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PACIFIC MISSILE TEST CENTER POINT MUGU CA F/8 8/3
TIDAL AND LUNAR DATA FOR POINT MUGU, SAN NICOLAS ISLAND, AND TH--ETC(U)
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Technical Publication TP-81-08



**TIDAL AND LUNAR DATA FOR
POINT MUGU, SAN NICOLAS ISLAND,
AND THE BARKING SANDS AREA
DURING 1981**

Compiled by

R. W. DIXON
Geophysics Division

15 November 1980

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PACIFIC MISSILE TEST CENTER

Point Mugu, California 93042

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PACIFIC MISSILE TEST CENTER

AN ACTIVITY OF THE NAVAL AIR SYSTEMS COMMAND

This report was compiled by Mr. Richard W. Dixon with the assistance of Mr. Robert de Violini and Mrs. Barbara Williams.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Basic lunar and tidal data for Point Mugu, San Nicolas Island, and the Barking Sands area during 1981 are provided. The data presented are (1) tidal data, (2) times of moonrise and moonset, and (3) times of lunar phases.		

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CONTENTS

	Page
INTRODUCTION	1
DATA SOURCE AND TIME REFERENCES	1
TIDAL DATA	2
LUNAR DATA	2
APPENDIXES	
A. Height of the Tide at Any Time	A-1
B. Equinoxes, Solstices, and Lunar Phases During 1981	B-1
TABLES	
1. Tidal Ranges for Point Mugu and San Nicolas Island	2
2. Tidal Ranges for Port Allen	2
3. Moonrise and Moonset, Point Mugu, California, 1981	3
4. Point Mugu Tides, January 1981	4
5. San Nicolas Island Tides, January 1981	4
6. Point Mugu Tides, February 1981	6
7. San Nicolas Island Tides, February 1981	6
8. Point Mugu Tides, March 1981	8
9. San Nicolas Island Tides, March 1981	8
10. Point Mugu Tides, April 1981	10
11. San Nicolas Island Tides, April 1981	10
12. Point Mugu Tides, May 1981	12
13. San Nicolas Island Tides, May 1981	12
14. Point Mugu Tides, June 1981	14
15. San Nicolas Island Tides, June 1981	14
16. Point Mugu Tides, July 1981	16
17. San Nicolas Island Tides, July 1981	16
18. Point Mugu Tides, August 1981	18
19. San Nicolas Island Tides, August 1981	18
20. Point Mugu Tides, September 1981	20
21. San Nicolas Island Tides, September 1981	20
22. Point Mugu Tides, October 1981	22
23. San Nicolas Island Tides, October 1981	22
24. Point Mugu Tides, November 1981	24
25. San Nicolas Island Tides, November 1981	24

CONTENTS (Concluded)

	Page
TABLES (Concluded)	
26. Point Mugu Tides, December 1981	26
27. San Nicolas Island Tides, December 1981	26
28. Moonrise and Moonset, Barking Sands, Hawaii, 1981	29
29. Port Allen Tides, January 1981	30
30. Port Allen Tides, February 1981	32
31. Port Allen Tides, March 1981	34
32. Port Allen Tides, April 1981	36
33. Port Allen Tides, May 1981	38
34. Port Allen Tides, June 1981	40
35. Port Allen Tides, July 1981	42
36. Port Allen Tides, August 1981	44
37. Port Allen Tides, September 1981	46
38. Port Allen Tides, October 1981	48
39. Port Allen Tides, November 1981	50
40. Port Allen Tides, December 1981	52
A-1. Height of the Tide at Any Time	A-2
B-1. Equinoxes and Solstices, 1981, Point Mugu and San Nicolas Island	B-1
B-2. Lunar Phases, 1981, Point Mugu and San Nicolas Island	B-1
FIGURES	
1. Tidal Graph for Point Mugu, January 1981	5
2. Tidal Graph for Point Mugu, February 1981	7
3. Tidal Graph for Point Mugu, March 1981	9
4. Tidal Graph for Point Mugu, April 1981	11
5. Tidal Graph for Point Mugu, May 1981	13
6. Tidal Graph for Point Mugu, June 1981	15
7. Tidal Graph for Point Mugu, July 1981	17
8. Tidal Graph for Point Mugu, August 1981	19
9. Tidal Graph for Point Mugu, September 1981	21
10. Tidal Graph for Point Mugu, October 1981	23
11. Tidal Graph for Point Mugu, November 1981	25
12. Tidal Graph for Point Mugu, December 1981	27
13. Tidal Graph for Port Allen, January 1981	31
14. Tidal Graph for Port Allen, February 1981	33
15. Tidal Graph for Port Allen, March 1981	35
16. Tidal Graph for Port Allen, April 1981	37
17. Tidal Graph for Port Allen, May 1981	39
18. Tidal Graph for Port Allen, June 1981	41
19. Tidal Graph for Port Allen, July 1981	43
20. Tidal Graph for Port Allen, August 1981	45
21. Tidal Graph for Port Allen, September 1981	47
22. Tidal Graph for Port Allen, October 1981	49
23. Tidal Graph for Port Allen, November 1981	51
24. Tidal Graph for Port Allen, December 1981	53
A-1. Tidal Curve for Solution of the Problem	A-3

INTRODUCTION

This publication combines into a single source all tidal and lunar data for operational locations of the Pacific Missile Test Center for use in Calendar Year 1981.

The data presentations are in two main divisions: one for Point Mugu and San Nicolas Island, and the other for the Barking Sands area. Within each division, the times of moonrise and moonset and tidal data are given. An appendix provides information regarding lunar phases. Since all such data change from year to year, this publication will be reissued annually.

Sunrise-sunset times for these locations, and associated solar data which do not change significantly from year to year, are issued as a single, permanent publication. Further information regarding any of these data may be obtained from the Geophysics Division of the Range Operations Department.

DATA SOURCE AND TIME REFERENCES

The data given here have been prepared from information contained in Tide Tables for the West Coast of North and South America including the Hawaiian Islands, 1981.*

For Point Mugu and San Nicolas Island, all times listed are Pacific Standard Time (PST); add eight hours to obtain Greenwich Mean Time (GMT or Z).**

For the Barking Sands area, all times listed are Alaska-Hawaii Standard Time (AHST); add 10 hours to obtain GMT. Daylight Savings Time is not observed in Hawaii.

*National Ocean Survey. Tide Tables for the West Coast of North and South America Including the Hawaiian Islands, 1981. Washington, D.C., GPO, 1980.

**When Daylight Saving Time (PDT) is in effect, 1 hour is to be added to the times given. In 1981, Pacific Daylight Time is scheduled to commence at 0200 PST on Sunday, 26 April (add 1 hour), and to end at 0200 PDT on Sunday, 25 October (subtract 1 hour).

TIDAL DATA

The ranges of tidal heights that may be expected at Point Mugu and San Nicolas Island are shown in table 1. The range of heights for the primary harbor in the Barking Sands area, Port Allen, is shown in table 2. The times and heights of high and low tides for 1981 at Point Mugu are given in the even-numbered tables 4 through 26, and at San Nicolas Island in the odd-numbered tables 5 through 27. Similar tide data for Port Allen are given in tables 29 through 40.

Table 1. Tidal Ranges for Point Mugu and San Nicolas Island

Tidal Levels	Point Mugu	San Nicolas Island
	Height (Feet)	Height (Feet)
Extreme high water	7.3	6.7
Mean higher high water	5.3	4.9
Mean high water	4.5	4.1
Mean tide level*	2.7	2.5
Mean low water	0.9	0.8
Mean lower low water	0.0	0.0
Extreme low water	-2.0	-1.8

* The mean tide level is also called mean sea level.

Table 2. Tidal Ranges for Port Allen

Tidal Levels	Height (Feet)
Extreme high water	2.6
Mean higher high water	1.6
Mean high water	1.2
Mean tide level*	0.7
Mean low water	0.2
Mean lower low water	0.0
Extreme low water	-0.4

* The mean tide level is also called mean sea level.

Tidal graphs prepared from the Point Mugu data are presented in figures 1 through 12, and graphs prepared from the Port Allen tables are presented in figures 13 through 24. (Because of their close similarity to the Point Mugu graphs, graphical presentations of the San Nicolas Island data are not included in this publication.)

These tables list the times and heights of high and low tide for each month of the year and chronologically through each day. The heights are all measured from mean lower low water (see tables 1 and 2) and are values for a sea unaffected by wind waves or swell. The height and character of the sea surface are influenced by factors other than the predictable positions of the moon and sun, and is thus likely to be higher or lower than computed values may indicate. Information regarding the height of the tide at any time will be found in appendix A.

LUNAR DATA

Times of moonrise and moonset for the Point Mugu-San Nicolas Island area in 1981 are given in table 3, and for the Barking Sands area in table 28, preceding the tidal data for the respective stations. Information regarding the phases of the moon in 1981 will be found in appendix B.

Table 3. Moonrise and Moonset, Point Mugu, California, 1981.

Date	January		February		March		April		May		June		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	0242	1353	0411	1436	0252	1316	0353	1501	0344	1601	0420	1821	1
2	0337	1430	0505	1530	0344	1412	0434	1608	0423	1712	0509	1931	2
3	0433	1511	0556	1629	0433	1513	0513	1717	0503	1823	0604	2037	3
4	0528	1557	0644	1732	0519	1617	0552	1827	0546	1935	0703	2136	4
5	0623	1648	0728	1837	0602	1724	0632	1937	0633	2046	0805	2227	5
6	0716	1744	0809	1943	0643	1832	0713	2048	0725	2153	0908	2312	6
7	0805	1843	0848	2049	0722	1940	0758	2158	0821	2254	1010	2351	7
8	0850	1946	0926	2156	0800	2049	0846	2305	0921	2347	1110	-----	8
9	0932	2050	1003	2302	0840	2157	0938	-----	1021	-----	1207	0026	9
10	1011	2154	1042	-----	0921	2305	1034	0006	1122	0034	1302	0057	10
11	1048	2258	1123	0008	1005	-----	1132	0102	1221	0115	1357	0127	11
12	1125	-----	1207	0113	1053	0011	1231	0152	1318	0151	1451	0157	12
13	1202	0003	1256	0218	1145	0114	1329	0235	1414	0224	1545	0228	13
14	1241	0109	1349	0319	1240	0212	1427	0313	1509	0254	1639	0259	14
15	1323	0215	1445	0416	1338	0305	1524	0348	1603	0324	1734	0334	15
16	1410	0321	1544	0507	1436	0352	1619	0420	1657	0354	1829	0412	16
17	1501	0426	1644	0554	1535	0434	1714	0451	1751	0425	1922	0455	17
18	1557	0527	1743	0635	1633	0511	1808	0521	1845	0458	2013	0542	18
19	1656	0624	1841	0712	1729	0546	1902	0551	1940	0534	2102	0633	19
20	1757	0715	1938	0746	1825	0618	1956	0623	2034	0613	2146	0729	20
21	1857	0759	2033	0817	1919	0648	2050	0657	2126	0657	2227	0827	21
22	1956	0839	2128	0848	2014	0719	2144	0734	2216	0745	2306	0928	22
23	2054	0915	2222	0919	2108	0750	2237	0815	2303	0838	2342	1029	23
24	2149	0947	2316	0950	2202	0822	2329	0900	2346	0934	-----	1132	24
25	2244	1018	-----	1024	2256	0857	-----	0949	-----	1033	0017	1237	25
26	2338	1049	0010	1100	2350	0936	0018	1044	0026	1134	0053	1342	26
27	-----	1119	0104	1140	-----	1018	0104	1142	0104	1238	0131	1450	27
28	0031	1152	0158	1225	0043	1105	0147	1243	0141	1343	0211	1559	28
29	0126	1226	-----	-----	0134	1158	0228	1347	0217	1450	0257	1709	29
30	0221	1305	-----	-----	0223	1255	0306	1453	0255	1559	0348	1816	30
31	0316	1348	-----	-----	0309	1356	-----	-----	0335	1709	-----	-----	31

Date	July		August		September		October		November		December		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	0444	1919	0638	2019	0821	2028	0858	2002	1026	2041	1045	2114	1
2	0546	2015	0740	2055	0917	2059	0953	2038	1116	2131	1126	2212	2
3	0649	2104	0840	2127	1012	2130	1047	2117	1203	2225	1204	2312	3
4	0753	2146	0937	2158	1107	2204	1140	2200	1247	2323	1239	-----	4
5	0855	2224	1033	2229	1201	2241	1232	2248	1327	-----	1314	0013	5
6	0955	2257	1128	2300	1255	2322	1321	2340	1405	0023	1348	0116	6
7	1053	2329	1222	2332	1349	-----	1408	-----	1441	0125	1424	0222	7
8	1148	2359	1317	-----	1440	0008	1451	0037	1517	0229	1503	0330	8
9	1243	-----	1411	0007	1529	0059	1532	0137	1554	0336	1547	0441	9
10	1337	0029	1505	0046	1616	0154	1610	0240	1633	0445	1636	0553	10
11	1432	0100	1559	0129	1659	0254	1648	0345	1715	0556	1732	0705	11
12	1526	0134	1650	0218	1739	0356	1724	0452	1802	0709	1834	0812	12
13	1621	0210	1738	0311	1817	0501	1802	0601	1855	0821	1940	0913	13
14	1715	0251	1823	0409	1854	0607	1843	0711	1953	0929	2046	1006	14
15	1808	0336	1905	0510	1930	0713	1926	0822	2055	1032	2151	1051	15
16	1858	0427	1944	0613	2008	0821	2015	0932	2158	1127	2253	1130	16
17	1944	0522	2020	0717	2049	0929	2108	1040	2301	1214	2352	1205	17
18	2027	0620	2056	0821	2133	1037	2206	1143	-----	1255	-----	1236	18
19	2107	0721	2132	0927	2221	1145	2306	1240	0003	1330	0049	1307	19
20	2144	0823	2210	1032	2315	1249	-----	1331	0102	1403	0145	1336	20
21	2220	0926	2250	1139	-----	1349	0008	1414	0159	1433	0240	1407	21
22	2255	1029	2335	1245	0012	1443	0109	1453	0255	1503	0335	1439	22
23	2331	1134	-----	1351	0113	1531	0209	1527	0350	1533	0429	1514	23
24	-----	1239	0025	1454	0214	1613	0307	1559	0445	1604	0524	1552	24
25	0009	1346	0119	1553	0315	1651	0404	1630	0540	1637	0618	1635	25
26	0051	1454	0219	1646	0415	1725	0500	1700	0635	1714	0710	1723	26
27	0138	1600	0321	1733	0514	1757	0556	1730	0729	1754	0759	1814	27
28	0231	1703	0424	1814	0611	1827	0651	1802	0823	1838	0845	1909	28
29	0329	1802	0526	1851	0708	1858	0746	1837	0913	1926	0927	2006	29
30	0431	1854	0626	1925	0803	1929	0841	1914	1001	2019	1005	2105	30
31	0535	1939	0724	1957	-----	-----	0934	1956	-----	-----	1041	2205	31

TABLE 4
POINT MUGU TIDES
34 DEG 06 MIN N, 114 DEG 06 MIN W - OCEAN PIER
JANUARY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0555	5.1	1311	0.5	1915	3.3	0007	2.0*
2	0627	5.4	1345	0.1	1958	3.4	0007	---
3	0644	2.0	0659	5.7	1418	-0.3	2033	3.5
4	0119	2.1	0731	5.9	1450	-0.6	2104	3.9
5	0152	2.1	0803	6.1	1522	-0.8	2144	3.7
6	0228	2.1	0835	6.2	1557	-0.9	2219	3.8
7	0306	2.1	0912	6.1	1634	-0.9	2301	3.8
8	0347	2.1	0949	5.9	1711	-0.8	2341	3.9
9	0436	2.2	1031	5.6	1748	-0.5	---	---
10	0026	4.0	0532	2.3	1120	5.1	1834	-0.1
11	0116	4.2	0646	2.3	1220	4.4	1920	0.3
12	0213	4.4	0816	2.1	1338	3.7	2017	0.8
13	0309	4.7	0955	1.6	1522	3.3	2116	1.2
14	0405	5.1	1115	0.9	1705	3.2	2222	1.6
15	0459	5.6	1220	0.1	1824	3.4	2323	1.7
16	0550	6.0	1311	-0.6	1925	3.6	---	---
17	0020	1.8	0637	6.3	1358	-1.1	2017	3.8
18	0110	1.8	0722	6.5	1440	-1.3	2059	4.0
19	0158	1.8	0803	6.6	1519	-1.4	2141	4.1
20	0240	1.7	0845	6.4	1557	-1.3	2219	4.1
21	0322	1.7	0922	6.2	1633	-1.0	2255	4.1
22	0404	1.8	1002	5.8	1711	-0.7	2333	4.1
23	0448	1.9	1038	5.2	1744	-0.2	---	---
24	0012	4.1	0537	2.1	1120	4.6	1818	0.3
25	0054	4.0	0633	2.2	1202	4.0	1955	0.9
26	0142	4.0	0752	2.2	1304	3.3	1933	1.4
27	0235	4.1	0932	2.1	1438	2.8	2026	1.8
28	0332	4.2	1106	1.6	1646	2.7	2128	2.2
29	0425	4.4	1206	1.1	1819	2.8	2237	2.3
30	0513	4.7	1252	0.5	1914	3.1	2336	2.4
31	0558	5.1	1327	0.0	1949	3.3	---	---

* -- TIDE OCCURS ON NEXT DATE.

TABLE 5
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST
JANUARY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0602	4.7	1321	0.5	1922	3.1	0017	1.8*
2	0634	5.0	1355	0.1	2005	3.2	---	---
3	0054	1.8	0706	5.3	1428	-0.3	2040	3.3
4	0129	1.9	0738	5.5	1500	-0.5	2116	3.4
5	0202	1.9	0810	5.6	1532	-0.7	2151	3.5
6	0238	1.9	0842	5.7	1607	-0.8	2226	3.5
7	0316	1.9	0919	5.6	1644	-0.8	2308	3.5
8	0357	1.9	0956	5.5	1721	-0.7	2348	3.6
9	0446	2.0	1038	5.2	1754	-0.5	---	---
10	0033	3.7	0542	2.1	1127	4.7	1844	-0.1
11	0123	3.4	0656	2.1	1227	4.1	1930	0.3
12	0220	4.1	0826	1.9	1345	3.5	2027	0.7
13	0316	4.4	1005	1.5	1529	3.1	2126	1.1
14	0412	4.7	1125	0.8	1712	3.0	2232	1.5
15	0506	5.2	1230	0.1	1831	3.2	2333	1.5
16	0557	5.6	1321	-0.5	1932	3.4	---	---
17	0030	1.6	0644	5.8	1408	-1.0	2024	3.5
18	0126	1.6	0729	6.0	1450	-1.2	2104	3.7
19	0208	1.6	0810	6.1	1529	-1.3	2144	3.8
20	0250	1.5	0852	5.9	1607	-1.2	2226	3.8
21	0332	1.5	0929	5.7	1643	-0.9	2302	3.8
22	0414	1.6	1009	5.4	1721	-0.6	2340	3.8
23	0458	1.7	1045	4.8	1754	-0.2	---	---
24	0019	3.8	0547	1.9	1127	4.3	1828	0.3
25	0101	3.7	0643	2.0	1209	3.7	1905	0.8
26	0149	3.7	0802	2.0	1311	3.1	1943	1.3
27	0242	3.8	0942	1.9	1445	2.6	2036	1.6
28	0339	3.9	1116	1.5	1653	2.5	2138	2.0
29	0432	4.1	1216	1.0	1826	2.6	2247	2.1
30	0520	4.4	1302	0.5	1921	2.9	2346	2.1
31	0605	4.7	1337	0.0	1956	3.1	---	---

* -- TIDE OCCURS ON NEXT DATE.

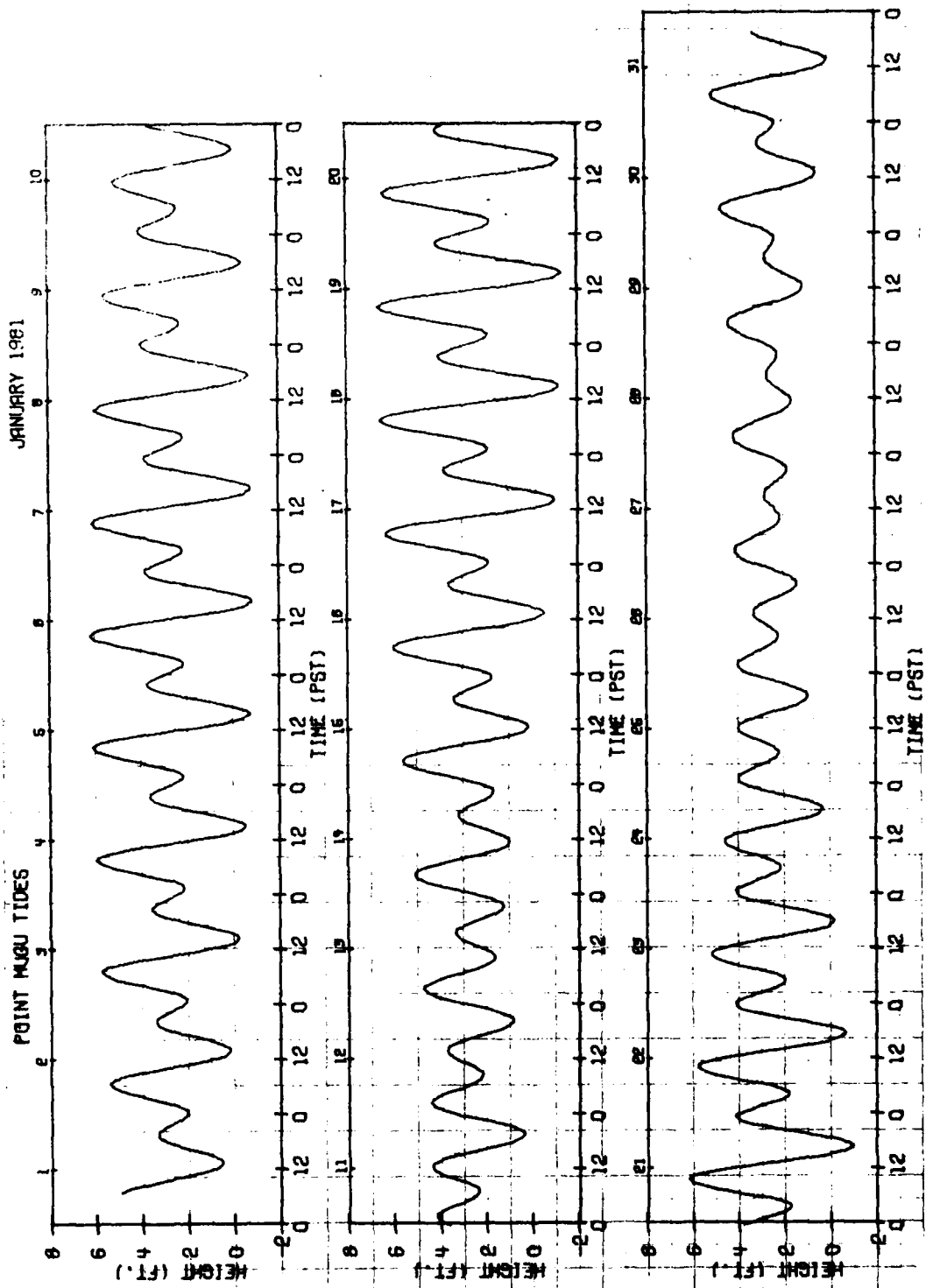


TABLE 6

POINT MUGU TIDES

34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

FEBRUARY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0024	2.2	0635	5.4	1358	-0.4	2021	3.5
2	0105	2.1	0712	5.8	1430	-0.7	2050	3.8
3	0145	1.9	0748	6.0	1502	-1.0	2114	3.9
4	0221	1.7	0826	6.2	1535	-1.1	2150	4.1
5	0304	1.5	0902	6.2	1609	-1.1	2226	4.3
6	0346	1.4	0944	5.9	1642	-0.8	2301	4.4
7	0432	1.3	1029	5.5	1719	-0.5	2340	4.5
8	0529	1.3	1117	4.9	1758	0.1	---	---
9	0624	1.6	1203	4.1	1841	0.7	1841	0.7
10	0716	1.7	1256	3.4	1935	1.3	1935	1.3
11	0817	1.8	0136	1.0	2041	1.8	2041	1.8
12	0927	2.0	1106	0.4	2125	2.1	2203	2.1
13	1036	2.3	1212	-0.1	2180	3.4	2323	2.1
14	1144	2.6	1304	0.6	2233	3.7	---	---
15	1254	2.9	1358	5.8	2348	4.1	2011	3.9
16	0114	1.8	1426	6.0	2446	4.1	2046	4.1
17	0158	1.5	1500	-1.1	2115	4.3	2115	4.3
18	0237	1.4	1532	-0.9	2144	4.3	2144	4.3
19	0314	1.2	1604	-0.6	2216	4.4	2216	4.4
20	0350	1.2	1630	-0.3	2244	4.4	2244	4.4
21	0426	1.2	1658	0.2	2312	4.3	2312	4.3
22	0508	1.3	1724	0.6	2341	4.2	2341	4.2
23	0553	1.5	1749	1.1	---	---	---	---
24	0616	1.5	1826	3.2	1814	1.6	1814	1.6
25	0655	1.6	1848	2.7	1849	2.1	1849	2.1
26	0751	1.5	1951	2.5	1951	2.5	1951	2.5
27	0808	1.4	2051	2.6	2051	2.6	2051	2.6
28	0425	4.3	1215	0.5	2317	2.5	2317	2.5

TABLE 7

SAN NICOLAS ISLAND TIDES

33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

FEBRUARY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0034	2.0	0642	5.0	1408	-0.4	2024	3.3
2	0115	1.9	0719	5.4	1440	-0.6	2057	3.5
3	0155	1.7	0755	5.6	1512	-0.9	2125	3.6
4	0231	1.5	0833	5.7	1545	-1.0	2157	3.8
5	0314	1.4	0909	5.7	1619	-1.0	2233	4.0
6	0356	1.3	0951	5.5	1652	-0.7	2308	4.1
7	0442	1.2	1036	5.1	1729	-0.5	2347	4.2
8	0539	1.2	1124	4.6	1808	0.1	---	---
9	0631	1.2	1224	3.8	1851	0.6	1851	0.6
10	0723	1.2	0806	1.2	1945	1.2	1945	1.2
11	0817	1.3	0946	0.9	2051	1.6	2051	1.6
12	0916	1.4	1116	0.4	2132	1.9	2132	1.9
13	1012	1.5	1222	-0.1	2233	1.9	2233	1.9
14	1114	1.6	1314	0.5	2348	2.9	---	---
15	1214	1.6	1408	3.5	1940	3.5	---	---
16	1314	1.8	1500	5.4	2053	3.8	2053	3.8
17	1414	1.6	1604	5.6	2122	4.0	2122	4.0
18	1514	1.4	1708	5.6	2231	4.1	2231	4.1
19	1614	1.3	1814	5.3	2348	4.1	2348	4.1
20	1714	1.1	1914	5.0	1640	-0.3	2251	4.1
21	1814	1.1	2014	4.6	1708	0.2	2314	4.0
22	1914	1.2	2114	4.1	1734	0.5	2348	3.9
23	2014	1.4	2214	3.5	1759	1.0	---	---
24	2114	1.5	2314	1.5	1824	1.5	1824	1.5
25	2214	1.5	0014	1.5	1859	1.5	1859	1.5
26	2314	1.4	0105	1.4	1948	2.4	1948	2.4
27	0015	1.4	0205	1.4	2001	2.3	2001	2.3
28	0115	1.4	0305	1.4	2051	2.3	2051	2.3

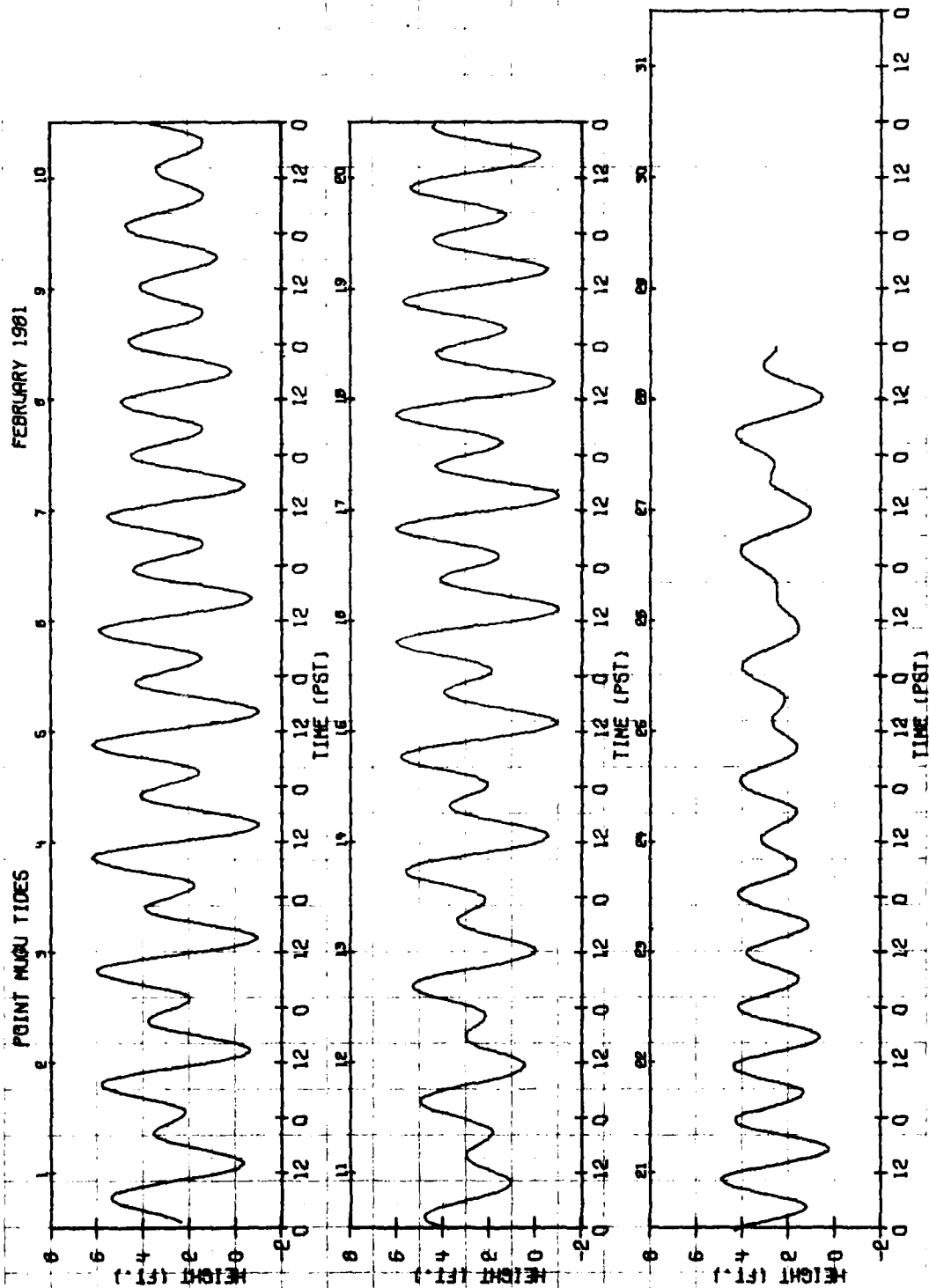


TABLE 8
POINT MUGU TIDES
34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER

MARCH 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0523	4.7	1252	0.0	1927	3.4	---	---
2	0010	2.3	0611	5.1	1327	-0.4	1949	3.7
3	0053	1.9	0651	5.5	1359	-0.7	2014	4.0
4	0132	1.5	0732	5.8	1431	-0.9	2043	4.3
5	0215	1.1	0814	6.0	1503	-1.0	2111	4.6
6	0254	0.7	0853	5.9	1536	-0.9	2143	4.9
7	0339	0.4	0938	5.6	1611	-0.5	2219	5.1
8	0426	0.3	1024	5.2	1646	-0.1	2256	5.2
9	0520	0.2	1117	4.5	1725	0.6	2338	5.1
10	0622	0.3	1220	3.8	1807	1.2	---	---
11	0031	5.0	0741	0.4	1351	3.2	1900	1.8
12	0132	4.9	0914	0.4	1553	3.0	2022	2.3
13	0255	4.8	1044	0.1	1735	3.2	2208	2.4
14	0417	4.8	1153	-0.3	1835	3.6	2335	2.2
15	0526	5.0	1247	-0.5	1914	3.9	---	---
16	0031	1.8	0625	5.2	1327	-0.7	1949	4.2
17	0117	1.5	0710	5.4	1401	-0.7	2017	4.4
18	0154	1.1	0749	5.4	1432	-0.6	2042	4.5
19	0230	0.9	0824	5.3	1500	-0.4	2105	4.6
20	0302	0.7	0857	5.1	1526	-0.1	2130	4.7
21	0335	0.6	0932	4.8	1548	0.3	2152	4.7
22	0410	0.5	1003	4.4	1612	0.7	2219	4.7
23	0443	0.6	1040	4.0	1636	1.1	2242	4.6
24	0521	0.7	1119	3.5	1659	1.5	2309	4.4
25	0609	0.9	1212	3.0	1719	2.0	2341	4.3
26	0713	1.0	1337	2.6	1739	2.3	---	---
27	0028	4.1	0842	1.1	---	---	---	---
28	0142	3.9	1021	0.8	1805	2.9	2112	2.8
29	0321	4.0	1122	0.5	1827	3.3	2256	2.5
30	0441	4.3	1207	0.1	1845	3.6	2355	2.2
31	0539	4.7	1244	-0.3	1907	4.0	---	---

TABLE 9
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N 119 DEG 30 MIN W - CENTRAL PART NE CAIST

MARCH 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0530	4.4	1302	0.0	1934	3.2	---	---
2	0020	2.1	0618	4.7	1337	-0.4	1956	3.5
3	0103	1.7	0658	5.1	1409	-0.6	2021	3.7
4	0142	1.4	0739	5.4	1441	-0.8	2050	4.0
5	0225	1.0	0821	5.6	1513	-0.9	2118	4.3
6	0304	0.6	0900	5.5	1546	-0.8	2150	4.6
7	0349	0.4	0945	5.2	1621	-0.5	2226	4.7
8	0436	0.3	1031	4.8	1656	-0.1	2303	4.8
9	0530	0.2	1124	4.2	1735	0.5	2345	4.7
10	0632	0.3	1227	3.5	1817	1.1	---	---
11	0038	4.6	0751	0.4	1358	3.0	1910	1.6
12	0139	4.6	0924	0.4	1600	2.8	2032	2.1
13	0302	4.5	1054	0.1	1742	3.0	2218	2.2
14	0424	4.5	1203	-0.3	1842	3.4	2345	2.0
15	0533	4.6	1257	-0.5	1921	3.6	---	---
16	0041	1.6	0632	4.8	1337	-0.6	1956	3.9
17	0127	1.4	0717	5.0	1411	-0.6	2024	4.1
18	0204	1.0	0756	5.0	1442	-0.5	2049	4.2
19	0240	0.8	0831	4.9	1510	-0.4	2112	4.3
20	0312	0.6	0904	4.7	1536	-0.1	2137	4.4
21	0345	0.5	0939	4.5	1558	0.3	2154	4.4
22	0420	0.5	1010	4.1	1622	0.6	2226	4.4
23	0453	0.5	1047	3.7	1646	1.0	2249	4.3
24	0531	0.6	1126	3.3	1704	1.4	2316	4.1
25	0619	0.8	1219	2.8	1729	1.9	2344	4.0
26	0723	0.9	1344	2.5	1749	2.1	---	---
27	0035	3.8	0652	1.0	---	---	---	---
28	0149	3.6	1031	0.7	1812	2.7	2122	2.6
29	0328	3.7	1132	0.5	1834	3.1	2306	2.4
30	0444	4.0	1217	0.1	1852	3.4	0005	2.0
31	0546	4.4	1254	-0.3	1914	3.7	---	---

* -- TIDE OCCURS ON NEXT DATE.

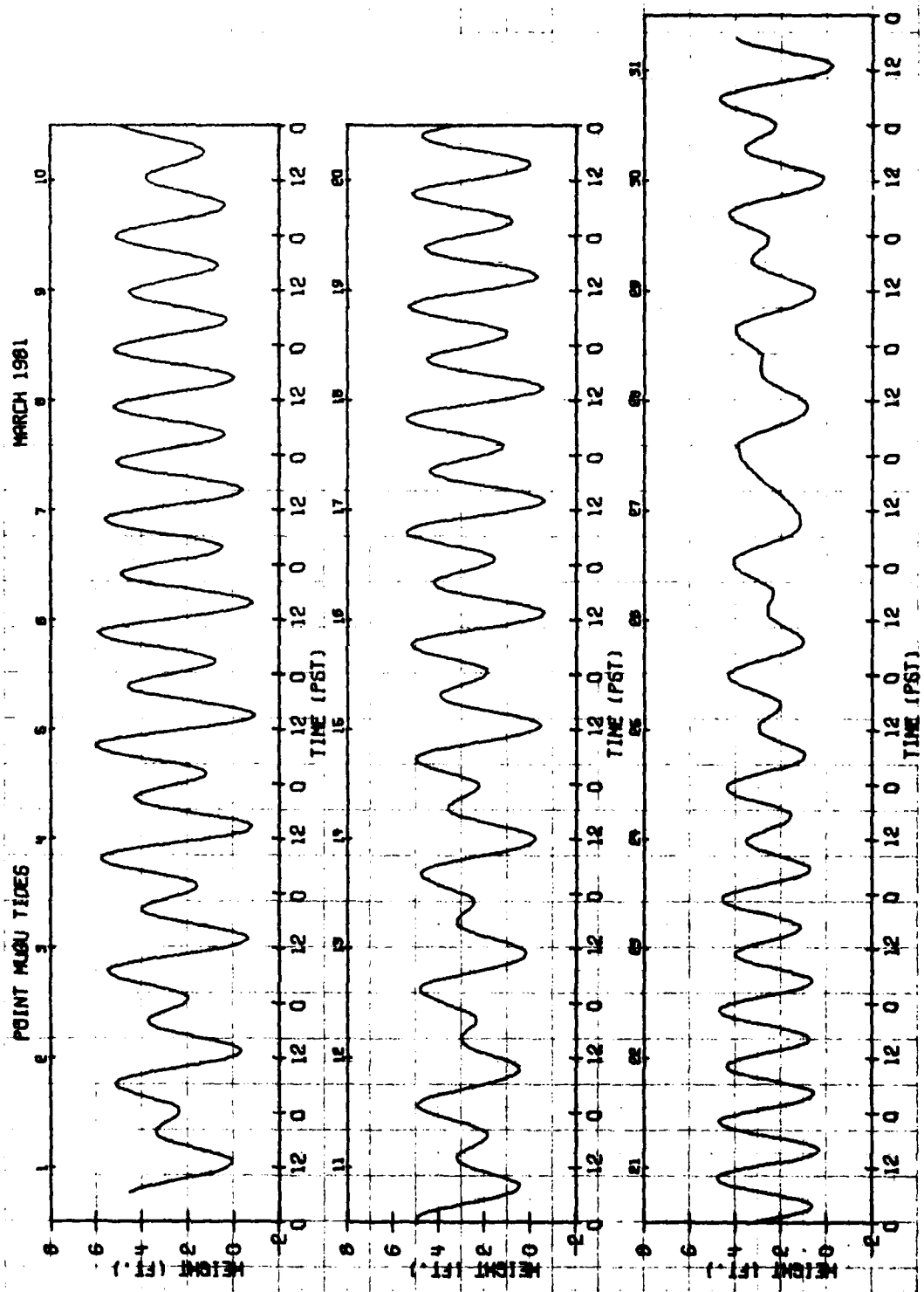


TABLE 10
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

APRIL 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0039	1.6	0628	5.0	1319	-0.5	1935	4.4
2	0121	1.0	0714	5.3	1353	-0.6	2003	5.9
3	0201	0.3	0759	5.5	1428	-0.6	2032	5.3
4	0245	-0.2	0845	5.4	1500	-0.3	2107	5.0
5	0330	-0.6	0933	5.1	1536	0.1	2142	5.7
6	0419	-0.7	1024	4.6	1614	0.6	2219	5.8
7	0513	-0.7	1122	4.1	1656	1.2	2304	5.6
8	0614	-0.5	1234	3.6	1741	1.8	2354	5.3
9	0726	-0.3	1406	3.2	1845	2.3	---	---
10	0857	4.9	0849	-0.1	1558	3.3	2024	2.5
11	0925	4.5	1013	-0.1	1718	3.6	2216	2.5
12	0353	4.4	1122	-0.2	1809	4.0	2335	2.1
13	0511	4.5	1213	-0.3	1845	4.3	---	---
14	0609	4.6	0609	4.6	1252	-0.2	1914	4.5
15	0109	1.1	0656	4.6	1324	-0.1	1941	4.7
16	0148	0.8	0735	4.6	1356	0.1	2003	4.9
17	0220	0.4	0812	4.5	1419	0.4	2026	5.0
18	0252	0.2	0846	4.4	1444	0.6	2047	5.0
19	0320	0.0	0920	4.1	1508	0.9	2109	5.1
20	0352	0.0	0955	3.9	1530	1.3	2133	5.0
21	0427	0.0	1035	3.6	1552	1.6	2159	4.9
22	0503	0.1	1120	3.3	1614	2.0	2225	4.8
23	0548	0.3	1217	2.9	1639	2.3	2256	4.6
24	0643	0.4	1342	2.8	1700	2.5	2339	4.3
25	0754	0.5	1553	2.9	1809	2.8	---	---
26	0042	4.0	0911	0.5	1702	3.2	2048	2.9
27	0218	3.9	1021	0.3	1731	3.6	2232	2.5
28	0351	4.0	1109	0.1	1756	4.0	2333	2.0
29	0503	4.2	1153	0.0	1821	4.5	---	---
30	0020	1.2	0603	4.5	1232	-0.1	1852	5.0

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 11
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

APRIL 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0049	1.5	0635	4.6	1329	-0.5	1942	4.1
2	0131	0.9	0721	4.9	1403	-0.5	2010	5.5
3	0211	0.3	0806	5.1	1438	-0.5	2039	4.9
4	0255	-0.2	0852	5.0	1510	-0.3	2114	5.2
5	0340	-0.5	0940	4.7	1546	0.1	2149	5.3
6	0429	-0.6	1031	4.3	1624	0.5	2226	5.4
7	0523	-0.6	1129	3.8	1706	1.1	2311	5.2
8	0624	-0.5	1241	3.4	1751	1.6	0001	4.9*
9	0736	-0.3	1413	3.0	1855	2.1	---	---
10	0104	4.6	0859	-0.1	1605	3.1	2034	2.4
11	0232	4.2	1023	-0.1	1725	3.4	2226	2.3
12	0400	4.1	1132	-0.2	1816	3.7	2345	1.9
13	0518	4.2	1223	-0.3	1852	4.0	---	---
14	0039	1.5	0616	4.3	1302	-0.2	1921	4.2
15	0119	1.0	0703	4.3	1334	-0.1	1948	4.4
16	0154	0.7	0742	4.3	1406	0.1	2010	4.6
17	0230	0.4	0819	4.2	1429	0.4	2033	4.6
18	0302	0.2	0853	4.1	1454	0.5	2054	4.6
19	0330	0.0	0927	3.8	1518	0.8	2114	4.7
20	0402	0.0	1002	3.6	1540	1.2	2140	4.6
21	0437	0.0	1042	3.4	1602	1.5	2206	4.6
22	0513	0.1	1127	3.1	1624	1.8	2232	4.5
23	0554	0.3	1224	2.7	1649	2.1	2303	4.3
24	0653	0.4	1349	2.6	1710	2.4	2344	4.0
25	0804	0.5	1600	2.7	1819	2.6	---	---
26	0049	3.7	0921	0.5	1709	3.0	2058	2.7
27	0225	3.6	1031	0.3	1738	3.4	2242	2.4
28	0354	3.7	1119	0.1	1803	3.7	2343	1.8
29	0510	3.9	1203	0.0	1828	4.2	---	---
30	0030	1.1	0610	4.2	1242	-0.1	1859	4.6

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 12
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER MAY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0105	0.5	0656	4.7	1311	0.0	1922	5.5
2	0150	-0.3	0747	4.8	1347	0.1	1957	5.9
3	0236	-0.9	0839	4.7	1425	0.4	2033	6.2
4	0321	-1.3	0932	4.5	1506	0.8	2111	6.3
5	0410	-1.4	1026	4.2	1545	1.2	2150	6.2
6	0503	-1.3	1128	3.9	1630	1.7	2237	5.9
7	0601	-1.1	1239	3.6	1724	2.2	2330	5.4
8	0707	-0.7	1403	3.5	1835	2.5	---	---
9	0831	4.9	0860	-0.4	1933	3.6	2021	2.6
10	0153	4.4	0930	-0.2	1638	3.9	2203	2.5
11	0322	4.1	1033	0.0	1726	4.3	2322	2.0
12	0438	4.0	1126	0.2	1805	4.5	---	---
13	0015	1.5	0547	3.9	1207	0.4	1934	4.8
14	0058	1.0	0637	3.9	1242	0.6	1900	5.0
15	0132	0.6	0722	3.9	1310	0.8	1925	5.2
16	0206	0.2	0800	3.9	1339	1.1	1946	5.3
17	0236	-0.1	0840	3.8	1404	1.3	2010	5.4
18	0308	-0.3	0917	3.7	1429	1.6	2034	5.4
19	0340	-0.4	0955	3.5	1454	1.8	2059	5.4
20	0415	-0.4	1037	3.4	1519	2.1	2128	5.3
21	0454	-0.3	1123	3.2	1544	2.3	2157	5.2
22	0533	-0.2	1214	3.1	1621	2.5	2232	4.9
23	0624	0.0	1327	3.1	1703	2.7	2317	4.6
24	0718	0.1	1447	3.3	1825	2.9	---	---
25	0816	4.3	0716	0.2	1546	3.5	2024	2.8
26	0135	4.0	0916	0.3	1628	3.9	2202	2.5
27	0308	3.4	1011	0.3	1703	4.4	2309	1.8
28	0434	3.8	1101	0.4	1736	4.9	0005	1.0*
29	0544	4.0	1146	0.5	1811	5.5	---	---
30	0055	0.1	0646	4.1	1231	0.7	1846	6.0
31	0139	-0.6	0743	4.2	1313	0.9	1925	6.4

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 13
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST MAY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0115	0.5	0703	4.4	1321	0.0	1929	5.1
2	0200	-0.3	0754	4.5	1357	0.1	2004	5.5
3	0246	-0.4	0846	4.4	1435	0.4	2040	5.7
4	0331	-1.2	0939	4.2	1516	0.7	2118	5.8
5	0420	-1.3	1033	3.9	1555	1.1	2157	5.7
6	0513	-1.2	1135	3.6	1640	1.5	2244	5.5
7	0611	-1.0	1246	3.4	1734	2.0	2337	5.0
8	0717	-0.6	1410	3.3	1845	2.4	---	---
9	0038	4.6	0830	-0.4	1540	3.4	2031	2.5
10	0200	4.1	0940	-0.2	1645	3.6	2213	2.3
11	0329	3.8	1043	0.0	1733	4.0	2332	1.8
12	0445	3.7	1136	0.2	1812	4.2	---	---
13	0025	1.4	0554	3.6	1217	0.4	1841	4.5
14	0108	0.9	0644	3.6	1252	0.5	1907	4.6
15	0142	0.5	0729	3.6	1320	0.7	1932	4.8
16	0218	0.2	0807	3.6	1349	1.0	1953	4.9
17	0246	-0.1	0847	3.5	1414	1.2	2017	5.0
18	0318	-0.3	0924	3.5	1439	1.5	2041	5.0
19	0350	-0.4	1002	3.3	1504	1.6	2106	5.0
20	0425	-0.4	1044	3.2	1529	1.9	2135	4.9
21	0504	-0.3	1130	3.0	1554	2.1	2204	4.8
22	0543	-0.2	1225	2.9	1631	2.4	2239	4.6
23	0634	0.0	1334	2.9	1713	2.5	2324	4.3
24	0728	0.1	1454	3.1	1835	2.7	---	---
25	0023	4.0	0826	0.2	1553	3.3	2034	2.6
26	0142	3.7	0926	0.3	1635	3.6	2212	2.3
27	0315	3.5	1021	0.3	1710	4.1	2319	1.6
28	0441	3.5	1111	0.4	1743	4.6	0015	0.9*
29	0551	3.7	1156	0.5	1818	5.1	---	---
30	0105	0.1	0653	3.8	1241	0.6	1853	5.6
31	0149	-0.5	0750	3.9	1323	0.8	1932	5.9

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 14
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

JUNE 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0227	-1.2	0839	4.2	1355	1.1	2005	6.7
2	0316	-1.6	0932	4.1	1441	1.4	2048	6.7
3	0404	-1.7	1027	4.0	1526	1.7	2133	6.5
4	0454	-1.5	1125	3.9	1615	2.0	2220	6.2
5	0548	-1.2	1231	3.8	1712	2.4	2309	5.6
6	0642	-0.8	1338	3.8	1822	2.5	2399	5.2
7	0705	5.0	0742	-0.4	1445	4.0	1950	2.6
8	0114	4.3	0841	0.1	1545	4.2	2126	2.5
9	0236	3.8	0936	0.4	1638	4.4	2250	2.0
10	0402	3.5	1029	0.8	1716	4.7	2352	1.5
11	0515	3.4	1114	1.1	1750	4.9	2444	1.1
12	0638	1.0	1217	3.4	1817	1.3	1917	5.2
13	0117	0.6	0709	3.4	1228	1.6	1945	5.4
14	0152	0.2	0757	3.5	1300	1.8	1914	5.7
15	0224	-0.1	0833	3.5	1328	1.9	1939	5.7
16	0256	-0.4	0915	3.5	1400	2.1	2008	5.8
17	0331	-0.5	0952	3.5	1429	2.2	2038	5.8
18	0403	-0.6	1032	3.5	1504	2.3	2110	5.7
19	0442	-0.5	1114	3.5	1539	2.5	2144	5.6
20	0519	-0.5	1159	3.5	1618	2.5	2223	5.3
21	0559	-0.3	1252	3.6	1715	2.7	2305	5.0
22	0643	-0.1	1344	3.7	1825	2.7	2359	4.6
23	0731	0.2	1436	4.0	1956	2.6	2444	4.1
24	0810	4.1	1524	4.5	2044	4.4	2525	3.7
25	0239	3.7	0917	0.8	1609	4.8	2247	1.5
26	0415	3.5	1014	1.0	1654	5.4	2351	0.7
27	0536	3.5	1107	1.3	1737	5.9	2444	0.3
28	0644	-0.1	1204	3.7	1825	1.5	1921	6.3
29	0135	-0.8	0746	3.9	1248	1.6	1904	6.7
30	0222	-1.3	0839	4.0	1336	1.7	1948	6.9

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 15
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

JUNE 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0237	-1.1	0846	3.9	1405	1.0	2012	6.2
2	0326	-1.5	0939	3.8	1451	1.3	2055	6.2
3	0414	-1.5	1034	3.7	1536	1.5	2140	6.0
4	0504	-1.4	1132	3.6	1625	1.8	2227	5.7
5	0558	-1.1	1238	3.5	1722	2.2	2316	5.2
6	0652	-0.7	1345	3.5	1832	2.4	2400	4.8
7	0742	4.6	0752	-0.4	1452	3.7	2000	2.5
8	0121	4.0	0851	0.1	1552	3.9	2134	2.3
9	0243	3.5	0946	0.4	1645	4.1	2300	1.8
10	0409	3.3	1039	0.7	1723	4.4	2402	1.4
11	0522	3.2	1124	1.0	1757	4.6	2444	1.1
12	0648	0.9	1224	3.2	1824	4.8	2444	0.8
13	0127	0.5	0716	3.2	1238	1.5	1852	5.0
14	0202	0.2	0804	3.3	1310	1.6	1921	5.1
15	0234	-0.1	0840	3.3	1334	1.7	1946	5.3
16	0306	-0.4	0922	3.3	1410	1.9	2015	5.4
17	0341	-0.5	0959	3.3	1439	2.0	2045	5.4
18	0413	-0.5	1039	3.3	1514	2.1	2117	5.3
19	0452	-0.5	1121	3.3	1549	2.3	2151	5.2
20	0529	-0.5	1206	3.3	1628	2.4	2230	4.9
21	0609	-0.3	1259	3.4	1725	2.5	2312	4.6
22	0653	-0.1	1351	3.5	1835	2.5	2406	4.3
23	0741	0.2	1443	3.7	2006	2.5	2444	4.1
24	0817	3.8	1532	4.1	2140	2.0	2527	3.7
25	0246	3.5	0927	0.9	1616	4.5	2257	1.4
26	0422	3.3	1024	0.9	1701	5.0	2401	0.8
27	0543	3.3	1117	1.2	1744	5.5	2444	0.5
28	0654	-0.1	1209	3.5	1828	5.8	2444	0.2
29	0145	-0.7	0753	3.6	1258	1.5	1911	6.2
30	0232	-1.2	0846	3.7	1346	1.5	1955	6.4

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

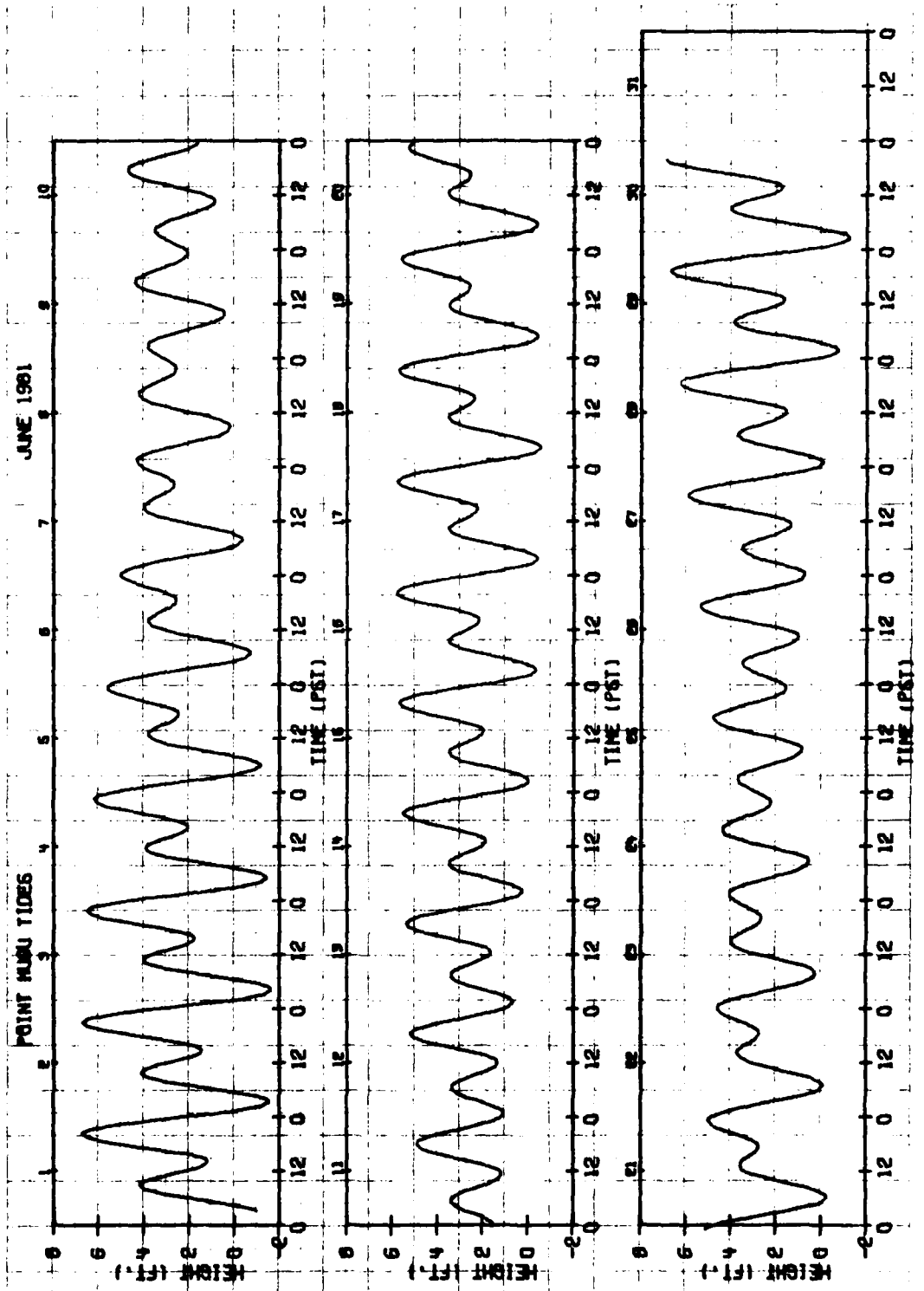


TABLE 16
POINT MUGO TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER
JULY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0308	-1.5	0930	4.1	1425	1.8	2034	6.9
2	0353	-1.6	1018	4.1	1514	1.9	2119	6.7
3	0439	-1.4	1107	4.1	1602	2.1	2205	6.3
4	0524	-1.0	1159	4.1	1655	2.3	2250	5.7
5	0611	-0.6	1252	4.2	1758	2.4	2340	5.0
6	0657	-0.1	1343	4.2	1912	2.5	---	---
7	0736	4.4	0743	4.5	1440	4.3	2036	2.4
8	0147	3.7	0833	1.0	1532	4.5	2206	2.1
9	0313	3.3	0922	1.4	1620	4.7	2320	1.7
10	0446	3.1	1014	1.8	1700	4.9	---	---
11	0513	1.2	0606	3.1	1104	2.0	1739	5.1
12	0100	0.7	0702	3.3	1146	2.2	1811	5.4
13	0135	0.3	0749	3.4	1228	2.3	1846	5.6
14	0209	0.0	0827	3.5	1306	2.3	1918	5.8
15	0240	-0.3	0902	3.7	1342	2.3	1950	6.0
16	0312	-0.5	0935	3.8	1418	2.3	2025	6.1
17	0348	-0.6	1010	3.8	1456	2.3	2100	6.1
18	0420	-0.6	1045	3.9	1533	2.3	2134	5.9
19	0452	-0.5	1120	4.0	1618	2.3	2214	5.6
20	0528	-0.3	1159	4.2	1711	2.3	2256	5.2
21	0607	0.0	1244	4.3	1814	2.3	2349	4.7
22	0649	0.5	1333	4.5	1936	2.2	---	---
23	0737	0.9	1426	4.8	2102	1.8	---	---
24	0833	1.4	1522	5.1	2231	1.2	---	---
25	0936	1.8	1620	5.6	2343	0.5	---	---
26	1044	2.0	1713	6.0	---	---	---	---
27	1143	2.1	1806	6.4	---	---	---	---
28	1242	2.0	1854	6.6	---	---	---	---
29	1333	1.9	1940	6.8	---	---	---	---
30	1419	1.9	2025	6.8	---	---	---	---
31	1505	1.8	2107	6.5	---	---	---	---

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 17
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST
JULY 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0318	-1.4	0937	3.8	1435	1.6	2041	6.4
2	0403	-1.5	1025	3.8	1524	1.7	2126	6.2
3	0449	-1.3	1114	3.8	1612	1.9	2212	5.8
4	0534	-0.9	1206	3.8	1705	2.1	2257	5.3
5	0621	-0.5	1259	3.9	1808	2.2	2347	4.6
6	0707	-0.1	1350	3.9	1922	2.3	---	---
7	0743	4.1	0753	0.5	1447	4.0	---	---
8	0154	3.5	0843	0.9	1539	4.2	---	---
9	0320	3.1	0932	1.3	1627	4.4	---	---
10	0453	2.9	1024	1.6	1707	4.6	---	---
11	0523	1.1	0613	2.9	1114	1.8	1746	4.7
12	0110	0.6	0709	3.1	1156	2.0	1818	5.0
13	0145	0.3	0756	3.2	1238	2.1	1853	5.2
14	0219	0.0	0834	3.3	1316	2.1	1925	5.4
15	0250	-0.3	0909	3.5	1352	2.1	1957	5.6
16	0322	-0.5	0942	3.5	1428	2.1	2032	5.6
17	0358	-0.5	1017	3.5	1506	2.1	2107	5.6
18	0430	-0.5	1052	3.6	1543	2.1	2141	5.5
19	0502	-0.5	1127	3.7	1628	2.1	2221	5.2
20	0538	-0.3	1206	3.9	1721	2.1	2303	4.8
21	0617	0.0	1251	4.0	1824	2.1	2356	4.4
22	0659	0.5	1340	4.2	1946	2.0	---	---
23	0106	3.7	0747	0.8	1433	4.5	2112	1.6
24	0238	3.3	0843	1.3	1529	4.7	2241	1.1
25	0424	3.1	0946	1.6	1627	5.2	2353	0.5
26	0554	3.2	1054	1.8	1720	5.6	---	---
27	0709	3.2	0702	3.5	1153	1.9	1813	5.9
28	0138	-0.6	0757	3.6	1252	1.8	1901	6.1
29	0223	-1.0	0839	3.9	1343	1.7	1947	6.3
30	0307	-1.1	0924	4.0	1429	1.7	2032	6.3
31	0346	-1.1	1003	4.1	1515	1.6	2114	6.0

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

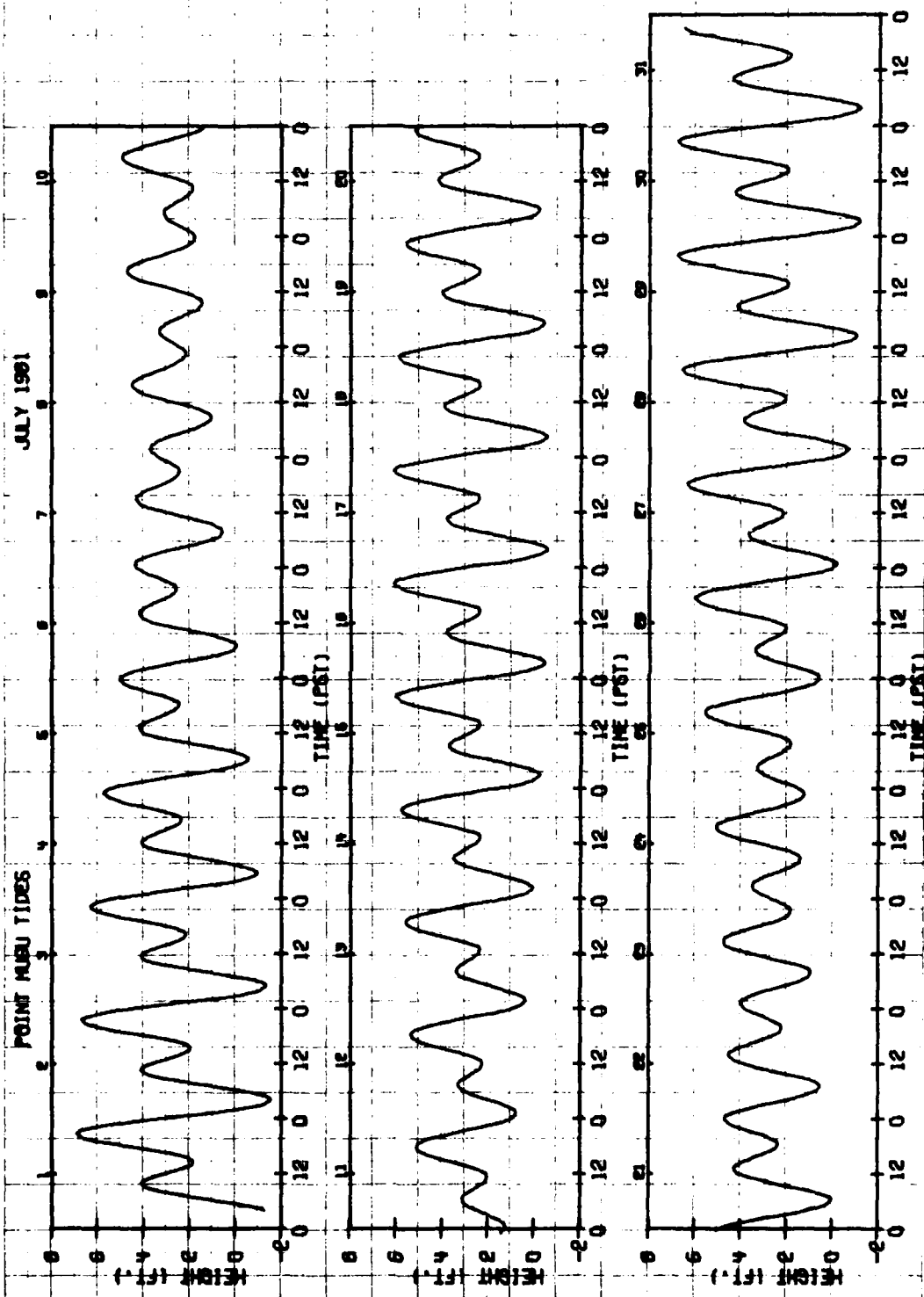


TABLE 18
POINT MUGU TIDES
14 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

AUGUST 1941

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0415	-0.4	1035	4.5	1551	1.8	2149	6.1
2	0452	-0.6	1114	4.5	1637	1.9	2229	5.6
3	0529	-0.1	1154	4.5	1727	2.0	2313	5.0
4	0606	0.5	1234	4.5	1825	2.1	---	---
5	0602	4.3	0638	1.0	1319	4.4	1936	2.2
6	0101	3.7	0720	1.6	1408	4.4	2105	2.1
7	0225	3.2	0809	2.1	1508	4.5	2237	1.8
8	0424	3.0	0912	2.4	1604	4.7	2343	1.3
9	0603	3.1	1024	2.5	1657	4.9	---	---
10	0034	0.9	0701	3.4	1126	2.6	1742	5.2
11	0111	0.4	0737	3.6	1215	2.5	1821	5.5
12	0145	0.1	0809	3.8	1255	2.4	1859	5.8
13	0217	-0.2	0837	4.0	1332	2.2	1935	6.0
14	0246	-0.4	0902	4.2	1408	2.0	2010	6.2
15	0317	-0.5	0931	4.4	1447	1.8	2048	6.2
16	0349	-0.5	1003	4.5	1526	1.7	2124	6.0
17	0421	-0.3	1035	4.7	1612	1.6	2207	5.7
18	0455	0.0	1110	4.8	1703	1.5	2253	5.2
19	0529	0.5	1151	5.0	1801	1.5	2349	4.5
20	0609	1.0	1236	5.0	1917	1.5	---	---
21	0100	3.9	0658	1.6	1335	5.1	2046	1.3
22	0242	3.4	0757	2.1	1441	5.3	2219	0.9
23	0438	3.3	0920	2.5	1553	5.5	2335	0.3
24	0606	3.6	1043	2.5	1702	5.8	---	---
25	0031	-0.2	0659	4.0	1152	2.4	1758	6.1
26	0119	-0.6	0741	4.3	1247	2.1	1849	6.3
27	0158	-0.7	0817	4.5	1335	1.8	1935	6.4
28	0236	-0.7	0852	4.7	1416	1.6	2017	6.3
29	0311	-0.6	0923	4.8	1458	1.4	2055	6.1
30	0342	-0.3	0955	4.9	1536	1.3	2134	5.8
31	0413	0.1	1021	4.9	1617	1.3	2209	5.3

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 19
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

AUGUST 1941

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0425	-0.8	1042	4.2	1601	1.6	2156	5.6
2	0502	-0.5	1121	4.2	1647	1.7	2236	5.2
3	0539	-0.1	1201	4.2	1737	1.8	2320	4.6
4	0616	0.5	1241	4.2	1835	1.9	---	---
5	0004	4.0	0648	0.9	1326	4.1	1946	2.0
6	0108	3.5	0730	1.5	1415	4.1	2115	1.9
7	0232	3.0	0819	1.9	1515	4.2	2247	1.6
8	0435	2.8	0922	2.2	1611	4.4	2353	1.2
9	0610	2.9	1034	2.4	1704	4.6	---	---
10	0044	0.8	0708	3.2	1136	2.5	1749	4.8
11	0121	0.4	0744	3.4	1225	2.4	1828	5.1
12	0155	0.1	0816	3.5	1305	2.2	1906	5.4
13	0227	-0.2	0844	3.7	1342	2.0	1942	5.6
14	0256	-0.4	0909	3.9	1418	1.8	2017	5.7
15	0327	-0.5	0938	4.1	1457	1.6	2055	5.7
16	0359	-0.5	1010	4.2	1536	1.5	2131	5.6
17	0431	-0.3	1042	4.4	1622	1.5	2214	5.3
18	0505	0.0	1117	4.5	1713	1.4	2300	4.8
19	0539	0.5	1158	4.6	1811	1.4	2356	4.2
20	0619	0.9	1243	4.6	1927	1.4	---	---
21	0107	3.6	0708	1.5	1342	4.7	2056	1.2
22	0249	3.2	0807	1.9	1448	4.9	2229	0.8
23	0445	3.1	0930	2.3	1600	5.1	2345	0.3
24	0613	3.4	1053	2.3	1709	5.4	---	---
25	0041	-0.2	0706	3.7	1202	2.2	1805	5.6
26	0129	-0.5	0748	4.0	1257	1.9	1856	5.8
27	0208	-0.6	0824	4.2	1345	1.6	1942	5.9
28	0246	-0.6	0859	4.4	1426	1.5	2024	5.8
29	0321	-0.5	0930	4.5	1508	1.3	2102	5.7
30	0352	-0.3	1002	4.6	1546	1.2	2141	5.4
31	0423	0.1	1028	4.6	1627	1.2	2216	4.9

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

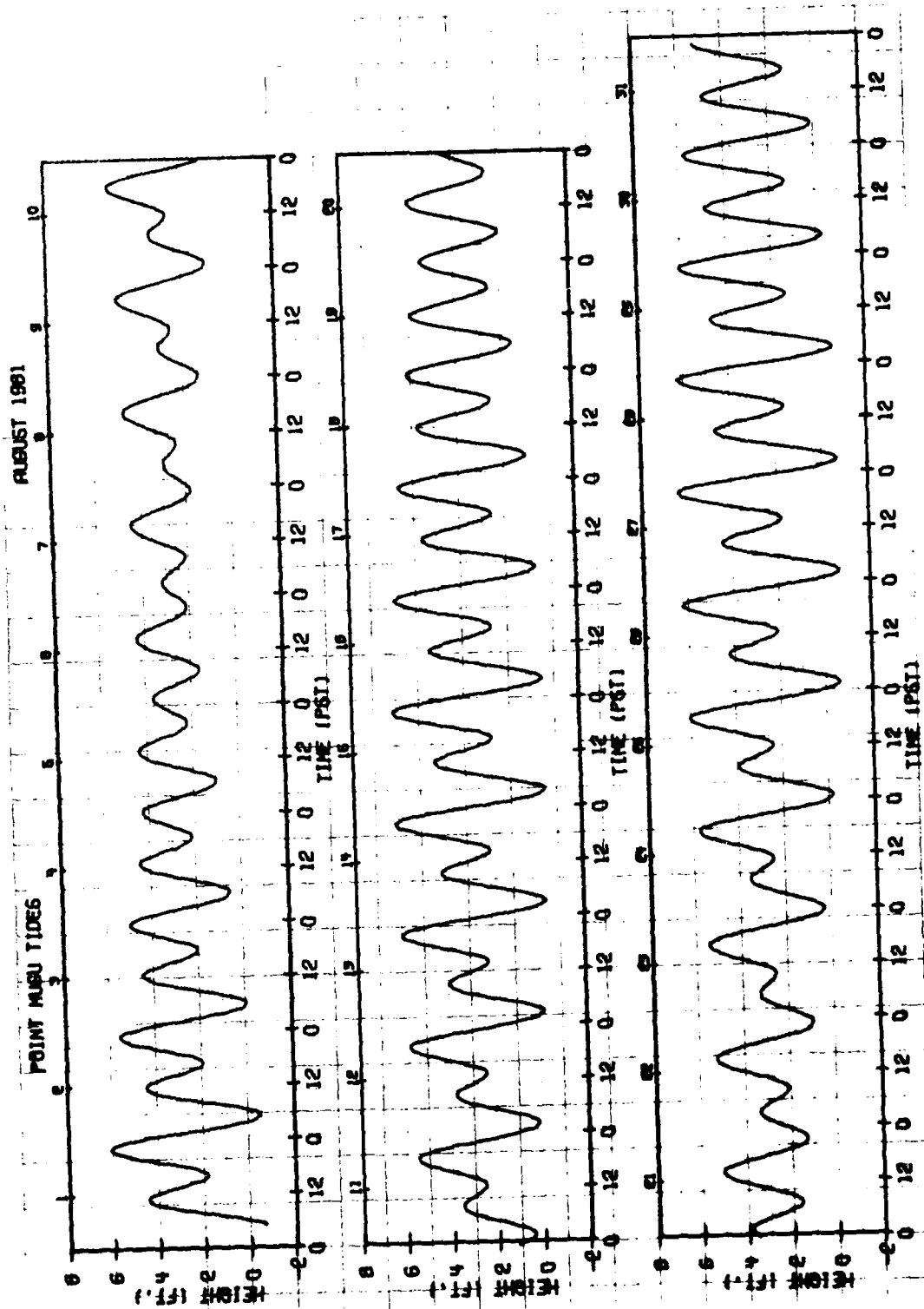


TABLE 2)
POINT MUDU TIDES
34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER

SEPTEMBER 1941

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0442	0.6	1053	4.6	1659	1.4	2248	4.7
2	0510	1.1	1123	4.7	1744	1.6	2333	4.1
3	0539	1.6	1157	4.6	1840	1.7	---	---
4	0626	3.6	0609	2.1	1238	4.5	1955	1.8
5	0157	3.1	0641	2.5	1334	4.4	2135	1.7
6	0438	3.0	0745	2.9	1452	4.4	2301	1.4
7	0611	3.3	0955	3.0	1609	4.5	2357	1.0
8	0645	3.6	1114	2.8	1709	4.9	---	---
9	0036	0.6	0711	3.9	1203	2.6	1755	5.2
10	0110	0.2	0733	4.1	1242	2.3	1837	5.6
11	0140	-0.1	0757	4.4	1319	1.9	1917	5.9
12	0210	-0.2	0822	4.7	1358	1.5	1954	6.0
13	0241	-0.3	0848	5.0	1435	1.1	2033	6.0
14	0311	-0.2	0917	5.3	1516	0.8	2115	5.8
15	0343	0.1	0949	5.5	1601	0.6	2200	5.4
16	0418	0.5	1026	5.6	1652	0.5	2253	4.9
17	0452	1.1	1105	5.6	1749	0.6	2353	4.2
18	0534	1.7	1151	5.5	1901	0.7	---	---
19	0115	3.7	0626	2.3	1251	5.3	2030	0.7
20	0309	3.4	0742	2.6	1408	5.2	2200	0.5
21	0457	3.7	0928	2.8	1535	5.2	2314	0.1
22	0601	4.0	1058	2.6	1653	5.4	---	---
23	0011	-0.1	0644	4.4	1202	2.3	1755	5.6
24	0055	-0.3	0719	4.7	1253	1.8	1845	5.7
25	0133	-0.3	0751	4.9	1333	1.4	1926	5.8
26	0204	-0.2	0820	5.1	1412	1.1	2005	5.7
27	0237	0.1	0845	5.2	1447	0.9	2083	5.4
28	0306	0.4	0909	5.3	1521	0.8	2158	5.1
29	0329	0.8	0934	5.3	1556	0.7	2154	4.7
30	0356	1.2	0959	5.2	1632	0.8	2232	4.3

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 21
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N 119 DEG 30 MIN W - CENTRAL PART NE COAST

SEPTEMBER 1941

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0452	0.5	1100	4.5	1709	1.3	2255	4.4
2	0520	1.0	1130	4.4	1754	1.5	2340	3.8
3	0549	1.5	1204	4.3	1850	1.5	---	---
4	0633	3.4	0619	1.9	1245	4.2	2005	1.6
5	0204	2.9	0651	2.4	1341	4.1	2145	1.5
6	0445	2.8	0755	2.7	1459	4.1	2311	1.3
7	0618	3.1	1005	2.8	1616	4.2	0007	0.9*
8	0652	3.4	1124	2.6	1716	4.6	---	---
9	0046	0.5	0718	3.6	1213	2.5	1802	4.8
10	0120	0.2	0740	3.8	1252	2.1	1844	5.2
11	0150	-0.1	0804	4.1	1329	1.7	1924	5.5
12	0220	-0.2	0829	4.4	1408	1.4	2001	5.6
13	0251	-0.3	0855	4.6	1445	1.0	2040	5.6
14	0321	-0.2	0924	4.9	1526	0.7	2122	5.4
15	0353	0.1	0956	5.1	1611	0.5	2207	5.0
16	0428	0.5	1033	5.2	1702	0.5	2300	4.6
17	0502	1.0	1112	5.2	1759	0.5	0000	3.9*
18	0544	1.5	1158	5.1	1911	0.6	---	---
19	0122	3.5	0636	2.1	1258	4.9	2040	0.6
20	0316	3.2	0752	2.5	1415	4.8	2210	0.5
21	0506	3.5	0938	2.6	1542	4.8	2324	0.1
22	0608	3.7	1108	2.5	1700	5.0	---	---
23	0021	-0.1	0651	4.1	1212	2.1	1802	5.2
24	0105	-0.3	0726	4.4	1303	1.6	1852	5.3
25	0143	-0.3	0758	4.6	1343	1.3	1933	5.4
26	0219	-0.2	0827	4.7	1422	1.0	2012	5.3
27	0247	0.1	0852	4.8	1457	0.8	2050	5.0
28	0316	0.4	0916	4.9	1531	0.7	2125	4.7
29	0339	0.7	0941	4.9	1606	0.6	2201	4.4
30	0406	1.1	1006	4.8	1642	0.7	2239	4.0

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

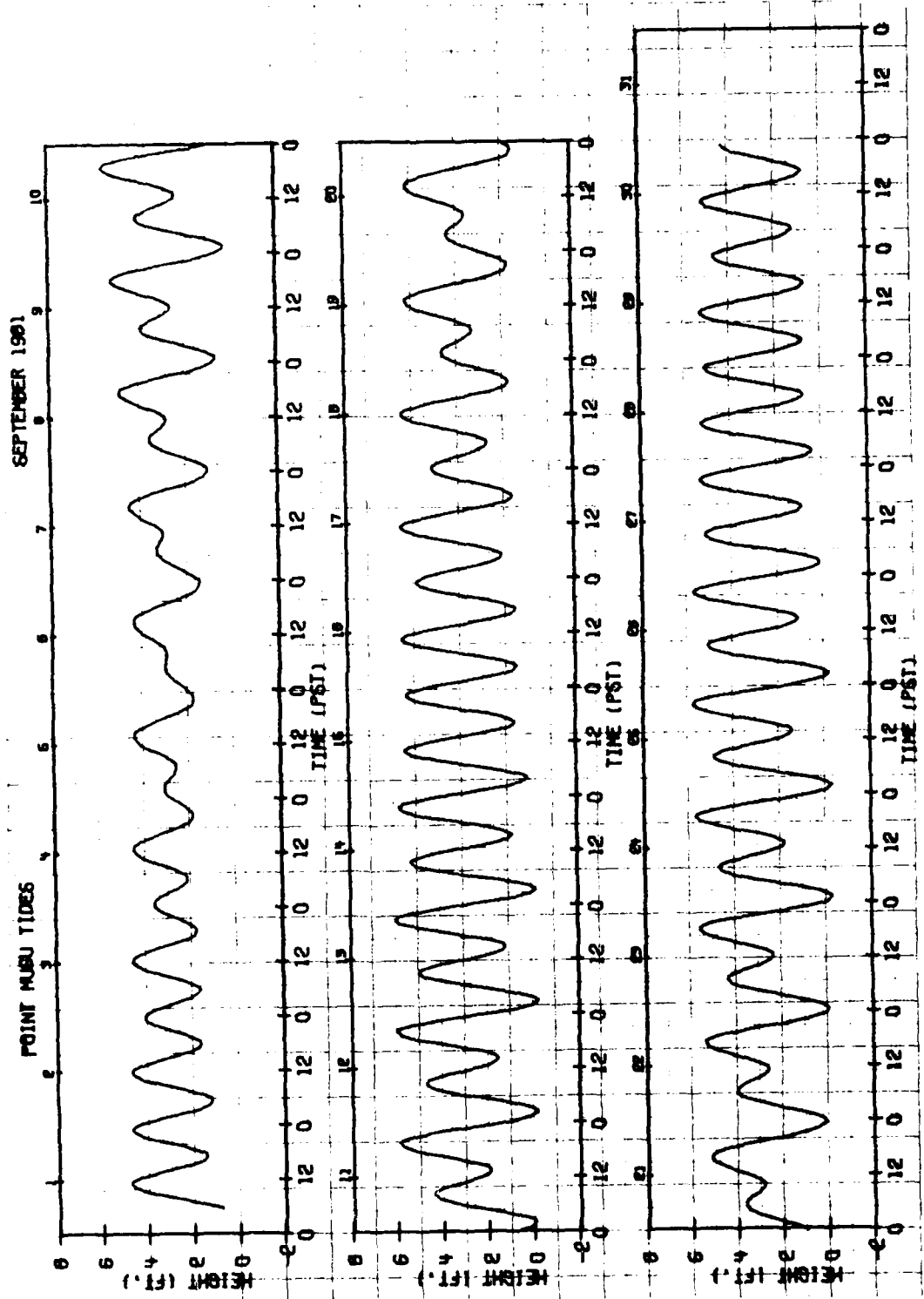


TABLE 22
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER
OCTOBER 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0418	1.6	1021	5.1	1712	0.9	2314	3.8
2	0440	2.1	1050	4.9	1800	1.1	---	---
3	0510	3.4	0503	2.5	1122	4.7	1903	1.3
4	0145	3.1	0526	2.8	1207	4.4	2029	1.4
5	1321	4.2	2201	1.2	---	---	---	---
6	0552	3.5	0926	3.3	1505	4.2	2304	0.9
7	0614	3.8	1059	3.0	1624	4.4	2349	0.6
8	0632	4.1	1150	2.5	1726	4.8	---	---
9	0023	0.3	0653	4.5	1228	2.0	1811	5.1
10	0058	0.1	0715	4.9	1305	1.4	1853	5.4
11	0127	0.1	0741	5.3	1343	0.8	1939	5.5
12	0201	0.1	0808	5.7	1422	0.3	2022	5.5
13	0233	0.3	0838	6.0	1507	-0.2	2110	5.3
14	0309	0.6	0912	6.2	1554	-0.4	2200	4.9
15	0344	1.1	0948	6.3	1645	-0.5	2253	4.5
16	0423	1.6	1029	6.1	1740	-0.3	---	---
17	0502	4.0	0505	2.2	1120	5.8	1849	-0.1
18	0132	3.7	0604	2.6	1220	5.4	2009	0.1
19	0318	3.7	0740	2.9	1340	5.0	2134	0.1
20	0444	4.0	0938	2.9	1515	4.8	2245	0.1
21	0540	4.4	1106	2.5	1638	4.8	2341	0.0
22	0617	4.8	1205	2.0	1743	4.9	---	---
23	0026	0.1	0649	5.1	1252	1.4	1832	5.0
24	0100	0.2	0718	5.3	1330	1.0	1917	4.9
25	0130	0.5	0744	5.5	1403	0.6	1957	4.8
26	0159	0.7	0806	5.6	1438	0.4	2033	4.7
27	0224	1.1	0828	5.6	1507	0.2	2109	4.4
28	0248	1.4	0852	5.6	1541	0.2	2145	4.2
29	0310	1.7	0914	5.6	1614	0.2	2224	3.9
30	0335	2.1	0940	5.4	1652	0.3	2310	3.6
31	0357	2.4	1005	5.2	1734	0.5	---	---

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 23
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST
OCTOBER 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0428	1.5	1028	4.7	1722	0.8	2321	3.5
2	0450	1.9	1057	4.6	1810	1.0	---	---
3	0517	3.2	0513	2.3	1129	4.4	1913	1.2
4	0152	2.9	0536	2.6	1214	4.1	2039	1.3
5	1328	3.9	2211	1.1	---	---	---	---
6	0559	3.3	0936	3.1	1512	3.9	2314	0.8
7	0621	3.5	1109	2.8	1631	4.1	2359	0.5
8	0639	3.8	1200	2.4	1733	4.5	---	---
9	0033	0.3	0700	4.2	1238	1.8	1818	4.7
10	0108	0.1	0722	4.6	1315	1.3	1900	5.0
11	0137	0.1	0748	4.9	1353	0.7	1946	5.1
12	0211	0.3	0815	5.3	1432	0.3	2029	5.1
13	0243	0.3	0845	5.6	1517	-0.2	2117	4.9
14	0319	0.5	0919	5.7	1604	-0.4	2207	4.6
15	0354	1.0	0955	5.8	1655	-0.5	2300	4.2
16	0433	1.5	1036	5.6	1750	-0.3	---	---
17	0509	3.7	0515	2.0	1127	5.4	1859	-0.1
18	0139	3.5	0614	2.5	1227	5.0	2019	0.1
19	0325	3.5	0750	2.7	1347	4.6	2144	0.1
20	0451	3.7	0948	2.7	1522	4.5	2255	0.1
21	0547	4.1	1116	2.3	1645	4.5	2351	0.0
22	0624	4.5	1215	1.8	1750	4.6	---	---
23	0036	0.1	0656	4.7	1302	1.3	1839	4.6
24	0110	0.2	0725	4.9	1340	0.9	1924	4.6
25	0140	0.5	0751	5.1	1413	0.5	2004	4.5
26	0209	0.6	0813	5.2	1448	0.4	2040	4.4
27	0234	1.0	0835	5.2	1517	0.2	2116	4.4
28	0258	1.3	0859	5.2	1551	0.2	2152	3.9
29	0320	1.5	0921	5.2	1624	0.2	2231	3.6
30	0345	1.9	0947	5.0	1702	0.3	2317	3.4
31	0407	2.2	1012	4.8	1744	0.5	---	---

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

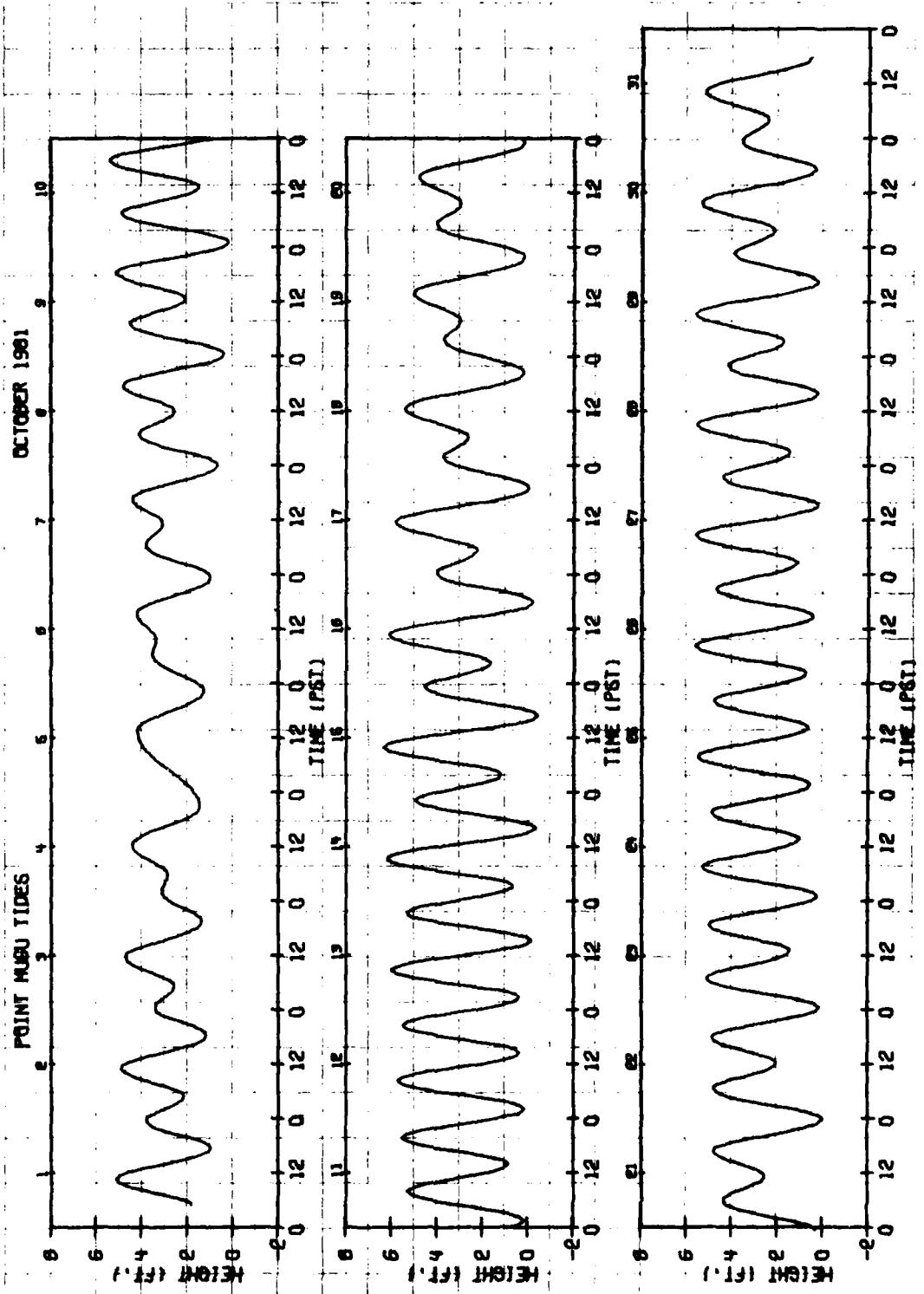


TABLE 24
POINT MUGU TIDES
34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER
NOVEMBER 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0007	3.3	0415	2.6	1035	5.0	1827	0.7
2	0137	3.1	0444	3.0	1116	4.6	1933	0.9
3	1212	4.3	2049	0.9	---	---	---	---
4	0459	3.6	0838	3.4	1348	4.1	2158	0.8
5	0521	3.9	1059	3.0	1531	4.1	2248	0.7
6	0542	4.3	1123	2.4	1643	4.3	2330	0.5
7	0606	4.8	1207	1.7	1742	4.5	0004	0.5*
8	0629	5.3	1248	0.9	1835	4.7	---	---
9	0644	0.5	0658	5.8	1330	0.2	1925	4.8
10	0120	0.6	0730	6.2	1413	-0.5	2015	4.8
11	0158	0.8	0805	6.6	1454	-0.9	2106	4.7
12	0236	1.1	0841	6.8	1546	-1.2	2201	4.5
13	0315	1.5	0923	6.7	1636	-1.2	2254	4.2
14	0400	2.0	1006	6.5	1732	-1.0	---	---
15	0007	3.9	0449	2.4	1054	6.0	1834	-0.7
16	0126	3.8	0558	2.7	1157	5.5	1943	-0.3
17	0256	3.9	0732	2.9	1313	4.9	2055	0.0
18	0407	4.2	0927	2.7	1443	4.4	2202	0.2
19	0459	4.6	1058	2.3	1612	4.2	2258	0.4
20	0534	4.9	1154	1.7	1724	4.2	2343	0.6
21	0614	5.2	1244	1.2	1821	4.2	---	---
22	0020	0.9	0643	5.4	1321	0.7	1909	4.1
23	0054	1.1	0709	5.6	1358	0.3	1951	4.1
24	0122	1.4	0732	5.7	1426	0.0	2030	4.0
25	0148	1.6	0757	5.8	1458	-0.1	2106	3.9
26	0213	1.8	0821	5.8	1530	-0.2	2142	3.8
27	0238	2.1	0846	5.8	1602	-0.2	2221	3.6
28	0306	2.3	0912	5.7	1641	-0.2	2306	3.5
29	0331	2.5	0941	5.5	1716	0.0	---	---
30	0002	3.4	0403	2.7	1013	5.2	1803	0.2

* -- TIDE OCCURS ON NEXT DATE.

TABLE 25
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N 119 DEG 30 MIN W - CENTRAL PART NE COAST
NOVEMBER 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0014	3.1	0425	2.5	1042	4.6	1837	0.6
2	0144	2.9	0454	2.8	1123	4.3	1943	0.8
3	1219	4.0	2059	0.8	---	---	---	---
4	0506	3.4	0848	3.2	1355	3.8	2204	0.7
5	0528	3.6	1039	2.8	1538	3.8	2258	0.6
6	0549	4.0	1133	2.2	1650	4.0	2340	0.5
7	0613	4.5	1217	1.5	1749	4.2	0018	0.5*
8	0636	4.9	1258	0.8	1842	4.4	---	---
9	0054	0.5	0705	5.4	1340	0.2	1932	4.5
10	0130	0.5	0737	5.7	1423	-0.5	2022	4.5
11	0208	0.7	0812	6.1	1508	-0.8	2113	4.4
12	0246	1.0	0848	6.3	1556	-1.1	2208	4.2
13	0325	1.4	0930	6.2	1646	-1.1	2305	3.9
14	0410	1.8	1013	6.0	1742	-0.9	---	---
15	0014	3.6	0459	2.2	1105	5.6	1844	-0.6
16	0133	3.5	0608	2.5	1204	5.1	1953	-0.3
17	0303	3.6	0742	2.7	1320	4.6	2105	0.0
18	0414	3.9	0937	2.5	1450	4.1	2212	0.2
19	0506	4.3	1108	2.1	1619	3.9	2308	0.4
20	0546	4.6	1204	1.5	1731	3.9	2353	0.5
21	0621	4.8	1254	1.1	1828	3.9	---	---
22	0030	0.8	0650	5.0	1331	0.6	1916	3.8
23	0104	1.0	0716	5.2	1408	0.3	1958	3.8
24	0132	1.3	0739	5.3	1436	0.0	2037	3.7
25	0158	1.5	0804	5.4	1508	-0.1	2113	3.6
26	0223	1.6	0828	5.4	1540	-0.2	2149	3.5
27	0248	1.9	0853	5.4	1612	-0.2	2228	3.4
28	0316	2.1	0919	5.3	1651	-0.2	2313	3.3
29	0341	2.3	0948	5.1	1726	0.0	---	---
30	0009	3.2	0413	2.5	1020	4.8	1813	0.2

* -- TIDE OCCURS ON NEXT DATE.

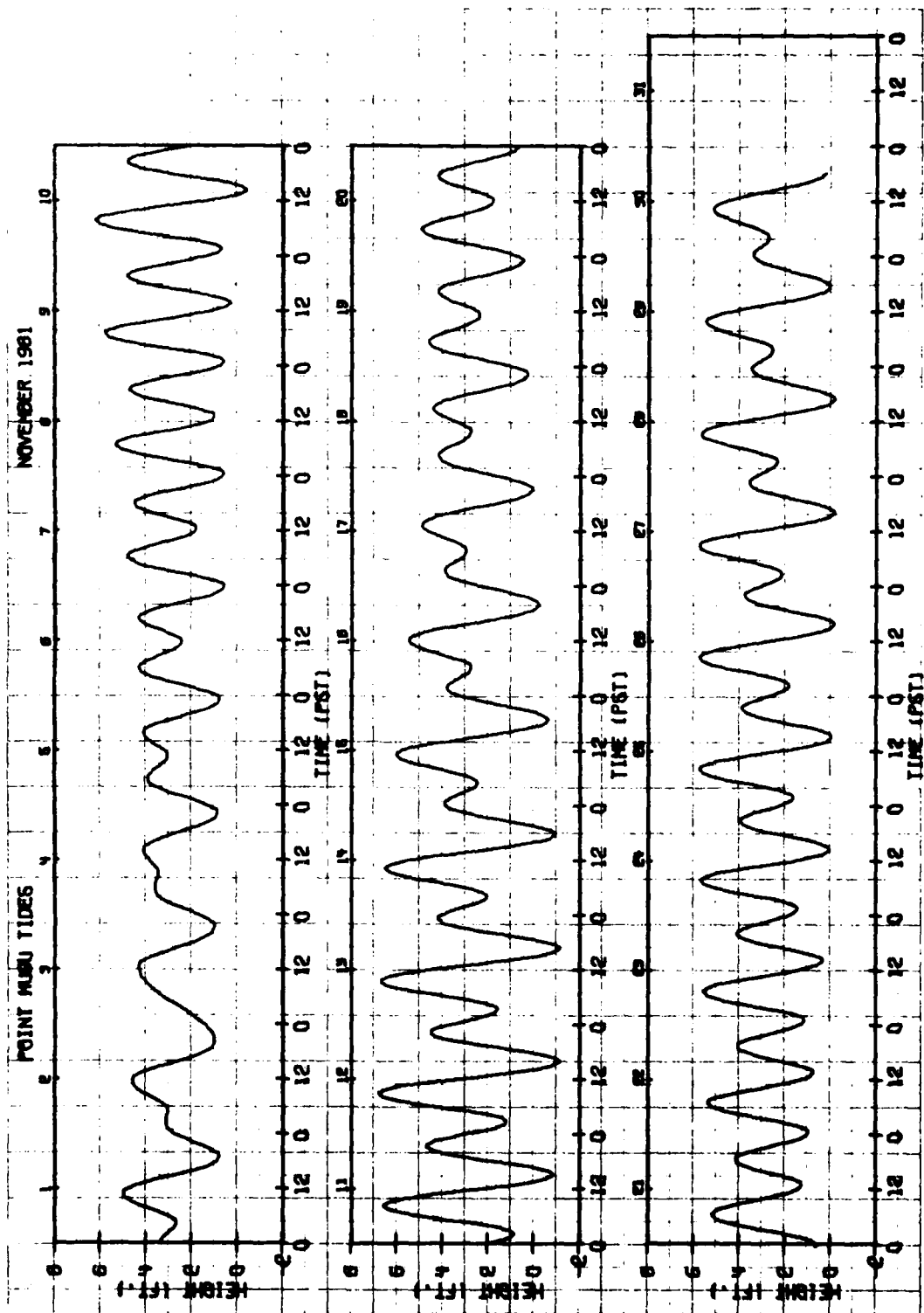


TABLE 26
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER
DECEMBER 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0106	3.3	0442	2.9	1051	4.9	1850	0.3		
2	0220	3.4	0548	3.1	1139	4.5	1946	0.5		
3	0326	3.7	0742	3.2	1253	4.1	2046	0.6		
4	0408	4.0	0936	2.8	1429	3.8	2142	0.7		
5	0443	4.5	1052	2.2	1604	3.7	2234	0.8		
6	0515	5.0	1148	1.4	1720	3.8	2320	0.9		
7	0548	5.5	1236	0.5	1824	4.0	0005	1.0*		
8	0625	6.1	1321	-0.3	1922	4.2	0005	1.0*		
9	0047	1.2	0702	6.6	1406	-1.0	2015	4.3		
10	0129	1.3	0741	6.9	1453	-1.4	2108	4.3		
11	0214	1.5	0823	7.0	1538	-1.7	2201	4.2		
12	0258	1.7	0908	7.0	1628	-1.6	2256	4.1		
13	0348	2.0	0954	6.6	1719	-1.4	2352	4.0		
14	0441	2.3	1042	6.1	1812	-1.3	0000	---		
15	0557	4.0	0548	2.5	1138	5.4	1907	-0.5		
16	0205	4.1	0708	2.6	1241	4.7	2008	0.0		
17	0311	4.3	0848	2.5	1401	4.1	2107	0.5		
18	0408	4.6	1024	2.2	1532	3.6	2205	0.9		
19	0454	4.8	1135	1.6	1659	3.5	2256	1.2		
20	0534	5.1	1228	1.1	1808	3.4	2339	1.5		
21	0606	5.3	1310	0.6	1905	3.5	---	---		
22	0018	1.7	0635	5.5	1346	0.2	1951	3.5		
23	0050	1.9	0704	5.7	1418	-0.1	2030	3.6		
24	0122	2.0	0732	5.8	1450	-0.4	2105	3.6		
25	0150	2.1	0800	5.9	1522	-0.5	2140	3.6		
26	0222	2.2	0831	5.9	1552	-0.6	2216	3.6		
27	0254	2.3	0859	5.8	1625	-0.5	2253	3.6		
28	0326	2.4	0931	5.7	1659	-0.4	2333	3.6		
29	0405	2.5	1003	5.4	1734	-0.3	---	---		
30	0015	3.6	0449	2.5	1042	5.1	1814	0.0		
31	0104	3.7	0547	2.6	1125	4.6	1857	0.3		

* -- TIDE OCCURS ON NEXT DATE.

TABLE 27
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST
DECEMBER 1981

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0113	3.1	0452	2.7	1058	4.6	1900	0.3		
2	0227	3.2	0558	2.9	1146	4.2	1956	0.5		
3	0333	3.5	0752	3.0	1300	3.8	2056	0.5		
4	0415	3.7	0946	2.6	1436	3.5	2152	0.6		
5	0450	4.2	1102	2.0	1611	3.5	2244	0.7		
6	0522	4.6	1158	1.3	1727	3.5	2330	0.8		
7	0555	5.1	1246	0.5	1831	3.7	0015	0.9*		
8	0632	5.6	1331	-0.3	1929	3.9	---	---		
9	0057	1.1	0709	6.1	1416	-0.9	2022	4.0		
10	0139	1.2	0748	6.4	1503	-1.3	2115	4.0		
11	0224	1.4	0830	6.5	1548	-1.5	2208	3.9		
12	0308	1.5	0915	6.5	1638	-1.5	2303	3.8		
13	0358	1.8	1001	6.1	1729	-1.3	2359	3.7		
14	0451	2.1	1049	5.6	1822	-0.9	---	---		
15	0104	3.7	0558	2.3	1145	5.0	1917	-0.5		
16	0212	3.8	0718	2.5	1248	4.4	2018	0.0		
17	0316	4.0	0856	2.4	1408	3.8	2117	0.5		
18	0415	4.3	1034	2.0	1539	3.4	2215	0.8		
19	0501	4.5	1145	1.5	1706	3.3	2306	1.1		
20	0541	4.7	1238	1.0	1815	3.2	2349	1.4		
21	0613	4.9	1320	0.5	1912	3.3	---	---		
22	0028	1.5	0642	5.1	1356	0.2	1958	3.3		
23	0100	1.7	0711	5.3	1428	-0.1	2037	3.4		
24	0132	1.8	0739	5.4	1500	-0.4	2112	3.4		
25	0200	1.9	0807	5.5	1532	-0.5	2147	3.4		
26	0232	2.0	0838	5.5	1602	-0.5	2223	3.4		
27	0304	2.1	0906	5.4	1635	-0.5	2300	3.4		
28	0336	2.2	0938	5.3	1709	-0.4	2340	3.4		
29	0415	2.3	1010	5.0	1744	-0.3	---	---		
30	0022	3.4	0459	2.4	1049	4.7	1824	0.0		
31	0111	3.5	0557	2.5	1132	4.3	1907	0.3		

* -- TIDE OCCURS ON NEXT DATE.

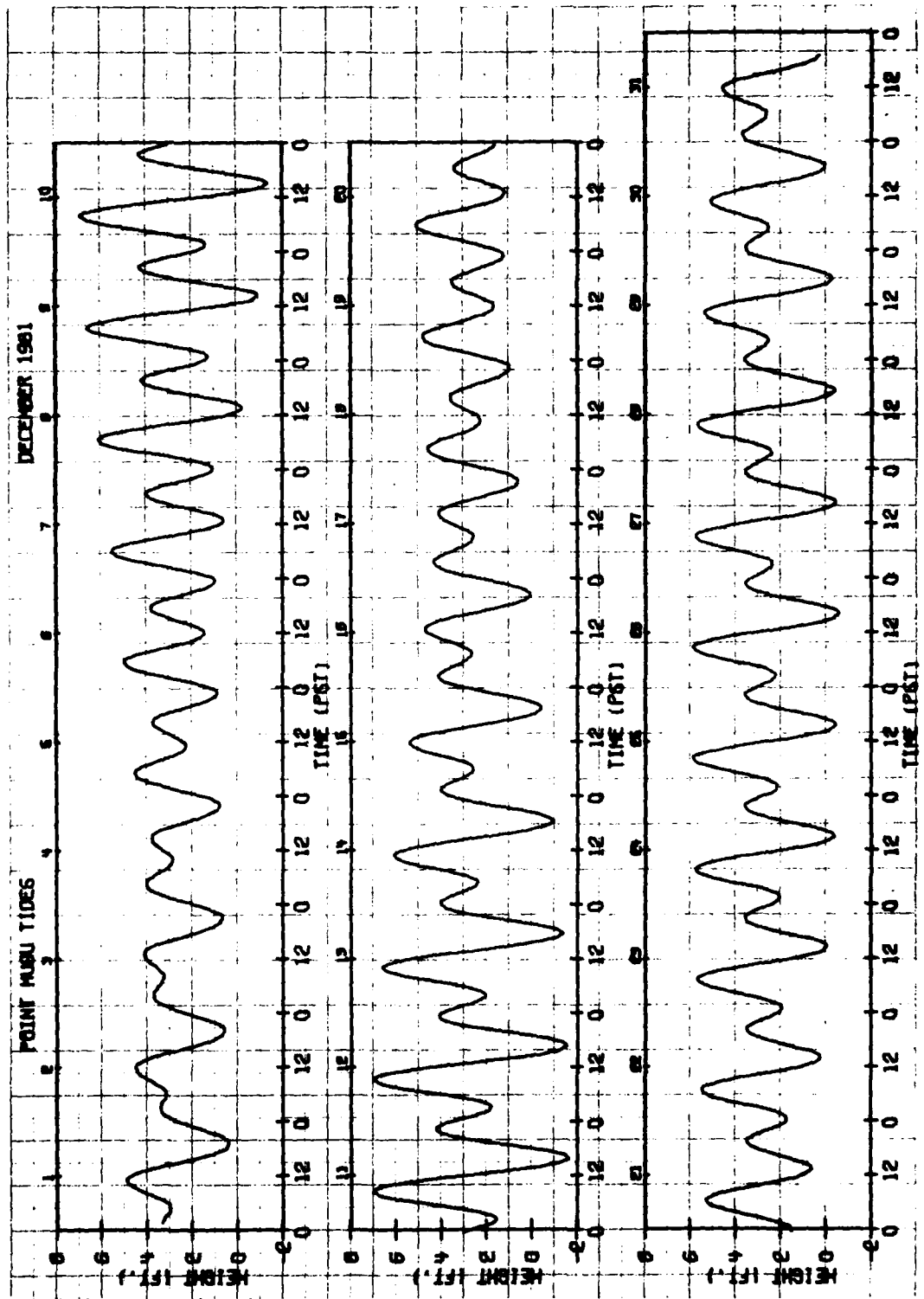


Table 28. Moonrise and Moonset, Barking Sands, Hawaii, 1981.

Date	January		February		March		April		May		June		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	0317	1456	0435	1549	0316	1429	0424	1605	0429	1651	0526	1851	1
2	0408	1536	0529	1644	0408	1525	0510	1707	0514	1755	0620	1957	2
3	0500	1621	0621	1741	0459	1623	0555	1809	0600	1901	0718	2101	3
4	0554	1709	0711	1840	0548	1723	0640	0913	0649	2007	0818	2200	4
5	0647	1801	0800	1941	0636	1825	0726	2019	0742	2114	0919	2253	5
6	0740	1856	0846	2042	0722	1927	0814	2123	0838	2218	1019	2341	6
7	0831	1954	0930	2142	0806	2030	0904	2228	0936	2318	1116	—	7
8	0919	2053	1013	2243	0851	2132	0956	2331	1035	—	1210	0024	8
9	1005	2151	1056	2343	0936	2235	1051	—	1133	0012	1303	0103	9
10	1049	2250	1140	—	1023	2338	1148	0031	1230	0101	1353	0139	10
11	1132	2349	1227	0044	1112	—	1245	0126	1325	0145	1442	0214	11
12	1214	—	1316	0145	1204	0039	1341	0217	1417	0226	1531	0249	12
13	1257	0048	1407	0245	1258	0139	1436	0303	1508	0303	1621	0324	13
14	1341	0148	1502	0344	1353	0236	1529	0346	1557	0338	1711	0401	14
15	1429	0249	1558	0440	1450	0330	1621	0424	1646	0413	1802	0440	15
16	1520	0351	1655	0533	1545	0419	1711	0501	1735	0448	1854	0522	16
17	1614	0452	1752	0621	1640	0504	1800	0536	1825	0523	1945	0607	17
18	1711	0552	1847	0706	1733	0545	1850	0611	1916	0601	2036	0655	18
19	1809	0649	1940	0747	1824	0624	1939	0647	2007	0641	2125	0747	19
20	1907	0741	2031	0825	1915	0700	2029	0723	2058	0724	2212	0841	20
21	2003	0829	2122	0902	2005	0736	2119	0801	2149	0810	2257	0936	21
22	2058	0912	2211	0937	2054	0811	2210	0842	2239	0859	2340	1033	22
23	2150	0952	2300	1012	2143	0847	2301	0926	2327	0951	—	1129	23
24	2241	1029	2350	1048	2233	0924	2352	1013	—	1045	0021	1227	24
25	2330	1104	—	1126	2324	1003	—	1103	10013	1141	0102	1325	25
26	—	1140	0040	1207	—	1045	0041	1156	0057	1238	0144	1425	26
27	0019	1215	0131	1250	0015	1130	0130	1252	0140	1336	0228	1527	27
28	0108	1252	0223	1338	0106	1219	0216	1349	0222	1435	0314	1631	28
29	0158	1331	—	—	0158	1311	0301	1449	0305	1536	0405	1736	29
30	0250	1413	—	—	0248	1407	0345	1549	0349	1639	0500	1841	30
31	0342	1459	—	—	0337	1505	—	—	0435	1744	—	—	31

Date	July		August		September		October		November		December		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	0559	1943	0744	2052	0908	2119	0932	2106	1049	2156	1109	2226	1
2	0701	2040	0841	2133	0959	2154	1022	2146	1138	2246	1153	2320	2
3	0802	2131	0935	2210	1049	2231	1113	2228	1226	2338	1235	—	3
4	0902	2218	1027	2246	1139	2309	1204	2314	1312	—	1315	0015	4
5	0959	2259	1117	2322	1230	2350	1254	—	1356	0033	1355	0111	5
6	1053	2337	1207	2357	1321	—	1344	0002	1438	0129	1436	0208	6
7	1145	—	1257	—	1412	0034	1432	0054	1520	0226	1518	0308	7
8	1236	0014	1347	0035	1503	0122	1518	0149	1602	0325	1604	0410	8
9	1325	0049	1438	0114	1553	0213	1603	0246	1645	0425	1654	0515	9
10	1415	0124	1530	0156	1641	0307	1647	0344	1730	0528	1748	0622	10
11	1505	0200	1622	0242	1728	0404	1730	0444	1819	0633	1848	0730	11
12	1555	0238	1713	0332	1813	0502	1813	0544	1912	0740	1951	0836	12
13	1647	0318	1803	0425	1856	0602	1857	0647	2009	0848	2055	0937	13
14	1739	0402	1850	0521	1939	0702	1944	0751	2109	0953	2157	1032	14
15	1831	0450	1936	0618	2022	0802	2033	0856	2210	1055	2257	1121	15
16	1921	0541	2020	0716	2106	0904	2126	1001	2311	1151	2353	1204	16
17	2010	0635	2102	0815	2152	1006	2223	1105	—	1241	—	1243	17
18	2056	0731	2143	0914	2241	1109	2321	1207	0010	1325	0047	1320	18
19	2140	0828	2225	1013	2334	1212	—	1304	0106	1406	0138	1355	19
20	2222	0925	2309	1113	—	1313	0020	1356	0200	1443	0229	1430	20
21	2303	1022	2355	1214	0029	1412	0119	1443	0252	1519	0318	1505	21
22	2344	1120	—	1316	0127	1507	0216	1525	0342	1553	0408	1542	22
23	—	1219	0044	1417	0226	1557	0311	1604	0432	1628	0459	1622	23
24	0026	1318	0138	1518	0324	1643	0404	1641	0522	1704	0550	1704	24
25	0110	1420	0234	1616	0420	1725	0455	1717	0612	1742	0641	1749	25
26	0157	1523	0333	1711	0515	1804	0546	1752	0703	1823	0731	1838	26
27	0249	1626	0433	1800	0608	1841	0636	1827	0754	1906	0821	1929	27
28	0345	1727	0532	1846	0700	1916	0726	1904	0845	1952	0908	2022	28
29	0444	1826	0629	1927	0751	1952	0817	1943	0935	2041	0953	2116	29
30	0545	1920	0724	2006	0841	2028	0907	2024	1023	2133	1035	2110	30
31	0646	2008	0817	2043	—	—	0958	2109	—	—	1115	2305	31

TABLE 29
PORT ALLEN TIDES
21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPPE HAY JANUARY 1981

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0102	1.6	0758	0.5	1203	0.7	1821	-0.1
2	0137	1.7	0850	0.4	1252	0.7	1856	-0.1
3	0212	1.8	0932	0.3	1337	0.6	1929	-0.1
4	0244	2.0	1010	0.2	1419	0.6	2004	-0.2
5	0319	2.0	1048	0.2	1458	0.6	2036	-0.2
6	0351	2.1	1121	0.1	1541	0.6	2114	-0.2
7	0428	2.1	1156	0.1	1626	0.6	2153	-0.1
8	0503	2.0	1235	0.1	1719	0.6	2238	0.0
9	0542	1.9	1314	0.0	1819	0.7	2327	0.2
10	0620	1.7	1352	0.0	1930	0.8	----	----
11	0030	0.4	0706	1.6	1437	0.0	2051	0.9
12	0156	0.6	0755	1.4	1521	-0.1	2210	1.2
13	0350	0.6	0855	1.1	1610	-0.1	----	----
14	2322	1.4*	0548	0.6	1006	0.9	1658	-0.2
15	0018	1.7	0720	0.5	1122	0.7	1746	-0.2
16	0107	1.8	0826	0.3	1228	0.6	1832	-0.2
17	0152	2.0	0915	0.2	1330	0.6	1918	-0.3
18	0236	2.1	1000	0.1	1422	0.6	2000	-0.3
19	0315	2.2	1039	0.1	1507	0.6	2042	-0.2
20	0351	2.1	1118	0.0	1552	0.6	2121	-0.2
21	0428	2.0	1150	0.1	1634	0.6	2203	-0.1
22	0503	1.9	1225	0.1	1720	0.7	2243	0.1
23	0535	1.7	1256	0.1	1809	0.7	2327	0.3
24	0610	1.6	1328	0.1	1907	0.8	----	----
25	0016	0.4	0642	1.4	1403	0.1	2013	0.9
26	0123	0.6	0714	1.2	1439	0.1	2128	1.0
27	0258	0.6	0757	1.0	1521	0.1	2241	1.2
28	0504	0.6	0855	0.8	1608	0.1	----	----
29	2341	1.4*	0650	0.6	1014	0.7	1653	0.0
30	0026	1.6	0756	0.5	1131	0.6	1739	0.0
31	0108	1.7	0838	0.3	1236	0.6	1824	-0.1

* -- TIDE OCCURS ON PREVIOUS DATE.

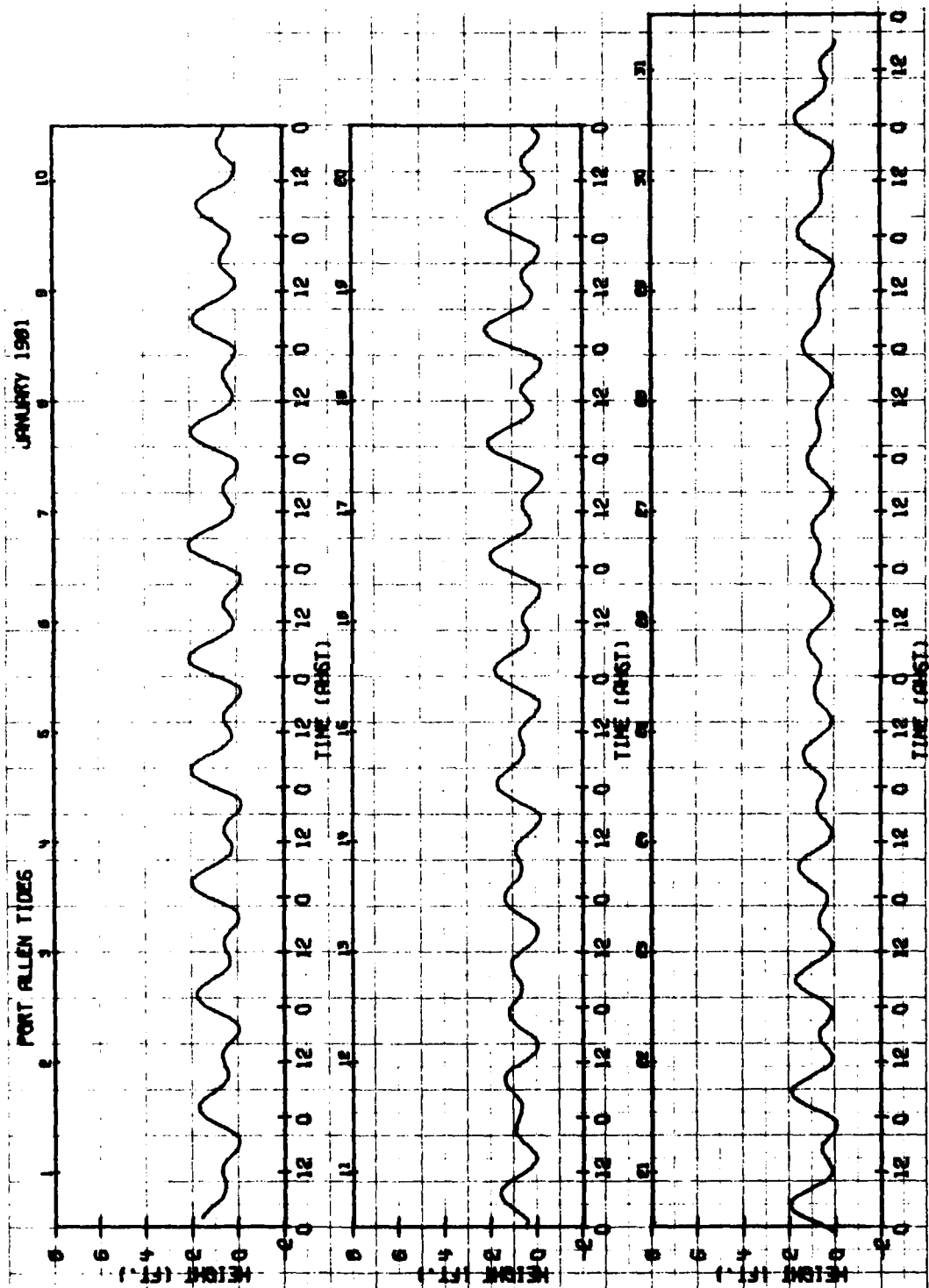


TABLE 30
PORT ALLEN TIDES FEBRUARY 1981
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE HAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0145	1.8	0910	0.2	1324	0.6	1906	-0.1
2	0222	1.9	0944	0.2	1409	0.6	1948	-0.2
3	0256	2.0	1017	0.1	1450	0.6	2027	-0.2
4	0331	2.0	1045	0.0	1533	0.7	2112	-0.2
5	0406	2.0	1116	0.0	1617	0.8	2158	-0.1
6	0441	1.9	1148	0.0	1703	0.9	2244	0.0
7	0516	1.7	1221	-0.1	1759	1.0	----	----
8	2336	0.2*	0555	1.6	1259	-0.1	1859	1.1
9	0044	0.4	0637	1.4	1338	-0.1	2015	1.2
10	0210	0.6	0722	1.1	1425	-0.1	2131	1.4
11	0406	0.6	0821	0.8	1518	-0.1	2247	1.6
12	0606	0.5	0951	0.6	1619	-0.1	----	----
13	2354	1.7*	0729	0.4	1122	0.6	1716	-0.1
14	0047	1.8	0821	0.2	1236	0.6	1818	-0.1
15	0135	1.9	0903	0.1	1333	0.6	1910	-0.1
16	0217	2.0	0938	0.1	1421	0.6	1958	-0.1
17	0255	2.0	1007	0.0	1500	0.7	2040	-0.1
18	0331	1.9	1035	0.0	1539	0.8	2122	-0.1
19	0403	1.8	1103	0.0	1616	0.9	2201	0.0
20	0432	1.7	1129	0.0	1654	0.9	2240	0.1
21	0500	1.6	1153	0.1	1733	1.0	2323	0.3
22	0524	1.4	1219	0.1	1822	1.1	----	----
23	0009	0.4	0556	1.2	1246	0.1	1911	1.1
24	0109	0.5	0629	1.0	1320	0.1	2013	1.2
25	0238	0.6	0707	0.8	1400	0.2	2129	1.3
26	0441	0.6	0806	0.6	1453	0.2	2238	1.4
27	0628	0.5	0945	0.6	1555	0.2	----	----
28	2338	1.5*	0726	0.4	1120	0.6	1659	0.1

* -- TIDE OCCURS ON PREVIOUS DATE.

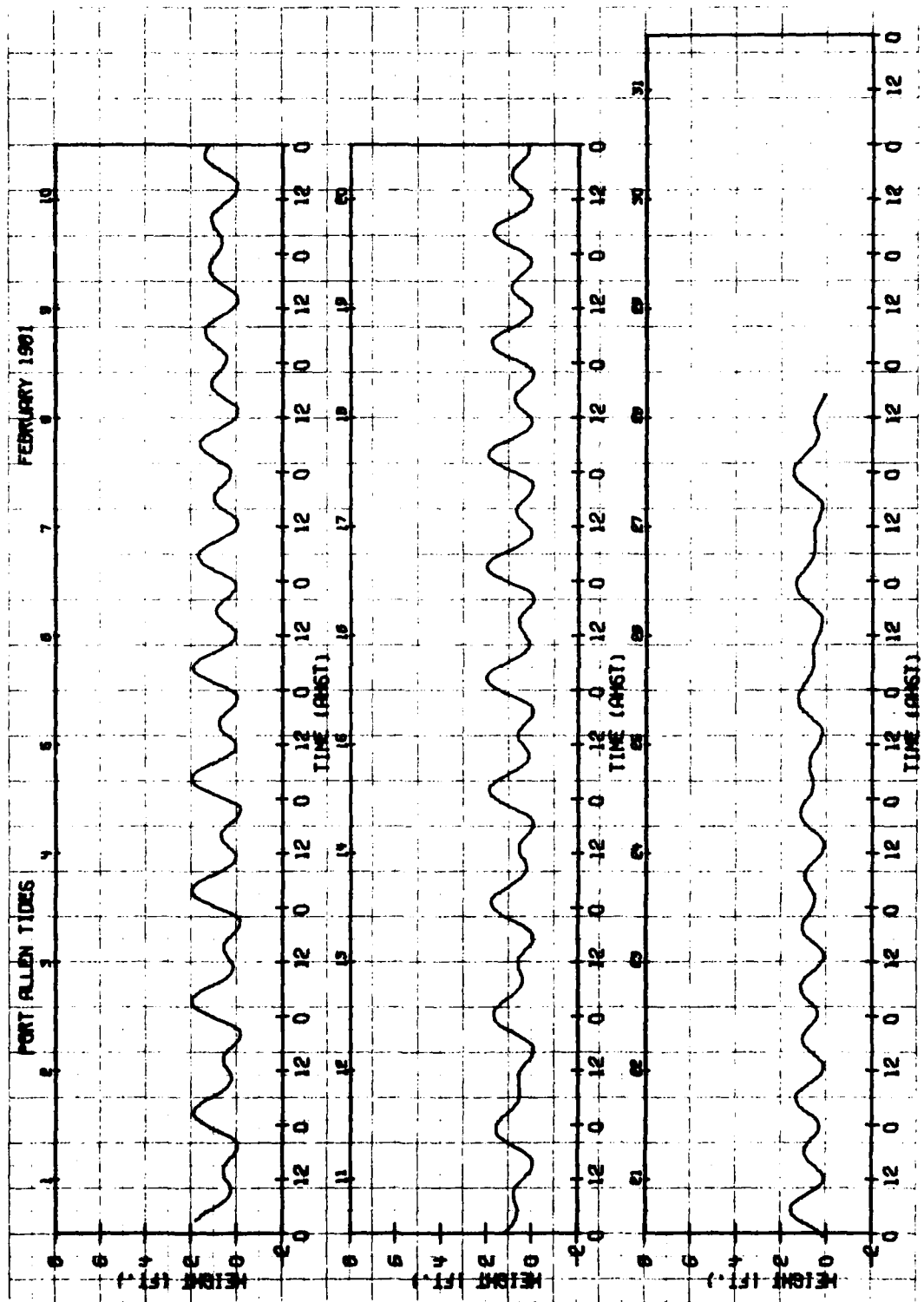


TABLE 31
PORT ALLEN TIDES

MARCH 1981

21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT
1	0028	1.7	0802	0.3	1226	0.6	1759	0.0
2	0112	1.7	0834	0.2	1313	0.6	1849	0.0
3	0151	1.8	0902	0.1	1358	0.7	1940	-0.1
4	0226	1.9	0931	0.0	1438	0.9	2025	-0.2
5	0305	1.9	0959	-0.1	1518	1.0	2114	-0.1
6	0341	1.8	1028	-0.1	1603	1.2	2200	-0.1
7	0416	1.7	1100	-0.1	1669	1.3	2255	0.0
8	0452	1.5	1132	-0.1	1738	1.4	---	---
9	2353	0.2*	0533	1.3	1206	-0.1	1835	1.5
10	0102	0.3	0615	1.0	1244	-0.1	1942	1.5
11	0231	0.5	0704	0.8	1332	0.0	2055	1.6
12	0424	0.5	0819	0.6	1432	0.1	2211	1.6
13	0610	0.3	1006	0.6	1544	0.1	---	---
14	2322	1.7*	0713	0.2	1141	0.6	1701	0.1
15	0021	1.7	0754	0.1	1247	0.6	1810	0.1
16	0109	1.7	0830	0.1	1332	0.7	1908	0.0
17	0151	1.7	0856	0.0	1411	0.9	1956	0.0
18	0229	1.7	0924	0.0	1449	1.0	2038	0.0
19	0301	1.7	0946	0.0	1521	1.1	2119	0.1
20	0330	1.5	1010	0.0	1553	1.2	2159	0.1
21	0358	1.4	1031	0.0	1629	1.3	2241	0.2
22	0427	1.3	1052	0.0	1701	1.3	2324	0.3
23	0452	1.1	1116	0.0	1743	1.4	---	---
24	0011	0.4	0521	0.4	1139	0.1	1825	1.4
25	0110	0.4	0556	0.4	1208	0.1	1917	1.4
26	0232	0.5	0638	0.6	1246	0.2	2019	1.4
27	0422	0.5	0747	0.6	1338	0.2	2131	1.4
28	0544	0.4	0940	0.5	1454	0.3	2238	1.5
29	0639	0.3	1114	0.6	1617	0.3	---	---
30	2337	1.6*	0713	0.2	1213	0.6	1733	0.2
31	0027	1.7	0743	0.1	1300	0.8	1835	0.1

* -- TIDE OCCURS ON PREVIOUS DATE.

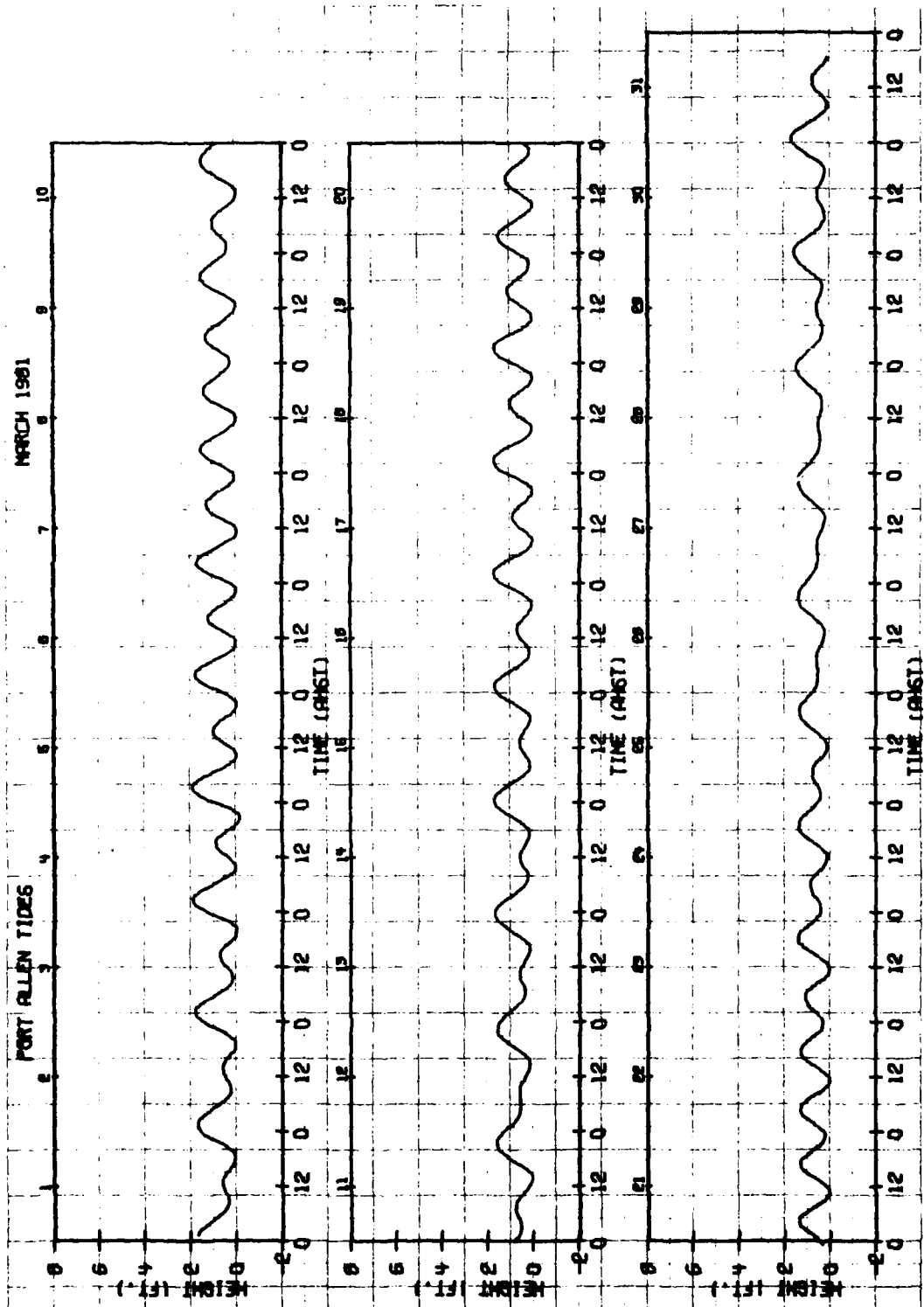


TABLE 32
PORT ALLEN TIDES APRIL 1981
21 DEG 54 MIN N, 159 DEG 35 MIN W - MANAPEPE HAY

DATE	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT
1	0109	1.7	0812	0.0	1342	1.0	1931	0.0
2	0152	1.7	0841	-0.1	1421	1.2	2023	0.0
3	0232	1.7	0910	-0.2	1503	1.4	2115	-0.1
4	0311	1.5	0939	-0.2	1548	1.6	2209	0.0
5	0347	1.3	1012	-0.2	1632	1.7	2305	0.1
6	0428	1.1	1044	-0.2	1719	1.7	----	----
7	0008	0.1	0511	0.9	1120	-0.2	1811	1.7
8	0120	0.2	0600	0.7	1158	-0.1	1910	1.7
9	0250	0.3	0702	0.6	1246	0.0	2019	1.7
10	0423	0.3	0835	0.5	1345	0.2	2132	1.7
11	0538	0.2	1027	0.5	1511	0.3	2240	1.7
12	0631	0.1	1149	0.6	1644	0.3	----	----
13	2341	1.6*	0709	0.0	1241	0.8	1800	0.3
14	0033	1.6	0741	0.0	1323	0.9	1900	0.2
15	0115	1.5	0806	0.0	1359	1.1	1953	0.2
16	0150	1.4	0832	0.0	1433	1.3	2039	0.2
17	0222	1.3	0853	-0.1	1503	1.4	2121	0.2
18	0254	1.2	0915	-0.1	1534	1.5	2202	0.2
19	0323	1.0	0935	-0.1	1606	1.6	2245	0.2
20	0351	0.9	0956	0.0	1638	1.6	2331	0.3
21	0423	0.8	1018	0.0	1713	1.6	----	----
22	0019	0.3	0455	0.7	1044	0.0	1752	1.6
23	0118	0.3	0532	0.6	1113	0.1	1838	1.6
24	0228	0.3	0629	0.5	1150	0.2	1933	1.6
25	0347	0.3	0750	0.5	1240	0.3	2035	1.6
26	0453	0.2	0939	0.5	1402	0.3	2139	1.6
27	0538	0.1	1100	0.6	1541	0.4	2238	1.6
28	0617	0.0	1159	0.8	1711	0.3	----	----
29	2337	1.5*	0649	-0.1	1241	1.0	1823	0.3
30	0026	1.5	0720	-0.2	1325	1.3	1929	0.2

* -- TIDE OCCURS ON PREVIOUS DATE.

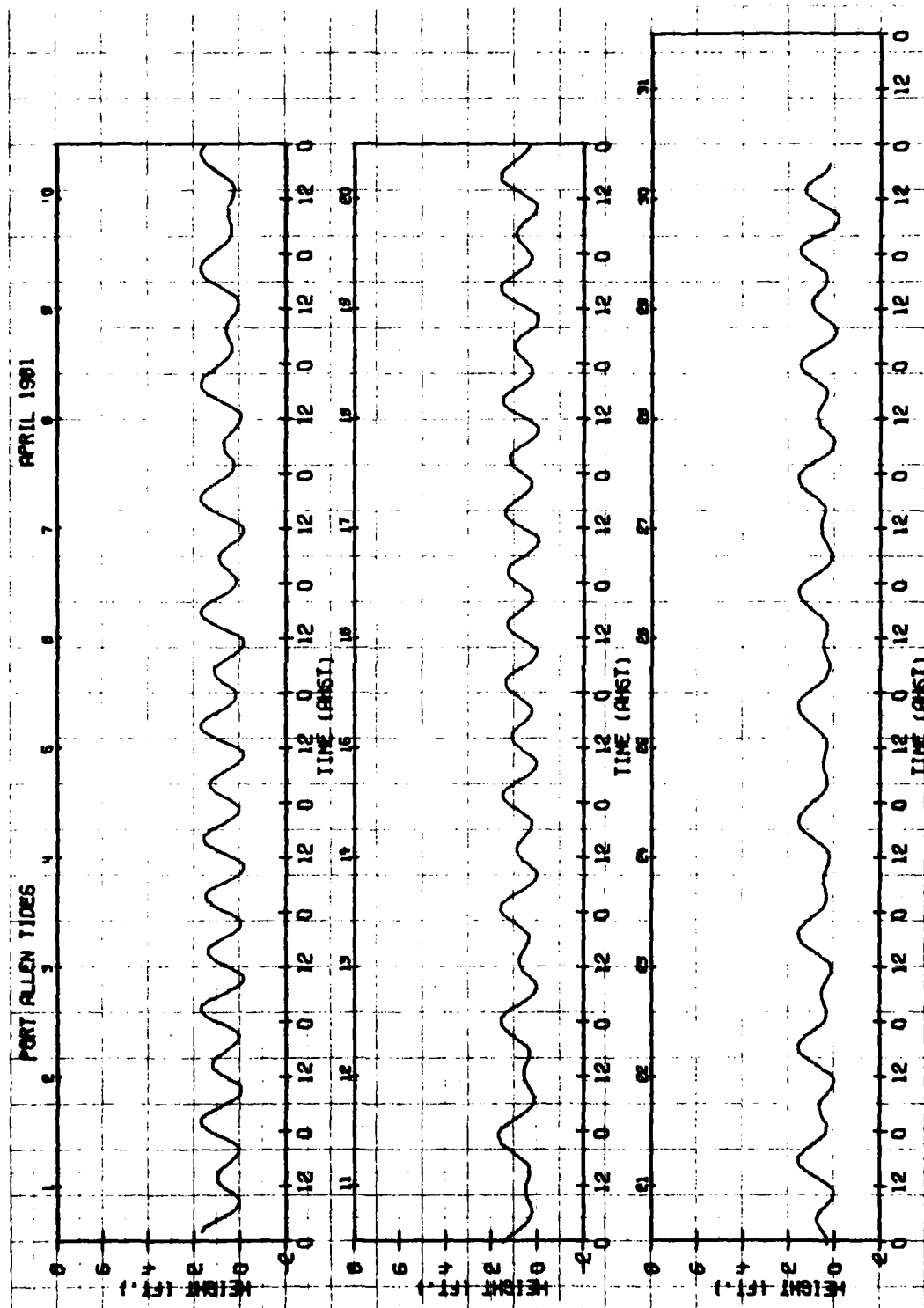


TABLE 33
PORT ALLEN TIDES
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY MAY 1981

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0111	1.4	0751	-0.2	1407	1.5	2026	0.1
2	0157	1.3	0823	-0.3	1449	1.7	2125	0.1
3	0242	1.1	0855	-0.3	1532	1.8	2221	0.0
4	0324	0.9	0929	-0.3	1618	2.0	2320	0.0
5	0410	0.8	1003	-0.3	1703	2.0	----	----
6	0022	0.1	0458	0.6	1038	-0.2	1752	2.0
7	0129	0.1	0554	0.6	1121	-0.1	1848	1.9
8	0244	0.1	0709	0.5	1211	0.1	1946	1.7
9	0354	0.1	0844	0.5	1309	0.3	2047	1.7
10	0453	0.1	1025	0.6	1442	0.4	2150	1.6
11	0538	0.0	1134	0.7	1620	0.5	2249	1.4
12	0617	0.0	1223	0.9	1746	0.5	----	----
13	2340	1.3*	0647	-0.1	1304	1.1	1853	0.4
14	0023	1.2	0713	-0.1	1340	1.3	1953	0.4
15	0105	1.1	0738	-0.1	1412	1.5	2043	0.3
16	0140	1.0	0801	-0.1	1444	1.6	2126	0.3
17	0215	0.9	0825	-0.1	1516	1.7	2210	0.3
18	0250	0.8	0848	-0.1	1544	1.7	2255	0.2
19	0322	0.7	0912	-0.1	1619	1.8	----	----
20	2339	0.2*	0358	0.6	0937	-0.1	1651	1.8
21	0024	0.2	0437	0.6	1007	0.0	1730	1.8
22	0120	0.2	0522	0.5	1036	0.1	1811	1.7
23	0212	0.2	0622	0.5	1118	0.1	1857	1.7
24	0308	0.1	0746	0.5	1213	0.3	1950	1.7
25	0356	0.1	0922	0.6	1329	0.4	2047	1.6
26	0439	0.0	1037	0.7	1512	0.5	2145	1.5
27	0517	-0.1	1137	1.0	1653	0.5	2244	1.4
28	0553	-0.2	1225	1.3	1818	0.4	----	----
29	2343	1.2*	0628	-0.2	1308	1.6	1932	0.3
30	0032	1.1	0703	-0.3	1353	1.7	2035	0.2
31	0125	0.9	0742	-0.4	1435	2.0	2134	0.1

* -- TIDE OCCURS ON PREVIOUS DATE.

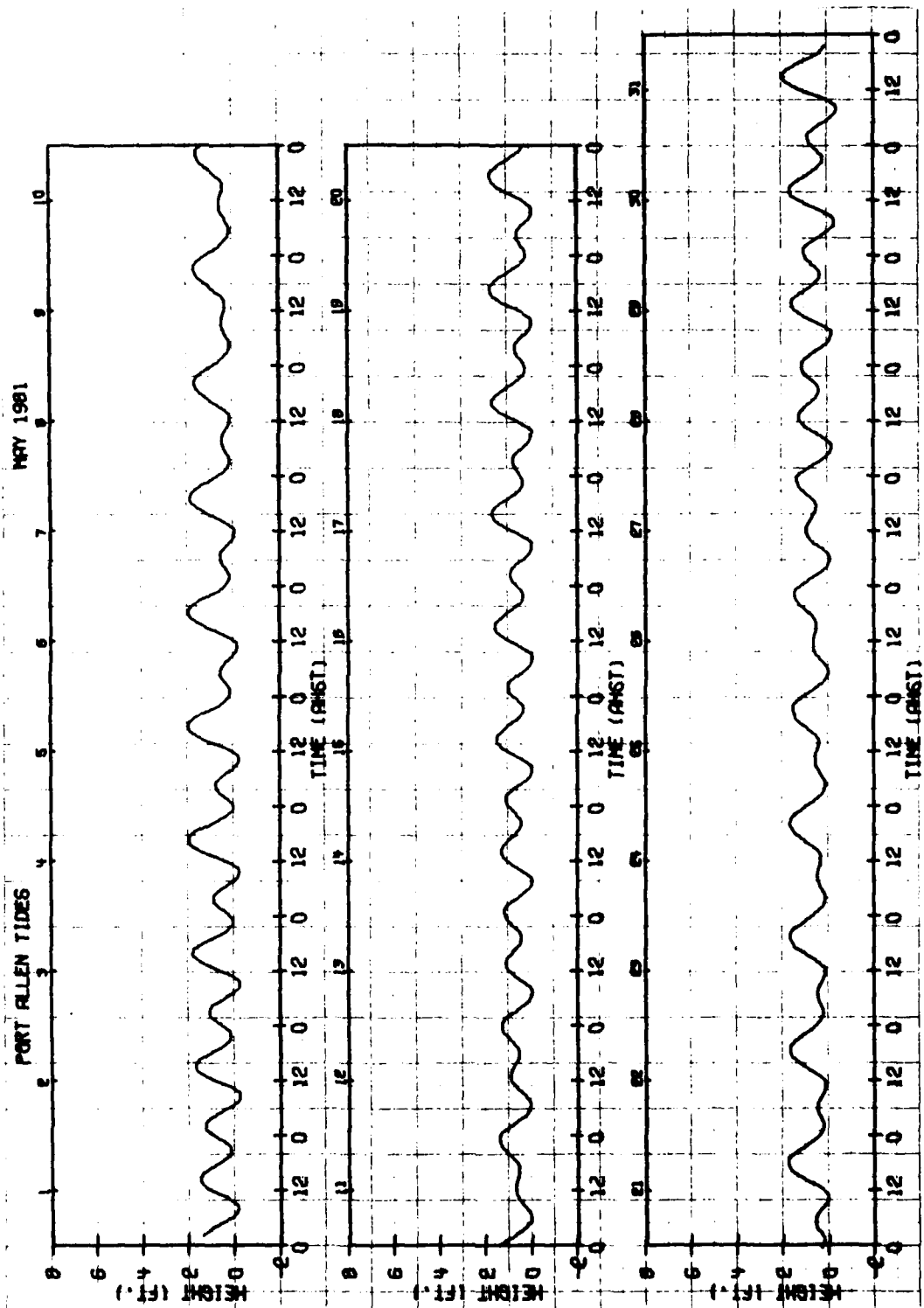


TABLE 34
PORT ALLEN TIDES
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPPE RAY JUNE 1981

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0213	0.8	0817	-0.4	1521	2.1	2230	0.1
2	0305	0.7	0853	-0.4	1603	2.2	2329	0.0
3	0354	0.6	0932	-0.3	1648	2.2	----	----
4	0024	0.0	0447	0.6	1014	-0.2	1735	2.1
5	0120	0.0	0548	0.5	1057	0.0	1823	2.0
6	0219	0.0	0659	0.5	1145	0.1	1909	1.8
7	0308	0.0	0823	0.6	1247	0.3	2002	1.7
8	0357	0.0	0952	0.6	1407	0.5	2053	1.5
9	0439	0.0	1101	0.8	1550	0.6	2149	1.3
10	0514	0.0	1157	1.1	1726	0.6	2241	1.1
11	0546	0.0	1239	1.3	1844	0.6	----	----
12	2330	1.0*	0618	-0.1	1316	1.5	1950	0.5
13	0015	0.9	0647	-0.1	1353	1.7	2045	0.4
14	0104	0.8	0714	-0.1	1422	1.7	2131	0.4
15	0143	0.7	0744	-0.1	1455	1.8	2213	0.3
16	0225	0.6	0813	-0.1	1528	1.9	2255	0.2
17	0303	0.6	0841	-0.1	1601	1.9	2334	0.2
18	0343	0.6	0913	-0.1	1634	1.9	----	----
19	0014	0.2	0424	0.6	0945	0.0	1708	1.9
20	0054	0.2	0513	0.6	1020	0.0	1748	1.9
21	0136	0.1	0613	0.6	1107	0.2	1830	1.8
22	0218	0.1	0723	0.6	1205	0.3	1912	1.7
23	0300	0.0	0846	0.7	1317	0.5	2002	1.6
24	0343	0.0	1005	0.9	1500	0.6	2056	1.4
25	0421	-0.1	1107	1.2	1648	0.6	2158	1.2
26	0504	-0.2	1203	1.5	1823	0.6	2301	1.0
27	0546	-0.2	1252	1.7	1941	0.5	----	----
28	0003	0.8	0628	-0.3	1338	2.0	2047	0.3
29	0102	0.7	0710	-0.3	1422	2.1	2142	0.2
30	0201	0.6	0750	-0.3	1507	2.3	2235	0.1

* -- TIDE OCCURS ON PREVIOUS DATE.

TABLE 35
PORT ALLEN TIDES
21 DEG 54 MIN N. 159 DEG 35 MIN W - MANAPPEE BAY JULY 1981

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0253	0.6	0832	-0.3	1549	2.3	2320	0.1
2	0343	0.6	0914	-0.2	1631	2.2	----	---
3	0008	0.1	0434	0.6	0959	-0.1	1713	2.1
4	0048	0.1	0529	0.6	1041	0.0	1753	2.0
5	0133	0.1	0630	0.6	1124	0.2	1833	1.8
6	0212	0.1	0740	0.7	1225	0.4	1915	1.6
7	0253	0.1	0853	0.8	1338	0.6	1957	1.4
8	0332	0.1	1009	1.0	1514	0.7	2043	1.2
9	0410	0.1	1115	1.2	1706	0.7	2135	1.0
10	0448	0.1	1202	1.4	1839	0.6	2237	0.9
11	0526	0.0	1245	1.6	1948	0.6	----	---
12	2339	0.8*	0602	0.0	1324	1.7	2040	0.5
13	0031	0.7	0640	0.0	1358	1.8	2122	0.4
14	0122	0.6	0715	0.0	1433	1.9	2201	0.3
15	0206	0.6	0749	-0.1	1506	2.0	2233	0.3
16	0248	0.6	0827	-0.1	1540	2.1	2308	0.2
17	0327	0.6	0901	0.0	1612	2.1	----	---
18	2340	0.2*	0410	0.7	0940	0.0	1847	2.0
19	0011	0.7	0459	0.7	1022	0.1	1723	1.9
20	0046	0.1	0552	0.8	1108	0.2	1758	1.8
21	0122	0.1	0658	0.9	1206	0.4	1839	1.7
22	0200	0.1	0807	1.0	1322	0.6	1925	1.5
23	0245	0.0	0923	1.2	1503	0.6	2017	1.2
24	0329	0.0	1037	1.5	1701	0.7	2120	1.0
25	0418	0.0	1138	1.7	1844	0.6	2239	0.8
26	0511	-0.1	1236	1.9	1953	0.5	----	---
27	2354	0.7*	0600	-0.1	1322	2.1	2048	0.3
28	0100	0.7	0652	-0.1	1404	2.2	2134	0.2
29	0157	0.7	0737	-0.2	1451	2.3	2216	0.2
30	0246	0.7	0822	-0.1	1532	2.3	2254	0.1
31	0336	0.7	0908	-0.1	1611	2.2	2330	0.1

* -- TIDE OCCURS ON PREVIOUS DATE.

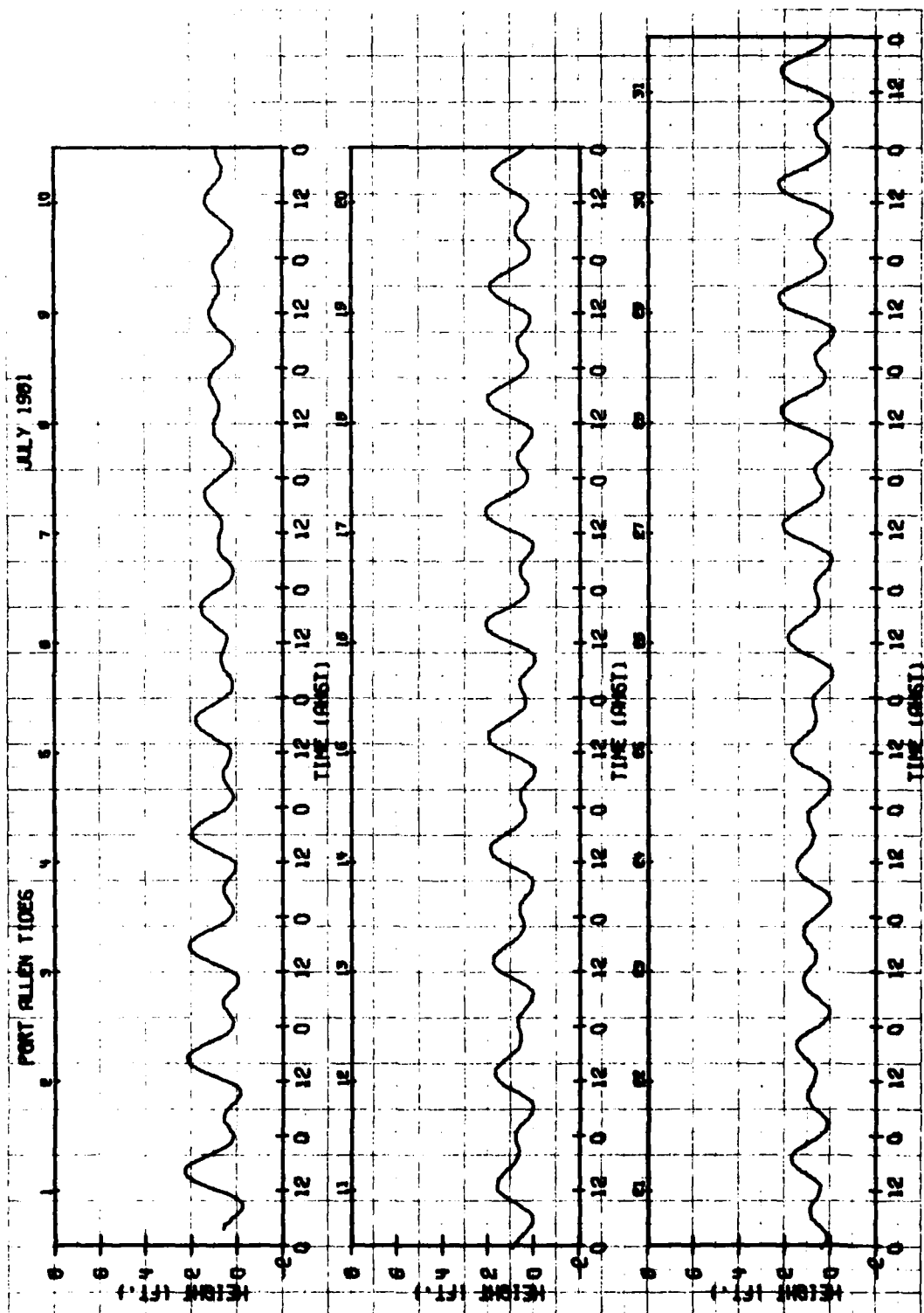


TABLE 36
PORT ALLEN TIDES
21 DEG 54 MIN N, 159 DEG 35 MIN W - MANAPEPE HAY AUGUST 1981

DATE	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT
1	0420	0.8	0953	0.0	1647	2.0	----	---
2	0002	0.2	0503	0.9	1035	0.2	1722	1.9
3	0034	0.2	0554	0.9	1118	0.3	1757	1.7
4	0107	0.2	0648	1.0	1213	0.5	1829	1.5
5	0141	0.2	0750	1.1	1318	0.6	1904	1.3
6	0217	0.2	0903	1.2	1448	0.7	1943	1.1
7	0256	0.2	1012	1.4	1646	0.8	2042	0.9
8	0342	0.2	1114	1.5	1829	0.7	2158	0.8
9	0434	0.2	1207	1.7	1936	0.6	2314	0.7
10	0522	0.2	1250	1.7	2018	0.5	----	---
11	0021	0.7	0608	0.2	1329	1.9	2056	0.4
12	0111	0.7	0656	0.1	1405	2.0	2125	0.3
13	0156	0.8	0735	0.1	1440	2.1	2154	0.3
14	0234	0.8	0814	0.0	1513	2.1	2222	0.2
15	0314	0.9	0856	0.0	1548	2.1	2254	0.2
16	0356	1.0	0938	0.1	1621	2.0	2323	0.2
17	0441	1.1	1023	0.2	1653	1.8	----	---
18	2353	0.1*	0530	1.2	1116	0.3	1731	1.7
19	0026	0.1	0625	1.3	1219	0.5	1810	1.5
20	0104	0.1	0735	1.4	1339	0.6	1953	1.3
21	0148	0.1	0847	1.6	1523	0.7	1951	1.0
22	0240	0.1	1006	1.7	1722	0.6	2111	0.8
23	0339	0.2	1114	1.8	1855	0.6	2243	0.7
24	0445	0.1	1215	2.0	1947	0.4	----	---
25	0005	0.7	0547	0.1	1305	2.1	2033	0.3
26	0108	0.8	0646	0.1	1349	2.1	2112	0.2
27	0156	0.9	0735	0.1	1431	2.1	2143	0.2
28	0240	1.0	0822	0.1	1508	2.1	2212	0.2
29	0319	1.1	0906	0.1	1542	2.0	2239	0.2
30	0358	1.2	0948	0.2	1615	1.8	2305	0.2
31	0437	1.2	1030	0.3	1643	1.7	2331	0.3

* -- TIDE OCCURS ON PREVIOUS DATE.

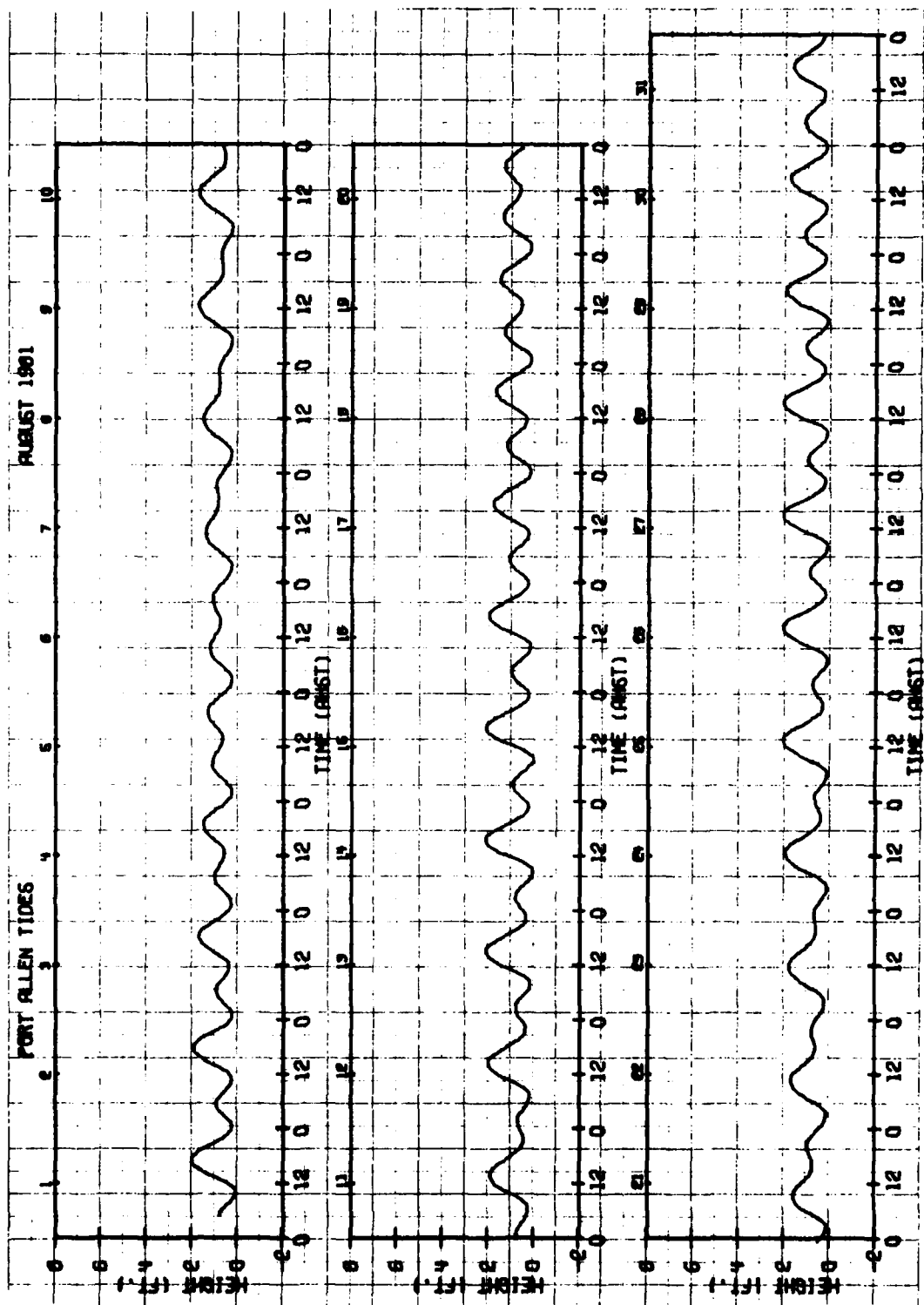


TABLE 37
PORT ALLEN TIDES
21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPEPE BAY
SEPTEMBER 1981

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0519	1.3	1116	0.5	1715	1.5	----	---
2	2358	0.3*	0602	1.4	1206	0.6	1743	1.3
3	0025	0.3	0654	1.4	1310	0.6	1816	1.2
4	0059	0.4	0750	1.4	1434	0.7	1857	1.0
5	0136	0.4	0902	1.5	1626	0.7	2003	0.8
6	0232	0.4	1015	1.6	1808	0.6	2143	0.7
7	0337	0.4	1114	1.7	1903	0.6	2314	0.7
8	0443	0.4	1207	1.7	1939	0.5	----	---
9	0015	0.4	0542	0.3	1252	1.9	2011	0.4
10	0101	0.9	0634	0.3	1330	1.9	2039	0.3
11	0141	1.0	0724	0.2	1406	2.0	2106	0.2
12	0220	1.1	0809	0.2	1442	2.0	2133	0.2
13	0257	1.3	0854	0.1	1517	1.9	2200	0.1
14	0339	1.4	0943	0.2	1549	1.8	2230	0.1
15	0422	1.6	1033	0.3	1627	1.7	2259	0.1
16	0511	1.7	1130	0.4	1704	1.5	2334	0.1
17	0603	1.7	1237	0.5	1748	1.2	----	---
18	0010	0.1	0705	1.7	1401	0.6	1837	1.0
19	0056	0.2	0814	1.7	1544	0.6	1949	0.8
20	0152	0.3	0931	1.8	1727	0.6	2132	0.7
21	0303	0.4	1043	1.9	1836	0.4	2312	0.7
22	0426	0.4	1146	1.9	1921	0.3	----	---
23	0023	0.8	0543	0.3	1239	2.0	1959	0.3
24	0111	1.0	0644	0.3	1324	1.9	2029	0.2
25	0154	1.1	0737	0.3	1404	1.9	2057	0.2
26	0230	1.3	0822	0.3	1438	1.8	2123	0.2
27	0305	1.4	0907	0.3	1510	1.7	2144	0.2
28	0337	1.5	0950	0.3	1539	1.6	2207	0.2
29	0413	1.6	1031	0.4	1607	1.4	2228	0.2
30	0447	1.7	1116	0.5	1636	1.2	2252	0.3

* -- TIDE OCCURS ON PREVIOUS DATE.

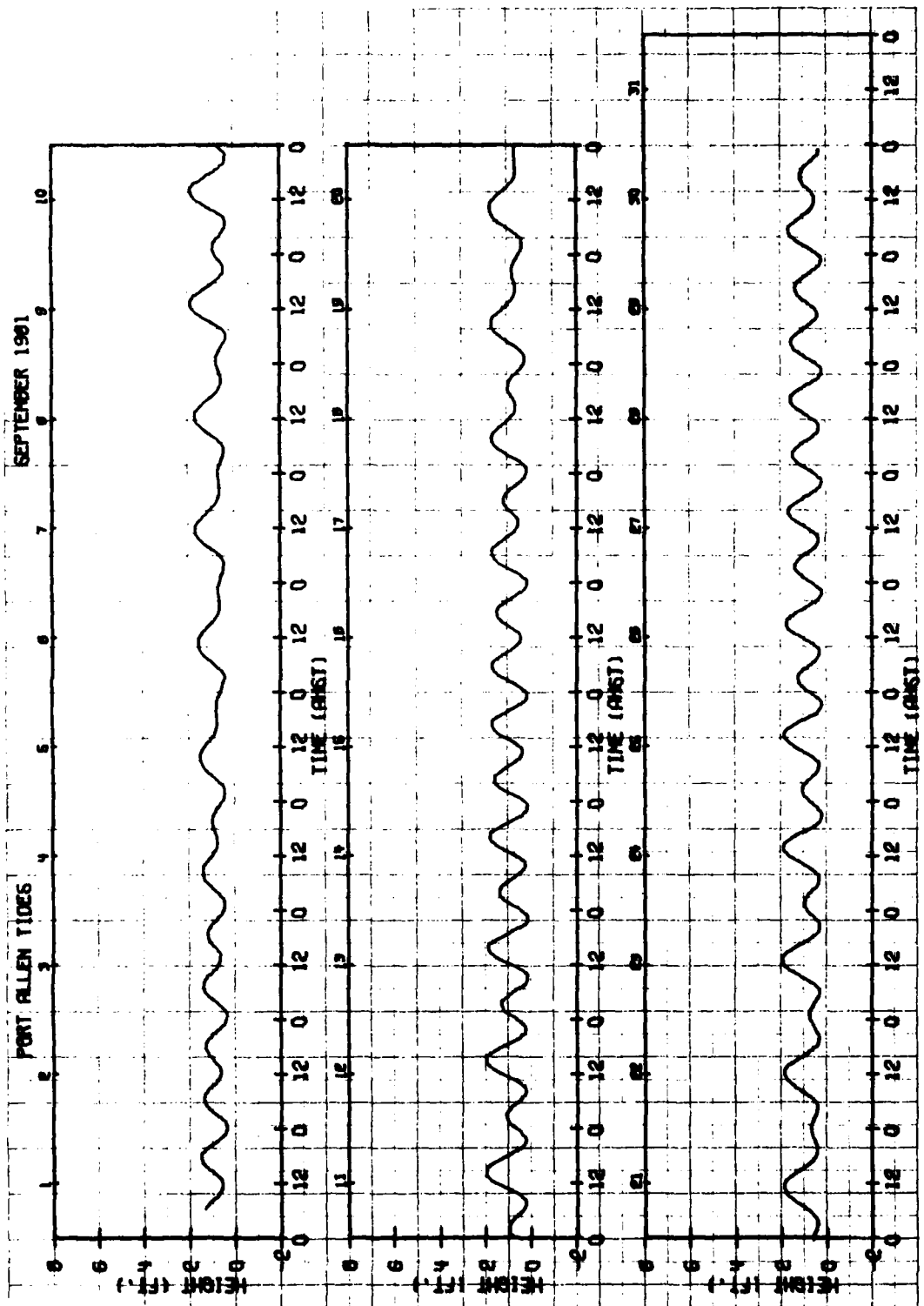


TABLE 38
PORT ALLEN TIDFS OCTOBER 1981
21 DEG 54 MIN N. 159 DEG 35 MIN W - MANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0523	1.7	1208	0.6	1704	1.1	2316	0.3
2	0604	1.7	1310	0.6	1739	0.9	----	---
3	2344	0.4*	0657	1.7	1426	0.6	1825	0.8
4	0020	0.4	0759	1.7	1606	0.6	1944	0.7
5	0112	0.5	0908	1.7	1729	0.6	2145	0.7
6	0228	0.6	1017	1.7	1816	0.5	2312	0.7
7	0401	0.6	1114	1.7	1851	0.4	----	---
8	0007	0.9	0517	0.5	1203	1.7	1920	0.3
9	0047	1.1	0620	0.4	1245	1.8	1947	0.2
10	0125	1.3	0714	0.3	1327	1.8	2014	0.1
11	0204	1.5	0807	0.3	1406	1.7	2042	0.1
12	0243	1.7	0856	0.2	1444	1.7	2109	0.0
13	0325	1.8	0949	0.2	1523	1.5	2141	0.0
14	0407	1.9	1044	0.3	1558	1.3	2210	0.0
15	0452	2.0	1145	0.4	1640	1.1	2246	0.0
16	0541	2.0	1254	0.4	1729	0.9	2324	0.1
17	0640	2.0	1416	0.5	1830	0.7	----	---
18	0010	0.2	0744	1.9	1546	0.4	2004	0.6
19	0108	0.4	0854	1.9	1704	0.4	2156	0.6
20	0235	0.5	1005	1.8	1800	0.3	----	---
21	2323	0.8*	0411	0.5	1108	1.8	1842	0.2
22	0022	1.0	0533	0.5	1203	1.7	1914	0.2
23	0104	1.2	0634	0.5	1248	1.7	1943	0.1
24	0144	1.4	0738	0.4	1327	1.6	2008	0.1
25	0218	1.5	0827	0.4	1402	1.5	2030	0.1
26	0249	1.7	0911	0.4	1434	1.3	2053	0.1
27	0320	1.7	0953	0.4	1503	1.2	2112	0.1
28	0350	1.8	1038	0.4	1535	1.1	2136	0.1
29	0422	1.8	1124	0.5	1603	0.9	2158	0.2
30	0457	1.8	1210	0.5	1639	0.8	2223	0.2
31	0535	1.8	1309	0.5	1717	0.7	2249	0.3

* -- TIDE OCCURS ON PREVIOUS DATE.

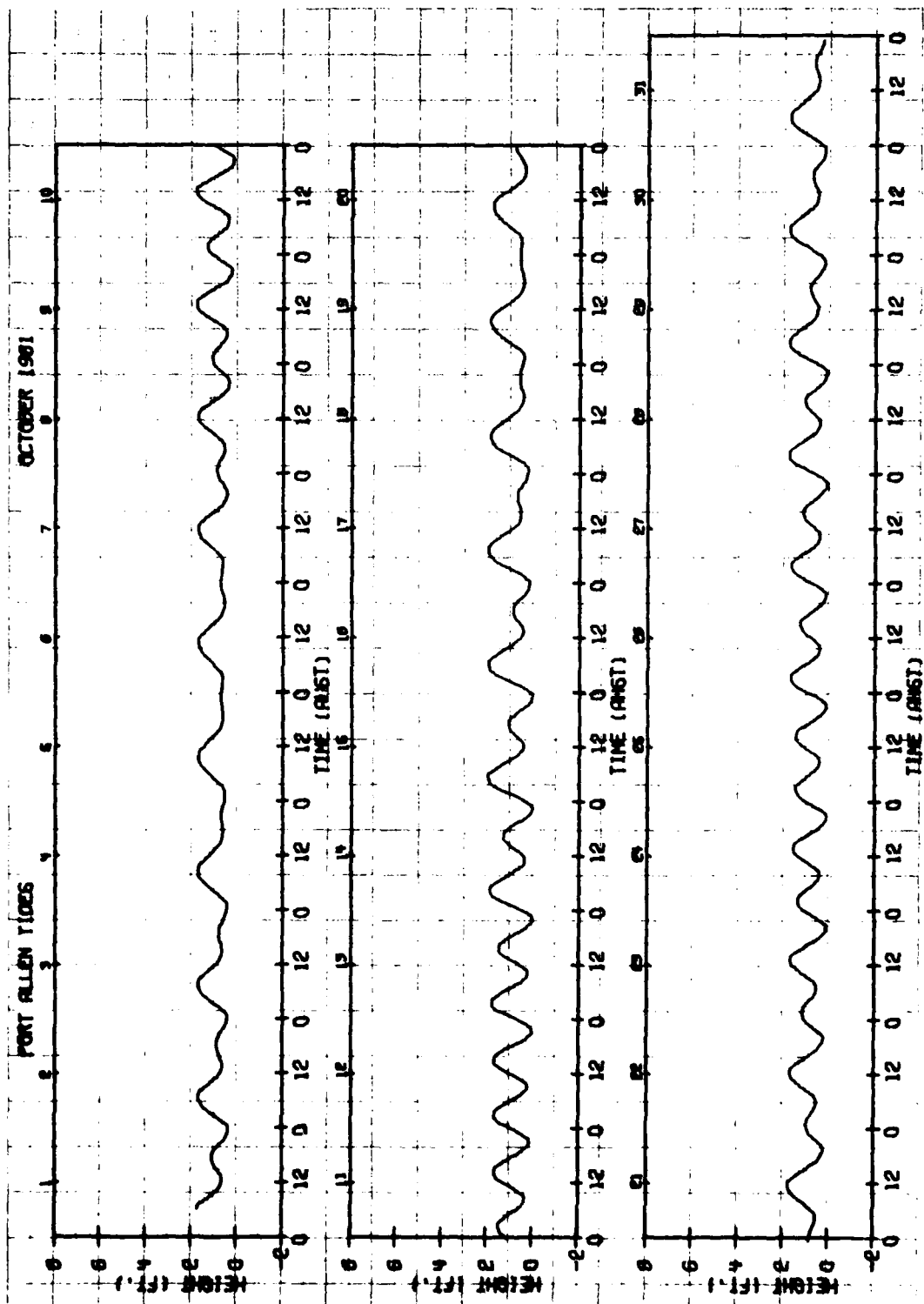


TABLE 39
 POINT ALLEN TIDES
 21 DEG 54 MIN N° 159 DEG 35 MIN W - HANAPEPE HAY NOVEMBER 1981

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0618	1.8	1414	0.5	1809	0.6	2324	0.4
2	0710	1.7	1527	0.5	1937	0.6	----	----
3	0009	0.5	0809	1.7	1633	0.4	2131	0.6
4	0125	0.6	0912	1.7	1717	0.3	2253	0.7
5	0311	0.6	1015	1.7	1752	0.2	----	----
6	2346	0.9*	0447	0.6	1110	1.7	1824	0.1
7	0026	1.2	0604	0.5	1159	1.6	1853	0.0
8	0107	1.5	0709	0.5	1245	1.5	1924	-0.1
9	0147	1.7	0807	0.4	1330	1.4	1955	-0.1
10	0227	1.9	0903	0.3	1412	1.2	2027	-0.2
11	0309	2.1	1001	0.2	1455	1.1	2100	-0.2
12	0351	2.2	1057	0.2	1540	0.9	2135	-0.2
13	0437	2.3	1156	0.2	1628	0.8	2211	-0.1
14	0526	2.2	1302	0.2	1724	0.6	2252	0.0
15	0618	2.1	1411	0.2	1833	0.6	----	----
16	2338	0.2*	0715	2.0	1920	0.2	2008	0.6
17	0036	0.4	0813	1.8	1623	0.2	2151	0.6
18	0202	0.5	0916	1.7	1711	0.1	2311	0.8
19	0349	0.6	1018	1.6	1750	0.1	----	----
20	0010	1.1	0522	0.6	1114	1.5	1824	0.1
21	0051	1.3	0641	0.6	1203	1.3	1852	0.0
22	0127	1.5	0741	0.6	1248	1.2	1919	0.0
23	0158	1.7	0834	0.5	1323	1.1	1943	0.0
24	0231	1.7	0920	0.4	1359	1.0	2007	0.0
25	0303	1.8	1002	0.4	1434	0.9	2032	0.0
26	0334	1.9	1044	0.4	1509	0.8	2057	0.0
27	0403	1.9	1126	0.3	1541	0.7	2122	0.0
28	0438	1.9	1214	0.3	1617	0.6	2148	0.1
29	0513	1.9	1300	0.3	1703	0.6	2220	0.2
30	0549	1.9	1349	0.3	1758	0.6	2252	0.3

* -- TIDE OCCURS ON PREVIOUS DATE.

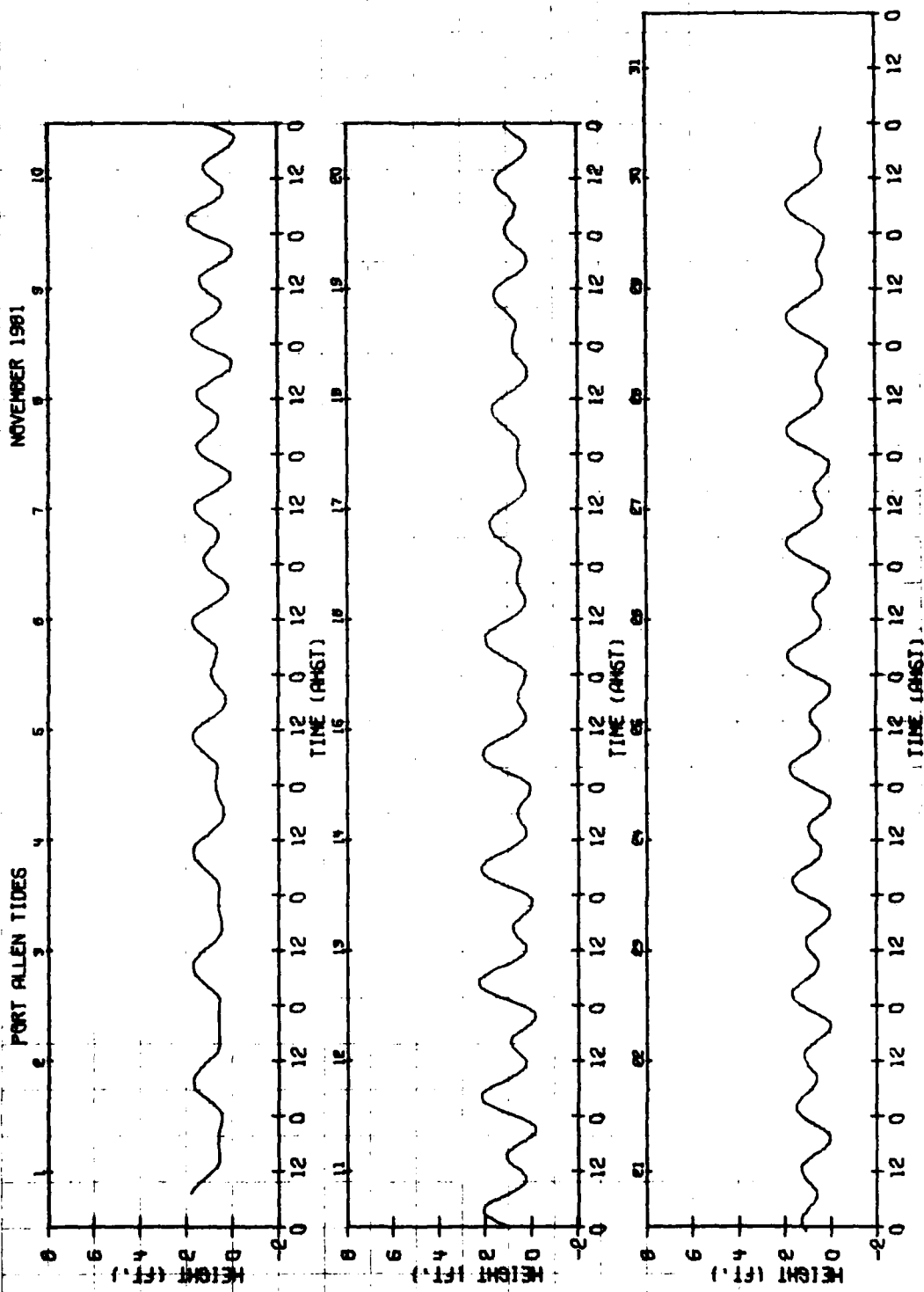


TABLE 40

PORT ALLEN TIDES

DECEMBER 1961

21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPPE HAY

DATE	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT	TIME AMST	HGT FT
1	0631	1.4	1440	0.3	1918	0.6	----	---
2	2340	0.4*	0720	1.7	1530	0.2	2052	0.6
3	0046	0.5	0816	1.7	1614	0.2	2215	0.6
4	0232	0.6	0912	1.6	1654	0.1	2314	1.0
5	0422	0.6	1012	1.4	1728	0.0	----	---
6	0006	1.3	0556	0.6	1110	1.3	1804	-0.1
7	0047	1.6	0709	0.5	1202	1.1	1839	-0.2
8	0130	1.8	0815	0.4	1258	1.0	1914	-0.3
9	0215	2.1	0914	0.3	1347	0.9	1953	-0.3
10	0257	2.2	1010	0.2	1439	0.8	2031	-0.3
11	0339	2.3	1102	0.1	1528	0.7	2112	-0.3
12	0425	2.4	1154	0.1	1620	0.6	2150	-0.2
13	0510	2.3	1247	0.1	1715	0.6	2233	-0.1
14	0556	2.1	1344	0.1	1820	0.6	2323	0.1
15	0643	2.0	1438	0.1	1943	0.6	----	---
16	0017	0.3	0731	1.7	1527	0.1	2116	0.7
17	0133	0.6	0825	1.6	1612	0.1	2235	0.9
18	0316	0.6	0922	1.4	1653	0.0	----	---
19	2341	1.1*	0506	0.6	1014	1.2	1727	0.0
20	0026	1.4	0639	0.6	1110	1.0	1802	0.0
21	0105	1.6	0746	0.6	1203	0.9	1832	-0.1
22	0140	1.7	0839	0.5	1252	0.8	1903	-0.1
23	0212	1.8	0924	0.4	1333	0.7	1932	-0.1
24	0246	1.9	1007	0.3	1415	0.6	2001	-0.1
25	0316	1.9	1042	0.3	1451	0.6	2033	-0.1
26	0348	2.0	1116	0.2	1530	0.6	2100	-0.1
27	0420	2.0	1155	0.2	1610	0.6	2135	0.0
28	0452	2.0	1230	0.2	1652	0.6	2208	0.1
29	0527	1.9	1310	0.2	1746	0.6	2249	0.2
30	0603	1.8	1347	0.1	1849	0.6	----	---
31	2336	0.3*	0642	1.7	1426	0.1	2003	0.7

* -- TIDE OCCURS ON PREVIOUS DATE.

APPENDIX A

HEIGHT OF THE TIDE AT ANY TIME*

The height of the tide at times intermediate to the times of high and low water is needed on occasion, and may be computed by either numerical or graphical methods. One example of each method is presented here, using the predicted tides for a day at Point Mugu.

Problem: Given that the predicted times and heights of the tides are:

Time	Height	Time	Height	Time	Height	Time	Height
0039	4.9	0814	0.2	1510	3.1	1933	2.4

Find the height of the tide at 0300.

Numerical Method

The duration of fall is $08^h 14^m - 00^h 39^m = 7^h 35^m$.

The time after high water for which the height is required is $03^h 00^m - 00^h 39^m = 02^h 21^m$.

The range of tide is $4.9 - 0.2 = 4.7$ feet.

Entering table A-1 at the duration of fall of $7^h 40^m$, which is the nearest value to $7^h 35^m$, the nearest value on the horizontal line to $2^h 21^m$ is $2^h 18^m$ after high water. Following down this column to its intersection with a range of 4.5 feet which is the nearest tabular value to 4.7 feet, one obtains 0.9 which, being calculated from high water, must be subtracted from it. The approximate height at $03^h 00^m$ is, therefore, $4.9 - 0.9 = 4.0$ feet.

When the duration of rise or fall is greater than $10^h 40^m$, enter the table with one-half the given duration and with one-half the time from the nearest high or low water; but if the duration of rise or fall is less than 4 hours, enter the table with double the given duration and with double the time from the nearest high or low water.

*This information is adapted from table 3 of the data source for this publication (see page 1).

Table A-1. Height of the Tide at Any Time

Duration of rise or fall, see footnote.	Time from the nearest high water or low water															
	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.
4 00	0 08	0 16	0 24	0 32	0 40	0 48	0 56	1 04	1 12	1 20	1 28	1 36	1 44	1 52	2 00	
4 20	0 09	0 17	0 26	0 35	0 43	0 52	1 01	1 09	1 18	1 27	1 35	1 44	1 53	2 01	2 10	
4 40	0 09	0 19	0 28	0 37	0 47	0 56	1 05	1 15	1 24	1 33	1 43	1 52	2 01	2 11	2 20	
5 00	0 10	0 20	0 30	0 40	0 50	1 00	1 10	1 20	1 30	1 40	1 50	2 00	2 10	2 20	2 30	
5 20	0 11	0 21	0 32	0 43	0 53	1 04	1 15	1 25	1 36	1 47	1 57	2 08	2 19	2 29	2 40	
5 40	0 11	0 23	0 34	0 45	0 57	1 08	1 19	1 31	1 42	1 53	2 05	2 16	2 27	2 39	2 50	
6 00	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2 00	2 12	2 24	2 36	2 48	3 00	
6 20	0 13	0 25	0 38	0 51	1 03	1 16	1 29	1 41	1 54	2 07	2 19	2 32	2 45	2 57	3 10	
6 40	0 13	0 27	0 40	0 53	1 07	1 20	1 33	1 47	2 00	2 13	2 27	2 40	2 53	3 07	3 20	
7 00	0 14	0 28	0 42	0 56	1 10	1 24	1 38	1 52	2 06	2 20	2 34	2 48	3 02	3 16	3 30	
7 20	0 15	0 29	0 44	0 59	1 13	1 28	1 43	1 57	2 12	2 27	2 41	2 56	3 11	3 25	3 40	
7 40	0 15	0 31	0 46	1 01	1 17	1 32	1 47	2 03	2 18	2 33	2 49	3 04	3 19	3 35	3 50	
8 00	0 16	0 32	0 48	1 04	1 20	1 36	1 52	2 08	2 24	2 40	2 56	3 12	3 28	3 44	4 00	
8 20	0 17	0 33	0 50	1 07	1 23	1 40	1 57	2 13	2 30	2 47	3 03	3 20	3 37	3 53	4 10	
8 40	0 17	0 35	0 52	1 09	1 27	1 44	2 01	2 19	2 36	2 53	3 11	3 28	3 45	4 03	4 20	
9 00	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3 00	3 18	3 36	3 54	4 12	4 30	
9 20	0 19	0 37	0 56	1 15	1 33	1 52	2 11	2 29	2 48	3 07	3 25	3 44	4 03	4 21	4 40	
9 40	0 19	0 39	0 58	1 17	1 37	1 56	2 15	2 35	2 54	3 13	3 33	3 52	4 11	4 31	4 50	
10 00	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4 00	4 20	4 40	5 00	
10 20	0 21	0 41	1 02	1 23	1 43	2 04	2 25	2 45	3 06	3 27	3 47	4 08	4 29	4 49	5 10	
10 40	0 21	0 43	1 04	1 25	1 47	2 08	2 29	2 51	3 12	3 33	3 55	4 16	4 37	4 59	5 20	

Range of tide, see footnote.	Correction to height															
	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.	Fl.
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
1.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5
1.5	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8
2.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.0
2.5	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.1	1.2
3.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.2	1.3	1.3	1.5
3.5	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.4	1.6	1.8	1.8
4.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.0
4.5	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.3	1.6	1.8	2.0	2.2	2.2
5.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.5
5.5	0.0	0.1	0.1	0.2	0.4	0.5	0.7	0.9	1.1	1.4	1.6	1.9	2.2	2.5	2.8	2.8
6.0	0.0	0.1	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.0
6.5	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.1	1.3	1.6	1.9	2.2	2.6	2.9	3.2	3.2
7.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.5
7.5	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.2	1.5	1.9	2.2	2.6	3.0	3.4	3.8	3.8
8.0	0.0	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.0
8.5	0.0	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.1	2.5	2.9	3.4	3.8	4.2	4.2
9.0	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.5	1.9	2.2	2.7	3.1	3.6	4.0	4.5	4.5
9.5	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.0	2.4	2.8	3.3	3.8	4.3	4.8	4.8
10.0	0.0	0.1	0.2	0.4	0.7	1.0	1.3	1.7	2.1	2.5	3.0	3.5	4.0	4.5	5.0	5.0
10.5	0.0	0.1	0.3	0.5	0.7	1.0	1.3	1.7	2.2	2.6	3.1	3.6	4.2	4.7	5.2	5.2
11.0	0.0	0.1	0.3	0.5	0.7	1.1	1.4	1.8	2.3	2.8	3.3	3.8	4.4	4.9	5.5	5.5
11.5	0.0	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	2.9	3.4	4.0	4.6	5.1	5.8	5.8
12.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.0	3.6	4.1	4.8	5.4	6.0	6.0
12.5	0.0	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.1	3.7	4.3	5.0	5.6	6.2	6.2
13.0	0.0	0.1	0.3	0.6	0.9	1.2	1.7	2.2	2.7	3.2	3.9	4.5	5.1	5.8	6.5	6.5
13.5	0.0	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.4	4.0	4.7	5.3	6.0	6.8	6.8
14.0	0.0	0.2	0.3	0.6	0.9	1.3	1.8	2.3	2.9	3.5	4.2	4.8	5.5	6.3	7.0	7.0
14.5	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.4	3.0	3.6	4.3	5.0	5.7	6.5	7.2	7.2
15.0	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.5	3.1	3.8	4.4	5.2	5.9	6.7	7.5	7.5
15.5	0.0	0.2	0.4	0.7	1.0	1.5	2.0	2.6	3.2	3.9	4.6	5.4	6.1	6.9	7.8	7.8
16.0	0.0	0.2	0.4	0.7	1.1	1.5	2.1	2.6	3.3	4.0	4.7	5.5	6.3	7.2	8.0	8.0
16.5	0.0	0.2	0.4	0.7	1.1	1.6	2.1	2.7	3.4	4.1	4.9	5.7	6.5	7.4	8.2	8.2
17.0	0.0	0.2	0.4	0.7	1.1	1.6	2.2	2.8	3.5	4.2	5.0	5.9	6.7	7.6	8.5	8.5
17.5	0.0	0.2	0.4	0.8	1.2	1.7	2.2	2.9	3.6	4.4	5.2	6.0	6.9	7.8	8.8	8.8
18.0	0.0	0.2	0.4	0.8	1.2	1.7	2.3	3.0	3.7	4.5	5.3	6.2	7.1	8.1	9.0	9.0
18.5	0.1	0.2	0.5	0.8	1.2	1.8	2.4	3.1	3.8	4.6	5.5	6.4	7.3	8.3	9.2	9.2
19.0	0.1	0.2	0.5	0.8	1.3	1.8	2.4	3.1	3.9	4.8	5.6	6.6	7.5	8.5	9.5	9.5
19.5	0.1	0.2	0.5	0.8	1.3	1.9	2.5	3.2	4.0	4.9	5.8	6.7	7.7	8.7	9.8	9.8
20.0	0.1	0.2	0.5	0.9	1.3	1.9	2.6	3.3	4.1	5.0	5.9	6.9	7.9	9.0	10.0	10.0

Obtain from the predictions the high water and low water, one of which is before and the other after the time for which the height is required. The difference between the times of occurrence of these tides is the duration of rise or fall, and the difference between their heights is the range of tide for the above table. Find the difference between the nearest high or low water and the time for which the height is required.

Enter the table with the duration of rise or fall, printed in heavy-faced type, which most nearly agrees with the actual value, and on that horizontal line find the time from the nearest high or low water which agrees most nearly with the corresponding actual difference. The correction sought is in the column directly below, on the line with the range of tide.

When the nearest tide is high water, subtract the correction.

When the nearest tide is low water, add the correction.

Graphical Method

If the height of the tide is required for a number of times on a certain day the full tide curve for the day may be obtained by the *one-quarter, one-tenth rule*. The procedure is as follows:

1. On cross-section paper plot the high and low water points in the order of their occurrence for the day, measuring time horizontally and height vertically. These are the basic points for the curve.
2. Draw light straight lines connecting the points representing successive high and low waters.
3. Divide each of these straight lines into four equal parts. The halfway point of each line gives another point for the curve.
4. At the quarter point adjacent to high water, draw a vertical line above the point, and at the quarter point adjacent to low water, draw a vertical line below the point, making the length of these lines equal to one-tenth of the range between the high and low waters used. The points marking the ends of these vertical lines give two additional intermediate points for the curve.
5. Draw a smooth curve through the points of high and low waters and the intermediate points, making the curve well rounded near high and low waters. This curve will approximate the actual tide curve and heights for any time of the day may be readily scaled from it. The resulting graph is shown in figure A-1.

CAUTION

Both methods presented are based on the assumption that the rise and fall conform to simple cosine curves. Therefore the heights obtained will be approximate. The roughness of approximation will vary as the tide curve differs from a cosine curve.

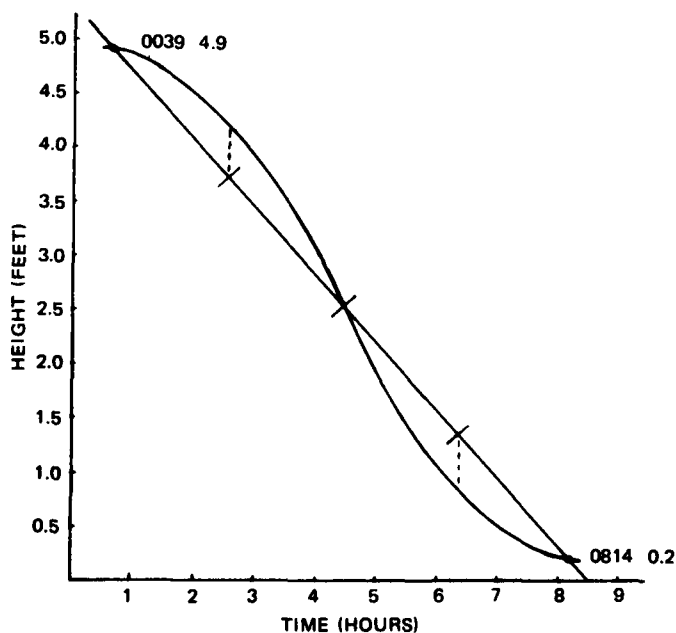


Figure A-1. Tidal Curve for Solution of the Problem.

APPENDIX B

EQUINOXES, SOLSTICES, AND LUNAR PHASES DURING 1981

The dates and times for Vernal and Autumnal Equinoxes and Summer and Winter Solstices during 1981 are listed in table B-1. The 1981 dates and times for phases of the moon are given in table B-2. Both tables have been calculated for Point Mugu and San Nicolas Island. Two hours must be subtracted for times in the Barking Sands area.

Table B-1. Equinoxes and Solstices, 1981, Point Mugu and San Nicolas Island

NOTE: All times are Pacific Standard Time; add 1 hour when Daylight Savings Time (PDT) is in effect. Subtract 2 hours for Barking Sands area.

Vernal Equinox	20 March, 0903 PST	Beginning of Spring; day and night of equal length.
Summer Solstice	21 June, 0345 PST	Beginning of Summer; greatest duration of daylight.
Autumnal Equinox	22 September, 1905 PST	Beginning of Autumn; day and night of equal length.
Winter Solstice	21 December, 1451 PST	Beginning of Winter; greatest duration of darkness.

Table B-2. Lunar Phases, 1981, Point Mugu and San Nicolas Island

NOTE: All times are Pacific Standard Time; add 1 hour when Daylight Savings Time (PDT) is in effect. Subtract 2 hours for times in the Barking Sands area.

Phase	January		February		March		April	
	Date	Time	Date	Time	Date	Time	Date	Time
New Moon	05	2324	04	1414	06	0231	04	1219
First Quarter	13	0210	11	0949	12	1750	11	0311
Full Moon	19	2339	18	1458	20	0722	18	2359
Last Quarter	27	2019	26	1714	28	1134	27	0214
Phase	May		June		July		August	
	Date	Time	Date	Time	Date	Time	Date	Time
New Moon	04	2019	02	0332	01	1103	—	—
First Quarter	10	1422	09	0333	08	1839	08	1839
Full Moon	18	1604	17	0704	16	2039	15	0837
Last Quarter	26	1300	24	2025	24	0140	22	0616
New Moon	—	—	—	—	30	1952	29	0643
Phase	September		October		November		December	
	Date	Time	Date	Time	Date	Time	Date	Time
First Quarter	06	0526	05	2345	04	1709	04	0822
Full Moon	13	1909	13	0449	11	1426	11	0041
Last Quarter	20	1147	19	1940	18	0645	17	2147
New Moon	27	2007	27	1213	26	0638	26	0210

Because the earth's period of revolution about the sun (365.24+ days) is not evenly divisible by the moon's period of revolution about the earth (27.32+ days), the dates and times of lunar phases, moonrise and moonset, and tidal data must be recomputed for each year. The following information, however, is based on geometrical relationships and holds true for all times:

1. The New Moon rises at sunrise, crosses the meridian at noon, and sets at sunset.
2. The First Quarter Moon rises at noon, crosses the meridian at sunset, and sets at midnight.
3. The Full Moon rises at sunset, crosses the meridian at midnight, and sets at sunrise.
4. The Last Quarter Moon rises at midnight, crosses the meridian at sunrise, and sets at noon.

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