R

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

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 consistant 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 CO-ORDINATES

LOCATION ENIWETOK ATOLL, M.I. 1957 EXPANSION (PROG.)
PROJECTION PLANE GRID JOB NO. 94_ SHEET ____ OF ____

	STATIONS	BEARING	DISTANCE	LATITUDE	DEPARTURE	COORDINATES NORTH	COORDINATES EAST	
1	CORAL TO					100,000.00	100,000.00	1
2	NORTH	N75-39-35.75E	25,065.01			106,208.02	124,284.06	2
3	SALLY	N24-26-09.76E	32,858.02			129,914.73	113,592.61	3
4	RUNDREL #2	N12-33-58.64E	33,525.88			132,222.77	107,294.19	4
5	GAIL	N30-24-46.49W	56,479.46			148,707.87	21,408.50	5
6								6
7	NORTH TO					106,208.02	124,284.06	7
8	RUNIT	S34-51-12.16E	8072.82			99,583.30	128,897.50	8
9	PURAAI	N26-40-41.30W	14,988.65			119,601.00	117,554.50	9
10								10
11	SALLY TO					129,914.73	113,592.61	11
12	PURAAI	S21-00-49.16E	11,048.50			119,601.00	117,554.50	12
13	RUNDREL #2	N65-58-16.96W	896.03			132,222.77	107,294.19	13
14								14
15	GAIL TO					148,707.87	71,408.50	15
16	ENEBI	S74-31-22.65E	15,665.65			144,527.92	76,506.20	16
17	ALICE	S62-13-02.55W	20,974.16			182,921.40	52,252.20	17
18								18
19								19
20								20
21								21
22								22
23								23
24								24
25								25
26								26

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

PLANE COORDINATES

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

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

* Third Order Station

S-57

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

PLANE COORDINATES

LOCATION Eniwetok Atoll MI — 1957 Expansion Survey

PROJECTION Ivy Grid — JOB NO. 942 SHEET 2 OF 3

	STATIONS	BEARING	DISTANCE	LATITUDE	DEPARTURE	COORDINATES NORTH	COORDINATES EAST	
1								1
2	Engebi to	S16-51-32.35E	46,527.59			144,527.90	86,506.20	2
3	Coral	S80-33-30.19W	34,116.16			100,000.00	100,000.00	3
4	Alice	N74-31-28.65W	15,665.65			138,931.40	52,852.20	4
5	Gail					148,707.87	71,408.50	5
6								6
7	Rujoru-2 to	S65-58-16.06E	6,896.03			132,722.77	107,294.19	7
8	Sally	S38-01-22.46E	16,656.98			129,914.73	113,592.61	8
9	Piiraai	S12-33-58.64W	33,525.88			119,601.00	117,554.50	9
10	Coral					100,000.00	100,000.00	10
11								11
12	Sally to	S21-00-49.16E	11,048.50			129,914.73	113,592:61	12
13	Piiraai	S24-26-09.74W	32,858.02			119,601.00	117,554.50	13
14	Coral	N65-58-16.06W	6,896.03			100,000.00	100,000.00	14
15	Rujoru-2					132,722.77	107,294.19	15
16								16
17	Piiraai to	S29-32-16.78E	23,008.02			119,601.00	117,554.50	17
18	Runit	S26-40-41.30E	14,988.65			99,583.30	128,897.50	18
19	North	S41-50-50.54W	26,312.73			106,208.00	124,284.06	19
20	Coral	N38-01-22.46W	16,656.98			100,000.00	100,000.00	20
21	Rujoru-2	N21-00-49.16W	11,048.50			132,722.77	107,294.19	21
22	Sally					129,914.73	113.592.61	22
23								23
24								24
25								25
26								26

7

S-57

HOLMES & NARVER INC. — ENGINEERS - CONSTRUCTORS

LOCATION Enlwetok Atoll MI
PROJECTION Ivy Grid

PLANE CO-ORDINATES
1957 Expansion Survey

JOB NO 942 SHEET 3 OF 3

	STATIONS	BEARING	DISTANCE	LATITUDE	DEPARTURE	COORDINATES NORTH	COORDINATES EAST	
1								1
2	North to					106,208.00	124,284.06	2
3	Runit	S34-51-12.16E	8,072.82			99,583.30	128,897.50	3
4	Coral	S75-39-35.75W	25,065.01			100,000.00	100,000.00	4
5	Piiraai	N26-40-41.30W	14,988.65			119,601.00	117,554.50	5
6								6
7	Runit to					99,583.30	128,897.50	7
8	Coral	N89-10-25.88W	28,900.50			100,000.00	100,000.00	8
9	North	N34-51-12.16W	8,072.82			106,208.00	124,284.06	9
10	Piiraai	N29-32-16.78W	23,008.02			119,601.00	117,554.50	10
11								11
12	Lantana to*					30,846.75	80,081.23	12
13	Rigili-2	N49-25-24.70W	63,053.07			71,860.40	32,190.00	13
14	Coral	N16-04-06.30E	71,964.78			100,000.00	100,000.00	14
15								15
16	Henry to *					33,542.29	70,806.31	16
17	Rigili-2	N45-13-19.50W	54,401.26			71,860.40	32,190.00	17
18	Coral	N23-42-54.10E	72,587.18			100,000.00	100,000.00	18
19								19
20	James to *					38,300.88	61,831.30	20
21	Rigili-2	N41-27-08.70W	44,775.53			71,860.40	32,190.00	21
22	Coral	N31-44-31.30E	72,550.89			100,000.00	100,000.00	22
23								23
24	Keith to *					40,935.85	57,407.47	24
25	Rigili-2	N39-11-44.10W	39,902.99			71,860.40	32,190.00	25
26	Coral	N35-47-46.50E	72,819.62			100,000.00	100,000.00	26

* Third Order Station

8

HOLMES & NARVER INC. - ENGINEERS · CONSTRUCTORS

GEOGRAPHIC POSITIONS

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

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

HOLMES & NARVER INC. - ENGINEERS · CONSTRUCTORS

GEOGRAPHIC POSITIONS

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

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	Piiraai	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	Piiraai	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
Piiraai	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	Piiraai	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	Piiraai	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

° Third Order Station

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

GEOGRAPHIC POSITIONS

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

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	4.21962 48	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						
Aniyaanii	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						

° Third Order Station

S-58

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

GEOGRAPHIC POSITIONS

LOCATION Eniwetok Atoll — Second ORDER TRIANGULATION

DATUM Eniwetok Astronomic 1944 — JOB NO. 942 — SHEET 4 OF 4

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						

⚲ Third Order Station

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

CALC. BY CSH DATE 12-14-57 JOB NO. 942
CHKD. BY E.R.G. DATE 12-26-57 F.B. REF. SHEET NO. 1 OF 1

TRAVERSE LOCATIONS OF STATIONS NORTH, SALLY, RUJOKU-2, GAIJO

	STATION	BEARING	DISTANCE	COSINE	SINE	LATITUDE	DEPARTURE	CO-ORDINATES NORTH	CO-ORDINATES EAST	
1										1
2	GOAL-2	N75-39-35.75E	25,065.01	24767663	96854277	+6208.02	+24,284.05	100,000.00	100,000.00	2
3	NORTH							106,208.02	124,284.05	3
4	SALLY	N24-36-07.74E	32,858.02	91042364	41367716	+29,914.72	+13,592.61	129,914.72	113,592.61	4
5	RUJOKU-2	N12-35-59.64E	33,525.88	97604474	21756901	+32,722.77	+7,294.19	132,722.77	107,294.19	5
6	GAIJO	N33-24-46.49W	56,179.46	86239958	50622816	+48,707.86	-28,591.49	148,707.86	71,409.51	6
7										7
8	NORTH TO	S34-51-12.16E	8,012.82	82061717	57147832	-6624.70	+4613.44	106,208.00	124,284.26	8
9	NORTH							99,583.30	128,897.50	9
10	PIIRAAI	N26-40-41.30W	14,988.65	87354276	44897810	+13,393.00	-6729.58	119,601.00	117,554.48	10
11										11
12	SALLY TO	S21-00-49.16E	11,048.60	93349479	35959044	-10,313.72	+3961.87	129,914.73	113,592.61	12
13	PIIRAAI							119,601.01	117,554.50	13
14	RUJOKU-2	N65-58-16.06W	6,896.03	40719694	91334038	+2808.04	-6296.42	132,722.77	107,294.19	14
15										15
16	GAIJO TO	S76-31-28.65E	15,666.65	26682419	96374523	-4178.97	+15,097.10	148,707.87	71,406.50	16
17	ENGERI							144,527.90	86,506.20	17
18	ALICE	S62-13-02.25W	20,994.16	46611963	88472167	-9776.47	-18,556.29	139,931.40	52,852.21	18
19										19
20	PIIRAAI TO	N 33-01-22.46W	16,656.98	78776456	61597645	+13,121.78	-10,260.31	119,601.00	117,554.50	20
21	RUJOKU-2							132,722.78	107,294.19	21
22										22
23										23
24										24
25										25
26										26
27										27
28	13									28

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

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

			°	'	"				°	'	"
α	2 PIIRAAI to 3 CORAL		41	51	25.86	α	3 CORAL to 2 PIIRAAI		221	50	50.42
2d L	8		+ 117	08	20.33	3d L	8		- 17	24	40.80
α	2 PIIRAAI to 1 SALLY		158	59	46.19	α	3 CORAL to 1 SALLY		204	26	09.62
$\Delta\alpha$			-	0	08.02	$\Delta\alpha$			+	0	27.45
			180	00	00.0				180	00	00.0
α'	1 SALLY to 2 PIIRAAI		338	59	38.16	α'	1 SALLY to 3 CORAL		24	26	37.09

FIRST ANGLE OF TRIANGLE 45-26-58.93

			°	'	"				°	'	"
ϕ	11 25 34.682	2 PIIRAAI	λ	162	20	07.557	ϕ	11 32 20.254	3 CORAL	λ	162	17	10.944
$\Delta\phi$	+ 01 47.318		$\Delta\lambda$	-	0	39.846	$\Delta\phi$	+ 04 56.747		$\Delta\lambda$	+	02	16.767
ϕ'	11 37 17.000	1 SALLY	λ'	162	19	27.711	ϕ'	11 37 17.000	1 SALLY	λ'	162	19	27.711

	Logarithms	Values in seconds		
s	3.5273179			
$\frac{1}{2}\cos^2\alpha$	9.9701406			
B	8.5124980			
h	2.0099565	1st term	-102.3191	
s^3	1.05463			
$\sin^2\alpha$	9.10881			
C	0.71877			
		2d term	+0.0008	
n^2	4.0199			
D	1.9864			
	6.0063	3d term	+0.0001	
		$-\Delta\phi$	-102.3182	

$\frac{1}{2}(\phi+\phi')$

	Logarithms	Values in seconds	
s	3.5273179		
Sin α	9.5544049		
A'	8.5096669		
Sec ϕ'	0.0089955		
$\Delta\lambda$	1.6003852	39.8460	
$\sin\frac{1}{2}(\phi+\phi')$	9.3036294		
$-\Delta\alpha$	0.9040146	8.017	

	Logarithms	Values in seconds		
s	4.0006573			
Cos α	9.9592436			
B	8.5124997			
h	2.4724006	1st term	-296.7568	
s^2	8.00121			
$\sin^2\alpha$	9.23332			
C	0.71669			
	7.95132	2d term	+3.0089	
n^2	4.9448			
D	1.9845			
	6.9293	3d term	+0.0008	
		$-\Delta\phi$	-296.7471	

$\frac{1}{2}(\phi+\phi')$

	Logarithms	Values in seconds	
s	4.0006573		
Sin α	9.6166610		
A'	8.5096669		
Sec ϕ'	0.0089955		
$\Delta\lambda$	2.1359807	136.7668	
$\sin\frac{1}{2}(\phi+\phi')$	9.3026316		
$-\Delta\alpha$	1.4386123	27.454	

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

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

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

FIRST ANGLE OF TRIANGLE 78 - 32 - 14.72

		°	'	"			°	'	"
11 37 17.000 2 SALLY	λ	162	19	27.711	φ	11 32 20.254 3 CORAL	λ	162	17	10.944
+ 0 27.862 3	Δλ	-	01	03.372	Δφ	+ 05 24.609	Δλ	+	01	13.395
11 37 44.862 RVJORU-2	λ'	162	18	24.339	φ'	11 37 44.863 1 RVJORU-2	λ'	162	18	24.339

Logarithms	Values in seconds			°	'	"		Logarithms	Values in seconds			°	'	"
3.3226150			½(φ+φ')				s	4.0093960			½(φ+φ')			
9.0099338				Logarithms	Values in seconds		Cos α	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			$\sin^2\alpha$	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	+0.009	$\sin\frac{1}{2}(\phi+\phi')$	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 & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY [illegible] DATE 12-12-57 JOB NO. 942 LOCATION ENIWETOK ATOLL

	2 to 3	°	'	"	α	3 to 2	°	'	"
	B	+			$3^d\angle$	B	−		
	PIIRAAI to RVJORU-2	141	59	12.91	α	3 to 1			
		−	0	20.78	$\Delta\alpha$				
		180	00	00.0	2		180	00	00.0
	RVJORU-2 to PIIRAAI	321	58	52.13	α'	1 to 3			

FIRST ANGLE OF TRIANGLE 50-35-21.15

	"	°	'	"		°	'	"		°	'	"
	11 55 34.682 PIIRAAI	λ	162	20	07.557	ϕ			3	λ		
	+ 02 10.181	$\Delta\lambda$	−	01	43.218	$\Delta\phi$				$\Delta\lambda$		
	11 57 44.863 RVJORU-2	λ'	162	18	24.339	ϕ'			1	λ'		

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	"	Sin α		
7.41122		A'	8.5096669				s^2				A'		
9.57894		Sec ϕ'	0.0090068				$\sin^2\alpha$				Sec ϕ'		
0.71877		$\Delta\lambda$	2.0137547		103.2178		C				$\Delta\lambda$		"
7.70893	2d term +0.0051	$\sin\frac{1}{2}(\phi+\phi')$	9.3037722						2d term	+	$\sin\frac{1}{2}(\phi+\phi')$		
4.2291		$-\Delta\alpha$	1.3175269		20.775		n^2				$-\Delta\alpha$		
1.9864							D						
6.2155	3d term +0.0000								3d term	+			
	$-\Delta\phi$ −130.1810								$-\Delta\phi$				

19

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

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
2d ∠	8	+59	38	09.17	3d ∠	8	-48	58	43.58
α	RUNIT to 1 PIIRAAI	150	28	41.37	α	3 CORAL to 1 PIIRAAI	221	50	50.42
Δα		-	0	22.87	Δα		+	0	35.41
		180	00	00.0			180	00	00.0
α'	1 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

	° ' "			° ' "		° ' "			° ' "
φ	11 32 16.080?	RUNIT	λ	162 22 01.621	φ	11 32 20.254	3 CORAL	λ	162 17 10.944
Δφ	+ 03 18.602		Δλ	- 01 54.063	Δφ	+ 03 14.428		Δλ	+ 02 56.613
φ'	11 35 34.682	1 PIIRAAI	λ'	162 20 07.557	φ'	11 35 34.682	1 PIIRAAI	λ'	162 20 07.557

	Logarithms	Values in seconds	
s	3.8458951		
cos α	9.9396030		
B	8.5124998		
h	2.2979979	1st term	-198.6085
s²	7.69179		
sin² α	9.38526		
C	0.71664		
	7.79369	2d term	+0.0062
h²	4.5960		
D	1.9845		
	6.5805	3d term	+0.0004
		-Δφ	-198.6019

$\frac{1}{2}(\phi+\phi')$ 11-33-55.381

	Logarithms	Values in seconds
s	3.8458951	
Sin α	9.6926313	
A'	8.5096672	
Sec φ'	0.0089512	
Δλ	2.0571448	114.0630
Sin ½(φ+φ')	9.3020841	
-Δα	1.3592289	22.868

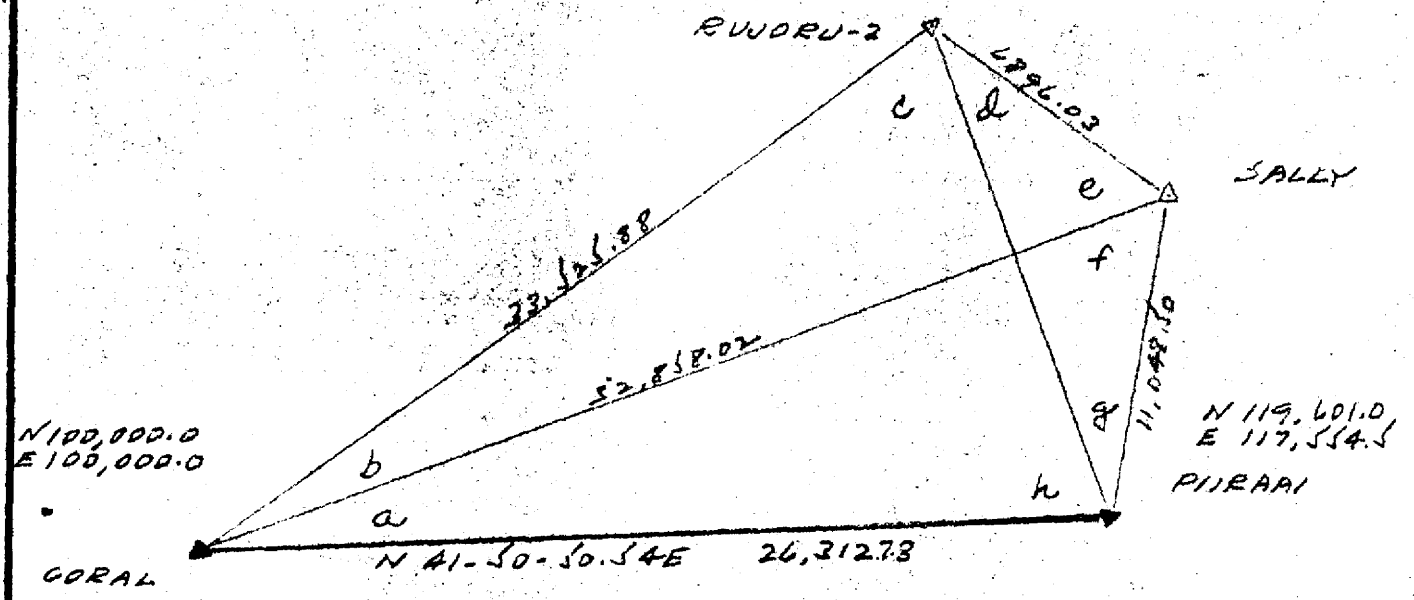
	Logarithms	Values in seconds	
s	3.9041817		
Cos α	9.8721126		
B	8.5124997		
h	2.2887940	1st term	-194.4438
s²	7.80836		
Sin² α	9.64844		
C	0.71669		
	8.17349	2d term	+0.0149
h²	4.5776		
D	1.9845		
	6.5621	3d term	+0.0004
		-Δφ	-194.4285

$\frac{1}{2}(\phi+\phi')$ 11-33-57.468

	Logarithms	Values in seconds
s	3.9041817	
Sin α	9.8242223	
A'	8.5096672	
Sec φ'	0.0089512	
Δλ	2.2470224	176.612
Sin ½(φ+φ')	9.3021056	
-Δα	1.5491280	35.410

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

JOB NO. 942
SHEET 1 OF 2
TITLE LOCATIONS & STA. RUJORU-2, SALLY
BY LSH DATE 9-11-57



	OBS. ∠	GEO. COND.		TRIG. COND.	
a	17-24-40.9	40.8	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	

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

log sin	17-24-39.7	9.4759971	67.2	11-52-12.2	9.3132190	100.1
- -	50-35-20.0	9.8879606	17.3	27-56-54.7	9.6708747	39.7
- -	89-35-32.1	9.9999890	0.2	45-27-00.0	9.8528693	20.7
- -	17-00-32.2	9.4661571	68.5	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

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

HOLMES & NARVER ENGINEERS-CONSTRUCTORS

COMPUTATION OF TRIANGLES

CALC. BY L S H DATE 12·11·57 JOB NO. 942

CHKD. BY E.R.G DATE 12-20-57 LOCATION ENIWETOK ATOLL

STATION	OBSERVED ANGLE	CORR-N	SPHERICAL ANGLE	SPHERICAL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
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	C3.5					
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	-C1.2					
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	C3.6					
1-2						
2-3						
1						
2						
3						
1-3						
1-2						

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

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

		°	'	"			°	'	"
α	2 to 3				α	3 to 2			
$2^d\angle$	8	+			$3^d\angle$	8	−		
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	2 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	1 ALICE	λ'	162	09	16.507	ϕ'			1	λ'		

	Logarithms	Values in seconds			°	'	"		Logarithms	Values in seconds		°	'	"
s	4.0169759			$\frac{1}{2}(\phi+\phi')$				s				$\frac{1}{2}(\phi+\phi')$			
Cos α	9.2153000				Logarithms	Values in seconds		Cos α					Logarithms	Values in seconds
B	8.5124960			s	4.0169759			B				s		
h	1.7447719	1st term	+55.5612	Sin α	9.9940670			h		1st term	"	Sin α		
s^2	8.03395			A'	8.5096666			s^2				A'		
$\sin^2\alpha$	9.98813			Sec ϕ'	0.0090342			$\sin^2\alpha$				Sec ϕ'		
C	0.72139			$\Delta\lambda$	2.5297437	338.6442	"	C				$\Delta\lambda$		"
	8.74347	2d term	+0.0554	$\sin\frac{1}{2}(\phi+\phi')$	9.3053512					2d term	+	$\sin\frac{1}{2}(\phi+\phi')$		
h^2	3.4695			$-\Delta\alpha$	1.8350949	68.4060		h^2				$-\Delta\alpha$		
D	1.9889							D						
	5.4584	3d term	+0.0000							3d term	+			
		$-\Delta\phi$	+55.6166							$-\Delta\phi$				

S-8

2

HOLMES & NARVER, 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
3d ∠		8	+ 92	37	48.88	3d ∠		8	- 20	02	22.35
α	1 GAIL	to 1 ALICE	62	12	04.45	α	3 CORAL	to 1 ALICE	129	32	51.11
Δα			-	0	37.73	Δα			-	01	35.34
			180	00	00.0				180	00	00.0
α'	1 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

	°	'	"			°	'	"			°	'	"			°	'	"
φ	11	40	23.398	2 GAIL	λ	162	12	23.207	φ	11	32	20.254	3 CORAL	λ	162	17	10.944
Δφ	-	01	37.051		Δλ	-	03	06.700	Δφ	+	06	26.094		Δλ	-	07	54.43
φ'	11	38	46.347	1 ALICE	λ'	162	09	16.507	φ'	11	38	46.347	1 ALICE	λ'	162	09	16.50

	Logarithms	Values in seconds		
	3.8057004			
Sin α	9.6687283			
b	8.5124956			
h	1.9869243	1st term	+97.0341	
s²	7.61140			
Sin²α	9.89349			
c	0.72184			
	5.22673	2d term	+0.0169	
s²	3.9739			
D	1.9892			
	5.9631	3d term	+0.0001	
		-Δφ	+97.0511	

½(φ+φ')	Logarithms	Values in seconds
s	3.8057004	
Sin α	9.9467425	
A'	8.5096666	
Sec φ'	0.0090342	
Δλ	2.2711437	186.6998
Sin ½(φ+φ')	9.3055626	
-Δα	1.5767063	37.732

	Logarithms	Values in seconds		
s	4.2703685			
Cos α	9.8039472			
b	8.5124997			
h	2.5868154	1st term	-386.2028	
s²	8.54074			
Sin²α	9.77422			
c	0.71669			
	9.03165	2d term	+0.1076	
n²	5.1736			
D	1.9845			
	7.1581	3d term	+0.0014	
		-Δφ	-386.0938	

½(φ+φ')	Logarithms	Values in seconds
s	4.2703685	
Sin α	9.8871088	
A'	8.5096666	
Sec φ'	0.0090342	
Δλ	2.6761781	474.436
Sin ½(φ+φ')	9.3030904	
-Δα	1.9792685	95.338

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY L.S.H. DATE 2-12-57. JOB NO. 942 LOCATION BIKINI ATOLL

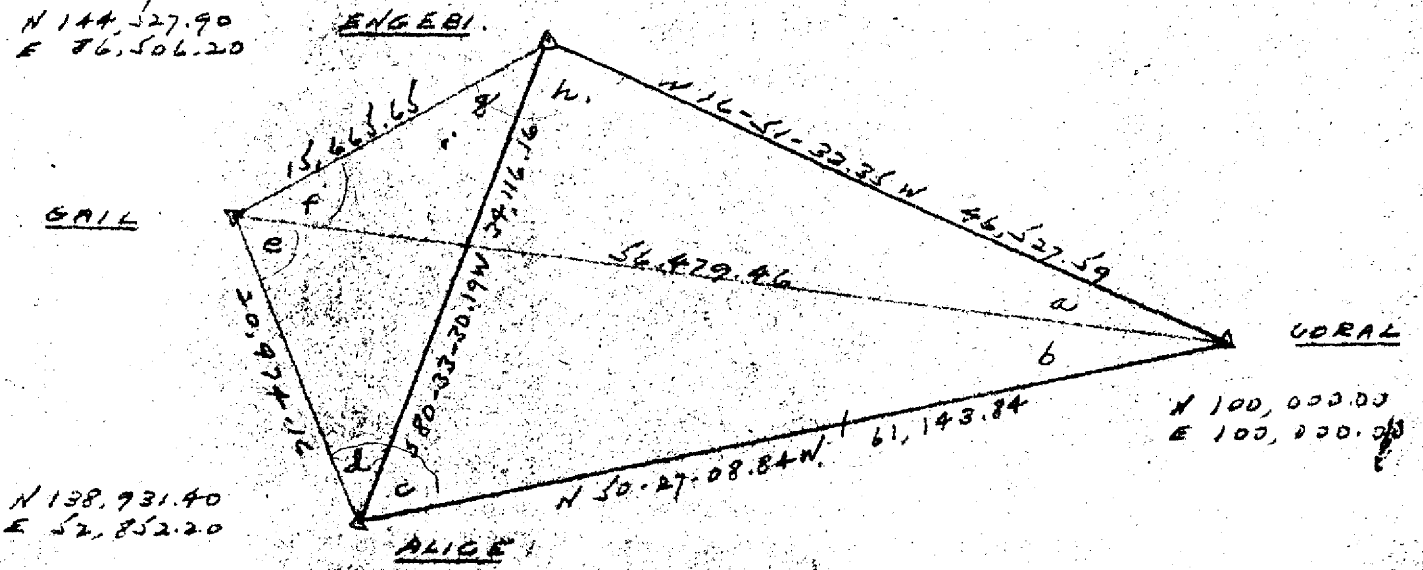
α	2 ENGEBI to 3 CORAL	343°	08'	00.30"	α	3 CORAL to 2 ENGEBI	163°	08'	27.60"
3d $\angle$	8	+122	20	03.78	3d $\angle$	8	- 13	33	14.14
α	2 ENGEBI to 1 GAIL	105	28	04.08	α	3 CORAL to 1 GAIL	149	35	13.46
$\Delta\alpha$		-	0	30.73	$\Delta\alpha$		-	0	57.89
		180	00	00.0			180	00	00.0
α'	1 GAIL to 2 ENGEBI	285	27	33.34	α'	1 GAIL to 3 CORAL	329	34	15.57

FIRST ANGLE OF TRIANGLE 44 -06 -42.23

ϕ	11 39 41.964	2 ENGEBI	λ	162	14	55.151	ϕ	11 32 20.254	3 CORAL	λ	162 17 10.949
$\Delta\phi$	+ 0 41.434		$\Delta\lambda$	-	02	31.945	$\Delta\phi$	+ 08 03.144		$\Delta\lambda$	- 04 47.737
ϕ'	11 40 23.398	1 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				
s	3.6789643		$\frac{1}{2}(\phi+\phi')$				s	4.2359063		$\frac{1}{2}(\phi+\phi')$		
Cos α	9.4260170			Logarithms	Values in seconds		Cos α	9.9357085			Logarithms	Values in seconds
B	8.5124960		s	3.6789643			B	8.5124997		s	4.2359063	
h	1.6174773	1st term -41.4455	Sin α	9.9839782			h	2.6841145	1st term -483.1862	Sin α	9.7043464	
s^2	7.35793		A'	8.5096664			s^2	8.47141		A'	8.5096664	
$\sin^2\alpha$	9.96796		Sec ϕ'	0.0090764			$\sin^2\alpha$	9.40869		Sec ϕ'	0.0090764	
C	0.72139		$\Delta\lambda$	2.1816853	151.9446		C	0.71669		$\Delta\lambda$	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	
s^2	3.2350		$-\Delta\alpha$	1.4875916	30.728		n^2	5.3678		$-\Delta\alpha$	1.7625837	57.887
D	1.9889						D	1.9845				
	5.2239	3d term +0.0000						7.3523	3d term +0.0023			
		$-\Delta\phi$ -41.4343							$-\Delta\phi$ -483.1443			

TITLE LOCATION OF A STATION GAIL



	OBS. ∠	GEO. COND.				TRIG. COND	
		Σ = 360	b+c = e+f		a+b ∠		
a	13-33-13.8	13.3	14.0	36.49∠	14.14	14.14	
b	20-02-23.0	22.5	22.2		22.35	22.35	
c	48-59-20.6	20.2	19.9	20.97∠	20.97	20.97	
d	18-20-28.2	27.7	27.0		26.39	27.94 +	
e	92-37-51.9	51.5	50.9		50.29	48.74 −	
f	44-06-40.3	39.8	40.0		40.61	42.16 +	
g	24-55-02.3	01.8	02.1		02.71	01.16 −	
h	97-25-03.4	03.2	03.9	02.54∠	02.54	02.54	

TRIG. EQ = ALICE-CORAL, sin c+d, sin f / ENGEBI-CORAL, sin g+h, sin e = 1   ∠ = Fixed ∠s.

log	61,143.84	4.7863527		46,527.59	4.6677106		1
log sin	c+d 67-19-47.36	9.9650788	8.8 +	g+h 122-30-03.25	9.9268244		13.3
" "	44-06-40.61	9.8421430	21.7 +	e 92-37-50.29	9.9995420		1.0
		4.5940745	30.5		4.5940770		14.3
					745		30.5
					25		44.8

25/448 = .056
.056 × 27.6 = 1.55

61,143.84 / sin 92-37-48.74 (9.9994652)	(9.9274172) sin 67-19-47.91 56,479.463	(9.5346857) sin 20-02-22.35 20,974.165
46,527.59 / sin 44-06-42.16 (9.8426437)	(9.8449412) sin 122-30-03.70 56,479.474	(9.3736047) sin 13-33-14.14 15,665.653

HOLMES & NARVER ENGINEERS-CONSTRUCTORS

COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57 JOB NO. 942

CHKD. BY E.R.S DATE 12-20-57 LOCATION ENIWETOC ATOLL

STATION	OBSERVED ANGLE	CORR-N	SPHERICAL ANGLE	SPHERICAL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
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		03.78	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	4.27056685
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	20-02-23.0		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						

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

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
2d ∠	8	+ 54	19	13.74	3d ∠	8	- 15	09	58.37
α	2 RUNIT to 1 NORTH	145	09	45.94	α	3 CORAL to 1 NORTH	255	39	35.63
Δα		-		09.29	Δα		+	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

		°	'	"			°	'	"
φ	11 32 16.080 ? RUNIT	λ	162	22	01.621	φ	11 32 20.254 3 CORAL	λ	162	17	10.944
Δφ	+ 01 05.730	Δλ	-	0	46.390	Δφ	+ 01 01.556	Δλ	+	04	04.286
φ'	11 33 21.810 1 NORTH	λ'	162	21	15.230	φ'	11 33 21.810 1 NORTH	λ'	162	21	15.230

	Logarithms	Values in seconds		
s	3.3910410			
Cos α	9.9142258			
B	8.5124998			
h	1.8177666	1st term	-65.7305	
s²	6.78208			
Sin²α	9.51365			
C	0.71664			
	7.01237	2d term	+0.0010	
n²	3.6355			
D	1.9845			
	5.6200	3d term	+0.0000	
		-Δφ	-65.7295	

		Logarithms	Values in seconds
½(φ+φ')			
s	3.3910410		
Sin α	9.7568241		
A'	8.5096676		
Sec φ'	0.0088946		
Δλ	1.6664273		46.3903
Sin½(φ+φ')	9.3014075		
-Δα	0.9678348		9.286

	Logarithms	Values in seconds	
s	3.8830837		
Cos α	9.3938260		
B	8.5124997		
h	1.7894694	1st term	-61.5842
s²	7.76617		
Sin²α	9.97251		
C	0.71669		
	8.45537	2d term	+0.0285
n²	3.5789		
D	1.9845		
	5.5634	3d term	+ 0.0001
		-Δφ	-61.5556

		Logarithms	Values in seconds
½(φ+φ')	11- 32- 51.032		
s	3.8830837		
Sin α	9.9862532		
A'	8.5096676		
Sec φ'	0.0088946		
Δλ	2.3878991		244.2863
Sin½(φ+φ')	9.3014215		
-Δα	1.6893206		48.902

V-8

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY C SH DATE 12-11-57 JOB NO. 992 LOCATION ENIWETOK "ATOLL"

α	2 to 3	°	'	"	α	3 PIIRAAI to 2 CORAL	41	51	25.86
$3^d\angle$	8	+			$3^d\angle$	8	- 68	31	31.88
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'	1 NORTH to 3 PIIRAAI	153	20	07.53

FIRST ANGLE OF TRIANGLE

	2	λ			ϕ	11 35 34.682	3 PIIRAAI	λ	162 20 07.55
$\Delta\phi$		$\Delta\lambda$			$\Delta\phi$	- 02 12.873		$\Delta\lambda$	+ 01 07.673
ϕ'	1	λ'			ϕ'	11 33 21.810	1 NORTH	λ'	162 21 15.230

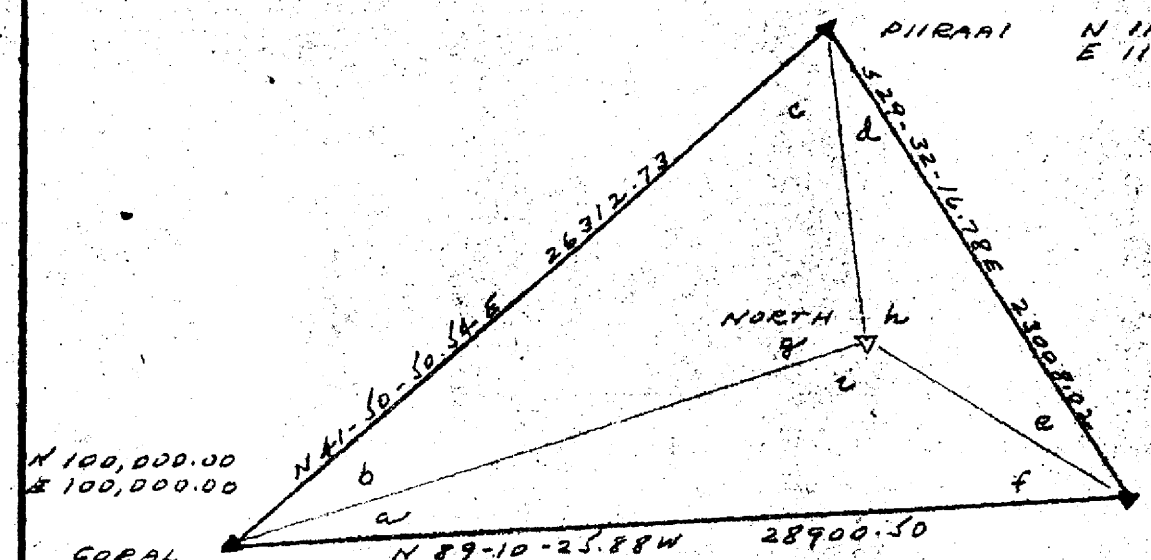
Logarithms	Values in seconds				Logarithms	Values in seconds			
		$\frac{1}{2}(\phi+\phi')$						$\frac{1}{2}(\phi+\phi')$	11-34-28.245
			Logarithms	Values in seconds					Logarithms	Values in seconds
		s			s	3.6597784		s	3.6597784	
		Sin α			Cos α	9.9511527		Sin α	9.6520773	
		A'			B	8.5129980		A'	8.5096676	
	1st term	Sec ϕ'			h	2.1234291	1st term +132.8707	Sec ϕ'	0.0088946	
		$\Delta\lambda$		"	s^2	7.31957		$\Delta\lambda$	1.8304179	67.6734
	2d term +	$\sin\frac{1}{2}(\phi+\phi')$			$\sin^2\alpha$	9.30415		$\sin\frac{1}{2}(\phi+\phi')$	9.3024221	
		$-\Delta\alpha$			C	0.71877		$-\Delta\alpha$	1.1328390	13.578
						7.34249	2d term +0.0022			
					n^2	4.2469				
					D	1.9864				
	3d term +					6.2333	3d term +0.0002			
	$-\Delta\phi$						$-\Delta\phi$ +132.8731			

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

JOB NO. 942
SHEET 1 OF 2

TITLE LOCATION △ STATION NORTH

BY LSH DATE 9-6-57



	OBS. ∠	GEO. COND.		TRIG. COND.	
a	15-10-01.9 ×	01.8	00.44 } * 43.58	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 } * 07.32	32.16	31.84
d	2-51-35.3		33.09 }	35.16	35.48
e	5-18-53.2 ×		57.77 } * 09.10	55.70	55.38
f	54-19-10.8	10.7	11.33 }	13.40	13.72
g	77-39-43.2	42.3	42.63		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 ∠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
	1243				312.5
	1617	1617/780.7 = 2.07			780.7

$\frac{\text{Coral-Piiraai}, \sin c, \sin i}{\text{Coral-Runit}, \sin f, \sin g} = 1$

Log 26312.73	4.4201689		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	9.9899517	4.6
	4.3604698	15.2		4.3604687	19.7
	687				15.2
	11	11/34.9 = 0.32			34.9

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

JOB NO. 942

SHEET 2 OF 2

TITLE LOCATION & STATION NORTH

BY LSH DATE 9-6-57

26312.73
Sin 77-39-42.95
Sin 68-31-31.84
25,065.024
Sin 33-48-45.21
14,988.624

28900.50
Sin 110-30-47.91
Sin 54-19-13.72
25,064.997
Sin 15-09-58.37
8072.842

HOLMES & NARVER ENGINEERS-CONSTRUCTORS

COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57 JOB NO. 942

CHKD. BY ERQ DATE 12-20-57 LOCATION ENIWETOK ATOLL

STATION	OBSERVED ANGLE	CORR-N	SPHERICAL ANGLE	SPHERICAL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
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	00.3					
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	68-31-34.8		31.88	0.04	31.84	
1 - 3	02.7					
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	00.7					
1 - 2						
2 - 3						
1						
2						
3						
1 - 3						
1 - 2						

HOLMES & NARVER INC. - ENGINEERS - CONSTRUCTORS

CALC. BY CSH DATE 11-57 TRAVERSE LOCATION OF STA. LANTANA, KEITH, JAMES, HENRY JOB NO. 942

CHKD. BY E.R.S DATE 12-26-57 F.B. REF. SHEET NO. 1 OF 1

	STATION	BEARING	DISTANCE	COSINE	SINE	LATITUDE	DEPARTURE	CO-ORDINATES NORTH	CO-ORDINATES EAST	
1										1
2	EIGHT-2 TO							71,860.40	32,190.00	2
3	CORAL	N67-27-45.60E	73,416.85	38328535	92362999	+28,139.60	+67,810.00	100,000.00	100,000.00	3
4	KEITH	S37-11-44.10E	39,702.99	77499320	63196957	-30,924.55	+25,217.48	40,935.85	57,407.47	4
5	JAMES	S41-27-08.70E	44,775.53	74950576	66199782	-33,559.52	+29,641.30	38,300.88	61,831.30	5
6	HENRY	S45-13-17.50E	54,401.26	70436067	70984227	-38,318.11	+38,616.31	33,542.29	70,806.31	6
7	LANTANA	S49-25-24.70E	63,053.07	65046238	75953848	-41,013.65	+47,891.23	30,846.75	80,081.23	7
8										8
9	CORAL TO							100,000.00	100,000.00	9
10	KEITH	S35-47-46.50W	72,819.62	81110210	58490459	-59,064.15	-42,592.53	40,935.85	57,407.47	10
11	JAMES	S51-44-31.30W	72,550.89	75042543	52609560	-61,699.12	-38,168.70	38,300.88	61,831.30	11
12	HENRY	S63-42-54.10W	72,587.18	91555713	40218772	-66,957.71	-29,193.69	33,542.29	70,806.31	12
13	LANTANA	S76-04-06.30W	71,969.78	96093187	27678500	-69,153.25	-19,918.77	30,846.75	80,081.23	13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
21										21
22										22
23										23
24										24
25										25
26										26
27										27
28	31									28

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

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

		°	'	"			°	'	"
α	2 RIGILI to 3 CORAL	247	25	29.60	α	3 CORAL to 2 RIGILI-2	67	27	45.60
2d ∠	8	+ 63	06	49.70	3d ∠	8	− 51	23	39.79
α	RIGILI to 1 LANTANA	310	32	19.30	α	3 CORAL to 1 LANTANA	16	04	05.81
Δα		+	01	35.25	Δα		−	10	39.73
		180	00	00.0			180	00	00.0
α'	1 LANTANA to 2 RIGILI-2	130	33	54.55 (7)	α'	1 LANTANA to 3 CORAL	196	03	36.08 (6)

FIRST ANGLE OF TRIANGLE 65-29-31.49

	°	'	"			°	'	"		°	'	"			°	'	"
φ	11	27	40.883	2 RIGILI-2	λ	162	05	49.036	φ	11	32	20.254	3 CORAL	λ	162	17	10.944
Δφ	−	06	46.660		Δλ	+	08	01.683	Δφ	−	11	26.031		Δλ	−	03	20.226
φ'	11	20	54.223	1 LANTANA	λ'	162	13	50.719 (8)	φ'	11	20	54.223	1 LANTANA	λ'	162	13	50.718

	Logarithms	Values in seconds			Logarithms	Values in seconds
			$\frac{1}{2}(\phi+\phi')$			
s	4.2837221		s		4.2837221	
Cos α	9.8128876		Sin α		9.8807949	
B	8.5125021		A'		8.5096696	
h	2.6091118	1st term +406.5480	Sec φ'		0.0085751	
s²	8.56744		Δλ		2.6827617	481.6834
Sin² α	9.76159		Sin ½(φ+φ')		9.2960962	
C	0.71367		−Δα		1.9788579	95.248
	9.04270	2d term +0.1103				
h²	5.2182					
D	1.9817					
	7.1999	3d term +0.0016				
		−Δφ +406.6599				

	Logarithms	Values in seconds			Logarithms	Values in seconds
			$\frac{1}{2}(\phi+\phi')$			
s	4.3411358		s		4.3411358	
Cos α	9.9826929		Sin α		9.4421390	
B	8.5124997		A'		8.5096696	
h	2.8363284	1st term +686.0068	Sec φ'		0.0085751	
s²	8.68227		Δλ		2.3015195	200.2256
Sin² α	8.88427		Sin ½(φ+φ')		9.2975517	
C	0.71669		−Δα		1.5990712	39.726
	8.28323	2d term +0.0192				
h²	5.6727					
D	1.9845					
	7.6572	3d term +0.0045				
		−Δφ +686.0305				

HOLMES & NARVER, 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
2d L	8	+ 73	20	30.63	3d L	8	- 31	39	59.10
α	RIGILI-2 to 1 KEITH	320	46	00.23	α	3 CORAL to 1 KEITH	35	47	46.50
Δα		+		50.23	Δα		-	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

		°	'	"			°	'	"
φ	11 27 40.883 2 RIGILI-2	λ	162	05	49.036	φ	11 32 20.254 3 CORAL	λ	162	17	10.944
Δφ	- 05	Δλ	+	04	13.720	Δφ	- 09 46.013	Δλ	-	07	08.190
φ'	11 22 34.240 1 KEITH	λ'	162	10	02.75[5]	φ'	11 22 34.241 1 KEITH	λ'	162	10	02.75[4]

	Logarithms	Values in seconds	
s	4.0850213		
Cos α	9.8590648		
B	8.5125031		
h	2.4865582	1st term	+306.6113"
s²	8.17004		
Sin² α	9.60297		
C	0.71367		
	8.49580	2d term	+0.0306
h²	4.9132		
D	1.9817		
	6.7549	3d term	+0.0009
		-Δφ	+306.6428

	° ' "	Logarithms	Values in seconds
½(φ+φ')			
s		4.0850213	
Sin α		9.8010462	
A'		8.5096694	
Sec φ'		0.0086175	
Δλ		2.4043544	253.7198"
Sin½(φ+φ')		9.2966178	
-Δα		1.7009722	50.231

	Logarithms	Values in seconds	
s	4.3462642		
Cos α	9.9090755		
B	8.5124997		
h	2.7678394	1st term	+585.9215"
s²	8.69253		
Sin² α	9.53417		
C	0.71669		
	8.94339	2d term	+0.0878
n²	5.5357		
D	1.9845		
	7.5202	3d term	+0.0033
		-Δφ	+506.0126

	° ' "	Logarithms	Values in seconds
½(φ+φ')			
s		4.3462642	
Sin α		9.7670851	
A'		8.5096697	
Sec φ'		0.0086174	
Δλ		2.6316361	428.189"
Sin½(φ+φ')		9.2980715	
-Δα		1.9297076	85.056

HOLMES & NARVER, INC.
ENGINEERS-CONSTRUCTORS

POSITION COMPUTATION SECOND ORDER TRIANGULATION

COMPUTED BY LSH DATE 12-15-57 JOB NO. 842 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
3d $\angle$	B	+ 71	05	06.07	3d $\angle$	B	- 35	43	14.30
α	2 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	34.67	α'	1 JAMES to 3 CORAL	211	43	15.08

FIRST ANGLE OF TRIANGLE 73-11-40.37

		°	'	"			°	'	"
ϕ	11 27 40.893 2 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 1 JAMES	λ'	162	10	47.239	ϕ'	11 22 08.118 1 JAMES	λ'	162	10	47.238

	Logarithms	Values in seconds
	4.1350566	
Cos α	9.5745226	
B	8.5124021	
h	2.5220813	1st term + 332.7218
s^2	8.27011	
$\sin^2\alpha$	9.64236	
C	0.71367	
	8.62614	2d term + 0.0423
h^2	5.0442	
D	1.9817	
	7.0257	3d term + 0.0011
		$-\Delta\phi$ + 332.7652

	$\frac{1}{2}(\phi+\phi')$	Logarithms	Values in seconds
s		4.1350566	
Sin α		9.8211797	
A'		8.5096695	
Sec ϕ'		0.0086063	
$\Delta\lambda$		2.4745121	298.2031
$\sin\frac{1}{2}(\phi+\phi')$		9.2964818	
$-\Delta\alpha$		1.7709939	59.020

	Logarithms	Values in seconds
s	4.3446586	
Cos α	9.9296362	
B	8.5124997	
h	2.7867945	1st term + 612.0607
s^2	8.68932	
$\sin^2\alpha$	9.44213	
C	0.71669	
	8.84814	2d term + 0.0704
h^2	5.7359	
D	1.9845	
	7.7204	3d term + 0.0053
		$-\Delta\phi$ + 612.1364

	$\frac{1}{2}(\phi+\phi')$	Logarithms	Values in seconds
s		4.3446586	
Sin α		9.7210647	
A'		8.5096695	
Sec ϕ'		0.0086063	
$\Delta\lambda$		2.5839991	383.706
$\sin\frac{1}{2}(\phi+\phi')$		9.2979357	
$-\Delta\alpha$		1.8819348	76.196

HOLMES & NARVER, 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
± ∠	B	+ 67	18	55.33	3d ∠	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
Δα		+	01	16.84	Δα		-	0	58.24
		180	00	00.0			180	00	00.0
α'	1 HENRY to 2 RIGILI-2	134	45	41.79	α'	1 HENRY to 3 CORAL	203	41	55.86

FIRST ANGLE OF TRIANGLE 68-56-14.04

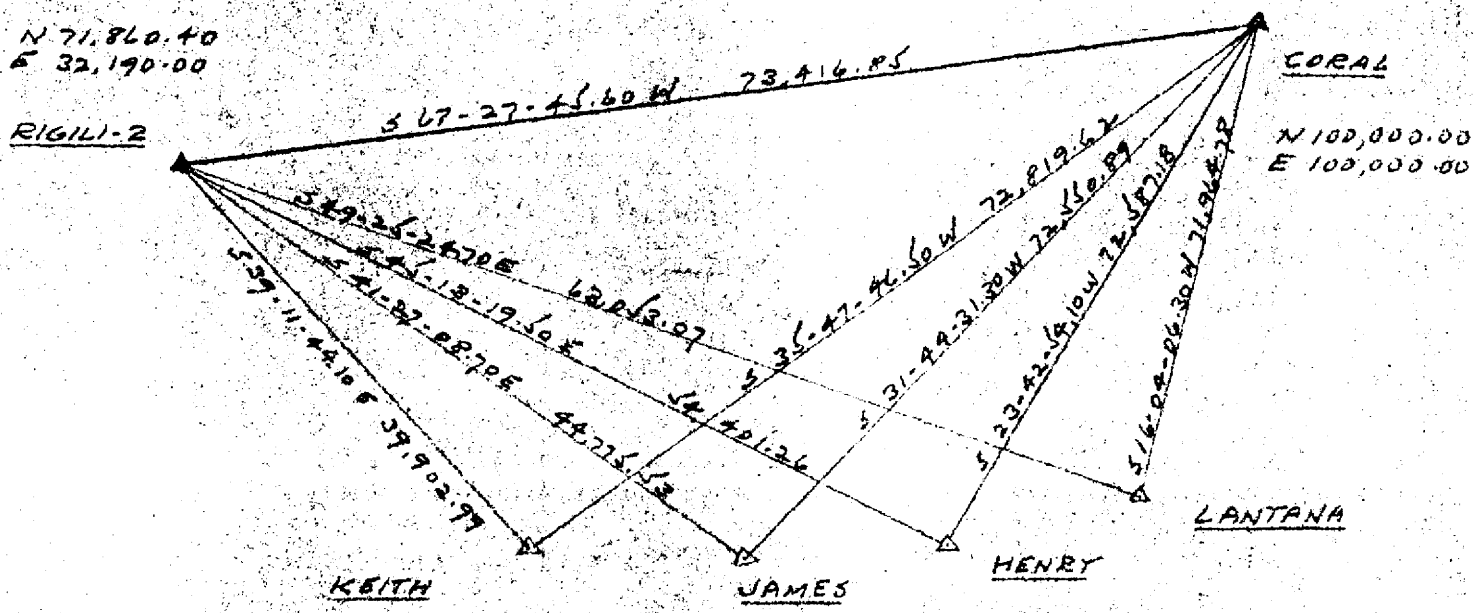
		°	'	"			°	'	"
φ	11 27 40.853 RIGILI-2	λ	162	05	49.036	φ	11 32 20.254 CORAL	λ	162 17 10.944
Δφ	- 06 19.912	Δλ	+	06	28.441	Δφ	- 10 59.312	Δλ	- 09 53.468
φ'	11 21 20.941 HENRY	λ'	162	12	17.475	φ'	11 21 20.942 HENRY	λ'	162 12 16.476

	Logarithms	Values in seconds
	4.2196248	
cos α	1.8475073	
b	8.5125021	
h	2.5796342	1st term +379.8693
s²	8.43925	
sin² α	9.70289	
	0.71367	
	8.85581	2d term +0.0717
	5.1593	
	1.9817	
	7.1410	3d term +0.0014
		-Δφ + 379.9424

	°	'	"	Logarithms	Values in seconds
½(φ+φ')					
s				4.2196248	
Sin α				9.8514449	
A'				8.5096696	
Sec φ'				0.0085864	
Δλ				2.5893257	388.4415
Sin ½(φ+φ')				9.2962356	
-Δα				1.8855613	76.835

	Logarithms	Values in seconds
s	4.3448758	
Cos α	9.9616854	
B	8.5124997	
h	2.8170609	1st term +659.2665
s²	8.68975	
Sin² α	9.20885	
C	0.71669	
	8.61529	2d term +0.0412
n²	5.6381	
D	1.9845	
	7.6226	3d term +0.0042
		-Δφ + 659.3119

	°	'	"	Logarithms	Values in seconds
½(φ+φ')					
s				4.3448758	
Sin α				9.6044290	
A'				8.5096696	
Sec φ'				0.0085864	
Δλ				2.4675608	293.468
Sin ½(φ+φ')				9.2976906	
-Δα				1.7652514	58.244



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
	04.2			(09.2)	

KEITH 73,416.85
Sin 74-59-30.60

Sin 31-39-59.10
39,902.987

Sin 73-20-30.30
72,819.670

JAMES 73,416.85
Sin 73-11-40.00

Sin 35-43-14.30
44,775.508

Sin 71-05-05.70
72,550.886

HENRY 73,416.85
Sin 68-56-13.60

Sin 43-44-51.50
54,401.263

Sin 67-18-54.90
72,587.182

LANTANA 73,416.85
Sin 65-29-31.0

Sin 51-23-39.3
63,053.069

Sin 63-06-49.7
71,964.781

HOLMES & NARVER ENGINEERS-CONSTRUCTORS

COMPUTATION OF TRIANGLES

CALC. BY LSH DATE 12-11-57 JOB NO. 942

CHKD. BY E.R.Q DATE 12-20-57 LOCATION ENIWETOK ATOLL

STATION	OBSERVED ANGLE	CORR-N	SPHERICAL ANGLE	SPHERICAL EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
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	09.3					
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**
CHIEF OF PARTY **H. M. Johnson**
DESCRIBED BY **W. Creasman** MARKED BY **H.M.J.**
FIELD BOOK NO PAGE DATE **5/14/57**

SITE **Gene**
Teiteiripucchi Island
Eniwetok Atoll
Marshall Islands

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
Gail				4.52
Elgin	----		00-00-00	----
Buck #1	164.04		32-27-24	8.15
Buck #2	328.07		32-27-24	9.23

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.

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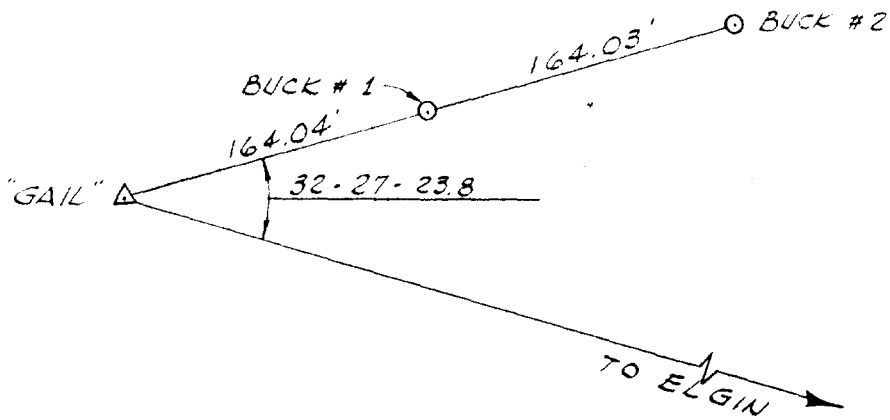
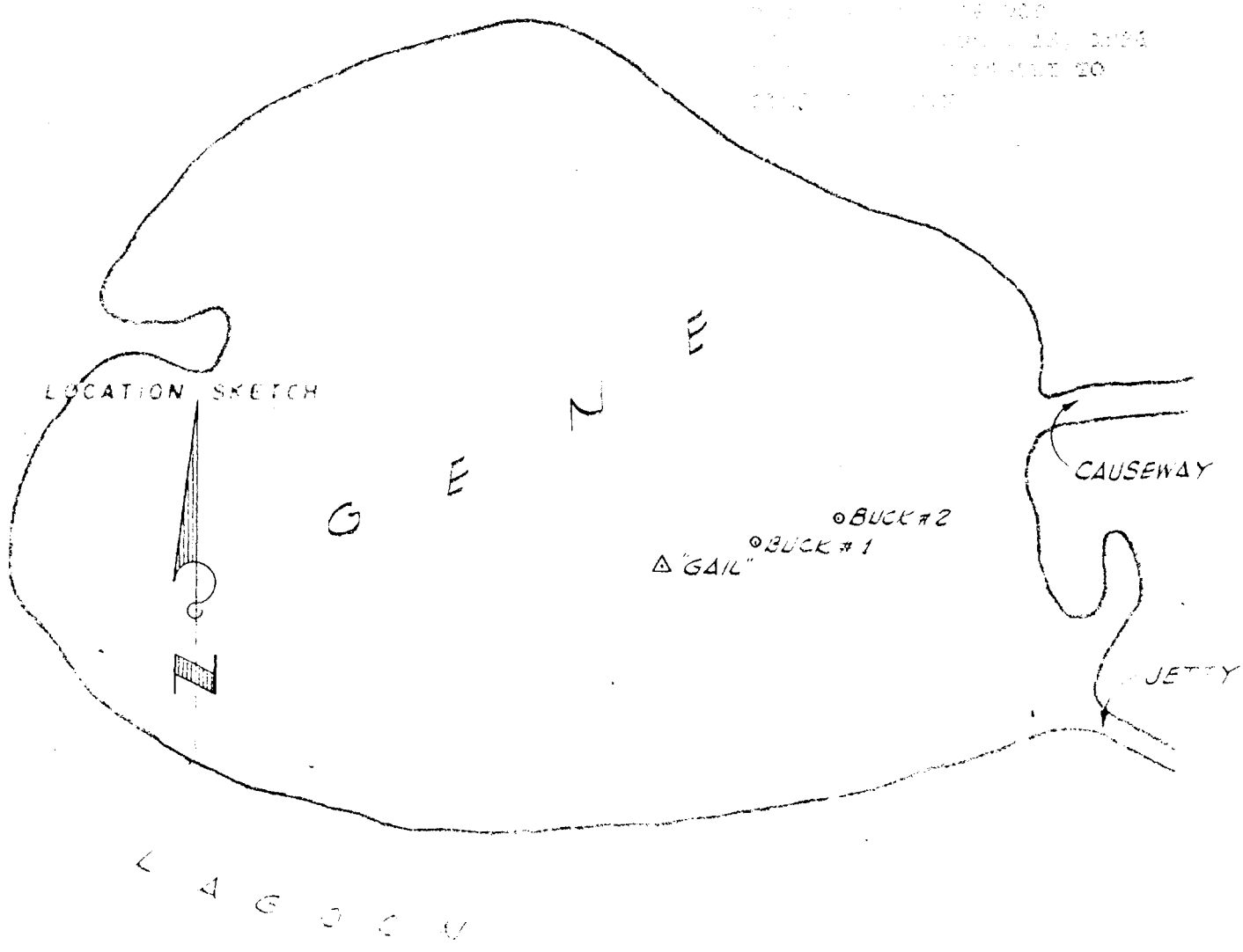
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION Gail SITE Gene, Teiteiripucchi Is, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)





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JOB 942

DESCRIPTION OF TRIANGULATION STATION

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

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
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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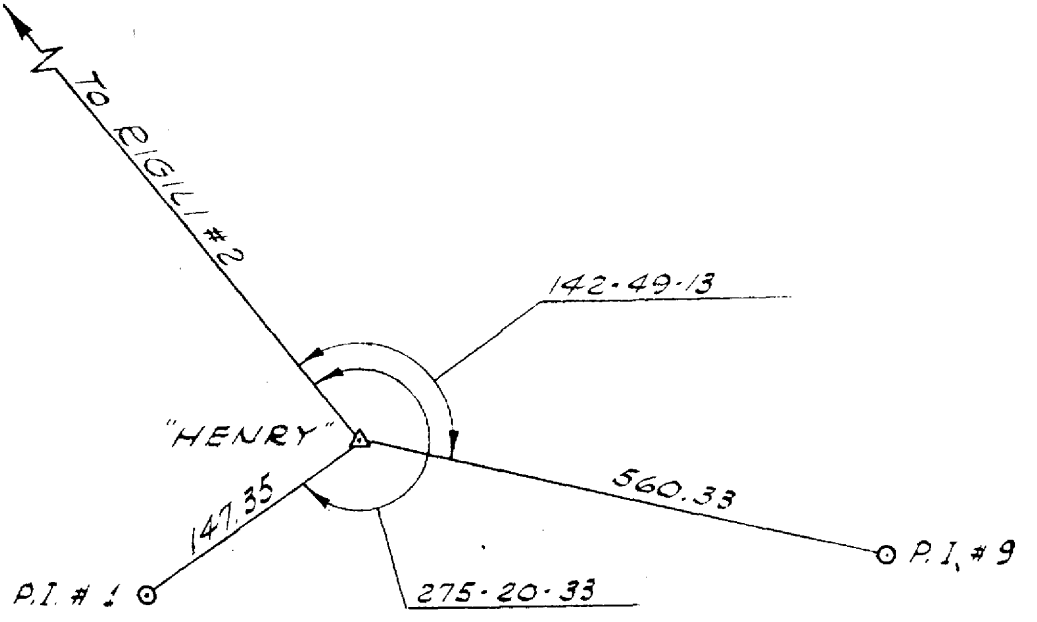
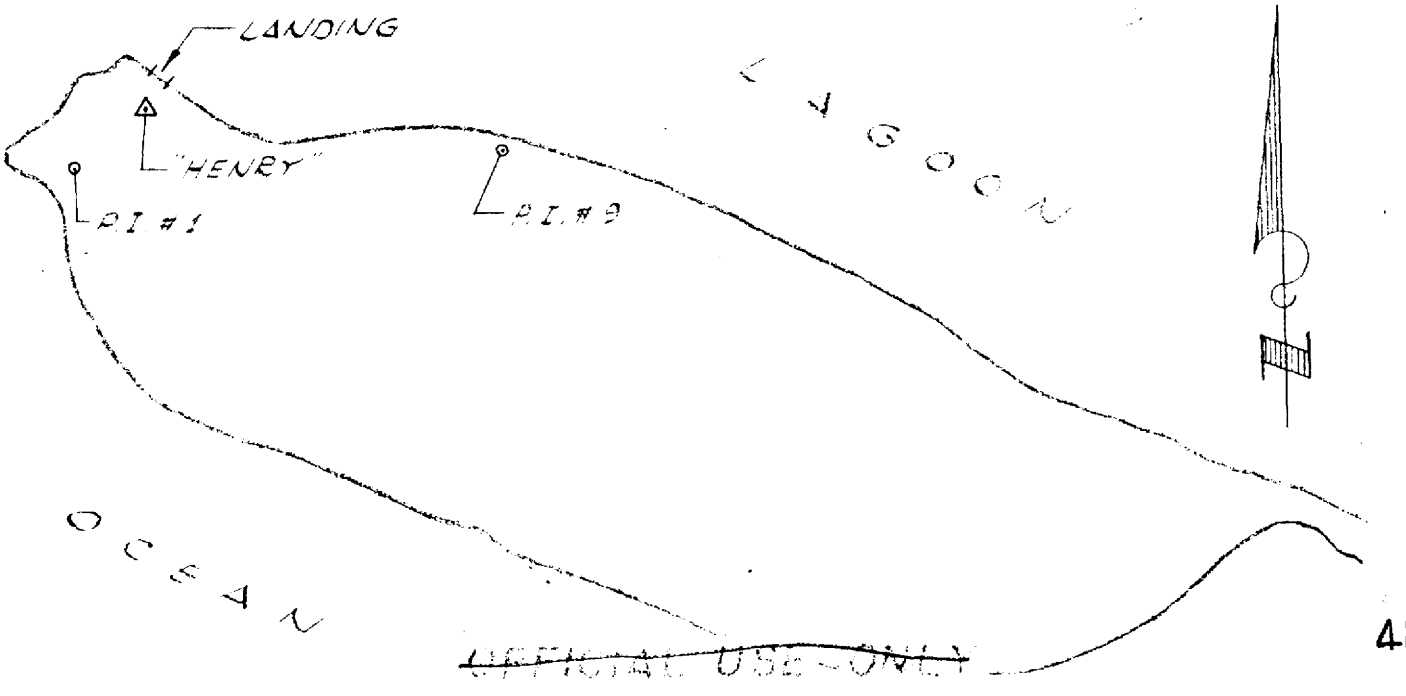
PAGE 2 DESCRIPTION OF TRIANGULATION STATION

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

DETAILED DESCRIPTION OF STATION CONTD



LOCATION SKETCH



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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: JAMES
CHIEF OF PARTY: F. A. Axtell
DESCRIBED BY: W. Creasman MARKED BY: F.A.A.
FIELD BOOK NO: PAGE: DATE: June 1957

SITE: JAMES
Rabaion Island
Eniwetok Atoll
Marshall Islands

DISTANCES AND DIRECTIONS TO REFERENCE MARKS				
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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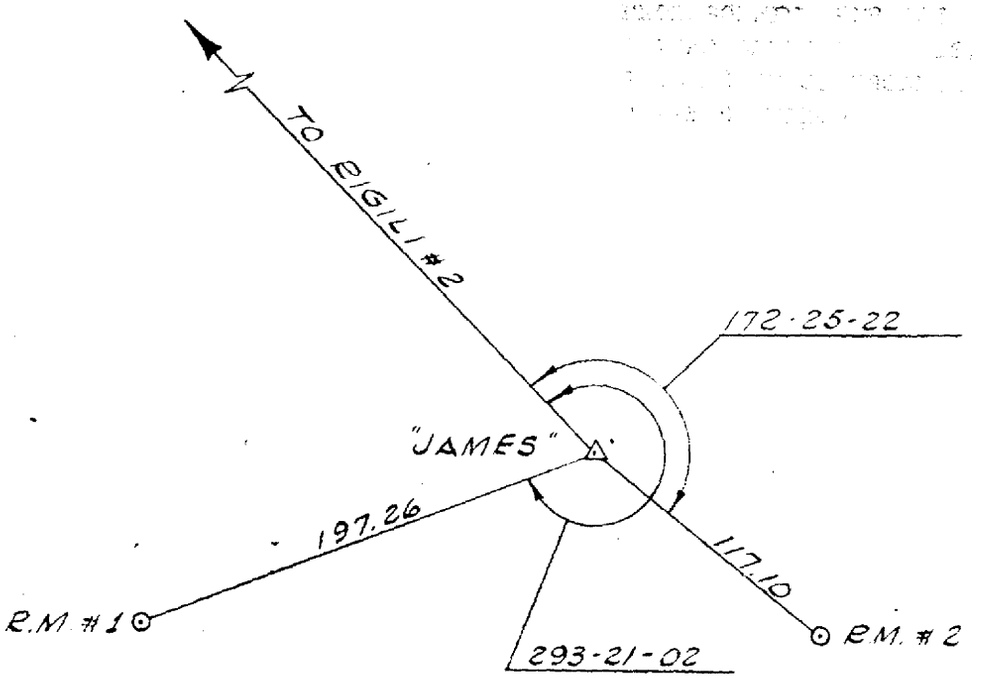
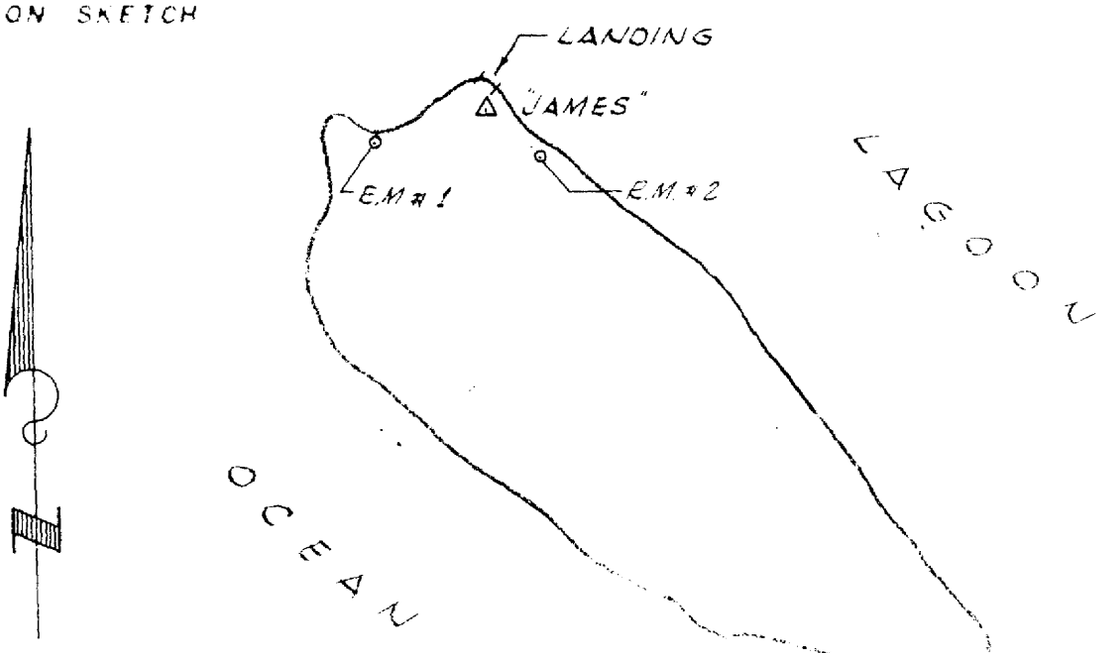
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

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

DETAILED DESCRIPTION OF STATION (CONT'D)



LOCATION SKETCH



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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION JUNK
CHIEF OF PARTY H. C. Dalton
DESCRIBED BY W. Creasman MARKED BY H.C.D.
FIELD BOOK NO. PAGE DATE 8/10/57

SITE IRWIN
Pokon Island
Eniwetok Atoll
Marshall Islands

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
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 extablished 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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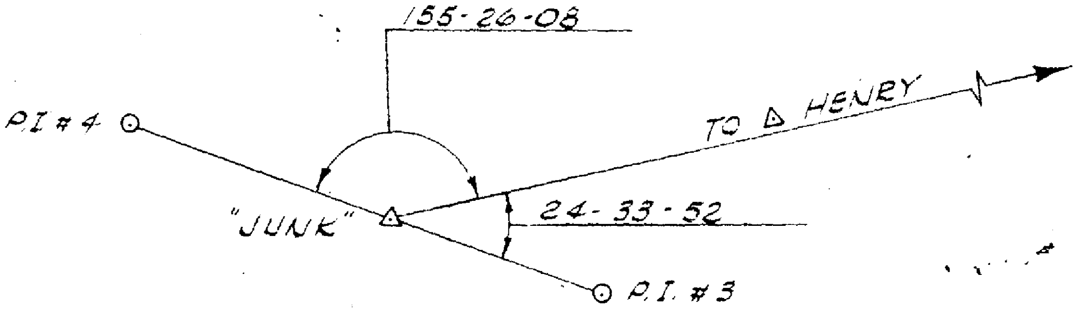
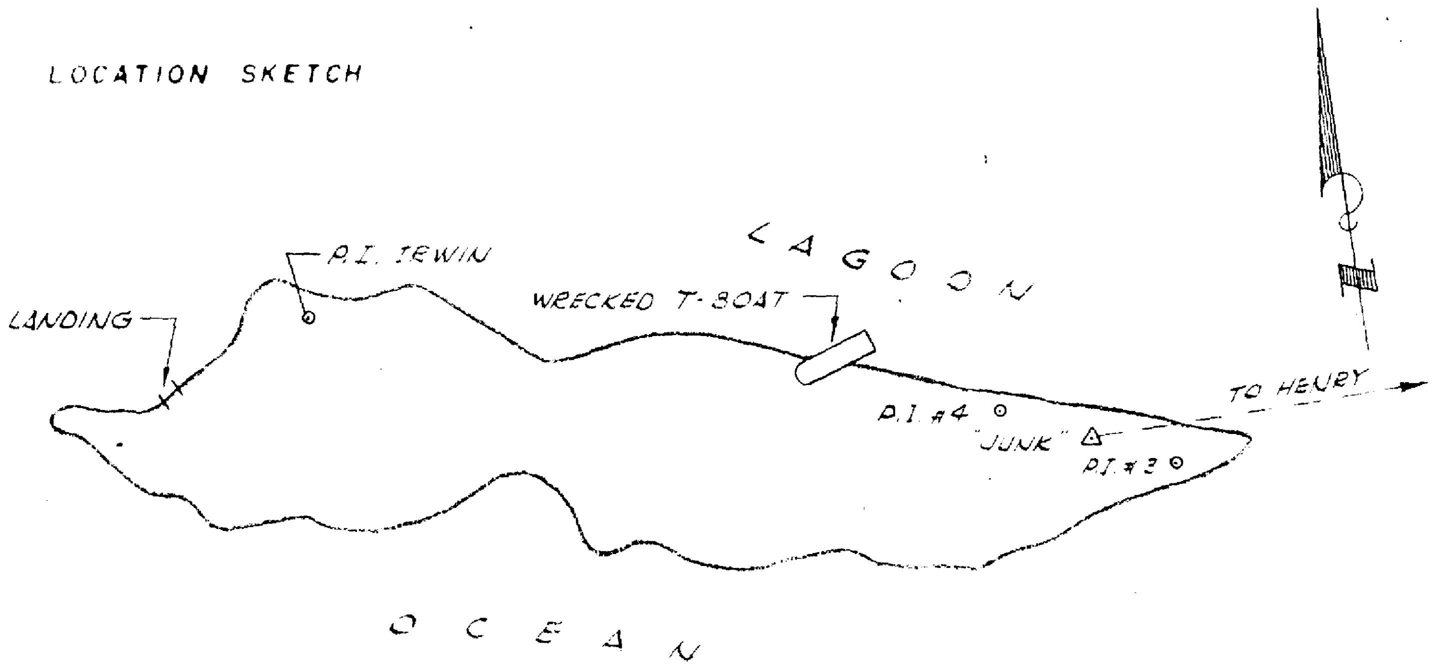
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

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

DETAILED DESCRIPTION OF STATION CONT'D



LOCATION SKETCH



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HOLMES & NARVER, INC
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION KEITH
CHIEF OF PARTY F. A. Axtell
DESCRIBED BY W. Creasman MARKED BY F.A.A.
FIELD BOOK NO PAGE DATE June 1957

SITE KEITH
Giriinien Island
Eniwetok Atoll
Marshall Islands

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
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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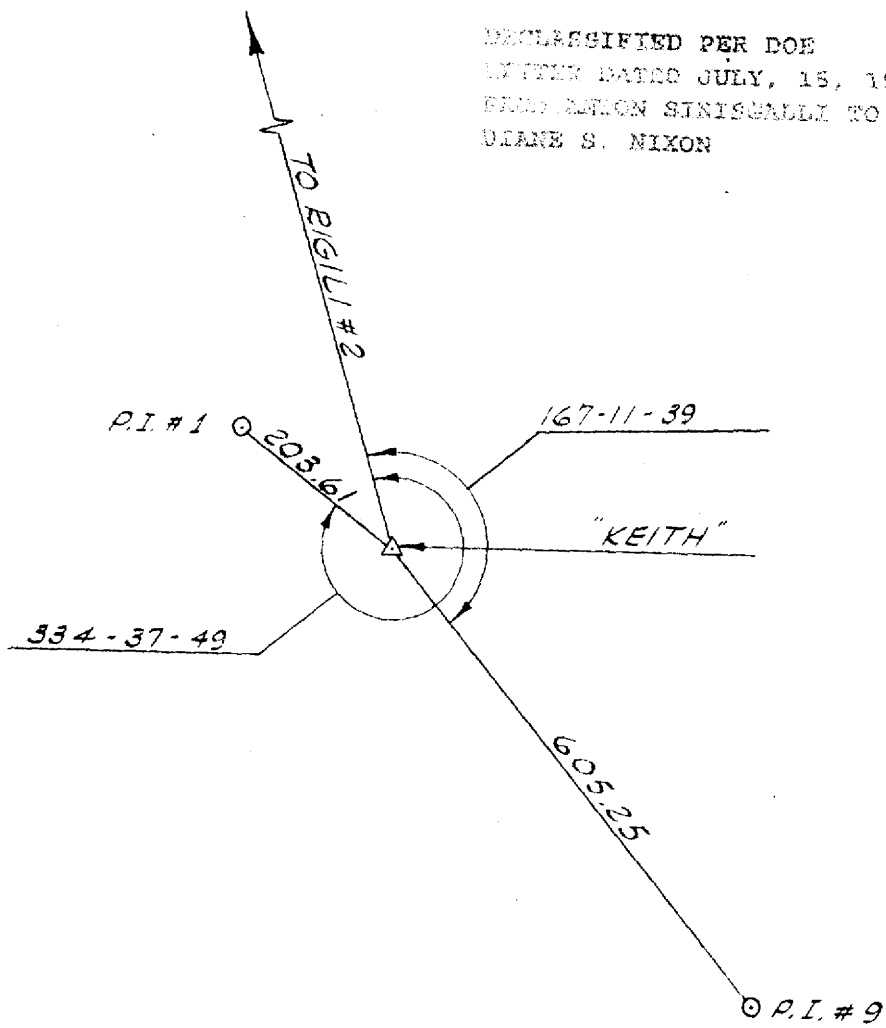
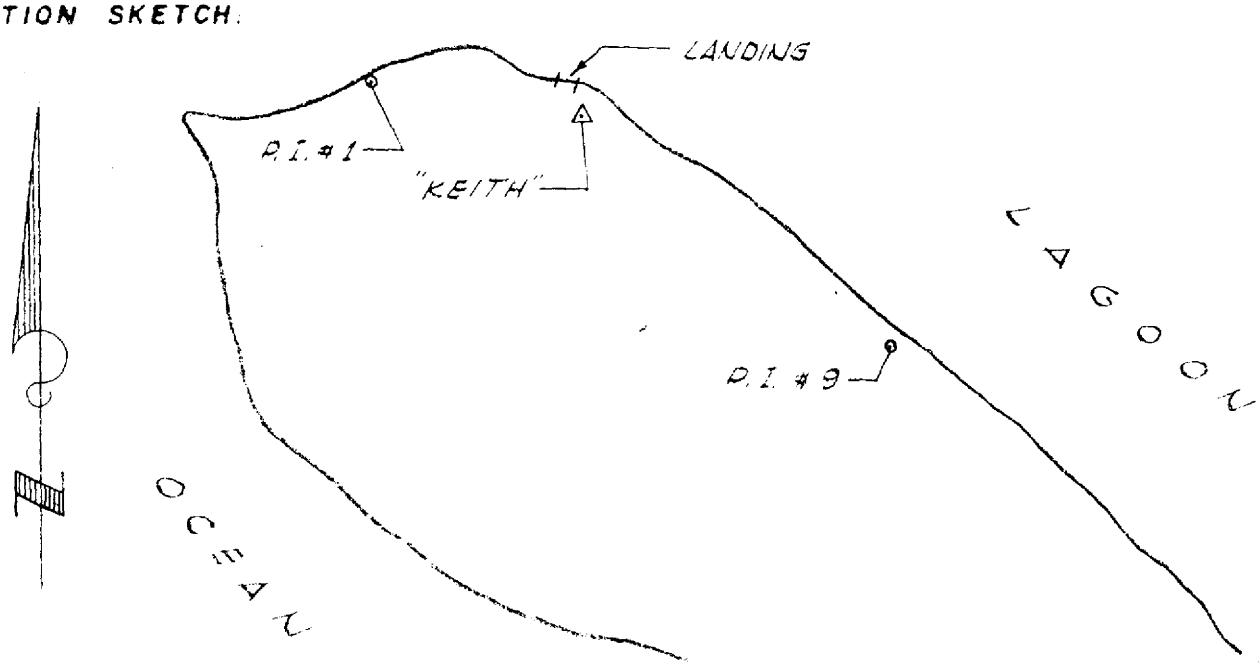
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION KEITH SITE: Keith, Giriinien 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 NORTH SITE YVONNE
Runit Island
Eniwetok Atoll
Marshall Islands

CHIEF OF PARTY H.M. Johnson
DESCRIBED BY W. Creasman MARKED BY H.M.J.
FIELD BOOK NO PAGE DATE 5/10/57

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
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.

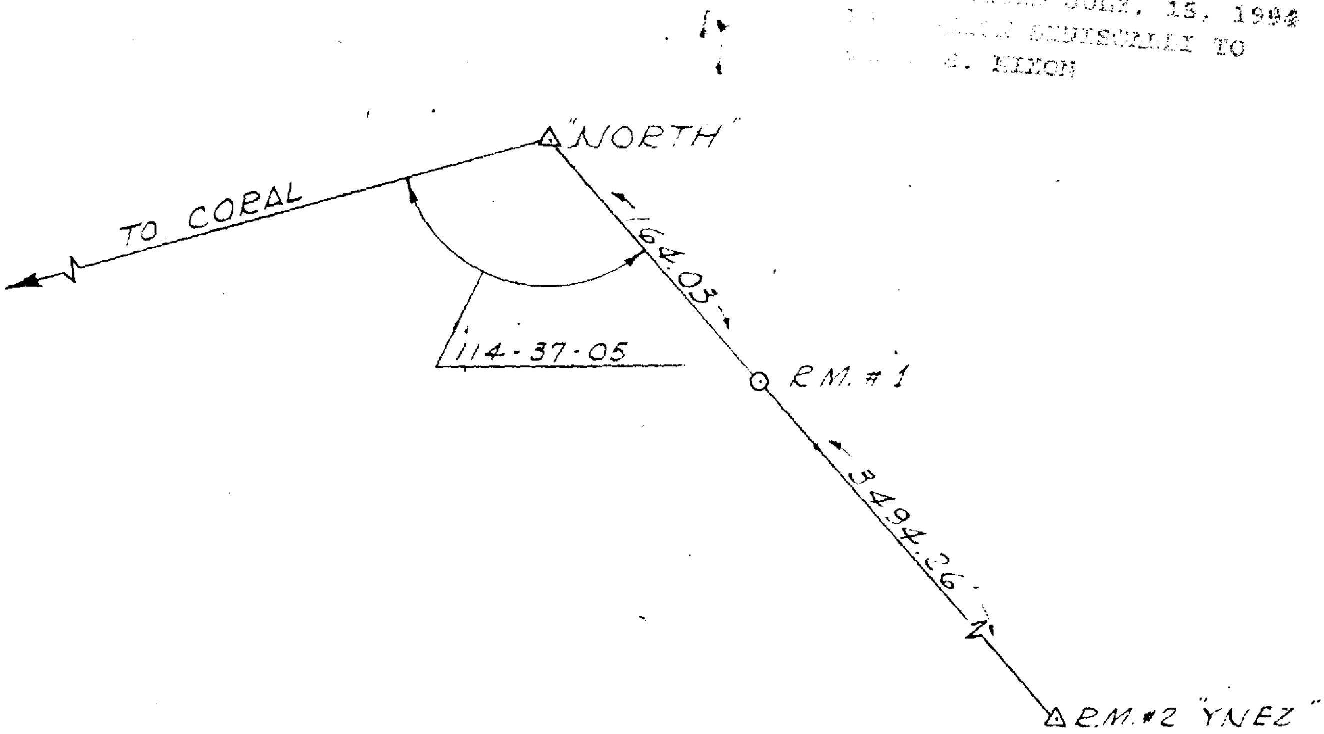
R.M. #1 is a 4"x4" post set in concrete with a punch-marked aluminum strip stamped "Buck #1" nailed to its top. It is a chaining buck on the "Yvonne" first order traverse.

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.

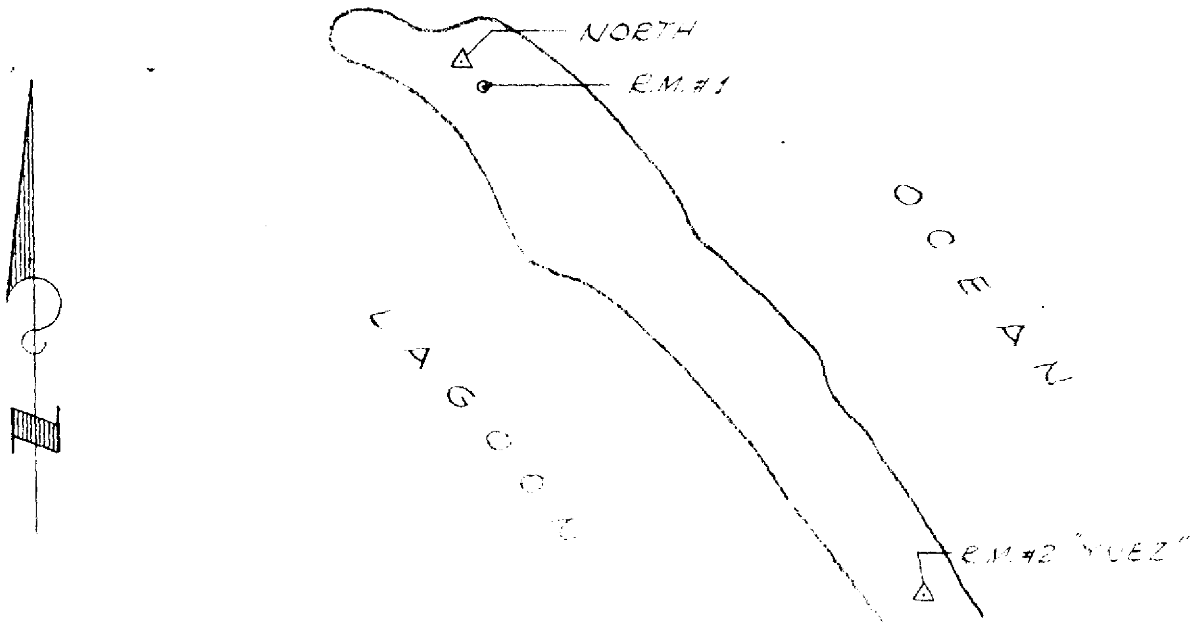
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION NORTH SITE/ Yvonne, Runit Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)



LOCATION SKETCH



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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION SALLY
CHIEF OF PARTY H. M. Johnson
DESCRIBED BY W. Creasman MARKED BY H.M.J.
FIELD BOOK NO. PAGE. DATE 5/13/57

SITE SALLY
Aomon Island
Eniwetok Atolll
Marshall Islands

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
Sally				9.59
Coral			00-00-00	----
Buck #41	164.04		97-30-20	12.86
Buck #30	164.05		159-46-30	12.72
Buck #29	54.00		277-31-30	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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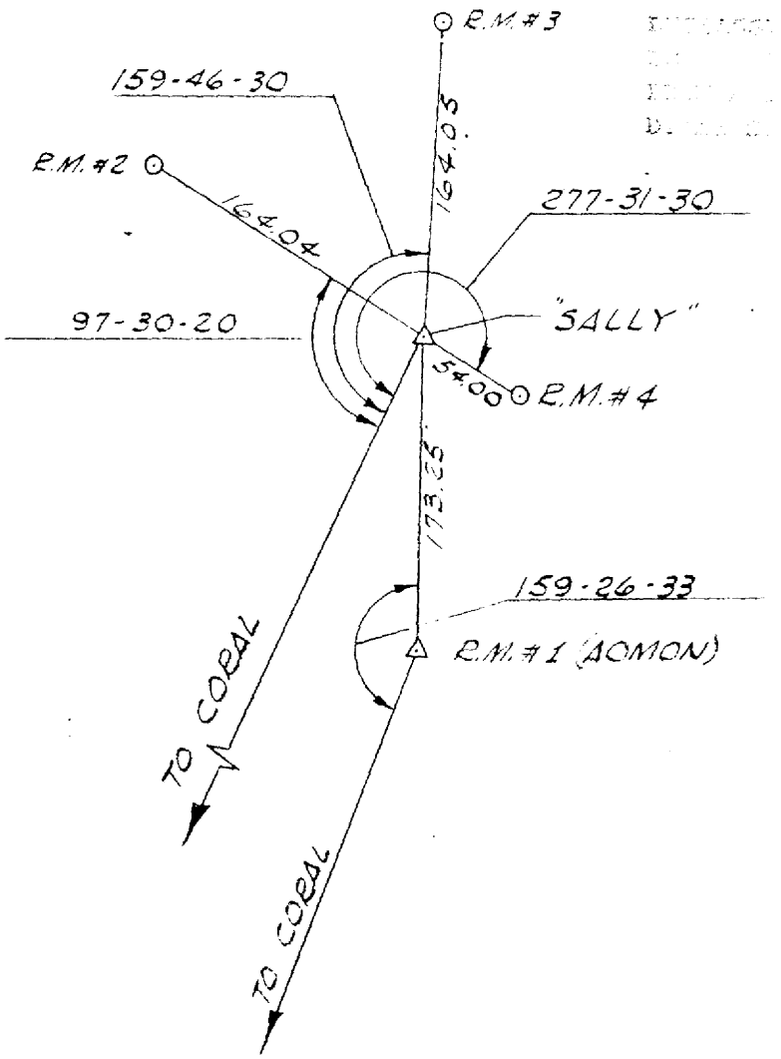
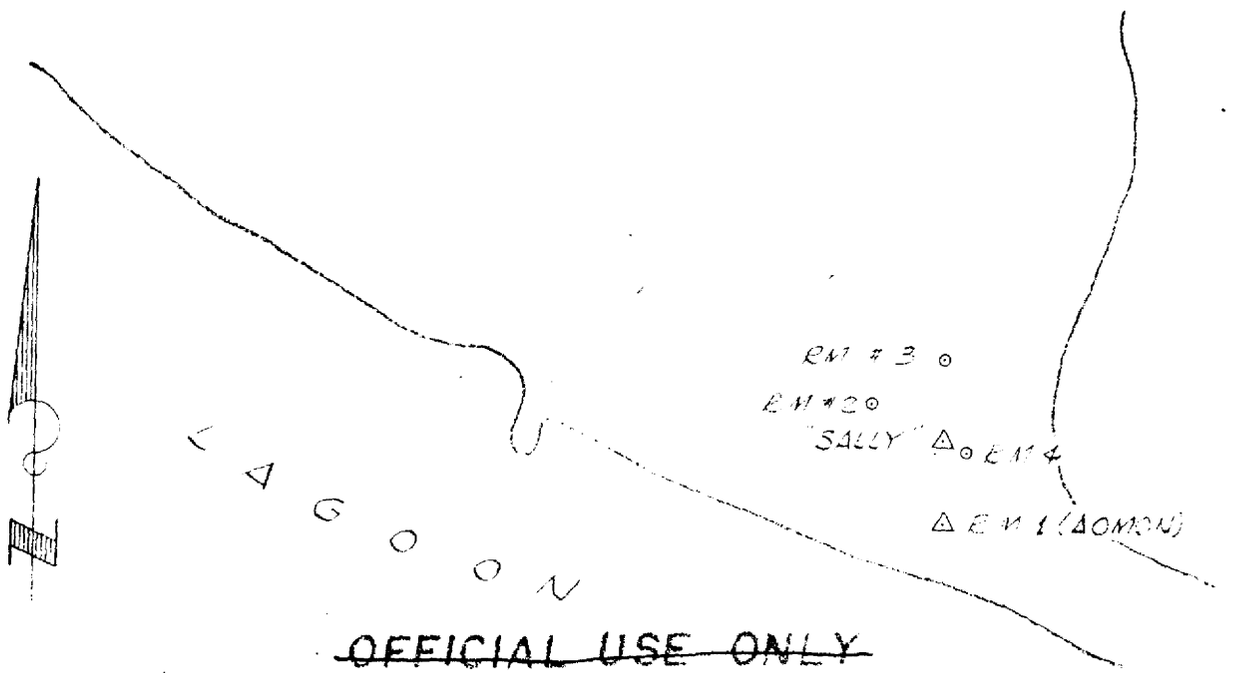
PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

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

DETAILED DESCRIPTION OF STATION (CONT'D)



LOCATION SKETCH:



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HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
JOB 942

DESCRIPTION OF TRIANGULATION STATION

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

DISTANCES AND DIRECTIONS TO REFERENCE MARKS

OBJECT	DISTANCE FEET	DISTANCE METERS	DIRECTION	ELEVATION
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.

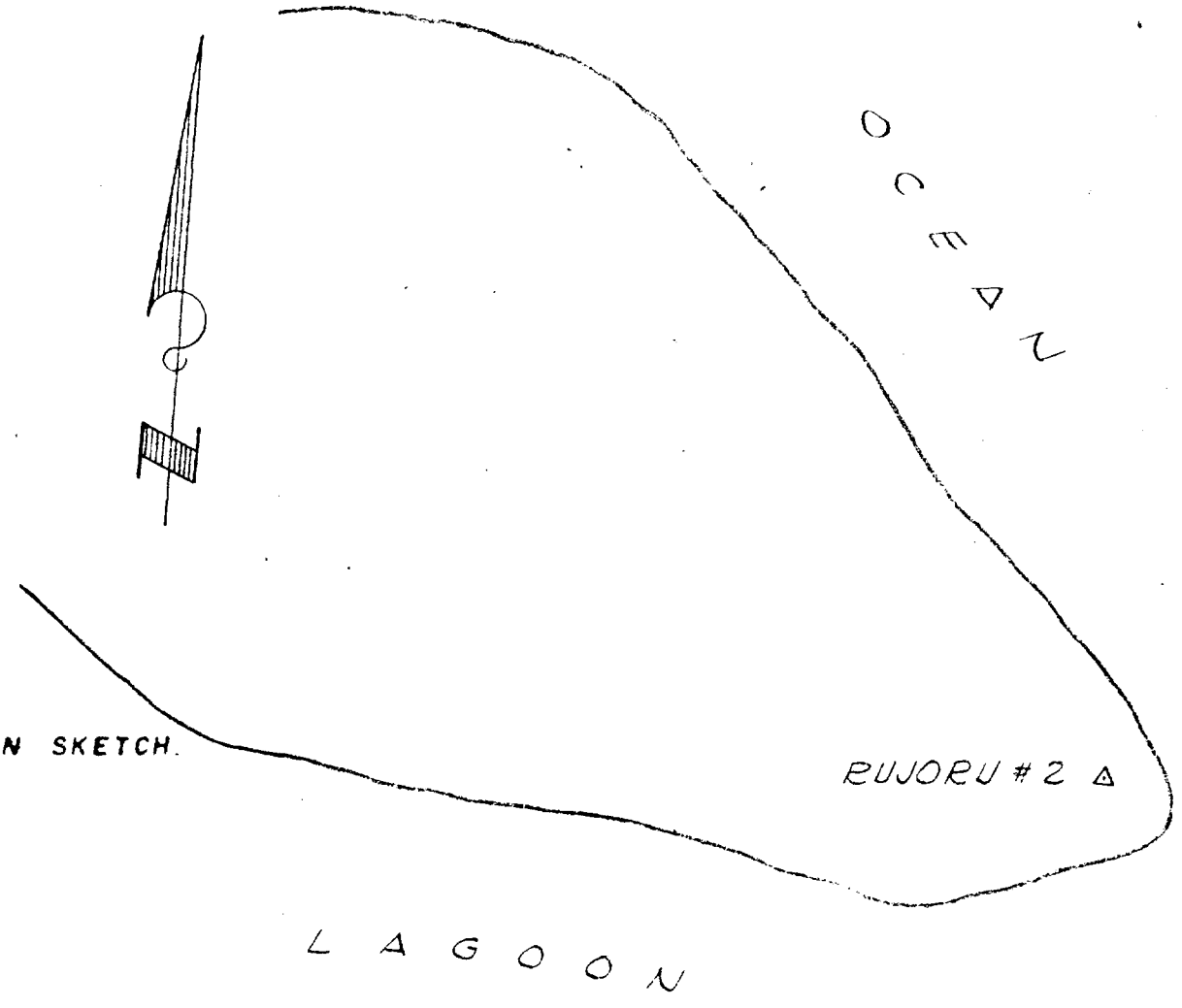
This station is located approximately 90 feet from the ocean high tide line and 115 feet from the easterly end of the island.

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

PAGE 2 - DESCRIPTION OF TRIANGULATION STATION

STATION Rujoru #2 SITE Pearl, Rujoru Island, Eniwetok Atoll, M.I.

DETAILED DESCRIPTION OF STATION (CONT'D)



LOCATION SKETCH.