11 32 16.080	RUNIT	λ	162 22 01.621	φ	11 32 20.254	3 CORAL	λ	162 17 10.944
+ 03 18.602		Δλ	- 01 54.063	Δφ	+ 03 14.428		Δλ	+ 02 56.613
11 35 34.682	PIIRAAI	λ'	162 20 07.557	φ'	11 35 34.682	PIIRAAI	λ'	162 20 07.557

Logarithms	Values in seconds		Logarithms	Values in seconds		Logarithms	Values in seconds		
5.8458951		$\frac{1}{2}(\phi + \phi')$	11-33-55.381	s	3.9041817		$\frac{1}{2}(\phi + \phi')$	11-33-57.468	
9.9396030		Logarithms	Values in seconds	Cos α	9.8721126		Logarithms	Values in seconds	
8.5124998		s	9.8458951	B	8.5124997		s	3.9041817	
2.2979979	1st term -198.6085	Sin α	9.6926313	h	2.2887940	1st term	-194.4438	Sin α	9.8242223
7.69179		A'	8.5096672	s ²	7.80836		A'	8.5096672	
9.38526		Sec φ'	0.0089512	Sin ² α	9.64844		Sec φ'	0.0089512	
0.71664		Δλ	2.0571448	114.0630	C	0.71669	Δλ	2.2470224	176.612
7.79369	2d term +0.0062	Sin $\frac{1}{2}(\phi + \phi')$	9.3020841		8.17349	2d term	+0.0149	Sin $\frac{1}{2}(\phi + \phi')$	9.3021056
4.5960		-Δα	1.3592289	22.868	n ²	4.5776	-Δα	1.5491280	35.410
1.9845					D	1.9845			
6.5805	3d term +0.0004					6.5621	3d term	+0.0004	
	-Δφ	-198.6019					-Δφ	-194.4285	



	OBS. ϕ	GEO. COND.		TRIG. COND.	
a	17-24-40.9	40.3	39.7	40.8	
b	11-52-12.8	12.3	12.2	11.1	
c	50-35-20.6	20.0	20.0	21.1	
d	27-56-54.7	54.1	54.7	53.6	
e	89-35-33.1	32.5	33.1	34.2	
f	45-27-00.6	00.0	00.0	58.9	
g	17-00-32.7	32.1	32.2	33.3	
h	100-07-49.3	48.7	48.1	47.0	

$\frac{\sin a, \sin c, \sin e, \sin g}{\sin b, \sin d, \sin f, \sin h} = 1$

100	$\sin 17-24-39.7$	9.4759971	67.2	$\sin 11-52-12.2$	9.3132190	100.1
-	$\sin 50-35-20.0$	9.8879606	17.3	$\sin 27-56-54.7$	9.6708747	39.7
-	$\sin 89-35-33.1$	9.9999890	0.2	$\sin 45-27-00.0$	9.8528693	20.7
-	$\sin 17-00-32.2$	9.4661571	68.8	$\sin 100-07-48.1$	9.9931762	3.8
		8.8301038	153.5		8.8301392	164.3
			164.3		1038	
			317.8		354	

$354 / 317.8 = 1.1$

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ENGINEERS - CONSTRUCTORS
LOS ANGELES, CALIFORNIA

JOB NO. 716

SHEET 2 OF 2

TITLE LOCATION A STA RUNDRI-2, SALLY

BY LSH DATE 9-11-57

26,312.73
sin 45-26-58.9

sin 117-08-20.3
32,858.024

sin 17-24-40.8
11,048.501

32,858.024
sin 78-32-14.7

sin 11-52-11.1
6896.030

sin 89-35-34.2
33,525.878

26,312.73
sin 50-35-21.1

sin 29-16-51.9
16,656.978

sin 100-07-47.0
33,525.893

16,656.978
sin 135-02-33.1

sin 27-56-52.6
11,048.521

sin 17-00-33.3
6896.018

COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57
 CHKD. BY E.R.G. DATE 12-20-57

JOB NO. 942
 LOCATION ENIWEJOK ATOLL

STATION	OBSERVED ANGLE	CORR - N	SPHERICAL		PLANE ANGLE AND DISTANCE	LOGARITHM
			ANGLE	EXCESS		
2-3					8,020.136	3.9041817
1 SALLY	45-27-00.6		58.93	0.03	26-58.90	
2 PIIRAAI	117-08-22.0		20.33	0.03	20.30	
3 CORAL	17-24-40.9		40.80	0.00	40.80	
1-3	<u>03.5</u>					
1-2						
2-3					10,015.145	4.006573
1 RVJORU-2	78-32-15.3		14.72	0.02	14.70	
2 SALLY	89-35-33.1		34.23	0.03	34.20	
3 CORAL	11-52-12.8		11.10	0.00	11.10	
1-3	<u>-01.2</u>					
1-2						
2-3					8,020.136	3.9041817
1 RVJORU-2	50-35-20.6		21.15	0.05	21.1	
2 PIIRAAI	100-07-49.3		47.05	0.05	47.0	
3 CORAL	29-16-53.7		51.90	0.00	51.9	
1-3	<u>03.6</u>					
1-2						
2-3						
1						
2						
3						
1-3						
1-2						

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HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION

SECOND ORDER TRIANGULATION

COMPUTED BY L SH DATE 12-14-57

JOB NO. 942 LOCATION ENIWETOK ATOLL

α	2	to 3				α	3	to 2			
$\alpha^d L$		B	+			$3^d L$		B	-		
α		ENGEBI to 1 ALICE	80	33	03.03	α		3 to 1			
$\Delta \alpha$			-	01	08.41	$\Delta \alpha$					
			180	00	00.0				180	00	00.0
α'	1	ALICE to 2 ENGEBI	260	31	54.61	α'	1	to 3			

FIRST ANGLE OF TRIANGLE

ϕ	11	39	41.964	ENGEBI	λ	162	14	55.151	ϕ			3	λ
$\Delta \phi$		-	0	55.617	$\Delta \lambda$		-	05	38.644	$\Delta \phi$			$\Delta \lambda$
ϕ'	11	38	46.347	ALICE	λ'	162	09	16.507	ϕ'			1	λ'

Logarithms		Values in seconds		Logarithms		Values in seconds	
$\frac{1}{2}(\phi + \phi')$				$\frac{1}{2}(\phi + \phi')$			
$\cos \alpha$	4.0169759			$\cos \alpha$			
B	9.2153000			B			
n	8.5124960			h			
$\sin^2 \alpha$	1.7447719	1st term	+55.5612	$\sin^2 \alpha$			
	8.03395			s^2			
	9.98813			$\sin^2 \alpha$			
C	8.5096666			C			
	0.0090342			$\Delta \lambda$	2.5297437	338.6442	
	2.5297437			$\sin^2(\phi + \phi')$	9.3053512		
	8.74347	2d term	+0.6554	$-\Delta \alpha$	1.8350949	68.4060	
	3.4695						
	1.9889						
	5.4584	3d term	+0.0000				
		$-\Delta \phi$	+55.6166				

HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION

SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-14-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

2	GAIL	to 3	CORAL	329° 34'	15.57"	α	3	CORAL	to 2	GAIL	149° 35'	13.46"	
				+ 92 37	48.88	3 ^d L					- 20 02	22.35	
	GAIL	to 1	ALICE	62	12	04.45	α	3	CORAL	to 1	ALICE	129 32	51.11
				-	0	37.73	Δα				-	01	35.34
				180	00	00.0					180	00	00.0
	ALICE	to 2	GAIL	242	11	26.72	α'	1	ALICE	to 3	CORAL	309 31	15.76

FIRST ANGLE OF TRIANGLE 67-19-49.04

11	40	23.398	GAIL	λ	162	12	23.207	φ	11	32	20.254	3	CORAL	λ	162	17	10.944	
		- 01	37.051	Δλ	-	03	06.700	Δφ	+	06	26.094			Δλ	-	07	54.43	
	11	38	46.347	ALICE	λ'	162	09	16.507	φ'	11	38	46.347	1	ALICE	λ'	162	09	16.50

Logarithms		Values in seconds		Logarithms		Values in seconds	
s	3.8057004	$\frac{1}{2}(\phi + \phi')$		s	4.2703685	$\frac{1}{2}(\phi + \phi')$	
cos α	9.6687283	Logarithms	Values in seconds	cos α	9.8039472	Logarithms	Values in seconds
b	8.5124956	s	3.8057004	b	8.5124997	s	4.2703685
h	1.9869243	1st term	+97.0341	h	2.5868154	1st term	-386.2028
3 ^d α	7.61140	Sin α	9.9467425	h ²	8.54074	Sin α	9.8871088
3 ^d α	9.89349	A'	8.5096666	s ²	8.54074	A'	8.5096666
	0.72184	Sec φ'	0.0090342	Sin ² α	9.77422	Sec φ'	0.0090342
	5.22673	Δλ	2.2711437	C	0.71669	Δλ	2.6761781
	3.9739	186.6998			9.03165	2d term	+0.1076
	1.9892	Sin $\frac{1}{2}(\phi + \phi')$	9.3055626	h ²	5.1736	Sin $\frac{1}{2}(\phi + \phi')$	9.3030904
	5.9631	-Δα	1.5767063	D	1.9845	-Δα	1.9792685
		37.732			7.1581	95.336	
		3d term	+0.0001			3d term	+0.0014
		-Δφ	+97.0511			-Δφ	-386.0938

HOLMES & HARVER, INC.
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POSITION COMPUTATION

SECOND ORDER TRIANGULATION

COMPUTED BY L SH DATE 12-12-57 JOB NO. 942 LOCATION BIKINI ATOLL

2	ENGEBI	to 3	CORAL	343° 08'	00.30"	α	3	CORAL	to 2	ENGEBI	163° 08'	27.60"	
2 ^d L			B	+122 20	03.78	3 ^d L				B	-13 33	19.14	
1	ENGEBI	to 1	GAIL	105 28	04.08	α	3	CORAL	to 1	GAIL	149 35	13.46	
Δ α				- 0	30.73	Δ α					- 0	57.89	
				180	00	00.0					180	00	00.0
1	GAIL	to 2	ENGEBI	285 27	33.34	α'	1	GAIL	to 3	CORAL	329 34	15.57	

FIRST ANGLE OF TRIANGLE 44-06-42.23

11	39	41.964	ENGEBI	λ	162	14	55.151	φ	11	32	20.254	3	CORAL	λ	162	17	10.944
Δ φ				Δ λ	-	02	31.945	Δ φ	+	08	03.144			Δ λ	-	04	47.737
11	40	23.398	GAIL	λ'	162	12	23.207	φ'	11	40	23.398	1	GAIL	λ'	162	12	23.207

Logarithms		Values in seconds				Logarithms		Values in seconds				Logarithms		Values in seconds	
3.6789643				$\frac{1}{2}(\phi + \phi')$		s	4.2359063			$\frac{1}{2}(\phi + \phi')$					
9.4260170				Logarithms	Values in seconds	Cos α	9.9357085			Logarithms	Values in seconds				
8.5124960				s	3.6789643	B	8.5124997			s	4.2359063				
1.6174773	1st term	-41.4455		Sin α	9.9839782	h	2.6841145	1st term	-483.1862	Sin α	9.7043464				
7.35793				A'	8.5096664	s ²	8.47141			A'	8.5096664				
9.96796				Sec φ'	0.0090764	Sin ² α	9.40869			Sec φ'	0.0090764				
0.72139				Δ λ	2.1816853	151.9446	C	0.71669		Δ λ	2.4589955	287.7369			
8.04728	2d term	+0.0112		Sin $\frac{1}{2}(\phi + \phi')$	9.3058963			8.59679	2d term	+0.0396	Sin $\frac{1}{2}(\phi + \phi')$	9.3035882			
3.2350				-Δ α	1.4875316	30.728	n ²	5.3678		-Δ α	1.7625837	57.887			
1.9889							D	1.9845							
5.2239	3d term	+0.0000						7.3523	3d term	+0.0023					
	-Δ φ	-41.4343								-Δ φ	-483.1443				

COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57

JOB NO. 942

CHKD. BY E.R.S. DATE 12-20-57

LOCATION ENIWETOK ATOLL

STATION	OBSERVED ANGLE	CORR - N	SPHERICAL		PLANE ANGLE AND DISTANCE	LOGARITHM
			ANGLE	EXCESS		
2-3					4,181.638	4.1517264
1 GAIL	44-06-40.3		42.23	0.07	42.16	
2 ENGEBI	122-20-05.9		02.78	0.08	03.70	
3 CORAL	13-33-13.8		14.14	0.00	14.14	
1-3	00.0					
1-2						
2-3					18,636.680	4.2705685
1 GAIL	67-19-48.8		49.04	0.13	48.91	
2 CORAL	92-37-51.9		48.88	0.14	48.74	
3 ALICE	20-02-25.0		22.35	0.00	22.35	
1-3						
1-2						
2-3					14,181.638	4.1517264
1 ALICE	48-59-20.6		21.15	0.18	20.97	
2 ENGEBI	97-25-03.6		02.73	0.19	02.54	
3 CORAL	33-35-36.8		36.49	0.00	36.49	
1-3	01.0					
1-2						
2-3						
1						
2						
3						
1-3						
1-2						

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POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-11-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

α	2 RUNIT to 3 CORAL	90° 50' 32.20"	α	3 CORAL to 2 RUNIT	270° 49' 34.00"
$2^d L$	B	+ 54 19 13.74	$3^d L$	B	- 15 09 58.37
α	2 RUNIT to 1 NORTH	145 09 45.94	α	3 CORAL to 1 NORTH	255 39 35.63
$\Delta \alpha$		- 09.29	$\Delta \alpha$		+ 0 48.90
		180 00 00.0			180 00 00.0
α'	1 NORTH to 2 RUNIT	325 09 36.63	α'	1 NORTH to 3 CORAL	75 40 24.54

FIRST ANGLE OF TRIANGLE 110-30-47.91

α	11 32 16.080	RUNIT	λ	162 22 01.621	ϕ	11 32 20.254	3 CORAL	λ	162 17 10.944
$\Delta \phi$	+ 01 05.730		$\Delta \lambda$	- 0 46.390	$\Delta \phi$	+ 01 01.556		$\Delta \lambda$	+ 04 04.286
ϕ'	11 33 21.810	NORTH	λ'	162 21 15.230	ϕ'	11 33 21.810	NORTH	λ'	162 21 15.230

Logarithms	Values in seconds		Logarithms	Values in seconds		Logarithms	Values in seconds		
3.3910410		$\frac{1}{2}(\phi + \phi')$	s	3.8830837		$\frac{1}{2}(\phi + \phi')$	11-32-51.032		
9.9142258		Logarithms	Values in seconds	Cos α	9.3938260	Logarithms	Values in seconds		
8.5124998		s	3.3910410	B	8.5124997	s	3.8830837		
1.8177666	1st term -65.7305	Sin α	9.7568241	h	1.7894694	1st term	-61.5842		
6.78208		A'	8.5096676	s^2	7.76617	A'	8.5096676		
9.51365		Sec ϕ'	0.0088946	Sin $^2 \alpha$	9.97251	Sec ϕ'	0.0088946		
0.71664		$\Delta \lambda$	1.6664273	46.3903	C	0.71669	$\Delta \lambda$	2.3878991	
7.01237	2d term +0.0010	Sin $\frac{1}{2}(\phi + \phi')$	9.3014075		8.45537	2d term	+0.0285	Sin $\frac{1}{2}(\phi + \phi')$	9.3014215
3.6355		$-\Delta \alpha$	0.9678348	9.286	n^2	3.5789	$-\Delta \alpha$	1.6893206	48.902
1.9845					D	1.9845			
5.6200	3d term +0.0000					5.5634	3d term	+0.0001	
	$-\Delta \phi$	-65.7295					$-\Delta \phi$	-61.5556	

HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION

SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-11-57

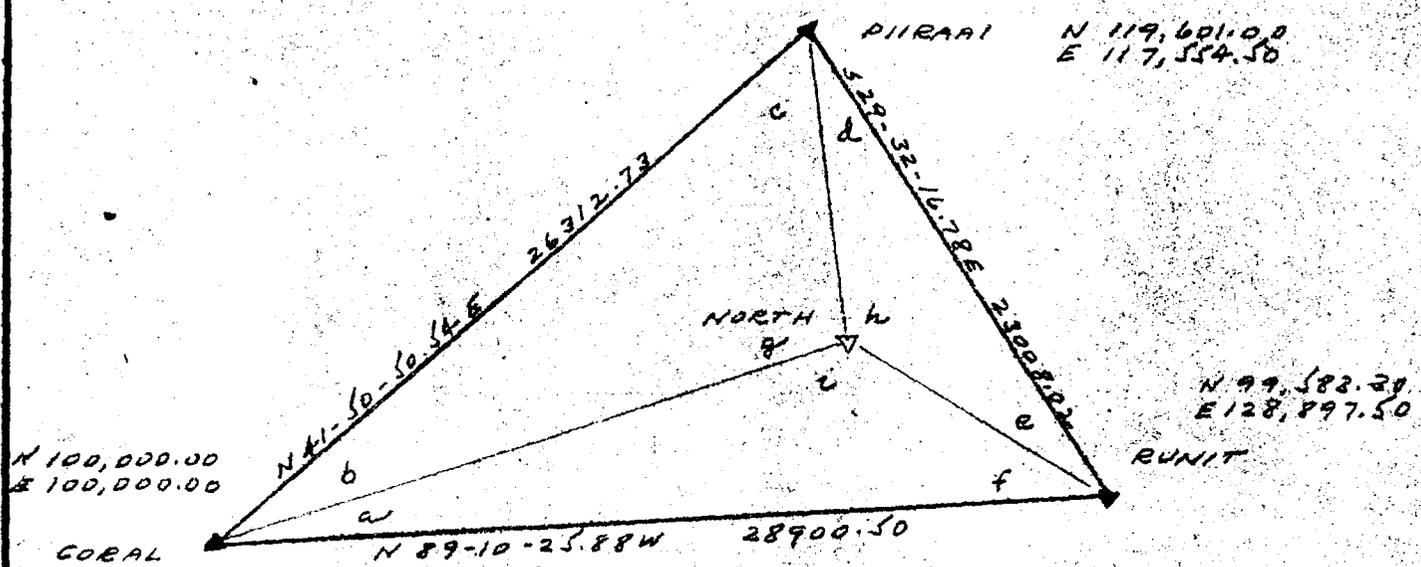
JOB NO. 942 LOCATION ENIWETOK ATOLL

α	2	to 3			α	3	PIIRAAI	to 2	CORAL	41	51	25.86
		8	+		$3^d \Delta$			8		- 68	31	51.88
α		to 1			α	3	PIIRAAI	to 1	NORTH	333	19	53.98
$\Delta \alpha$					$\Delta \alpha$					+ 0		13.58
				180	00	00.0				180	00	00.0
α'	1	to 2			α'		NORTH	to 3	PIIRAAI	153	20	07.53

FIRST ANGLE OF TRIANGLE

ϕ	11	35	34.6823	PIIRAAI	λ	162	20	07.55
$\Delta \phi$			02	12.873	$\Delta \lambda$	+	01	07.673
ϕ'	11	33	21.8101	NORTH	λ'	162	21	15.230

Logarithms	Values in seconds	Logarithms	Values in seconds	Logarithms	Values in seconds		
	$\frac{1}{2}(\phi + \phi')$	s	3.6597784		$\frac{1}{2}(\phi + \phi')$	11-34-28.245	
		Cos α	9.9511527				
		B	8.5124980				
	1st term	h	2.1234291	1st term	+132.8707	Sin α	9.6520773
		s^2	7.31957			A'	8.5096676
		Sin α^2	9.30415			Sec ϕ'	0.0088946
		C	0.71877			$\Delta \lambda$	1.8304179 67.6734
	2d term +		7.34249	2d term	+0.0022	Sin $\frac{1}{2}(\phi + \phi')$	9.3024221
		$-\Delta \alpha$				$-\Delta \alpha$	1.1328390 13.578
	3d term +		4.2469				
	$-\Delta \phi$		1.9864				
			6.2333	3d term	+0.0002		
				$-\Delta \phi$	+132.8731		



	OBS. \angle	GEO. COND.		TRIG. COND.	
a	15-10-01.9*	01.8	00.44	58.37	58.37
b	33-48-44.7	43.8	43.14	45.21	45.21
c	68-31-34.8*	33.9	34.23	32.16	31.84
d	2-51-35.3		33.09	35.16	35.48
e	5-18-53.2*		57.77	55.70	55.38
f	54-19-10.8	10.7	11.33	13.40	13.72
g	77-39-43.2	42.3	42.62		42.95
h	171-49-29.2		29.14		29.14
i	110-30-47.6	47.5	48.23		47.91

$\frac{\sin a, \sin c, \sin e}{\sin b, \sin d, \sin f} = 1$ * = Fixed \angle s.

Log Sin. 15-10-00.44	9.4176871	77.6	33-48-43.14	9.7454412	31.4
68-31-34.23	9.9687560	8.3	2-51-33.09	8.6979745	421.7
5-18-57.77	8.9668429	226.6	54-19-11.33	9.9097086	15.1
	8.3532860	312.5		8.3531243	468.2
	<u>1243</u>				<u>312.5</u>
	1617		1617 / 780.7 = 2.07		780.7

$\frac{\sin a - \sin c, \sin c, \sin i}{\sin f, \sin g} = 1$

Log 26312.73	4.4201659		28900.50	4.4609053	
" sin. 68-31-32.16	9.9687543	8.3	54-19-13.40	9.9097117	15.1
" " 110-30-48.23	9.9715496	7.9	77-39-42.63	9.9892517	4.6
	4.3604698	15.2		4.3604687	19.7
	<u>687</u>				<u>15.2</u>
	11		11 / 34.9 = 0.32		74.9

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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
LOS ANGELES, CALIFORNIA

JOB NO. 942

SHEET 2 OF 2

TITLE LOCATION Δ STATION NORTH

BY LSH DATE 9-6-57

26312.73
Sta 77-39-42.95

Sta 68-31-31.84
25,065.024

Sta 33-48-45.21
14,988.629

28900.50
Sta 110-30-47.91

Sta 54-19-13.72
25,064.997

Sta 15-09-58.37
8072.873

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COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57

JOB NO. 942

CHKD. BY ERG DATE 12-20-57

LOCATION ENUEWETOK ATOLL

STATION	OBSERVED ANGLE	CORR - N	SPHERICAL		PLANE ANGLE AND DISTANCE	LOGARITHM
			ANGLE	EXCESS		
2-3					8,808.890	3.9449212
1 NORTH	110-30-47.6		47.94	0.03	47.91	
2 RUNIT	54-19-10.8		13.74	0.02	13.72	
3 CORAL	15-10-01.9		58.37	0.00	58.37	
1-3						
1-2						
2-3					8,020.136	3,9041817
1 NORTH	77-39-43.2		42.99	0.04	42.95	
2 CORAL	33-48-44.7		45.21	0.00	45.21	
3 PIIRAAI	68-31-54.8		31.88	0.04	31.84	
1-3						
1-2						
2-3					8,808,890	3.9449212
1 PIIRAAI	71-23-10.1		07.39	0.07	07.32	
2 RUNIT	59-38-04.0		09.17	0.07	09.10	
3 CORAL	48-58-46.6		43.58	0.00	43.58	
1-3						
1-2						
2-3						
1						
2						
3						
1-3						
1-2						

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HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

TRAVERSE LOCATION OF
STA. LANTANA, KEITH, JAMES, HENRY JOB NO. 942

CHKD. BY CSH DATE 11-57 F. B. REF. SHEET NO. 1 OF 1
DATE 12-26-57

STATION	BEARING	DISTANCE	COSINE	SINE	CO-ORDINATES		MORTH	EAST
					LATITUDE	DEPARTURE		
1								
2	EIGILI-2 TO						71,860.40	32,190.00
3	CORAL	N67-27-45.60E 73,416.85	38328535	92362999	+28,139.60	+67,810.00	100,000.00	100,000.00
4	KEITH	S33-11-44.10E 39,702.99	77499320	63198957	-30,924.55	+25,217.48	40,935.85	57,407.47
5	JAMES	S41-27-08.70E 44,775.53	74950576	66199782	-33,559.52	+29,641.30	38,300.88	61,831.30
6	HENRY	S45-13-17.50E 54,401.26	70436067	70984227	-38,318.11	+38,416.31	33,542.29	70,806.31
7	LANTANA	S49-25-24.70E 63,053.07	65046238	75953848	-41,013.65	+47,891.23	30,846.75	80,081.23
8								
9	CORAL TO						100,000.00	100,000.00
10	KEITH	S35-47-46.50W 72,819.62	81110210	58490459	-59,064.15	-42,592.53	40,935.85	57,407.47
11	JAMES	S51-44-31.30W 72,550.89	85042543	52609560	-61,699.12	-38,163.70	38,300.88	61,831.30
12	HENRY	S23-42-54.10W 72,587.18	91555713	40218772	-66,957.71	-29,193.68	33,542.29	70,806.31
13	LANTANA	S16-04-06.30W 71,969.78	96093187	27678500	-69,153.25	-19,918.77	30,846.75	80,081.23
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28	31							

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-15-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

2 RIGILI to 3 CORAL	247° 25'	29.60"	α	3 CORAL to 2 RIGILI-2	67° 27'	45.60"
8	+ 63 06	49.70	3 ^d L	8	- 51 23	39.79
RIGILI to 1 LANTANA	310 32	19.30	α	3 CORAL to 1 LANTANA	16 04	05.81
	+ 01	35.25	Δα		- 10	39.73
	180 00	00.0			180 00	00.0
LANTANA to 2 RIGILI-2	130 33	54.55	α'	LANTANA to 3 CORAL	196 03	36.08

FIRST ANGLE OF TRIANGLE 65-29-31.49

11 27 46.853 ² RIGILI-2	λ	162 05 49.036	φ	11 32 20.254 ³ CORAL	λ	162 17 10.944
- 06 46.660	Δλ	+ 08 01.683	Δφ	- 11 26.031	Δλ	- 03 20.226
11 20 54.223 ¹ LANTANA	λ'	162 13 50.718 ⁸	φ'	11 20 54.223 ¹ LANTANA	λ'	162 13 50.718

Logarithms	Values in seconds	$\frac{1}{2}(\phi + \phi')$	Logarithms	Values in seconds	$\frac{1}{2}(\phi + \phi')$
4.2837221		s	4.3411358		s
9.8128876		Logarithms	9.9826929		Logarithms
8.5125021		Values in seconds	8.5124997		Values in seconds
2.6091118	1st term +406.5480	Sin α	9.8807949	1st term +686.0068	Sin α
8.56744		A'	8.5096696		A'
9.76159		Sec φ'	0.0085751		Sec φ'
0.71367		Δλ	2.6827617	481.6834	Δλ
9.04270	2d term +0.1103	Sin $\frac{1}{2}(\phi + \phi')$	9.2960962		Sin $\frac{1}{2}(\phi + \phi')$
5.2182		-Δα	1.9788579	95.248	-Δα
1.9817					
7.1999	3d term +0.0016				
	-Δφ +406.6599				

HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION

SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-15-57

JOB NO. 942 LOCATION ENIWETOK ATOLL

α	2 RIGILI-2 to 3 CORAL	247° 25' 29.60"	α	3 CORAL to 2 RIGILI-2	67° 27' 45.60"
β		+ 73 20 30.63	β		- 31 39 59.10
α	1 RIGILI-2 to 1 KEITH	320 46 00.23	α	3 CORAL to 1 KEITH	35 47 46.50
$\Delta\alpha$		+ 50.23	$\Delta\alpha$		- 01 25.06
		180 00 00.0			180 00 00.0
α'	1 KEITH to 2 RIGILI-2	140 46 50.48 ⁹	α'	1 KEITH to 3 CORAL	215 46 21.48 ³

FIRST ANGLE OF TRIANGLE 74-59-30.94

RIGILI-2		CORAL		KEITH	
Logarithms	Values in seconds	Logarithms	Values in seconds	Logarithms	Values in seconds
4.0850213		4.3462642		4.3462642	
7.8890648		9.9090755		9.9090755	
8.5125031		8.5124997		8.5124997	
2.4265582	1st term +306.6113	2.7678394	1st term +585.9215	2.7678394	1st term +585.9215
8.17004		8.69253		8.69253	
9.60209		9.53417		9.53417	
0.71367		0.71669		0.71669	
8.45580	2d term +0.0306	8.94339	2d term +0.0878	8.94339	2d term +0.0878
4.9732		5.5357		5.5357	
1.9817		1.9845		1.9845	
6.9549	3d term +0.0009	7.5202	3d term +0.0033	7.5202	3d term +0.0033
	- $\Delta\phi$ + 306.6428		- $\Delta\phi$ + 506.0126		- $\Delta\phi$ + 506.0126

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION

SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-15-57

JOB NO. 242 LOCATION ENIWETOK ATOLL

α	2 RIGILI-2 to 3 CORAL	247° 25' 29.60"	α	3 CORAL to 2 RIGILI-2	67° 27' 45.60"
β	B	+ 71 05 06.07	β	B	- 35 43 14.30
α	RIGILI-2 to 1 JAMES	318 30 35.67	α	3 CORAL to 1 JAMES	31 44 31.30
$\Delta\alpha$		+ 59.02	$\Delta\alpha$		- 01 16.20
		180 00 00.0			180 00 00.0
α'	1 JAMES to 2 RIGILI-2	138 31 34.89	α'	1 JAMES to 3 CORAL	211 43 15.70

FIRST ANGLE OF TRIANGLE 73-11-40.37

ϕ	11 27 40.888 RIGILI-2	λ	162 05 49.036	ϕ	11 32 20.254 3 CORAL	λ	162 17 10.944
$\Delta\phi$	- 05 32.765	$\Delta\lambda$	+ 04 58.203	$\Delta\phi$	- 10 12.136	$\Delta\lambda$	- 06 23.706
ϕ'	11 22 08.118 JAMES	λ'	162 10 47.238	ϕ'	11 22 08.118 JAMES	λ'	162 10 47.238

Logarithms		Values in seconds		Logarithms		Values in seconds		
4.1350566		$\frac{1}{2}(\phi + \phi')$		s	4.3446586	$\frac{1}{2}(\phi + \phi')$		
9.5745226		Logarithms	Values in seconds	cos α	9.9296362	Logarithms	Values in seconds	
8.5125021		s	4.1350566	B	8.5124997	s	4.3446586	
2.5220813	1st term + 332.7218	Sin α	9.8211797	h	2.7867945	1st term + 612.0607	Sin α	9.7210647
8.27011		A'	8.5096695	s ²	8.68932		A'	8.5096695
9.64236		Sec ϕ'	0.0086063	Sin ² α	9.44213		Sec ϕ'	0.0086063
0.71367		$\Delta\lambda$	2.4745121 298.2031	C	0.71669		$\Delta\lambda$	2.5839991 383.706
8.62614	2d term + 0.0423	Sin $\frac{1}{2}(\phi + \phi')$	9.2964818		8.84814	2d term + 0.0764	Sin $\frac{1}{2}(\phi + \phi')$	9.2979357
5.0442		$-\Delta\alpha$	1.7709939 59.020	n ²	5.7359		$-\Delta\alpha$	1.8819348 76.196
1.9817				D	1.9845			
7.0257	3d term + 0.0011				7.7204	3d term + 0.0053		
	$-\Delta\phi + 532.7652$					$-\Delta\phi + 612.1364$		

HOLMES & HARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION

SECOND ORDER TRIANGULATION

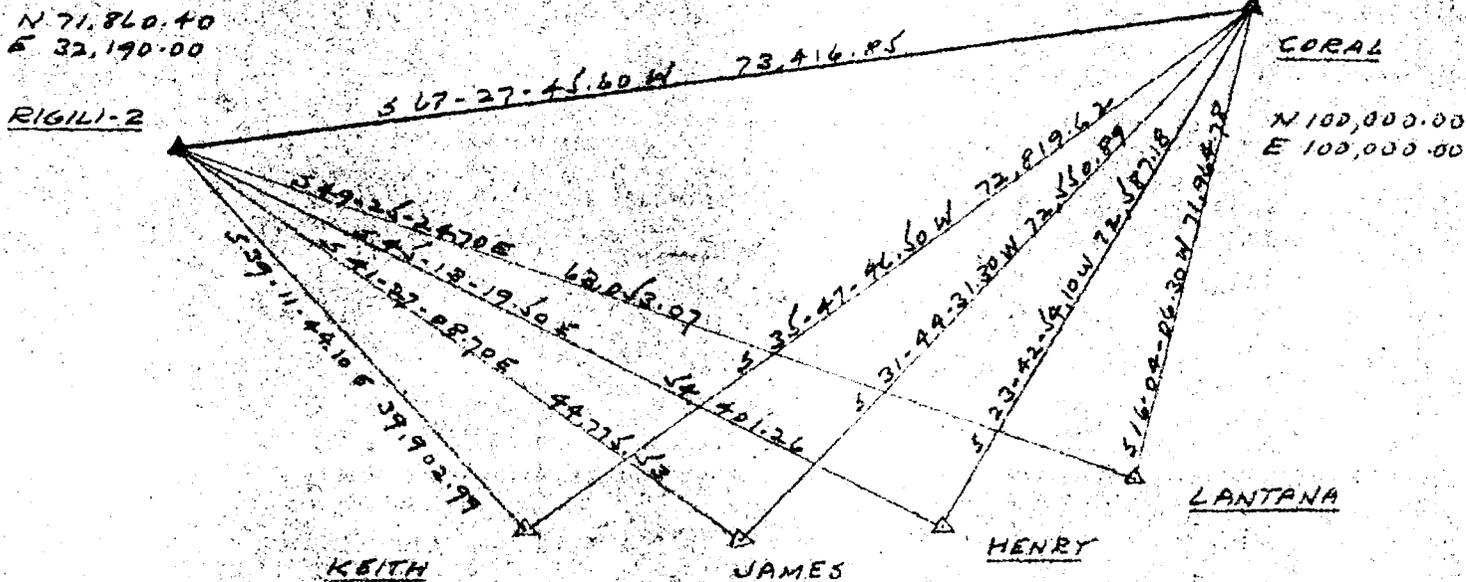
COMPUTED BY LSH DATE 12-15-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

α	2 RIGILI-2 to 3 CORAL	247° 25'	29.60"	α	3 CORAL to 2 RIGILI-2	67° 27'	45.60"
β	B	+ 67 18	55.33	β	B	- 43 44	51.50
α	2 RIGILI-2 to 1 HENRY	314 44	24.93	α	3 CORAL to 1 HENRY	23 42	54.10
$\Delta\alpha$		+ 01 16.84		$\Delta\alpha$		- 0 58.24	
		180 00	00.0			180 00	00.0
α'	1 HENRY to 3 CORAL	134 45	41.79	α'	1 HENRY to 3 CORAL	203 41	55.86 ^s

FIRST ANGLE OF TRIANGLE 68-56-14.04

ϕ	11 27 40.853 ³ RIGILI-2	λ	162 05 49.036	ϕ	11 32 20.254 ³ CORAL	λ	162 17 10.944
$\Delta\phi$	- 06 19.942	$\Delta\lambda$	+ 06 28.441	$\Delta\phi$	- 10 59.312	$\Delta\lambda$	- 04 53.468
ϕ'	11 21 20.941 HENRY	λ'	162 12 17.475	ϕ'	11 21 20.942 HENRY	λ'	162 12 16.476 ^s

Logarithms		Values in seconds		Logarithms		Values in seconds		
4.2196248		$\frac{1}{2}(\phi+\phi')$		s	4.3448758	$\frac{1}{2}(\phi+\phi')$		
9.8475073		Logarithms	Values in seconds	Cos α	9.9616854	Logarithms	Values in seconds	
8.5125021		s	4.2196248	B	8.5124997	s	4.3448758	
2.5796342	1st term + 379.8693	Sin α	9.8514449	h	2.8190609	1st term + 659.2665	Sin α	9.6044290
8.43925		A'	8.5096696	s ²	8.68975		A'	8.5096696
9.70289		Sec ϕ'	0.0085864	Sin ² α	9.20885		Sec ϕ'	0.0085864
0.71367		$\Delta\lambda$	2.5893257 388.4415	C	0.71669		$\Delta\lambda$	2.4675608 293.468
8.85581	2d term + 0.0717	Sin $\frac{1}{2}(\phi+\phi')$	9.2962356		8.61529	2d term + 0.0412	Sin $\frac{1}{2}(\phi+\phi')$	9.2976906
5.1593		$-\Delta\alpha$	1.8855613 76.835	n ²	5.6381		$-\Delta\alpha$	1.7652514 58.244
1.9817				D	1.9845			
7.1410	3d term + 0.0014				7.6226	3d term + 0.0042		
	$-\Delta\phi$ + 379.9424					$-\Delta\phi$ + 659.3119		



HENRY	68-56-14.8	13.6	KEITH	74-59-31.9	30.6
CORAL	43-44-52.6	51.5	CORAL	31-40-00.4	39.59.1
RIGILI-2	67-18-56.0	54.9	RIGILI-2	73-20-31.6	30.2
	03.4			03.9	
JAMES	73-11-41.5	40.0	LANTANA	65-29-34.0	31.0
CORAL	35-43-15.7	14.3	CORAL	51-23-42.4	39.3
RIGILI-2	71-05-07.1	02.7	RIGILI-2	63-06-52.8	49.7
	04.3			(09.2)	

KEITH	<u>73,416.85</u>	Sin 31-39-59.10	Sin 73-20-30.30
	Sin 74-59-30.60	39,902.987	72,819.620
JAMES	<u>73,416.85</u>	Sin 35-43-14.30	Sin 71-05-05.70
	Sin 73-11-40.00	44,775.528	72,550.886
HENRY	<u>73,416.85</u>	Sin 43-44-51.50	Sin 67-18-54.90
	Sin 68-56-13.60	54,401.263	72,587.182
LANTANA	<u>73,416.85</u>	Sin 51-23-39.3	Sin 63-06-49.7
	Sin 65-29-31.0	63,053.069	71,964.781

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COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57
 CHKD. BY ERQ DATE 12-20-57

JOB NO. 942
 LOCATION ENIWETOK ATOLL

STATION	OBSERVED ANGLE	CORR - N	SPHERICAL		PLANE ANGLE AND DISTANCE	LOGARITHM
			ANGLE	EXCESS		
2-3					22,377.501	4.3498116
1 LANTANA	65-29-34.0		31.49	0.49	31.0	
2 RIGILI-2	51-23-42.4		39.79	0.49	39.3	
3 CORAL	63-06-52.8		49.70	0.00	49.7	
1-3						
1-2						
2-3					22,377.501	4.3498116
1 HENRY	68-56-14.8		14.04	0.44	13.60	
2 RIGILI-2	67-18-56.0		55.33	0.43	54.90	
3 CORAL	43-44-52.6		51.50	0.00	51.50	
1-3					03.4	
1-2						
2-3					22,377.501	4.3498116
1 JAMES	73-11-41.5		40.37	0.37	40.00	
2 RIGILI-2	71-05-07.1		06.07	0.37	05.70	
3 CORAL	35-43-15.7		14.30	0.00	14.30	
1-3					04.3	
1-2						
2-3					22,377.501	4.3498116
1 KEITH	74-59-31.9		30.94	0.34	30.60	
2 RIGILI-2	73-20-31.6		30.63	0.33	30.30	
3 CORAL	31-40-00.4		59.10	0.00	39-59.10	
1-3					03.9	
1-2						

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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION GAIL SITE Gene
CHIEF OF PARTY H. M. Johnson Teiteiripucchi Island
DESCRIBED BY W. Creasman MARKED BY H.M.J. Eniwetok Atoll
FIELD BOOK NO PAGE DATE 5/14/57 Marshall Islands

OBJECT	DISTANCES AND DIRECTIONS TO REFERENCE MARKS		ELEVATION
	DISTANCE	DIRECTION	
	FEET	METERS	
Gail			4.52
Elgin	---		00-00-00
Buck #1	164.04		32-27-24
Buck #2	328.07		32-27-24

ELEVATION OF MARK 4.52

DETAILED DESCRIPTION OF STATION

This station was established as a second order triangulation station in the Atoll Control Net by the Holmes & Narver 1957 Replacement Survey to replace triangulation Station GENE which was destroyed during Operation Redwing.

This station is located approximately at the center of the island and 125 feet from the lagoon high tide line.

The station mark is a standard H & N brass cap set in a concrete filled 55 gallon drum encasing the top of a 10" H-pile. It is stamped "Gail - H & N - 1957." The mark is 6" below the ground surface.

This station is the western end of the "Gene-Helen-Irene" first order traverse.

Bucks #1 and #2 are 4"x4" posts set in concrete with a punched aluminum strip fastened to the top. The Strips are stamped with the buck number.

DECLASSIFIED PER DOD
REF ID: A66677 JULY 15, 1994
BY: [illegible] TO
[illegible]

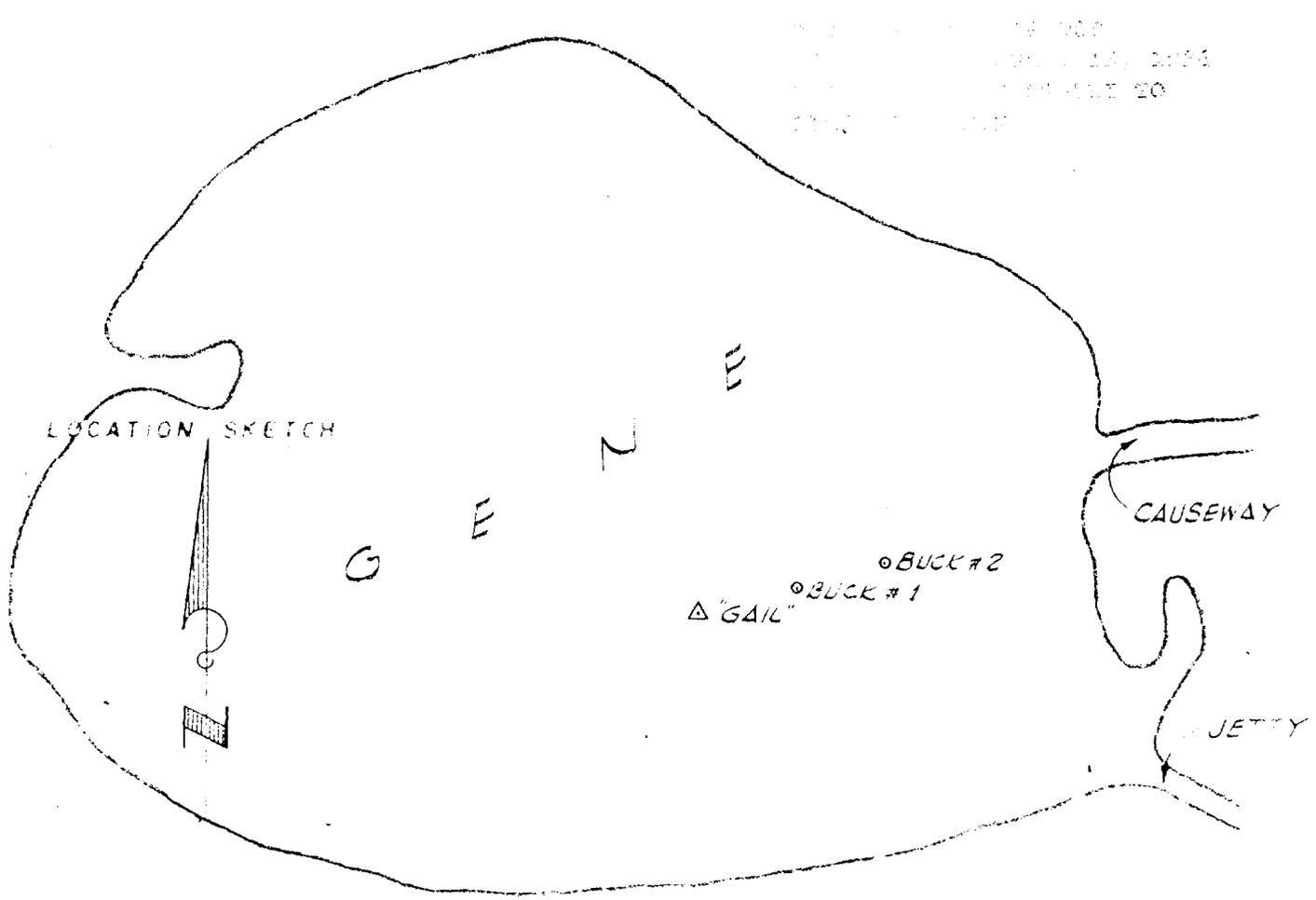
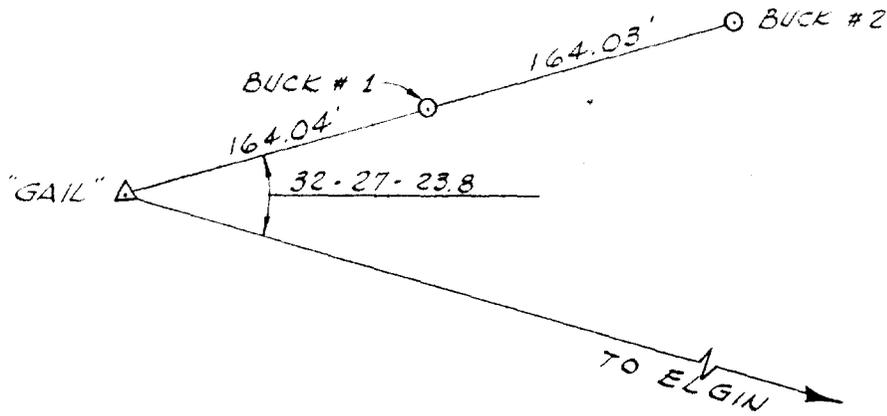
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PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION: Gail

SITE: Gene, Teiteiripucchi Is, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)



19 000
1900 10 2000
1900 10 2000
1900 10 2000

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L A E O C U

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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION HENRY SITE HENRY
CHIEF OF PARTY F. A. Axtell Mui Island
DESCRIBED BY W. Creasman MARKED BY F. A. A. Eniwetok Atoll,
FIELD BOOK NO PAGE DATE June 1957 Marshall Islands

OBJECT	DISTANCE		DIRECTION	ELEVATION
	FEET	METERS		
Henry				6.54
Rigili #2	---	---	00-00-00	---
P.I. #1	147.35	---	275-20-33	7.72
P.I. #9	560.33	---	142-49-13	11.64

ELEVATION OF MARK 6.54

DETAILED DESCRIPTION OF STATION

This station was established as a third order triangulation station in the Atoll Control Net by the Holmes & Narver 1957 Expansion Survey

This station is located on the north east portion of the island approximately 50 feet south of the lagoon high tide line.

The station mark is a standard H & N brass cap set in concrete 1 foot below the ground surface. It is stamped "Henry - H & N - 1957."

P.I.'s #1 and #9 are 1"x3" flats marked with stake tacks. The flats are driven flush with the ground surface. They are P.I.'s in the Island topographic control traverse.

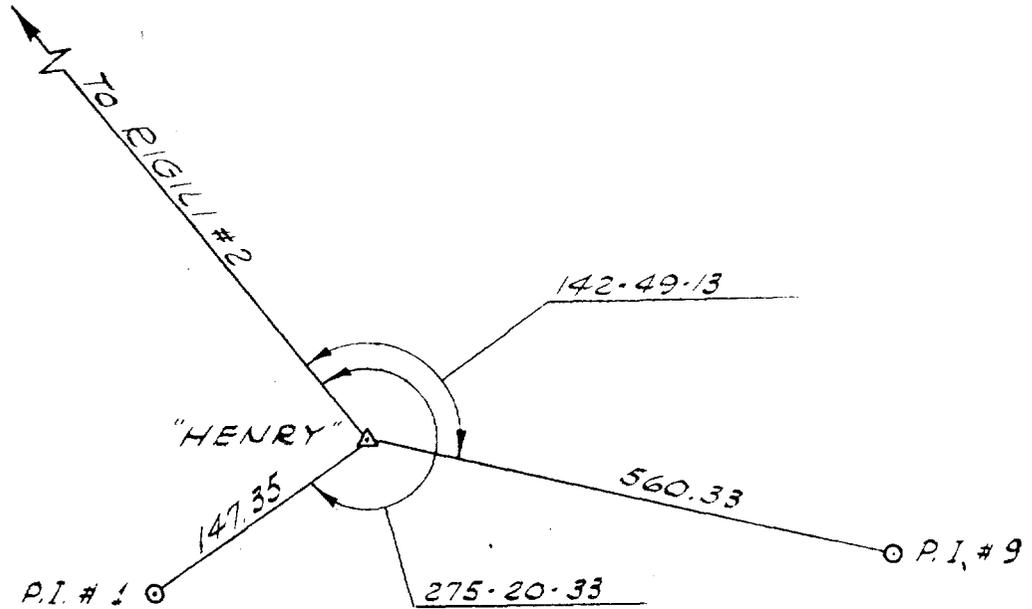
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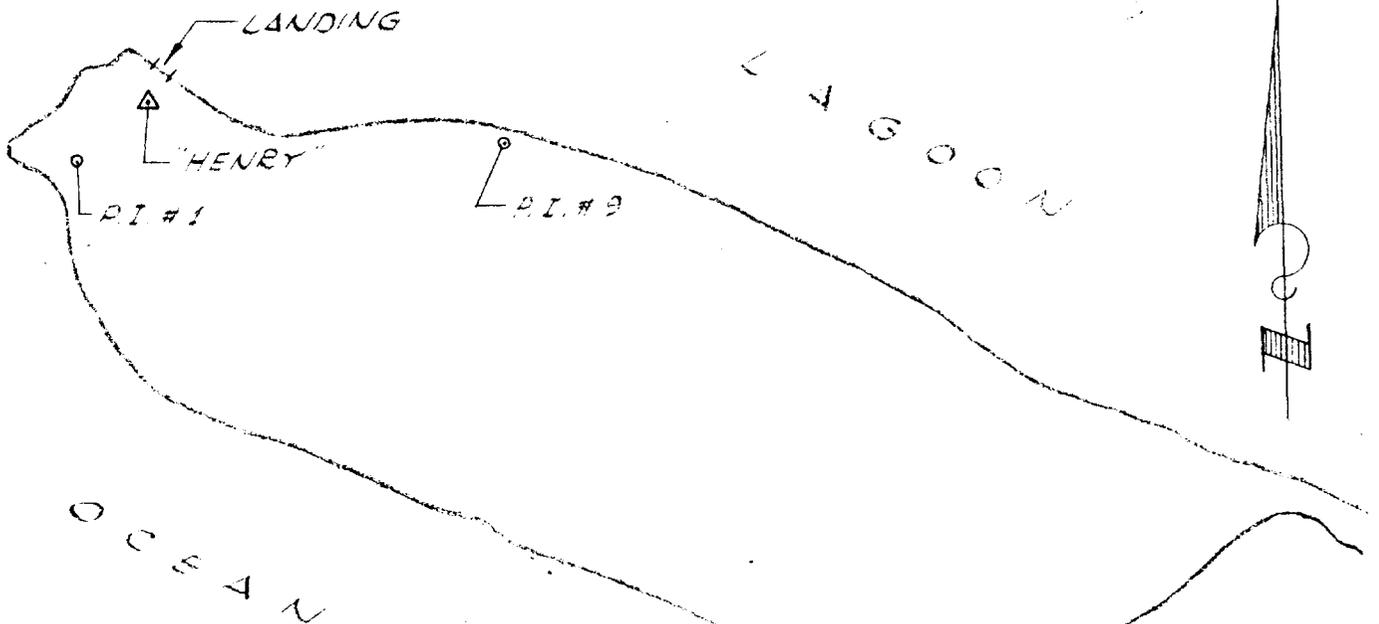
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION Henry SITE Henry, Mui Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION CONT'D



LOCATION SKETCH



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ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: JAMES SITE: JAMES
CHIEF OF PARTY: F. A. Axtell Rabaion Island
DESCRIBED BY: W. Creasman MARKED BY: F.A.A. Eniwetok Atoll
FIELD BOOK NO: PAGE: DATE: June 1957 Marshall Islands

OBJECT	DISTANCE		DIRECTION	ELEVATION
	FEET	METERS		
James				6.76
Rigili #2	---	---	00-00-00	---
P.I. #1	197.26	---	293-21-02	7.18
P.I. #8	117.10	---	172-25-22	---

ELEVATION OF MARK: 6.76

DETAILED DESCRIPTION OF STATION:

This station was established as a third order triangulation station in the Atoll Control Net by the Holmes & Narver 1957 Expansion Survey.

This station is located on the north east portion of the island approximately 30 feet from the lagoon high tide line.

The station mark is a standard H & N brass cap set in concrete flush with the ground. It is stamped "James - H & N - 1957."

P.I.'s #1 and #8 are 1"x3" flats marked with stake tacks. The flats are driven flush with the ground surface. They are P.I.'s in the Island topographic control traverse.

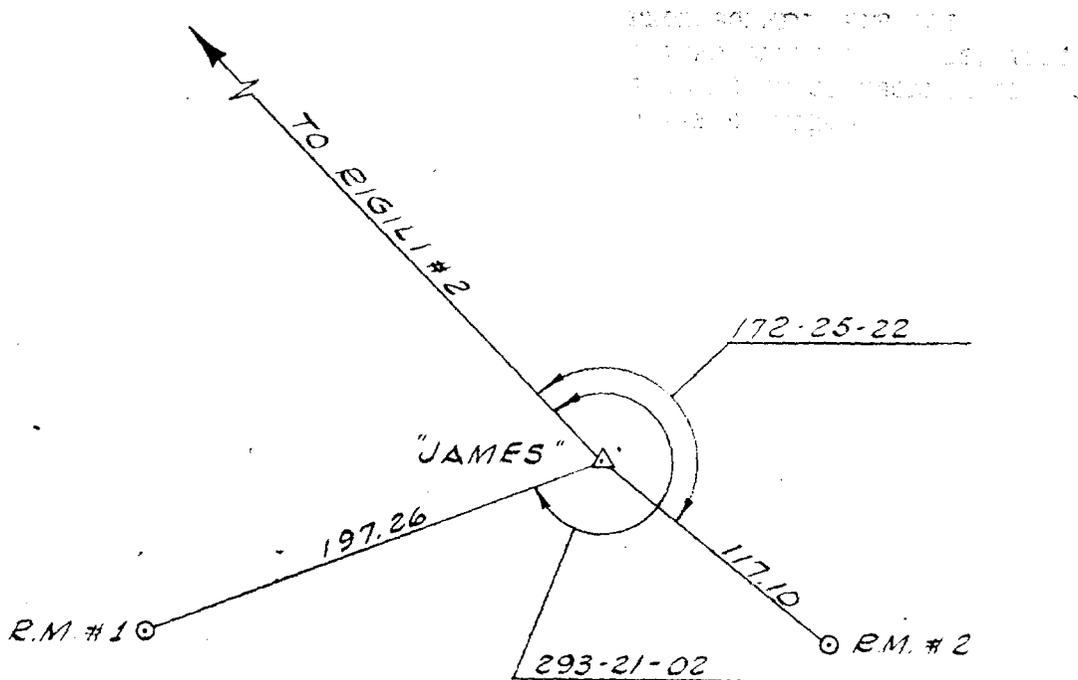
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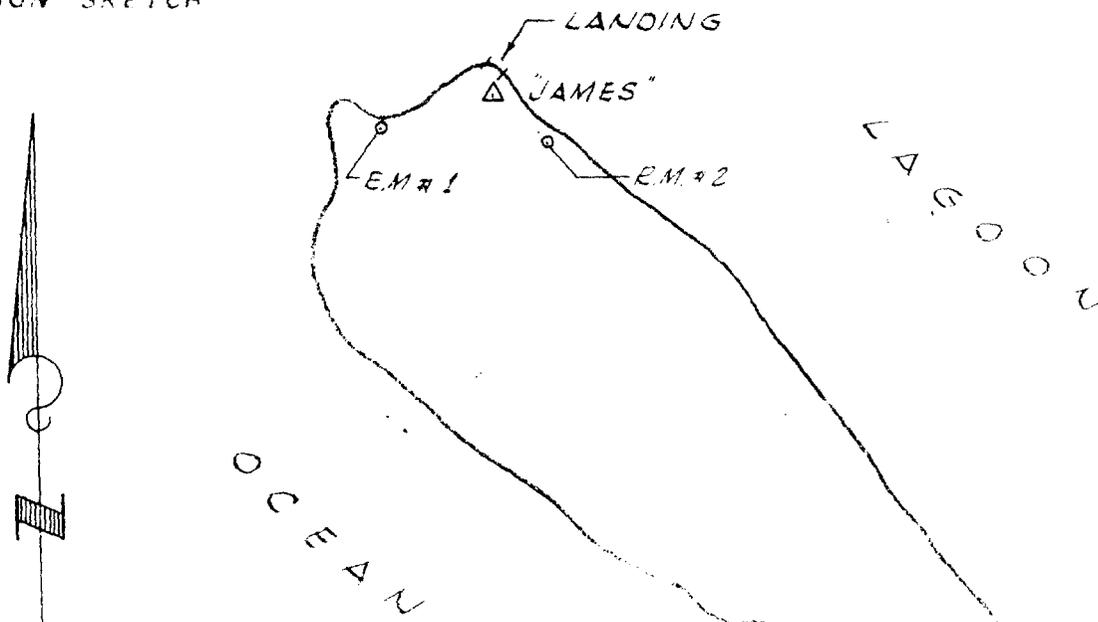
PAGE 2-DESCRIPTION OF TRIANGULATION STATION

STATION JAMES SITE James, Rabaion Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION, CONT'D.



LOCATION SKETCH



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DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION JUNK SITE IRWIN
CHIEF OF PARTY H. C. Dalton Pokon Island
DESCRIBED BY W. Creasman MARKED BY: H.C.D. Eniwetok Atoll
FIELD BOOK NO. PAGE DATE 8/10/57 Marshall Islands

OBJECT	DISTANCES AND DIRECTIONS TO REFERENCE MARKS		ELEVATION
	FEET	METERS	
Junk			
Henry	2544.54		00-00-00 6.54
P.I. #3	103.99		24-33-52 8.36
P.I. #4	197.03		155-26-08 8.66

ELEVATION OF MARK:

DETAILED DESCRIPTION OF STATION.

This station was established as a third order Traverse Station in the Atoll control net by traverse from Triangulation Station Henry as a part of the Holmes & Narver 1957 Expansion Survey.

This station is located approximately 355 feet from the east end of the island and 45 feet from the lagoon high tide line.

The station mark is a standard Holmes & Narver brass disc set in concrete 1 foot below the ground surface. It is stamped "Junk - H & N - 1957."

P.I. #3 is a 1"x3" flat marked with a stake tack driven flush with the ground surface.

P.I. #4 is a 2"x2" stake marked with a stake tack driven flush with the ground surface.

P.I.'s #3 & #4 are both P.I.'s in the Island topographic control traverse.

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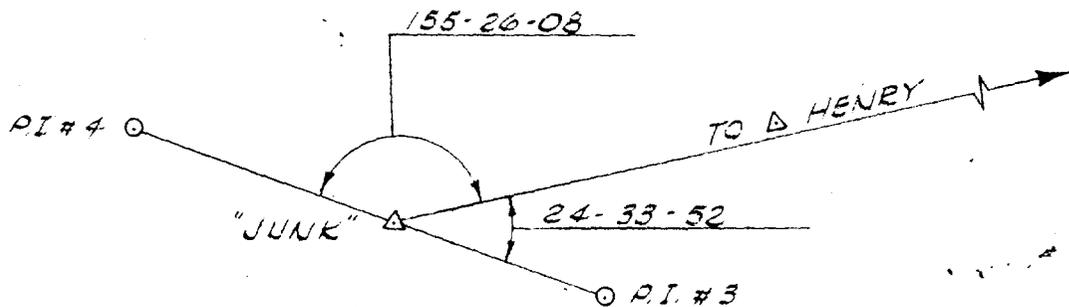
PAGE 2-DESCRIPTION OF TRIANGULATION STATION

STATION JUNK

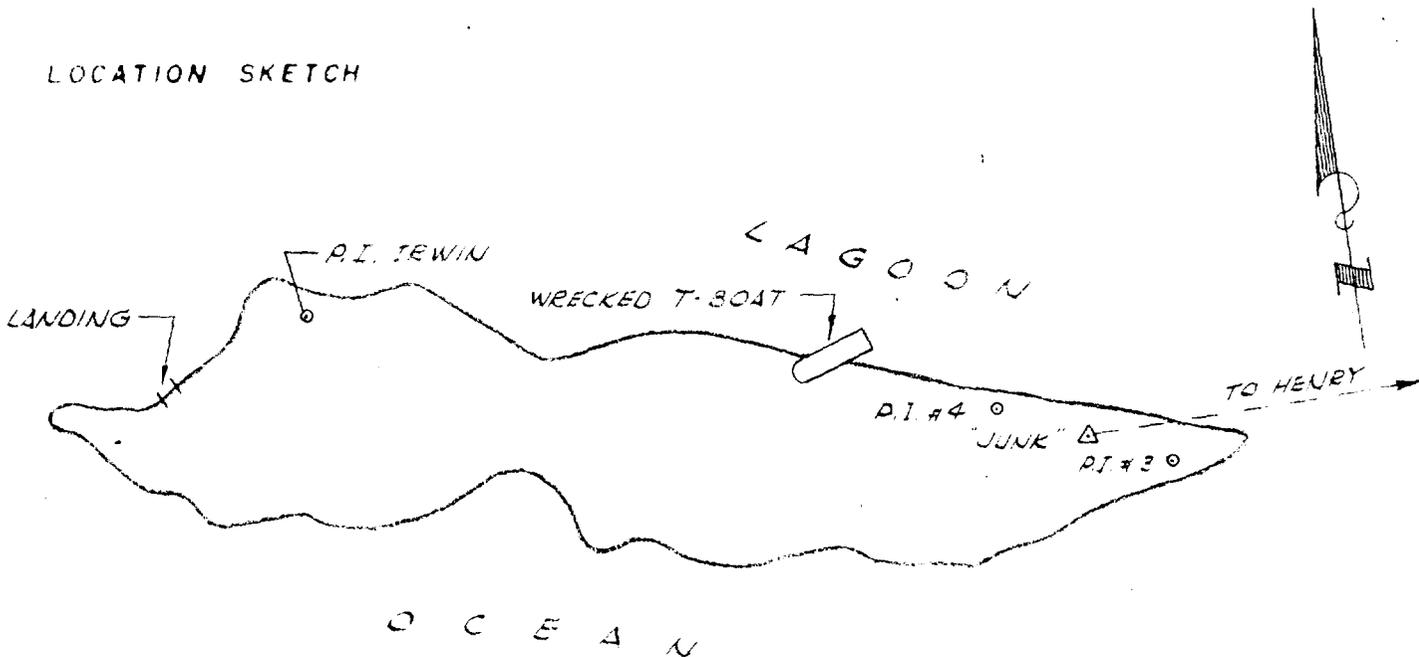
SITE Irwin, Pokon Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)

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ORDER DATED JULY, 15, 1994
FROM ANTON SINISCALLI TO
REAME S. NIXON



LOCATION SKETCH



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DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION. KEITH SITE KEITH
CHIEF OF PARTY. F. A. Axtell Giriinien Island
DESCRIBED BY. W. Creasman MARKED BY. F.A.A. Eniwetok Atoll
FIELD BOOK NO. PAGE DATE June 1957 Marshall Islands

OBJECT	DISTANCE		DIRECTION	ELEVATION
	FEET	METERS		
Keith				8.69
Rigili #2	---	---	00-00-00	---
P.I. #1	203.61		334-37-49	8.04
P.I. #9	605.25		167-11-39	10.82

ELEVATION OF MARK 8.69

DETAILED DESCRIPTION OF STATION.

This station was established as a third order triangulation station in the Atoll Control Net by the Holmes & Narver 1957 Expansion Survey.

This station is located on the north portion of the island, approximately 40 feet from the lagoon high tide line.

The station mark is a standard H & N brass cap set in concrete 1 foot below the ground surface. It is stamped #Keith - H & N - 1957."

P.I.'s #1 and #9 are 1"x3" flats marked with stake tacks. The flats are driven flush with the ground surface. They are P.I.'s in the Island topographic control traverse.

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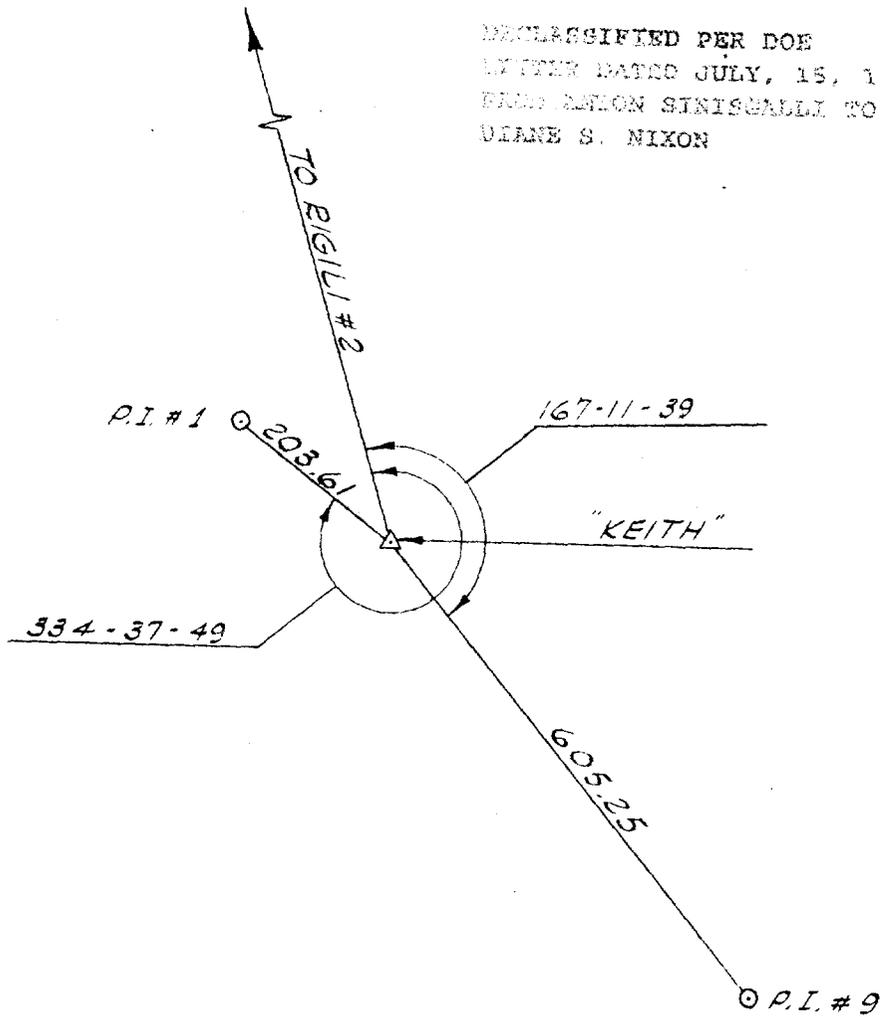
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION KEITH

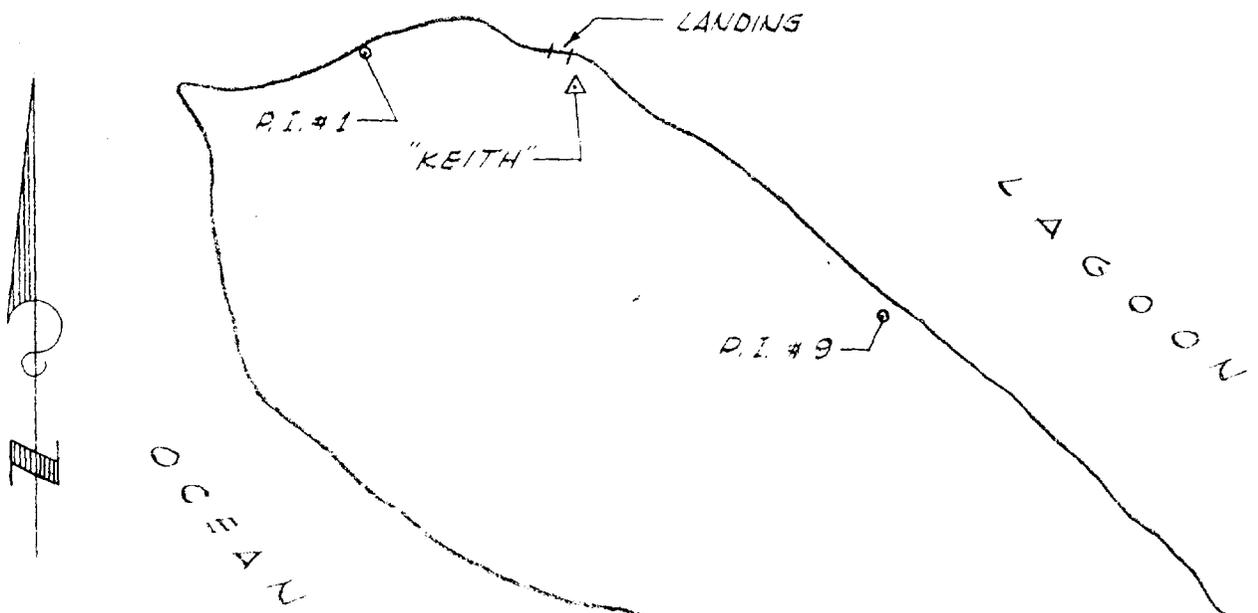
SITE: Keith, Grinnien Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)

DECLASSIFIED PER DOE
LETTER DATED JULY, 15, 1994
FROM EMBLON SINISCALLI TO
DEANE S. NIXON



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DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION NORTH SITE YVONNE
CHIEF OF PARTY H.M. Johnson Runit Island
DESCRIBED BY W. Creasman MARKED BY H.M.J. Eniwetok Atoll
FIELD BOOK NO PAGE DATE 5/10/57 Marshall Islands

OBJECT	DISTANCE		DIRECTION	ELEVATION
	FEET	METERS		
North				5.44
Coral	----		00-00-00	----
R.M. #1	164.03		114-37-05	10.59
R.M. #2	3658.29		114-37-05	13.62

ELEVATION OF MARK 5.44

DETAILED DESCRIPTION OF STATION

This station was established as a Second Order Triangulation Station in the Atoll Control Net by the Holmes & Narver 1957 Replacement Survey to replace triangulation station Yvonne, which was disturbed during Operation Redwing.

This station is located approximately 500 feet from the north end of the island and 300 feet from the lagoon high tide line.

The station mark is a standard H & N brass cap set in a concrete filled 55 gallon drum encasing the top of a 10" H-pile. It is stamped "North - H & N - 1957." The mark is 6" below the ground surface.

This station is at the north end of the "Yvonne" first order traverse.

R.M. #1 is a 4"x4" post set in concrete with a punch-marked aluminum strip stamped "Buck #1" nailed to its top. It is a chaining buck on the "Yvonne" first order traverse.

R.M. #2 is a standard H & N brass cap set in concrete set flush with the ground surface. It is stamped "Ynez." It is flush with the surrounding ground. This R.M. is an angle point on the "Yvonne" first order traverse.

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DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION SALLY SITE SALLY
CHIEF OF PARTY H. M. Johnson Aomon Island
DESCRIBED BY W. Creasman MARKED BY H.M.J. Eniwetok Atoll
FIELD BOOK NO. PAGE DATE 5/13/57 Marshall Islands

OBJECT	DISTANCES AND DIRECTIONS TO REFERENCE MARKS		ELEVATION
	FEET	METERS	
Sally			9.59
Coral			---
Buck #41	164.04		12.86
Buck #30	164.05		12.72
Buck #29	54.00		13.06

ELEVATION OF MARK: 9.59

DETAILED DESCRIPTION OF STATION.

This station was established as a second order triangulation station in the Atoll Control Net by the Holmes & Narver 1957 Replacement Survey to replace triangulation station Aomon which was disturbed during Operation Redwing

This station is located on the south east portion of the island, approximately 350 feet from the lagoon high tide line.

The station mark is a standard H & N brass cap set in a concrete filled 55 gallon drum encasing the top of a 10" H-pile. It is stamped "Sally - H & N * 1957." The mark is 6" below the ground surface.

This station is a part of the "Sally" first order Traverse.

Bucks #29, 30 and 41 are 4"x4" posts set in concrete with an aluminum strip on the top with the buck number stamped on it. They are chaining bucks in the Sally First Order Traverse.

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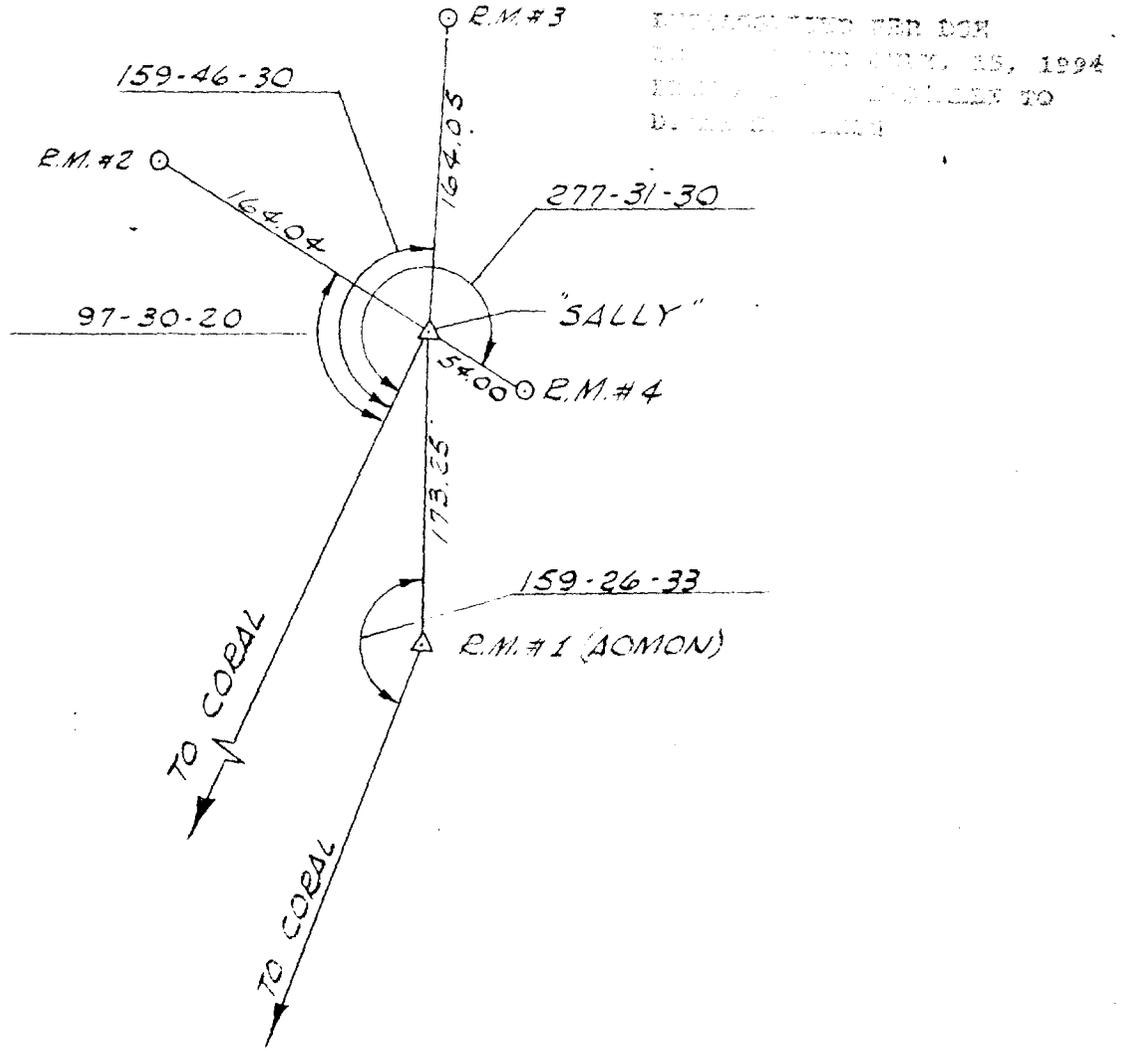
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PAGE 2-DESCRIPTION OF TRIANGULATION STATION

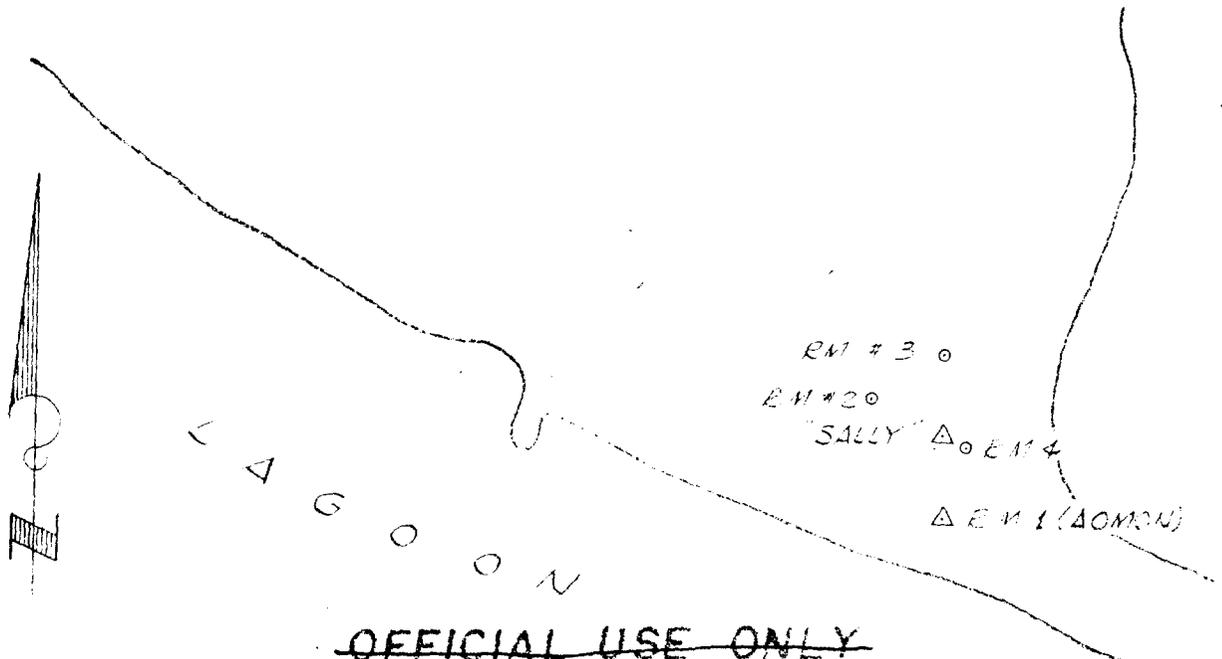
STATION Sally

SITE Sally, Aomon Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D.)



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DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION RUJORU #2 SITE PEARL
CHIEF OF PARTY H. M. Johnson Rujoru Island
DESCRIBED BY W. Creasman MARKED BY H.M.J. Eniwetok Atoll
FIELD BOOK NO PAGE DATE May 1957 Marshall Islands

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE		DIRECTION	ELEVATION
	FEET	METERS		
Rujoru #2				10.66

ELEVATION OF MARK 10.66

DETAILED DESCRIPTION OF STATION

This station was established as a second order triangulation station in the Atoll Control Net by the Holmes and Narver 1957 Replacement Survey to replace Rujoru, which was disturbed during Operation Redwing.

The station mark is a standard H & N brass cap set in a mass of concrete encasing the top of a number of steel rebars driven to refusal. It is marked only by a center punch mark.

This station is located approximately 90 feet from the ocean high tide line and 116 feet from the easterly end of the island.

No reference marks were set at this station when it was established.

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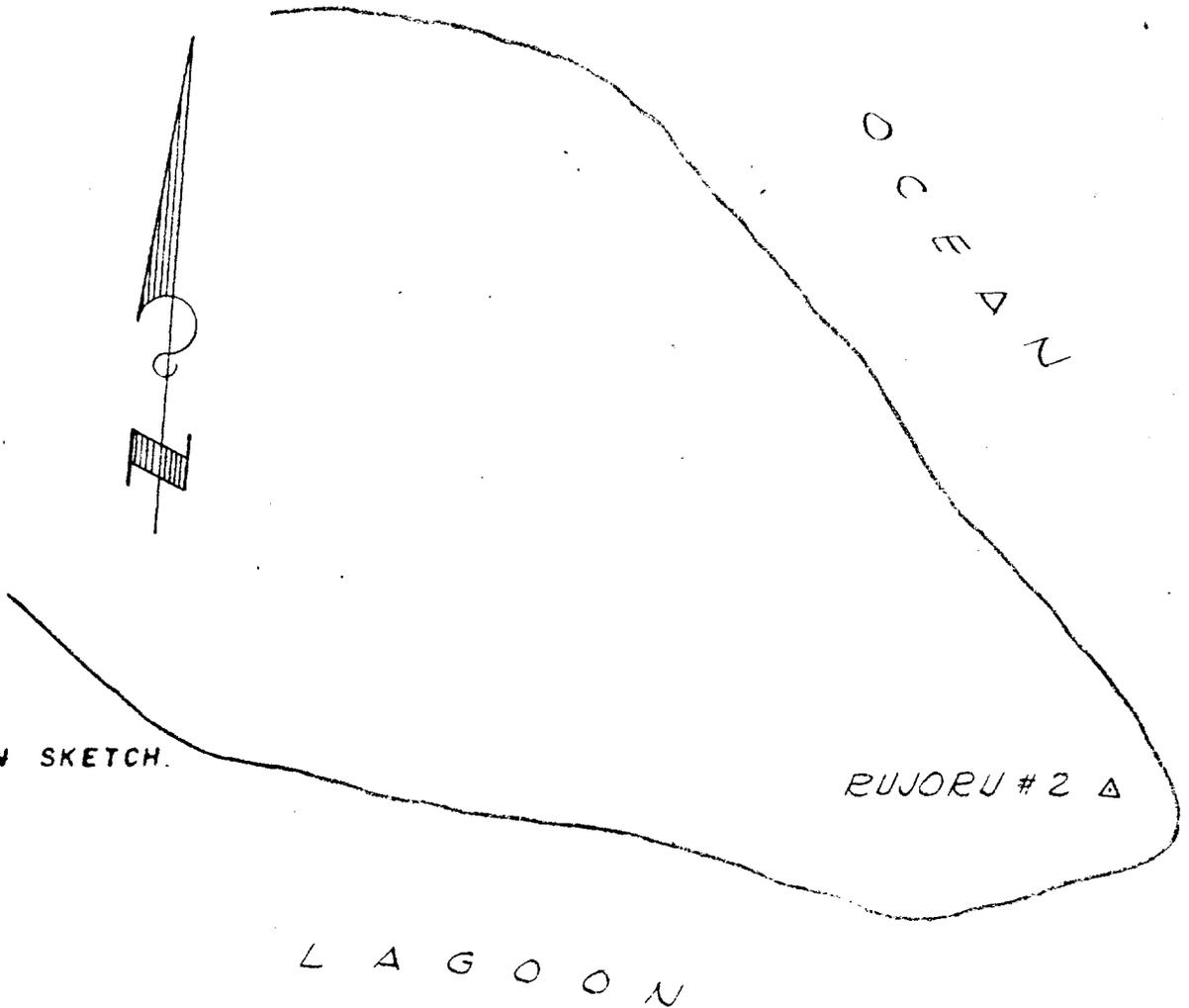
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION Rujoru #2

SITE: Pearl, Rujoru Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)

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LETTER DATED JULY, 15, 1994
FROM ANTON SCORSCALDI TO
DIANE S. NIXON



LOCATION SKETCH.

RUJORU #2 Δ

LAGOON

OCEAN

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