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SUMMARY OF ANNUAL WAVE POWER FOR TEN DEEP WATER STATIONS ALONG THE CALIFORNIA, OREGON & WASHINGTON COASTS

by

J. W. JOHNSON
J. T. MOORE
F. B. ORRETT

HYDRAULIC ENGINEERING LABORATORY
COLLEGE OF ENGINEERING

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13. ABSTRACT

The conclusions reached in this report are based on wave statistics for ten locations on the California, Oregon and Washington coasts, compiled in 1960 by the National Marine Consultants for the Corps of Engineers Districts. These deepwater wave statistics were compiled by hindcast procedures using meteorological records and charts from 1956 through 1958. Wave height, direction, and wave period for "sea" and "swell" were averaged monthly and annually. While sandy beaches may change as a result of changing wave conditions, rocky shorelines change very little from wave action over hundreds of years. Seasonal variations of wave power were analyzed on a monthly basis, and are graphically presented as wave power vs. period and power vs. direction.

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University of California
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Technical Report HEL-24-9

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This compilation was completed on research projects on coastal inlets (Contract DACW 72-71-C-005) and nearshore sediments (Contract 72-67-C-0015) with the Coastal Engineering Research Center, Corps of Engineers, U.S. Army.

Berkeley, California

October 1971

ERRATA

Technical Report HEL-24-9

For	Figures	A-1 to A-11,	inclusive,	multiply	swell	power	values	by	1.15
"	"	A-12 to A-22,	"	"	"	"	"	"	1.18
"	"	A-23 to A-32,	"	"	"	"	"	"	1.17
"	"	A-33 to A-42,	"	"	"	"	"	"	1.15
"	"	A-43 to A-55,	"	"	"	"	"	"	1.10
"	"	A-56 to A-66,	"	"	"	"	"	"	1.29
"	"	A-67 to A-79,	"	"	"	"	"	"	0.93
"	"	A-80 to A-90,	"	"	"	"	"	"	1.22
"	"	A-91 to A-101	"	"	"	"	"	"	1.19
"	"	A-102 to A-112	"	"	"	"	"	"	1.18
"	"	B-1 to B-10	"	"	"	"	"	"	1.51
"	"	B-11 to B-20	"	"	"	"	"	"	1.31
"	"	B-21 to B-30	"	"	"	"	"	"	1.49
"	"	B-31 to B-38	"	"	"	"	"	"	1.02
"	"	B-39 to B-48	"	"	"	"	"	"	1.02
"	"	B-49 to B-54	"	"	"	"	"	"	0.86
"	"	B-55 to B-60	"	"	"	"	"	"	0.67
"	"	B-61 to B-66	"	"	"	"	"	"	0.77
"	"	B-67 to B-73	"	"	"	"	"	"	1.13
"	"	B-74 to B-80	"	"	"	"	"	"	1.42
"	"	B-81 to B-87	"	"	"	"	"	"	1.40
"	"	B-88 to B-95	"	"	"	"	"	"	1.51

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INTRODUCTION

The most important factor in shaping a shoreline and establishing the characteristics of beaches is the intensity of the wave attack. Rocky shorelines change very little over several hundreds of years as a result of wave action. The sandy portions of a shoreline (beaches), however, may undergo changes in a matter of even a few hours as a result of changing wave conditions. Beaches which are subjected to waves from a variety of directions and of a variety of heights and periods are much more complex in both plan and profile than beaches which are affected by less variable wave conditions. Basic to an appraisal of the characteristics of shore processes in a given locality is adequate information on the wave climate.

Wave statistics for ten locations along the Pacific Coast (California, Oregon, and Washington) were compiled in 1960 by the National Marine Consultants for the Corps of Engineers*. These deep water wave statistics were compiled by the hindcast procedure using meteorological records and charts for the years 1956, 1957, and 1958. The statistics compiled were wave height, wave direction, and wave period for both "sea" and "swell" and were presented as monthly and annual averages. The locations of the ten stations are shown in Figs. 1 and 2 and are:

California Coast

Station 1	42.0° N, 125.0° W
Station 2	39.6° N, 124.5° W
Station 3	37.6° N, 123.5° W

*See references 1 and 2.

Station 4	35.5° N, 122.0° W
Station 5	34.5° N, 121.0° W
Station 6	34.2° N, 120.0° W
Station 7	33.5° N, 119.5° W

Oregon-Washington Coast

Station 1	44° 40'N, 124° 50'W
Station 2	46° 12'N, 124° 30'W
Station 3	47° 40'N, 125° 00'W

The meteorological aspects of the wave regime of the Pacific Coast, choice of hindcast years, and hindcast methods are fully explained in the reports (1,2). The statistical summaries are presented both in tabular and rose form.

The data summarized in this report pertain to deep water. To apply the data for any one of the ten stations to a nearby location at or near the shore would require, of course, a consideration of refraction and shoaling effects to arrive at the annual power acting at the inshore location.

WAVE POWER

The calculations for the wave power per foot of wave crest is based on the following relationships:

$$E = \text{Wave energy per unit width of crest} = \frac{\gamma H_o^2 L_o}{8}$$

where:

γ = Unit weight of sea water = 64 lbs/ft^3

H_o = Deep water wave height, ft.

L_o = Deep water wave length, ft.

$= gT^2/2\pi = 5.12\ T^2$

T = Wave period, sec.

g = acceleration of gravity

In deep water,

$$\text{Wave power, } P = \frac{E}{2T}$$

$$\text{or } P = \frac{(64)(5.12)\ T^2\ H_o^2}{16\ T}$$

$$P = 20.5\ H_o^2\ T = \text{ft lbs/sec/ft} \qquad (1)$$

To obtain the total power for a year would involve multiplication of power, P, by the percentage of time that a wave with a given height and period occurs by the number of seconds in a year; that is,

$$\text{Total power per year} = P(\%\text{ of time})(365.33 \times 24 \times 3600^{*})$$

$$= P(\%\text{ of time})(3.17 \times 10^{7*}) = \text{ft lbs/ft/year} \qquad (2)$$

WAVE STATISTICS

The annual wave power for the ten deep water stations along the California, Oregon, and Washington coasts were calculated, tabulated, and summarized in graphical form in laboratory reports (3,4). The proceedings involved in this compilation is illustrated as follows for one of the stations.

Table 1 shows the average annual height-period-direction frequency distribution (per cent) of sea and swell for Station 3 which is located in deep water west of San Francisco. This summary is typical of all ten stations along the Pacific Coast (Figs. 1 and 2)(3, 4). For each wave direction shown in Table 1 a tabulation of per cent of

---

*In the case of Sea the total seconds per year when the category of calm is included is 3.17 X 10^7. For Swell, where more than one wave train can exist, the total hours (or seconds) per year varies among the ten stations (for example, see footnote, Table 2, for Station 3).

time was made that wave heights of 2,4,... 16 ft. occurred for wave periods of 7,9,... 17 sec. for both sea and swell. Such data are shown in Table 2 for Statio: as derived from Table 1. The wave power in foot pounds per foot of wave crest per year for the various periods and wave heights was then calculated by Eq. 2* and tabulated. The total power for each wave period and direction was calculated, tabulated, and plotted as illustrated for the NNW direction in Fig. 3. This procedure was repeated for all nine of the directions (SSE to NNW) shown in Table 1. Figure 3 clearly illustrates the relative contribution of wave power for various periods of both sea and swell. A summary plot of annual wave power for all nine directions for sea and swell is shown by the bar graph in Fig. 4. Plots similar to Figs. 3 and 4 for all ten Pacific Coast stations are shown in Appendix A.

SEASONAL VARIATION OF WAVE POWER

The deep water data for Station 3 (California) was broken down and further analyzed on a monthly basis (5). Wave power was computed in the same manner previously described except for a change in the time constant (seconds per month used instead of seconds per year)**. The calculated results are presented on graphs of wave power vs. period for all months and directions and on bar charts for each month showing power vs. direction. These graphs are presented in Appendix B.

---

* Seconds per year for Swell was 3.7×10^7.

** For Sea, seconds per month varies with the days in the month. For Swell, the number of seconds per month depends on the average number of wave trains in existance during the three years of hindcast.

REFERENCES

1. Wave statistics for seven deep water stations along the California coast, prepared for the U. S. Army Corps of Engineers Districts, Los Angeles and San Francisco. National Marine Consultants, December 1960.

2. Wave statistics for three deep water stations along the Oregon-Washington coast, prepared for the U. S. Army Corps of Engineers Districts, Seattle and Portland. National Marine Consultants, May 1961.

3. Annual wave power, seven deep water stations along the California coast, by Jon T. Moore and Edwin B. Orrett, Univ. of Calif. Hydraulic Engineering Laboratory Report, Berkeley, August, 1971.

4. Annual wave power, three deep water stations along the Oregon-Washington coast, by Jon T. Moore and E. B. Orrett, Univ. of Calif. Hydraulic Engineering Laboratory Report, Berkeley, August, 1971.

5. Monthly wave power of sea and swell, Station 3, California Coast, by Jon T. Moore and E. B. Orrett, Univ. of Calif. Hydraulic Engineering Laboratory Report, Berkeley, August, 1971.

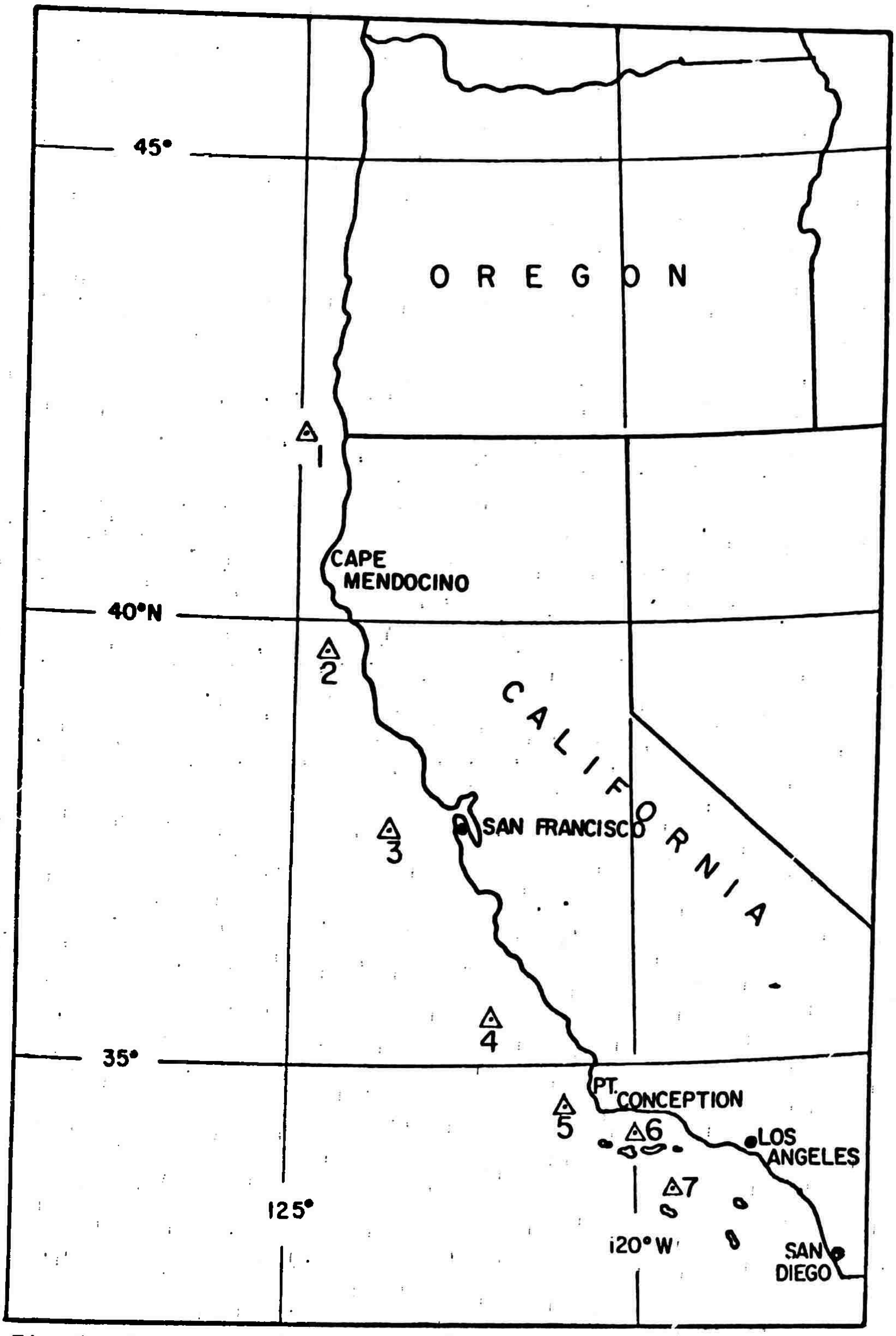

Fig. 1. Locations of hindcast stations along the California coast (From Ref. 1).

Fig. 2. Locations of hindcast stations along the Oregon and Washington coasts (From Ref. 2).

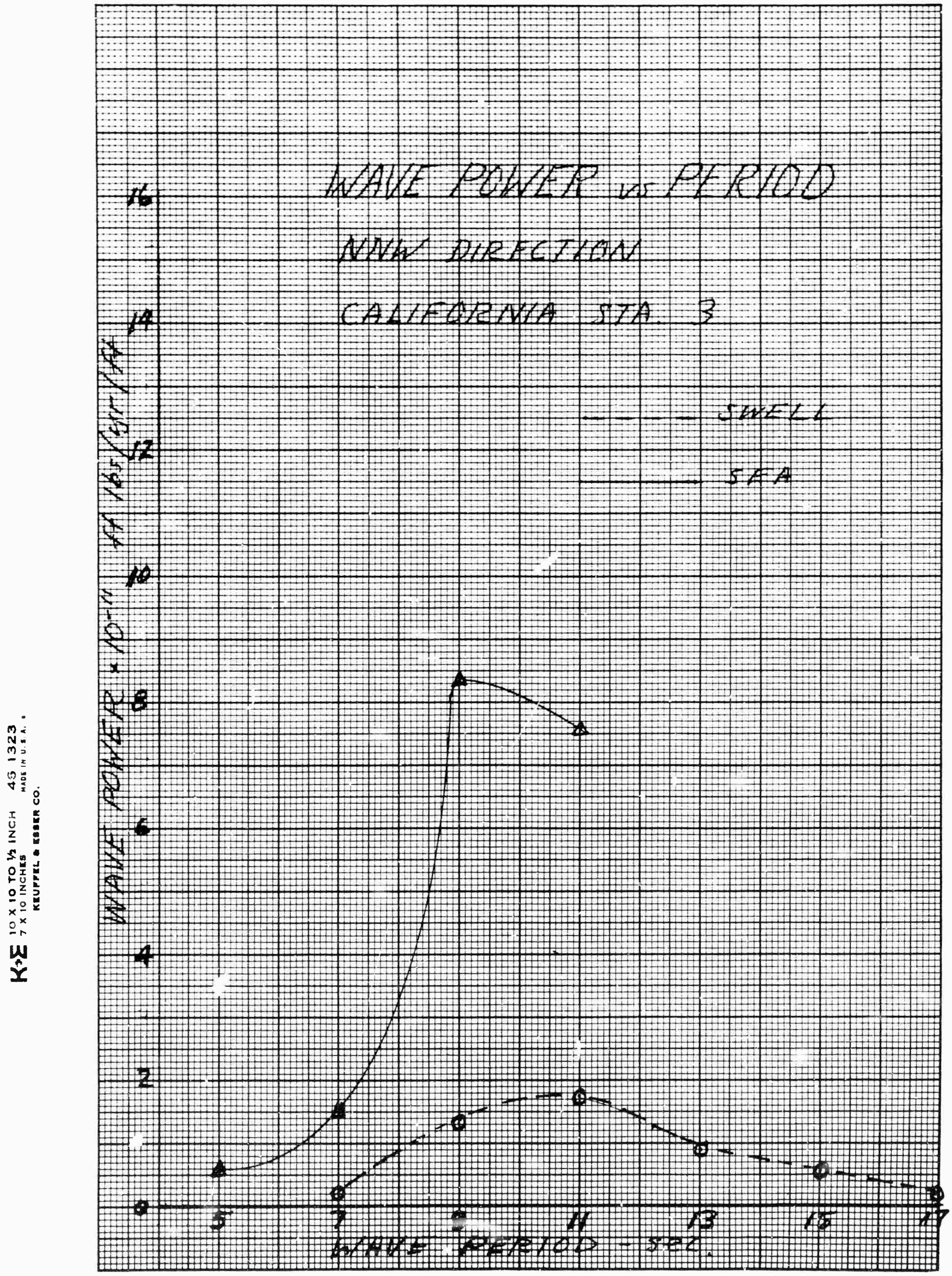
WAVE POWER vs PERIOD
NNW DIRECTION
CALIFORNIA STA. 3
SWELL
SEA
WAVE POWER × 10⁻¹¹ ft lbs/yr/ft
WAVE PERIOD - sec.
0
2
4
6
8
10
12
14
16
5
7
9
11
13
15
17

Fig. 3

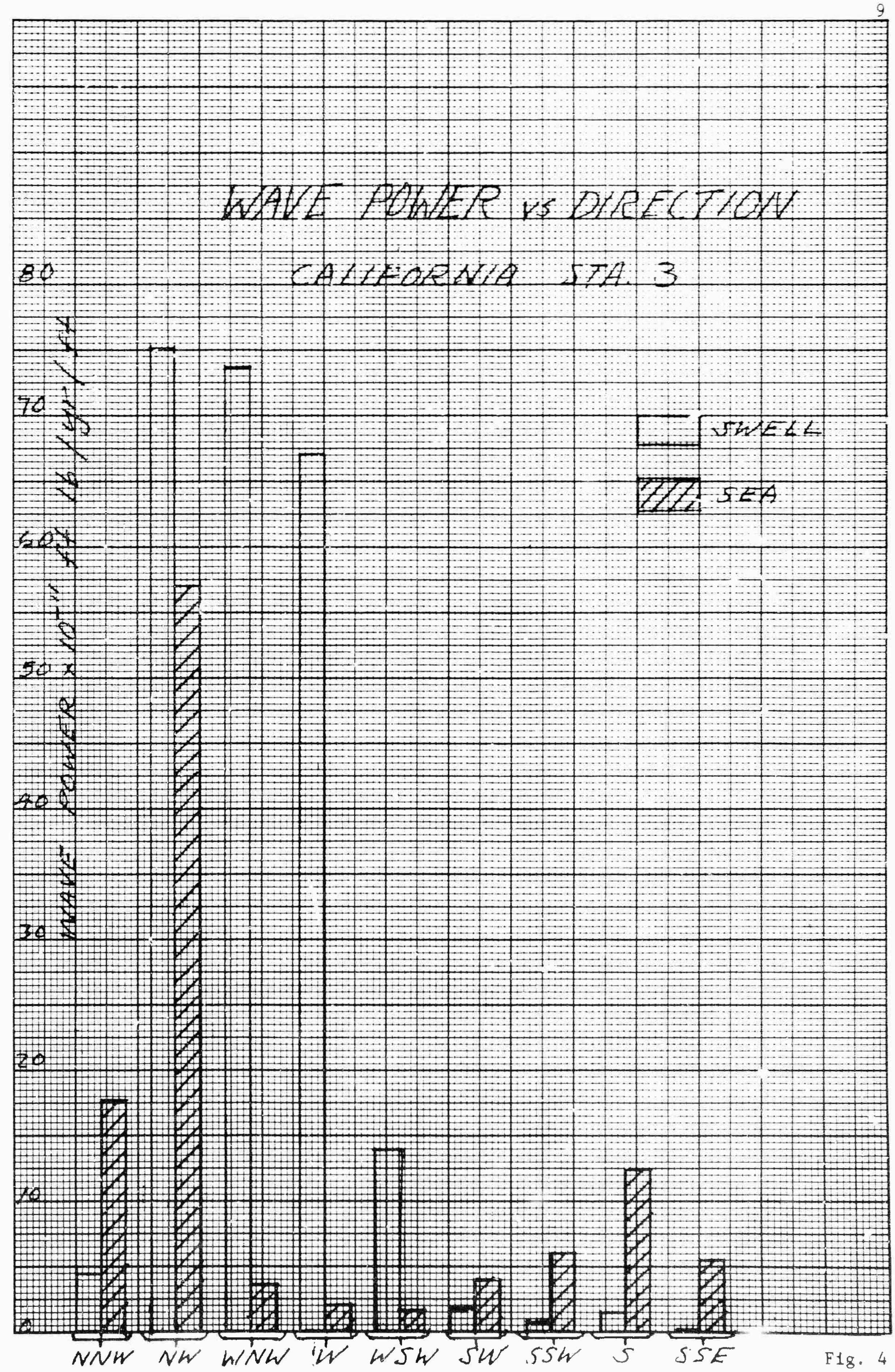

Fig. 4

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7 X 10 INCHES MADE IN U.S.A.
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TABLE 1

AVERAGE Annual HEIGHT-PERIOD-DIRECTION FREQUENCY DISTRIBUTION (PERCENT)[1] STATION 3 (1956,1957,1958)

SWELL AVERAGE TOTAL HOURS [illegible]

DIR.	NNW							NW							WNW							W							WSW							SW							SSW							S							SSE							Σ
T_s / H_s	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	6-8	8-10	10-12	12-14	14-16	16-18	18+	
1-2.9	43	96	.17	13	.02	05		276	968	84	133	82	.04	.02	292	695	214	.22	.81	33	25	153	296	219	102	41	10	.02	64	.86	.51	.12	.10			.09	.94	.23					.02							02	04	04							04	02	02			5203
3-4.9	12	.49	29	16	07	05		159	584	275	129	45	20	02	.41	498	316	169	89	12	07	140	273	182	53	35	.10	02	46	.57	29	.17				.01	.09						07	16						12	07	11	02					02						3541
5-6.9		.16	12	.12	.02			07	220	149	57	27	14		07	193	220	107	61	23	05	.23	175	110	50	36	.13		.05	.43	.17	07					.12	.02	.05					05			02			05	02			02										1653
7-8.9		02	07	02					43	90	32	.22	07			42	114	.62	23	04		.02	44	55	.48	.14				.14	.12	.05					.02	.05	.02						02	02					01		02											6 71
9-10.9			.07						07	.49	24	21	.05			39	32	.27	.09				.12	38	.18	.05				.02	10	04		.02			.05														02	05												284
11-12.9									02	17	24	.07	07				.18	09	02	05			.10	42	.12	07	02			.05	.12	02																																183
13-14.9										.10	.25	.07					05	09	07					05	.10	02					.02																																	82
15-16.9											.02	02						07	04					13	.02						02	02		02																														36
17-18.9											07						.02							.05	.05	.02						02	02																															25
19-20.9																				.02					.05	.02	.02					.02																																13
21-22.9																																																																
23-24.9																									05	.02	.02																																					09
25-26.9																																																																
27 +																																																																
Σ	.55	1.63	.72	.43	.18	.10		442	1823	1421	433	213	.60	04	1446	1435	980	507	279	146	37	318	810	669	310	146	.39	04	115	207	157	.54	12	.04		.16	1.22	.30	.01				09	21	02	.02	.02			19	22	20	.04	02				02	04	02	02			11700

SEA

DIR.	N					NNW					NW					WNW					W					WSW					SW					SSW					S					SSE					OFFSHORE	CALM[2]	Σ
T_s / H_s	4-6	6-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12+	4-6	5-8	8-10	10-12	12+	4-6	6-8	8-10	10-12	12	4-6	6-8	8-10	10-12	12+			
1-2.9	.02					218	.09				117	52	.02			198	.02				266	12				.53					214	05				18					199					105							2472
3-4.9	.02	02				.58	239	05			199	124	23			.58	159	10			66	.85				17	42	02			40	129	.05			15	36				35	125	10			.11	62	.07					2649
5-6.9		02					79	33				317	104			07	37	02				14	.02				.09					12	07	02			.14	02				33	05				24						7.03
7-8.9								151				.09	571				.05	28					20					.16				.02	.32				04	21					88				18	27	02				994
9-10.9								34	.17				122	13			02																.02					.09	02				10	02				17					227
11-12.9								.02	45				09	26														.07					02					09	05				14	12					02				129
13-14.9														45																				05					.14				05	16				02	07				64
15-16.9									.09					14																									05				02	02					.07				54
17-18.9																																												.02									02
19 +																																																					
																																																			94	26 30	2724
Σ	04	04				276	327	222	.71		1316	1598	834	68		263	200	40			332	111	.22			70	51	25			254	148	48	01		33	54	.37	.26		234	136	134	34		116	104	53	.15		94	26 30	10000

1 Based on 365-1/3 Days

2 Includes waves of 0 to 0.9 feet

TABLE 2. ANNUAL WAVE POWER: SEA AND SWELL
CALIF. STA. 3, NNW

T (sec)	H_o = 2' % time	H_o = 2' sec/year $\times 10^{-7}$	H_o = 2' P	H_o = 4' % time	H_o = 4' sec/year $\times10^{-7}$	H_o = 4' P	H_o = 6' % time	H_o = 6' sec/yr $\times 10^{-7}$	H_o = 6' P	H_o = 8' % time	H_o = 8' sec/yr $\times 10^{-7}$	H_o = 8' P	H_o = 10' % time	H_o = 10' sec/year $\times 10^{-7}$	H_o = 10' P	H_o = 12' % time	H_o = 12' sec/yr $\times 10^{-7}$	H_o = 12' P	H_o = 18' % time	H_o = 18' sec/yr $\times 10^{-7}$	H_o = 18' P	ΣP
SWELL*																						
7	.43	1.60	0.91×10^{10}	.12	0.45	1.04×10^{10}																1.94×10^{10}
9	.96	3.56	2.62×10^{10}	.49	1.82	5.50×10^{10}	.16	0.59	3.96×10^{10}	.02	0.074	0.89×10^{10}	.07	0.26	5.90×10^{10}							13.00
11	.17	0.63	5.72×10^{9}	.29	1.08	3.89×10^{10}	.12	0.45	3.63×10^{10}	.07	0.26	3.78×10^{10}										17.75
13	.13	0.48	5.16×10^{9}	.16	0.59	2.54×10^{10}	.12	0.45	4.28×10^{10}	.02	0.074	1.26×10^{10}										8.80
15	.02	0.074	0.91×10^{9}	.07	0.26	1.29×10^{10}	.09	0.33	3.71×10^{10}													5.10
17	.05	0.185	2.80×10^{9}	.05	0.18	1.04×10^{10}																1.29
18+																						$\sum_{T=7}^{17} P_{swell} = 47.98 \times 10^{10}$ ft-lb/yr/ft
SEA**																						
5	2.18	6.91	2.84×10^{10}	.58	1.84	3.02×10^{10}																3.86×10^{10}
7	.09	.285	1.64×10^{9}	2.39	7.58	1.74×10^{10}	.79	2.51	1.3×10^{10}													14.90
9				.05	.1585	4.68×10^{9}	.33	1.045	$.70\times10^{11}$	1.51	4.78	5.60×10^{11}	.31	.963	1.92×10^{11}	.02	.0635	1.70×10^{10}				93.37
11													.17	.539	1.22×10^{11}	.48	1.425	4.65×10^{11}	.09	.285	1.98×10^{11}	75.30
12+																						$\sum_{T=5}^{11} P_{sea} = 1.79 \times 10^{12}$ ft-lb/yr/ft

* For Swell, the total number of seconds per year is 10,258.56 × 3600 = 3.7×10^7.

**For Sea, the total number of seconds per year is 365.33 × 24 × 3600 = 3.17×10^7.

APPENDIX A

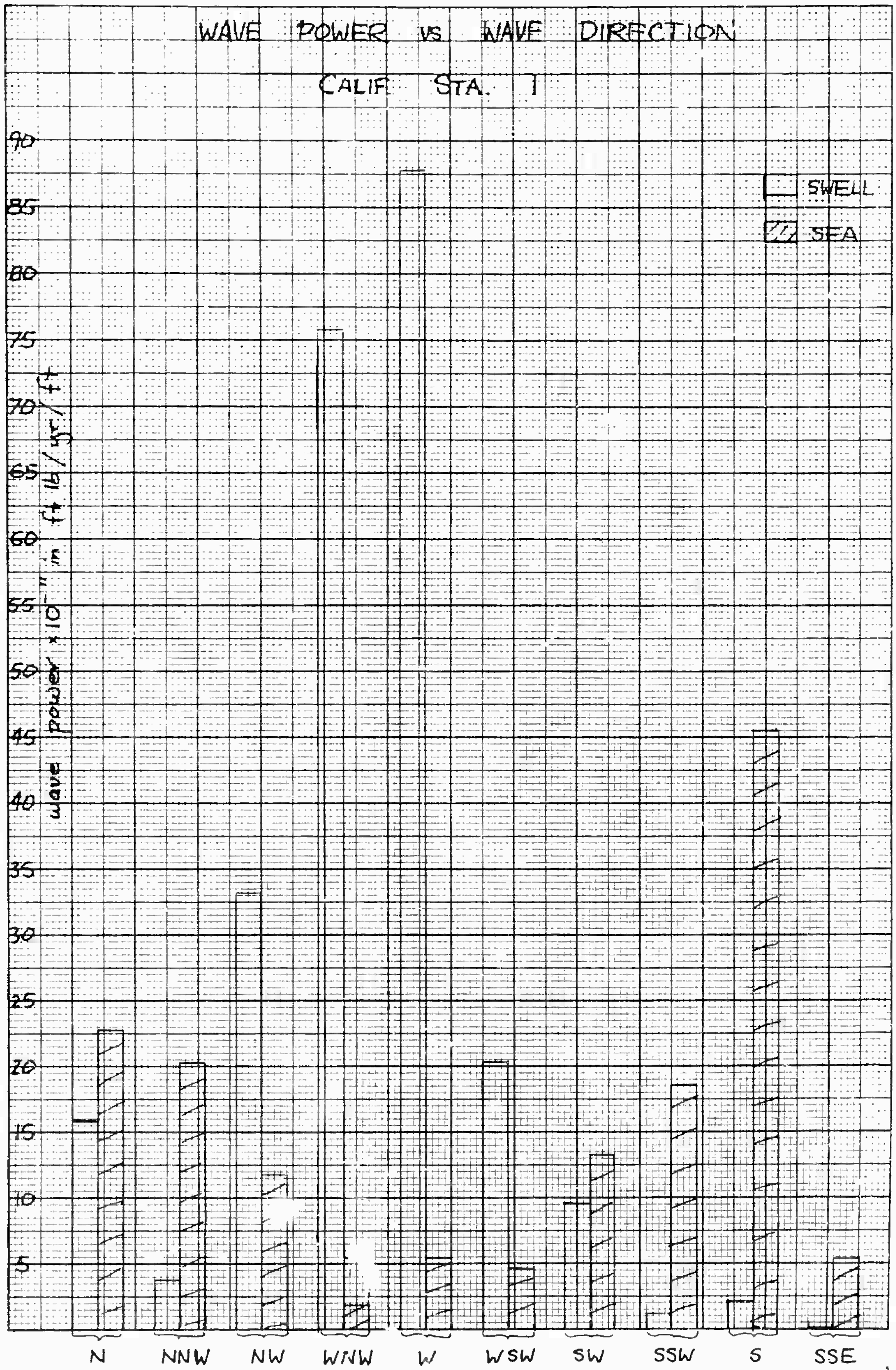
GRAPHS OF WAVE POWER FOR

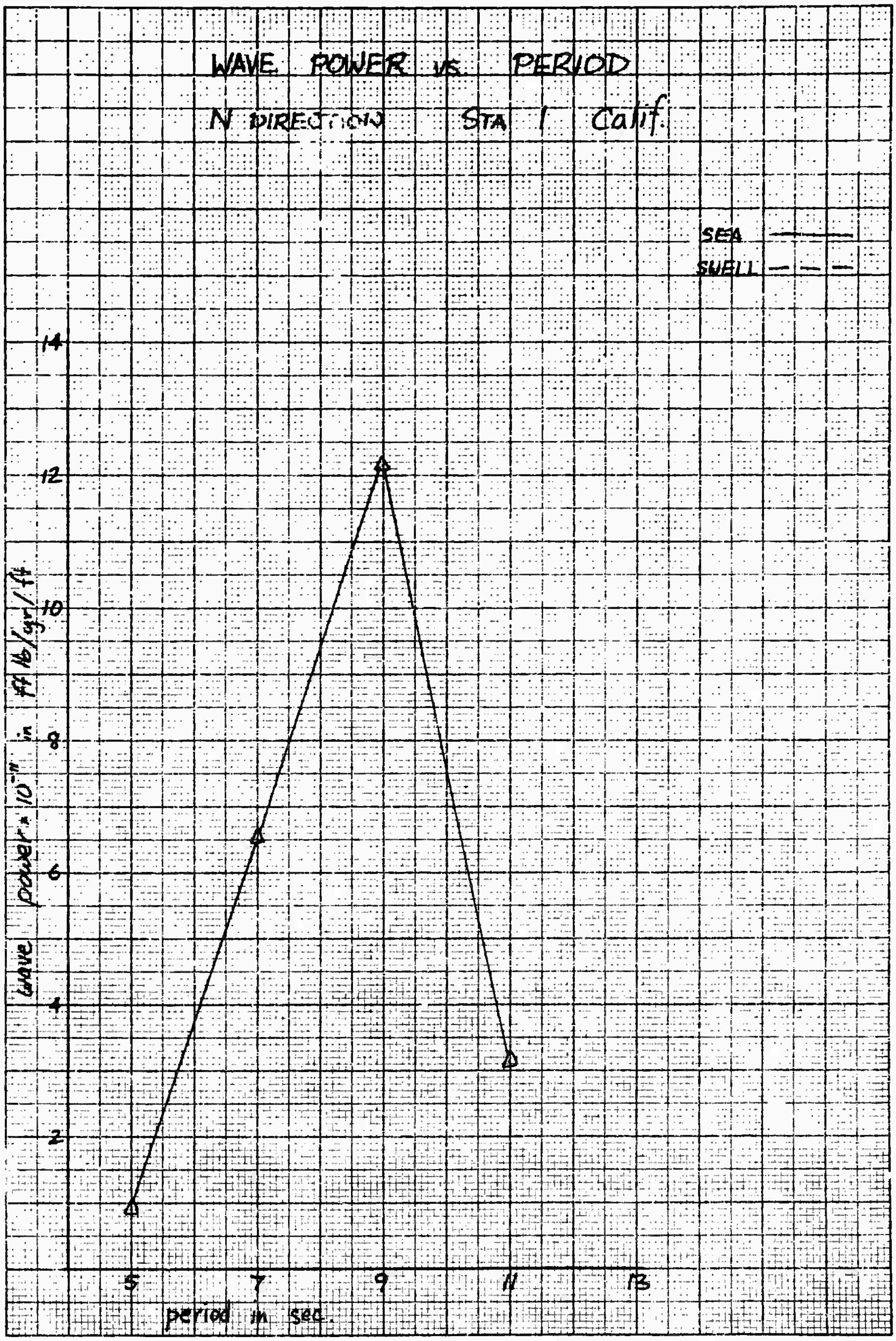
TEN DEEP WATER STATIONS

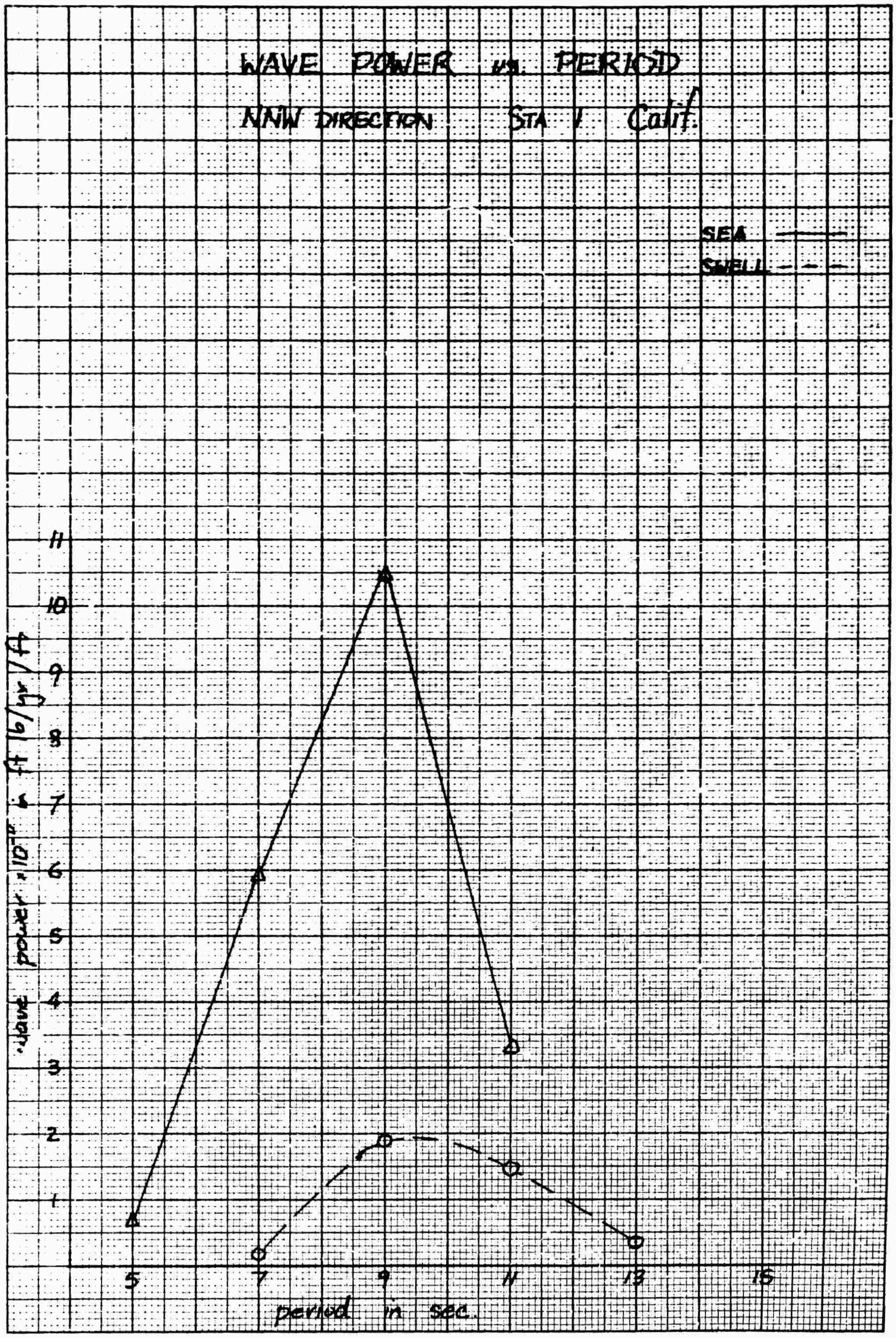
CALIFORNIA, OREGON AND WASHINGTON COASTS

STATION 1 - CALIFORNIA COAST

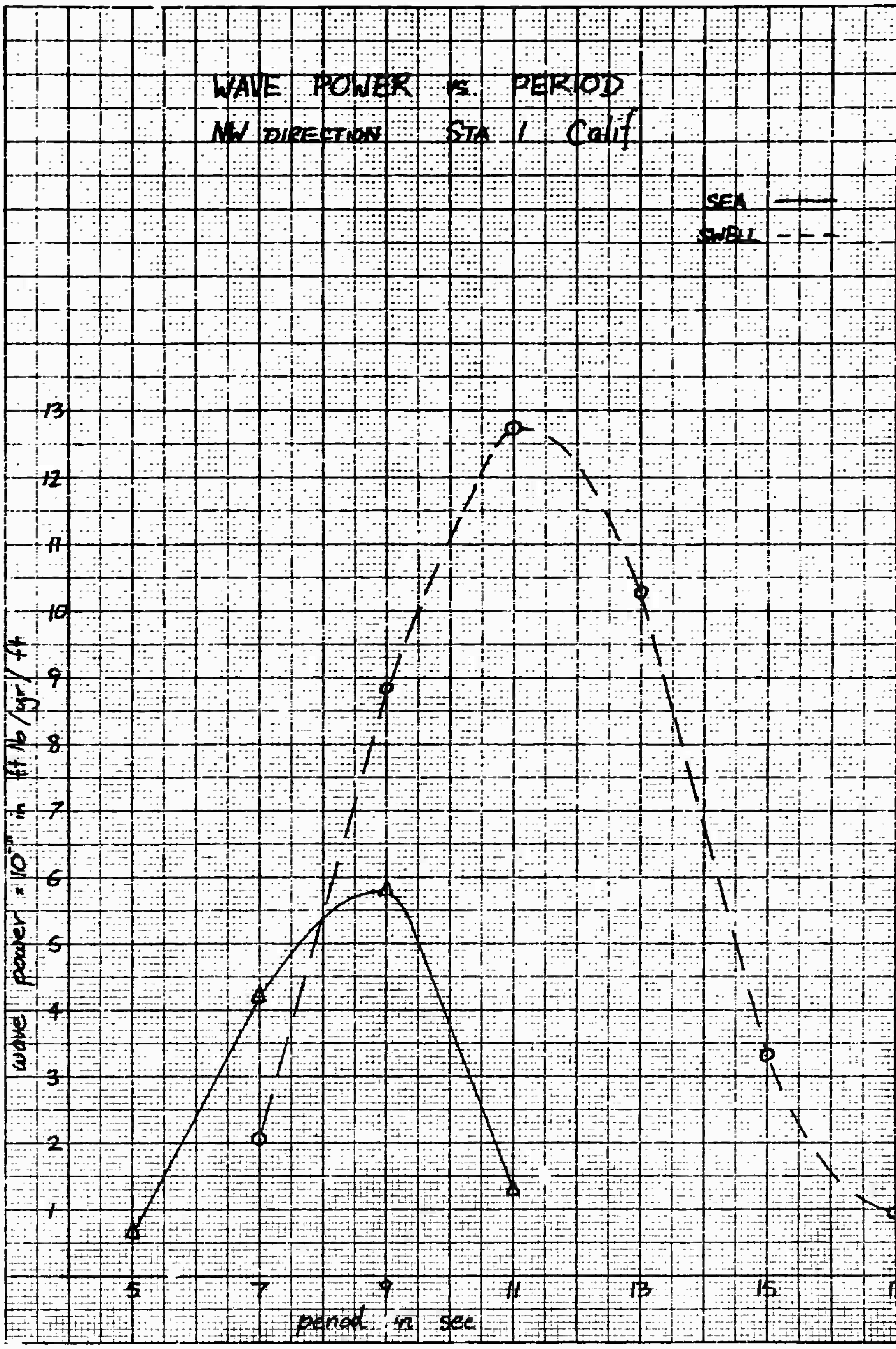
Lat. 42.0°N, Long. 125.0°W


WAVE POWER vs WAVE DIRECTION
CALIF STA. 1
SWELL
SEA
wave power × 10⁻⁷ in ft lb/yr/ft
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE

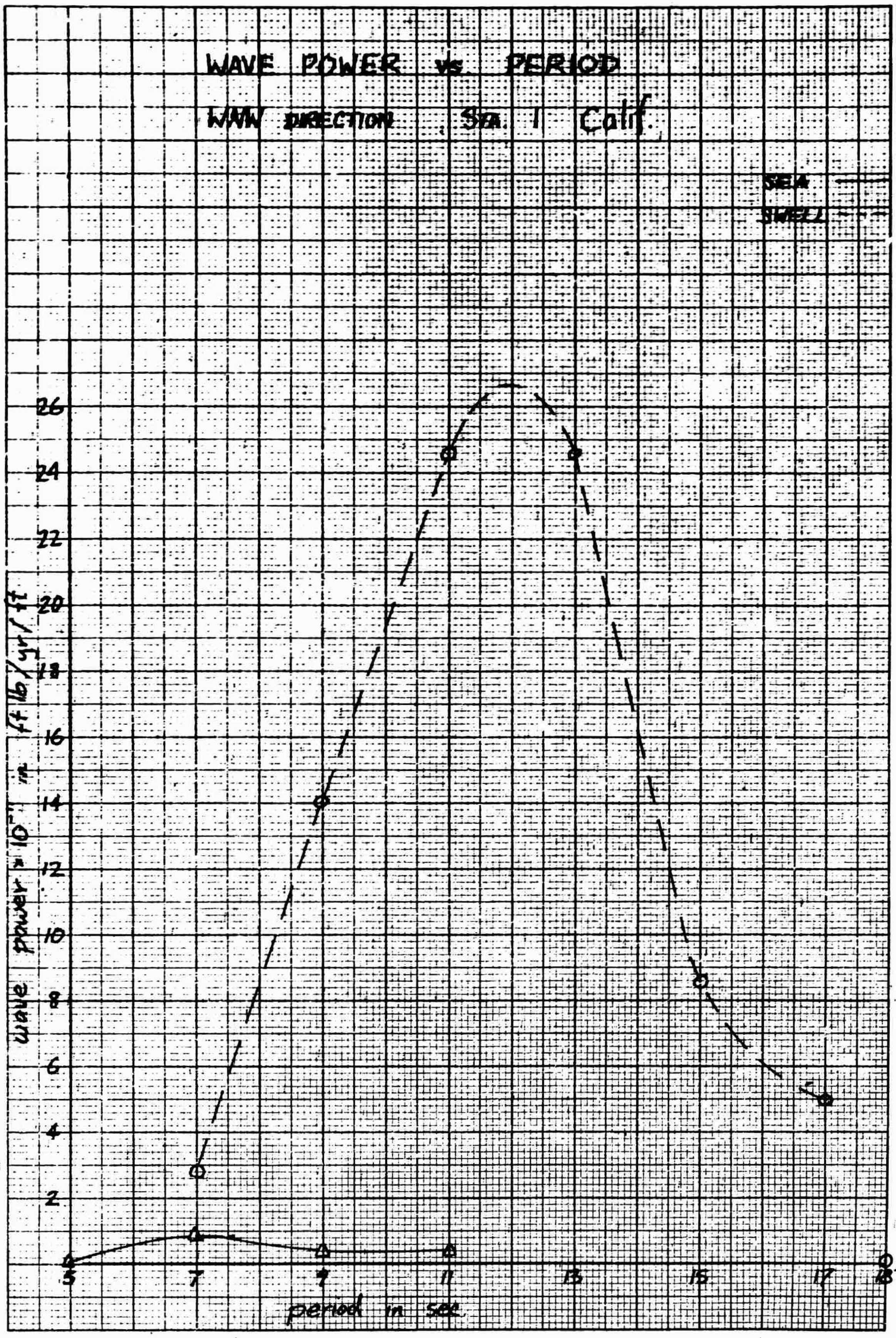

WAVE POWER vs. PERIOD
N DIRECTION STA 1 Calif.
SEA
SWELL
14
12
10
8
6
4
2
wave power x 10⁻¹¹ in ft lb/yr/ft
5
7
9
11
13
period in sec.
K+E 10 X 10 TO 1/2 INCH 46 1323

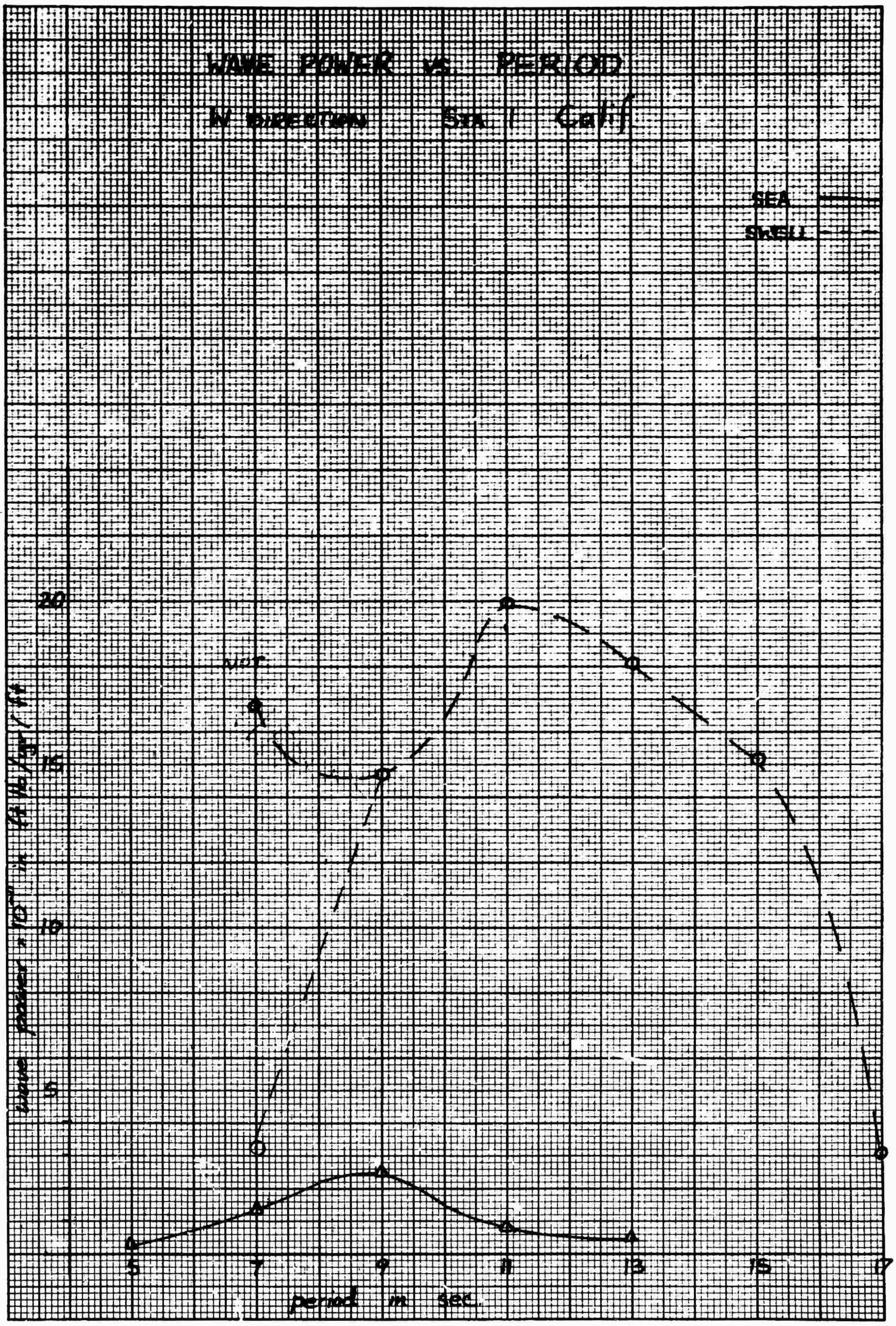


K&E 10 X 10 TO ½ INCH 46 1323

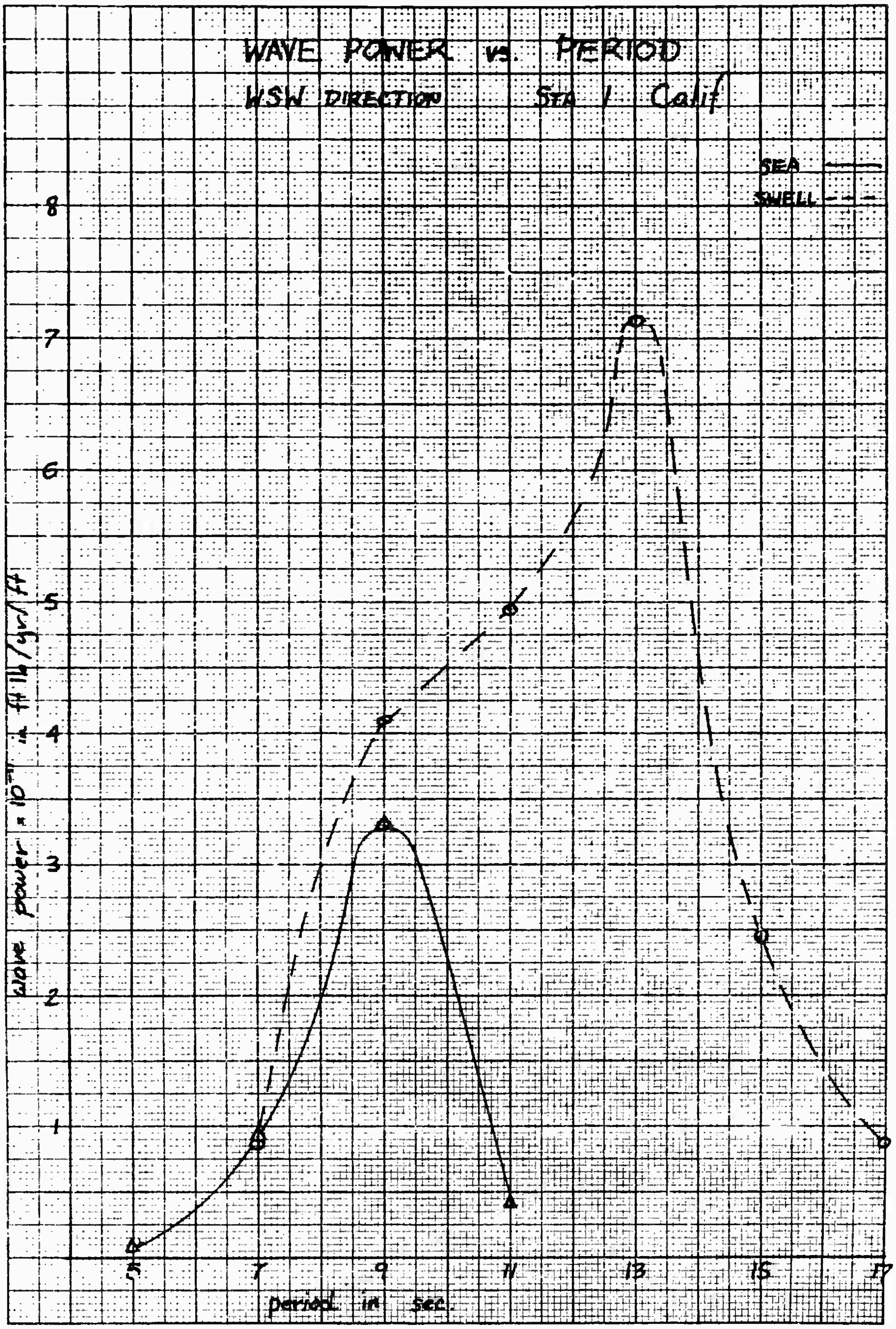


WAVE POWER vs. PERIOD
NW DIRECTION STA 1 Calif
SEA
SWELL
wave power × 10^11 in ft lb/yr/ft
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
period in sec

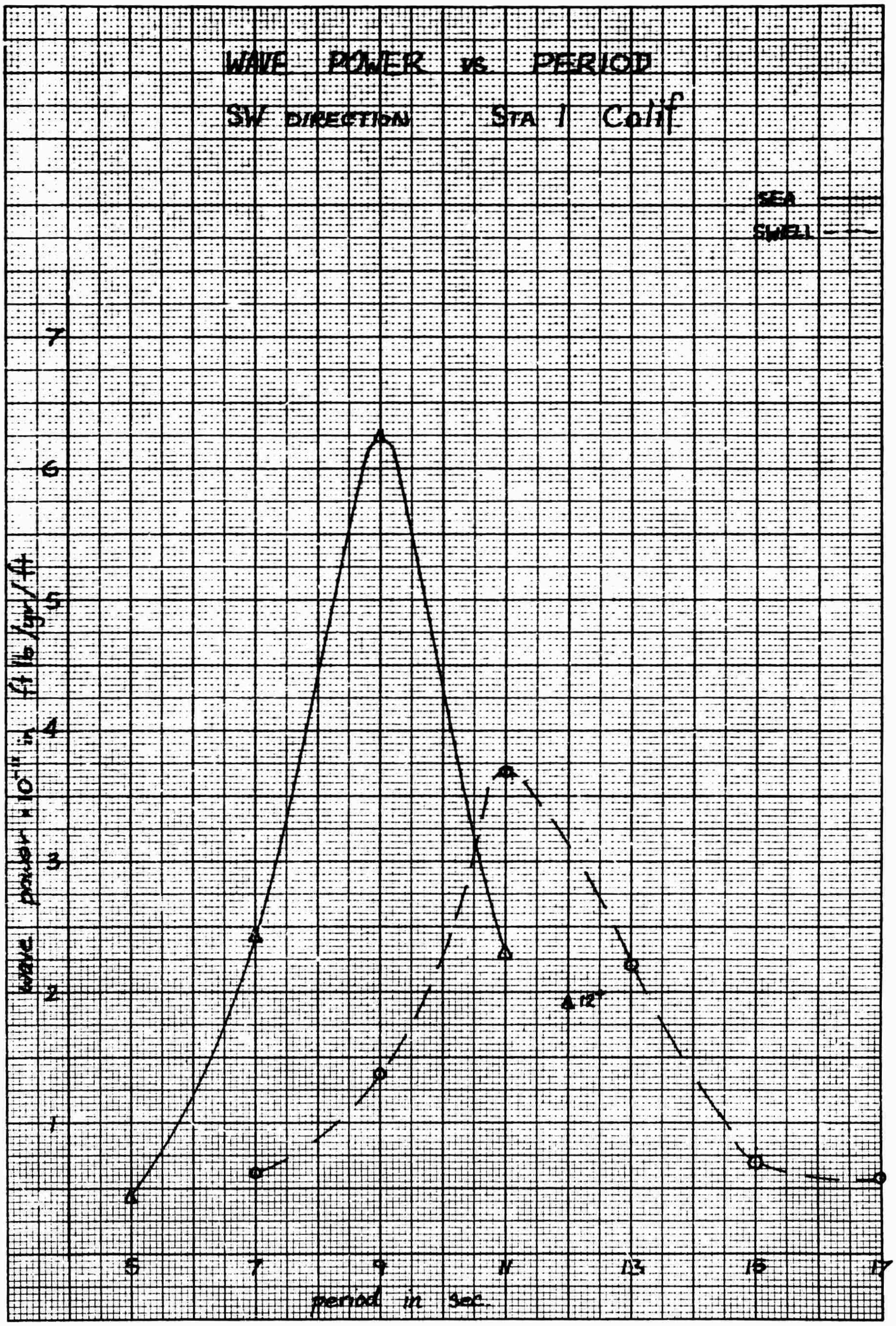

WAVE POWER vs. PERIOD
WNW DIRECTION , STA. I Calif.
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
26
24
22
20
18
16
14
12
10
8
6
4
2
5
7
9
11
13
15
17
18+
period in sec



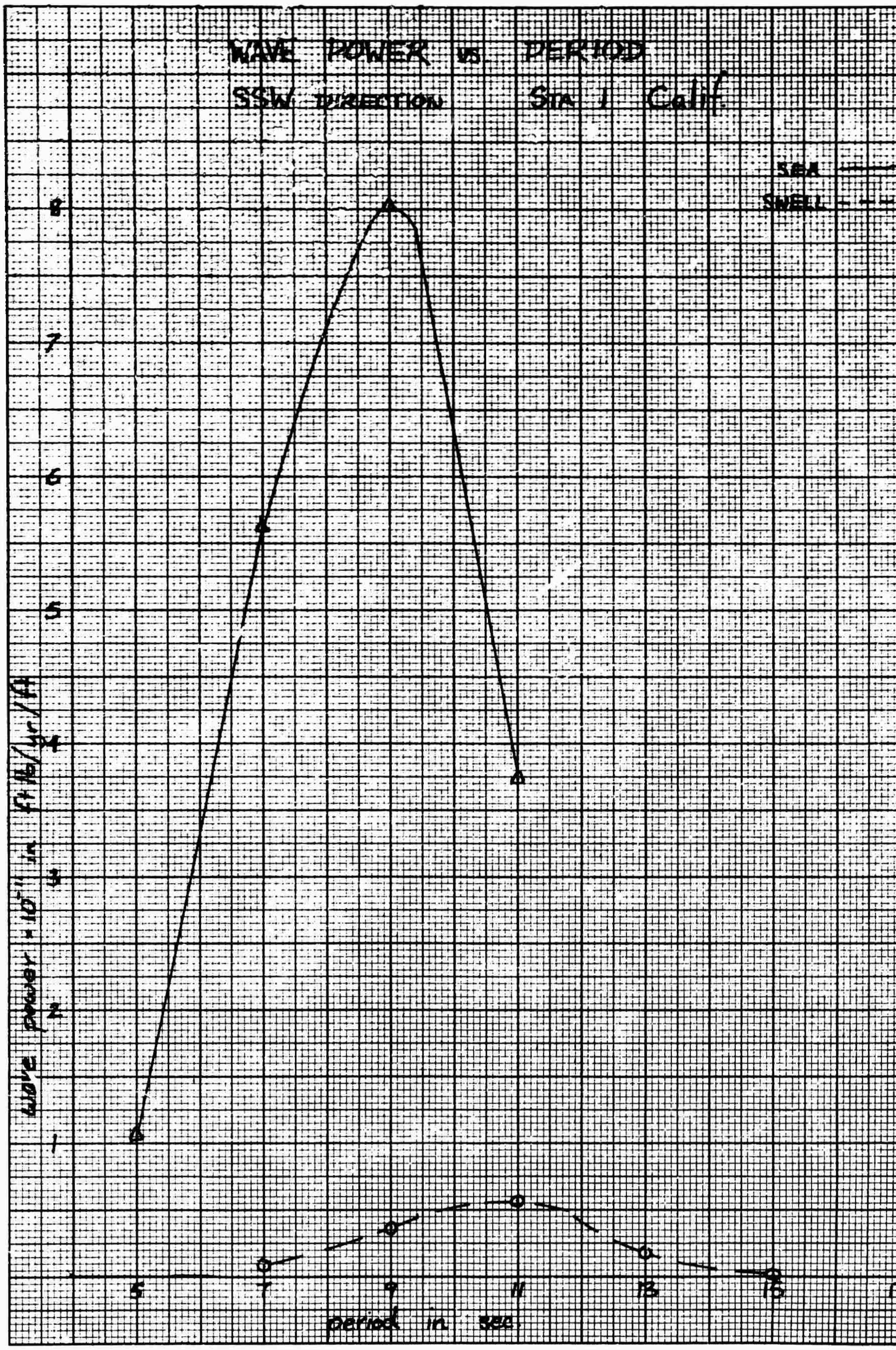
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



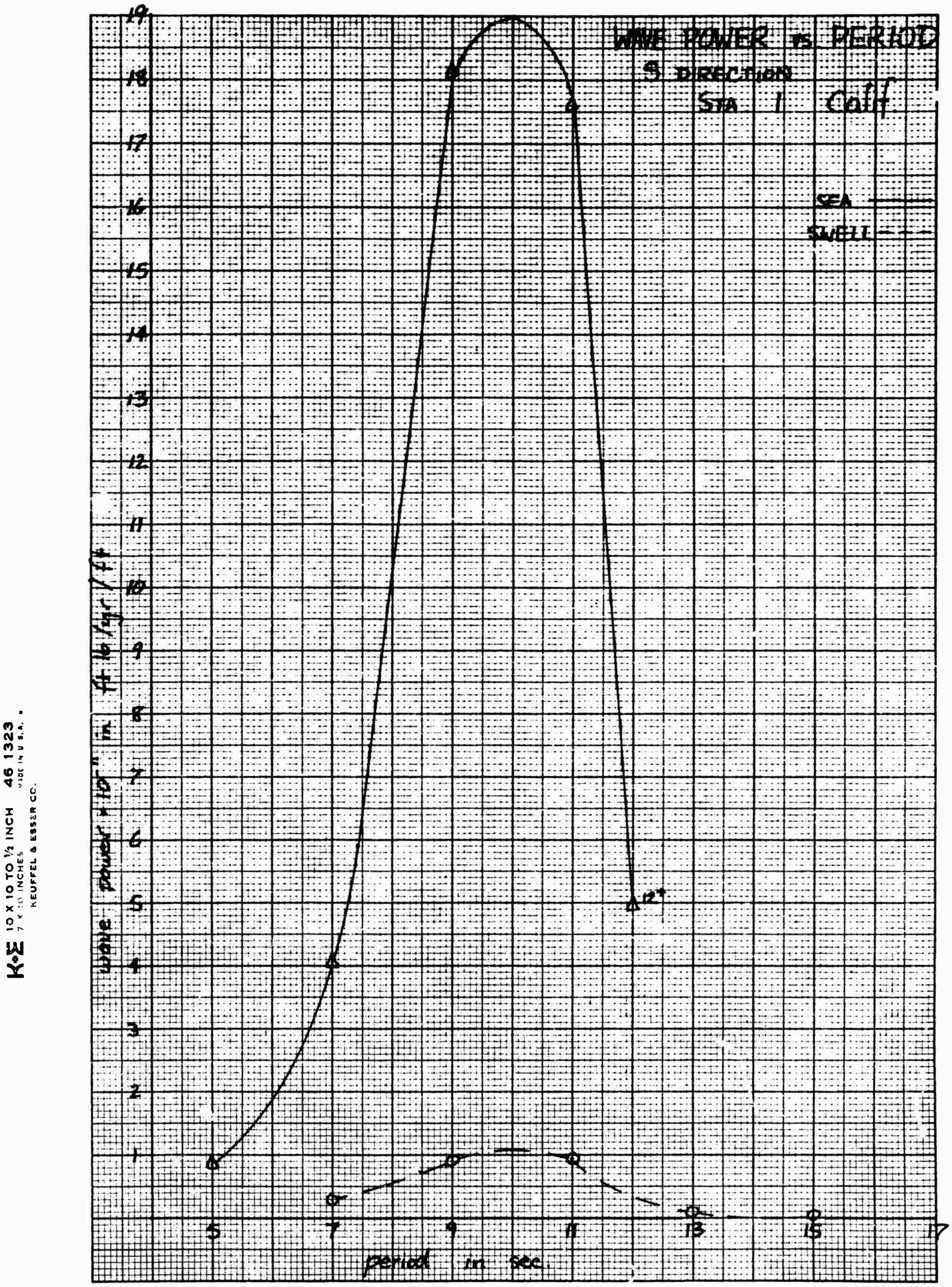
WAVE POWER vs. PERIOD
WSW DIRECTION STA 1 Calif
SEA
SWELL
wave power x 10^-11 in ft lb/yr/ft
period in sec.
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17

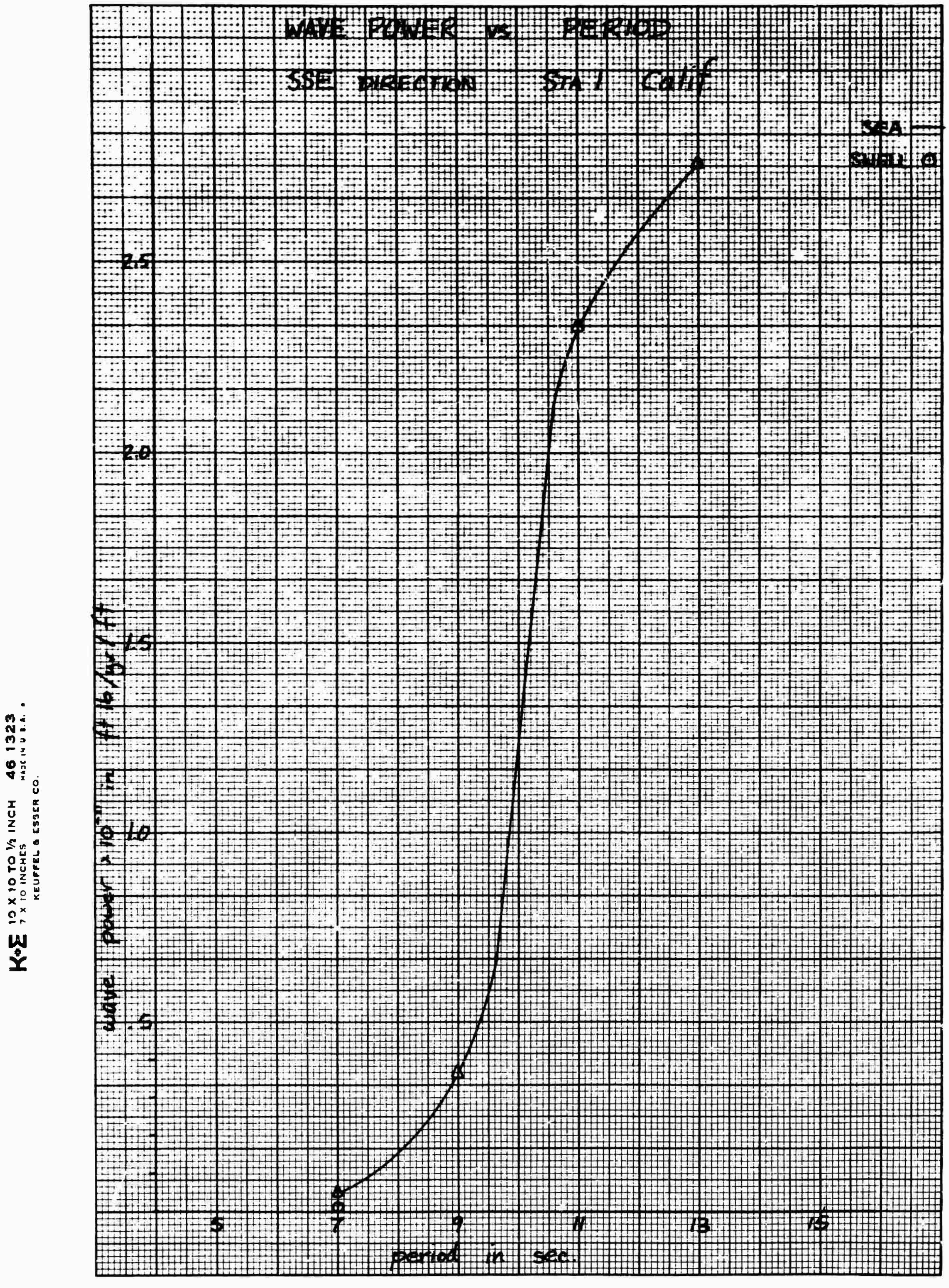


K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



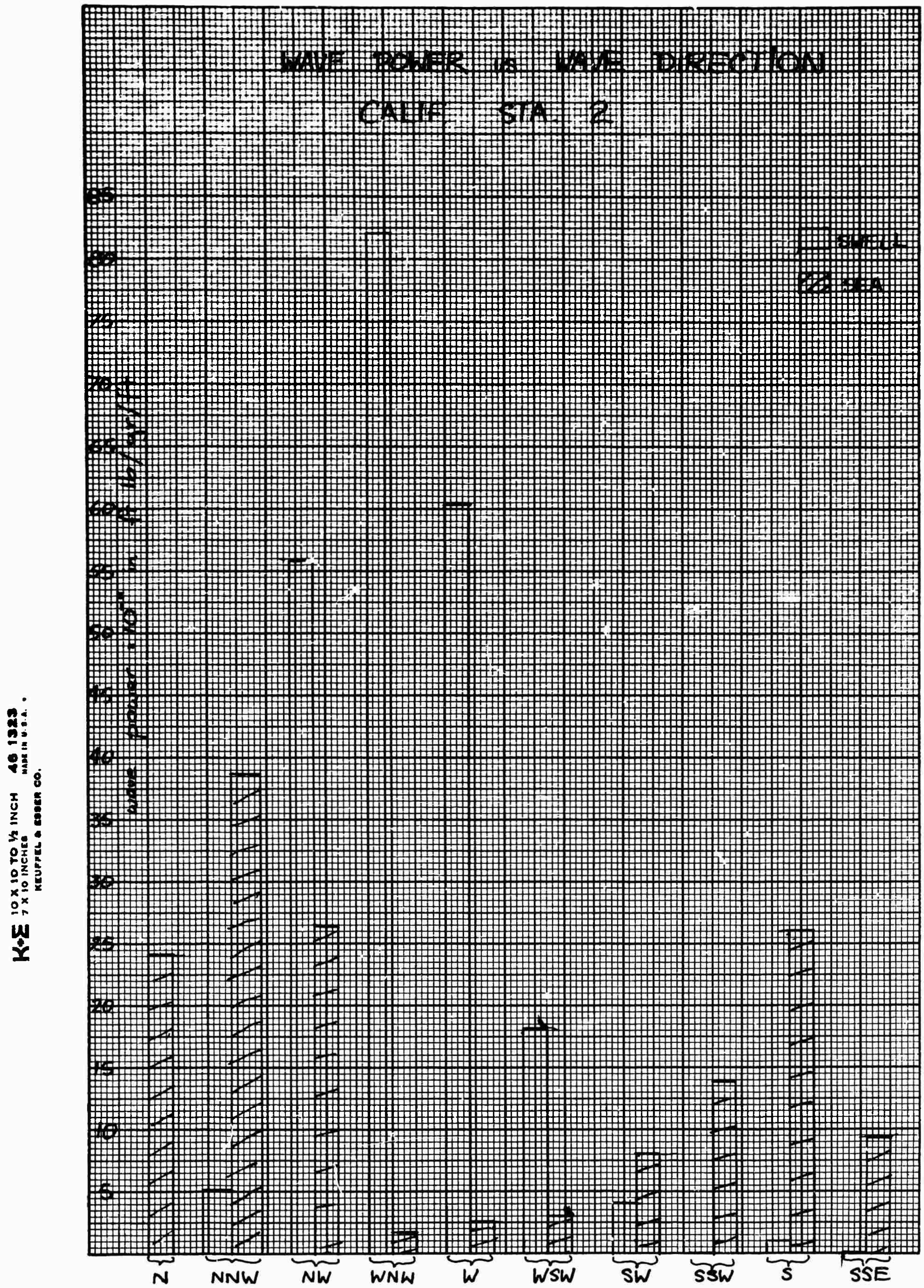
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

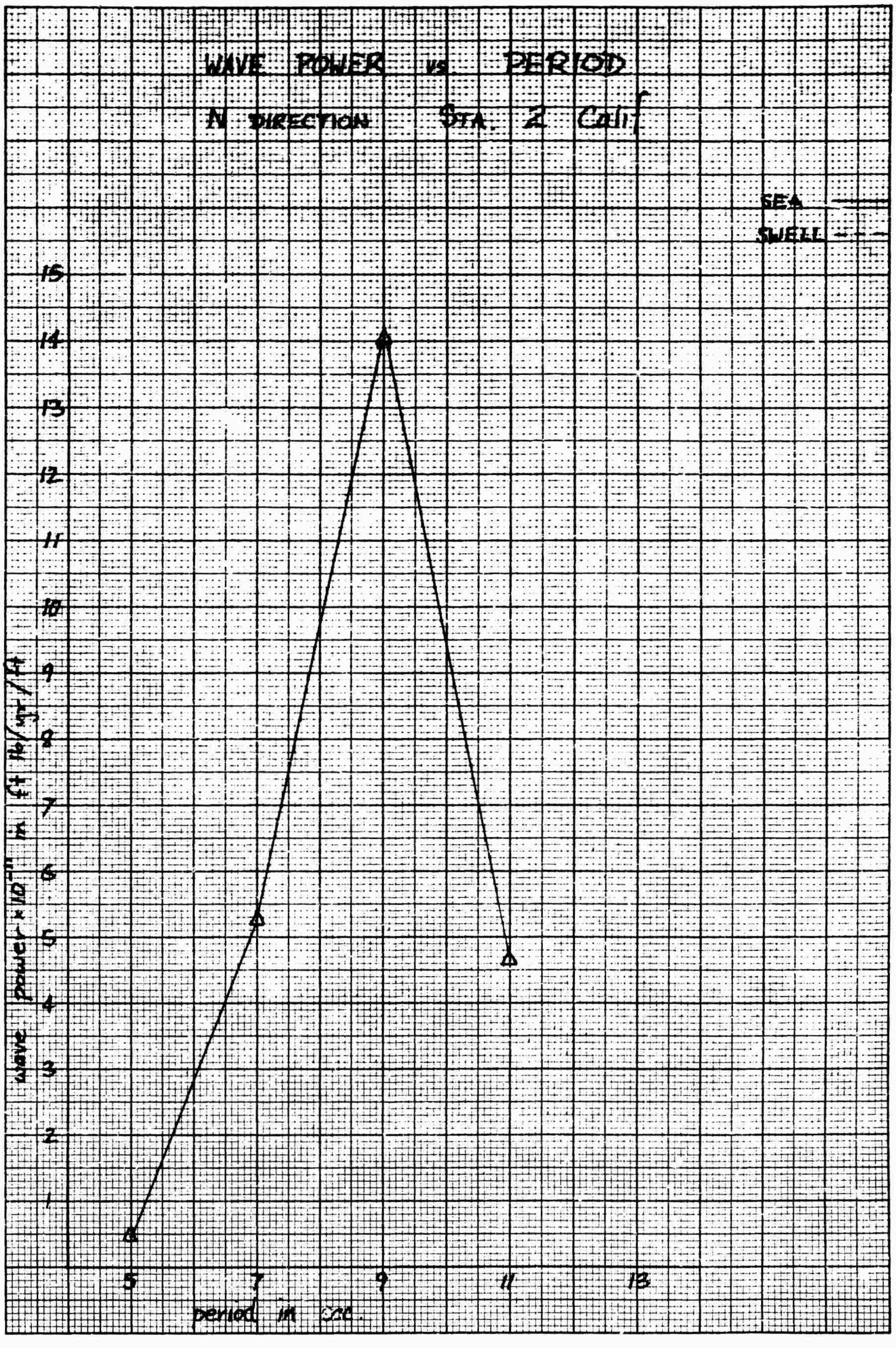

WAVE POWER vs. PERIOD
S DIRECTION
STA I Calif
SEA
SWELL
wave power × 10" in ft lb/yr / ft
period in sec.
12+
K+E 10 X 10 TO ½ INCH 46 1323
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
SSE DIRECTION STA 1 Calif
SEA —
SWELL ⊙
wave power x 10^-4 in ft lb/hr/ft
2.5
2.0
1.5
1.0
.5
5
7
9
11
13
15
period in sec.
K·E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

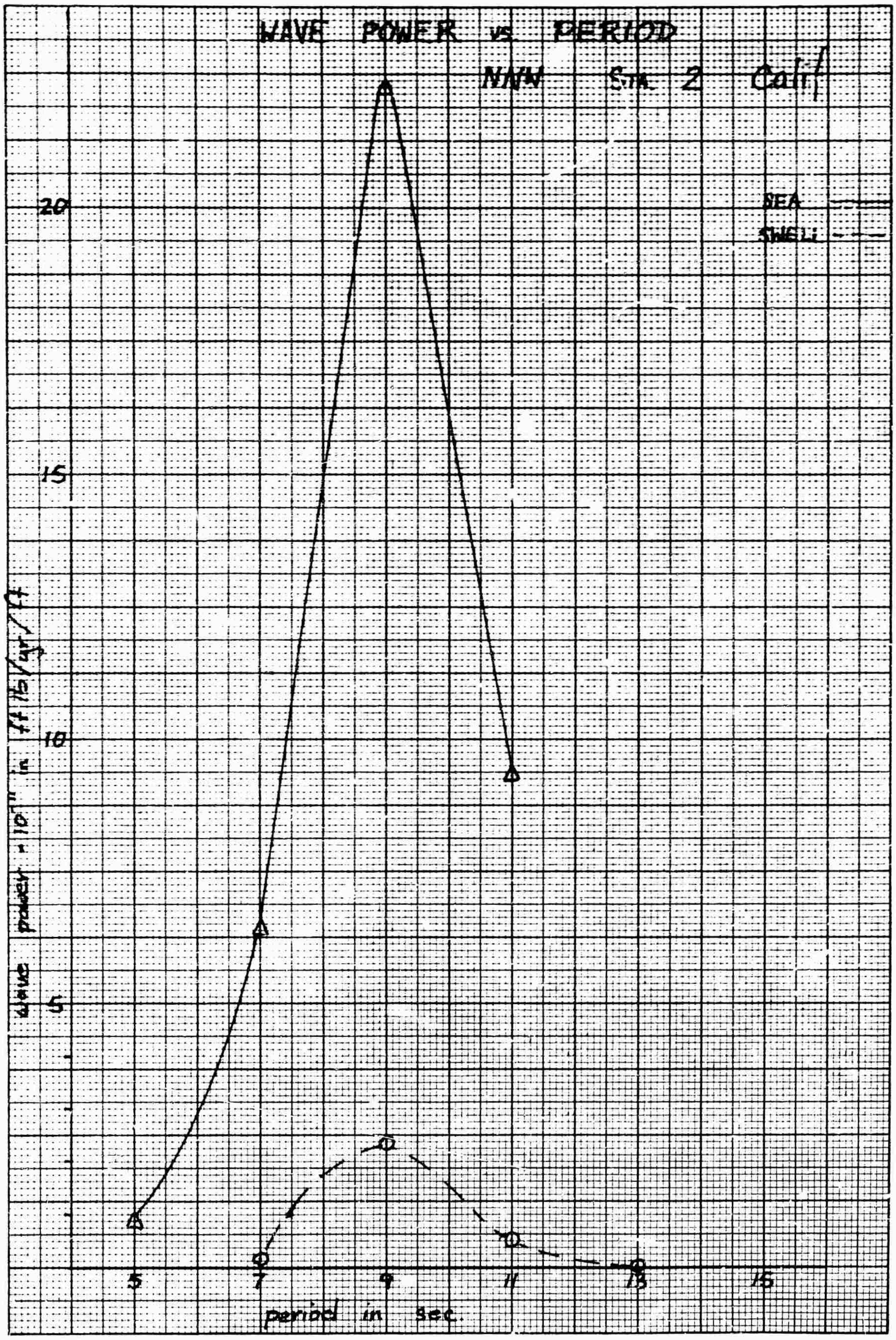
STATION 2 - CALIFORNIA COAST

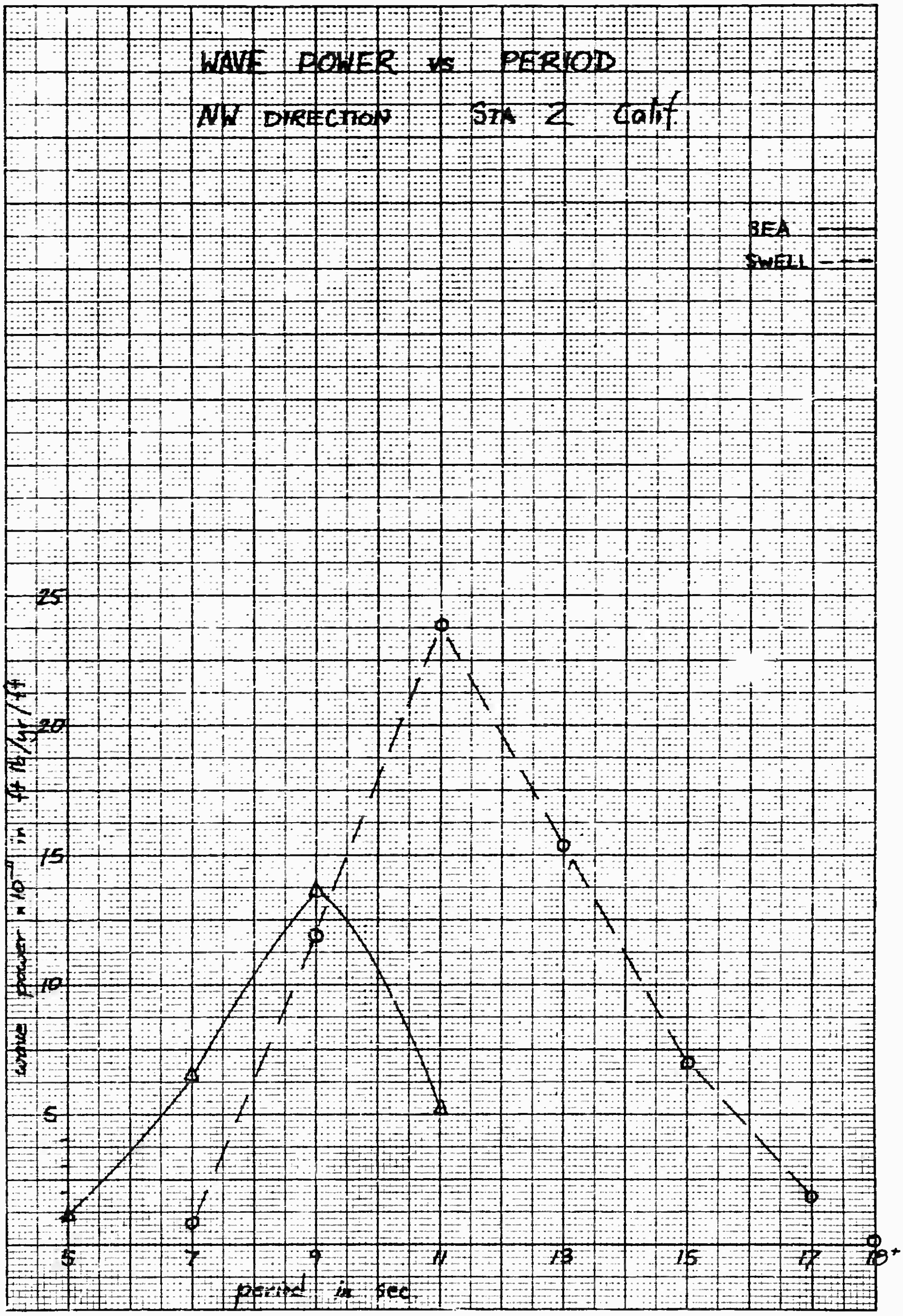
Lat. 39.6°N, Long. 124.5°W


WAVE POWER vs WAVE DIRECTION
CALIF STA 2
SWELL
SEA
wave power $\times 10^{11}$ in ft lb/yr/ft
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

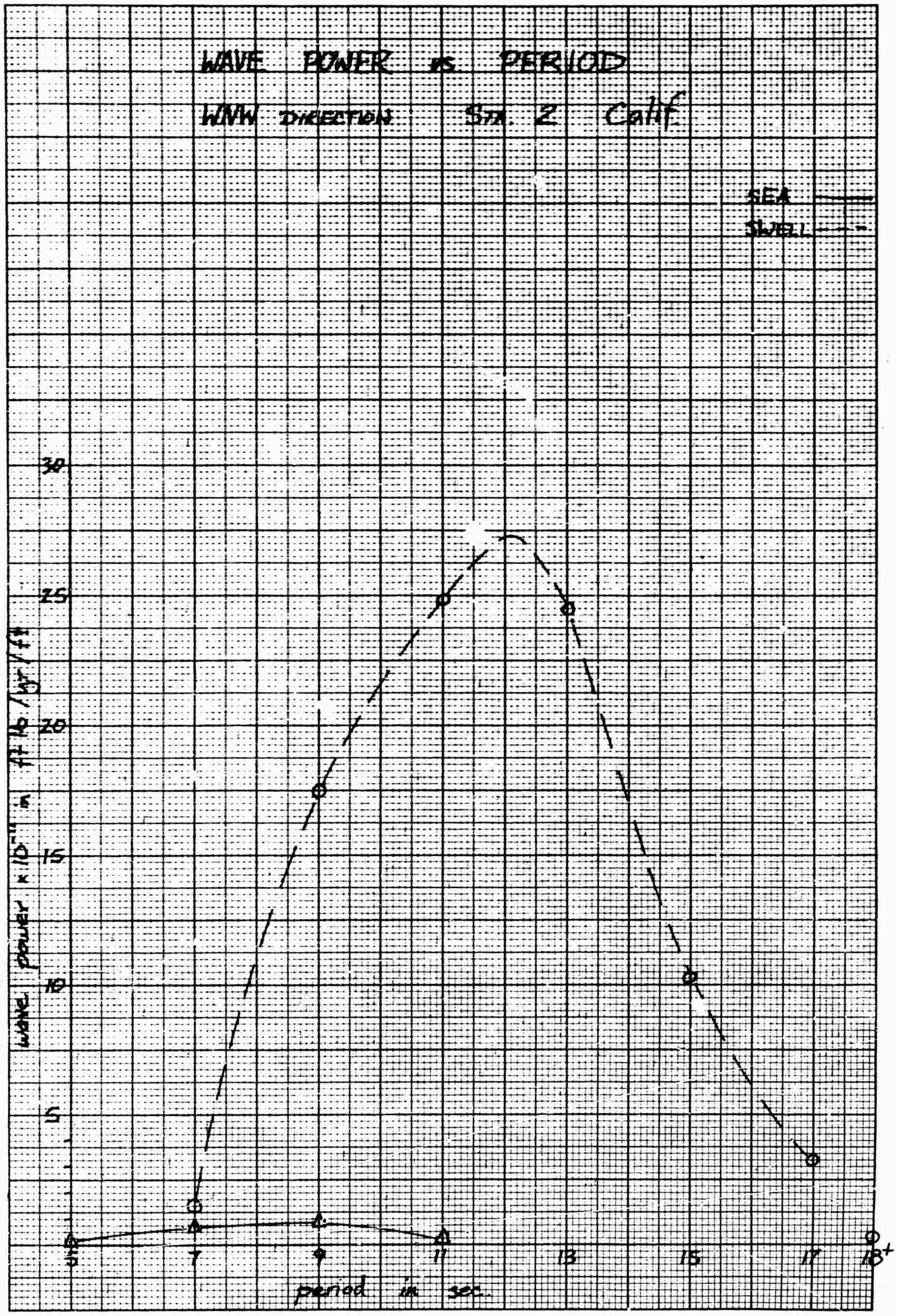


KE 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

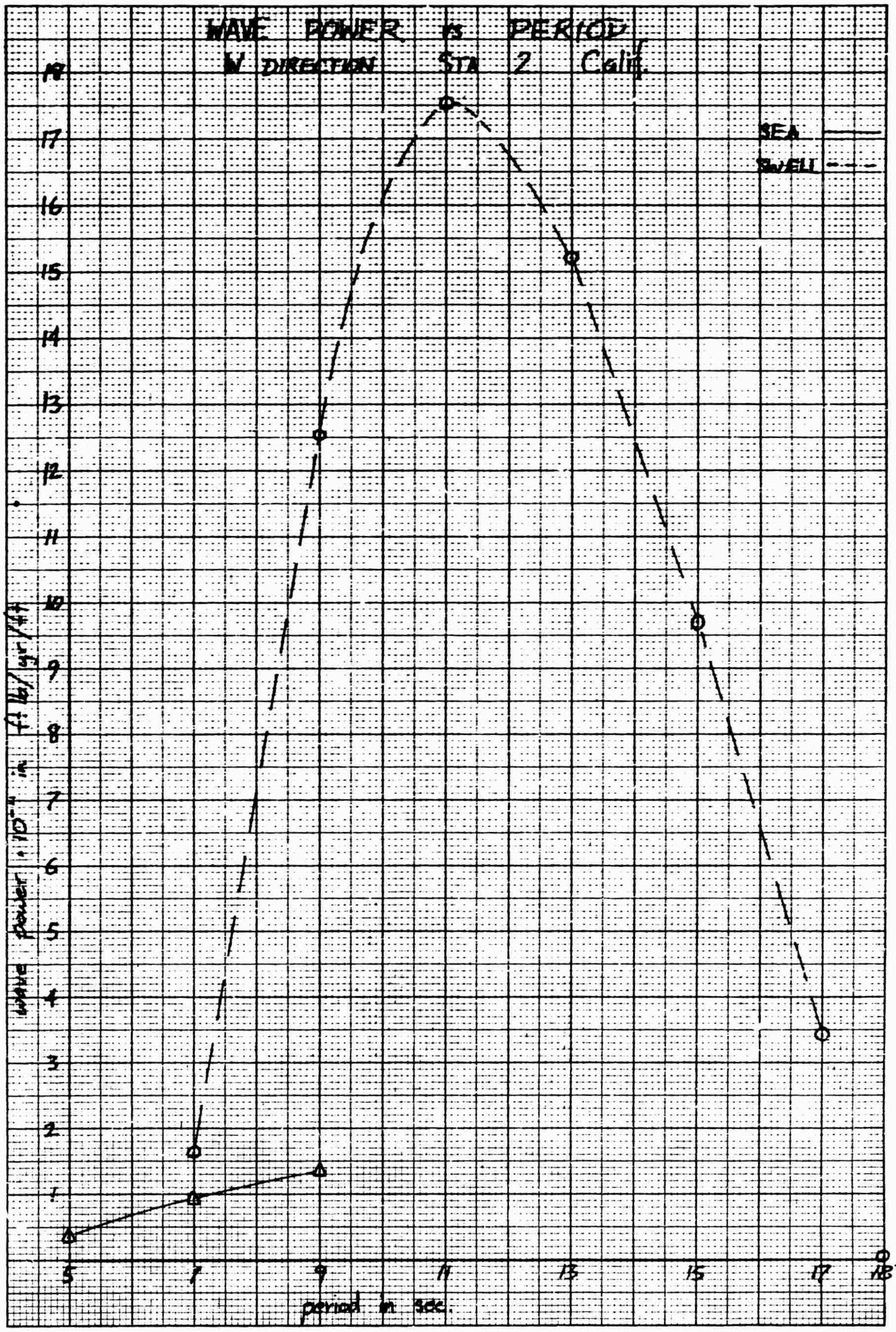

WAVE POWER vs PERIOD
NNW STA 2 Calif
SEA
SWELL
wave power × 10^{11} in ft lbs/yr/ft
period in sec
5
10
15
20
5
7
9
11
13
15

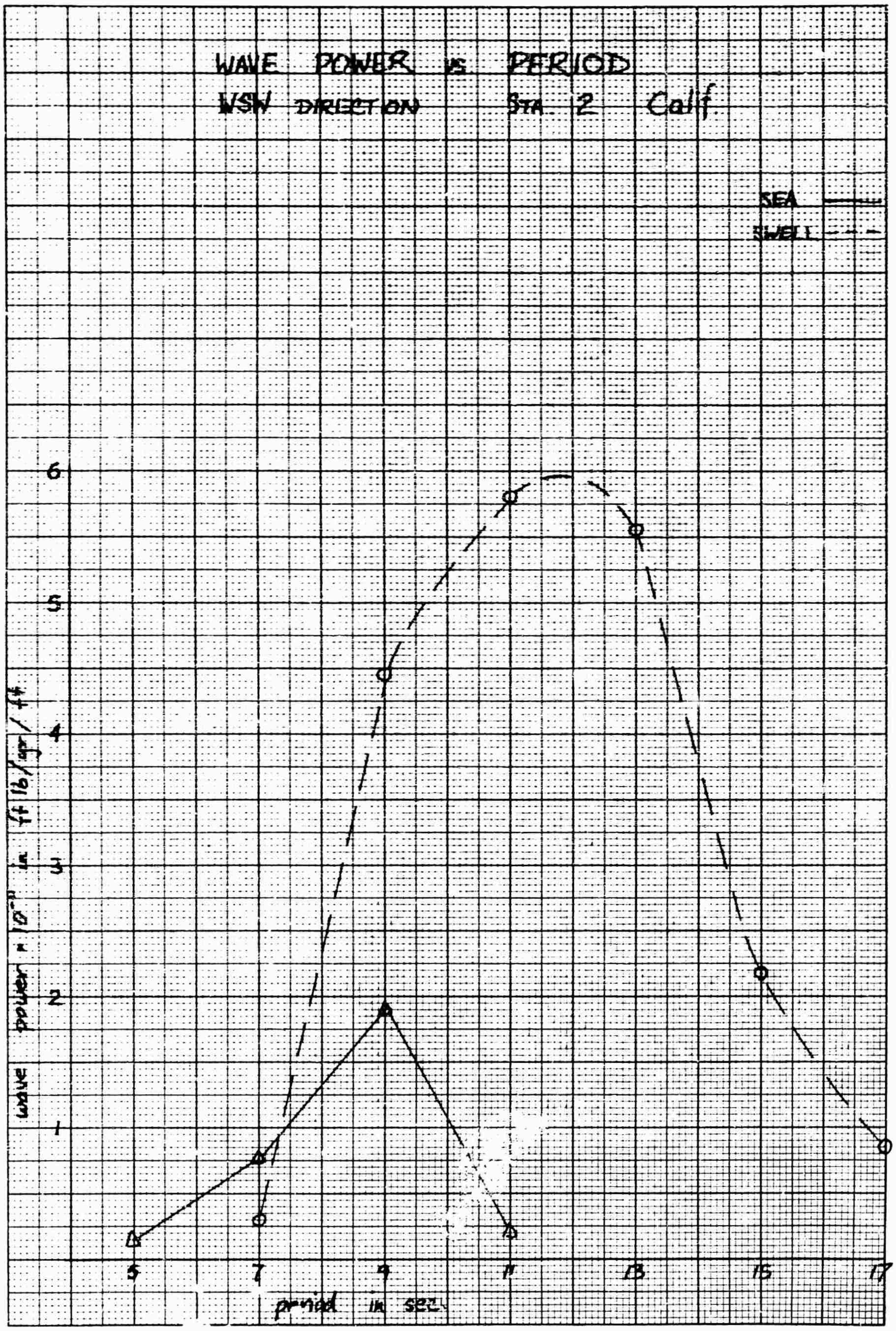


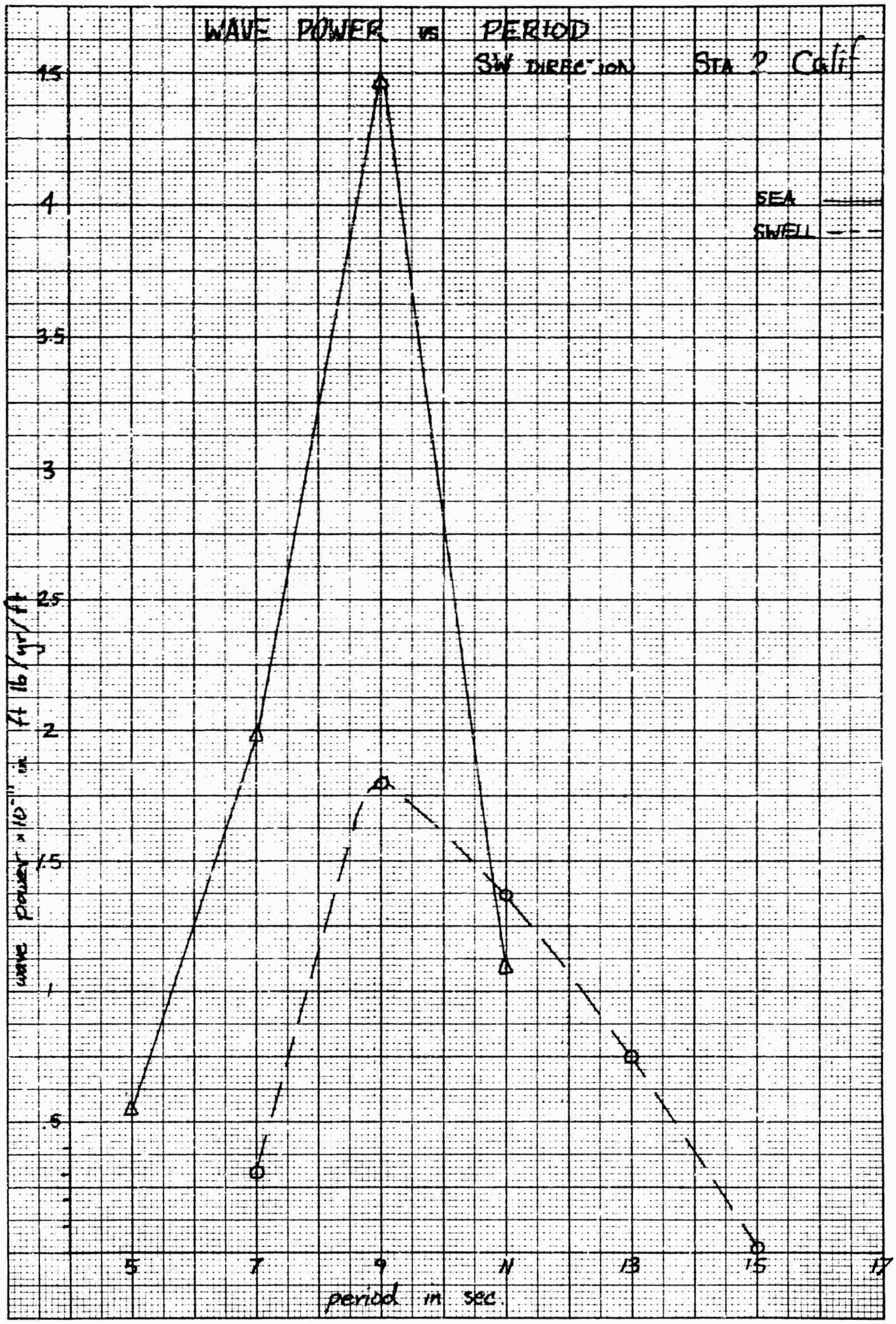
K&E 10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

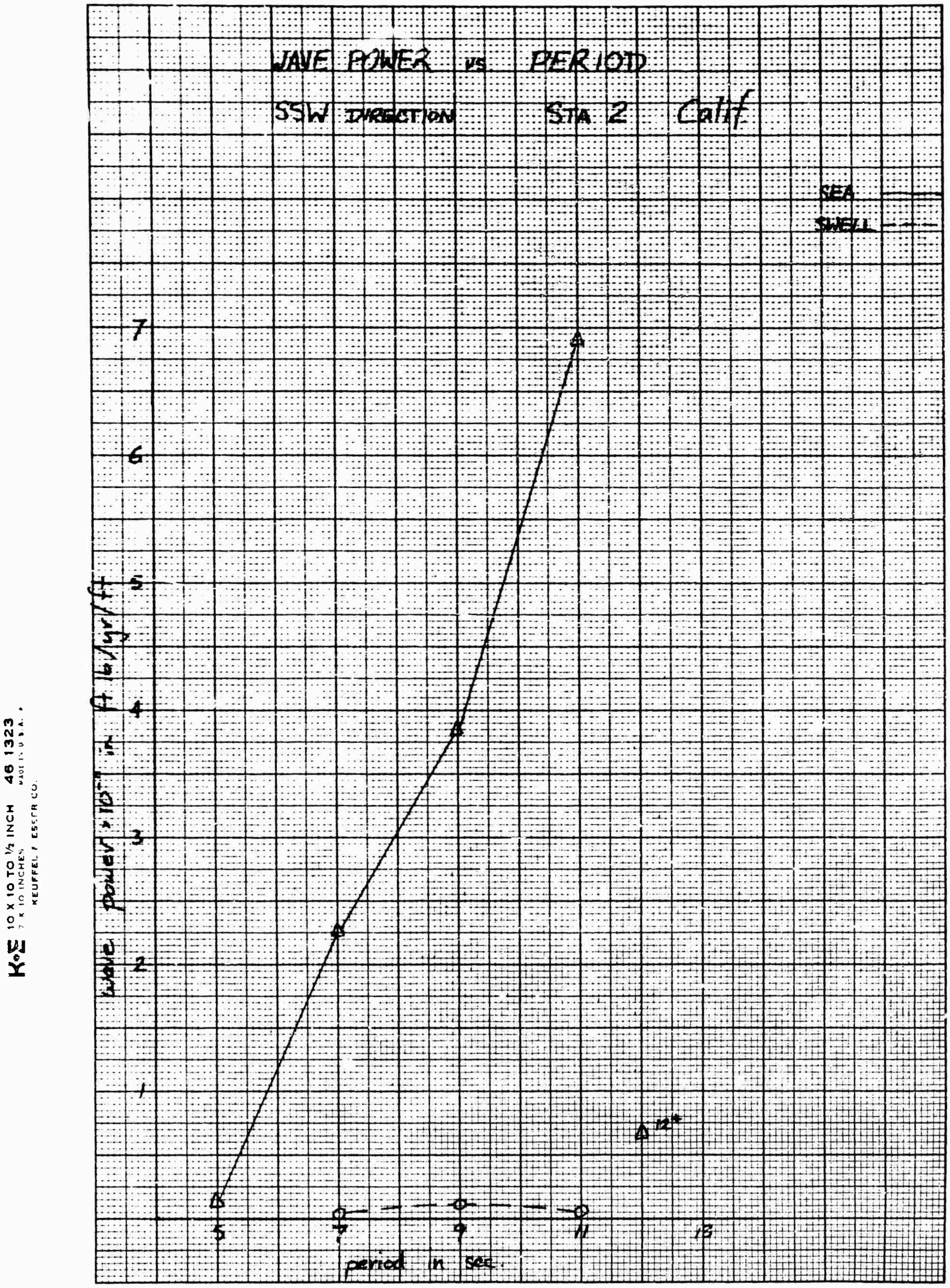


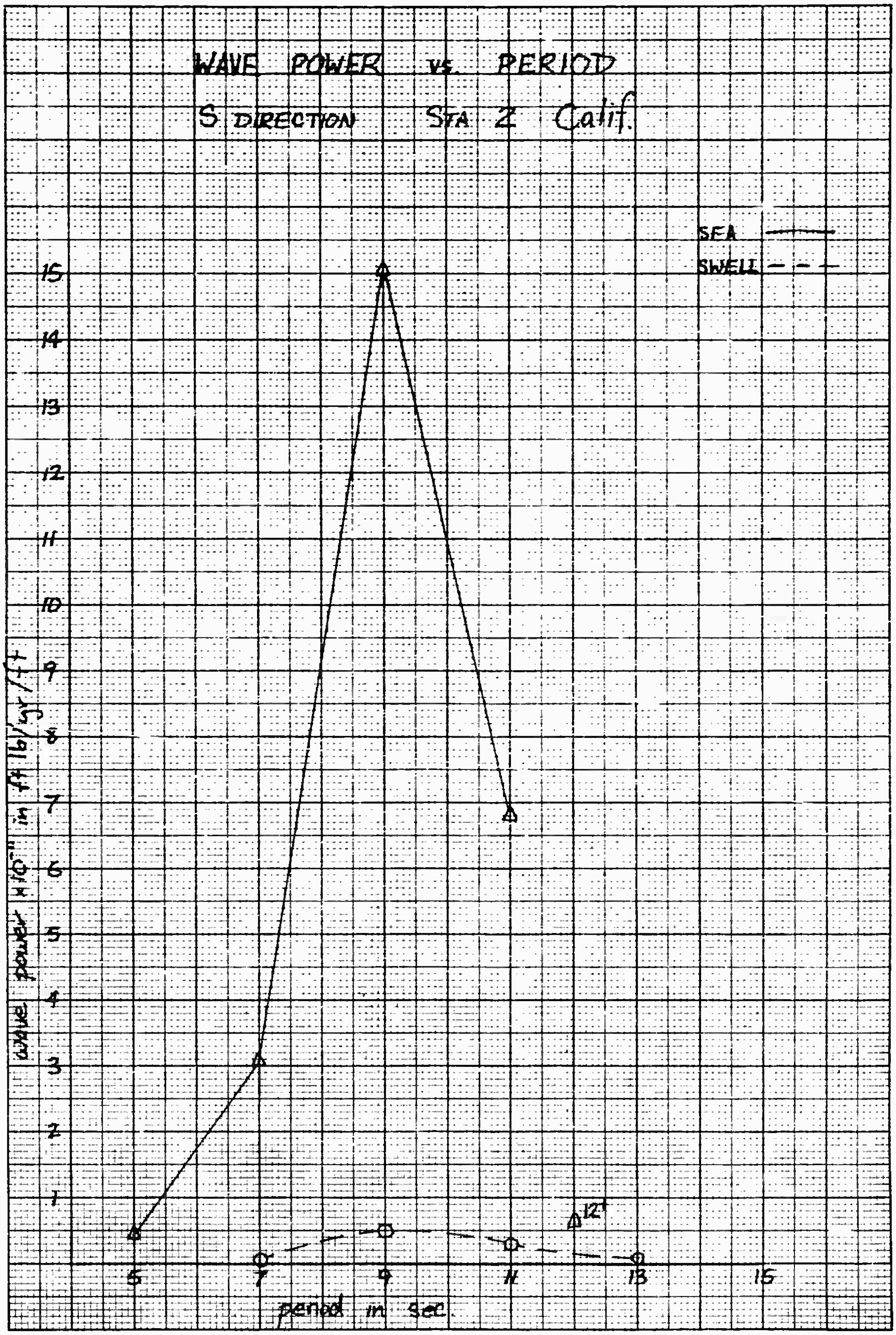
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
W DIRECTION STA 2 Calif.
SEA
SWELL
wave power · 10⁻⁴ in ft lb/yr/ft
period in sec.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
5
7
9
11
13
15
17
18+

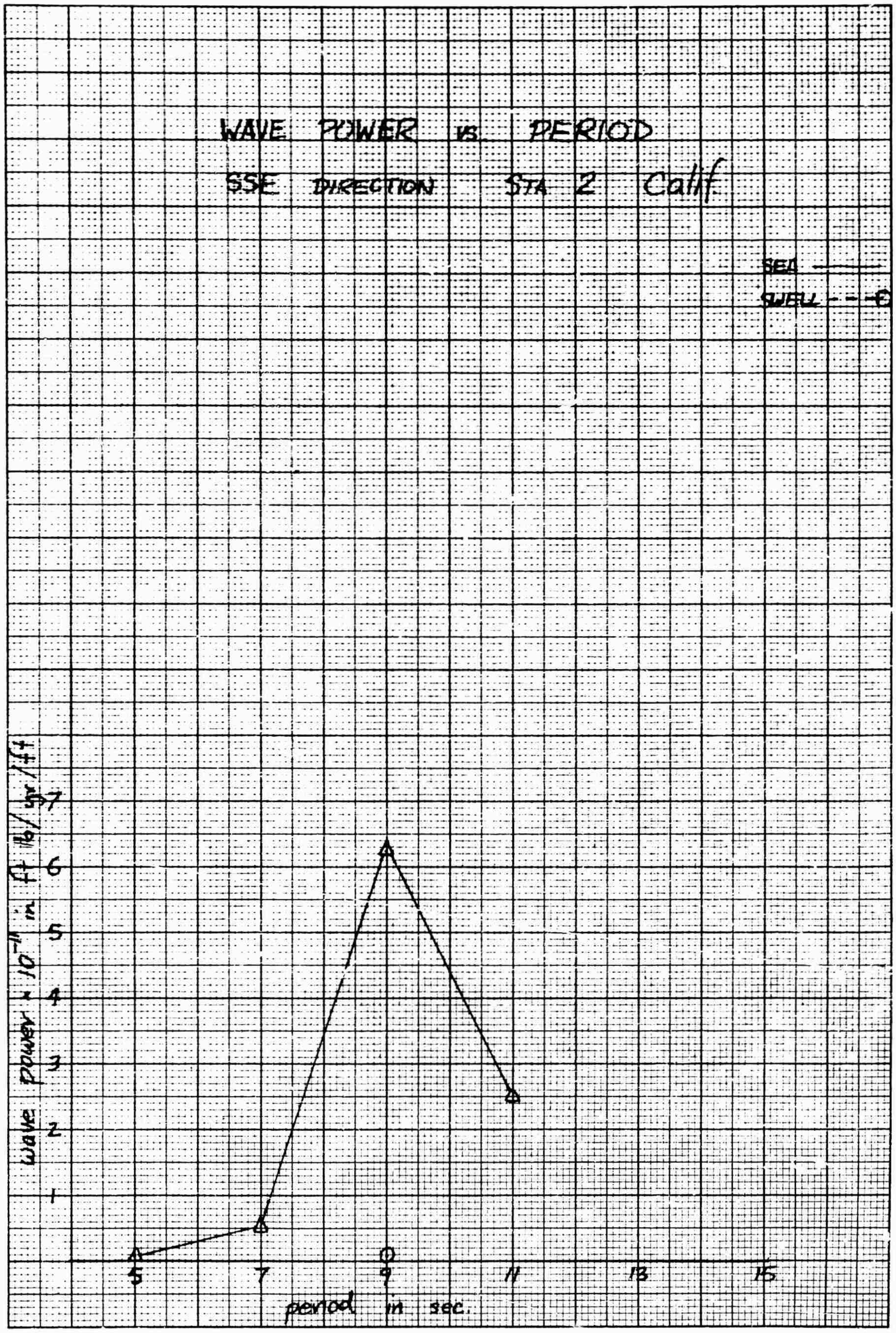

WAVE POWER vs PERIOD
WSW DIRECTION STA. 2 Calif.
SEA
SWELL
wave power x 10^-11 in ft lb/sqr/ft
6
5
4
3
2
1
5
7
9
11
13
15
17
period in sec.


WAVE POWER vs PERIOD
SW DIRECTION
STA 2 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
period in sec


WAVE POWER vs PERIOD
SSW DIRECTION STA 2 Calif
SEA
SWELL
7
6
5
4
3
2
1
wave power × 10⁻⁴ in ft lb/yr/ft
12*
5
7
9
11
13
period in sec.
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



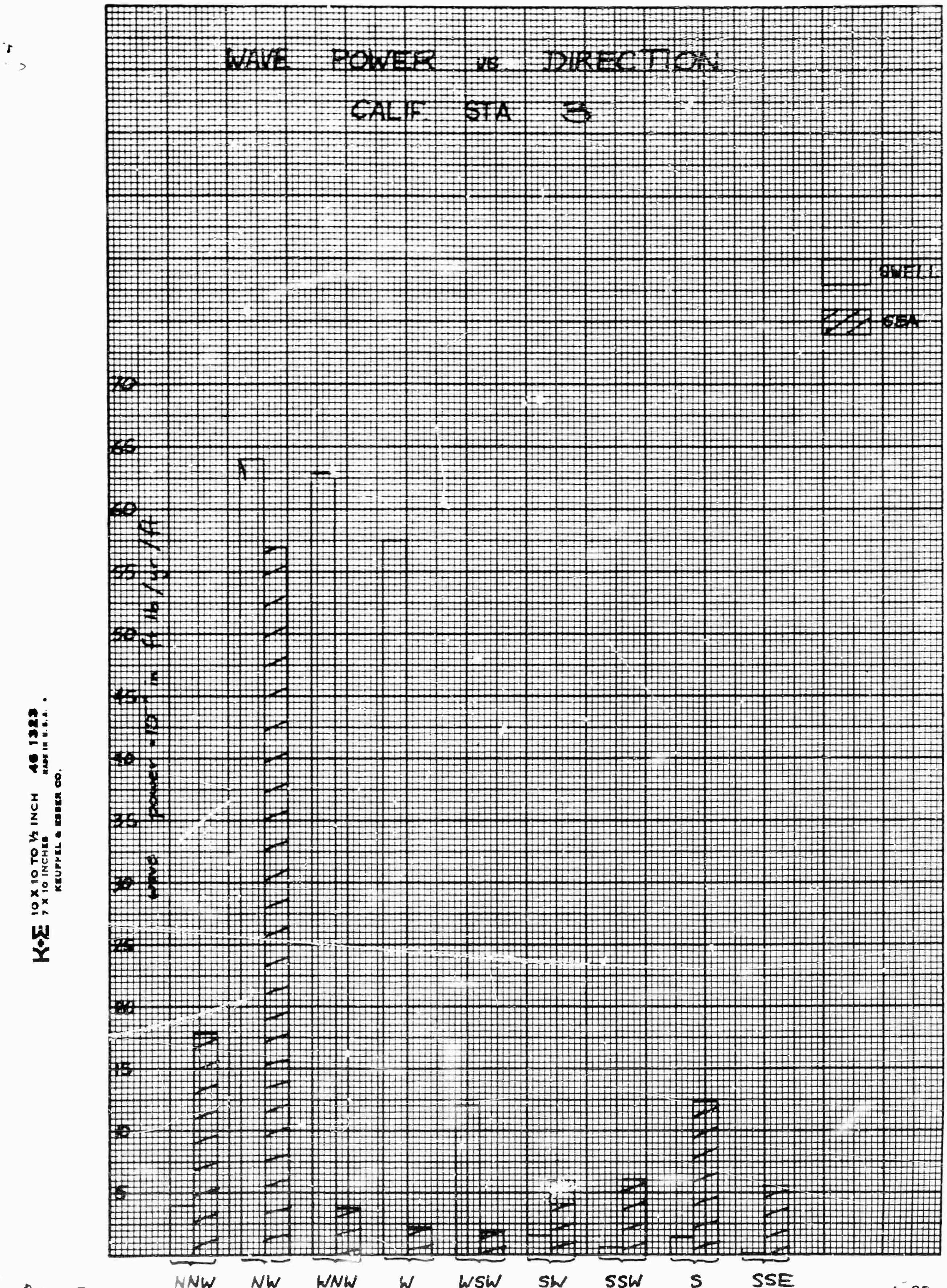
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



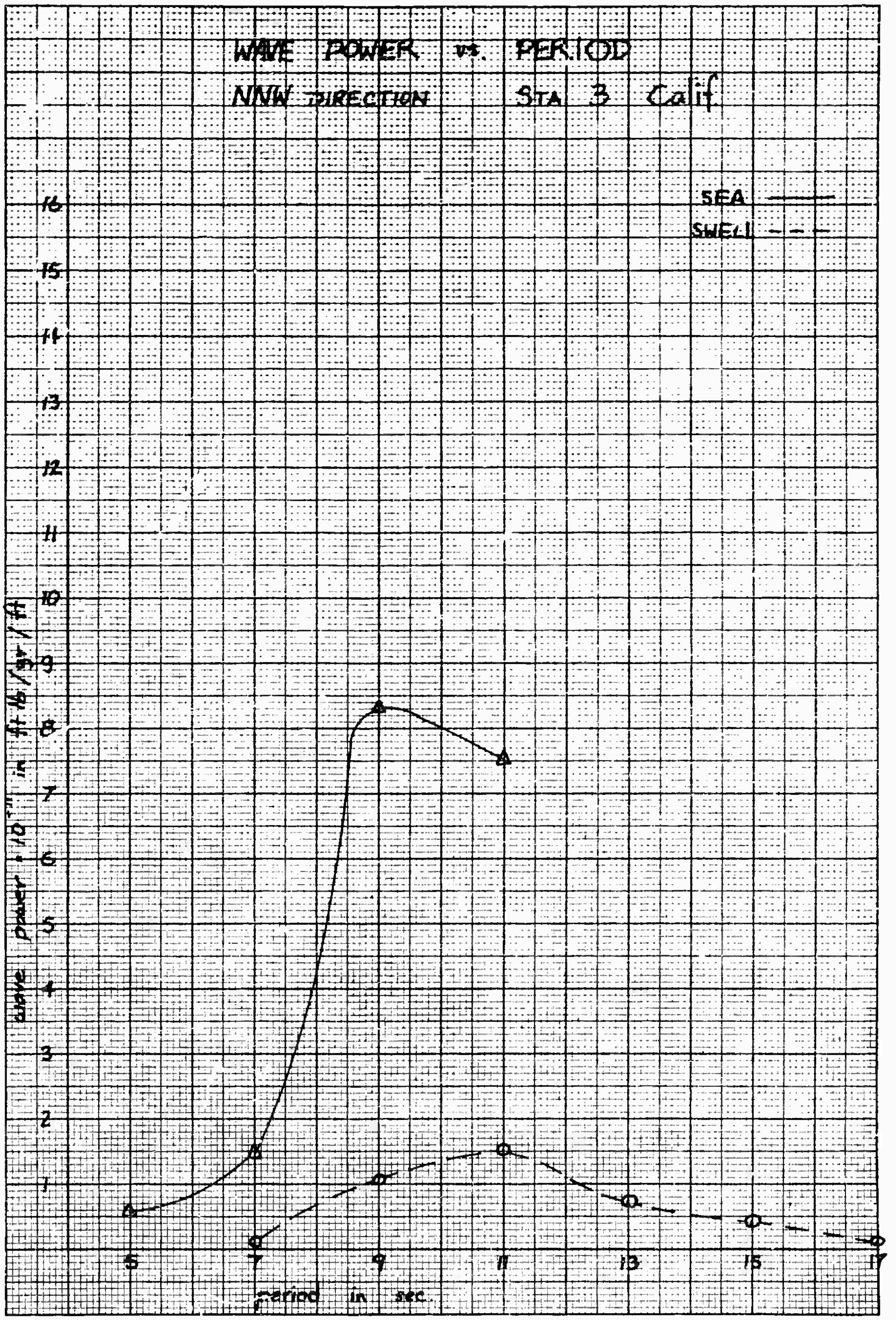
K&E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

STATION 3 - CALIFORNIA COAST

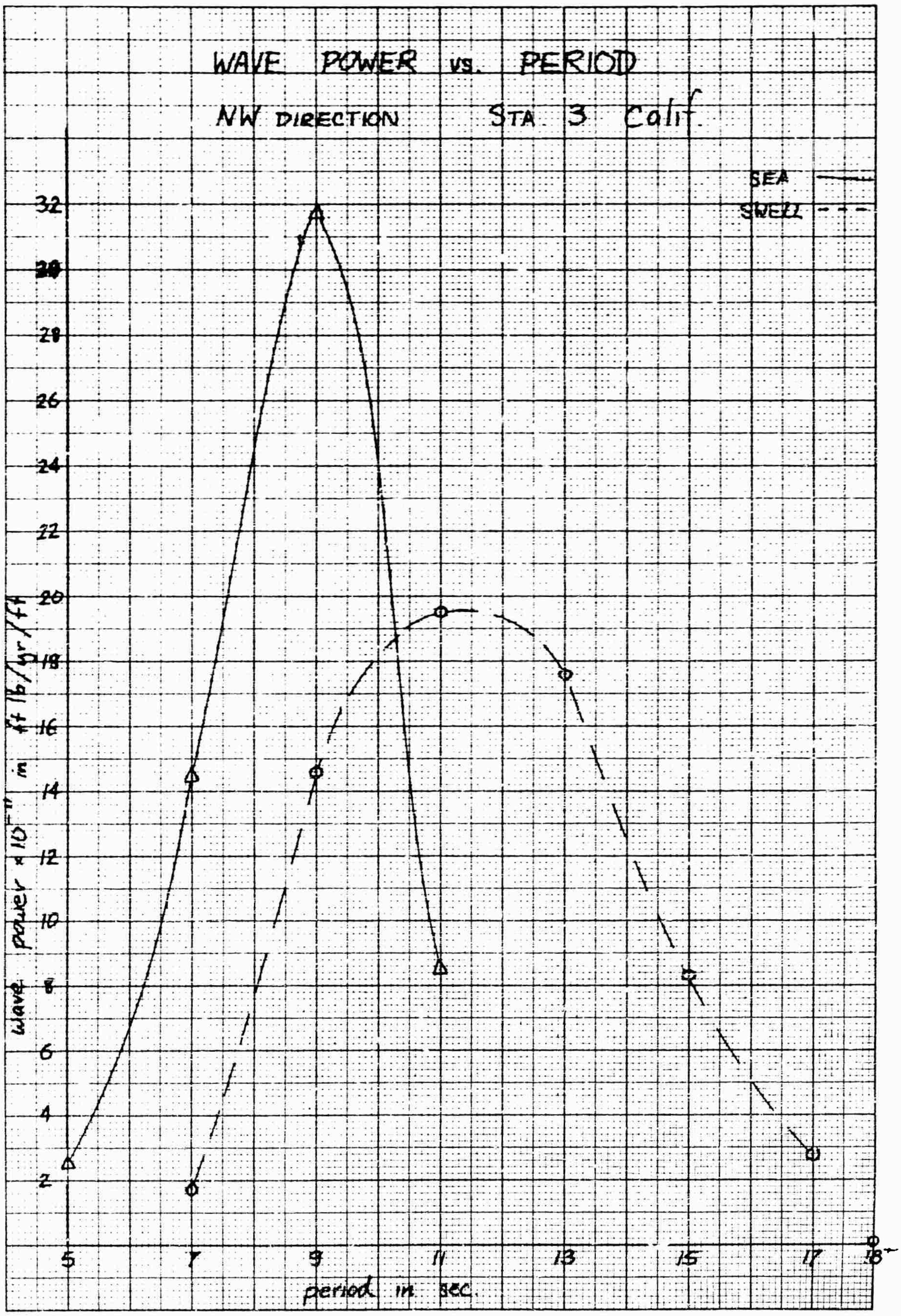
Lat. 37.6°N, Long. 123.5°W

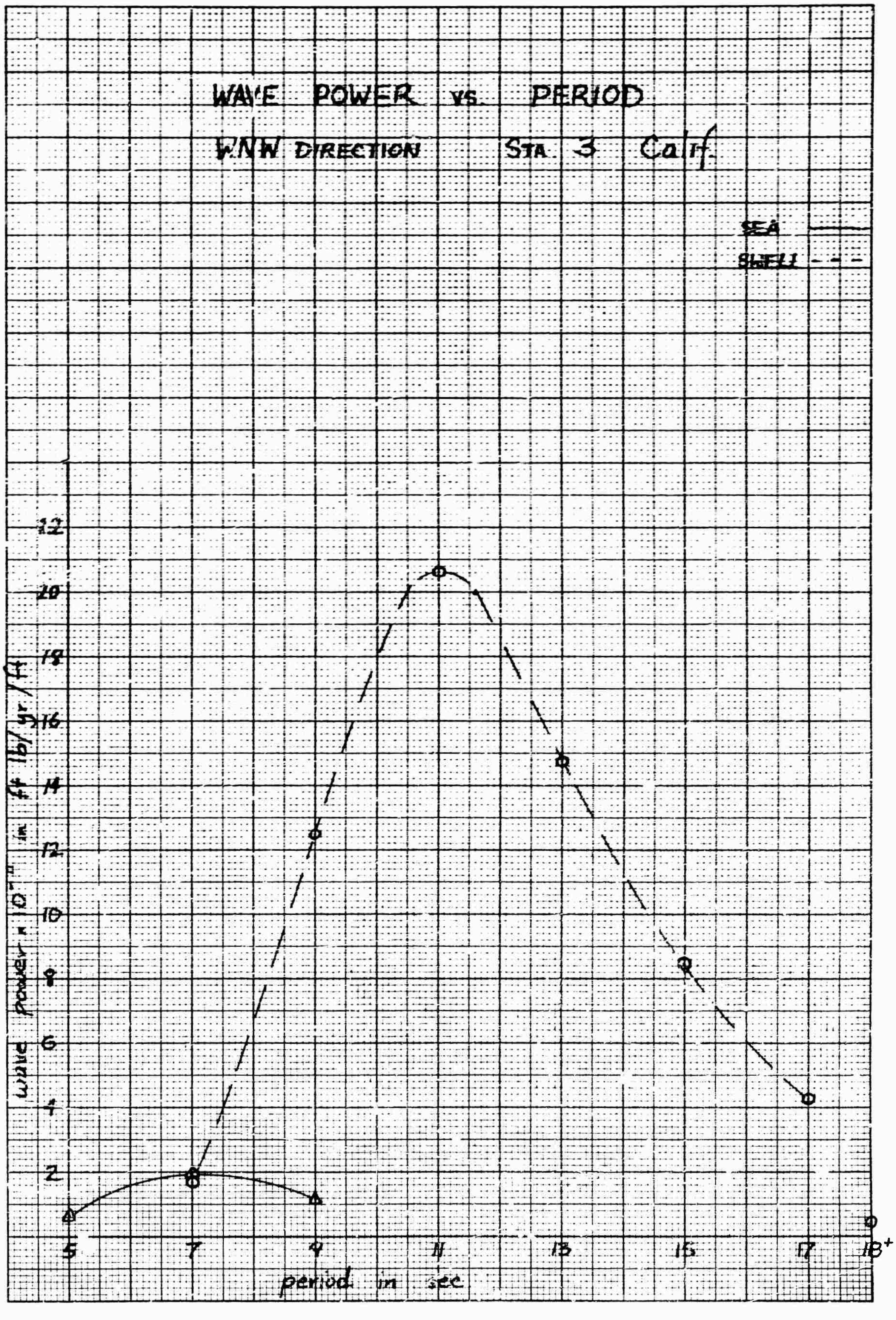

WAVE POWER vs DIRECTION
CALIF STA 3
SWELL
SEA
70
65
60
55
50
45
40
35
30
25
20
15
10
5
WAVE POWER ·10 in ft lb/yr/ft
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

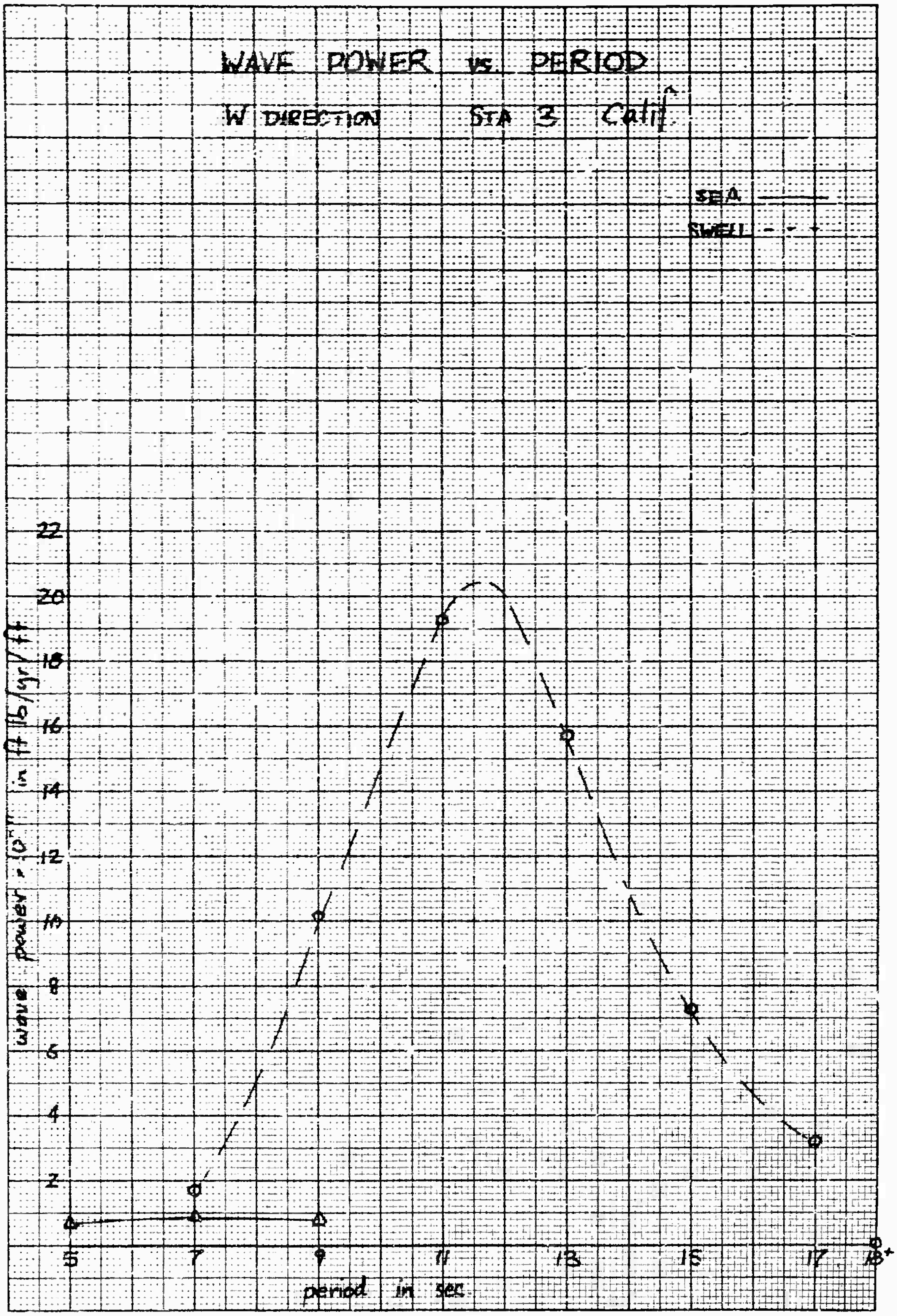
A-23



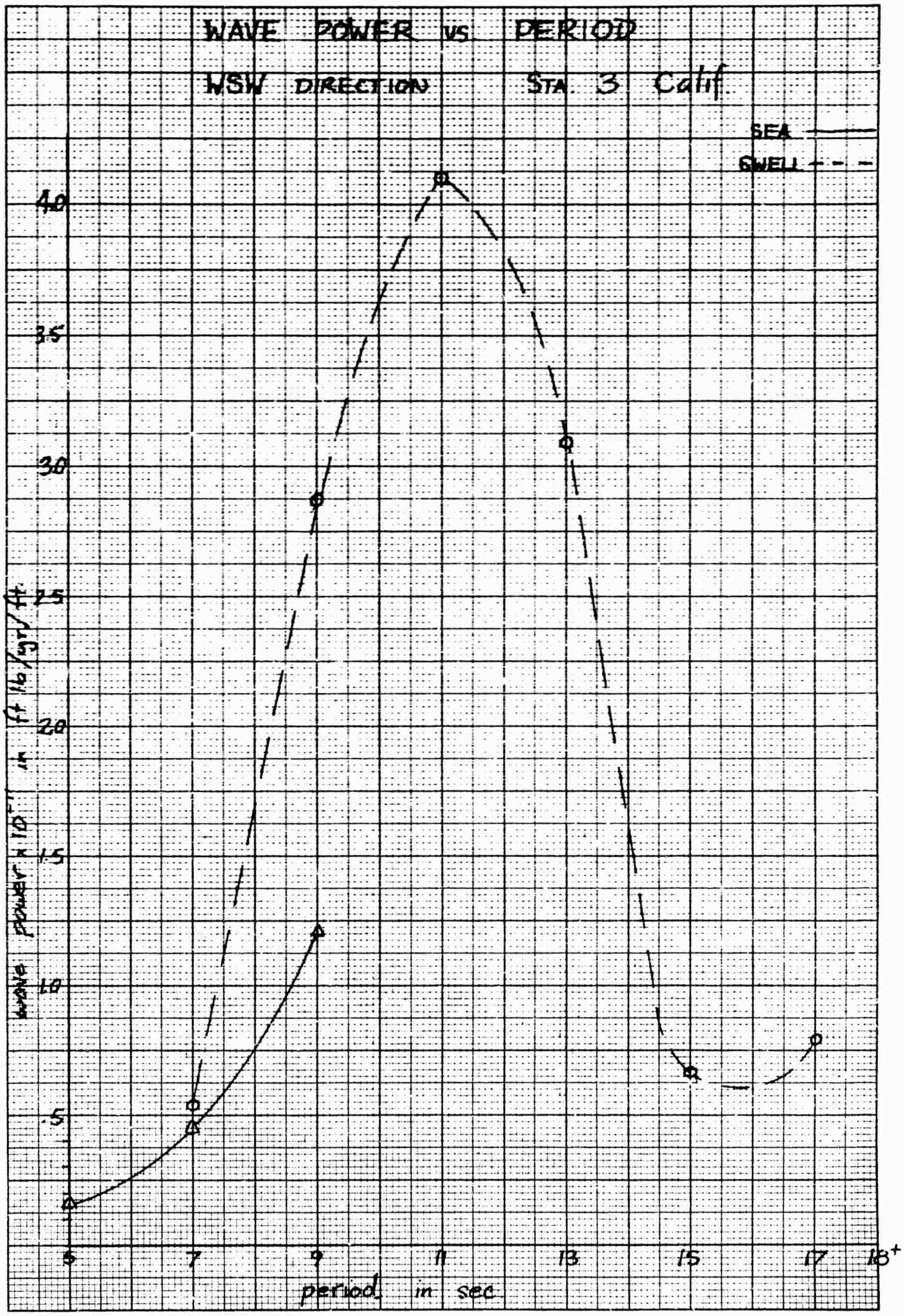
K&E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

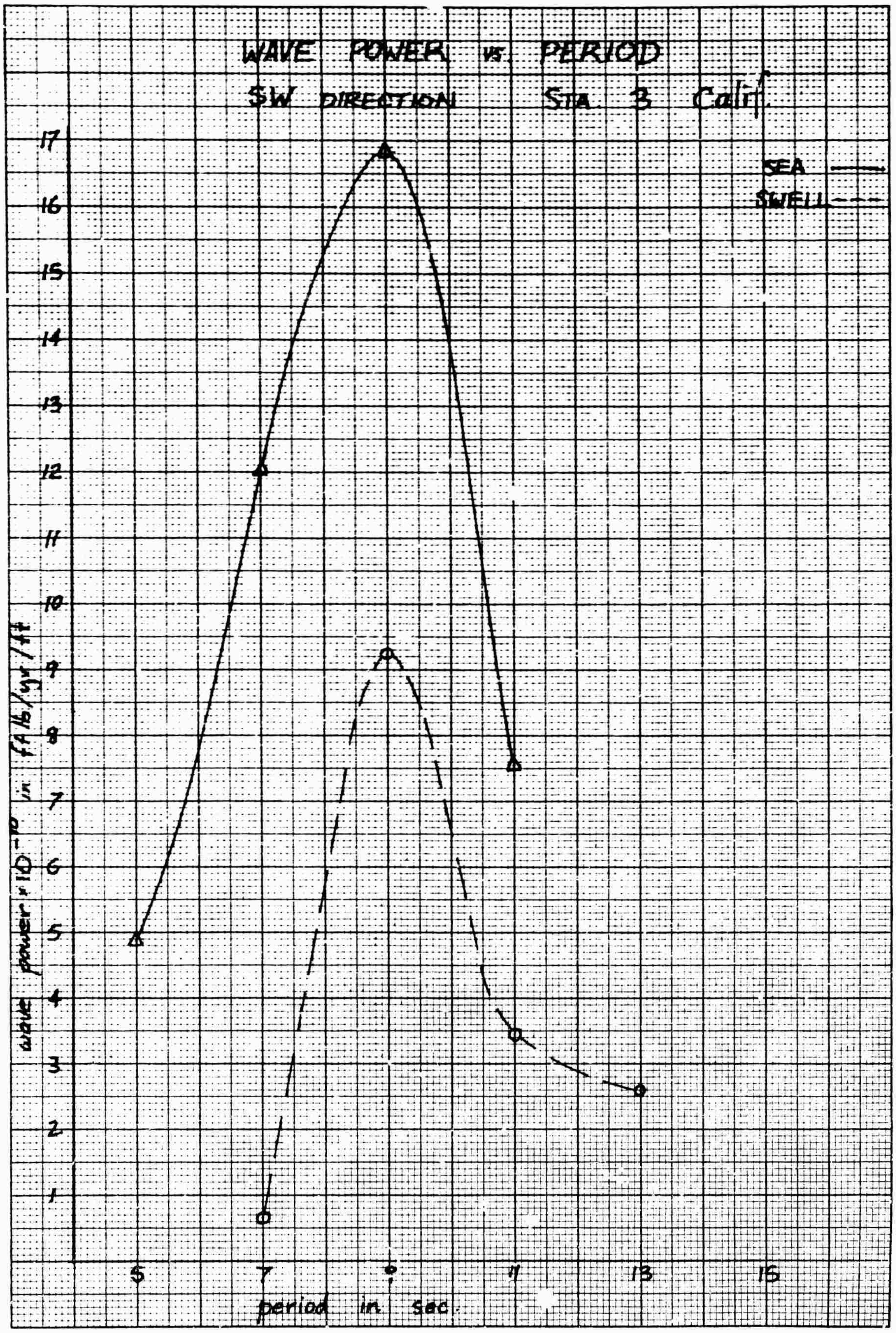

WAVE POWER vs. PERIOD
NW DIRECTION STA 3 Calif.
SEA
SWELL
32
28
26
24
22
20
18
16
14
12
10
8
6
4
2
wave power × 10⁻¹¹ in ft lb/yr/ft
5
7
9
11
13
15
17
18
period in sec.


WAVE POWER vs. PERIOD
WNW DIRECTION STA. 3 Calif.
SEA
SWELL
Wave Power × 10⁻¹¹ in ft lb/yr/ft
period in sec
5
7
9
11
13
15
17
18⁺
2
4
6
8
10
12
14
16
18
20
22

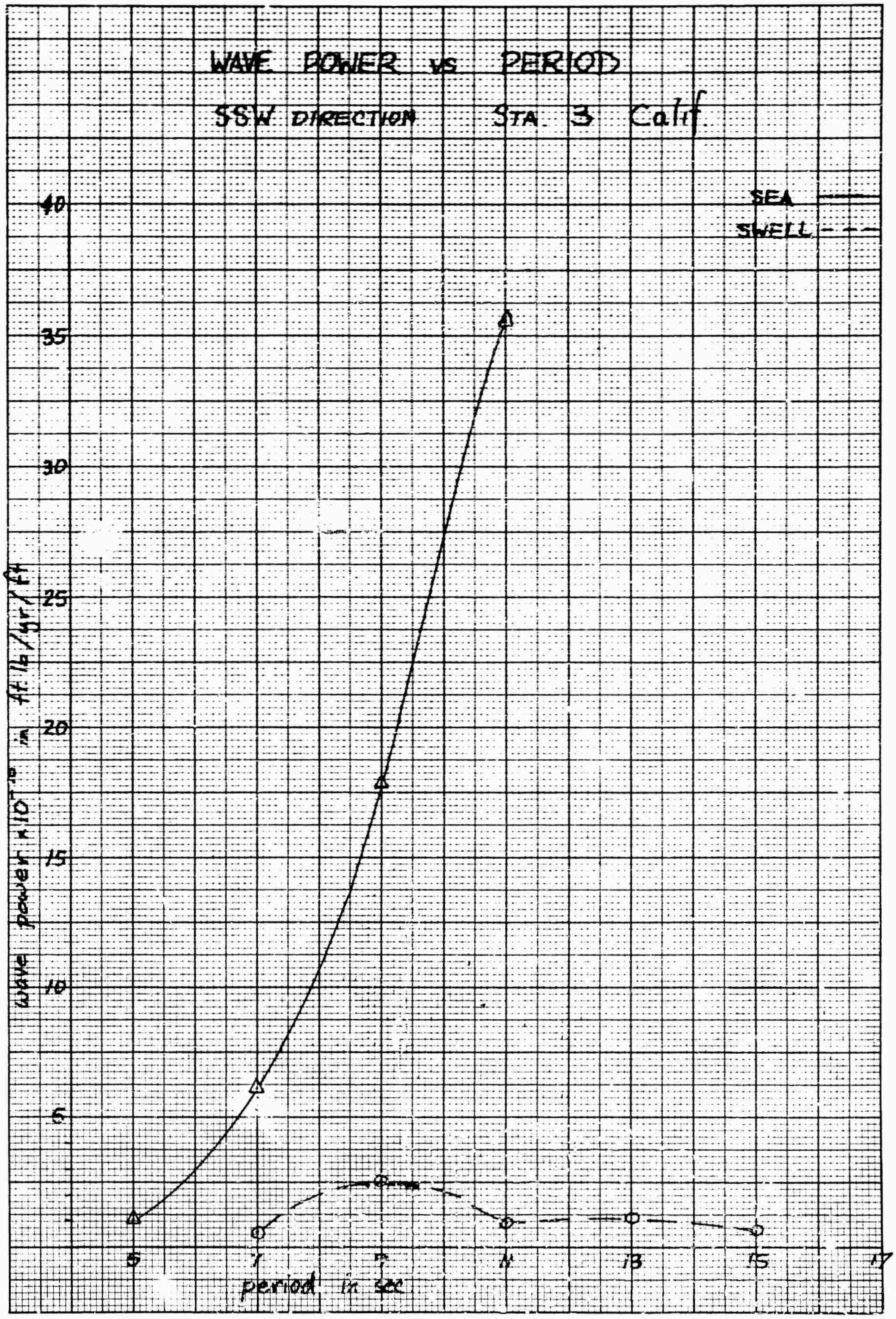


K+E 10 X 10 TO 1/2 INCH 46 1323

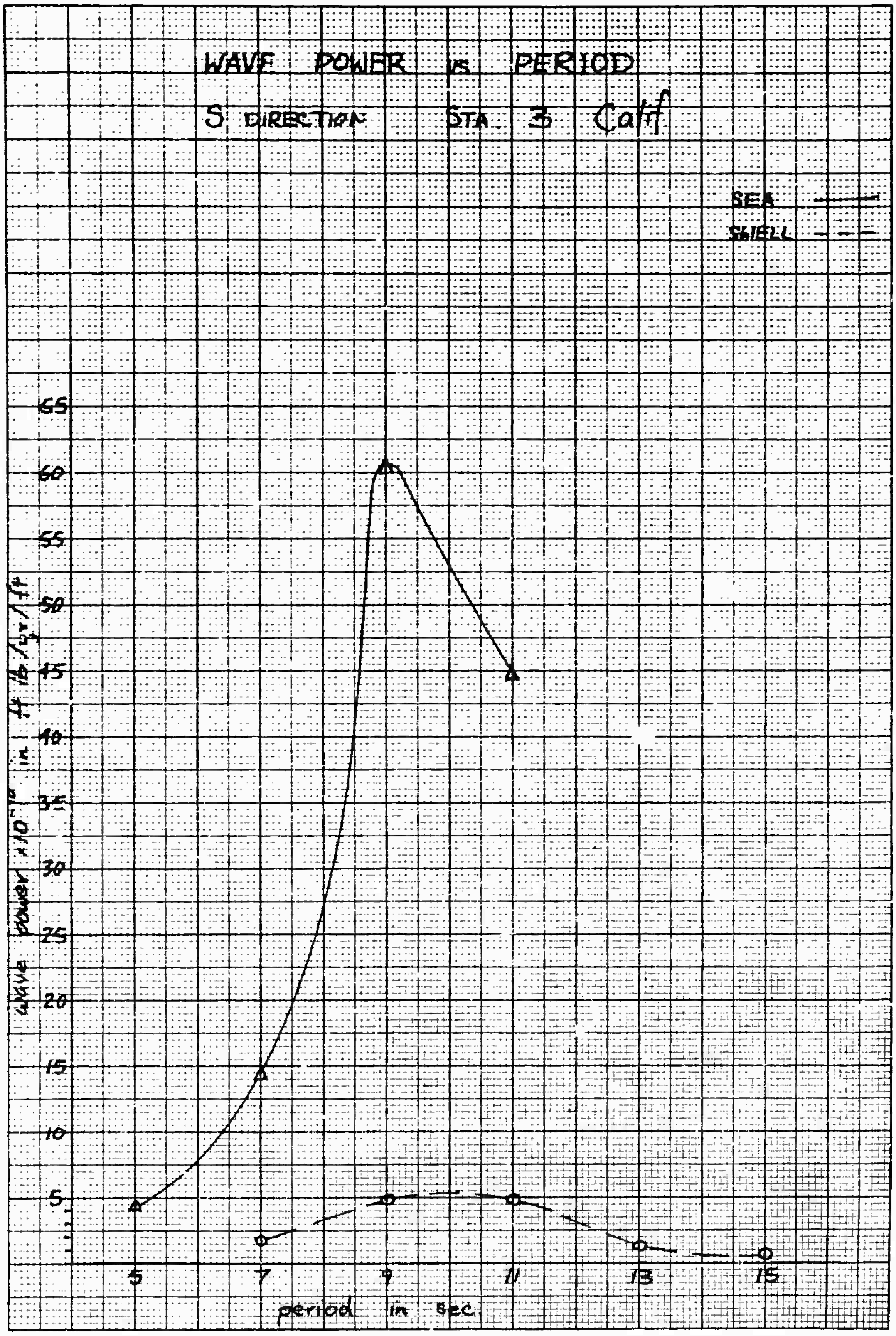

WAVE POWER vs PERIOD
WSW DIRECTION
STA 3 Calif
SEA
SWELL
wave power x 10^-11 in ft lb/yr/ft
40
35
30
25
20
15
10
5
5
7
9
11
13
15
17
18+
period in sec
K&E 10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.



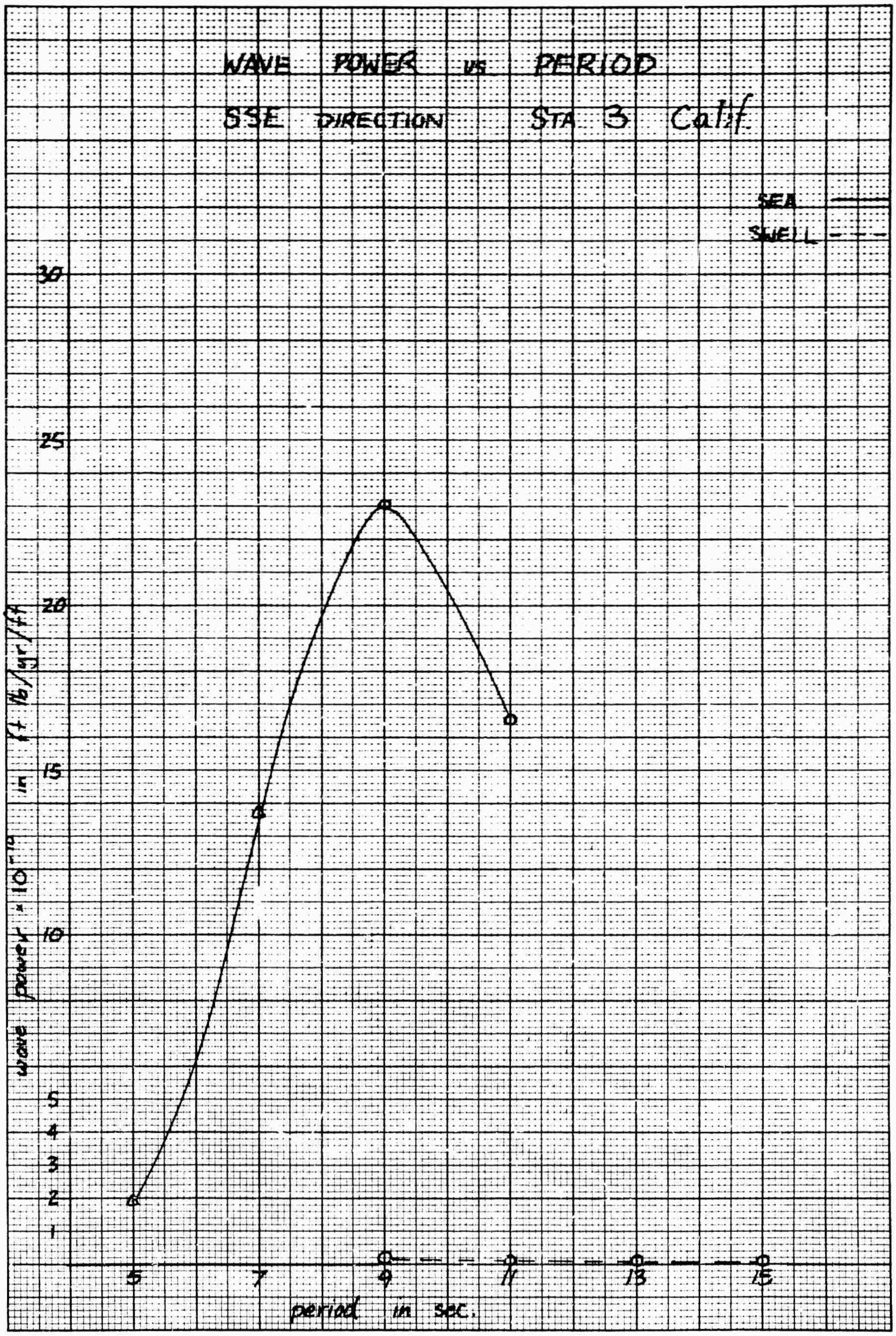
WAVE POWER vs PERIOD
SW DIRECTION STA. 3 Calif.
SEA
SWELL
wave power × 10^-10 in ft lb/yr/ft
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
period in sec.



K&E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



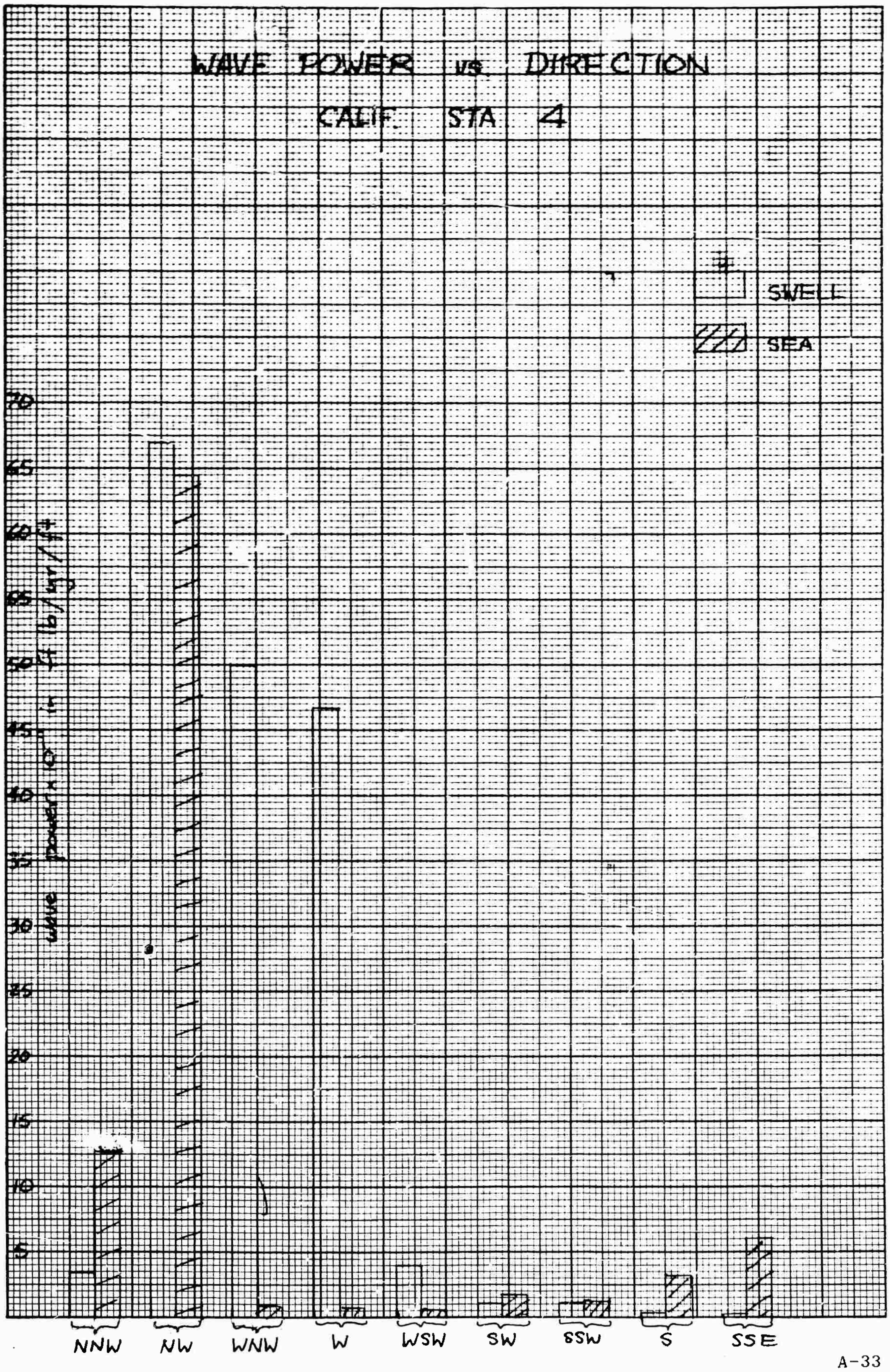
K&E 10 X 10 TO 1/2 INCH 46 1323

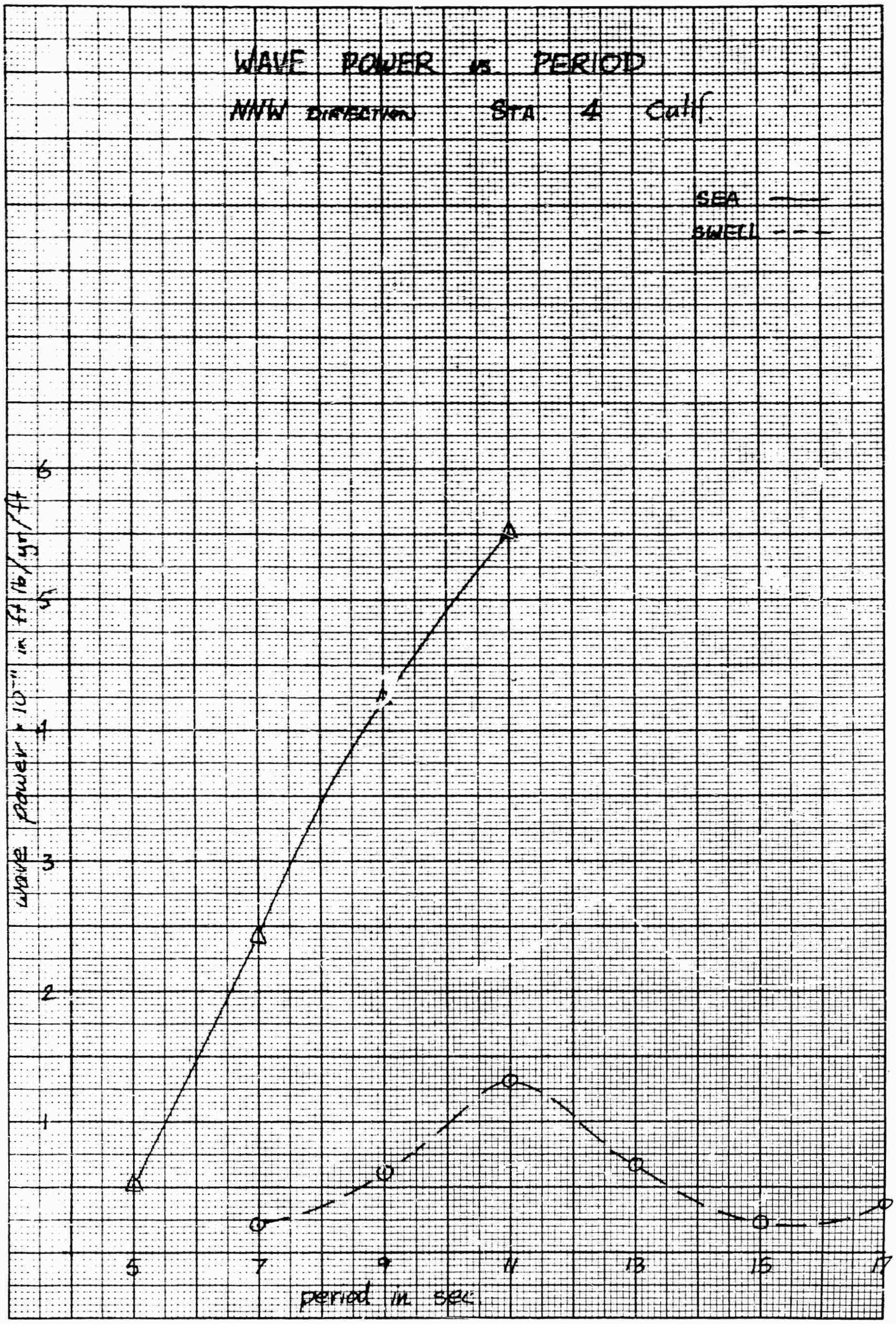


WAVE POWER vs PERIOD
SSE DIRECTION STA 3 Calif.
SEA
SWELL
wave power × 10⁻¹⁰ in ft lb/yr/ft
30
25
20
15
10
5
4
3
2
1
5
7
9
11
13
15
period in sec.

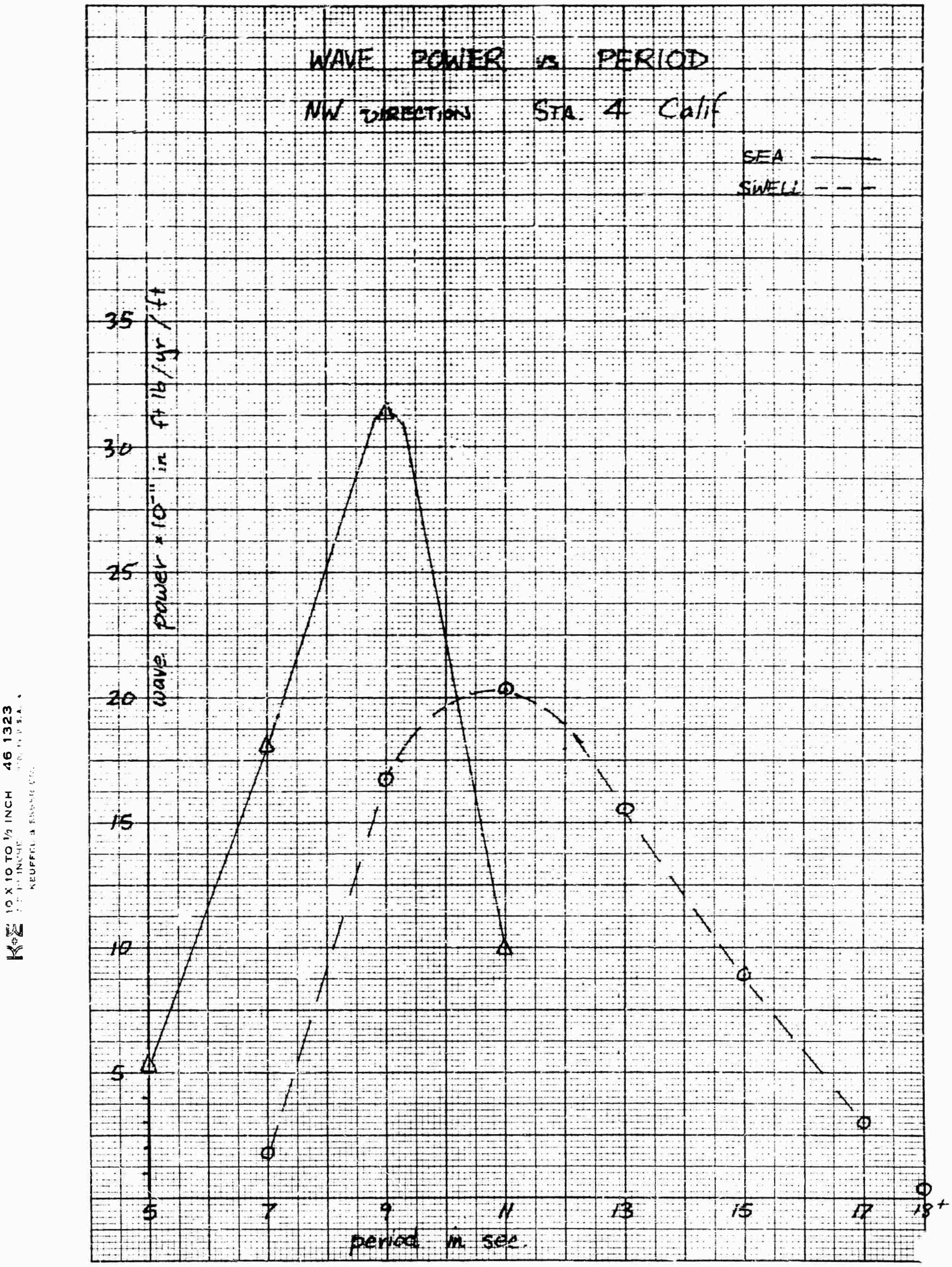
STATION 4 - CALIFORNIA COAST

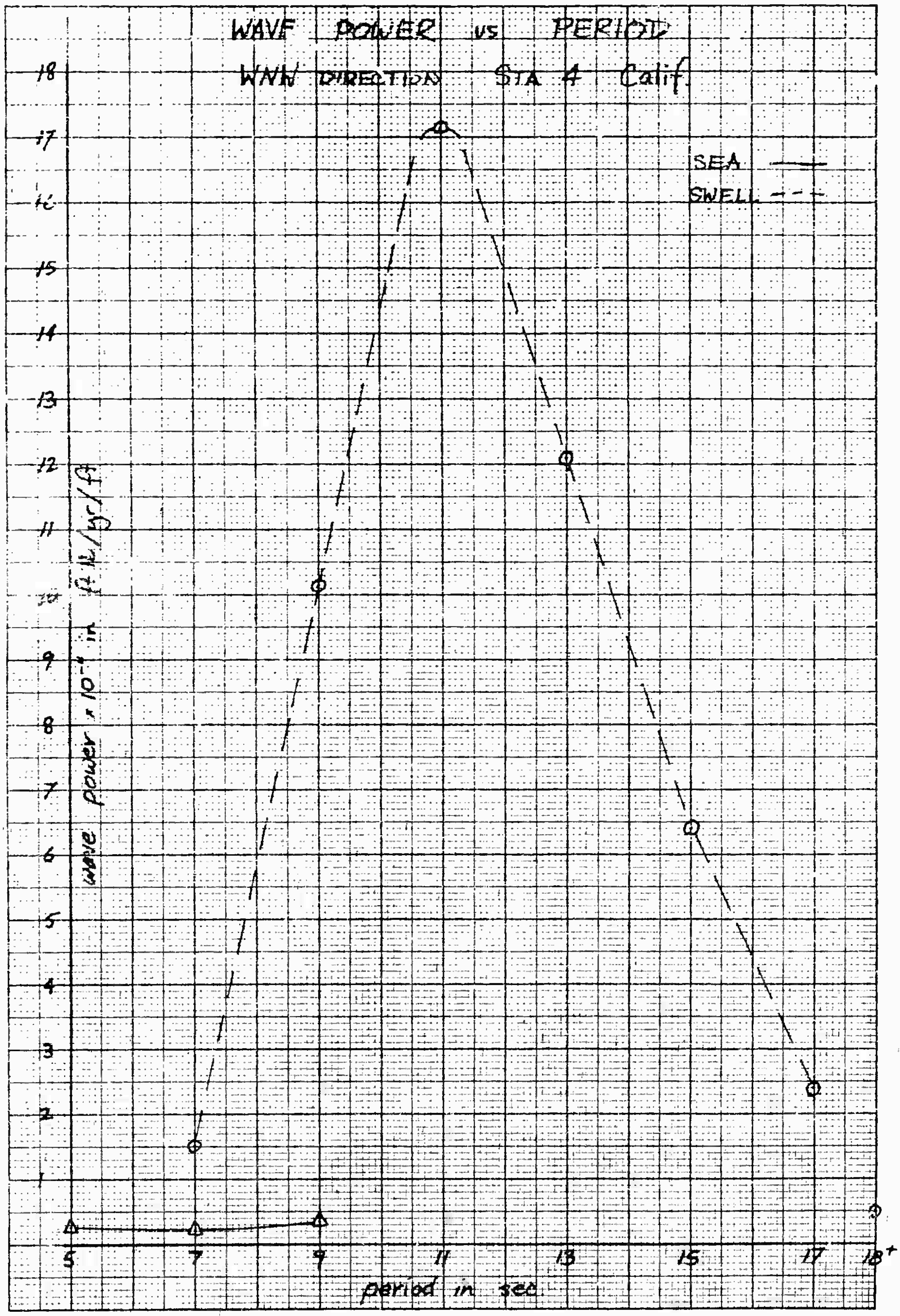
Lat. 35.5°N, Long. 122.0°W

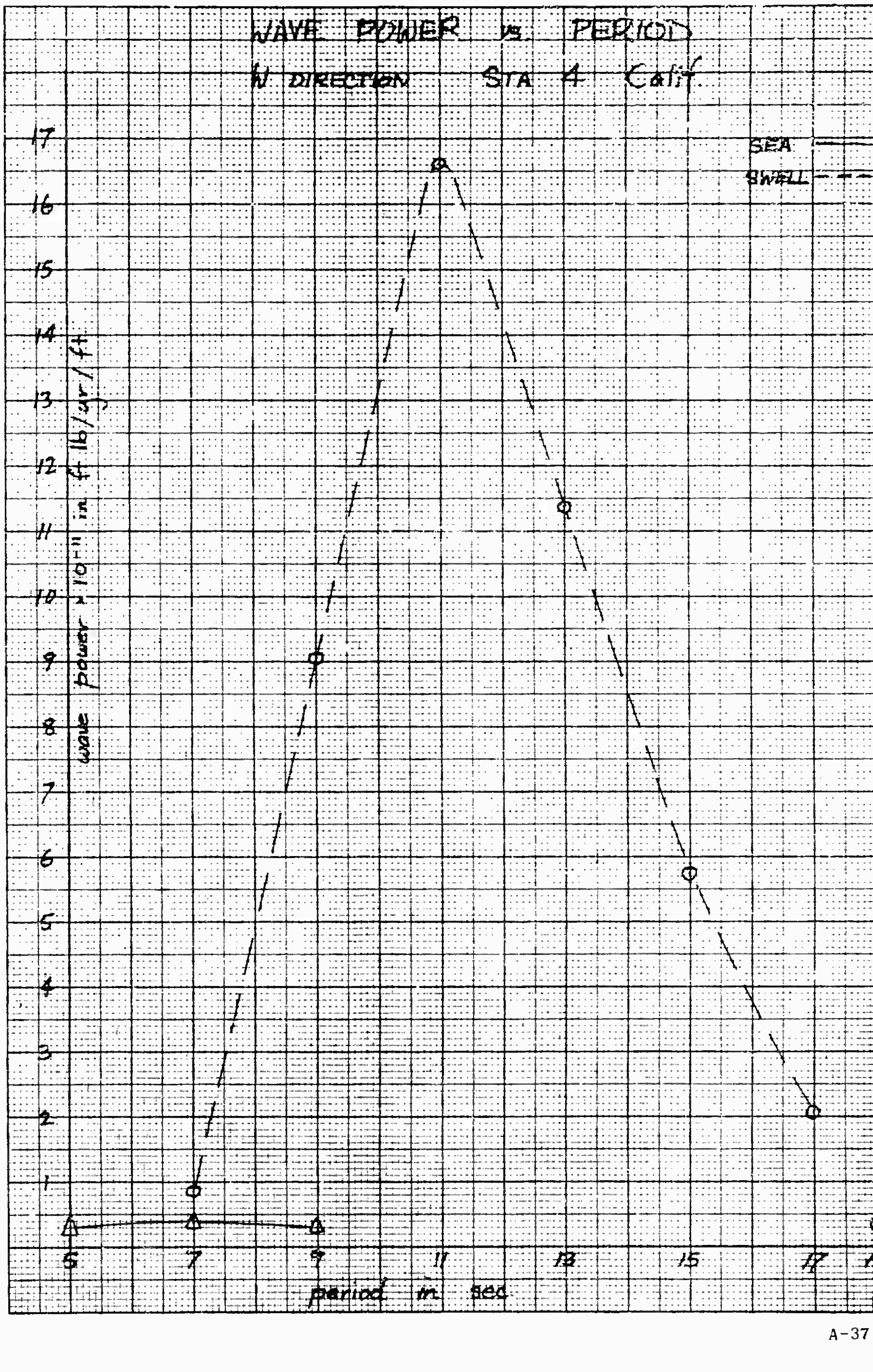

WAVE POWER vs. DIRECTION
CALIF. STA. 4
SWELL
SEA
70
65
60
55
50
45
40
35
30
25
20
15
10
5
wave power x 10⁶ in ft lb/yr/ft
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE



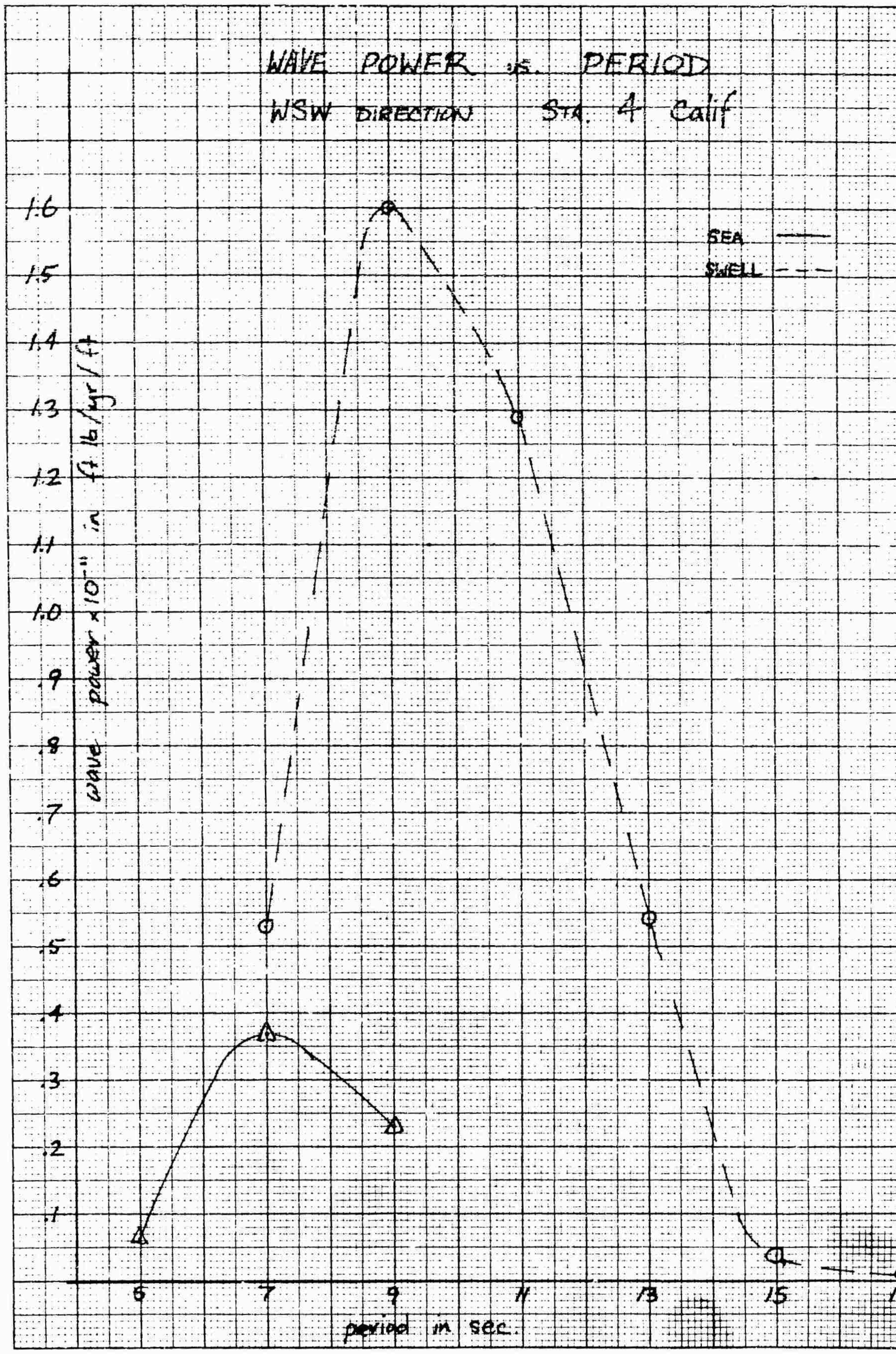
K+E 10 X 10 TO ½ INCH 46 1323
KEUFFEL & ESSER CO.

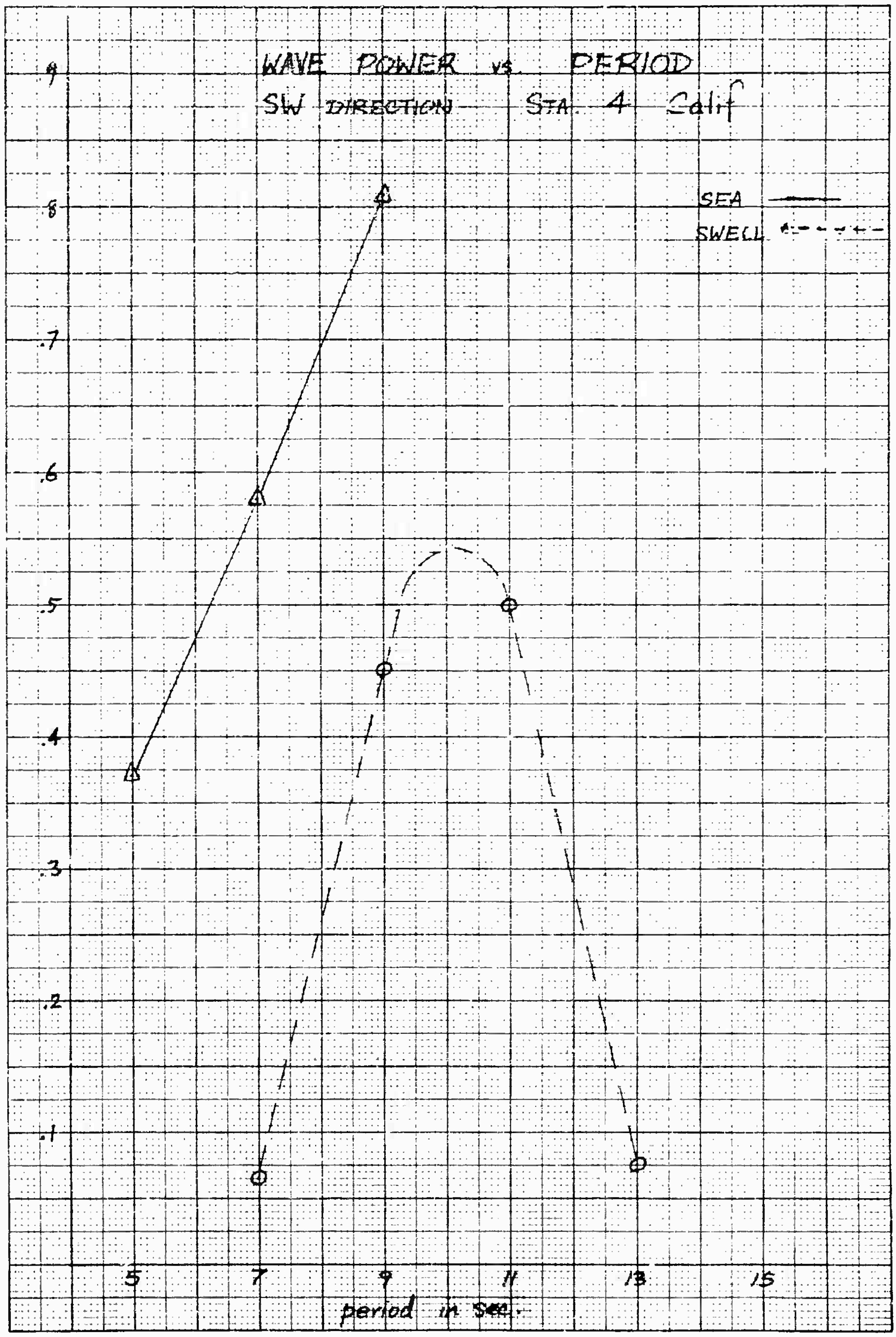

WAVE POWER vs PERIOD
NW DIRECTION STA. 4 Calif
SEA
SWELL
wave power × 10" in ft lb/yr/ft
35
30
25
20
15
10
5
5
7
9
11
13
15
17
18+
period in sec.
10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

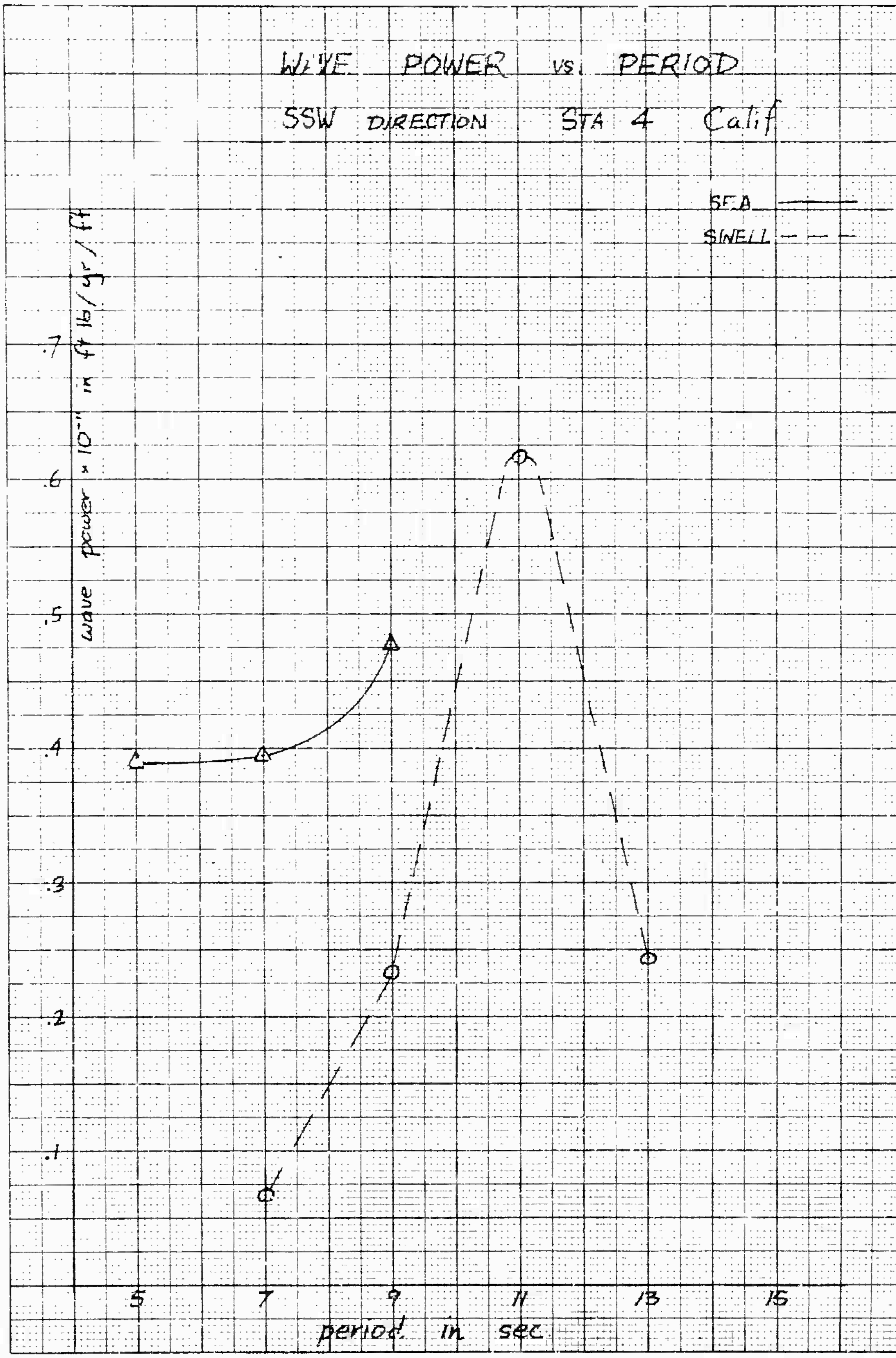

WAVE POWER vs PERIOD
WNW DIRECTION STA 4 Calif.
SEA
SWELL
wave power x 10⁻⁴ in ft lb/yr/ft
period in sec
5 7 9 11 13 15 17 18+
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

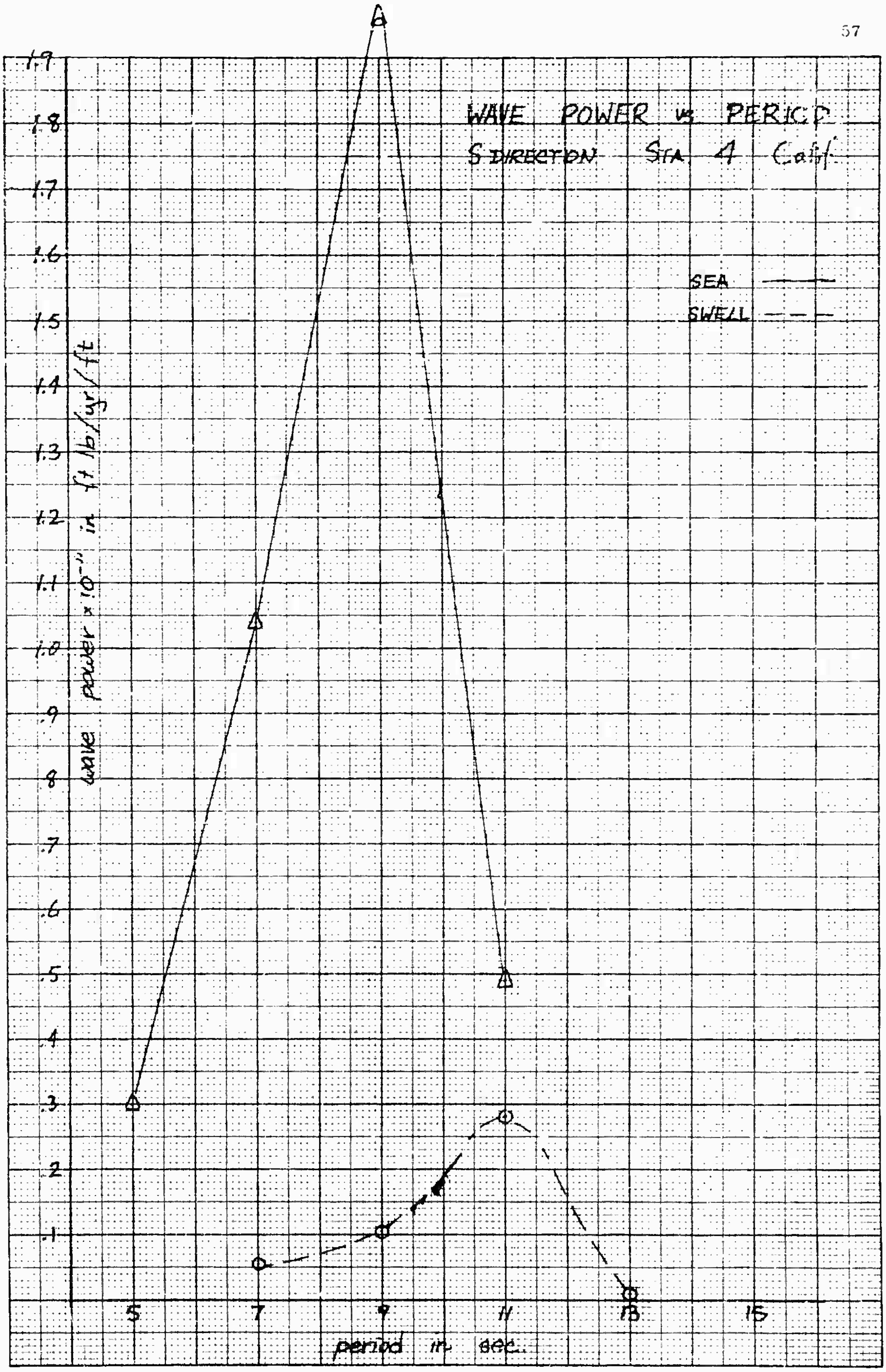


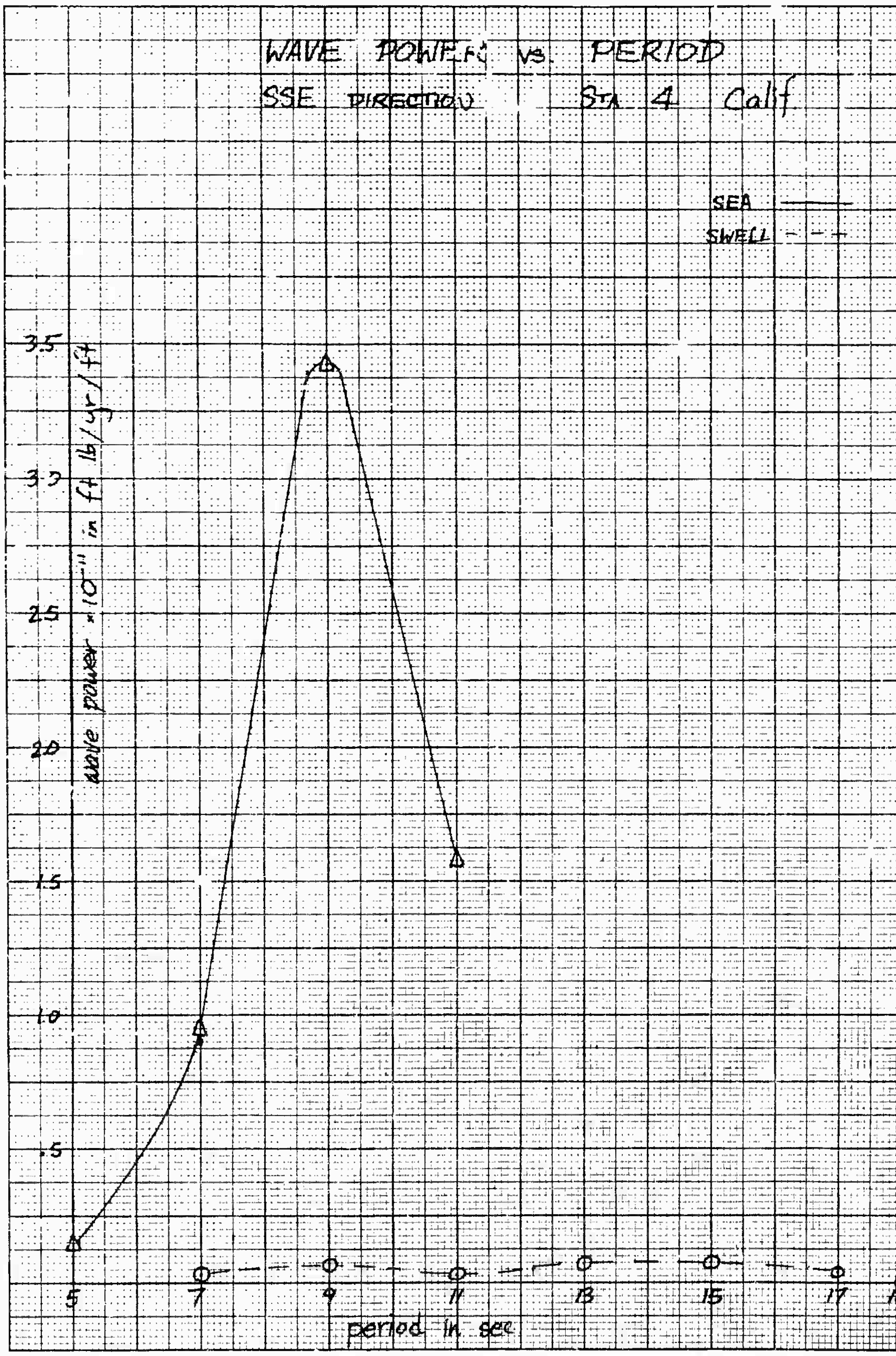
K+E 10 X 10 TO 1/2 INCH 46 1323 KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
WSW DIRECTION STA. 4 Calif
SEA
SWELL
1.6
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
wave power × 10⁻¹¹ in ft lb/yr/ft
6
7
9
11
13
15
17
period in sec.


WAVE POWER vs. PERIOD
SW DIRECTION STA. 4 Calif
SEA
SWELL
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
period in sec.

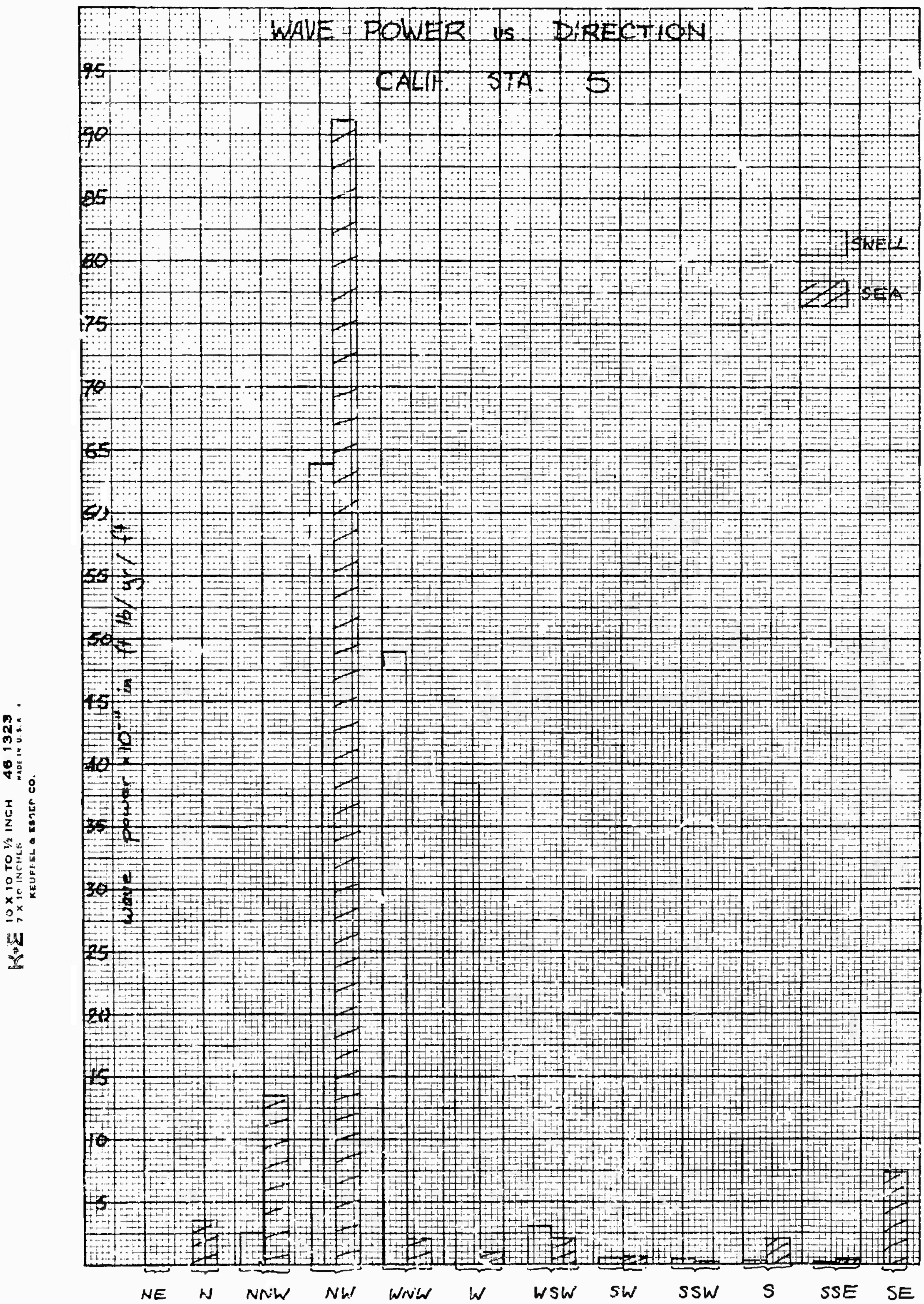

WAVE POWER vs PERIOD
SSW DIRECTION STA 4 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
.1
.2
.3
.4
.5
.6
.7
5
7
9
11
13
15
period in sec

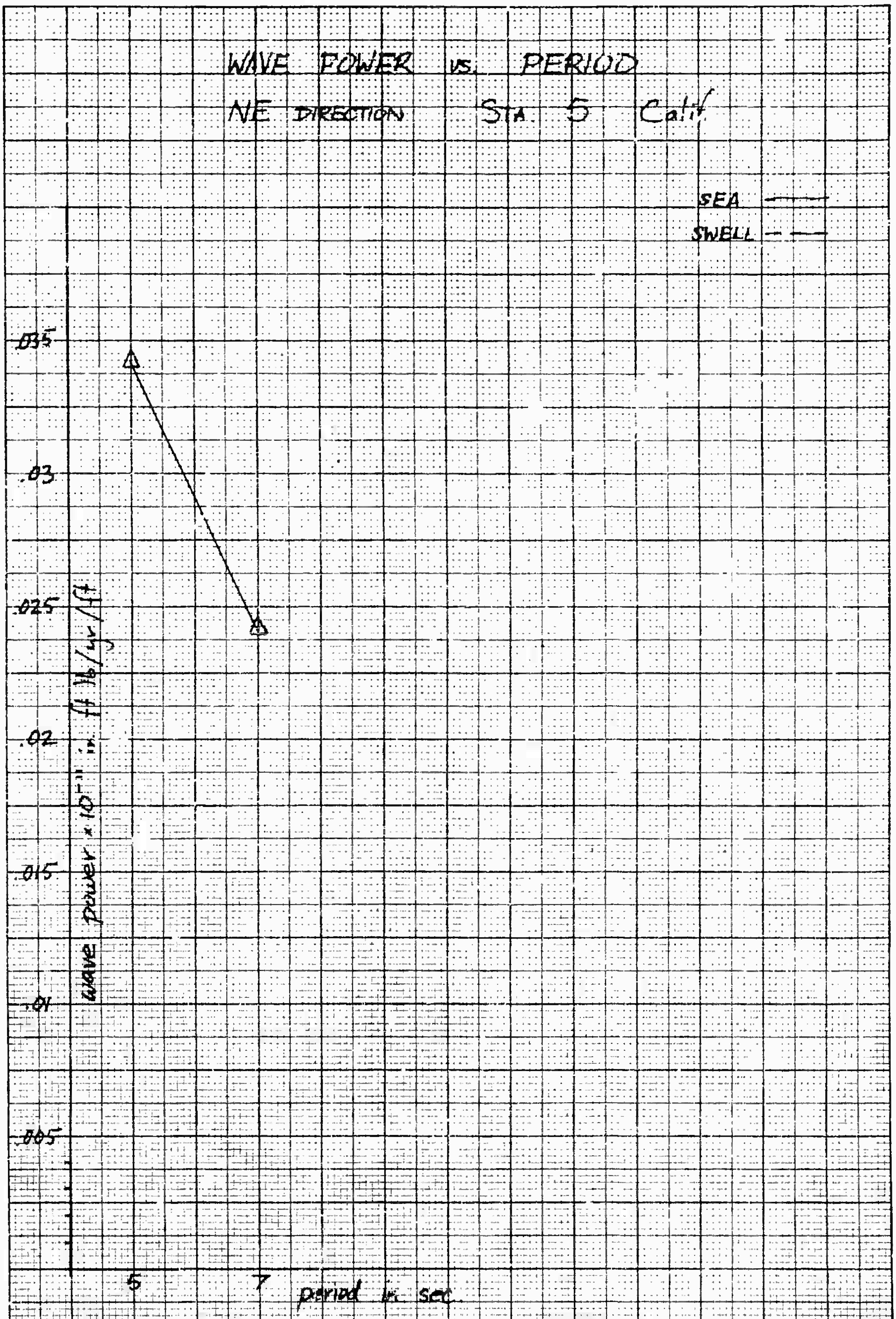

WAVE POWER vs PERIOD
S DIRECTION STA 4 Calif.
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
period in sec.


WAVE POWER vs. PERIOD
SSE DIRECTION Sta 4 Calif.
SEA
SWELL
3.5
3.0
2.5
2.0
1.5
1.0
.5
wave power ×10⁻¹¹ in ft lb/yr/ft
5
7
9
11
13
15
17
18+
period in sec

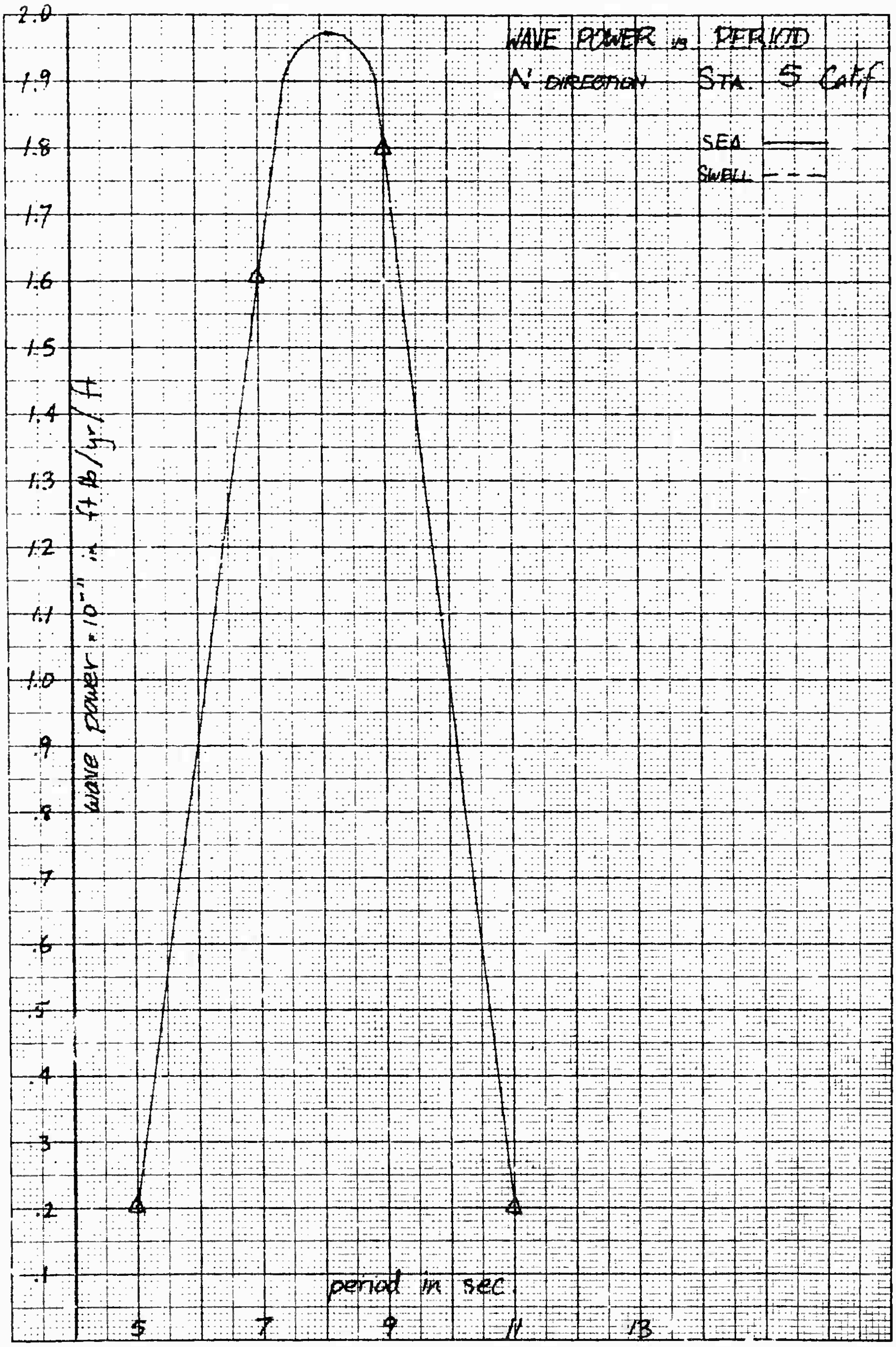
STATION 5 - CALIFORNIA COAST

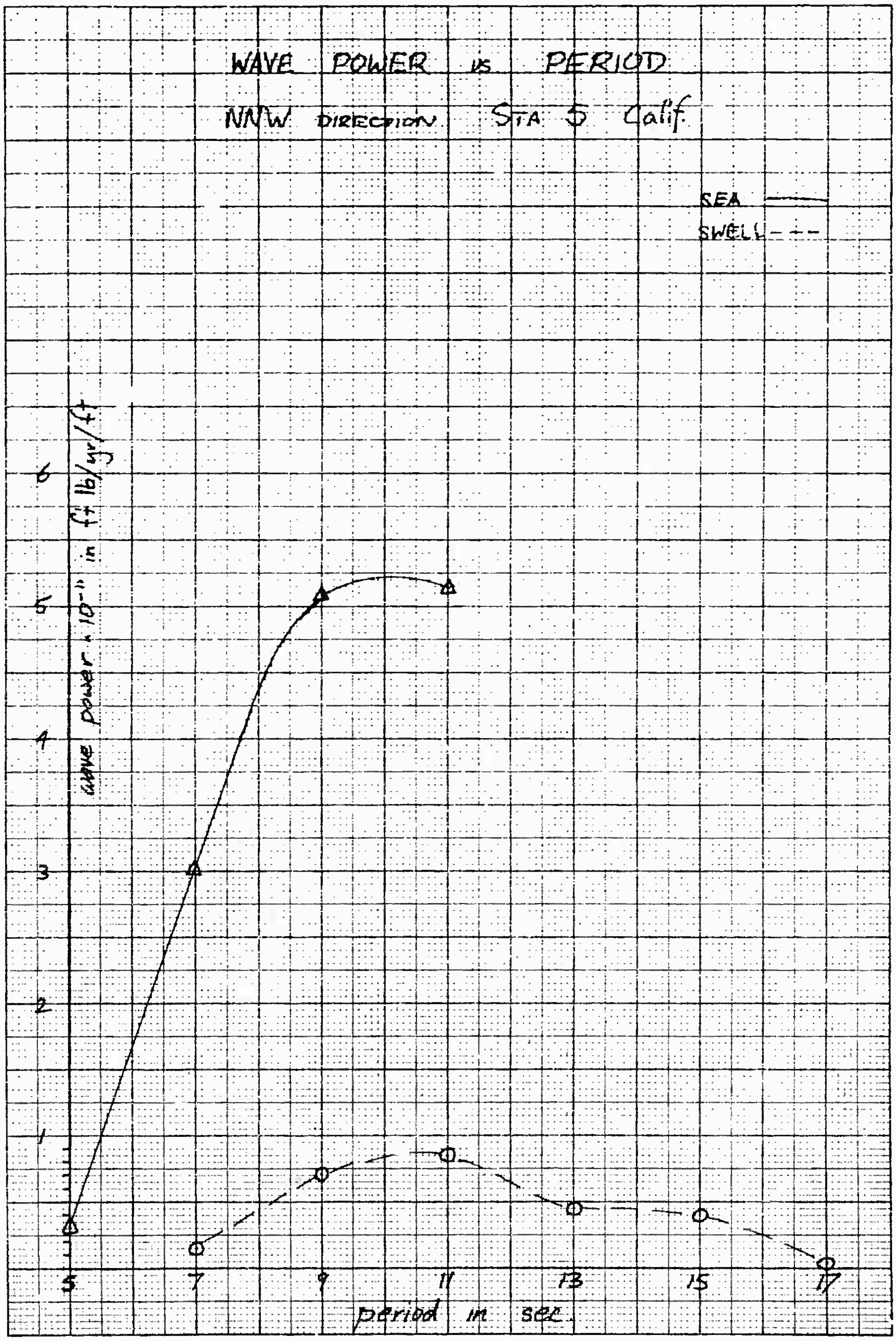
Lat. 34.5°N, Long. 121.0°W

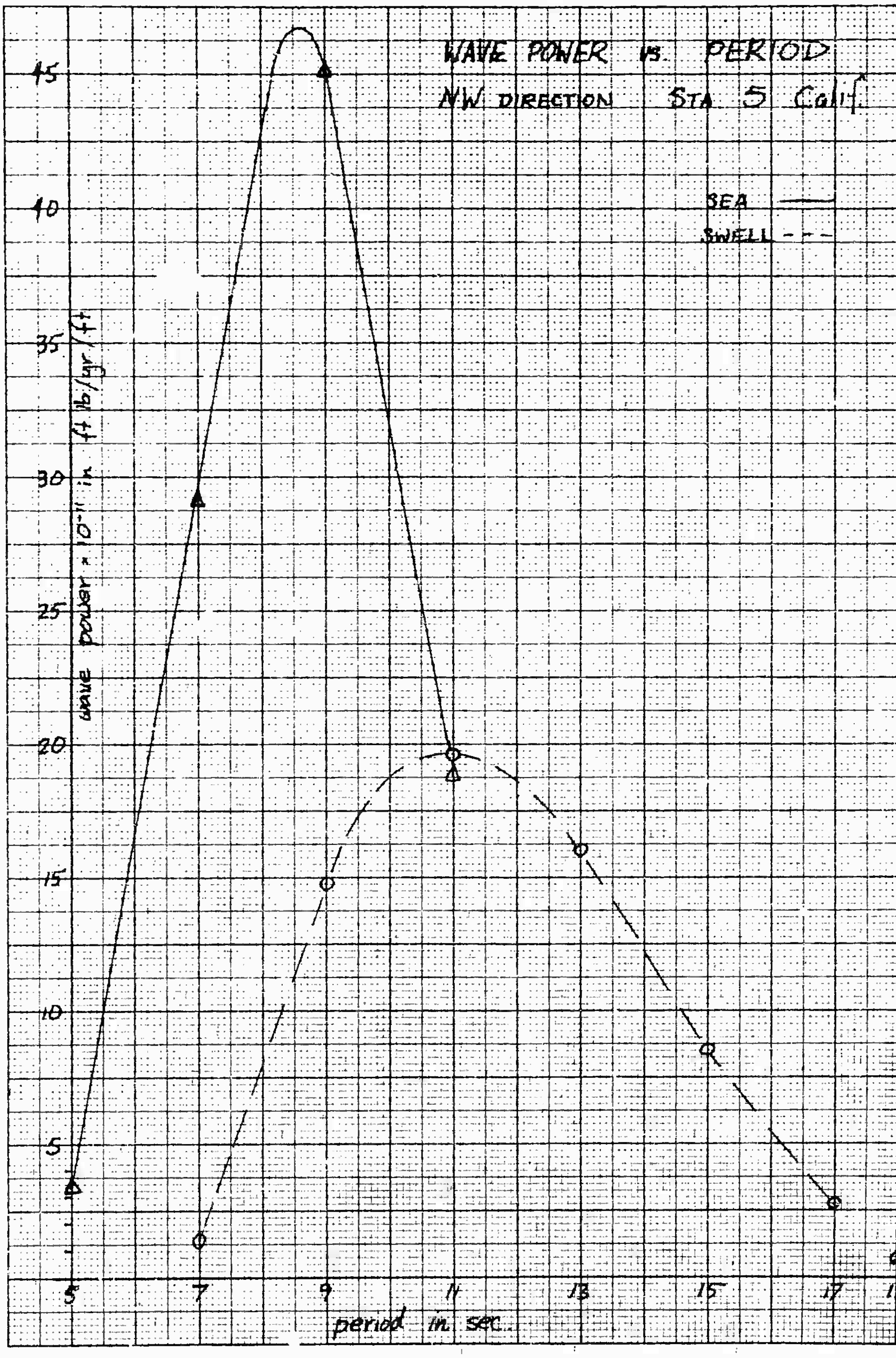

WAVE POWER vs. DIRECTION
CALIF. STA. 5
SWELL
SEA
wave power x 10^-11 in ft lb/yr/ft
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
NE
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
SE
10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



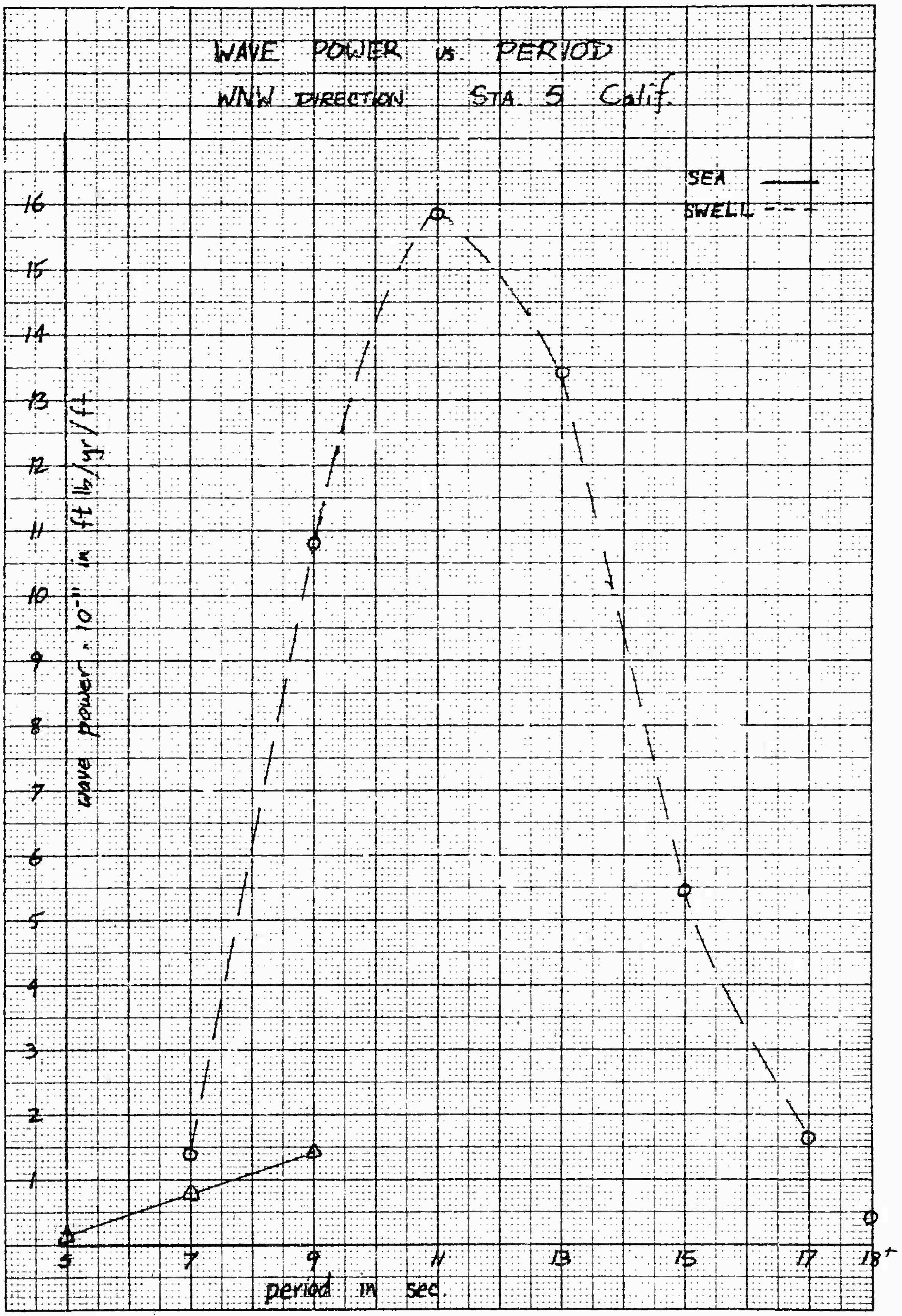
WAVE POWER vs. PERIOD
NE DIRECTION Sta. 5 Calif
SEA
SWELL
.035
.03
.025
.02
.015
.01
.005
wave power × 10⁻¹¹ in. ft lb/yr/ft
5
7
period in sec.


WAVE POWER vs PERIOD
N DIRECTION STA. 5 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
period in sec
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13

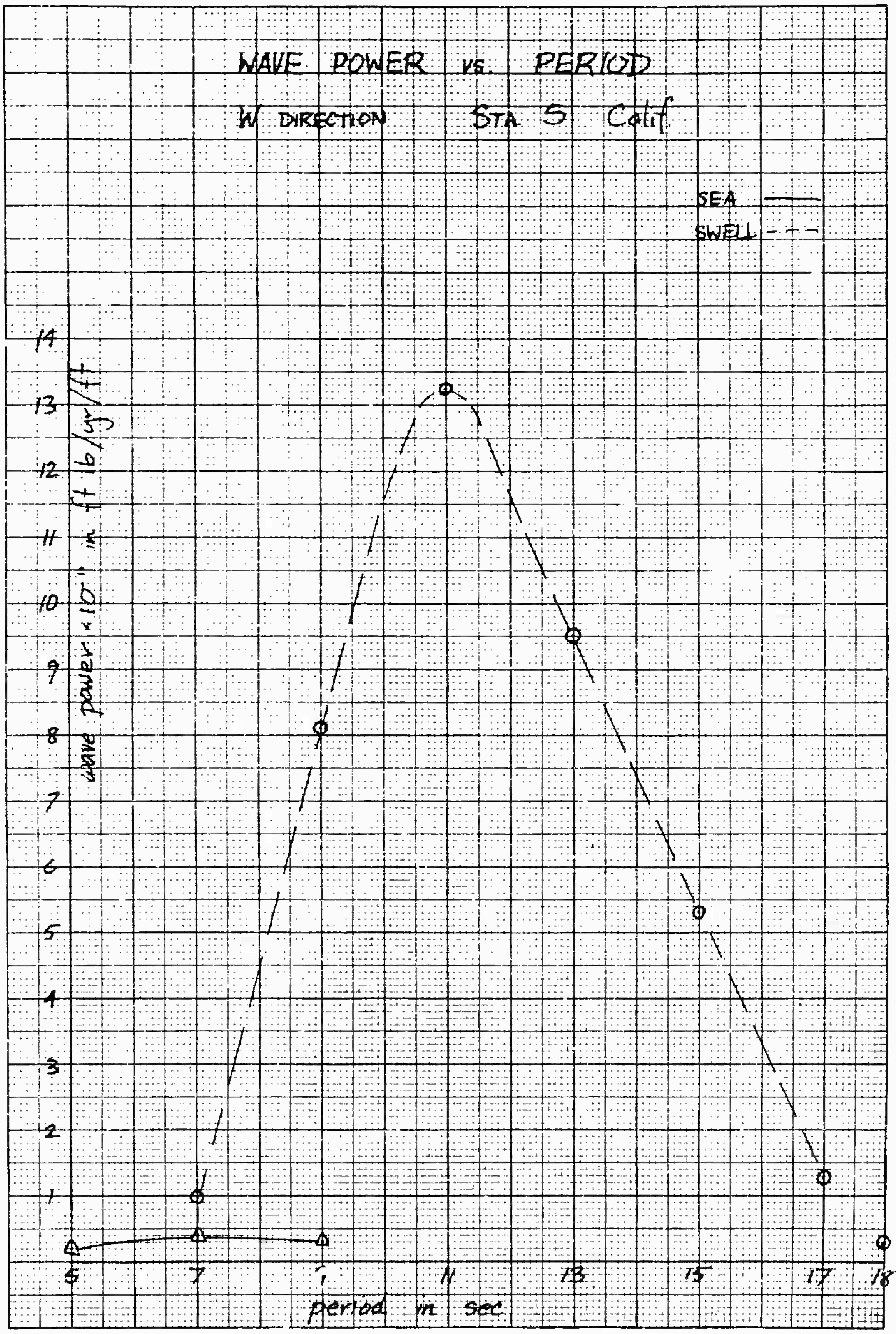

WAVE POWER vs PERIOD
NNW DIRECTION STA 5 Calif.
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
6
5
4
3
2
1
5
7
9
11
13
15
17
period in sec.

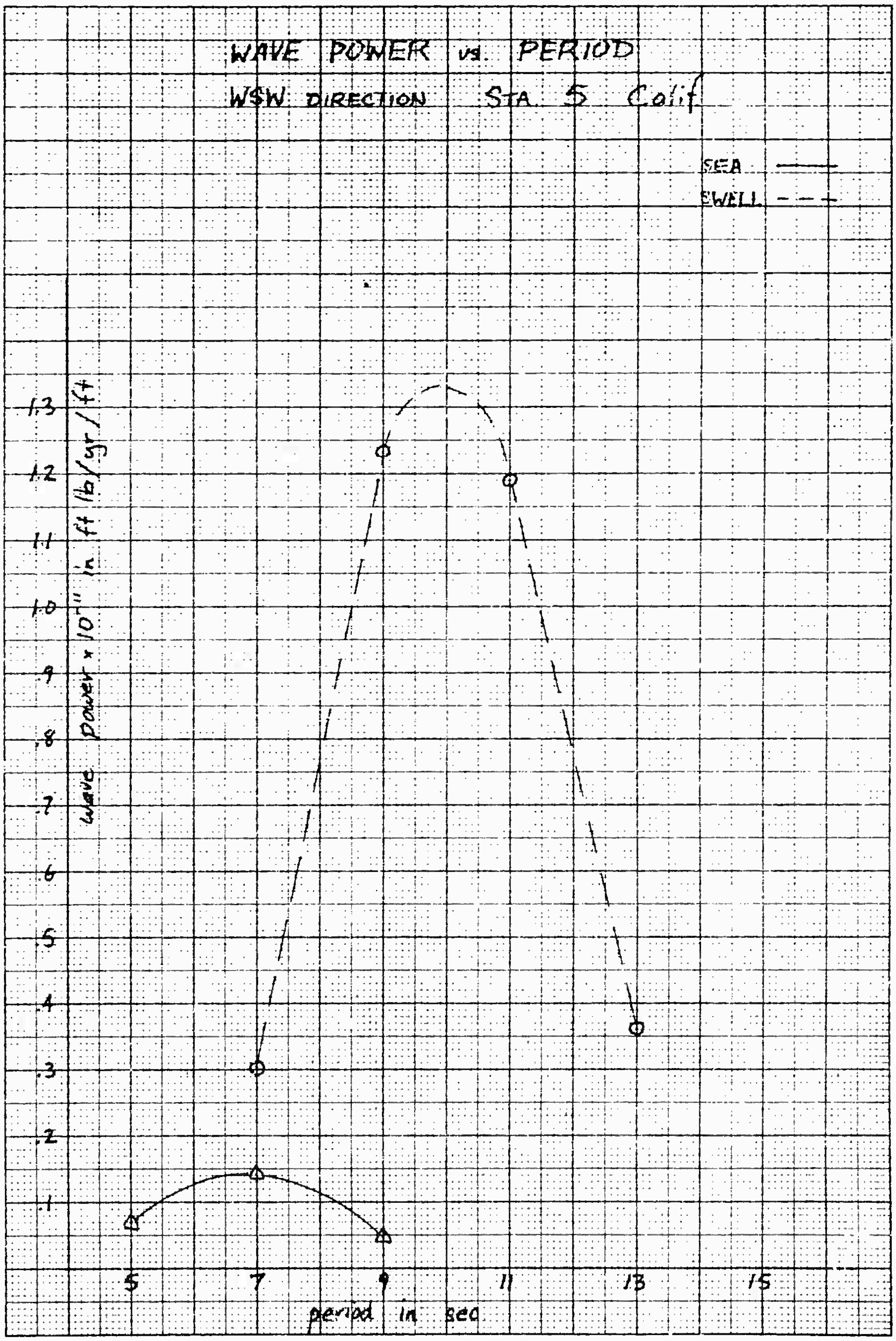


K+E 10 X 10 TO ½ INCH 46 1323

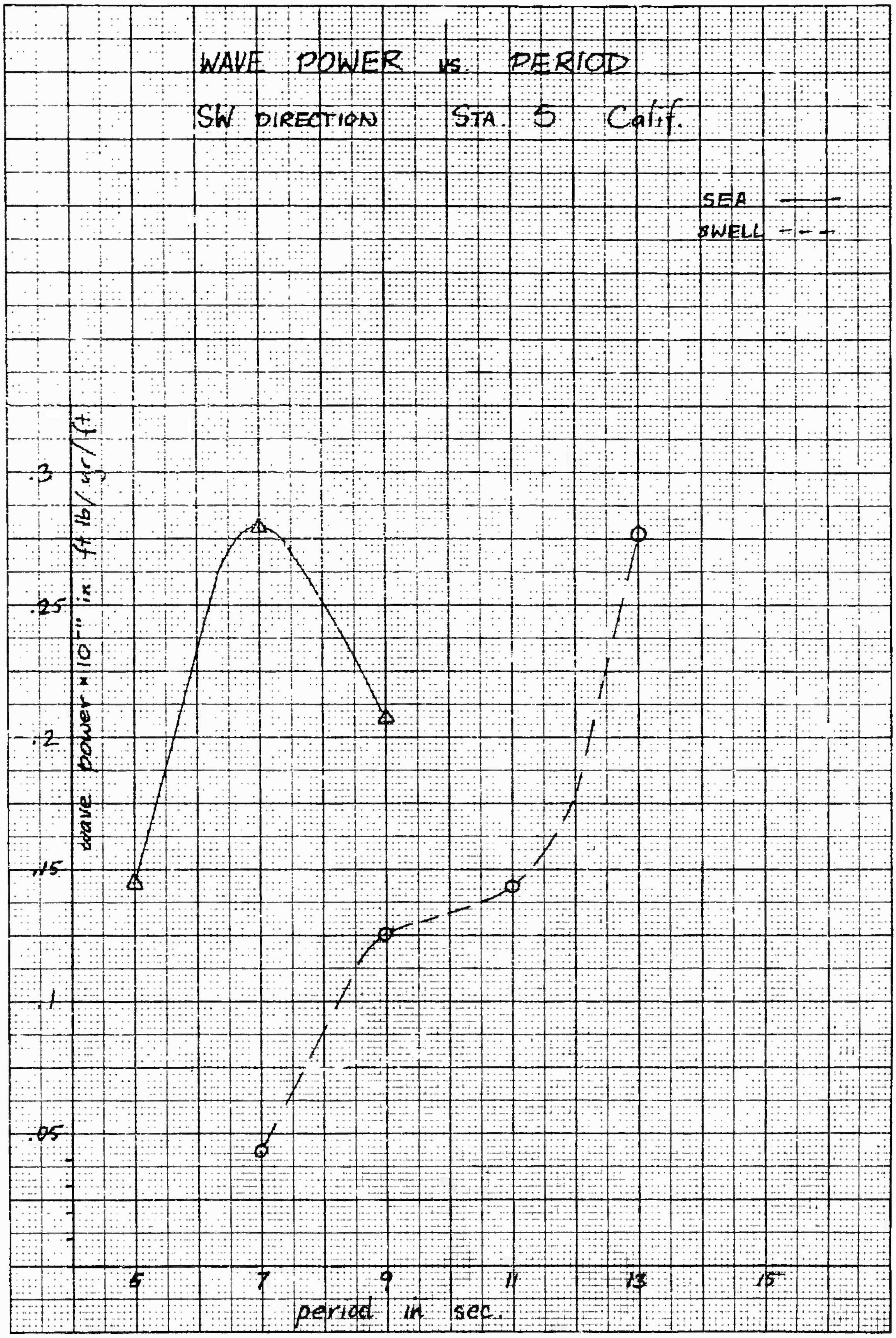


10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

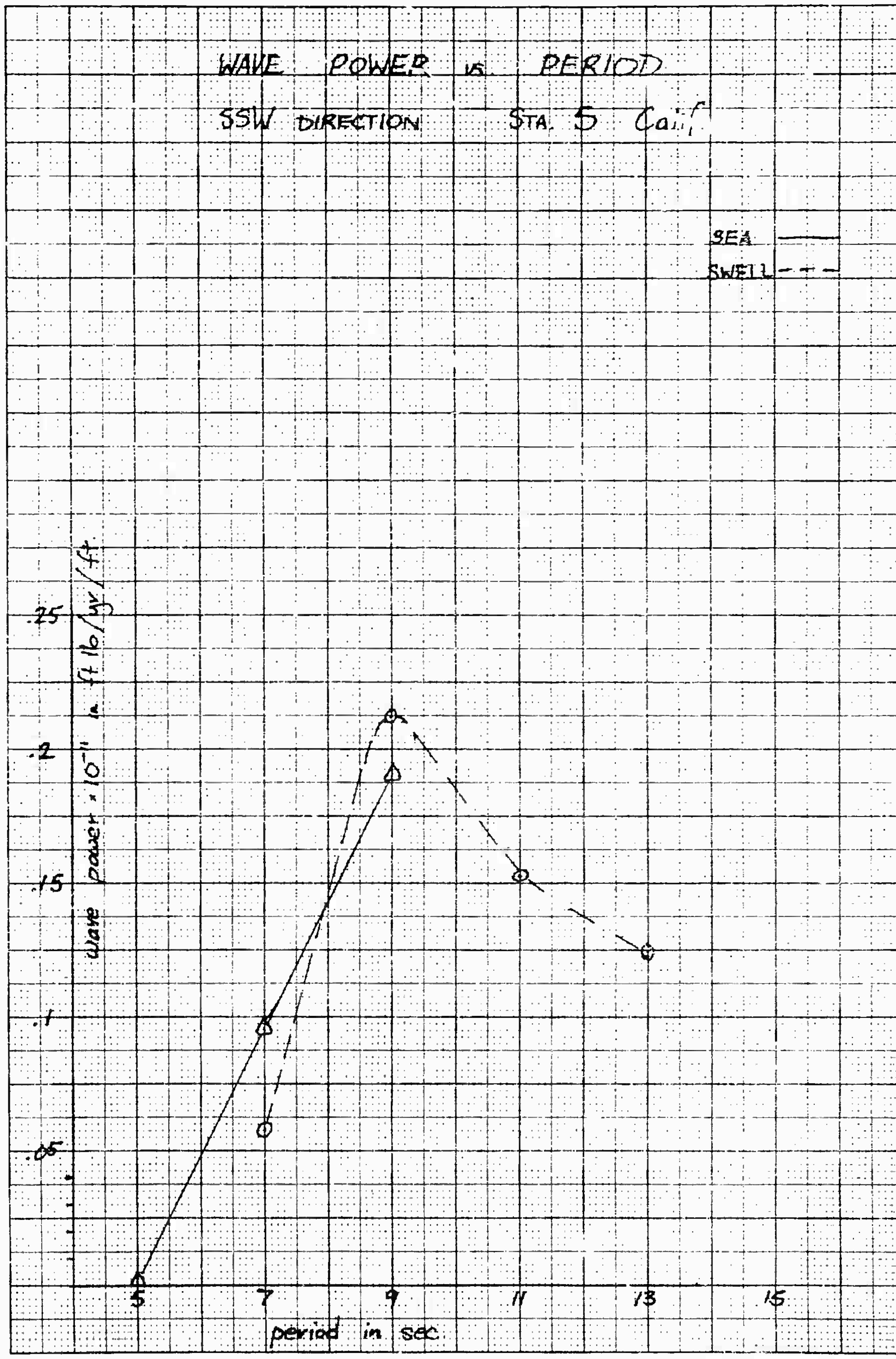

WAVE POWER vs. PERIOD
W DIRECTION STA 5 Calif
SEA
SWELL
wave power × 10⁴ in ft lb/yr/ft
period in sec
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
18+

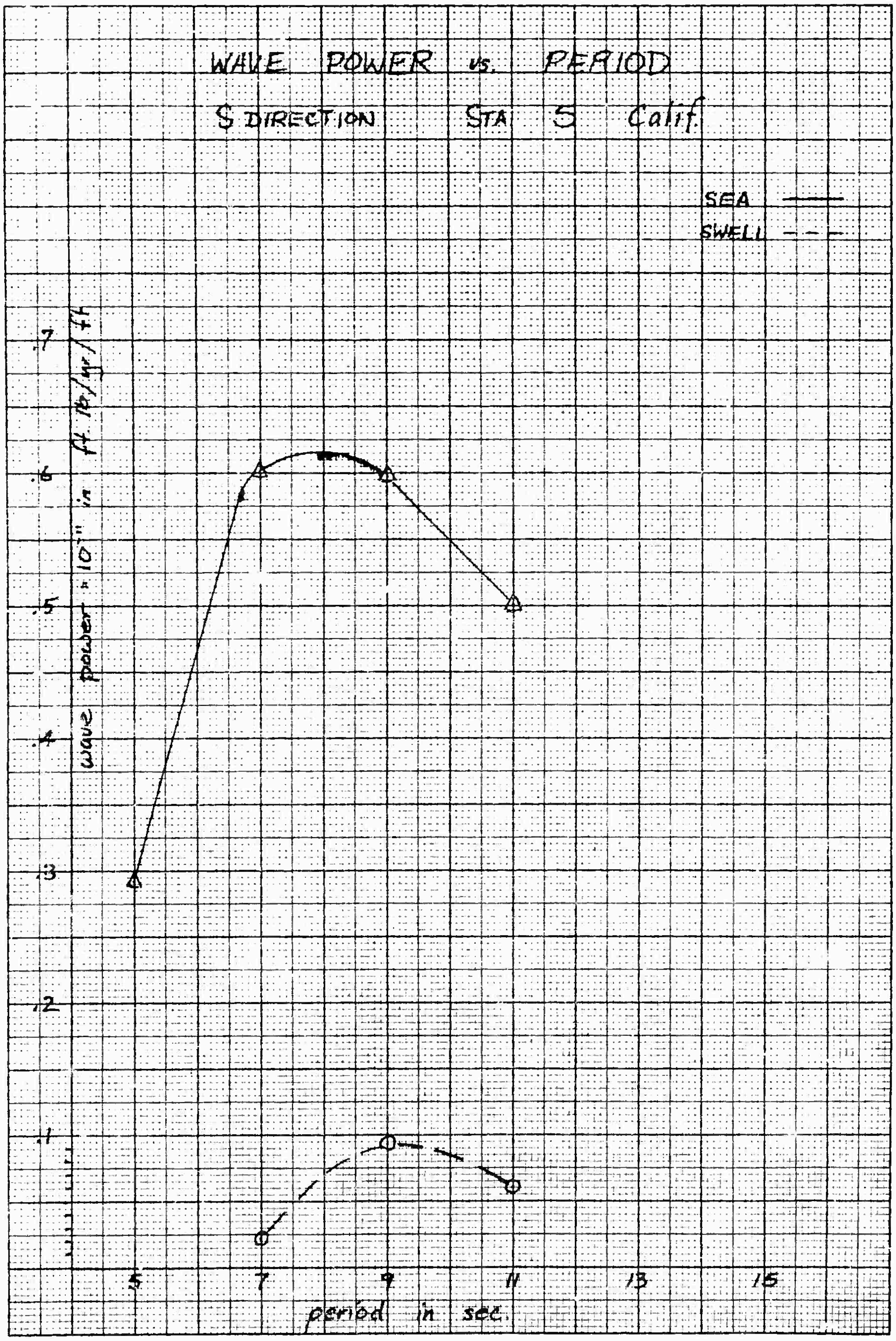


WAVE POWER vs. PERIOD
WSW DIRECTION STA. 5 Calif
SEA
SWELL
Wave power x 10^11 in ft lb/yr/ft
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
period in sec

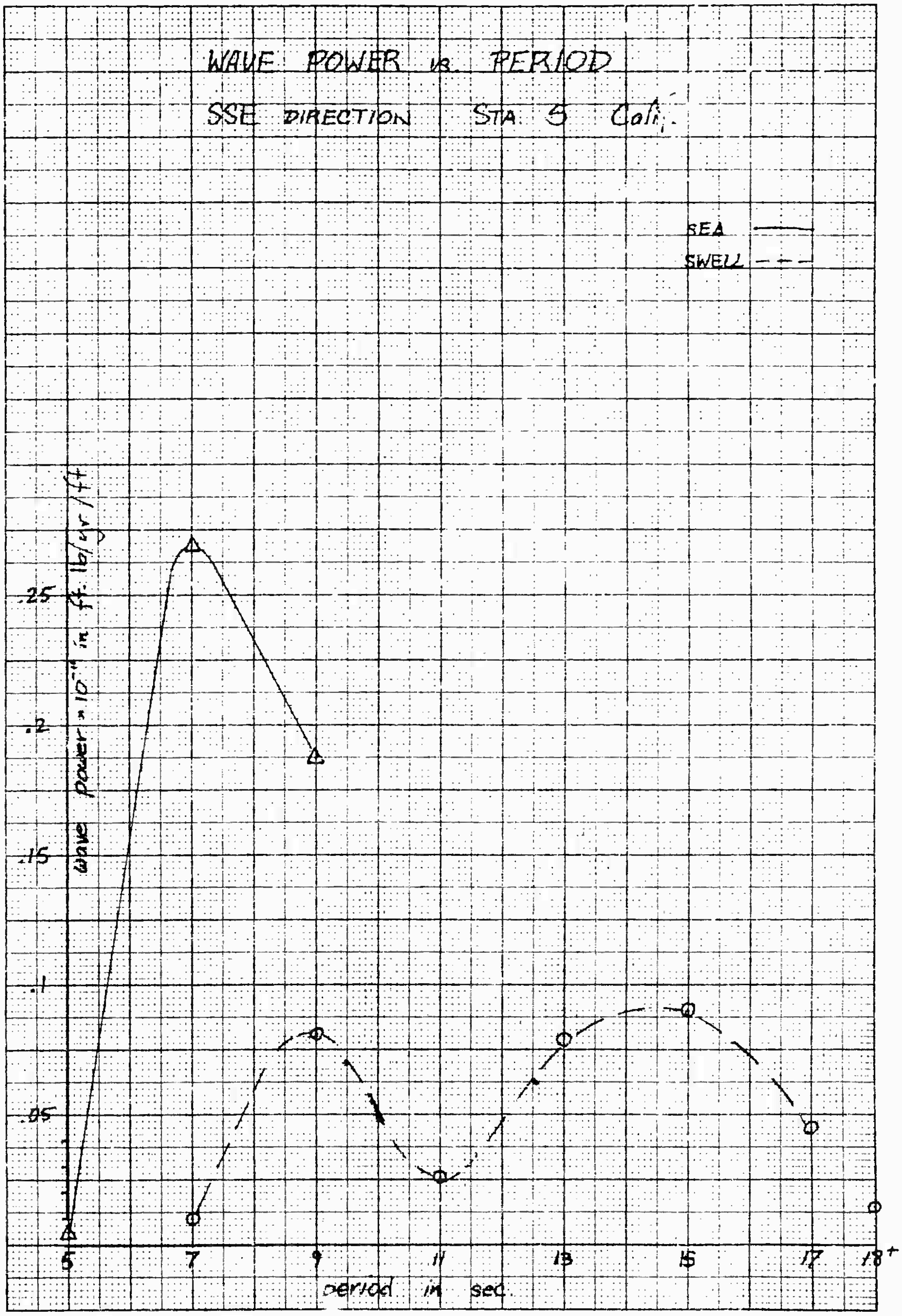


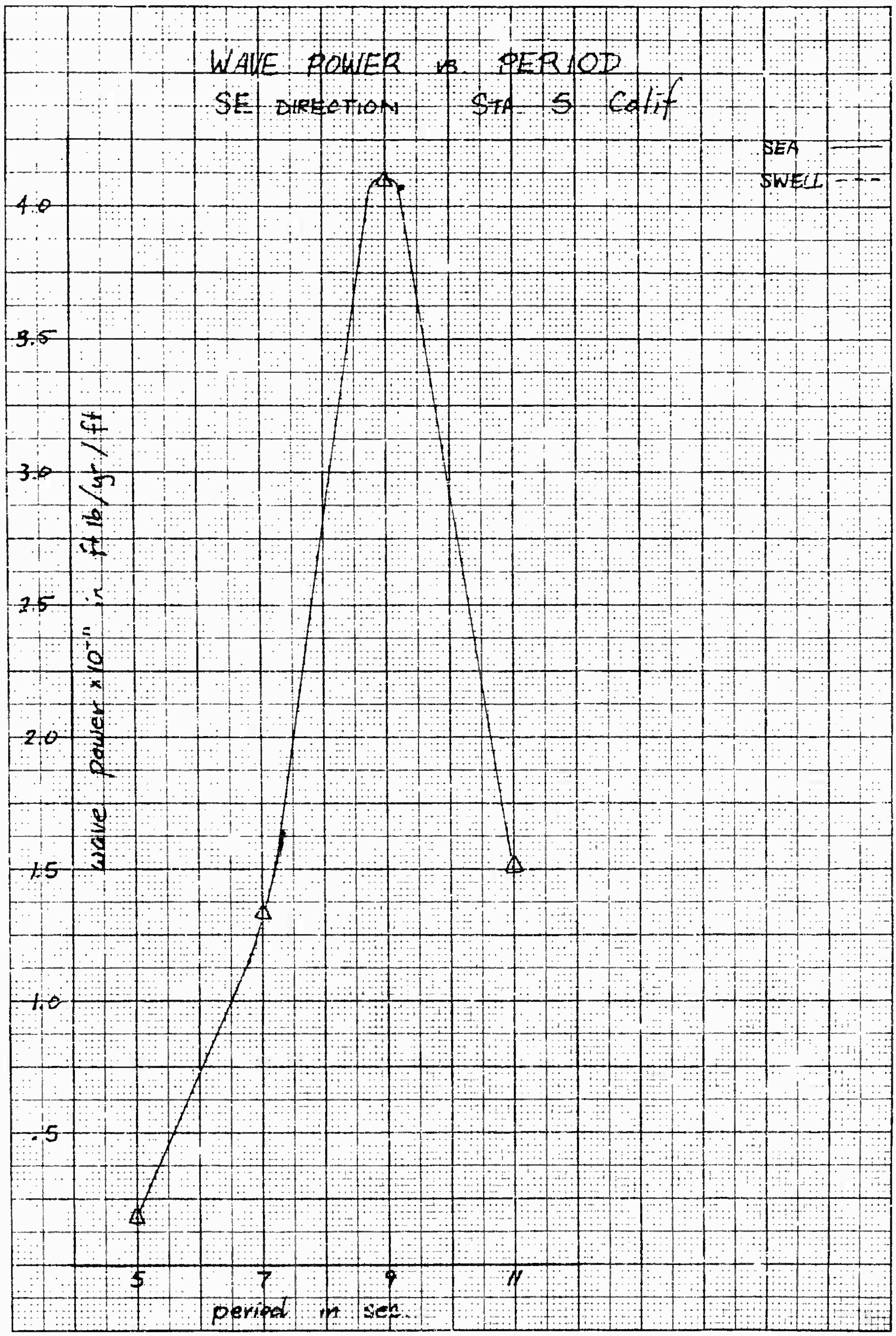
WAVE POWER vs. PERIOD
SW DIRECTION STA. 5 Calif.
SEA
SWELL
wave power × 10" in ft lb/ yr / ft
.3
.25
.2
.15
.1
.05
5
7
9
11
13
15
period in sec.


WAVE POWER vs PERIOD
SSW DIRECTION STA. 5 Calif
SEA
SWELL
wave power x 10⁻¹¹ in ft lb/yr/ft
.25
.2
.15
.1
.05
5
7
9
11
13
15
period in sec.



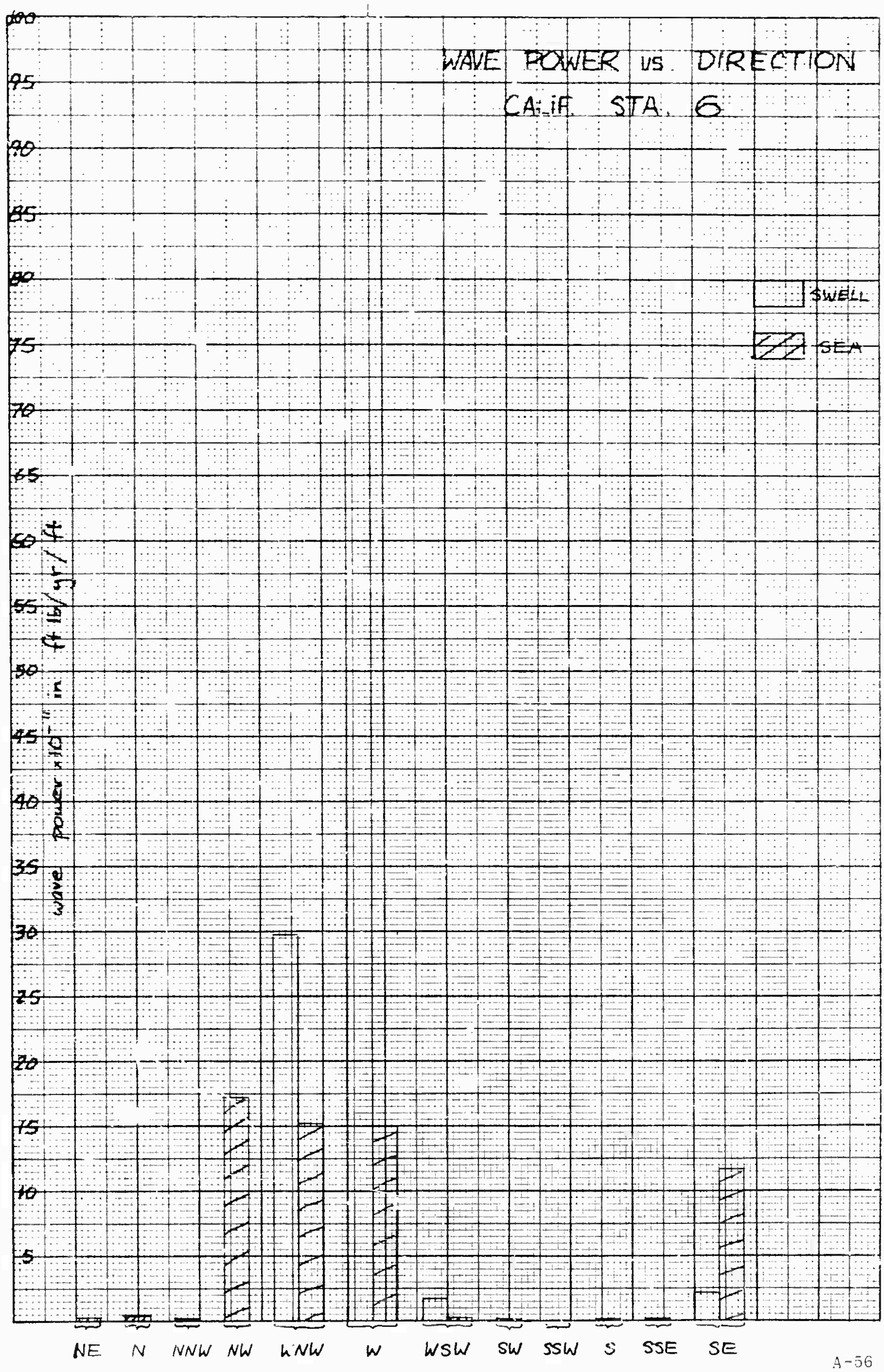
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

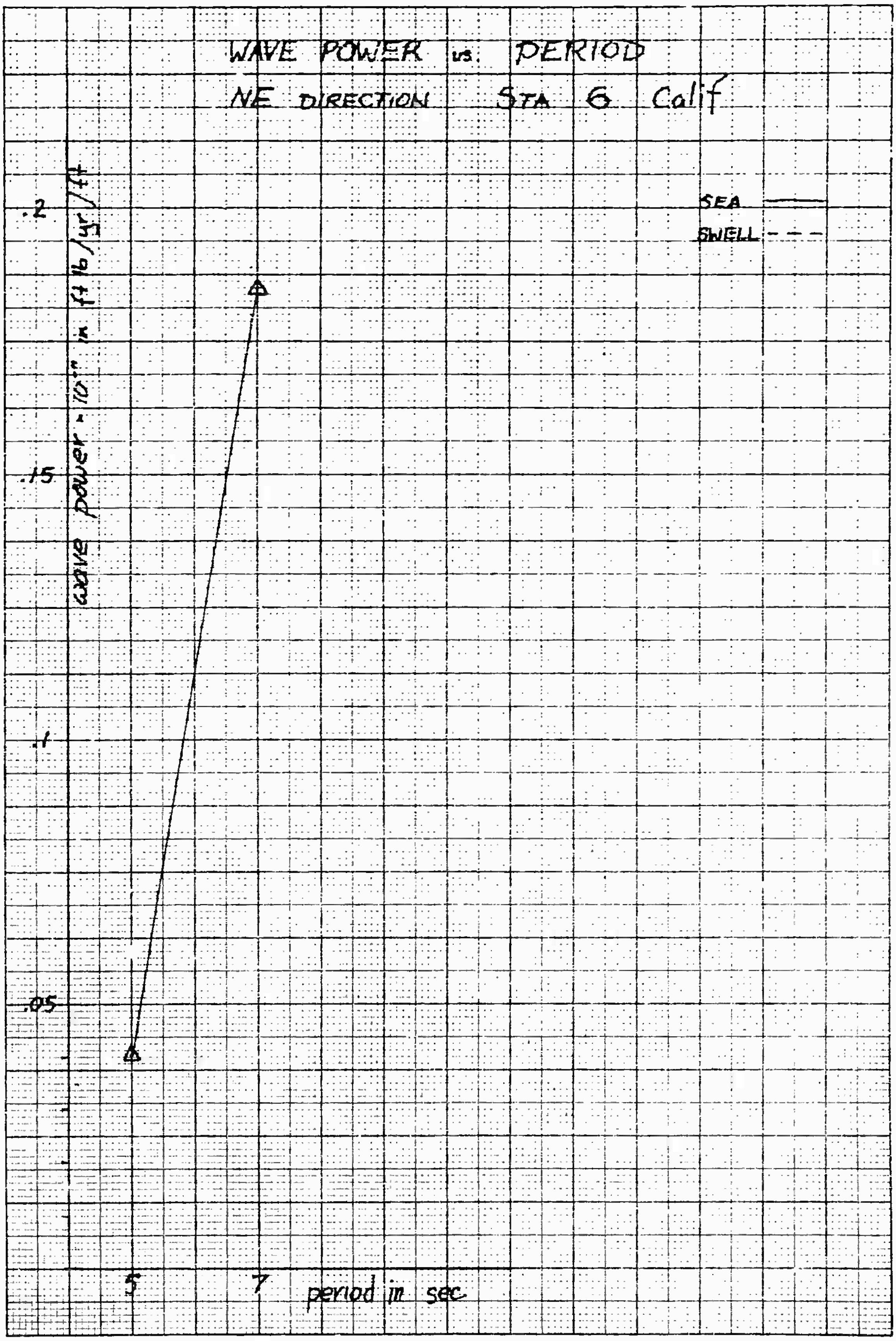

WAVE POWER vs. PERIOD
SSE DIRECTION STA. 5 Cali.
SEA
SWELL
wave power × 10⁻⁴ in ft. lb/yr/ft
.25
.2
.15
.1
.05
5
7
9
11
13
15
17
18+
period in sec.

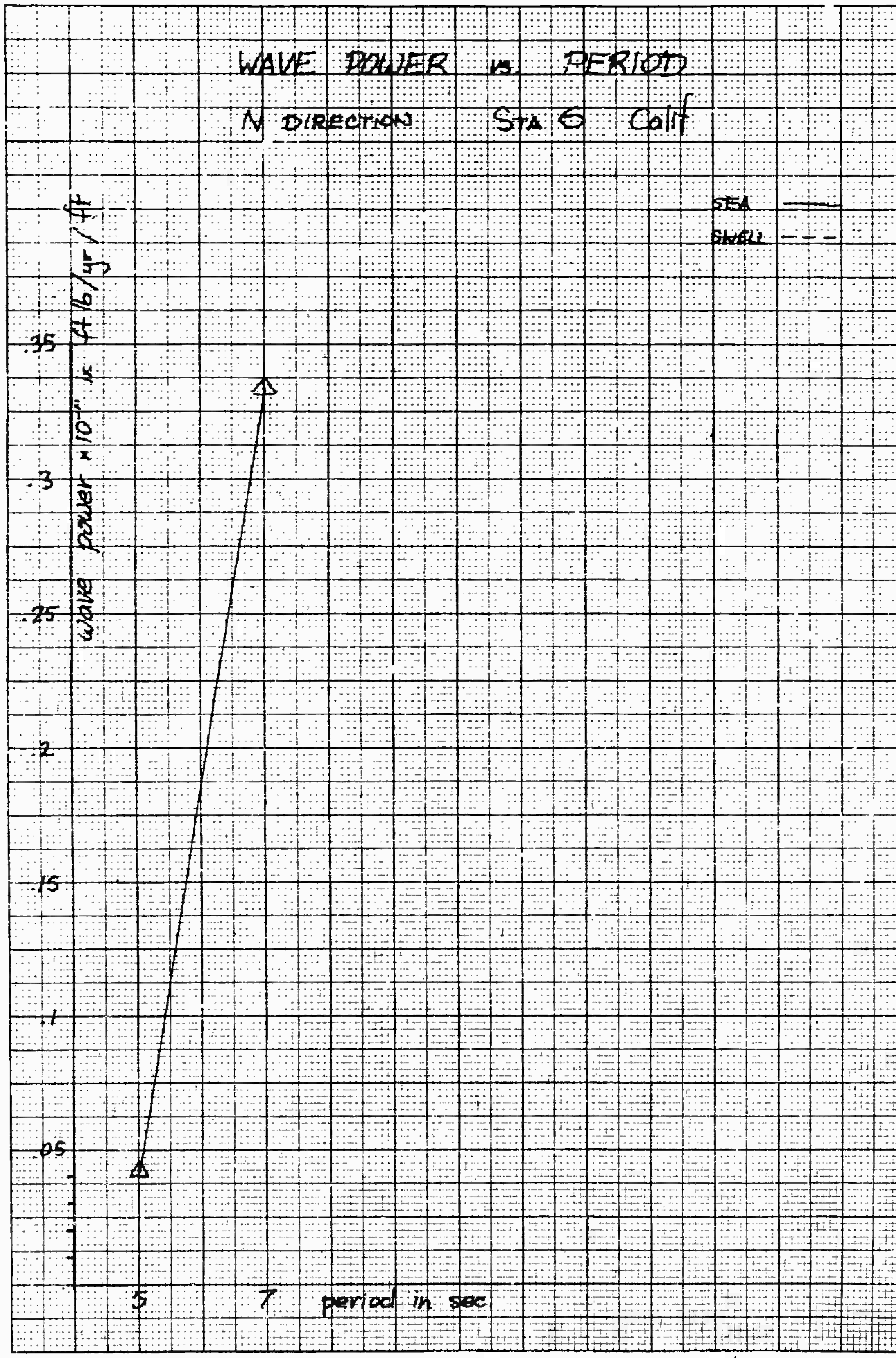

WAVE POWER vs PERIOD
SE DIRECTION STA 5 Calif
SEA
SWELL
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
wave power x 10^n in ft lb/yr/ft
5
7
9
11
period in sec.

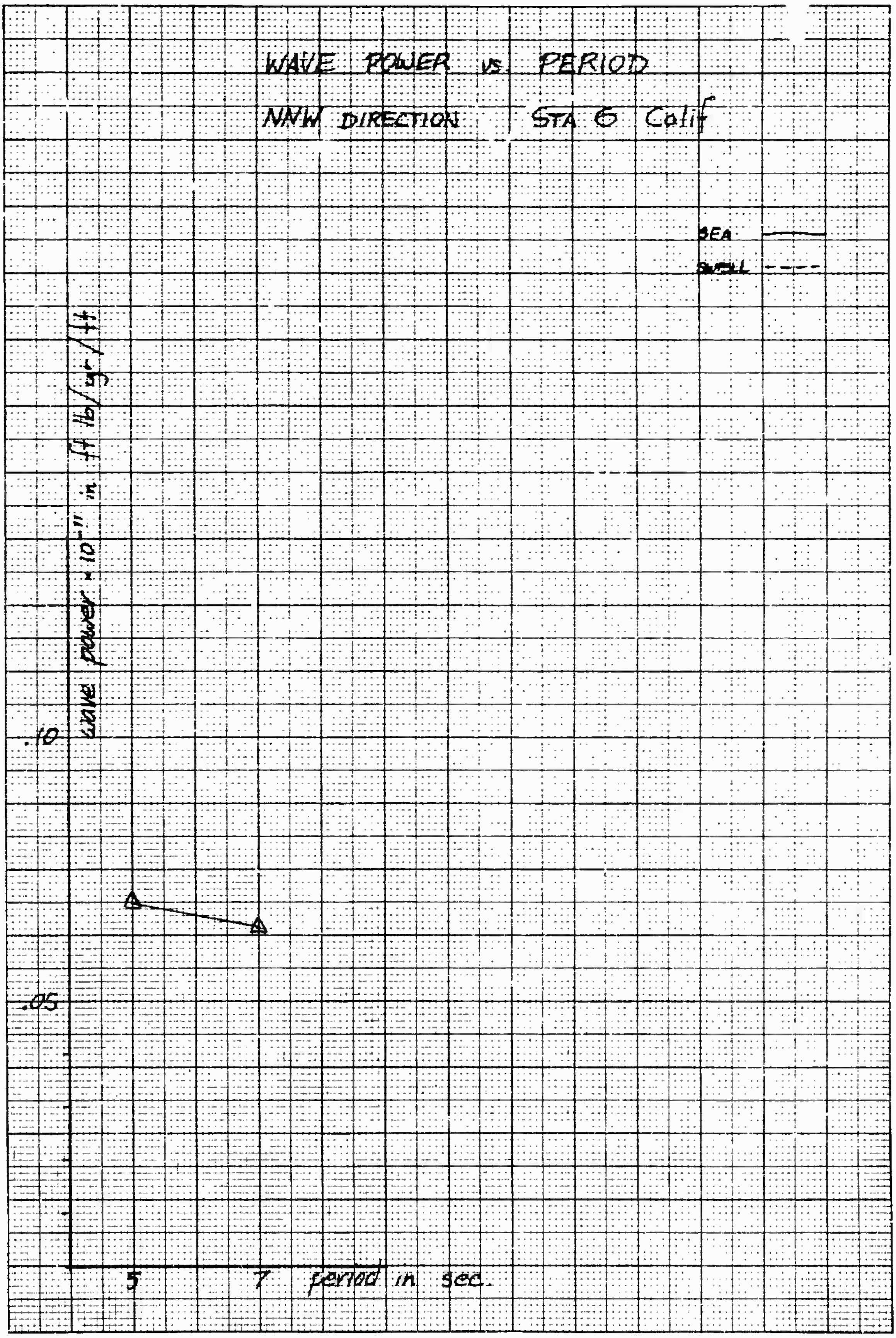
STATION 6 - CALIFORNIA COAST

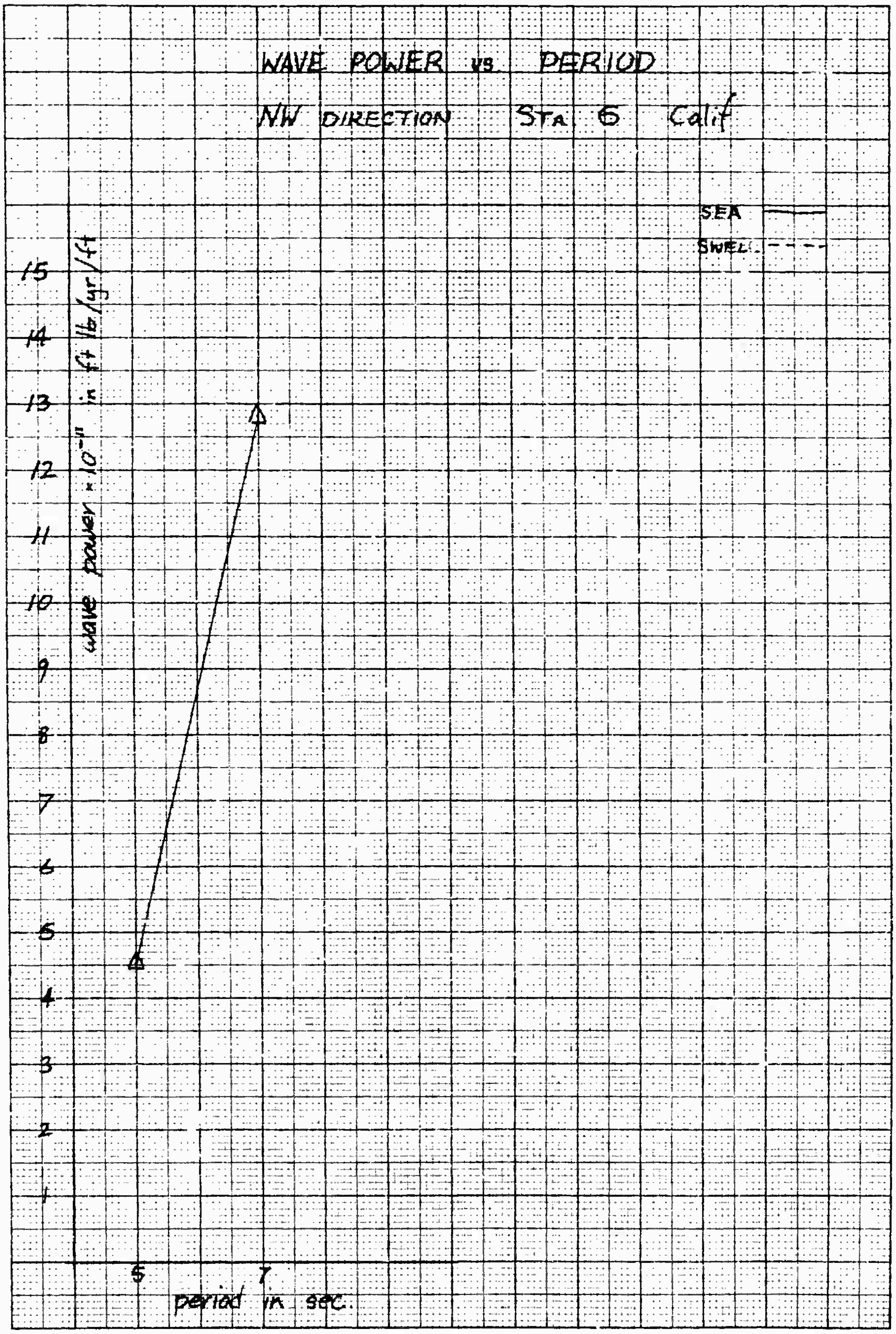
Lat. 34.2°N, Long. 120.0°W

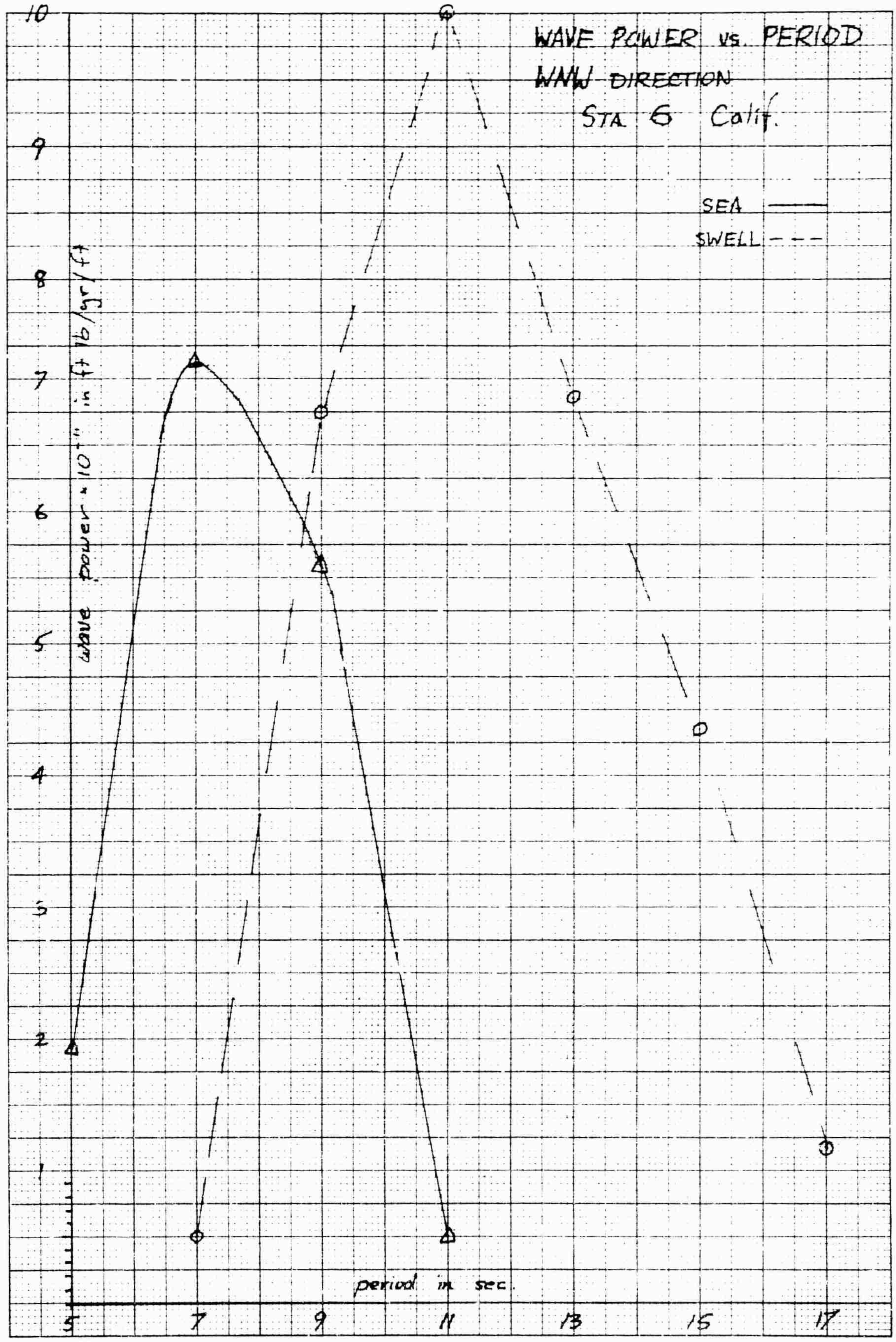

WAVE POWER vs DIRECTION
CALIF. STA. 6
SWELL
SEA
wave power x10^11 in ft lb/yr/ft
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
NE
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
SE

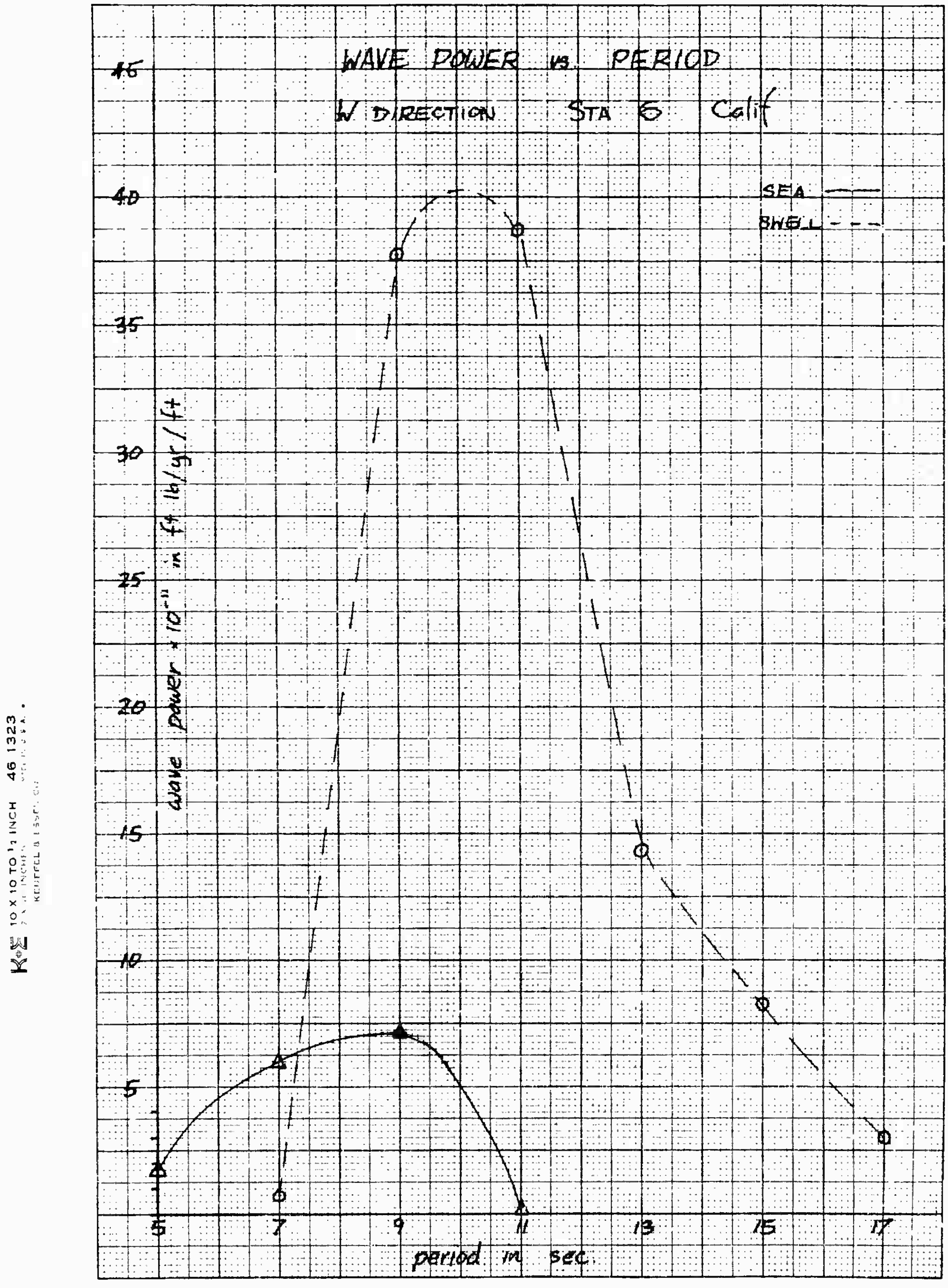

WAVE POWER vs. PERIOD
NE DIRECTION STA 6 Calif
SEA
SWELL
.2
.15
.1
.05
wave power × 10⁷ in ft lb/yr/ft
5
7
period in sec

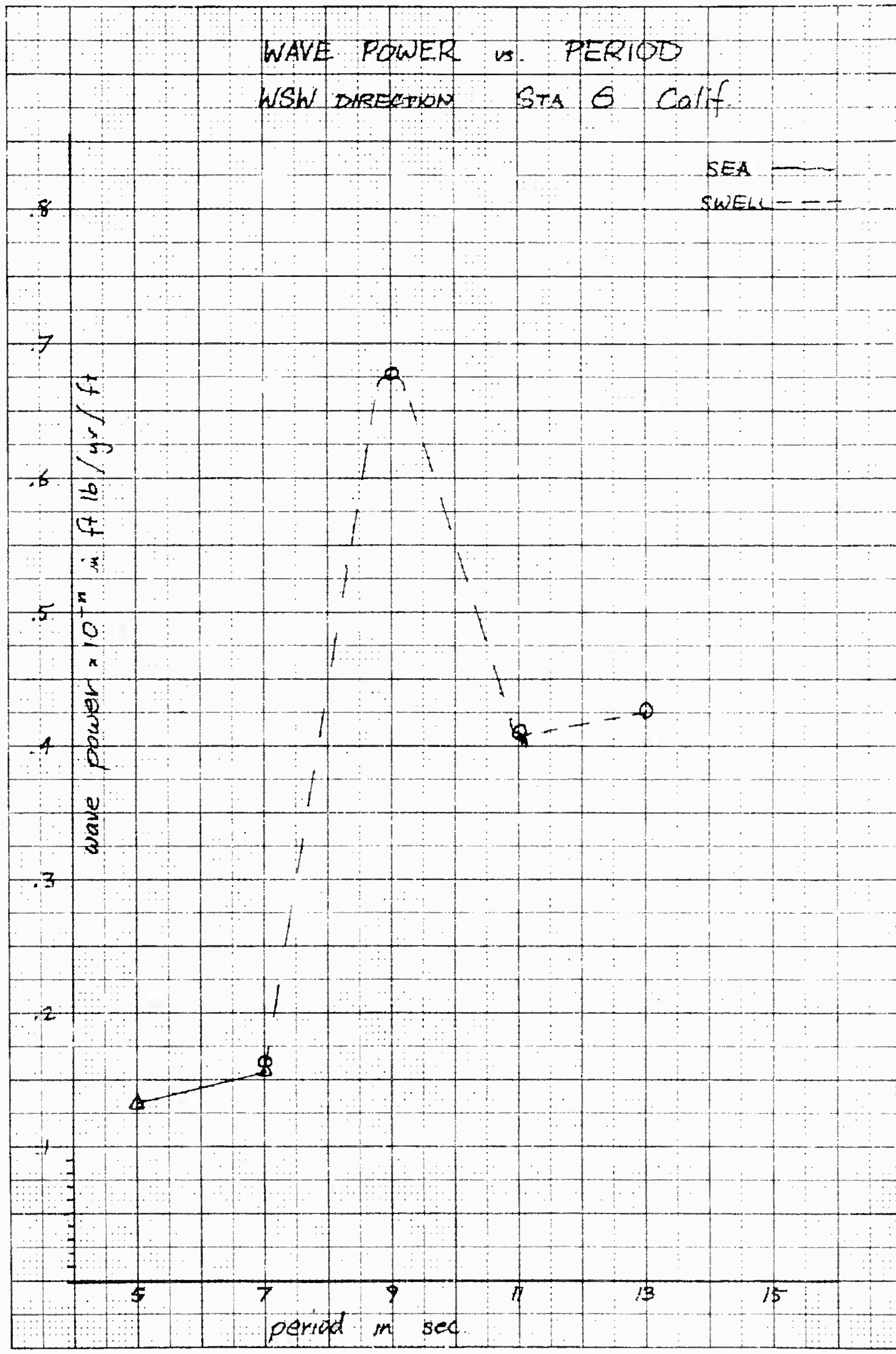

WAVE POWER vs. PERIOD
N DIRECTION Sta 6 Calif
SEA
SWELL
wave power × 10" × ft lb/yr/ft
.35
.3
.25
.2
.15
.1
.05
5
7
period in sec.

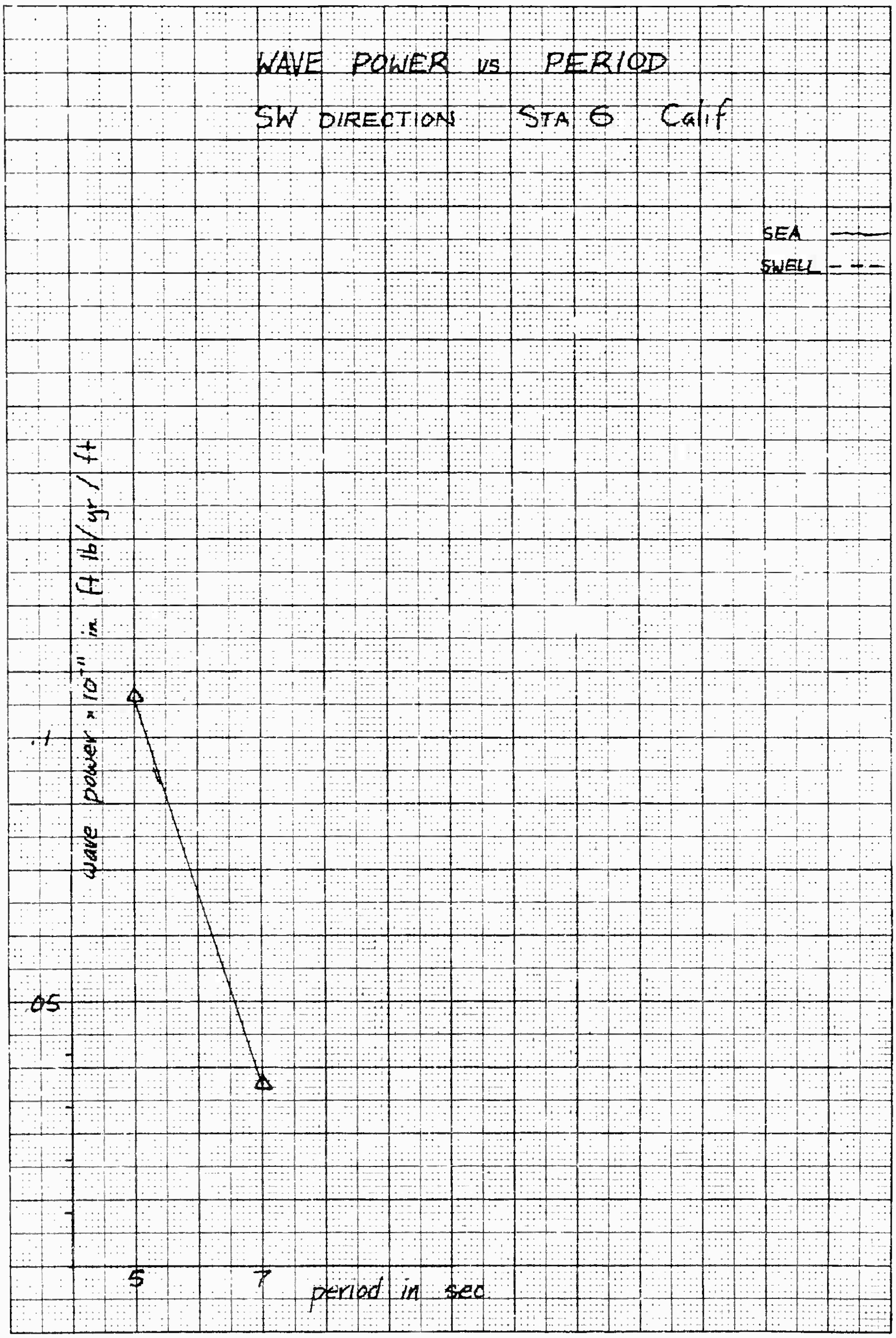

WAVE POWER vs. PERIOD
NNW DIRECTION STA 6 Calif
SEA
SWELL
wave power x 10^-11 in ft lb/yr/ft
.10
.05
5
7
period in sec.

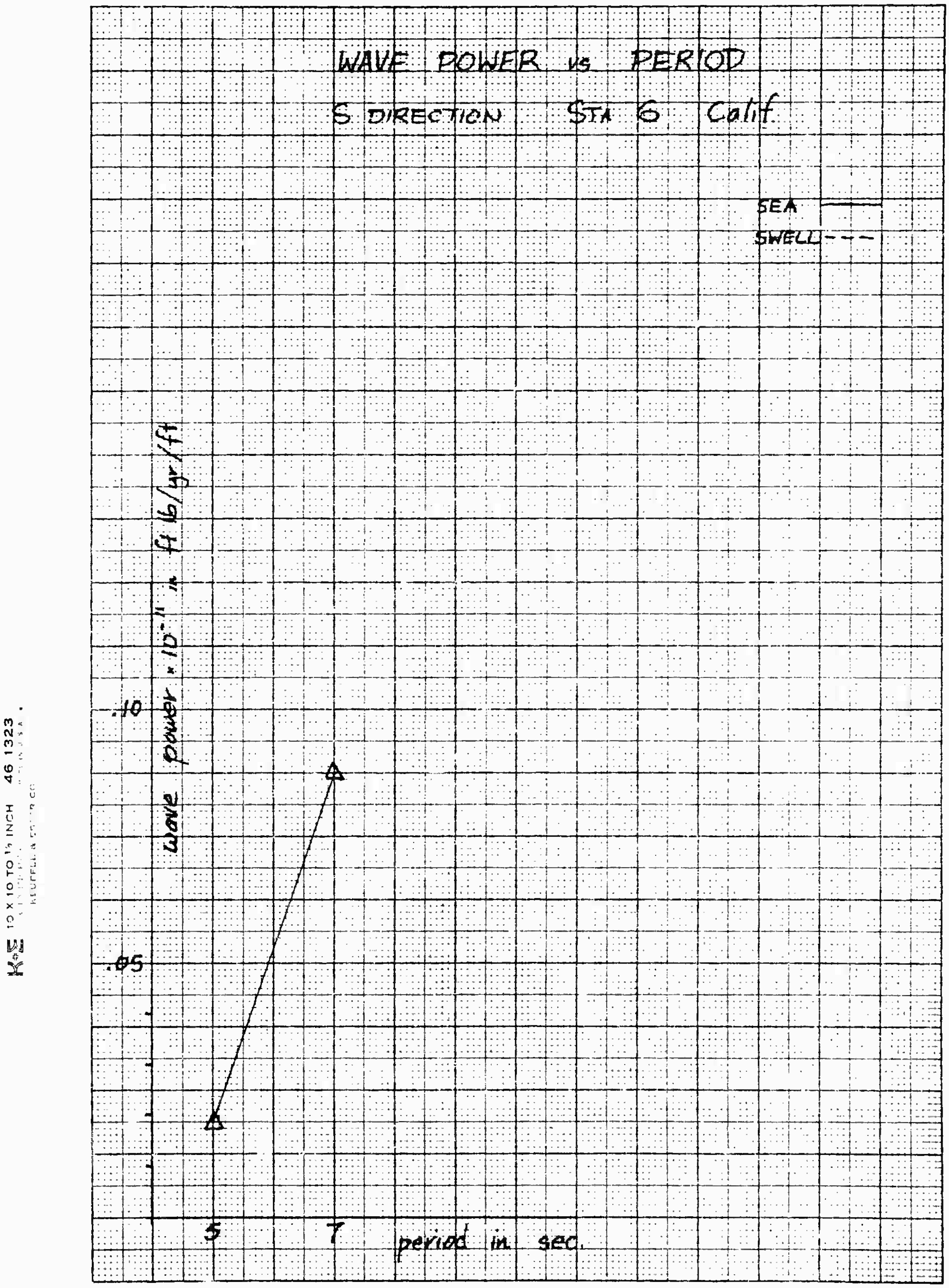

WAVE POWER vs PERIOD
NW DIRECTION STA 6 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
period in sec.

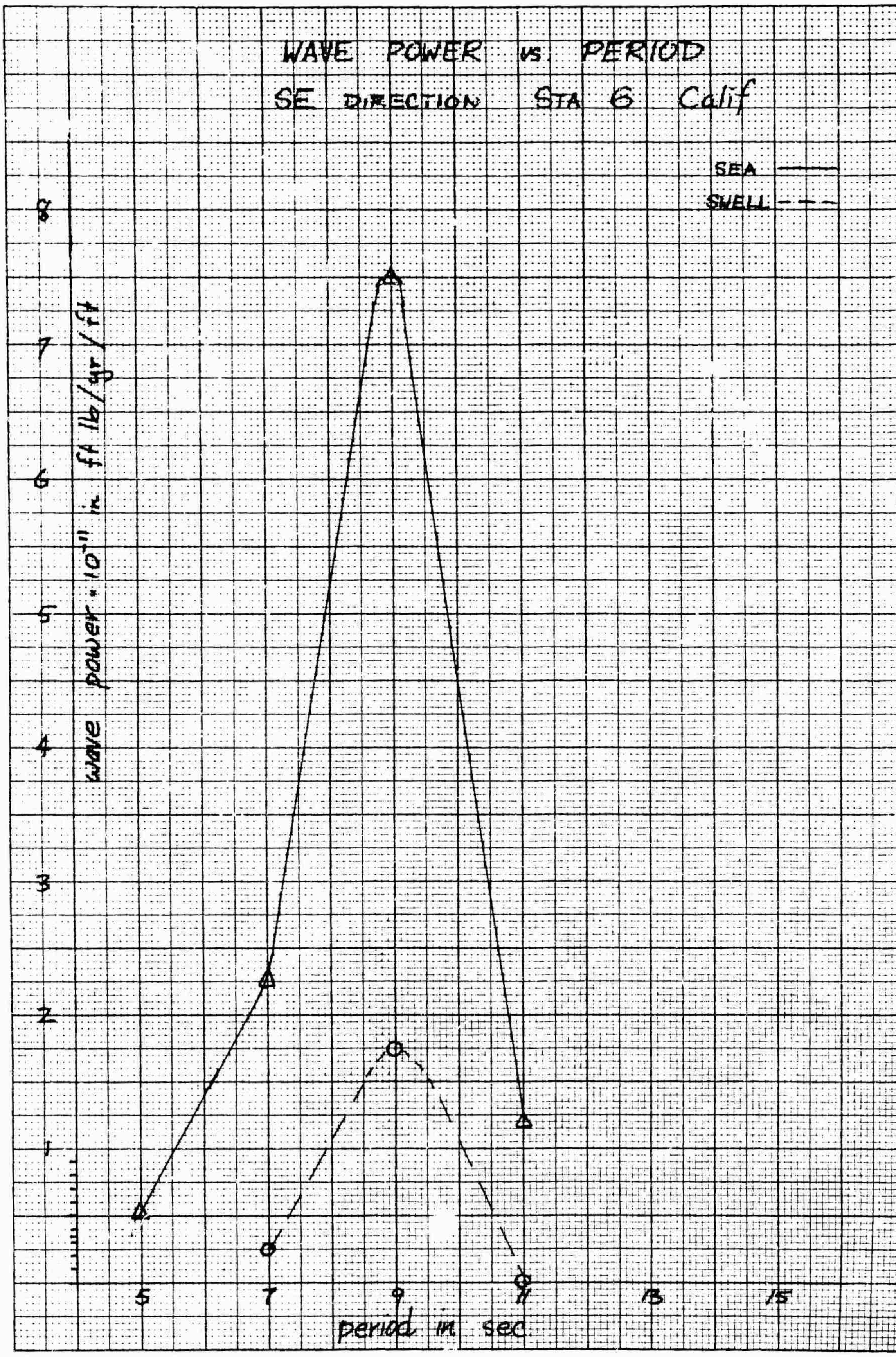

WAVE POWER vs. PERIOD
WNW DIRECTION
STA 6 Calif.
SEA
SWELL
wave power × 10⁻⁴ in ft lb/yr/ft
period in sec
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17


WAVE POWER vs PERIOD
W DIRECTION STA 6 Calif
SEA
SWELL
45
40
35
30
25
20
15
10
5
wave power × 10⁻¹¹ in ft lb/yr/ft
5
7
9
11
13
15
17
period in sec
10 X 10 TO ½ INCH 46 1323
KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
WSW DIRECTION STA 6 Calif.
SEA
SWELL
wave power × 10⁻ⁿ in ft lb/yr/ft
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
period in sec


WAVE POWER vs PERIOD
SW DIRECTION STA 6 Calif
SEA
SWELL
wave power × 10^-11 in ft lb/yr/ft
.1
.05
5
7
period in sec

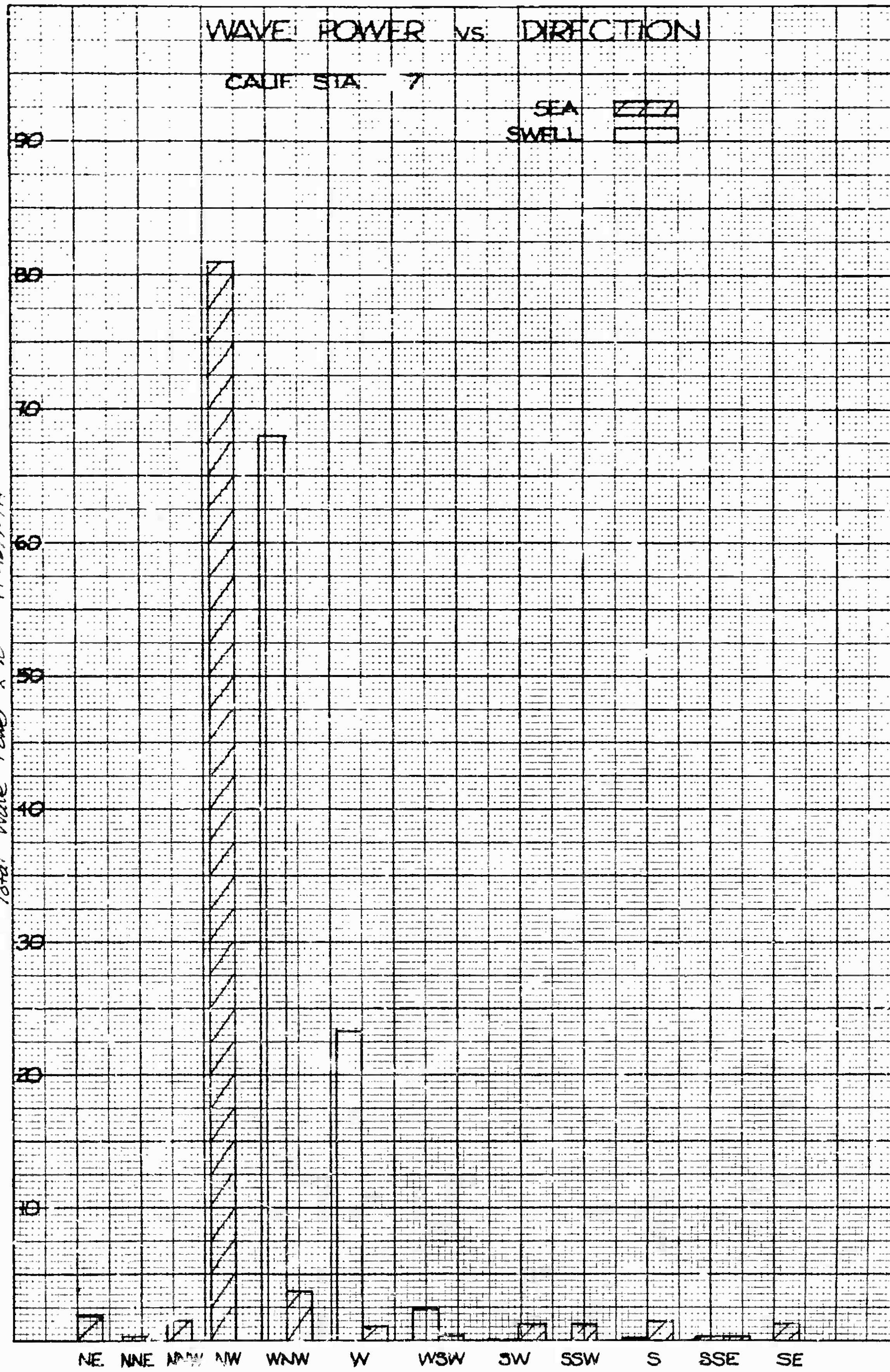

WAVE POWER vs PERIOD
S DIRECTION STA 6 Calif
SEA
SWELL
wave power × 10⁻¹¹ ft lb/yr/ft
.10
.05
5
7
period in sec.
10 X 10 TO ½ INCH 46 1323

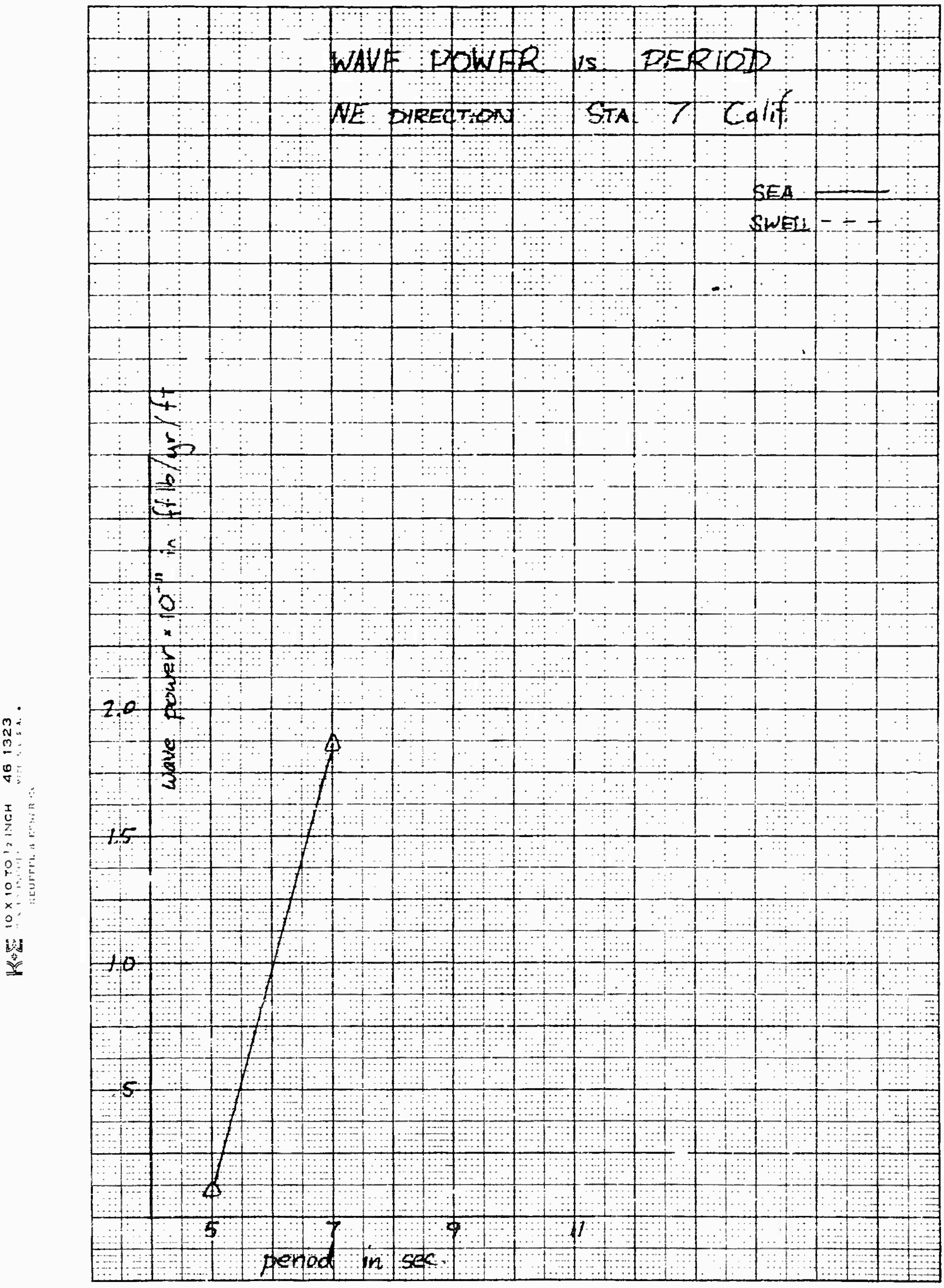


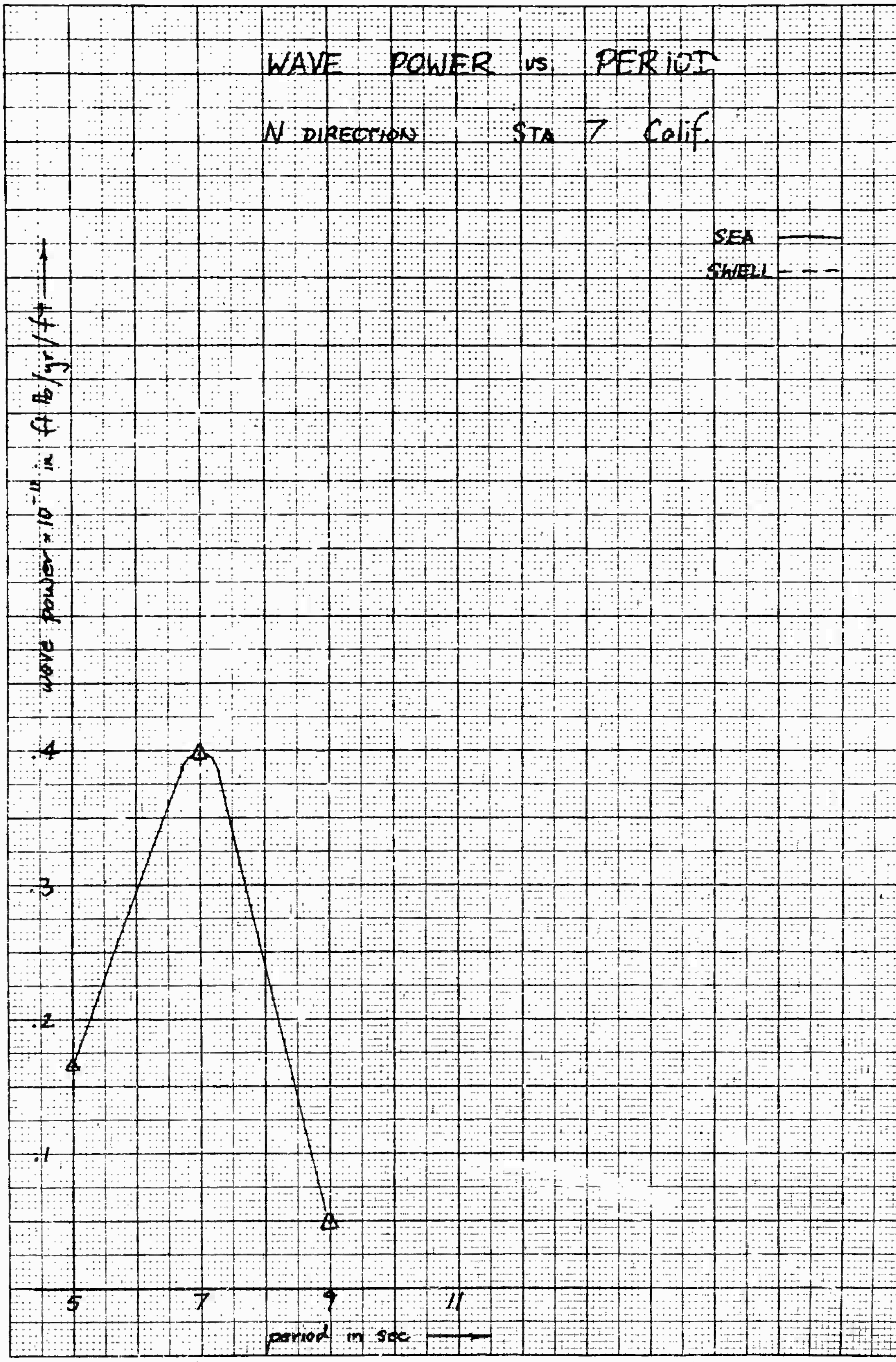
10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

STATION 7 - CALIFORNIA COAST

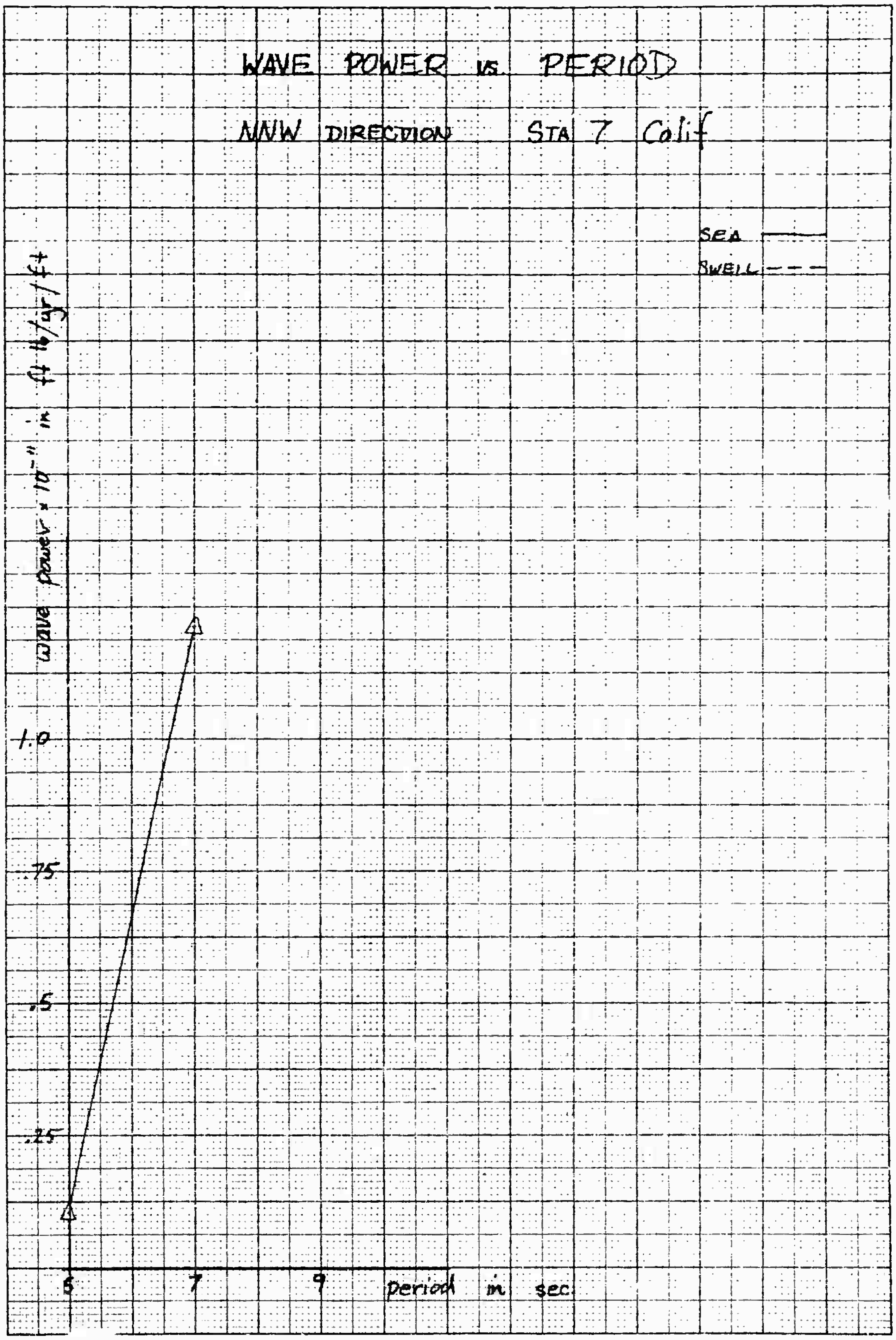
Lat. 33.5°N, Long. 119.5°W

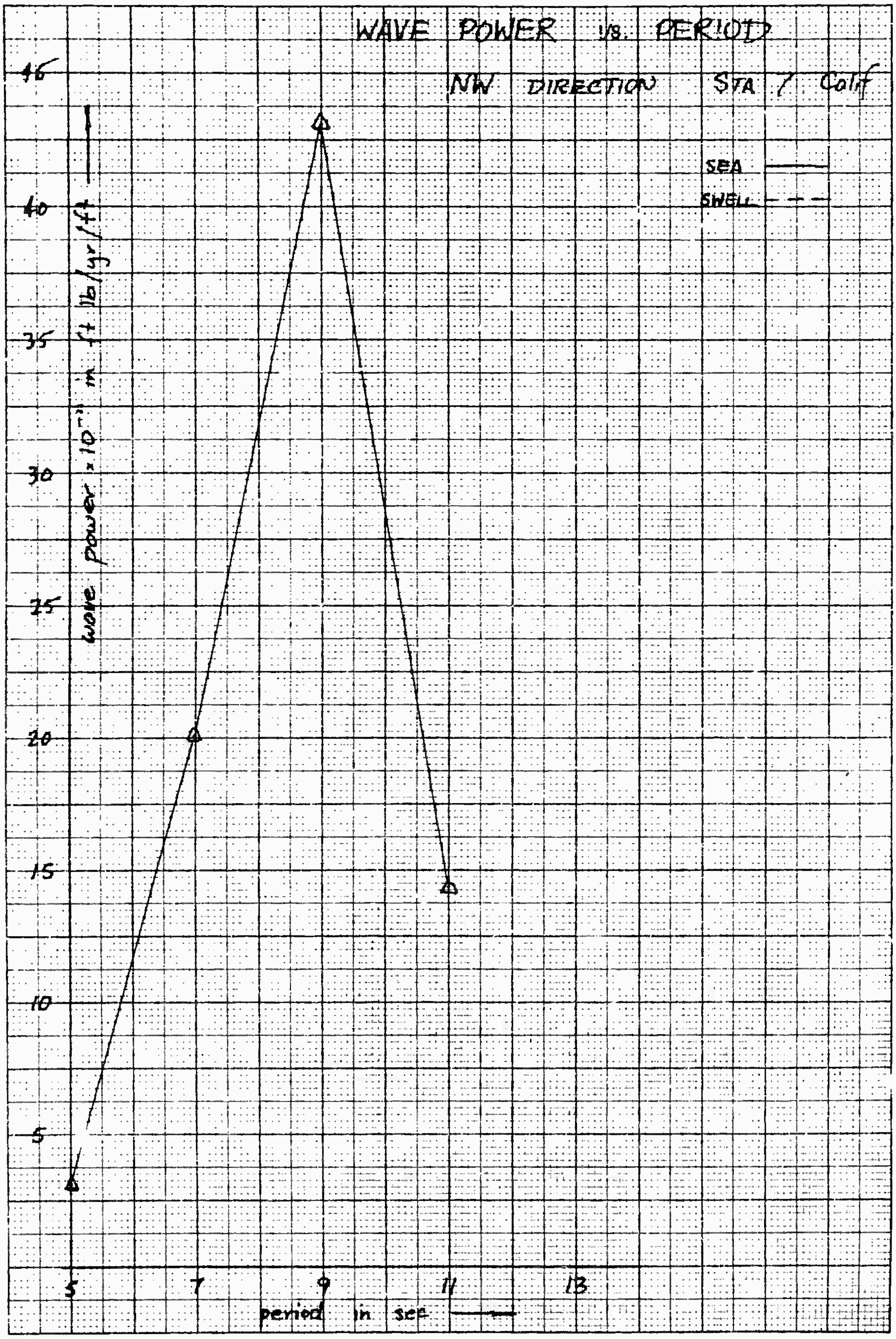

WAVE POWER vs DIRECTION
CALIF STA. 7
SEA
SWELL
Total Wave Power x 10^-11 ft-lb/yr/ft
90
80
70
60
50
40
30
20
10
NE
NNE
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
SE


WAVE POWER vs PERIOD
NE DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
2.0
1.5
1.0
.5
5
7
9
11
period in sec
10 X 10 TO ½ INCH 46 1323
KEUFFEL & ESSER CO.

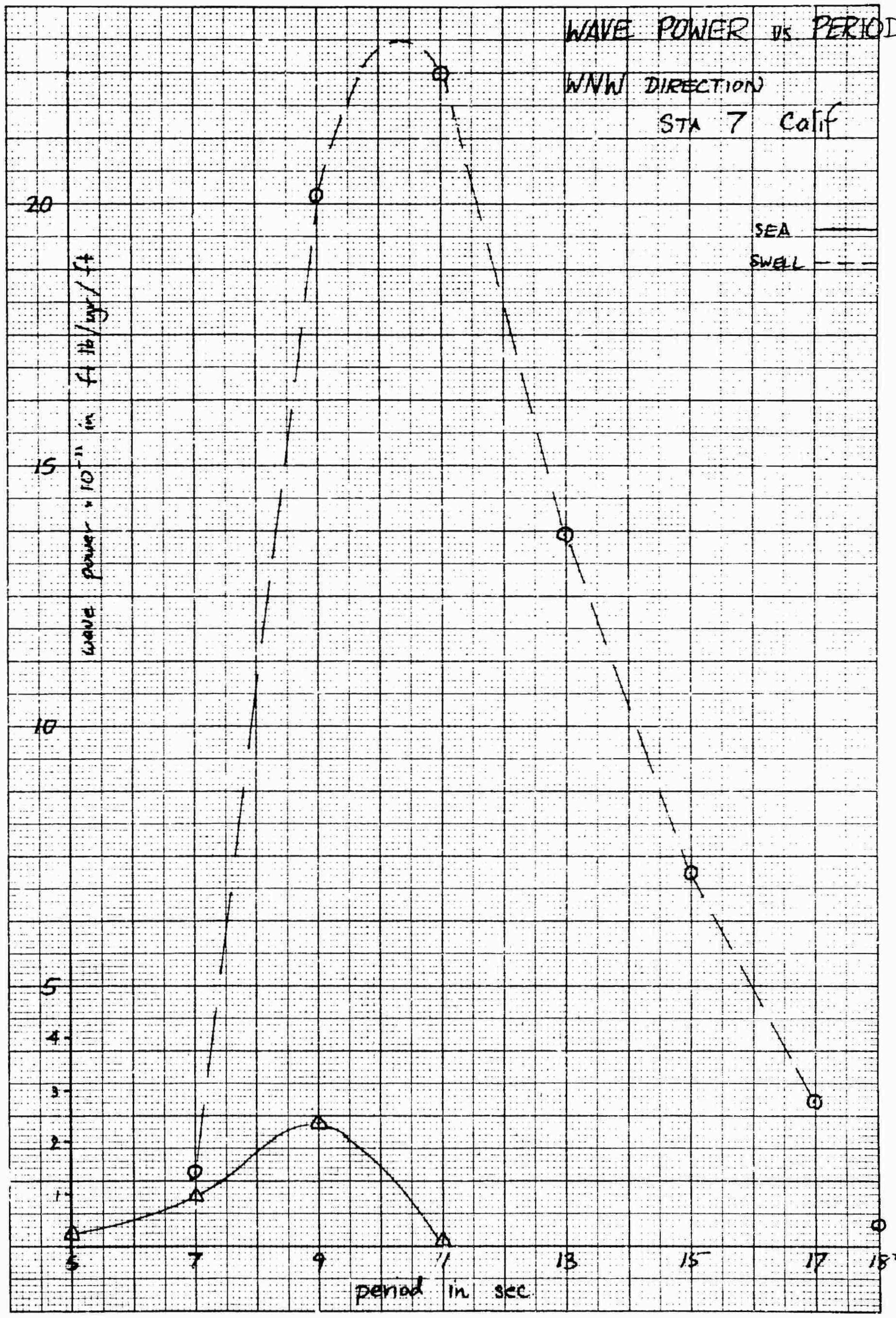


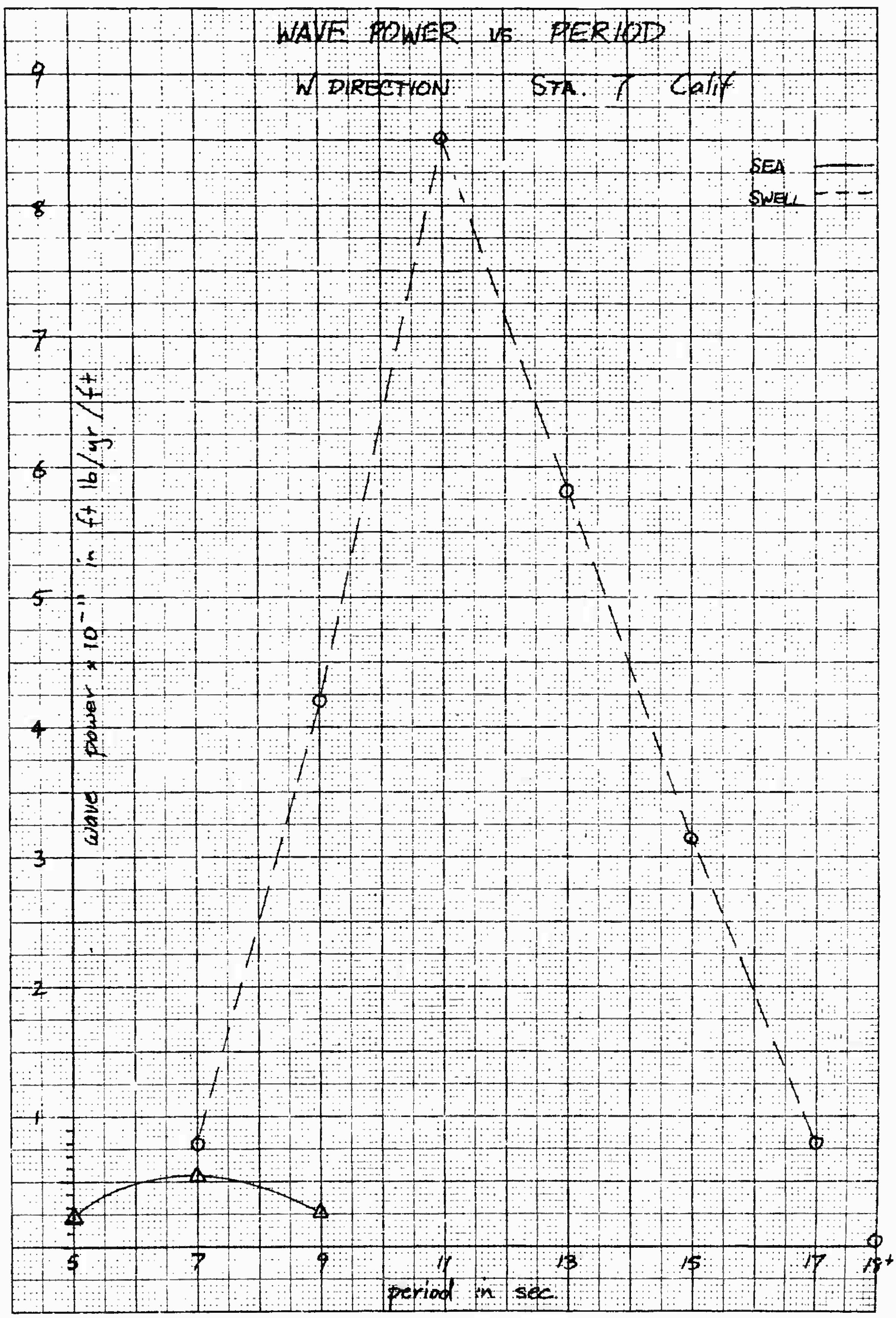
WAVE POWER vs PERIOD
N DIRECTION STA 7 Calif.
SEA
SWELL
wave power × 10^{-12} in ft lb/yr/ft
.4
.3
.2
.1
5
7
9
11
period in sec

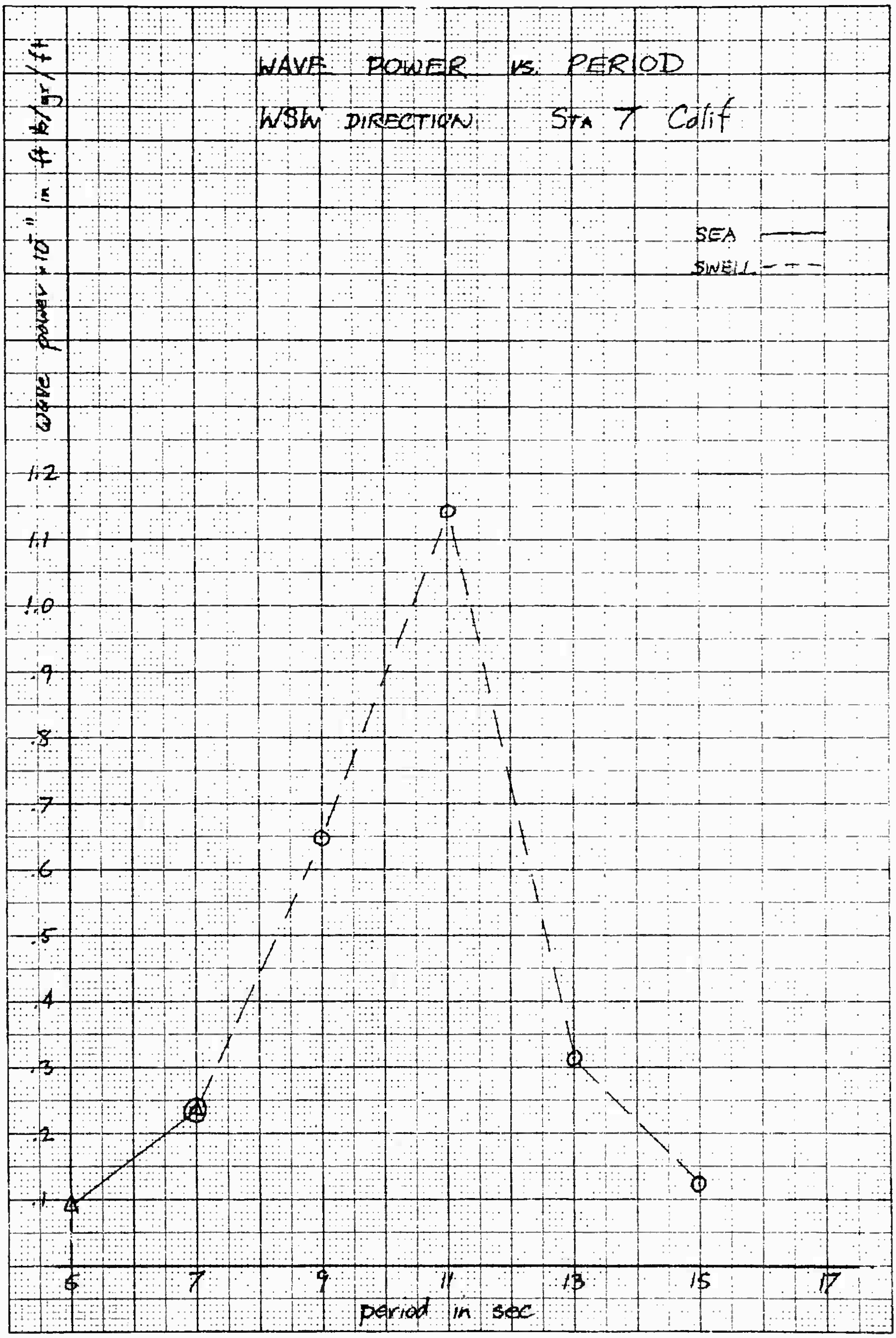

WAVE POWER vs. PERIOD
NNW DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
1.0
.75
.5
.25
5
7
9
period in sec.

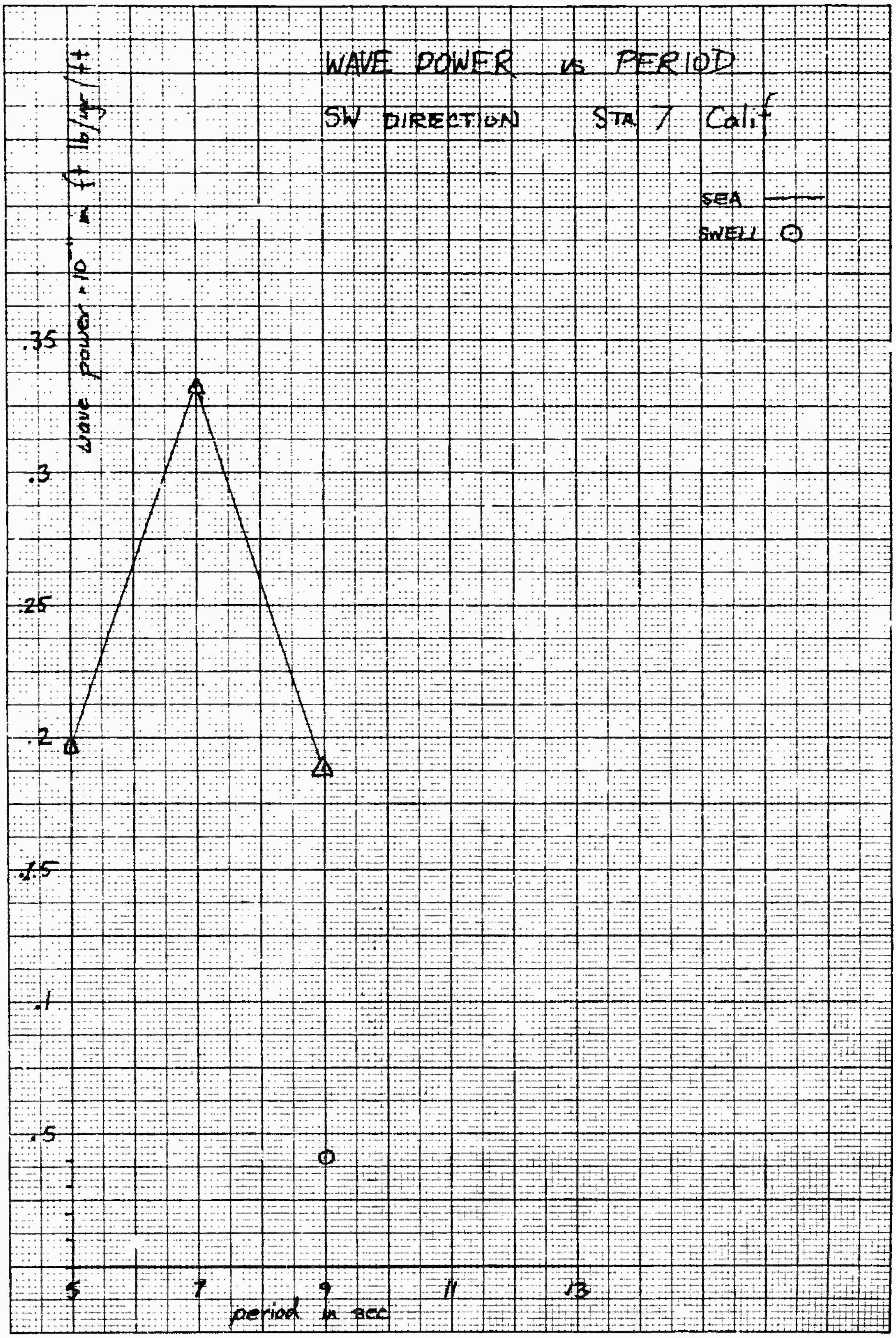


WAVE POWER vs. PERIOD
NW DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻⁷ in ft lb/yr/ft
40
35
30
25
20
15
10
5
5
7
9
11
13
period in sec

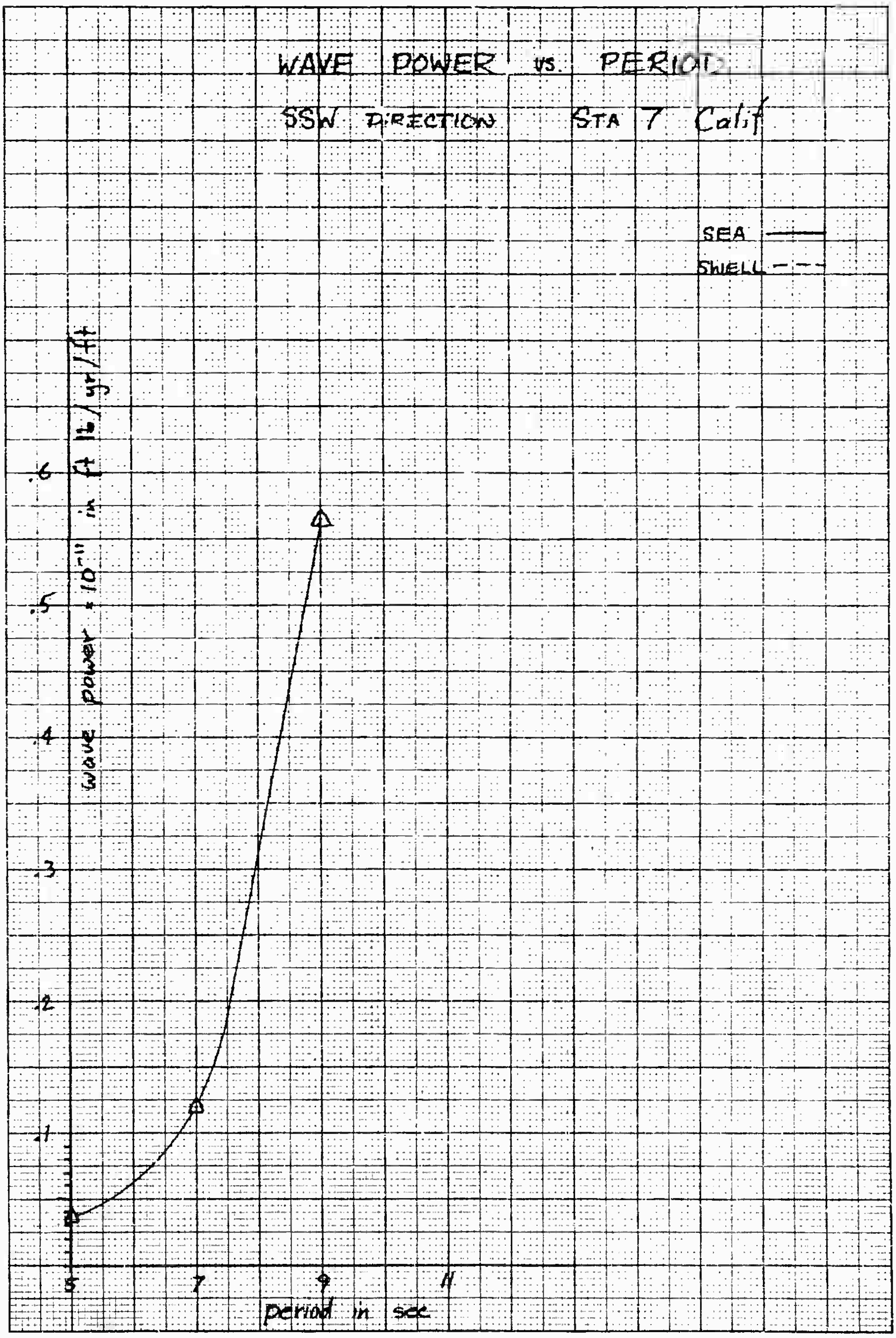

WAVE POWER vs PERIOD
WNW DIRECTION
STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
period in sec
20
15
10
5
4
3
2
1
5
7
9
11
13
15
17
18+

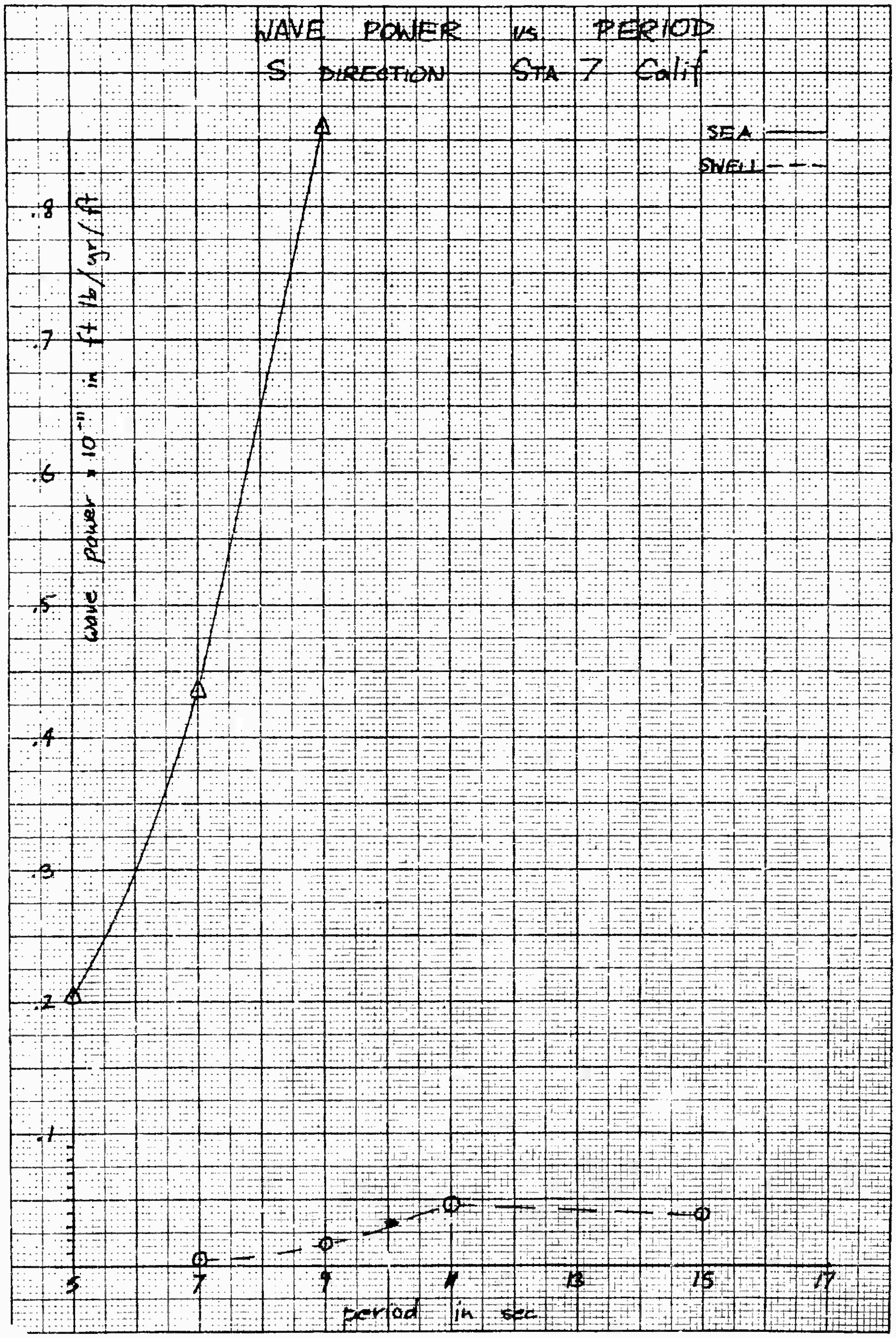

WAVE POWER vs PERIOD
W DIRECTION
STA. 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
period in sec.
1
2
3
4
5
6
7
8
9
5
7
9
11
13
15
17
19+

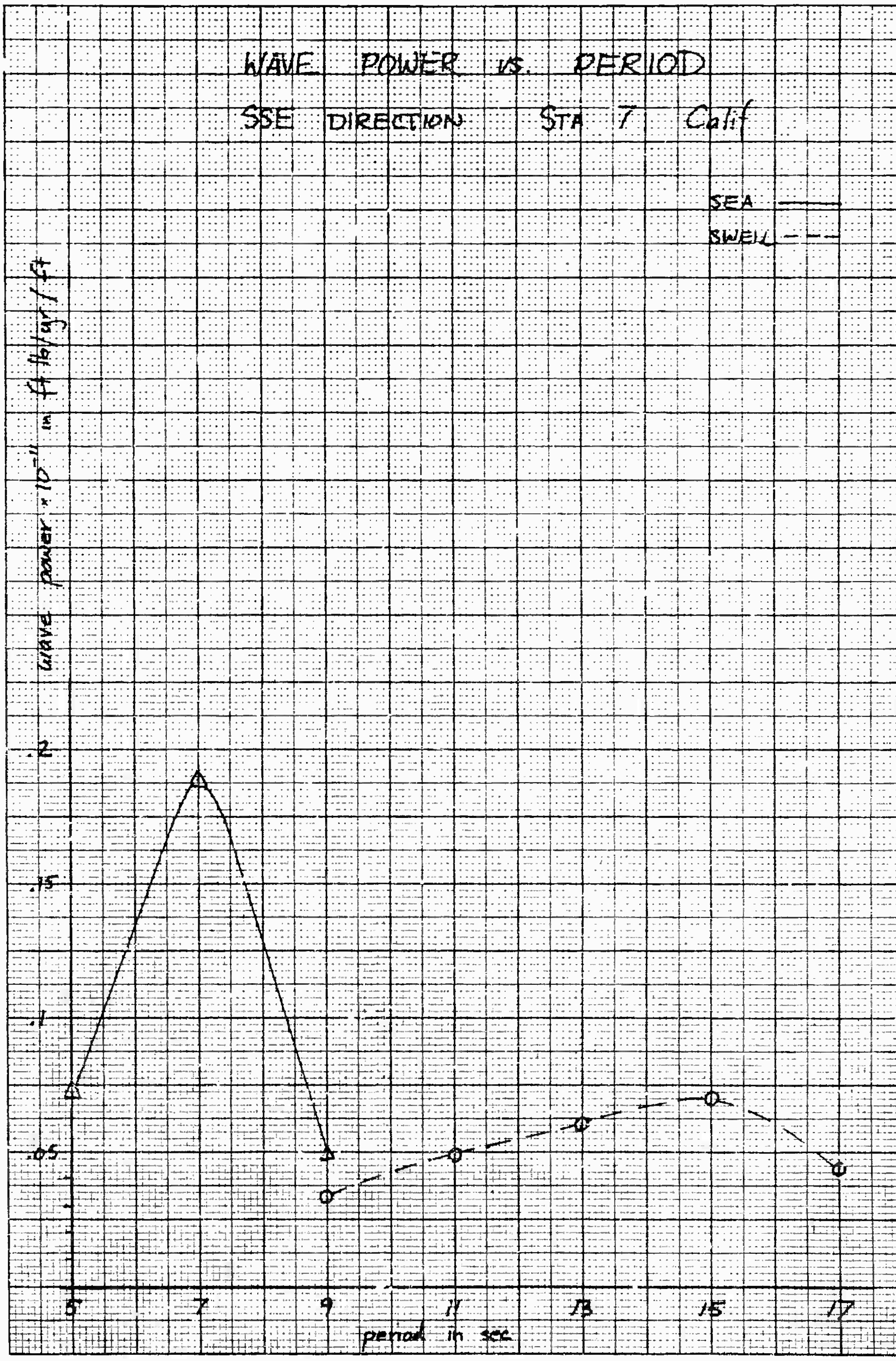

WAVE POWER vs. PERIOD
WSW DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
6
7
9
11
13
15
17
period in sec

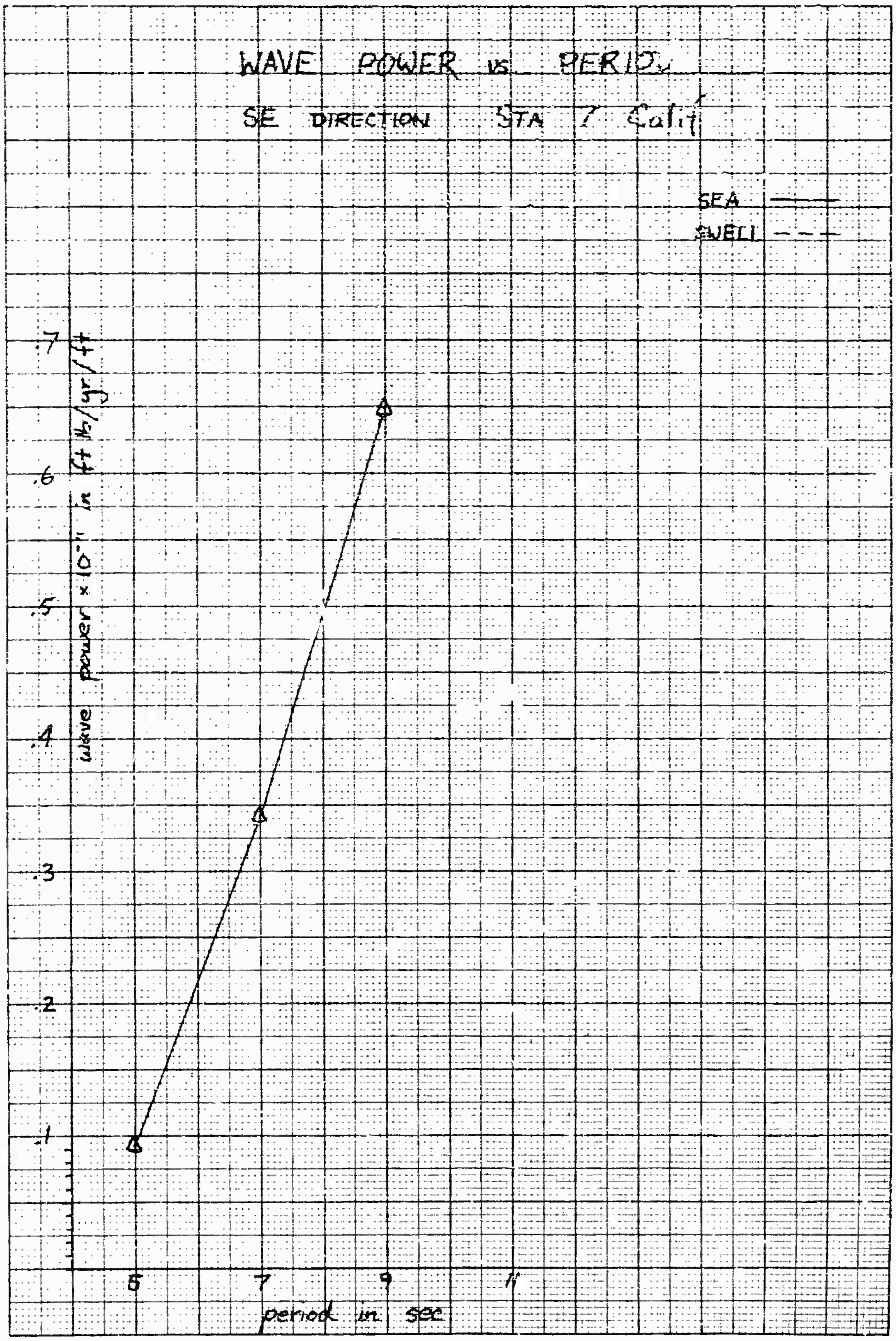


K&E 10 X 10 TO ½ INCH 46 1323
KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
SSW DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
.6
.5
.4
.3
.2
.1
5
7
9
11
period in sec


WAVE POWER vs PERIOD
S DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
17
period in sec

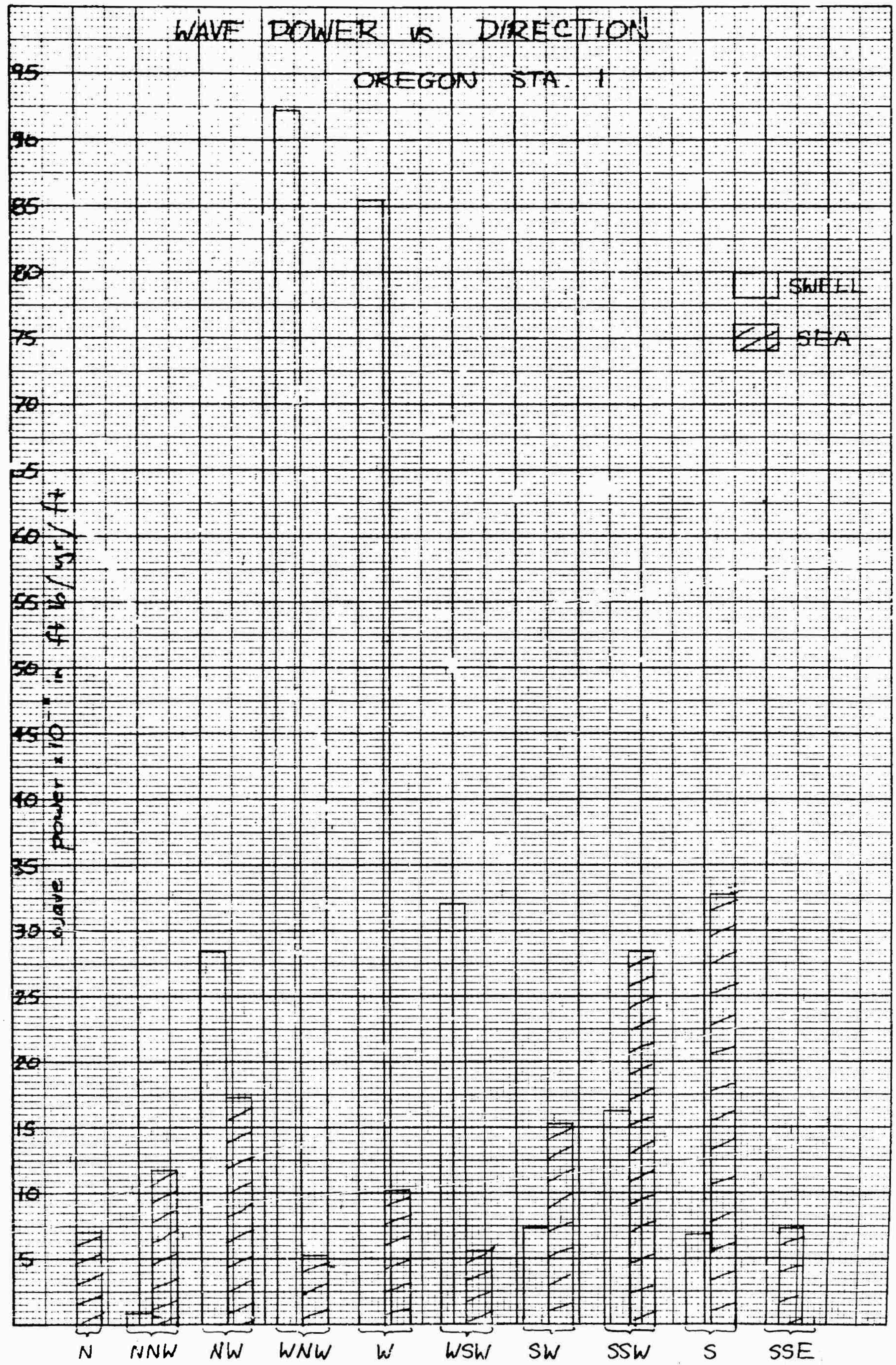

WAVE POWER vs. PERIOD
SSE DIRECTION STA 7 Calif
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
.2
.15
.1
.05
5
7
9
11
13
15
17
period in sec



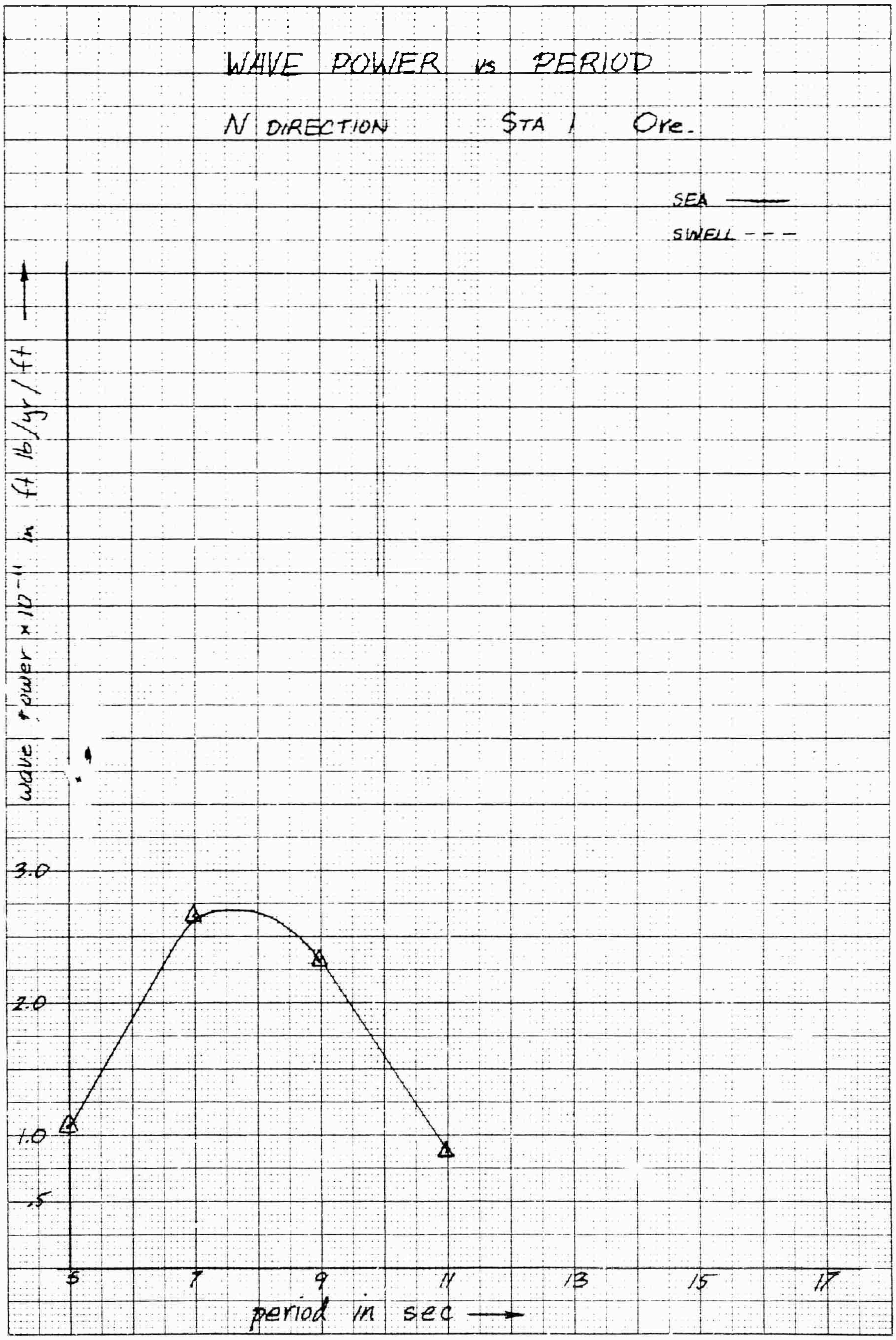
K+E 10 X 10 TO 1/2 INCH 46 1323

STATION 1 - OREGON COAST

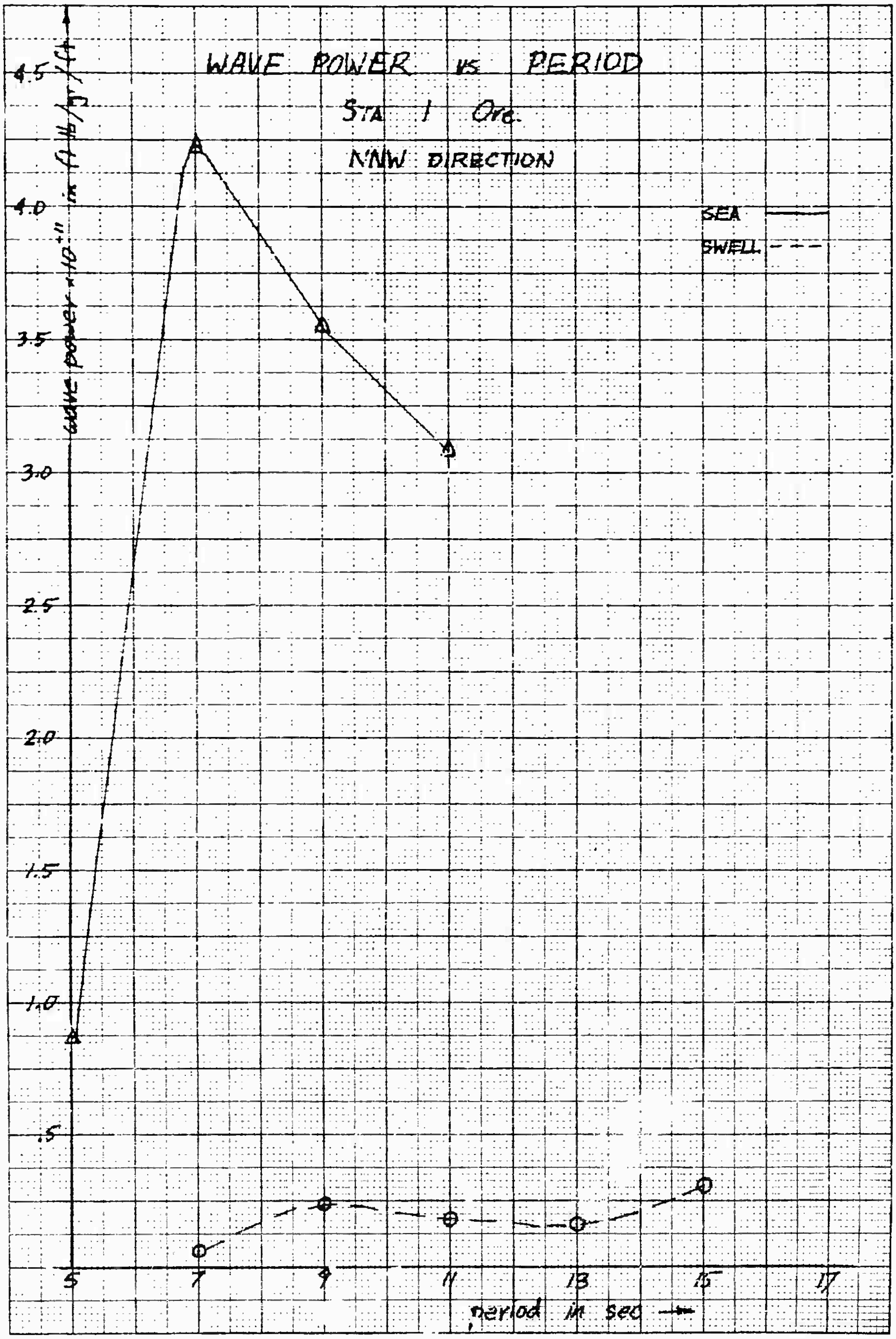
Lat. 44° 40'N, Long. 124° 50'W

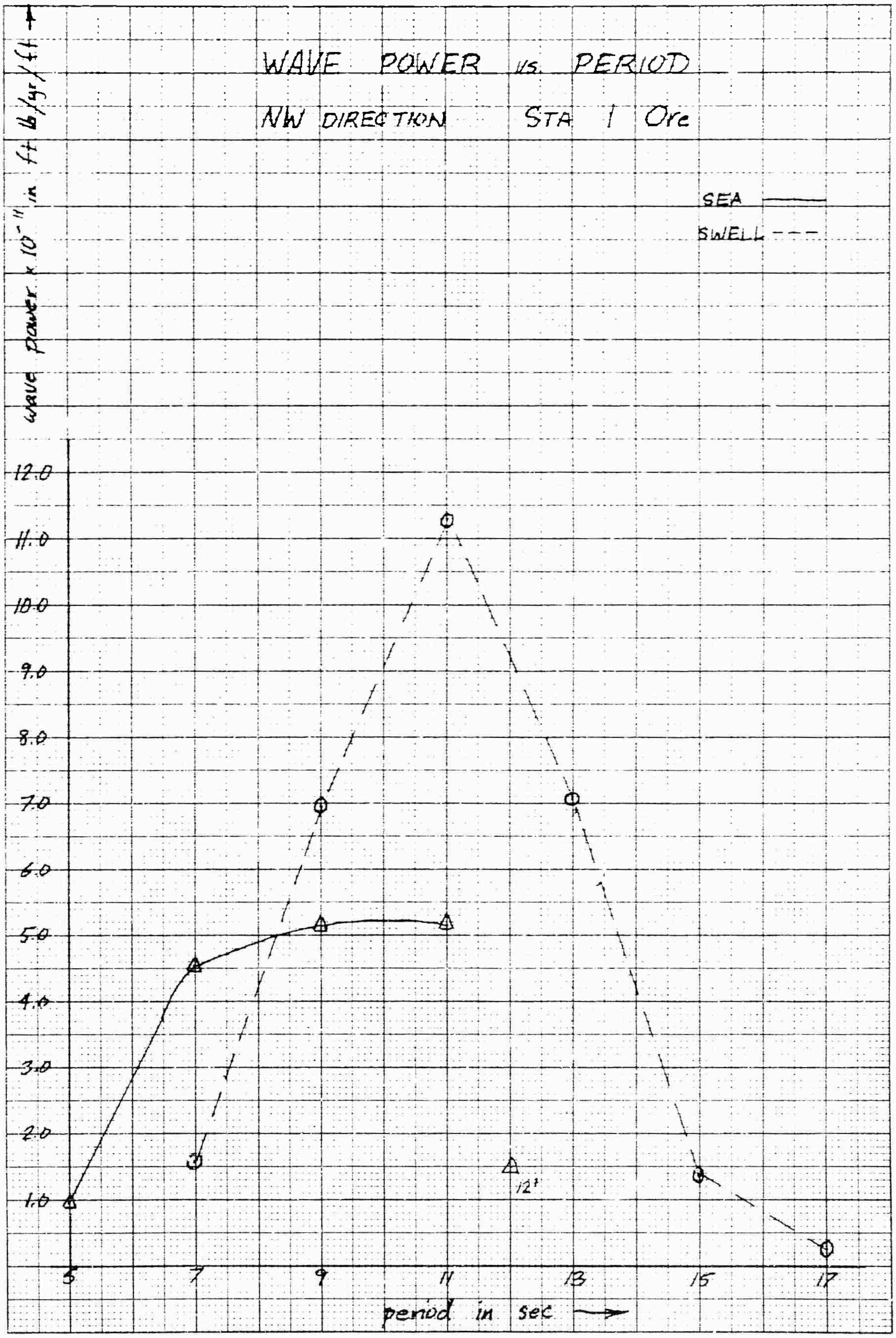


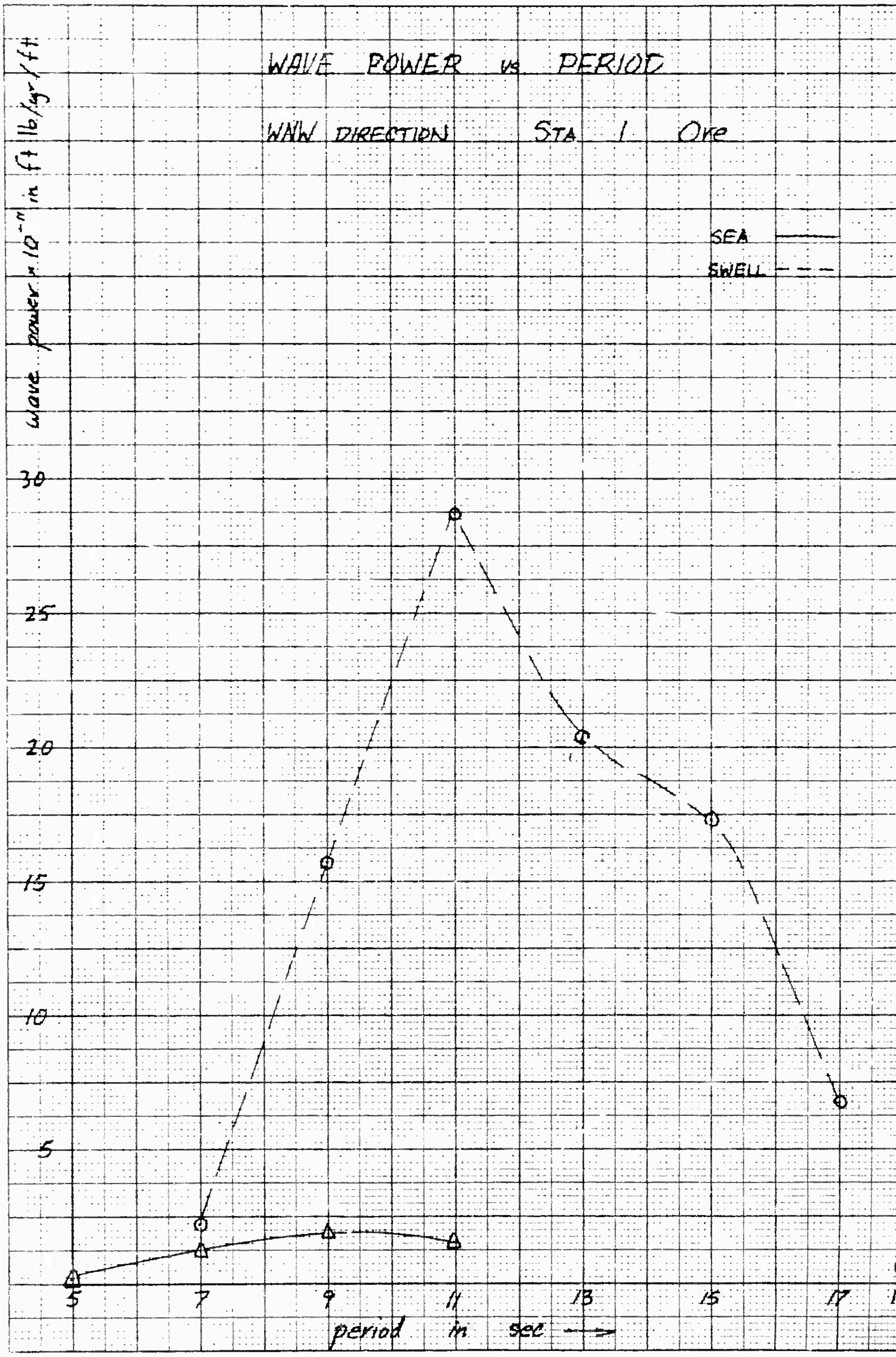
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



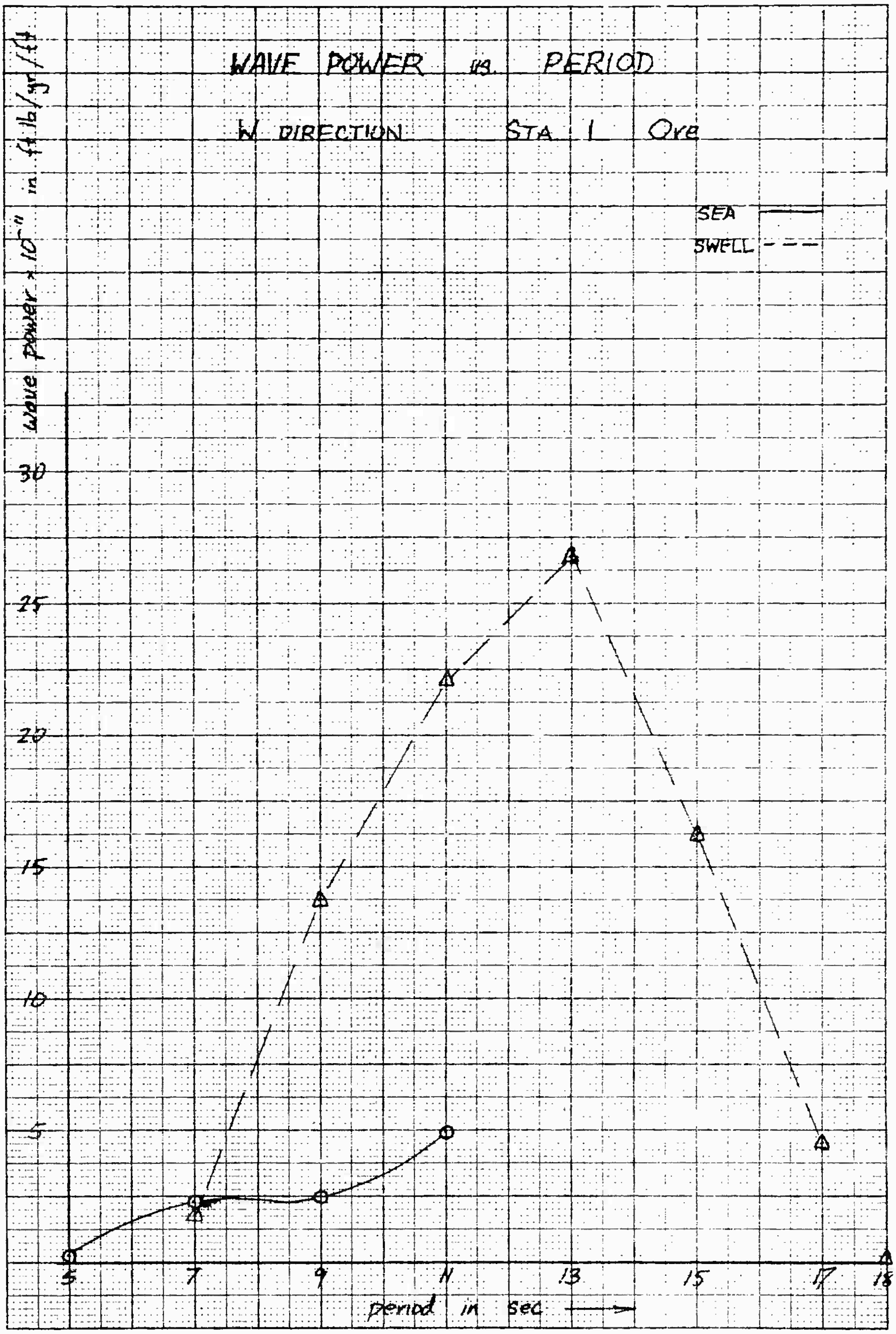
10 X 10 TO 1/2 INCH 46 1323


WAVE POWER vs PERIOD
STA 1 Ore.
NNW DIRECTION
SEA
SWELL
wave power x 10^+11 in ft lb/yr/ft
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
5
7
9
11
13
15
17
period in sec

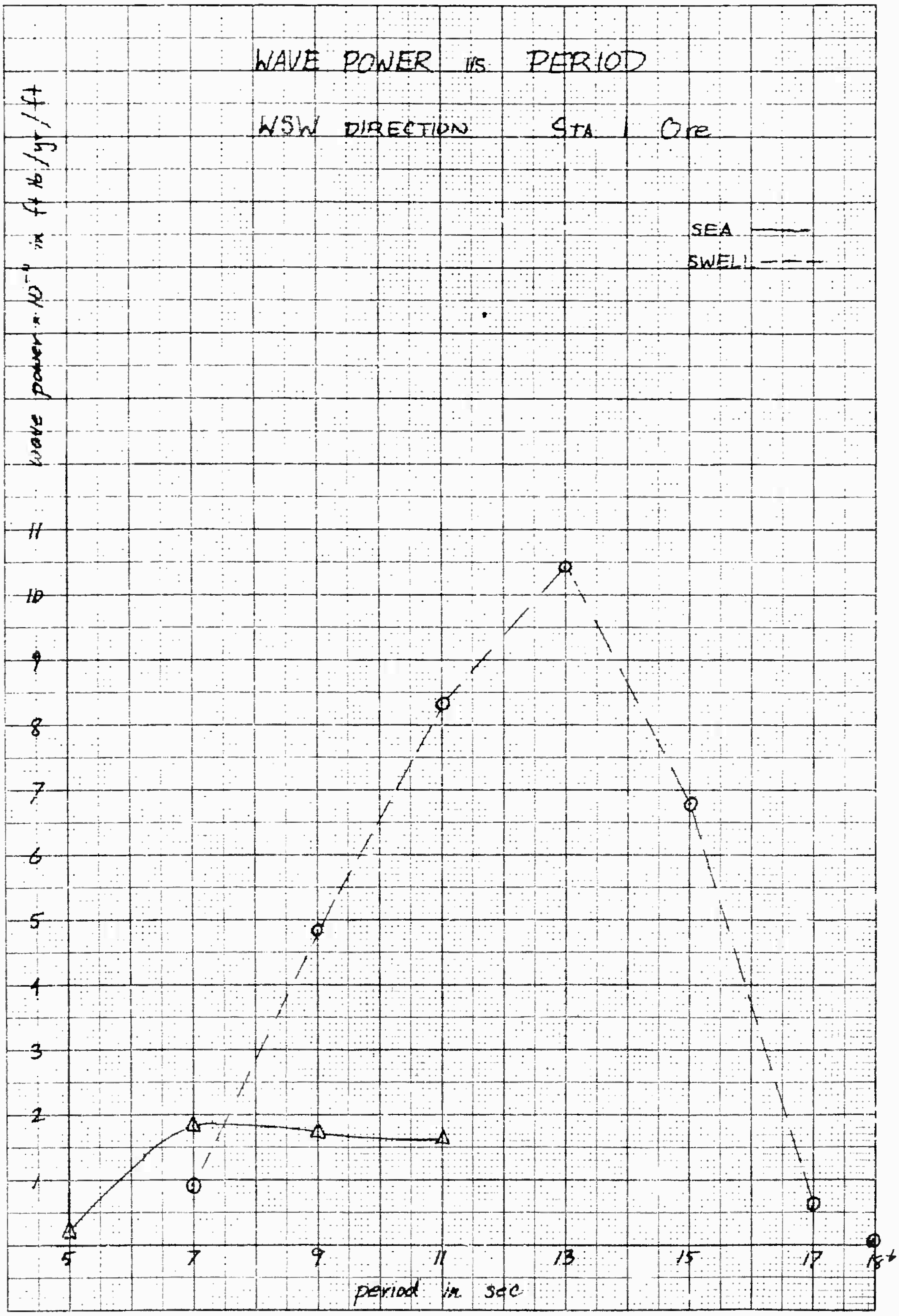

WAVE POWER vs. PERIOD
NW DIRECTION STA 1 Orc
SEA
SWELL
wave power x 10^-11 in ft lb/yr/ft
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
5
7
9
11
13
15
17
12'
period in sec

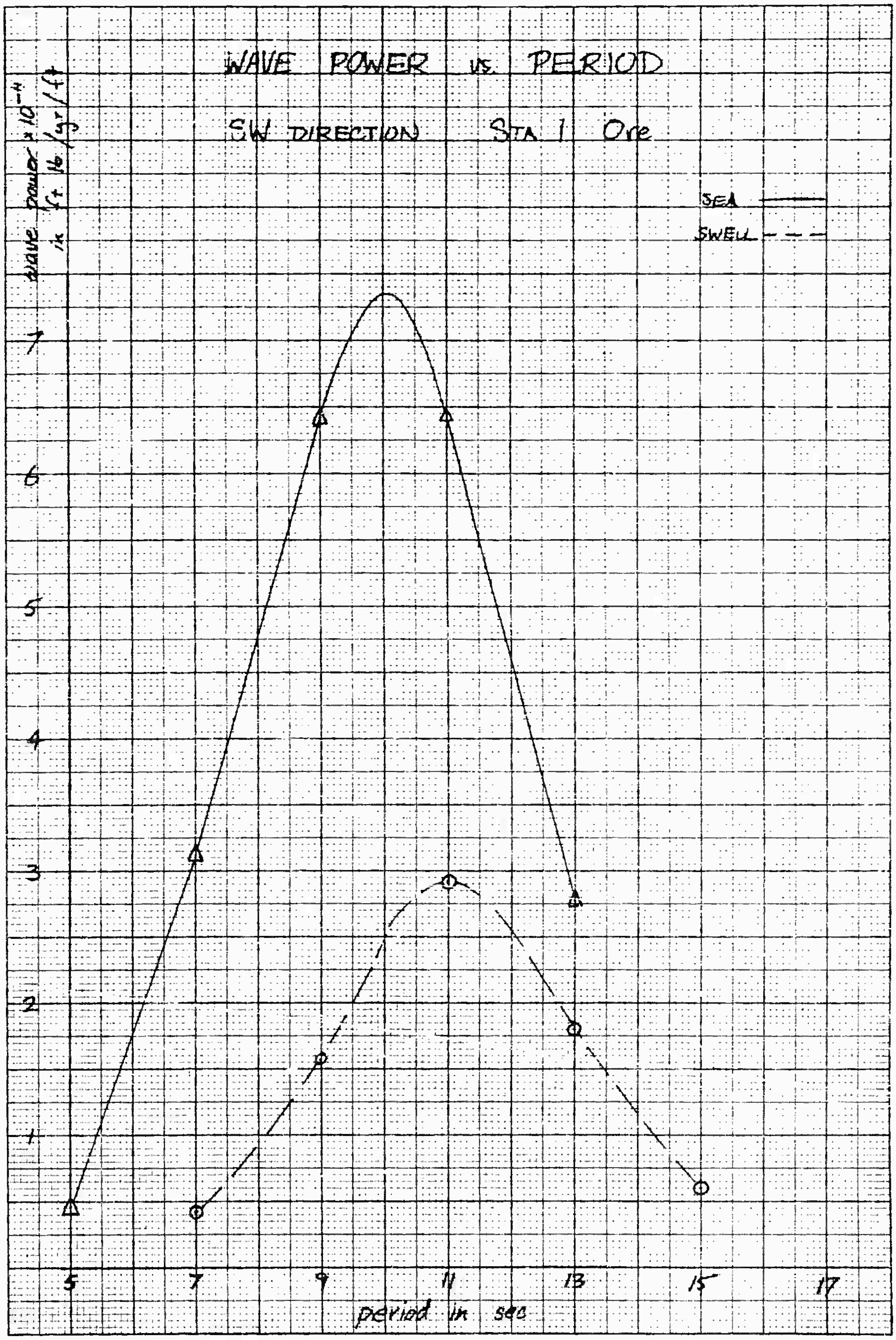


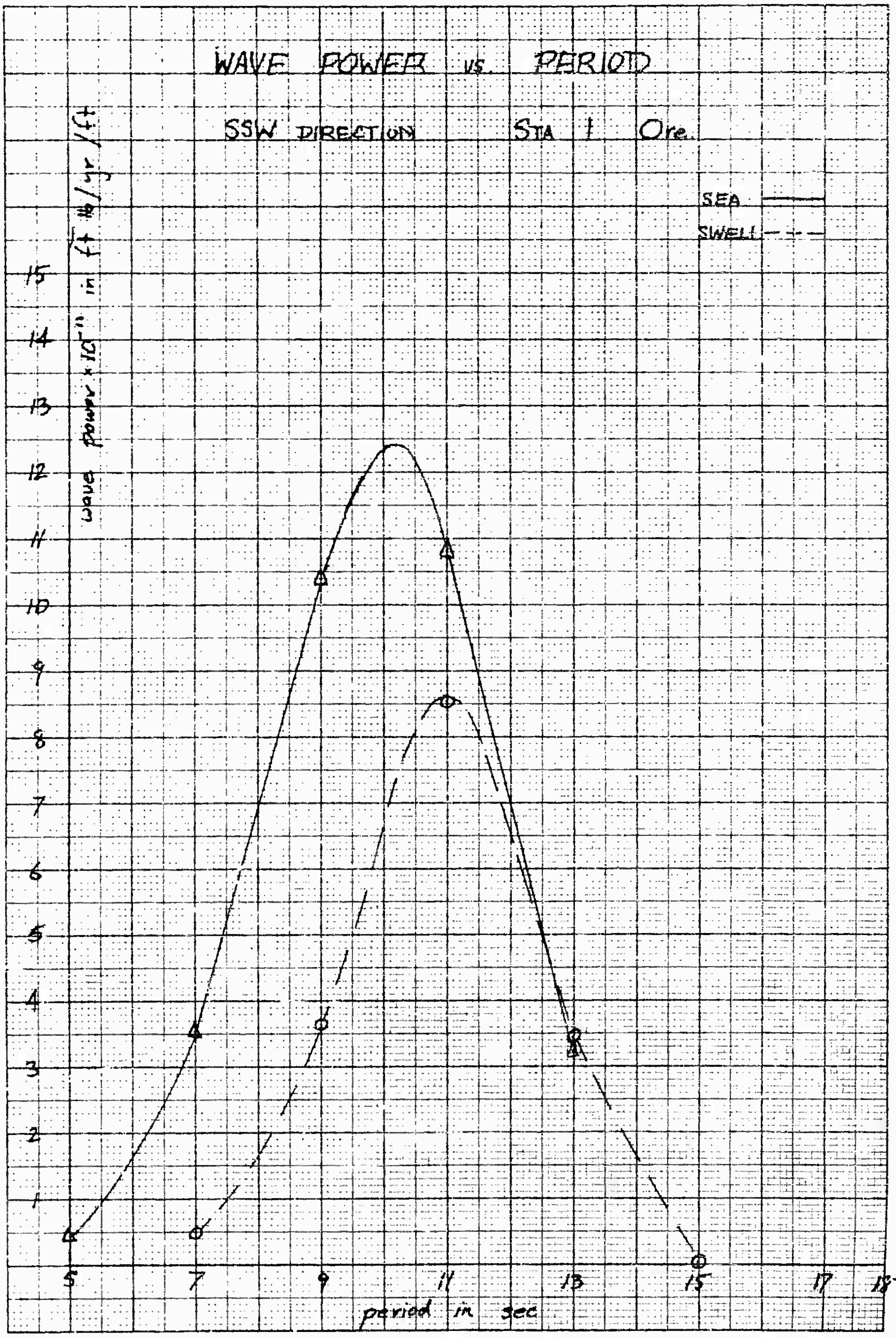
10 X 10 TO 1/2 INCH 46 1323



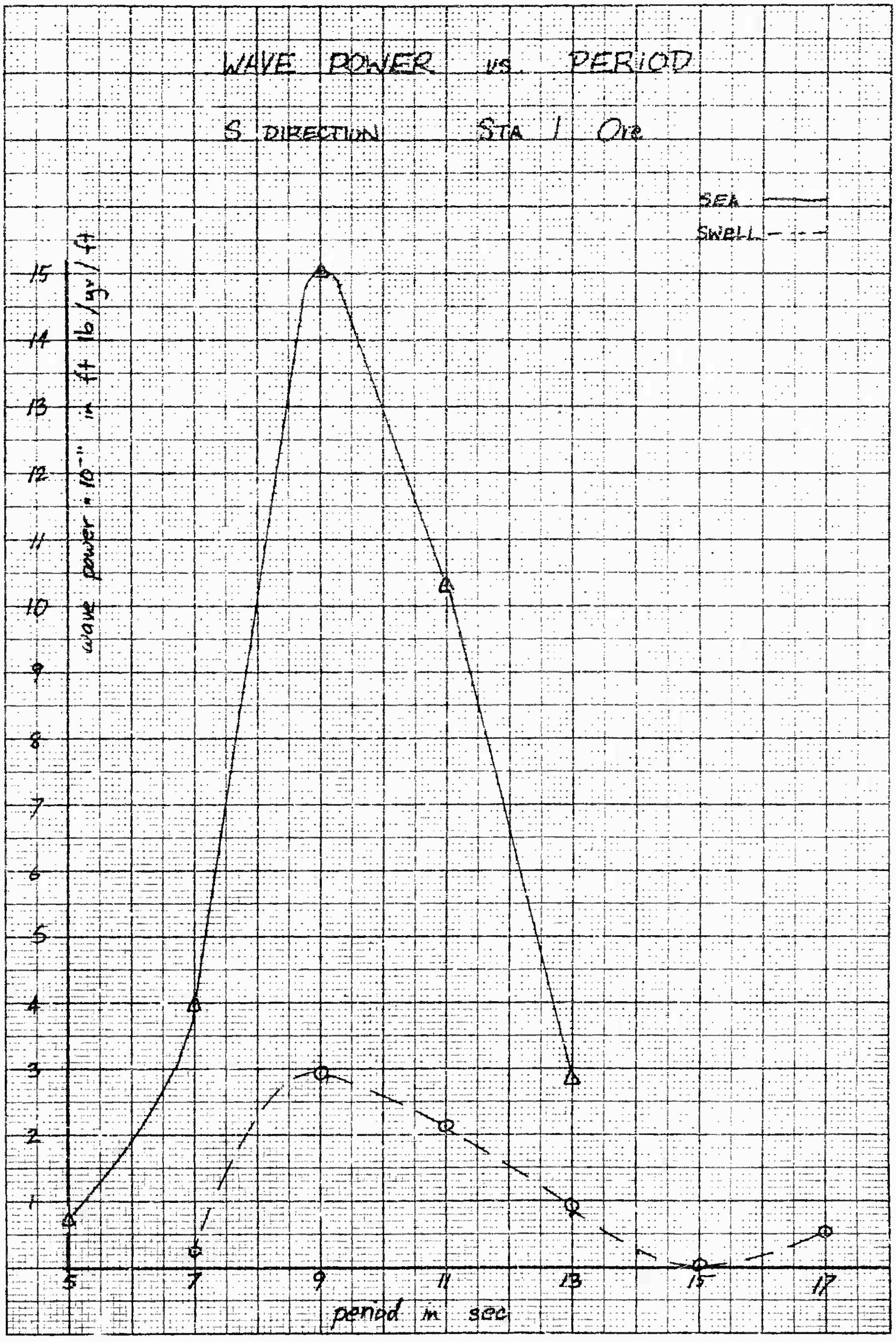
10 X 10 TO ½ INCH 46 1323
KEUFFEL & ESSER CO.

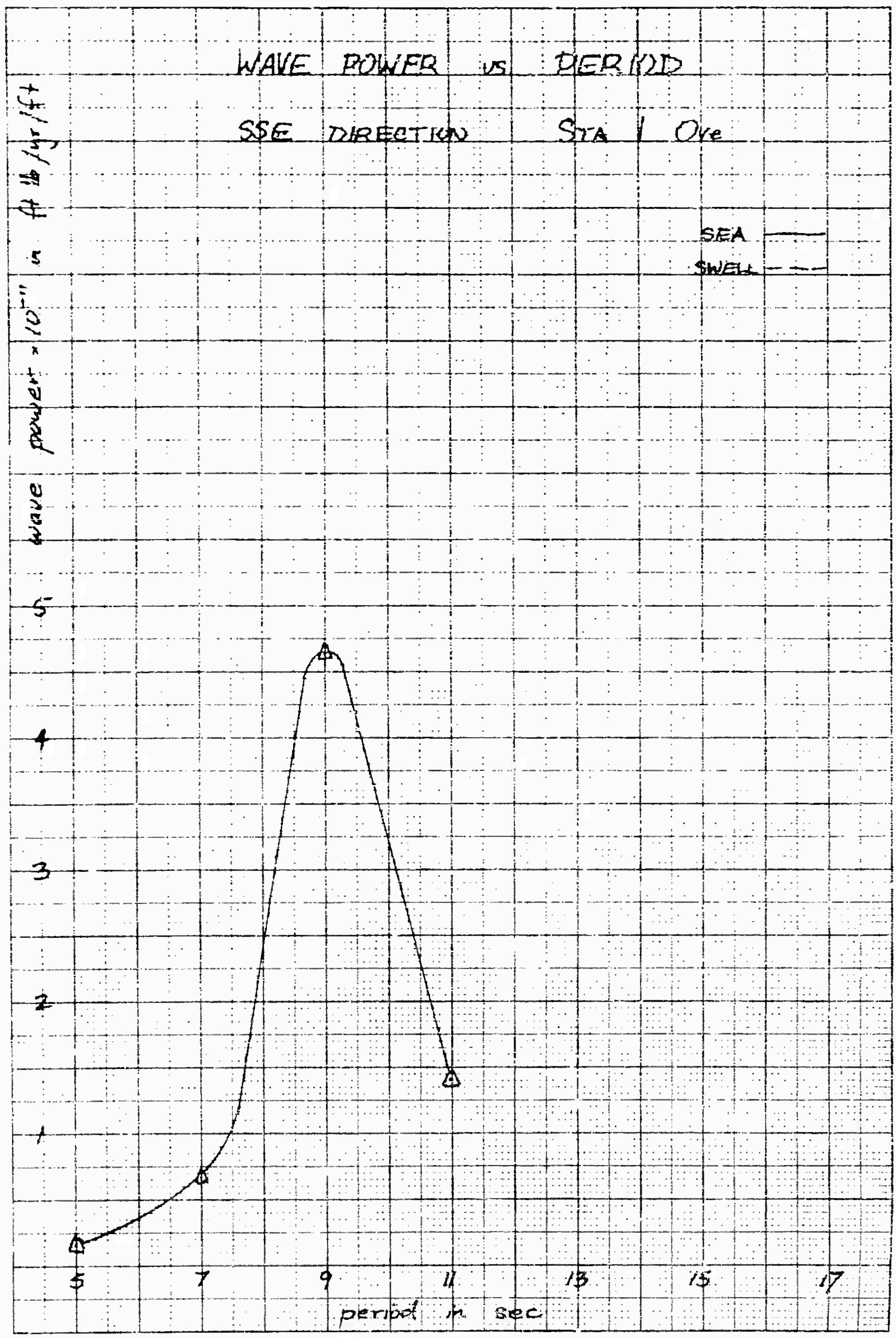

WAVE POWER vs PERIOD
WSW DIRECTION STA 1 Ore
SEA
SWELL
wave power × 10^{-4} in ft lb/yr/ft
period in sec
5
7
9
11
13
15
17
18+
1
2
3
4
5
6
7
8
9
10
11


WAVE POWER vs. PERIOD
SW DIRECTION STA 1 Ore
wave power × 10⁻⁴
in ft lb/yr/ft
SEA
SWELL
1
2
3
4
5
6
7
5
7
9
11
13
15
17
period in sec



WAVE POWER vs. PERIOD
SSW DIRECTION STA 1 Ore.
SEA
SWELL
wave power × 10^11 in ft lb/yr/ft
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
18+
period in sec

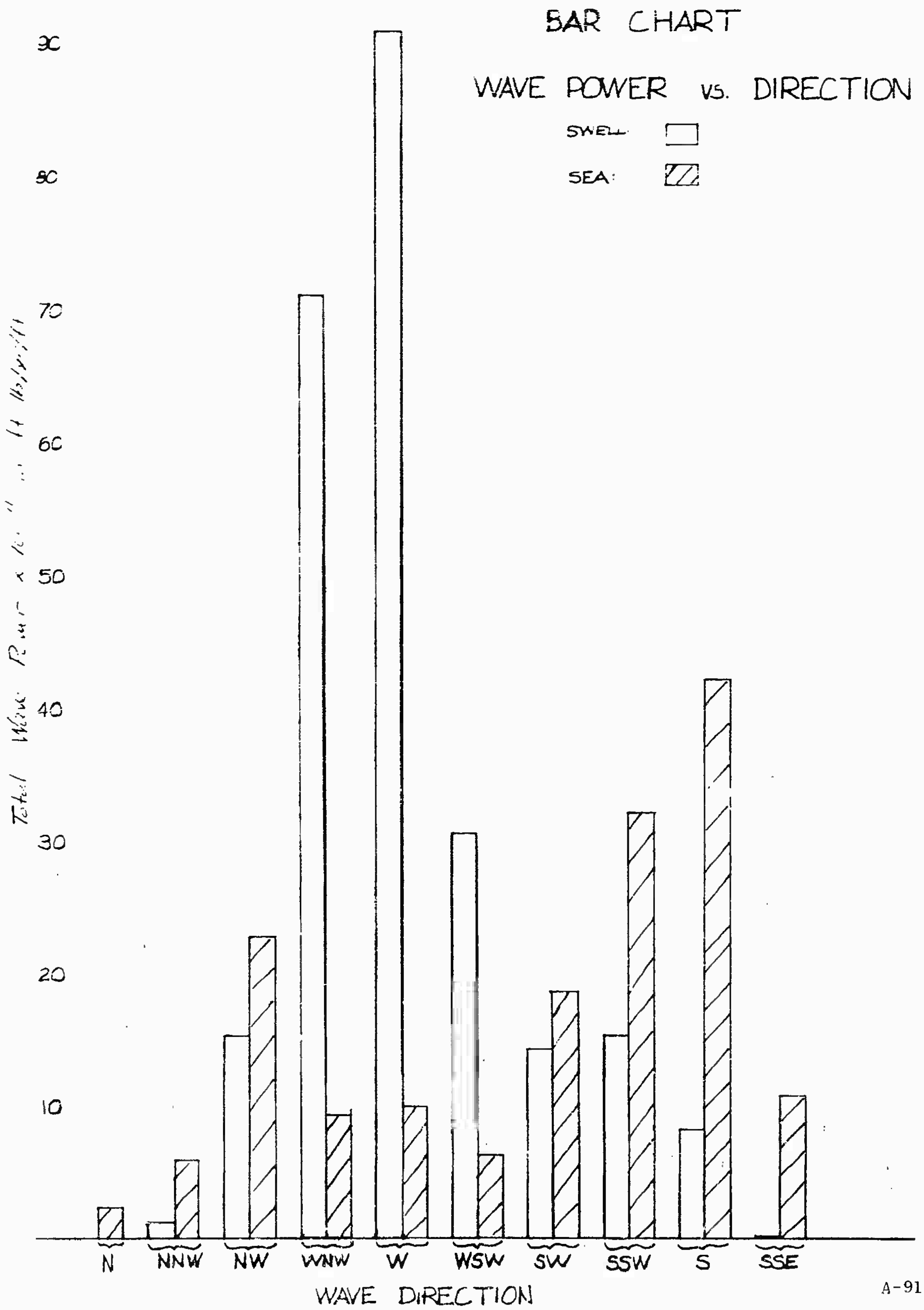

WAVE POWER vs. PERIOD
S DIRECTION STA 1 Ore
SEA
SWELL
wave power • 10⁻¹¹ in ft lb/yr/ft
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
period in sec

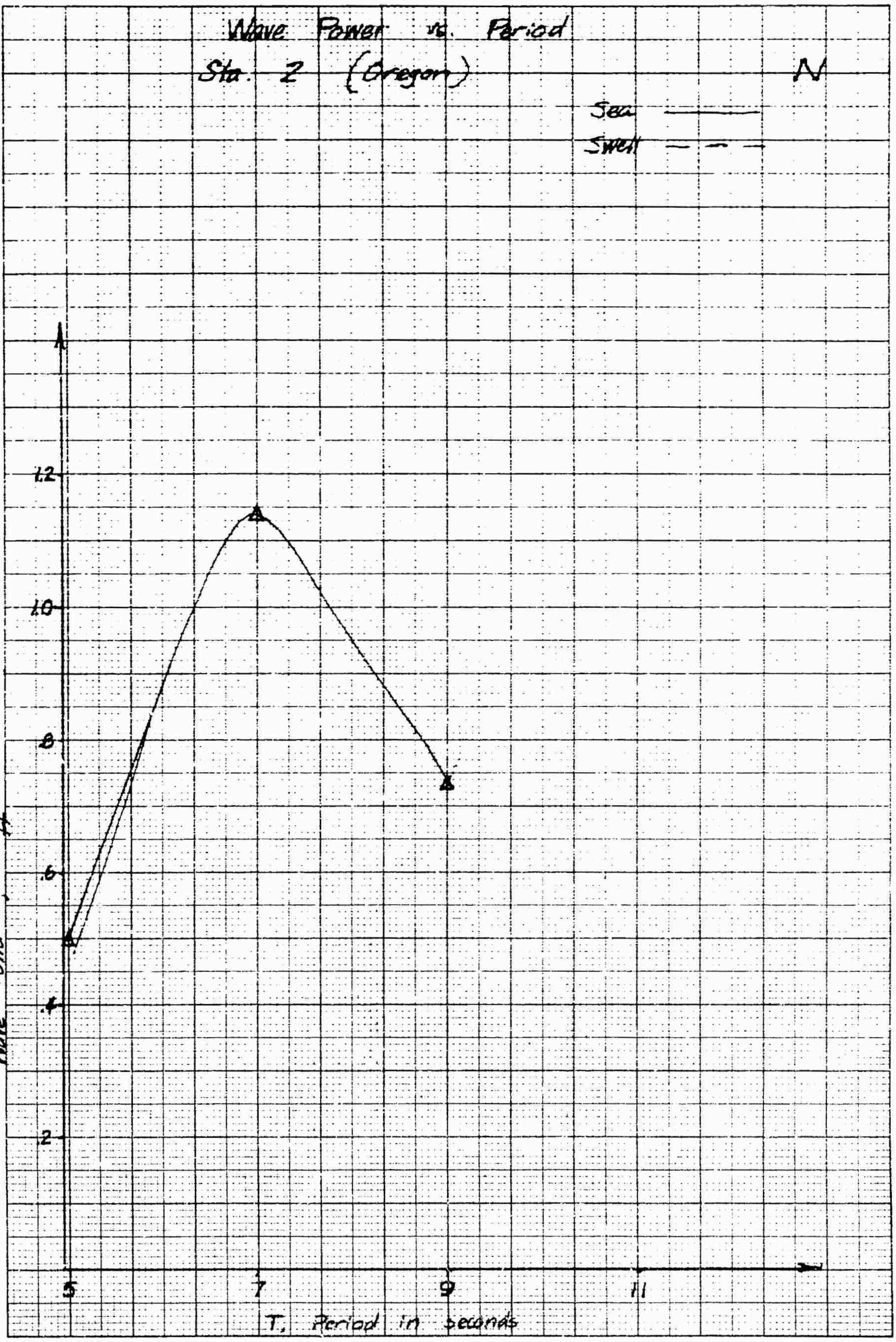

WAVE POWER vs PERIOD
SSE DIRECTION
STA 1 Ove
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
1
2
3
4
5
5
7
9
11
13
15
17
period in sec

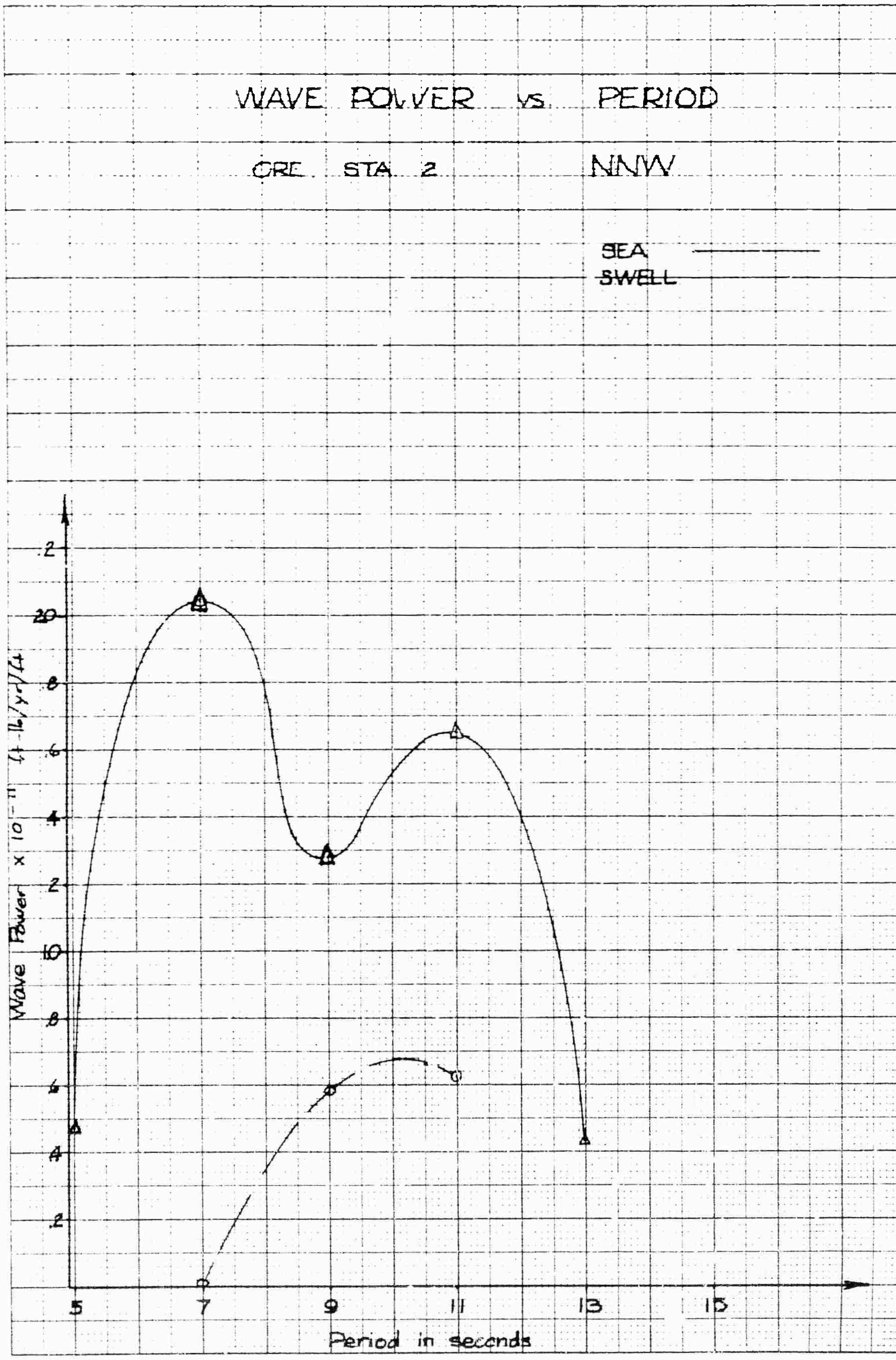
STATION 2 - COLUMBIA RIVER MOUTH

Lat. 46° 12'N, Long. 124° 30'W

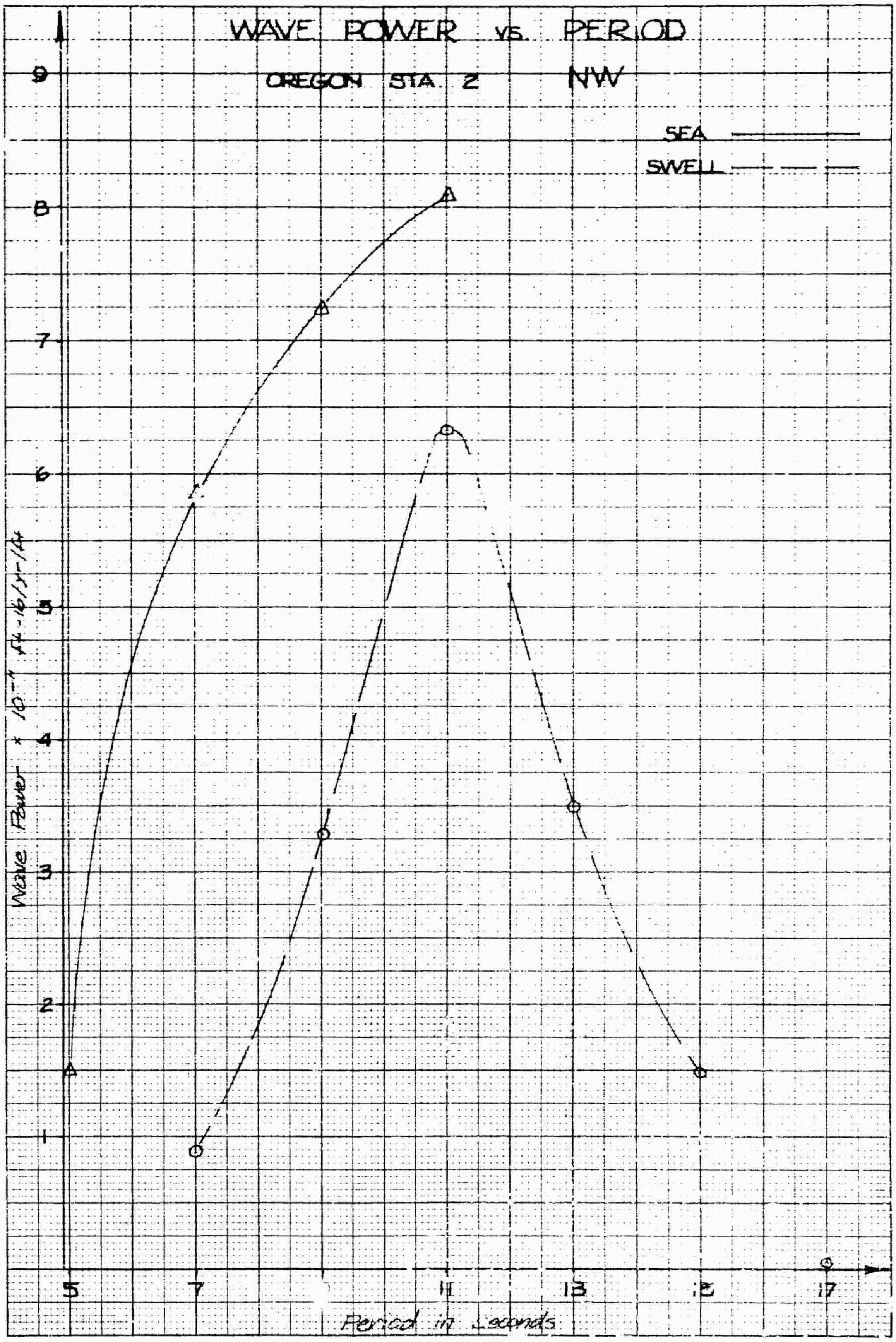
OREGON STA. 2


BAR CHART
WAVE POWER vs. DIRECTION
SWELL
SEA
10
20
30
40
50
60
70
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
WAVE DIRECTION

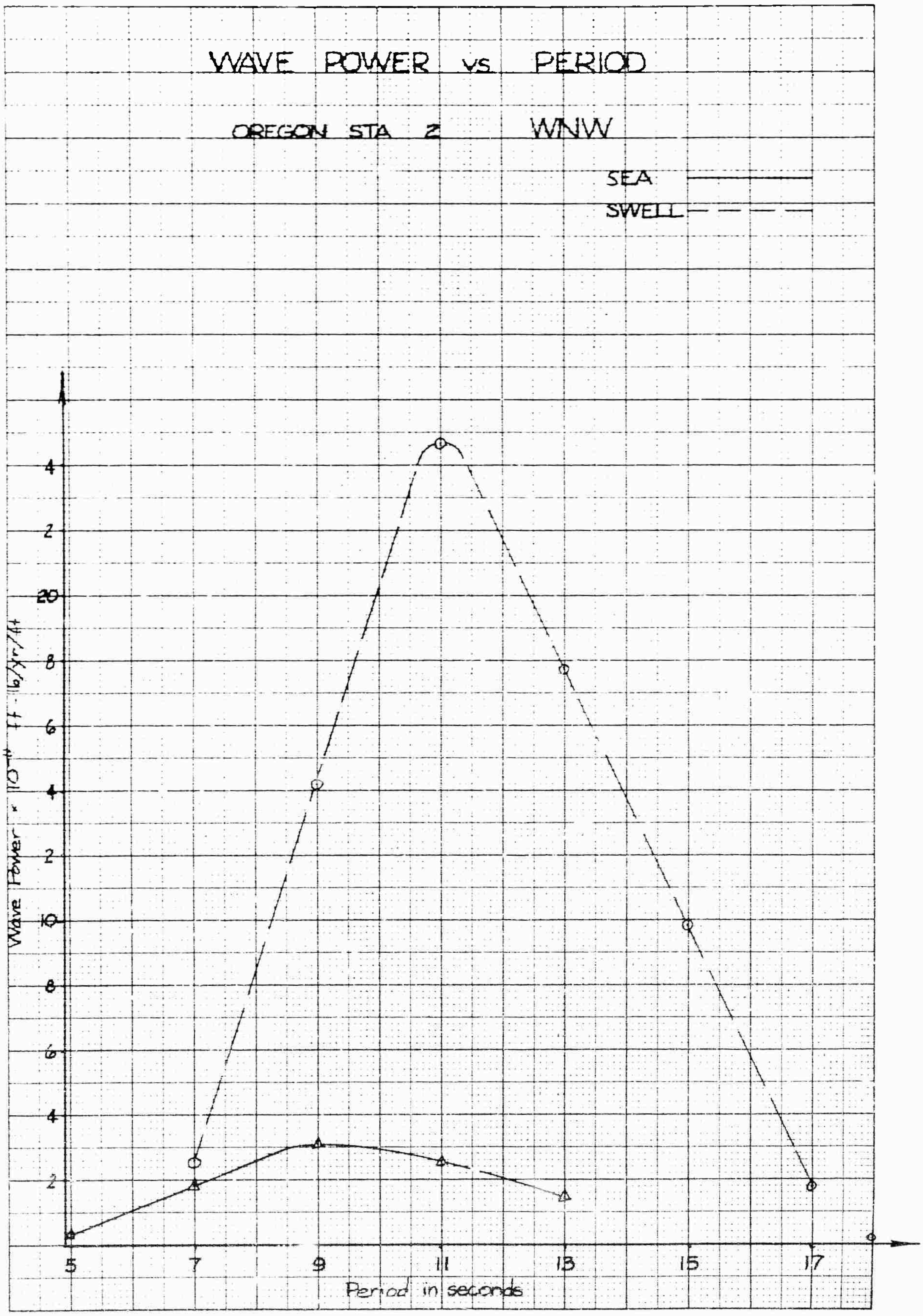

Wave Power vs. Period
Sta. 2 (Oregon)
N
Sea
Swell
1.2
1.0
.8
.6
.4
.2
Wave Power $\frac{ft\text{-}lb/yr}{ft}$ x 10^{-11}
5
7
9
11
T, Period in seconds

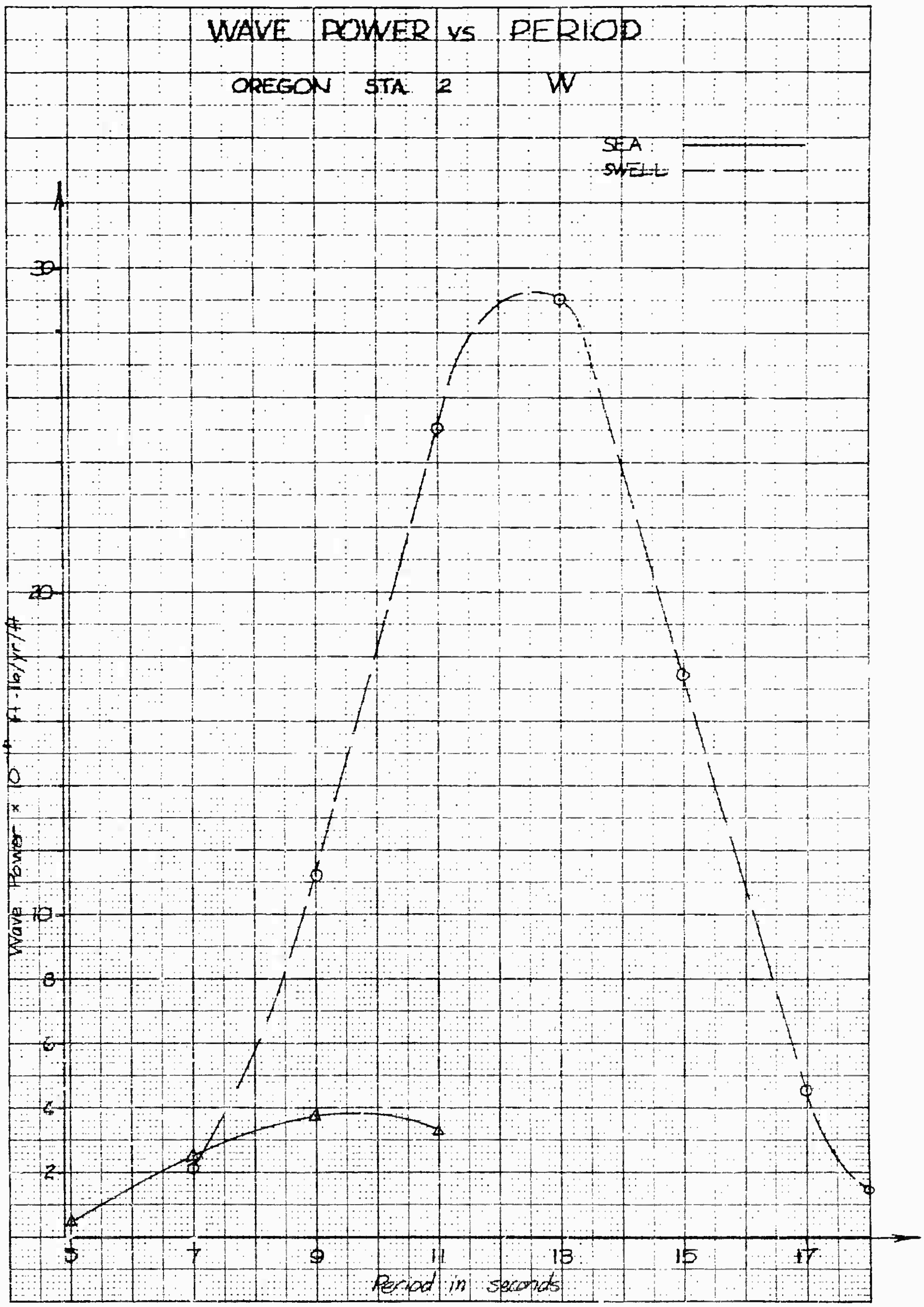


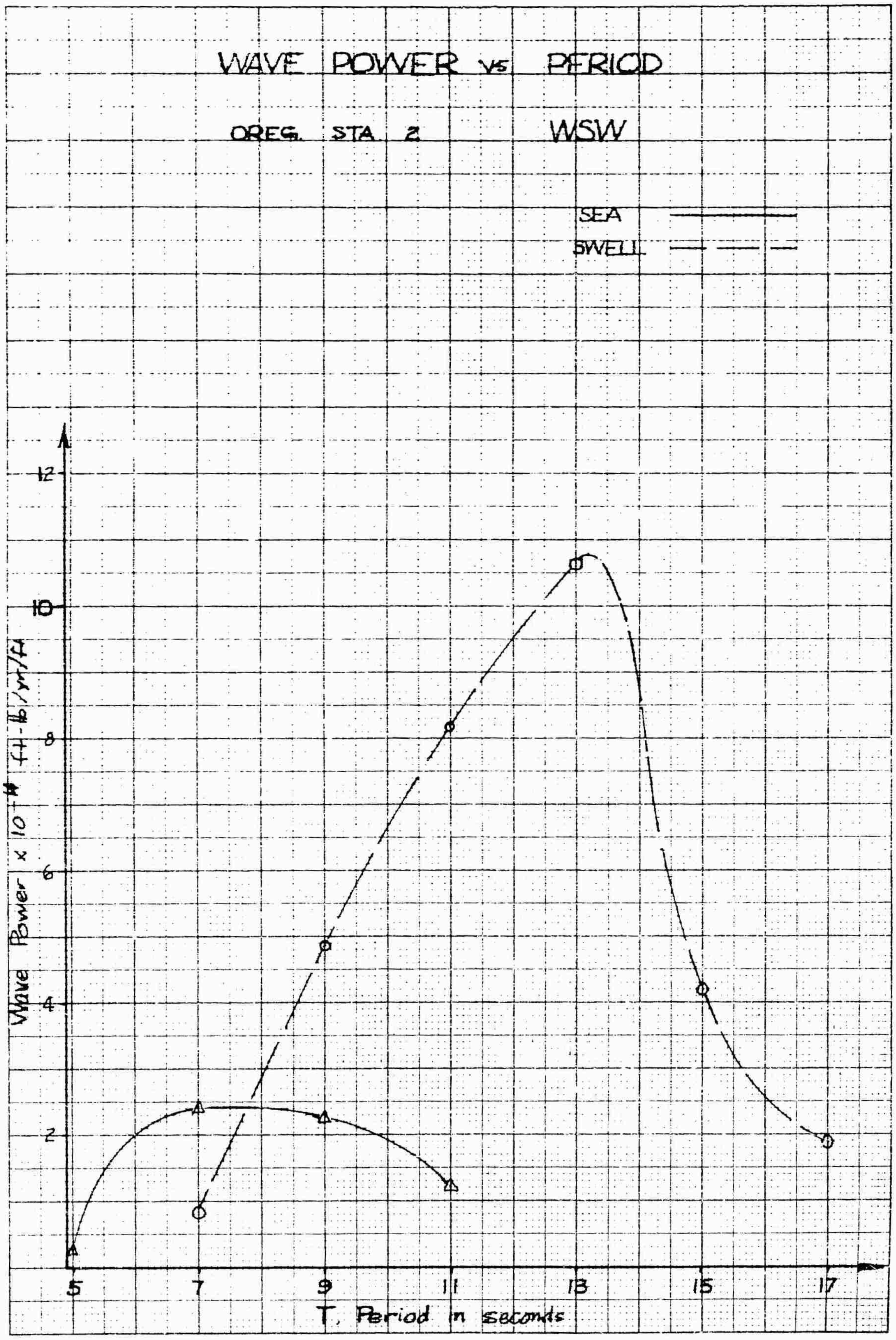
WAVE POWER vs. PERIOD
CRE. STA. 2
NNW
SEA
SWELL
Wave Power x 10⁻¹¹ ft-lb/yr/ft
.2
20
.8
.6
.4
.2
10
.8
.6
.4
.2
5
7
9
11
13
15
Period in seconds

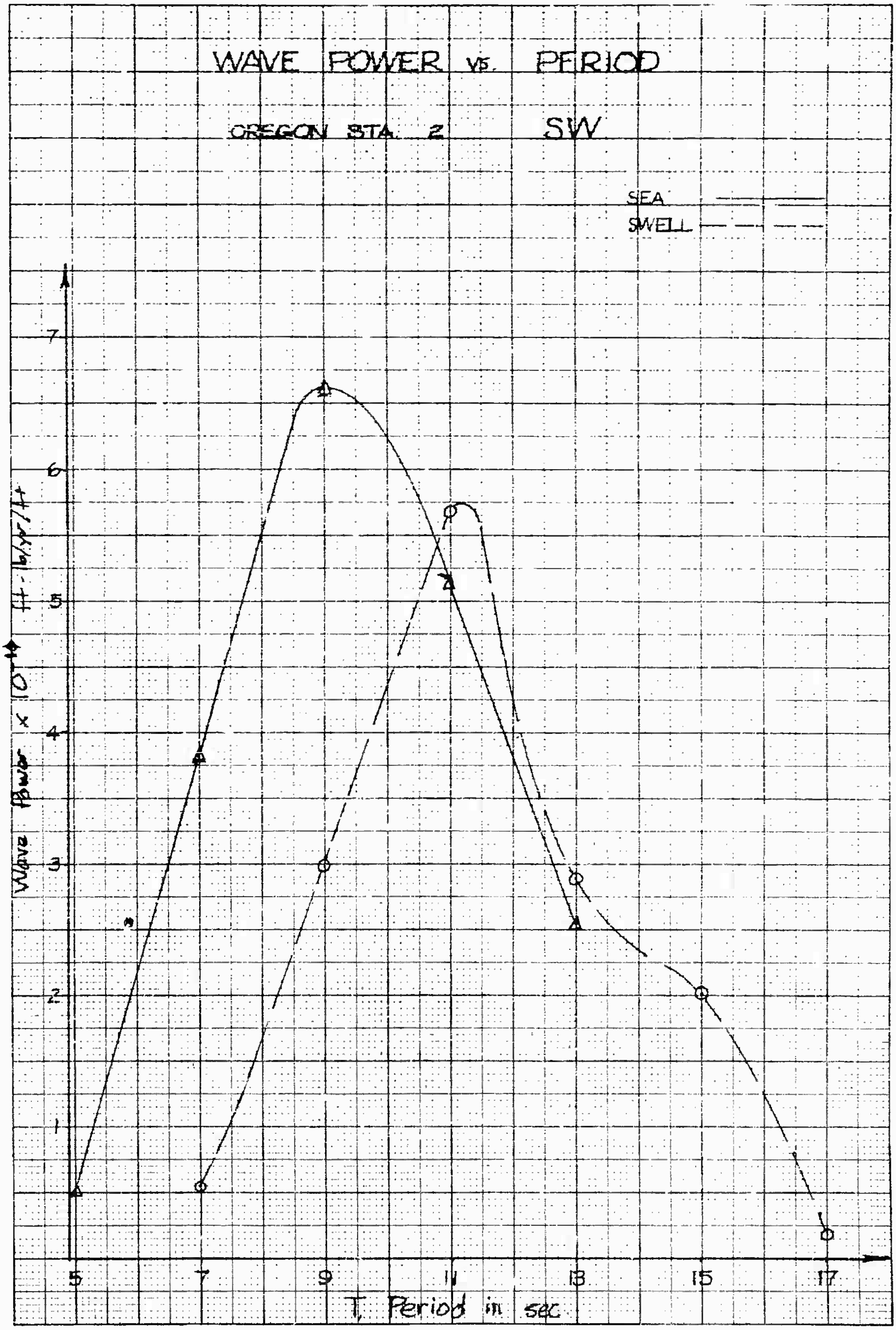


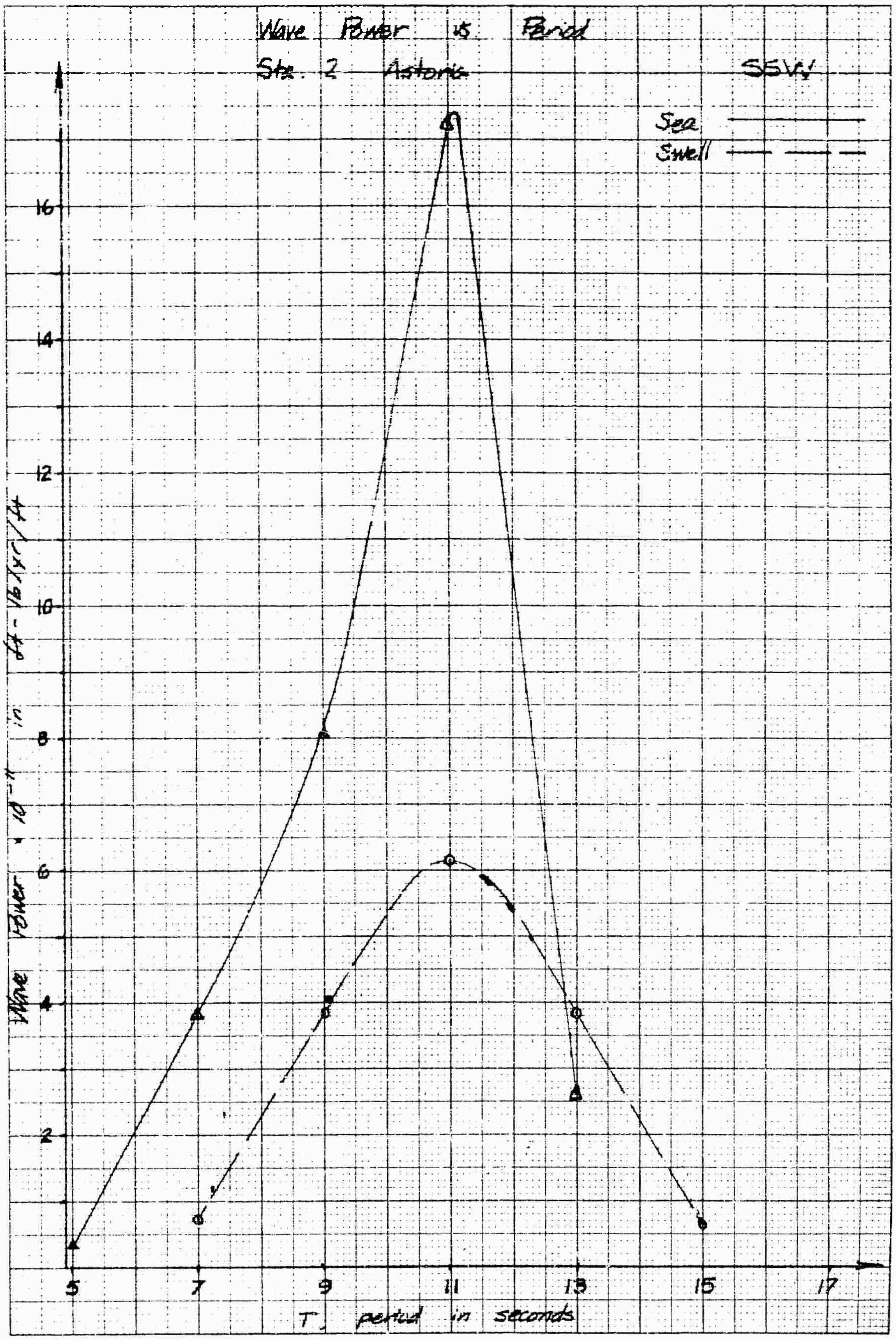
WAVE POWER vs. PERIOD
OREGON STA. 2 NW
SEA
SWELL
Wave Power x 10⁻⁴ ft-lb/ft-hr
Period in Seconds

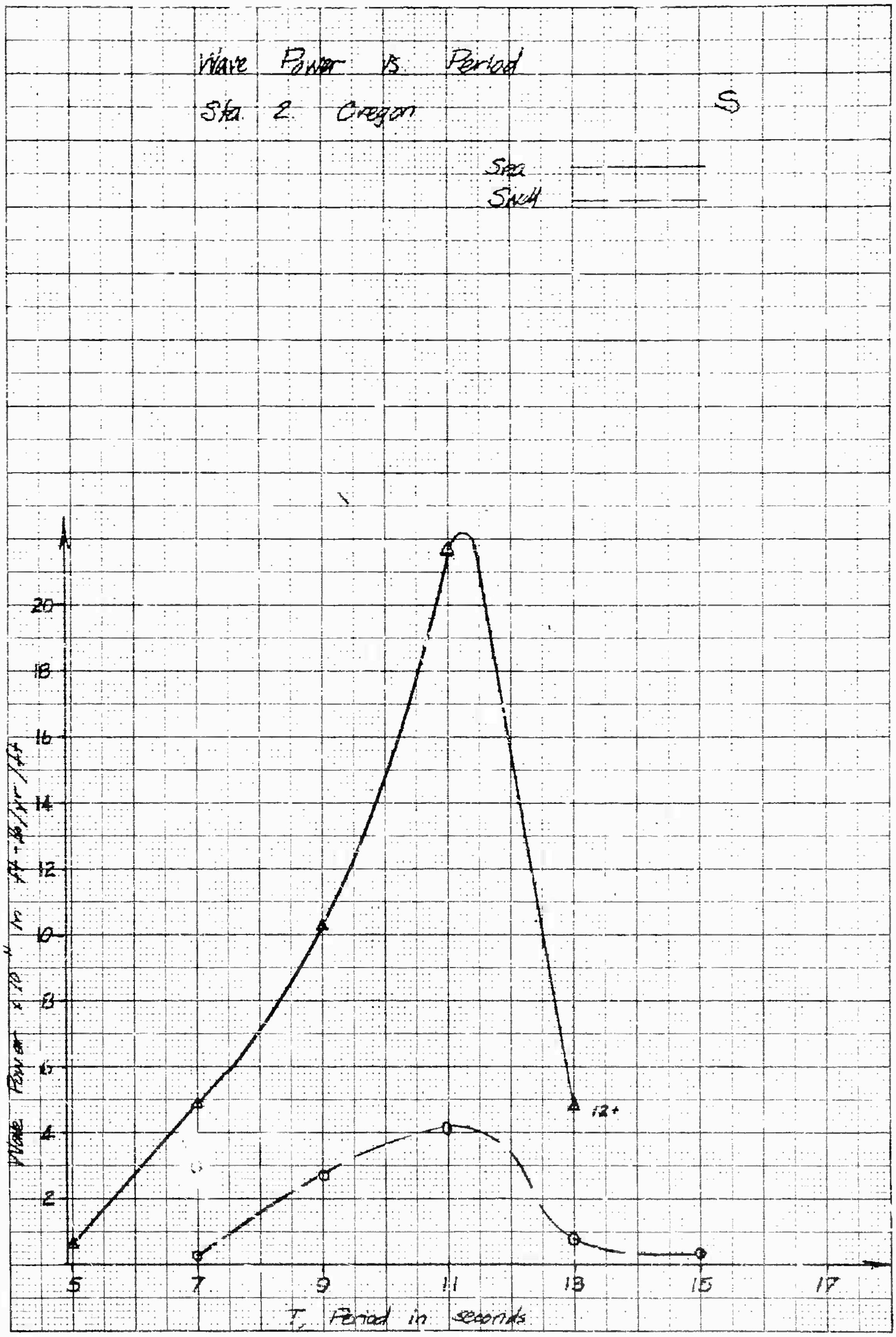

WAVE POWER vs PERIOD
OREGON STA 2 WNW
SEA
SWELL
Wave Power × 10⁻⁴ ft·lb/yr/ft
4
2
20
8
6
4
2
10
8
6
4
2
5
7
9
11
13
15
17
Period in seconds

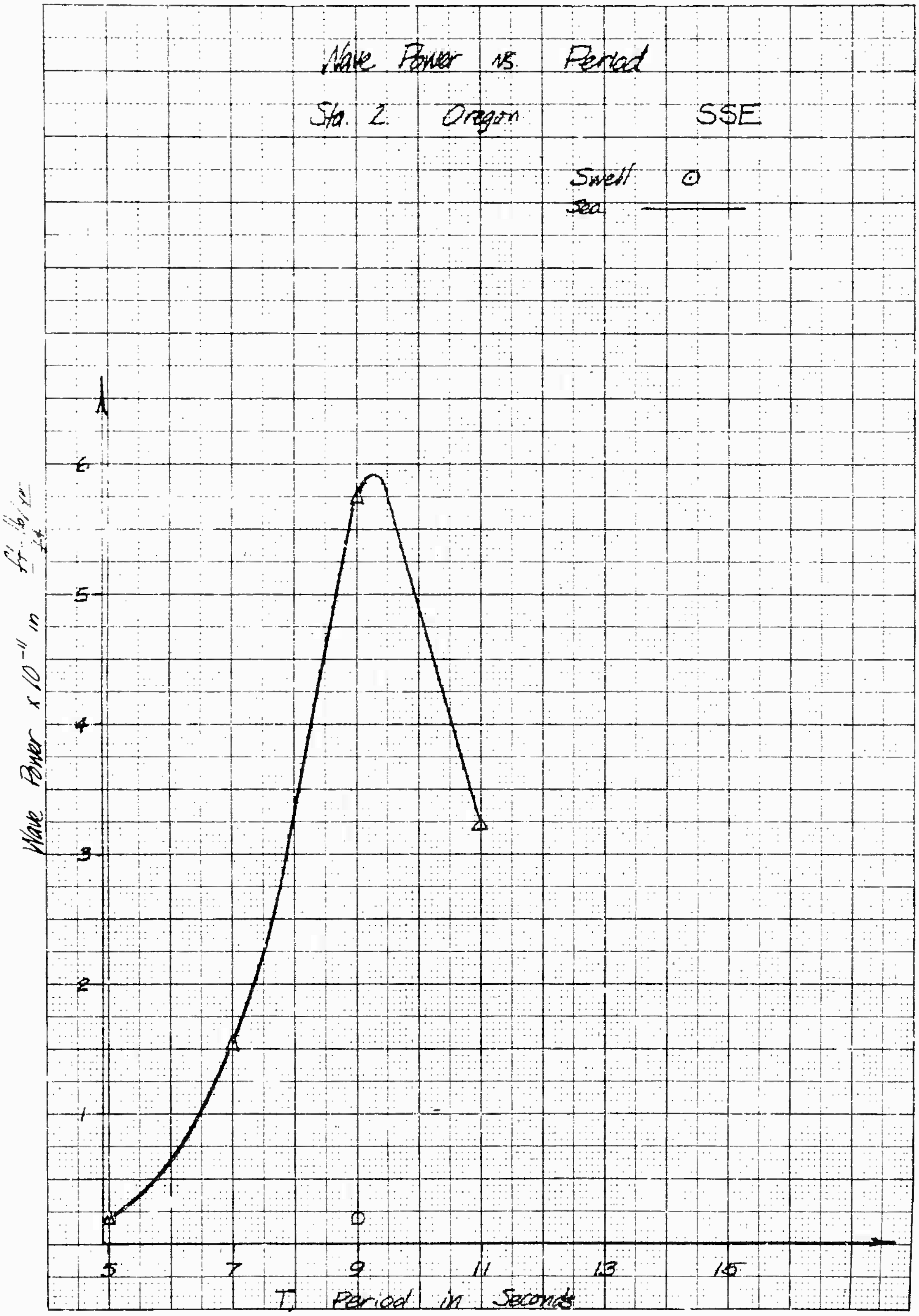

WAVE POWER vs PERIOD
OREGON STA. 2 W
SEA
SWELL
Wave Power × 10⁴ ft-lb/yr/ft
30
20
10
8
6
4
2
5
7
9
11
13
15
17
Period in seconds


WAVE POWER vs PERIOD
OREG. STA. 2
WSW
SEA
SWELL
Wave Power x 10^-4 ft-lb/yr/ft
T, Period in seconds
12
10
8
6
4
2
5
7
9
11
13
15
17


WAVE POWER vs. PERIOD
OREGON STA. 2
SW
SEA
SWELL
Wave Power x 10^{-14} ft-lb/yr/ft
T, Period in sec
1
2
3
4
5
6
7
5
7
9
11
13
15
17

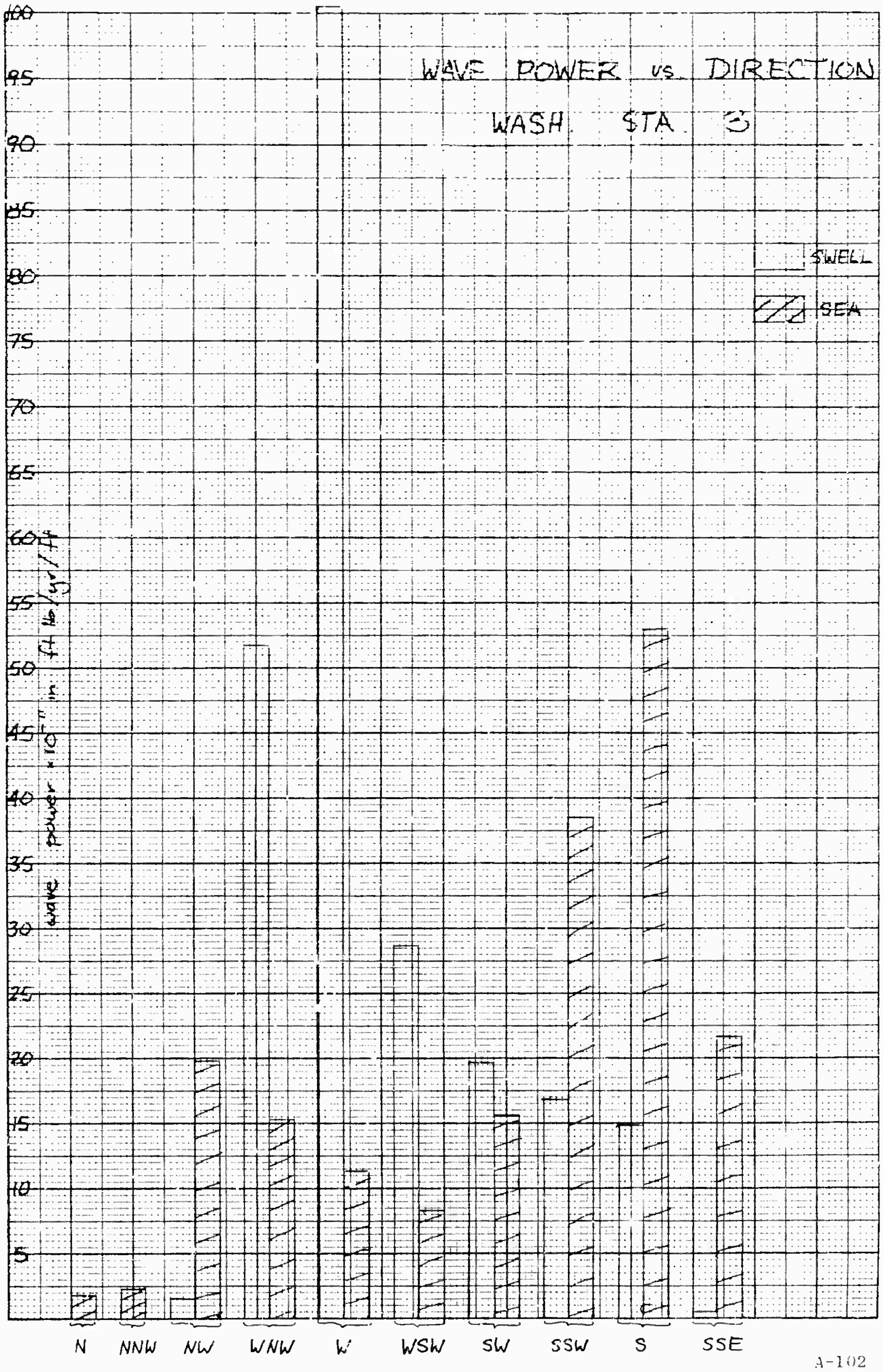

Wave Power vs Period
Sta. 2 Astoria
SSW
Sea
Swell
Wave Power × 10⁻¹¹ in ft-lb/yr/ft
16
14
12
10
8
6
4
2
5
7
9
11
13
15
17
T, period in seconds

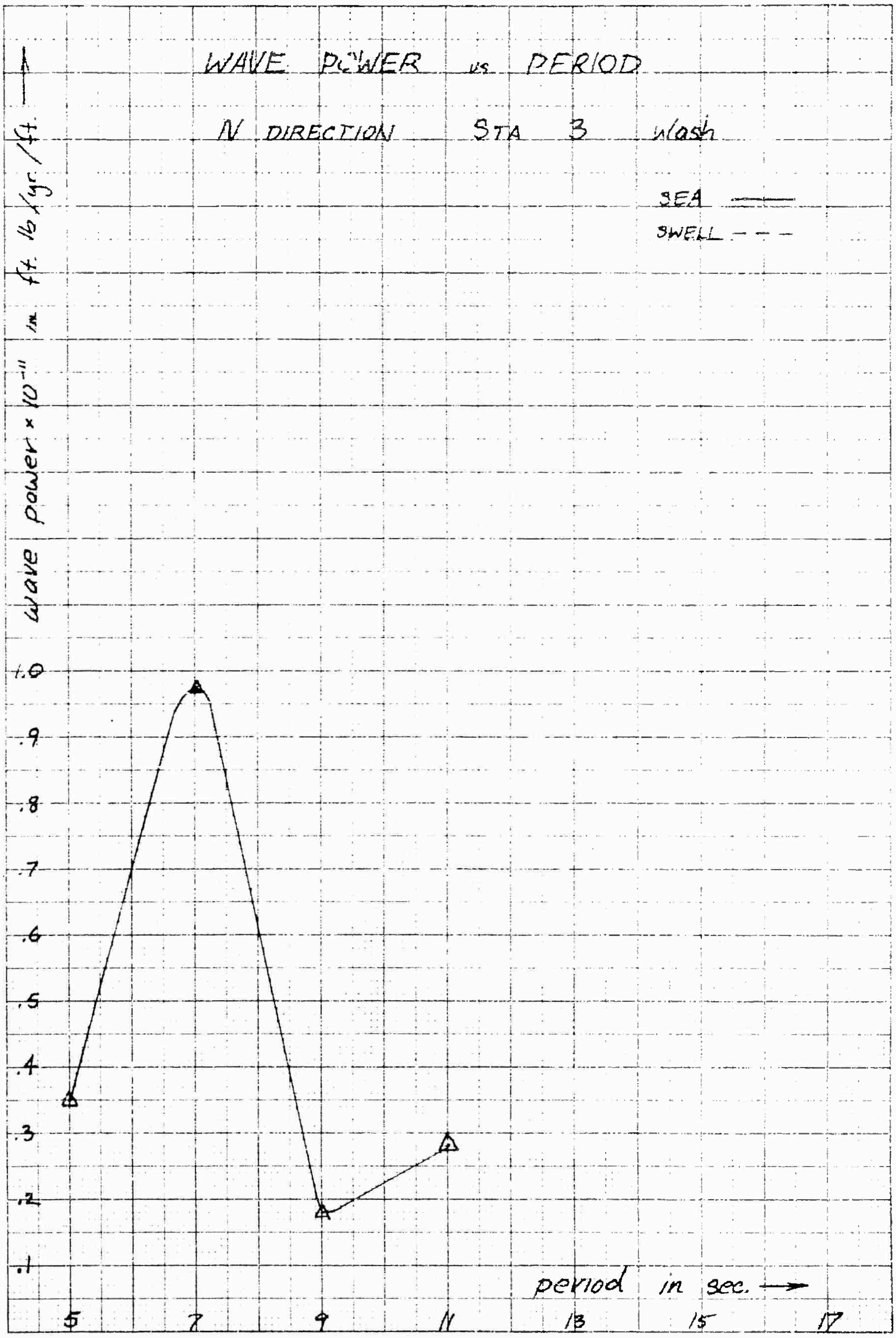

Wave Power vs. Period
Sta. 2 Oregon
S
Sea
Swell
Wave Power x 10^4 in ft-lb/yr/ft
20
18
16
14
12
10
8
6
4
2
12+
5
7
9
11
13
15
17
T, Period in seconds

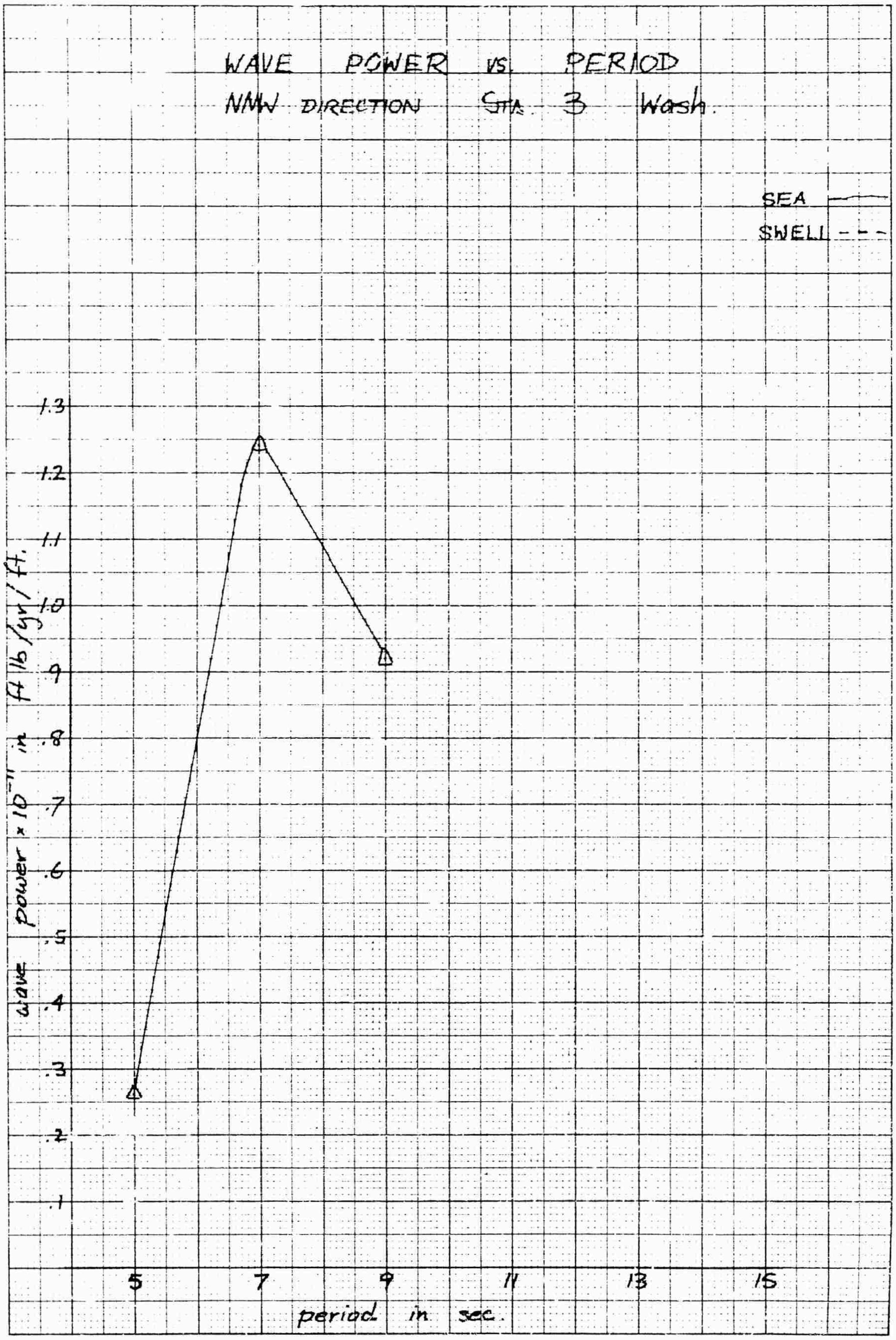

Wave Power vs. Period
Sta. 2. Oregon
SSE
Swell
Sea
Wave Power x 10⁻¹¹ in ft. lb/yr / ft
6
5
4
3
2
1
5
7
9
11
13
15
T, Period in Seconds

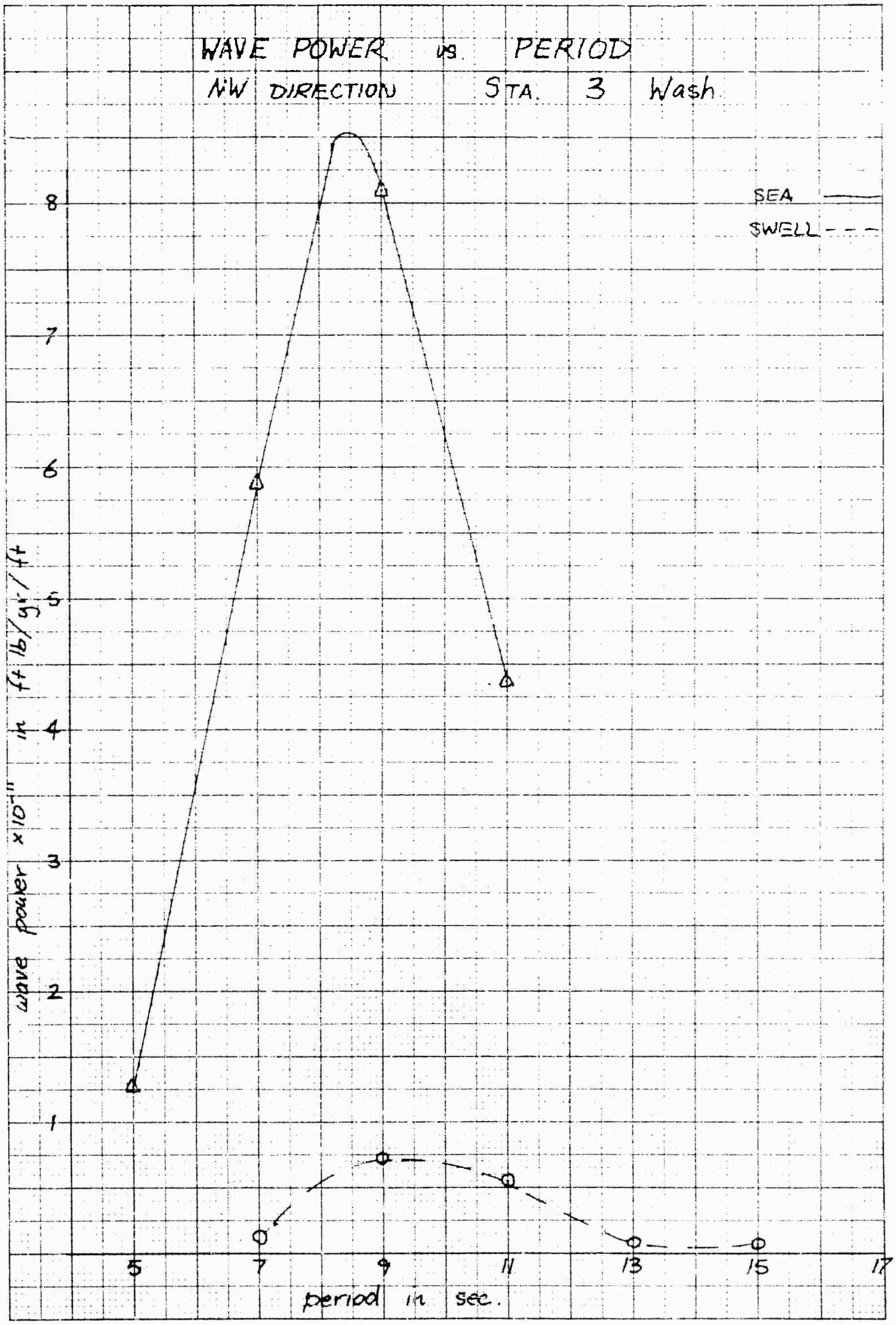
STATION 3 WASHINGTON COAST

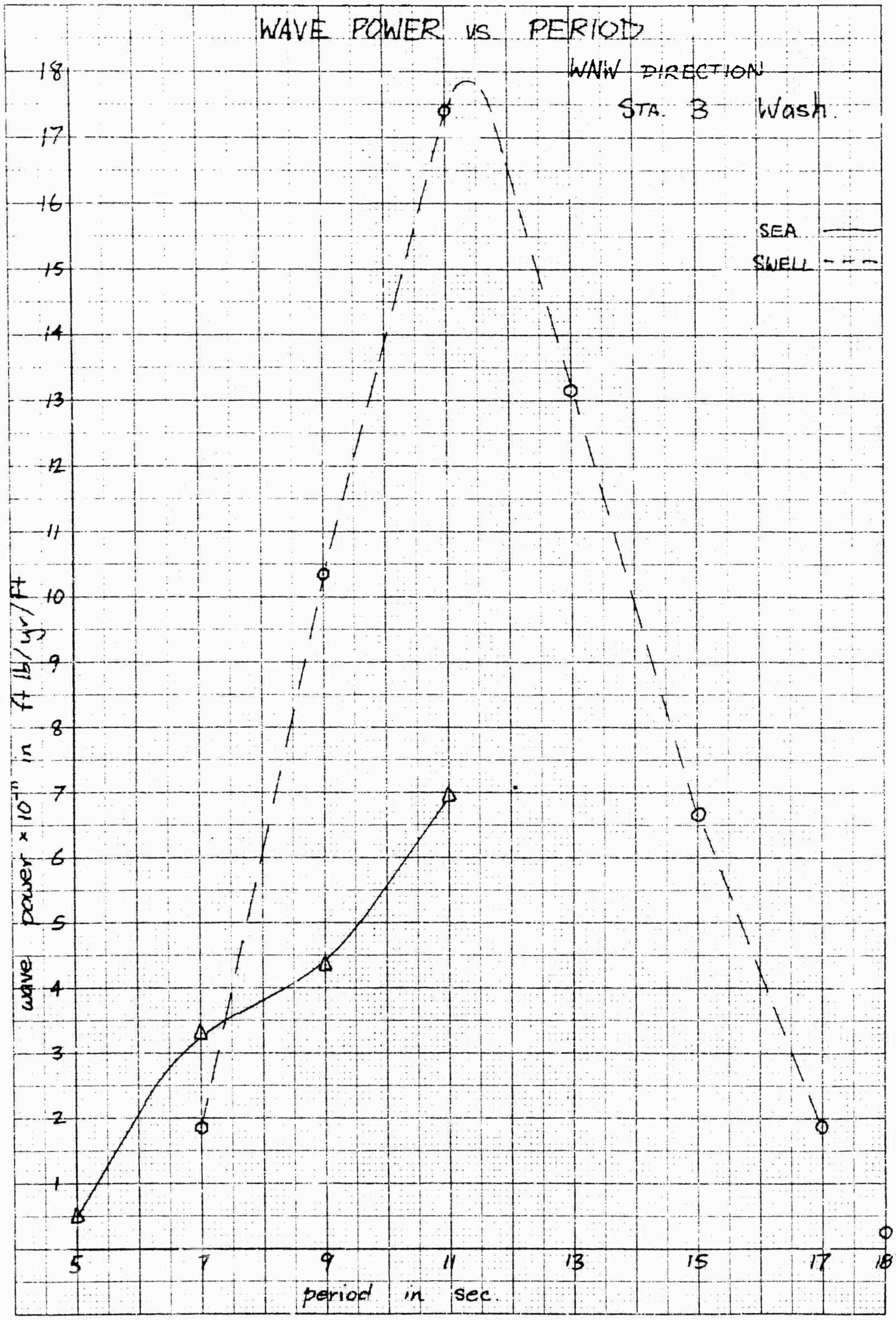
Lat. 47° 40'N, Long. 125° 00'W

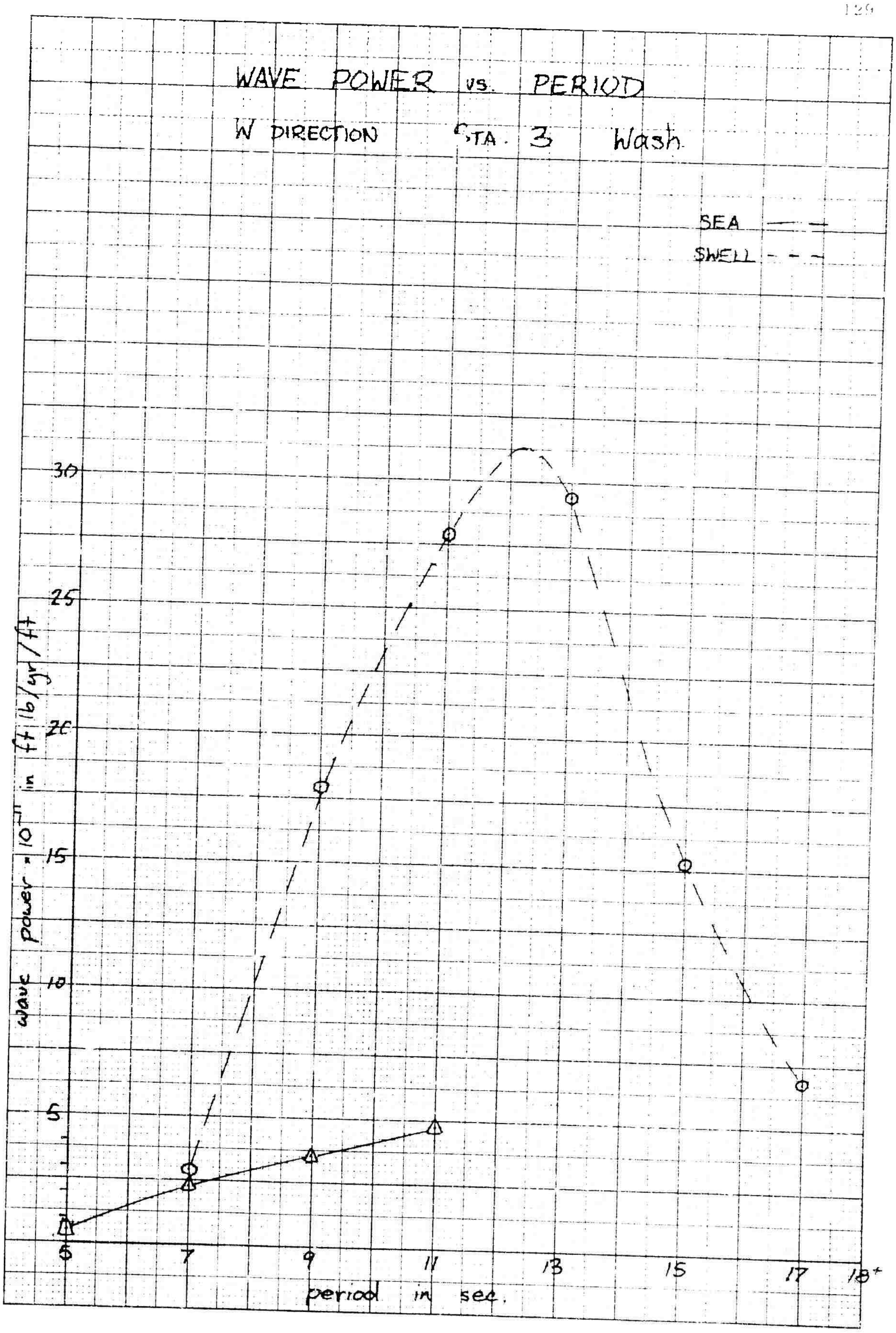

WAVE POWER vs. DIRECTION
WASH. STA. 3
SWELL
SEA
wave power × 10⁻⁷ in ft lb/yr/ft
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE


WAVE POWER vs PERIOD
N DIRECTION STA 3 wash
SEA
SWELL
wave power × 10⁻¹¹ in ft. lb/yr./ft.
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
period in sec.
5
7
9
11
13
15
17

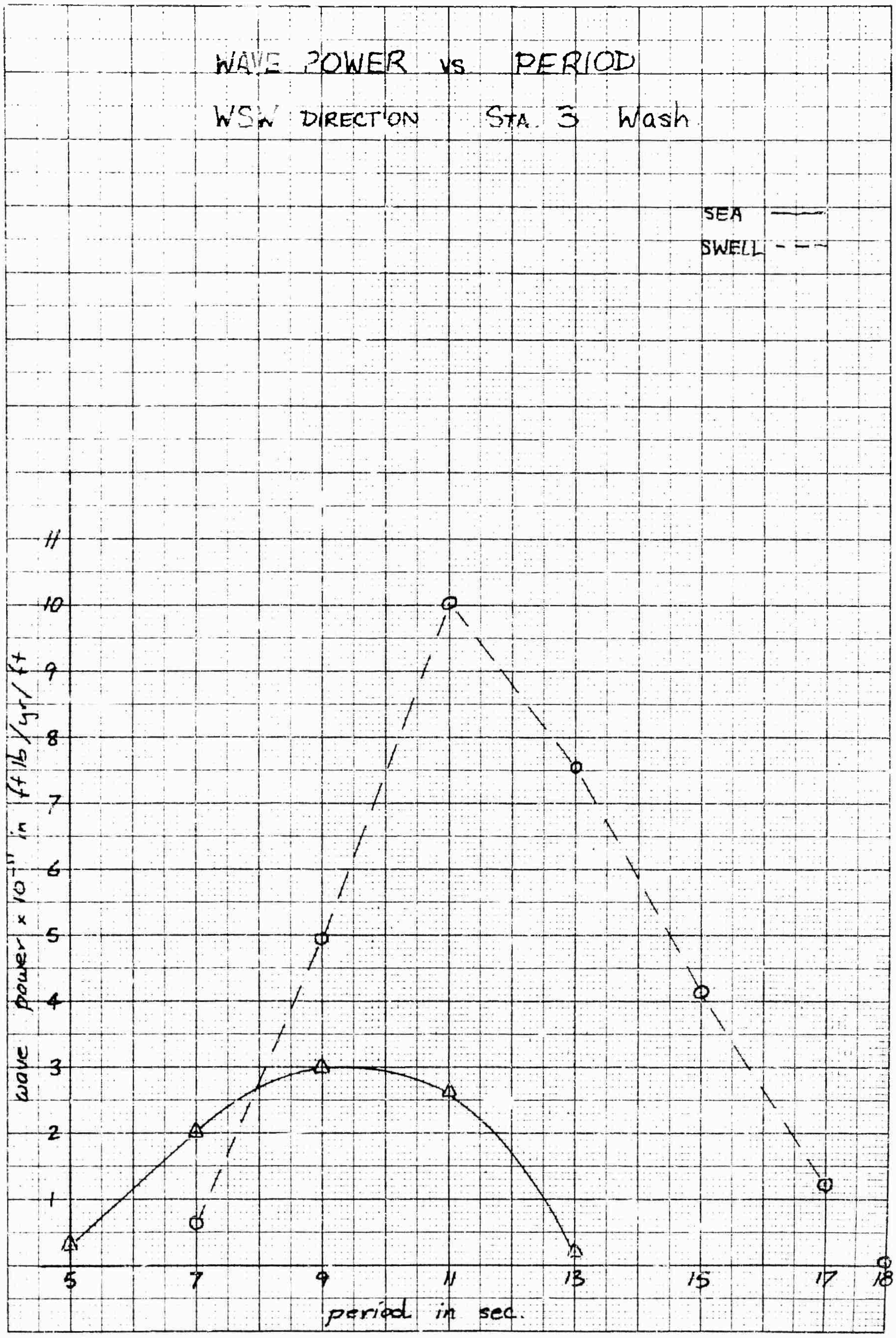

WAVE POWER VS PERIOD
NNW DIRECTION STA. 3 Wash.
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft.
1.3
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
period in sec.

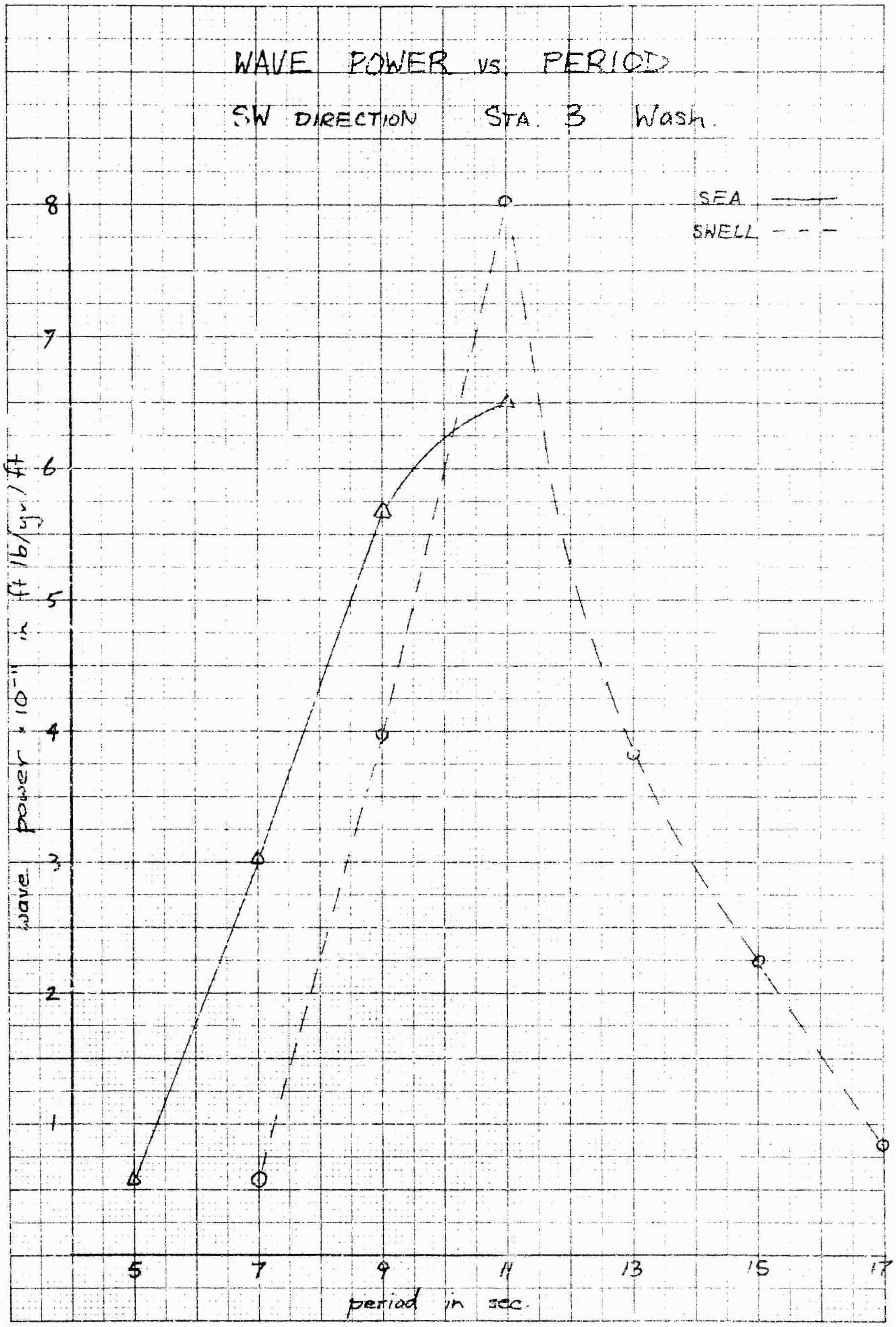

WAVE POWER vs. PERIOD
NW DIRECTION STA. 3 Wash
SEA
SWELL
wave power x10⁻¹¹ in ft lb/yr/ft
period in sec.
1
2
3
4
5
6
7
8
5
7
9
11
13
15
17

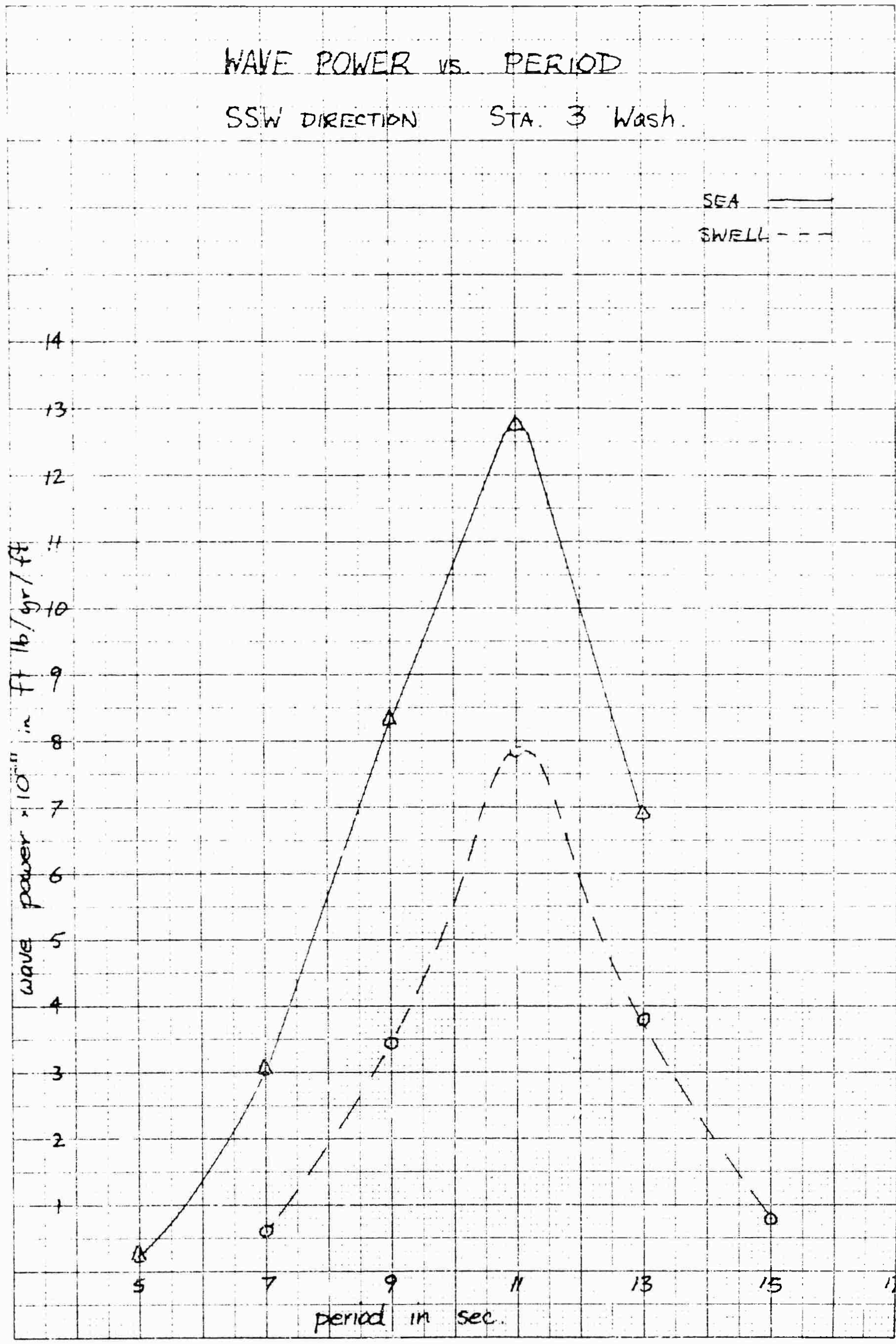

WAVE POWER VS PERIOD
WNW DIRECTION
STA. 3 Wash.
SEA
SWELL
wave power × 10⁻ⁿ in ft lb/yr/ft
period in sec.
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
18+

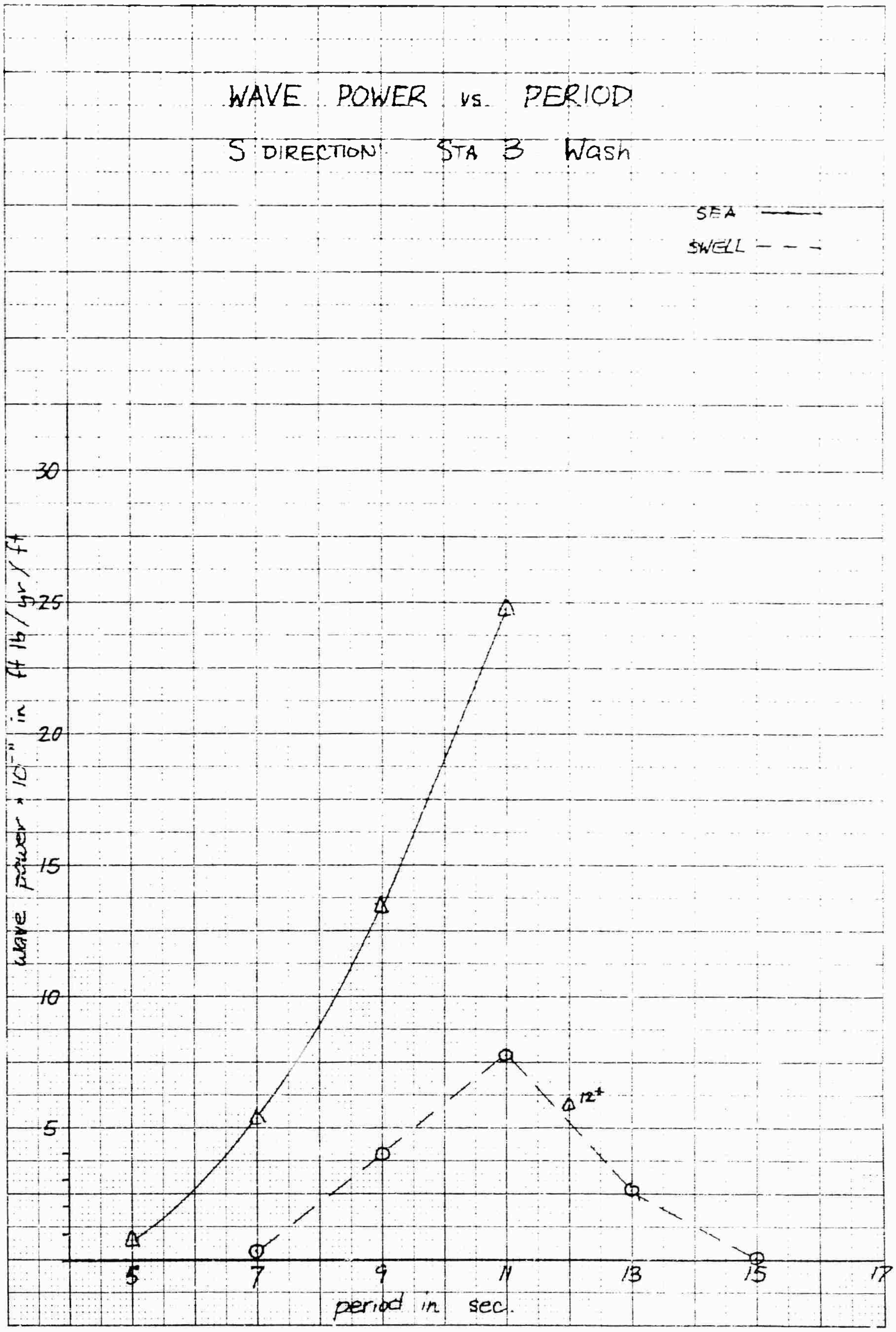


WAVE POWER vs. PERIOD
W DIRECTION STA. 3 Wash.
SEA
SWELL
wave power × 10^11 in ft lb/yr/ft
30
25
20
15
10
5
5
7
9
11
13
15
17
18+
period in sec.

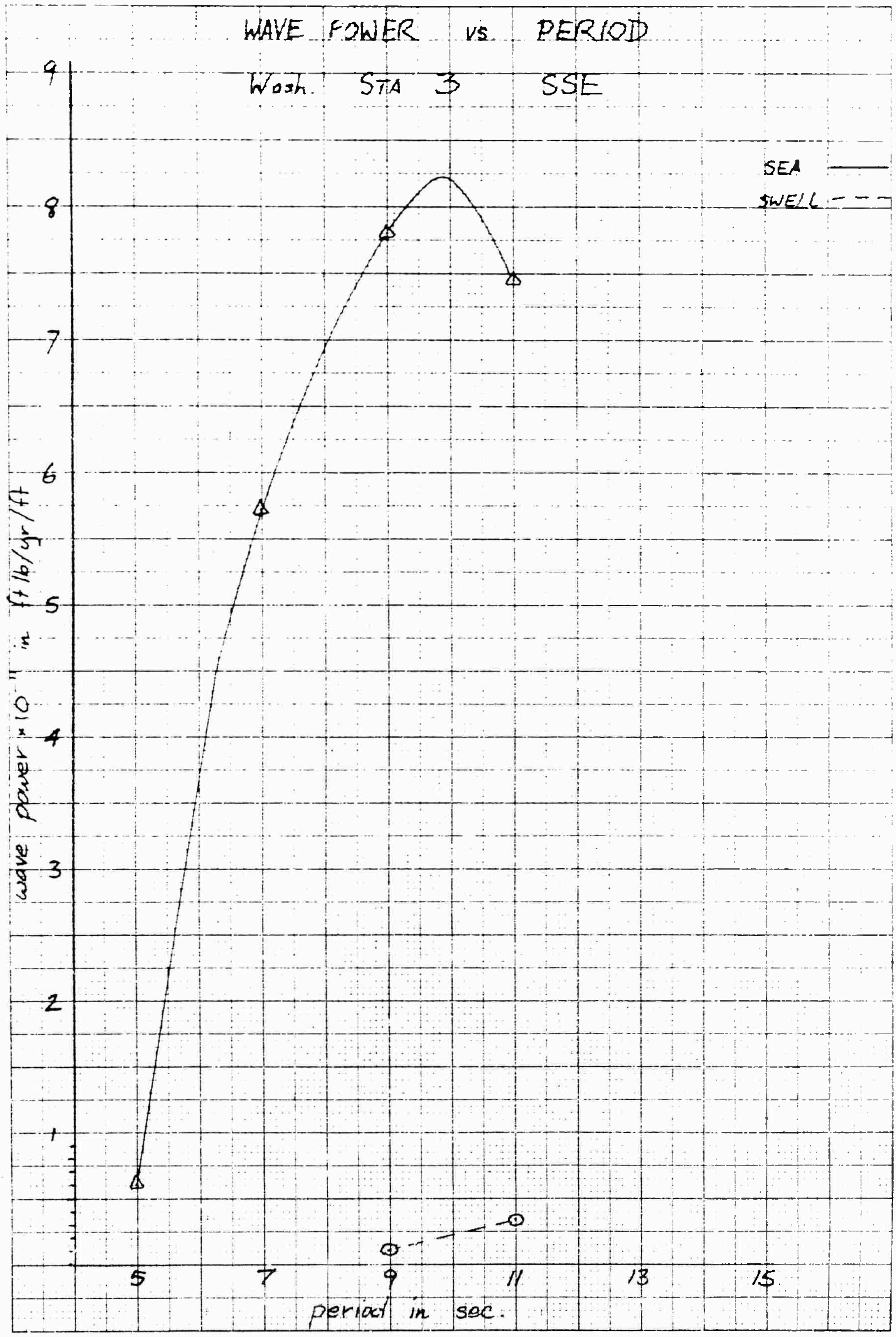

WAVE POWER vs PERIOD
WSW DIRECTION STA. 3 Wash
SEA
SWELL
wave power x 10^11 in ft lb/yr/ft
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
18+
period in sec.


WAVE POWER vs. PERIOD
SW DIRECTION STA. 3 Wash.
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
period in sec.


WAVE POWER VS. PERIOD
SSW DIRECTION STA. 3 Wash.
SEA
SWELL
wave power × 10⁻¹¹ in ft lb/yr/ft
14
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
period in sec.



WAVE POWER vs. PERIOD
S DIRECTION STA B Wash
SEA
SWELL
30
25
20
15
10
5
5
7
9
11
13
15
17
12+
period in sec.


WAVE POWER vs. PERIOD
Wash. STA 3 SSE
SEA
SWELL
wave power × 10^-11 in ft lb/yr/ft
period in sec.
5
7
9
11
13
15
1
2
3
4
5
6
7
8
9

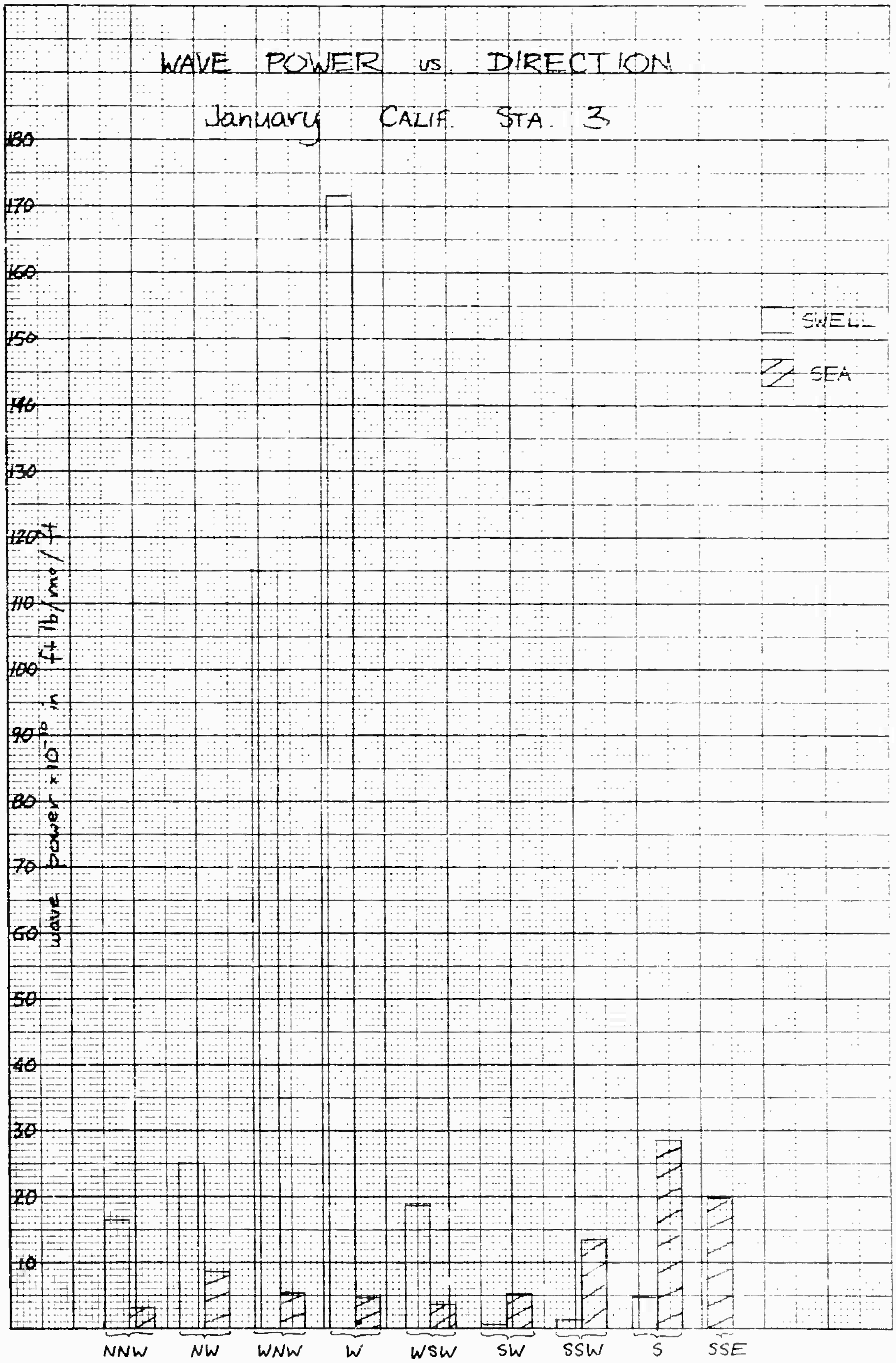
APPENDIX B

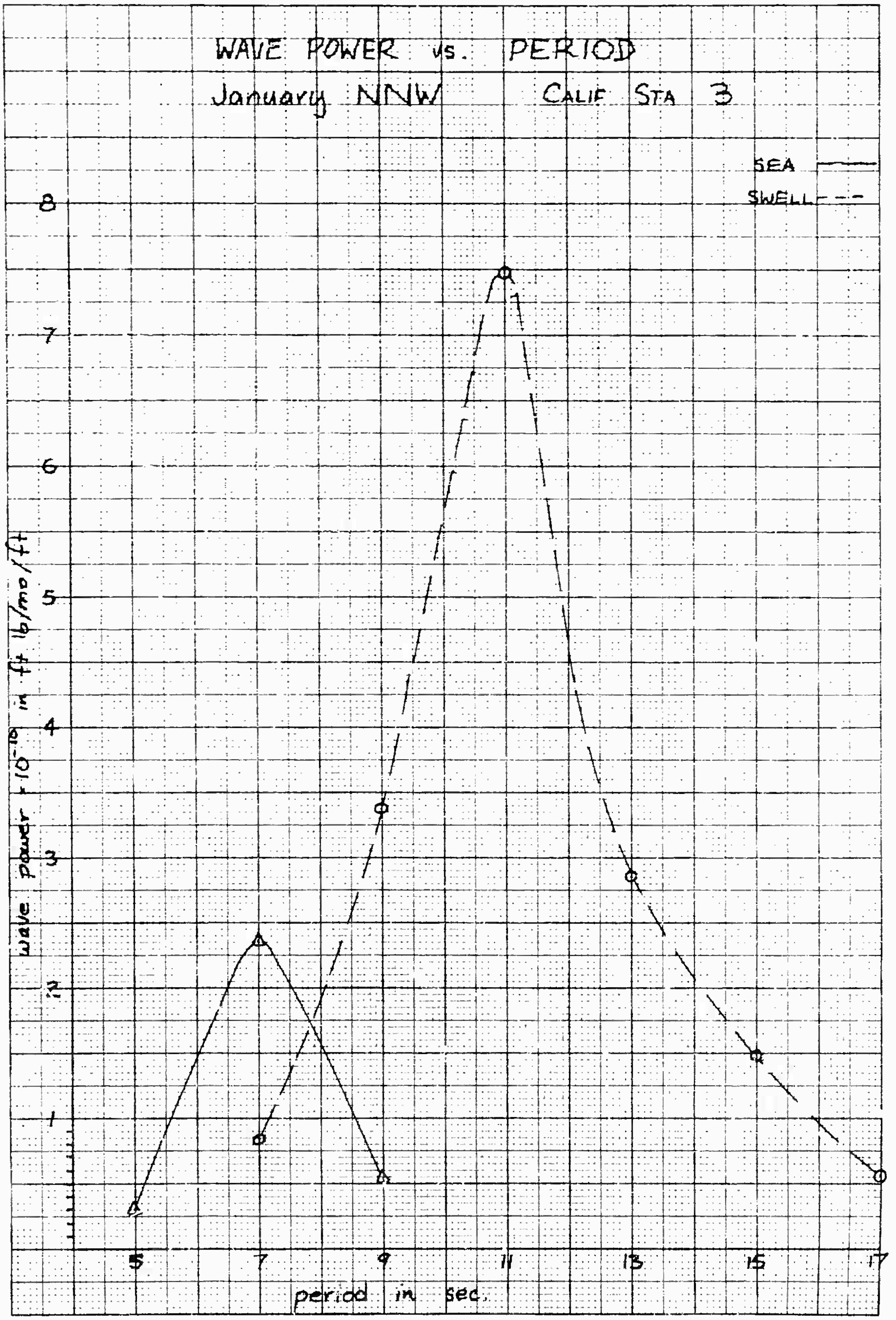
WAVE POWER FOR VARIOUS MONTHS

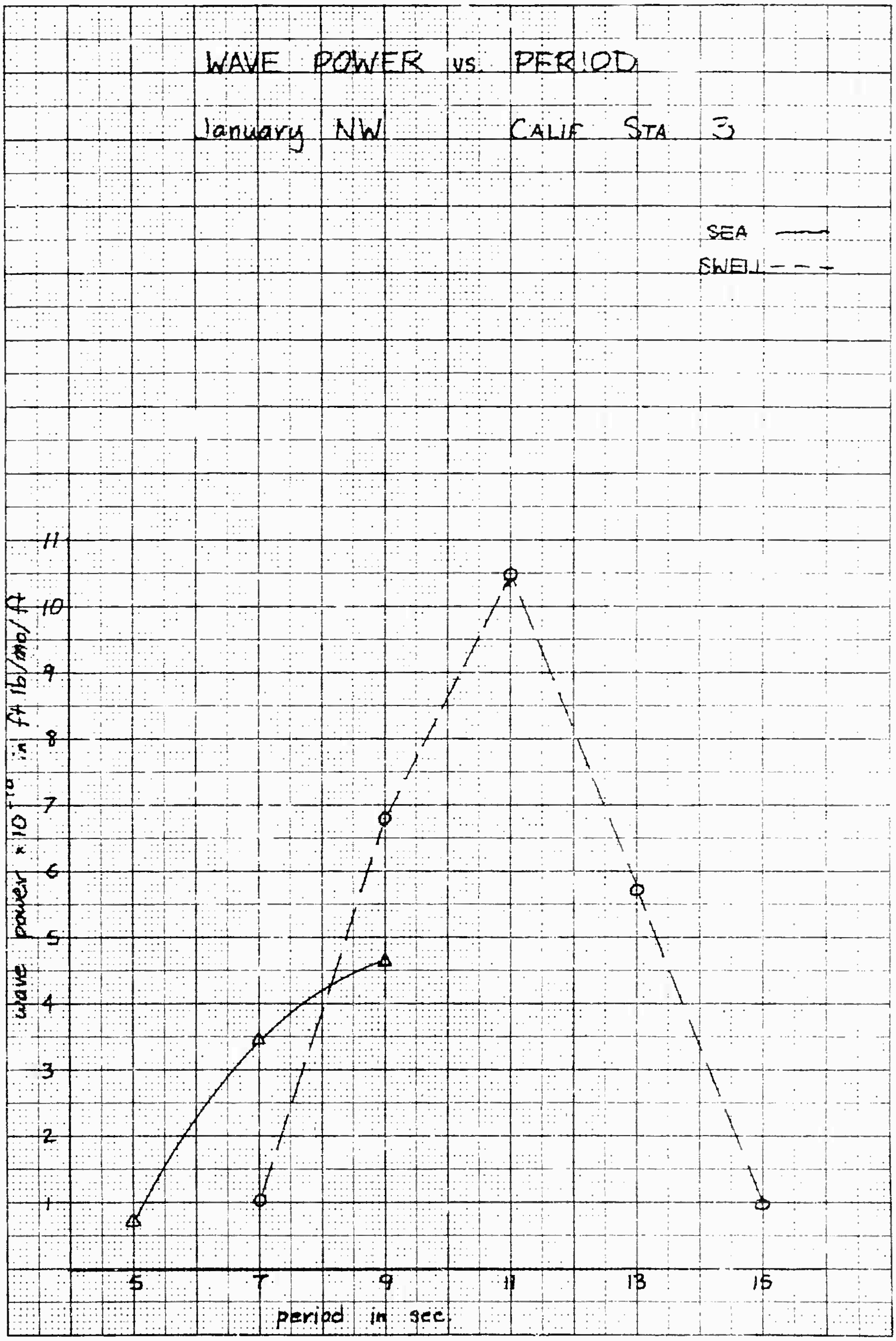
STATION 3 - CALIFORNIA COAST

Lat. 37.6°N Long. 123.5°W

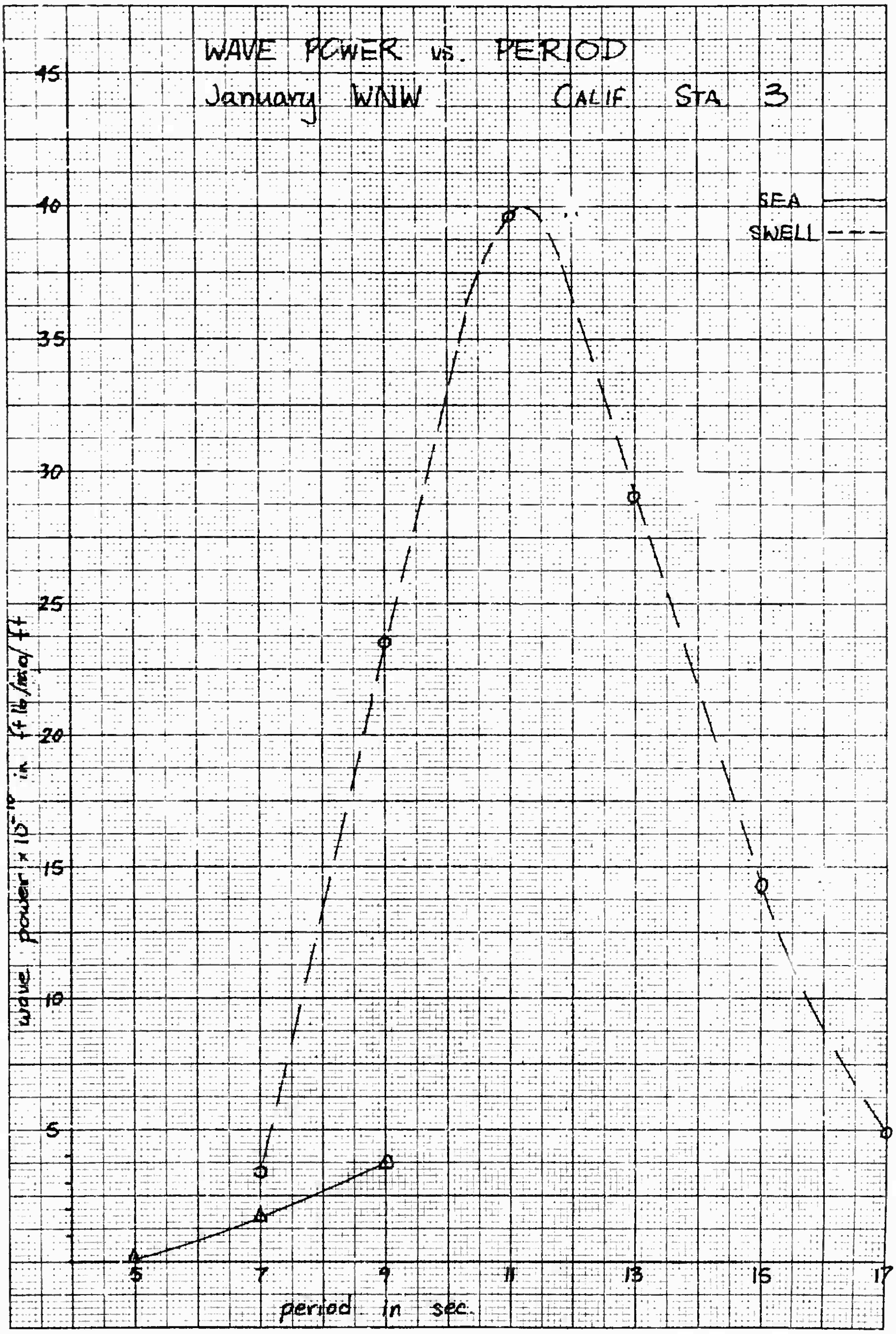
STATION 3 - JANUARY

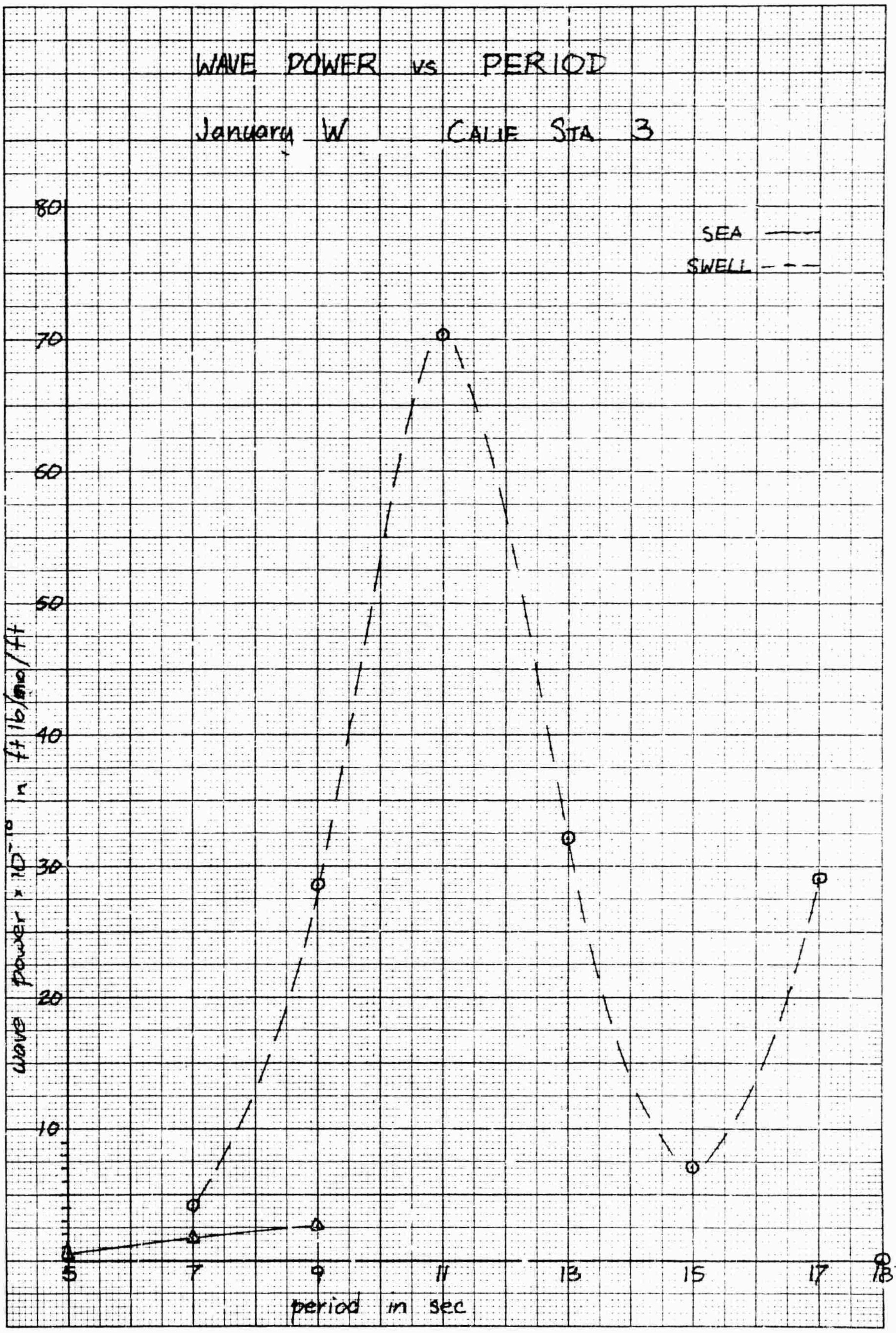

WAVE POWER vs DIRECTION
January CALIF. STA. 3
wave power × 10⁻¹⁰ in ft lb/mo/ft
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
SWELL
SEA
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE

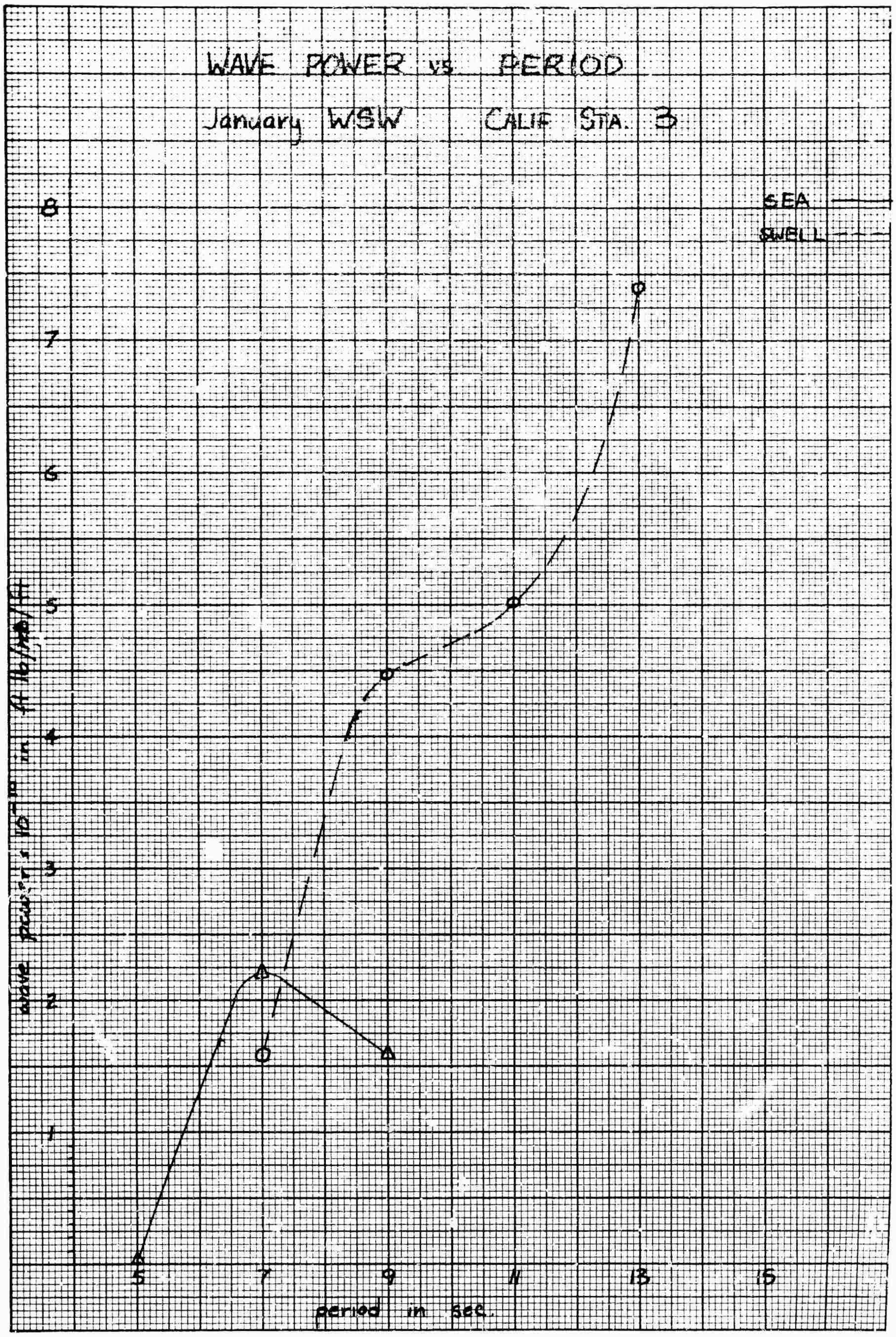

WAVE POWER vs. PERIOD
January NNW CALIF STA 3
SEA
SWELL
8
7
6
5
4
3
2
1
wave power ÷ 10^-10 in ft lb/mo/ft
5
7
9
11
13
15
17
period in sec.



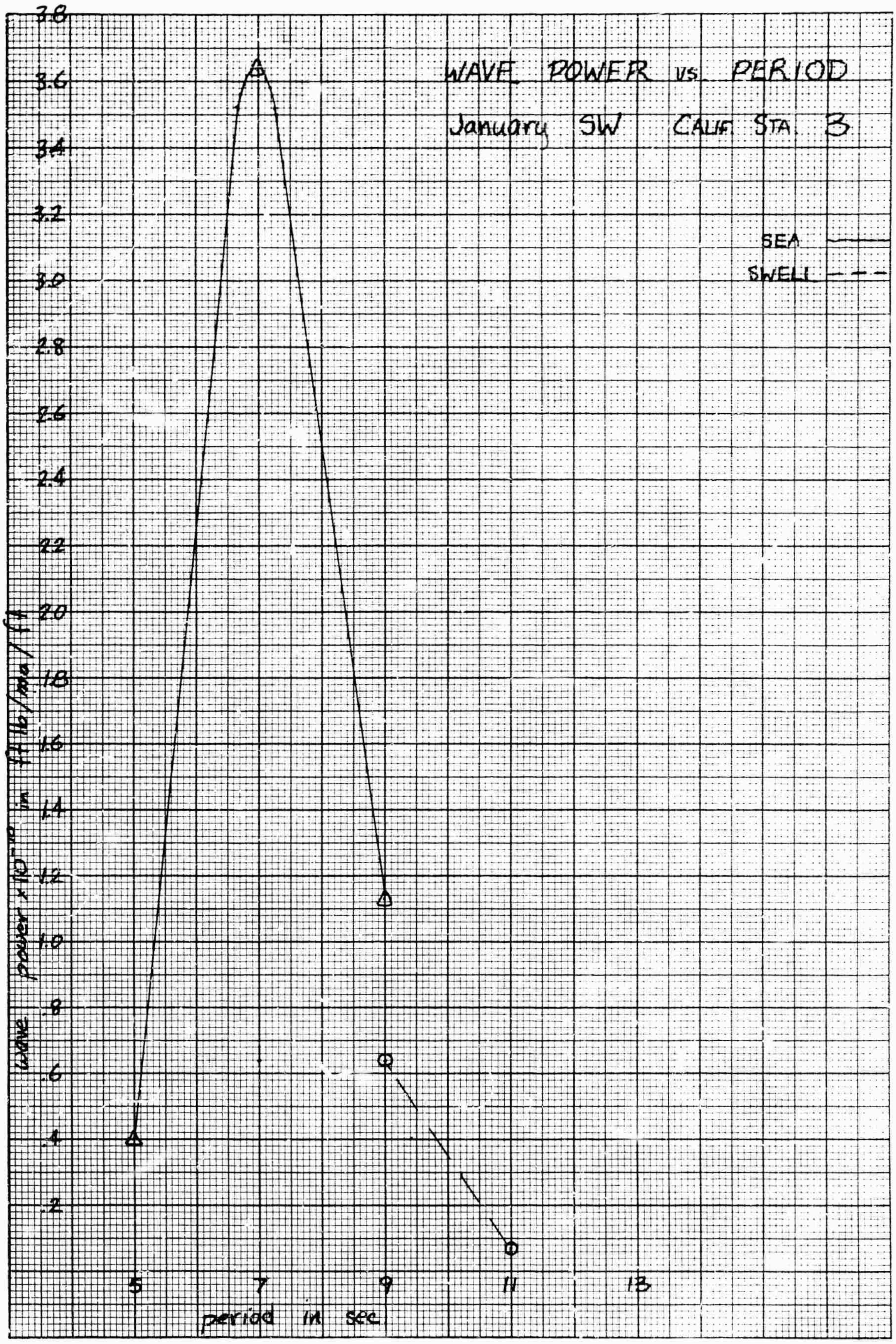
WAVE POWER vs. PERIOD
January NW
CALIF STA 3
SEA
SWELL
wave power × 10^10 in ft lb/mo/ft
period in sec.

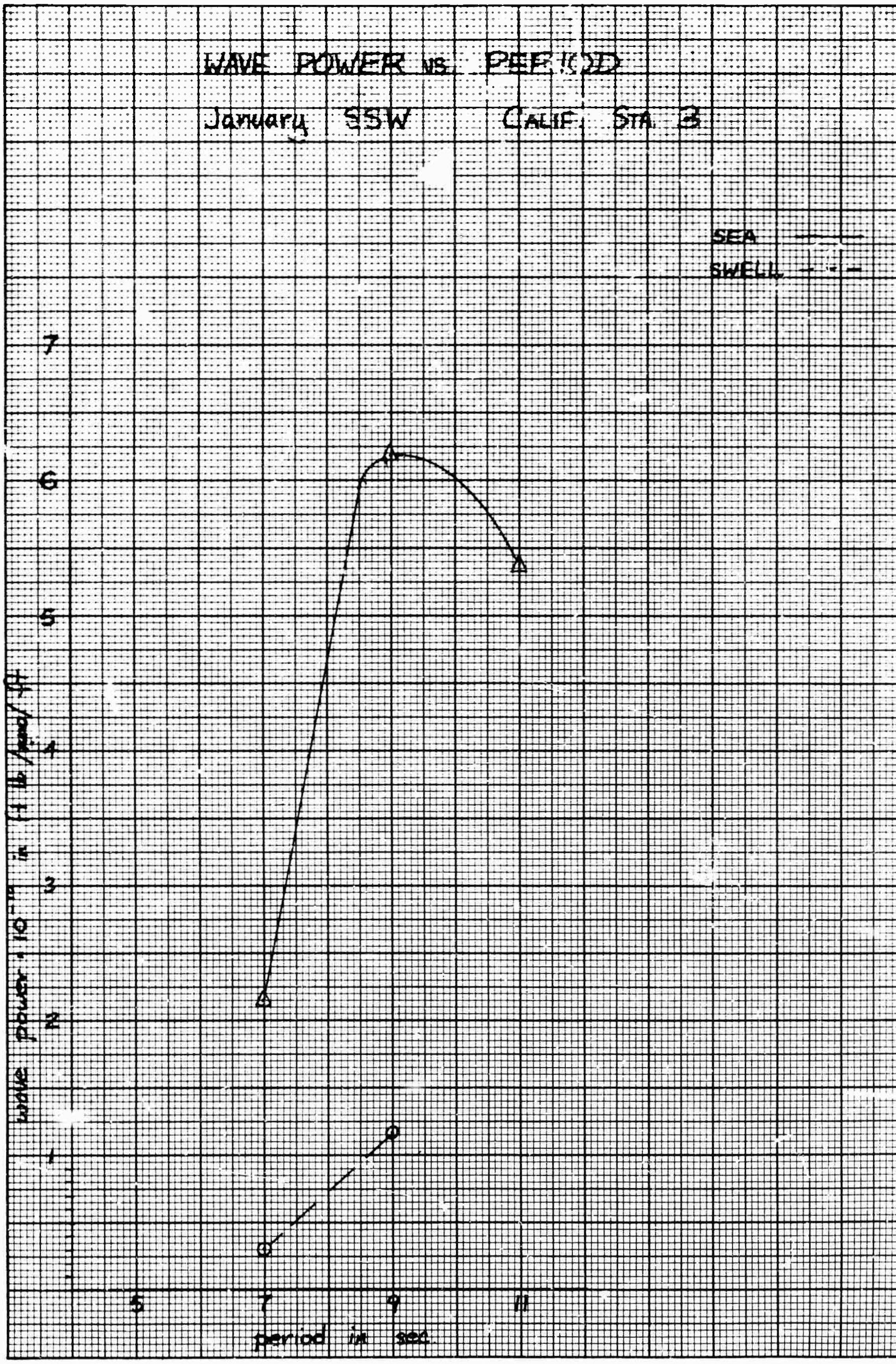

WAVE POWER vs. PERIOD
January WNW
CALIF. STA. 3
SEA
SWELL
wave power x 10^-10 in ft lb/mo/ft
period in sec.
45
40
35
30
25
20
15
10
5
5
7
9
11
13
15
17


WAVE POWER vs PERIOD
January W
CALIF STA 3
SEA
SWELL
Wave power × 10⁻¹⁰ in ft lb/mo/ft
period in sec
80
70
60
50
40
30
20
10
5
7
9
11
13
15
17
18+

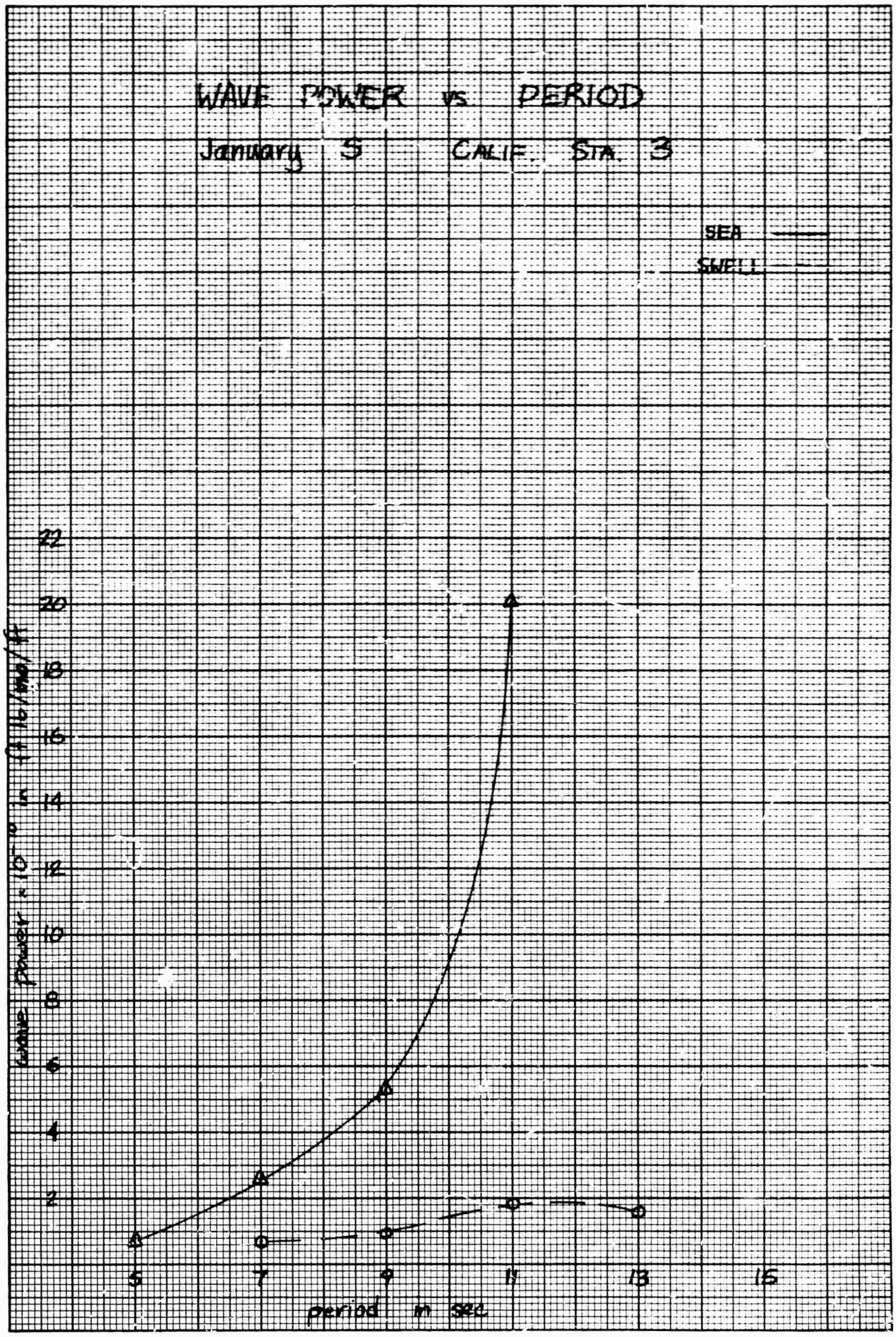


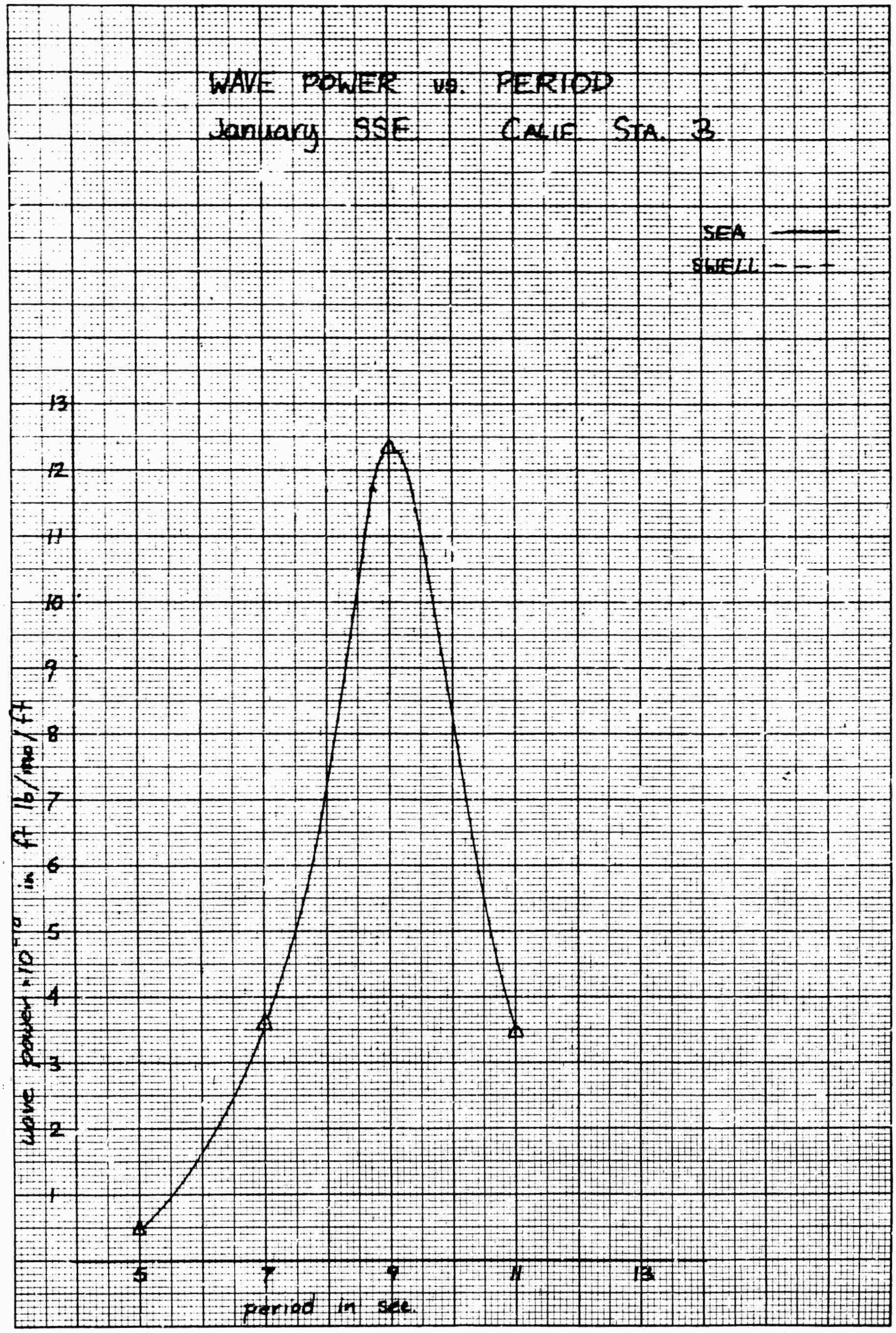
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
January SW CALIF. STA. 3
SEA
SWELL
wave power x10^-10 in ft lb/mo/ft
period in sec
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
5
7
9
11
13



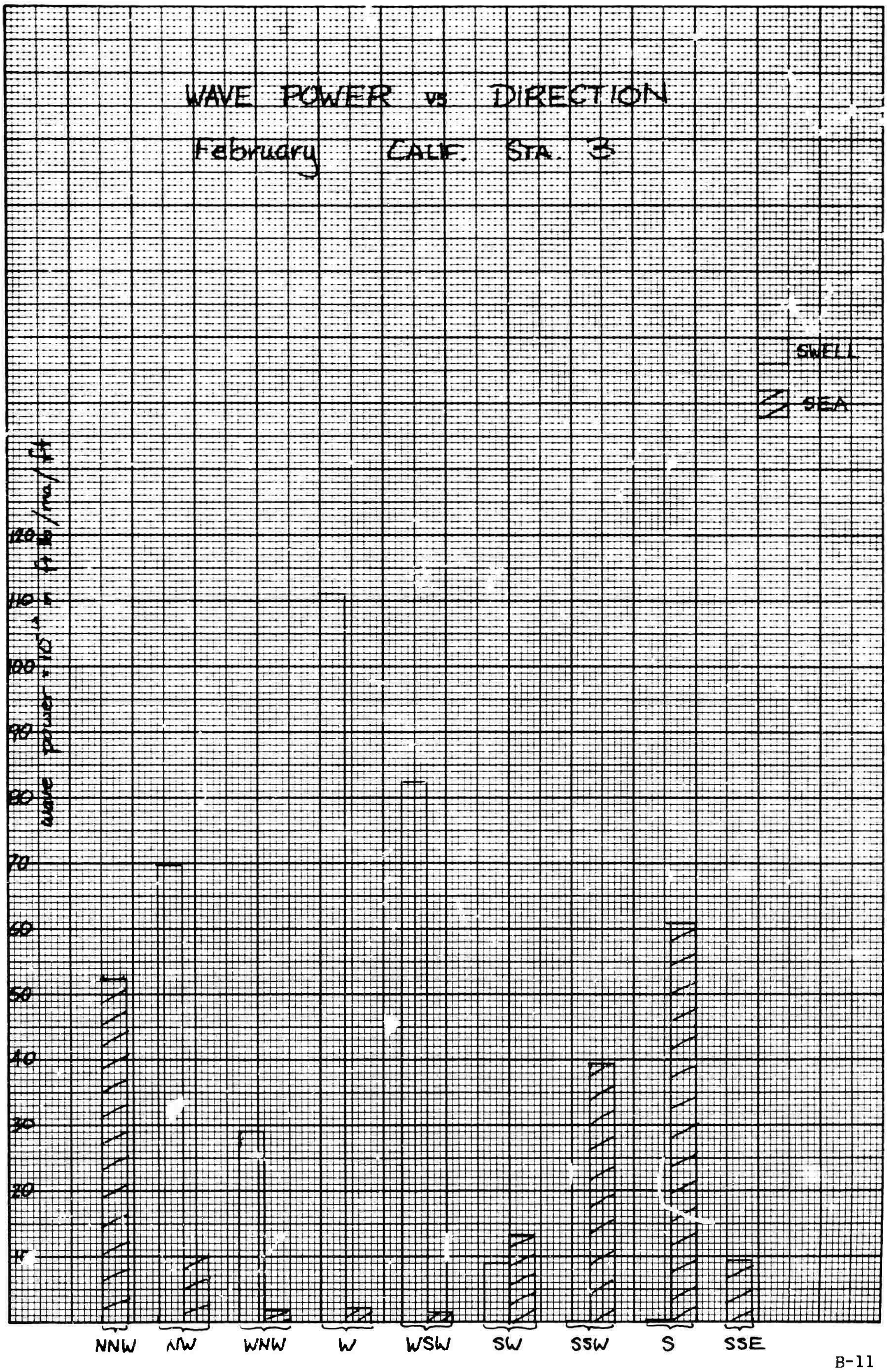
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
January 5 CALIF. STA. 3
SEA
SWELL
Wave Power x 10^-6 in ft lb/mo/ft
22
20
18
16
14
12
10
8
6
4
2
5
7
9
11
13
15
period in sec

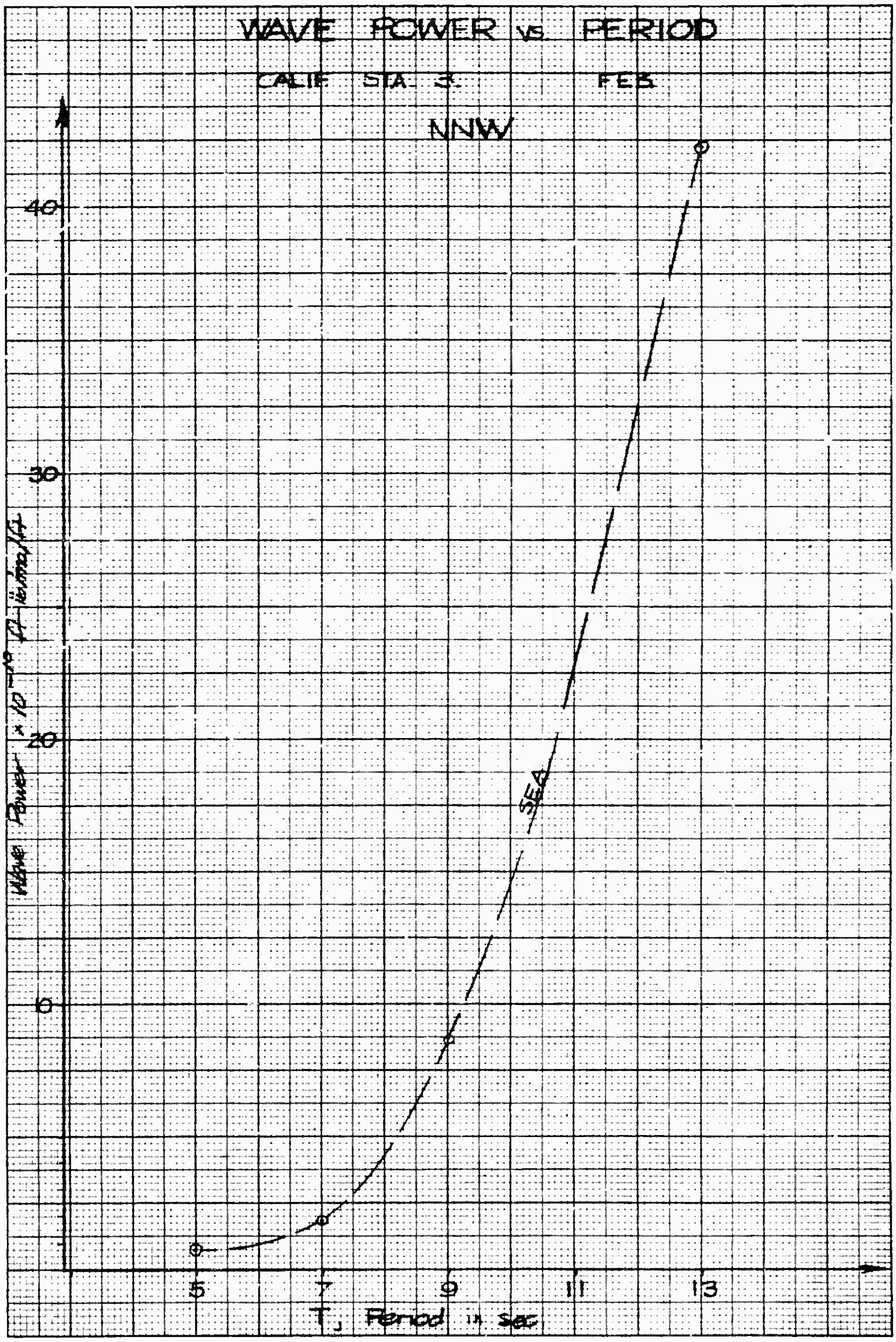


WAVE POWER vs. PERIOD
January SSE CALIF STA. 3
SEA
SWELL
wave power ·10^-6 in ft lb/mo/ft
13
12
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
period in sec.

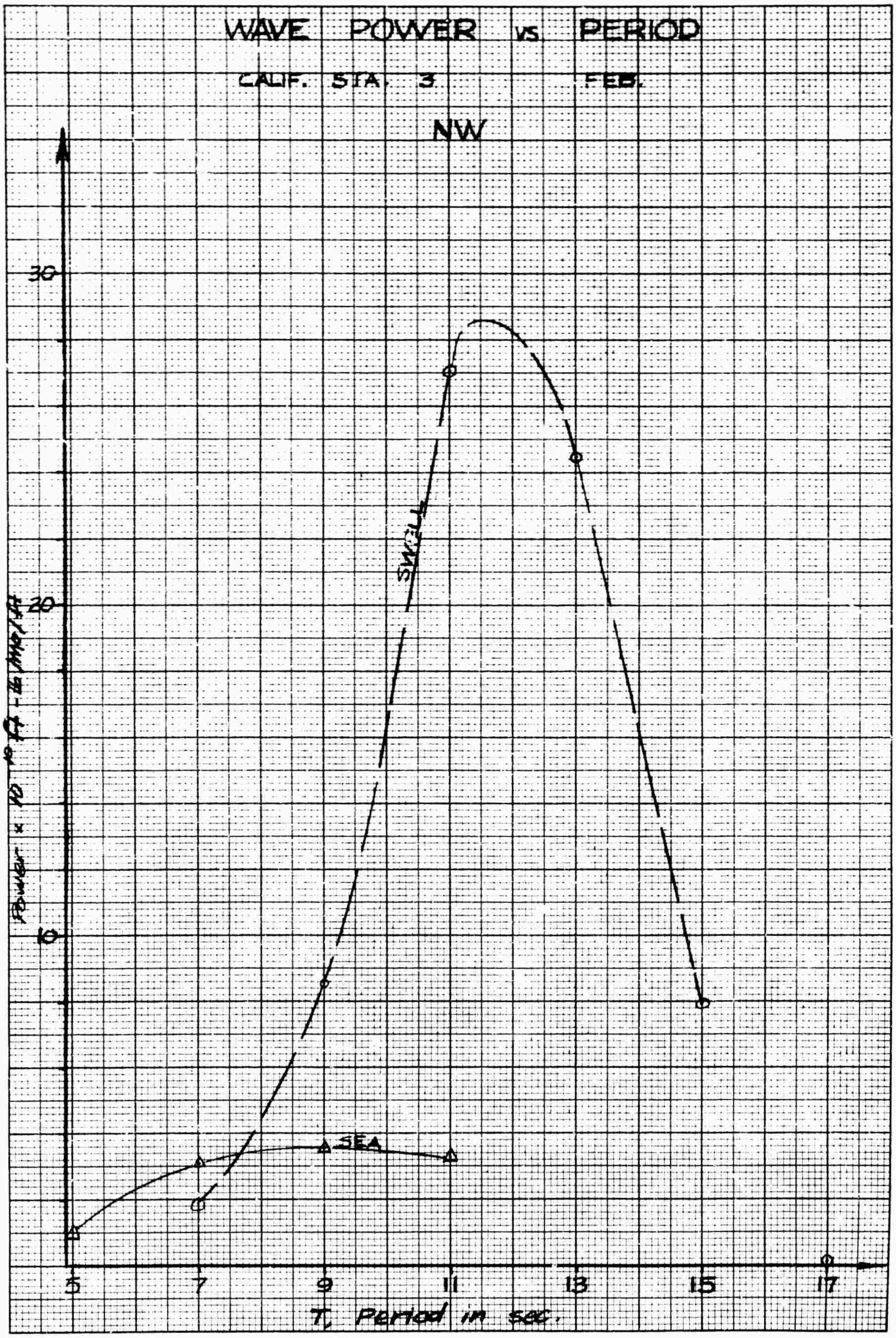
STATION 3 - FEBRUARY

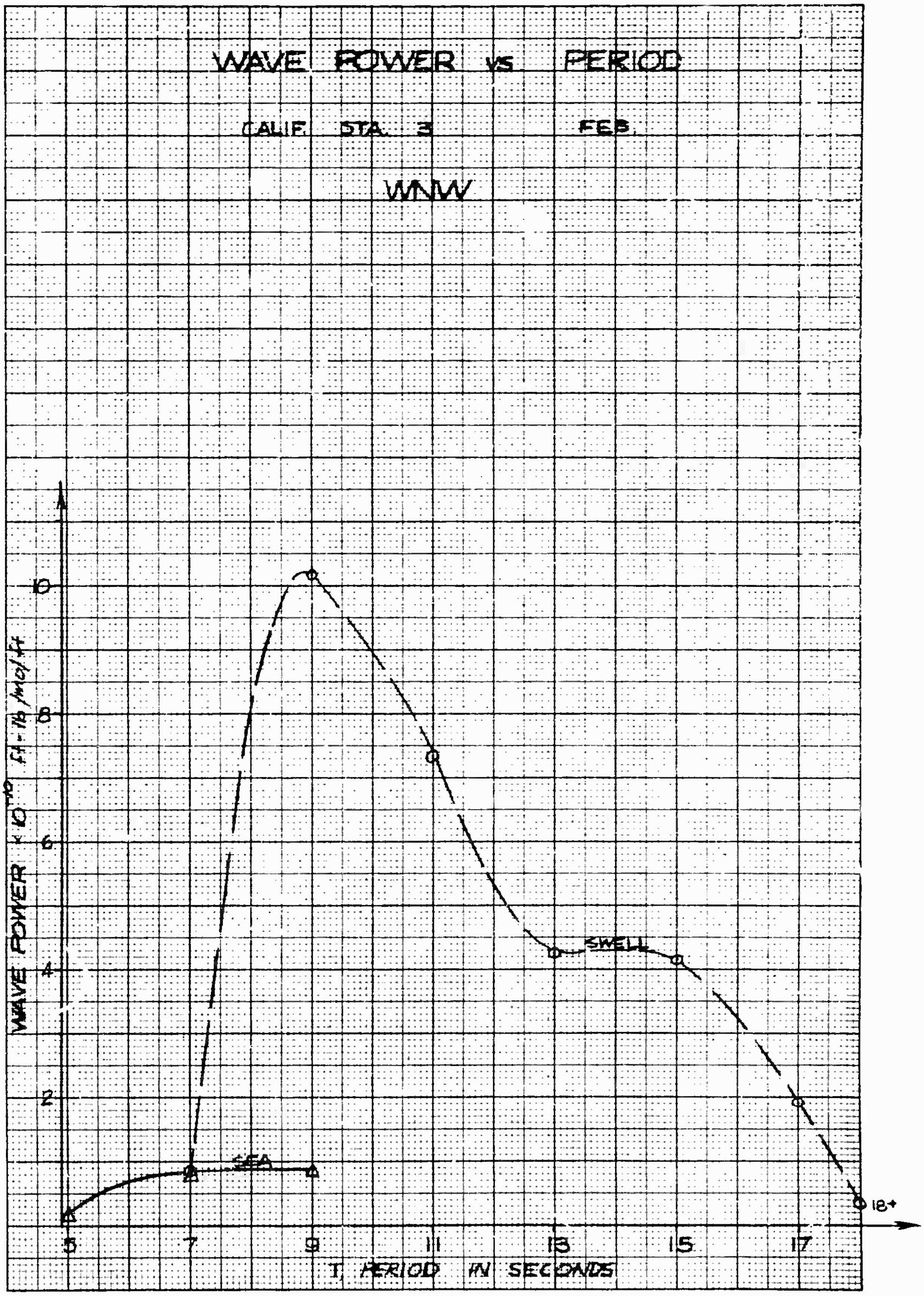


K•E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

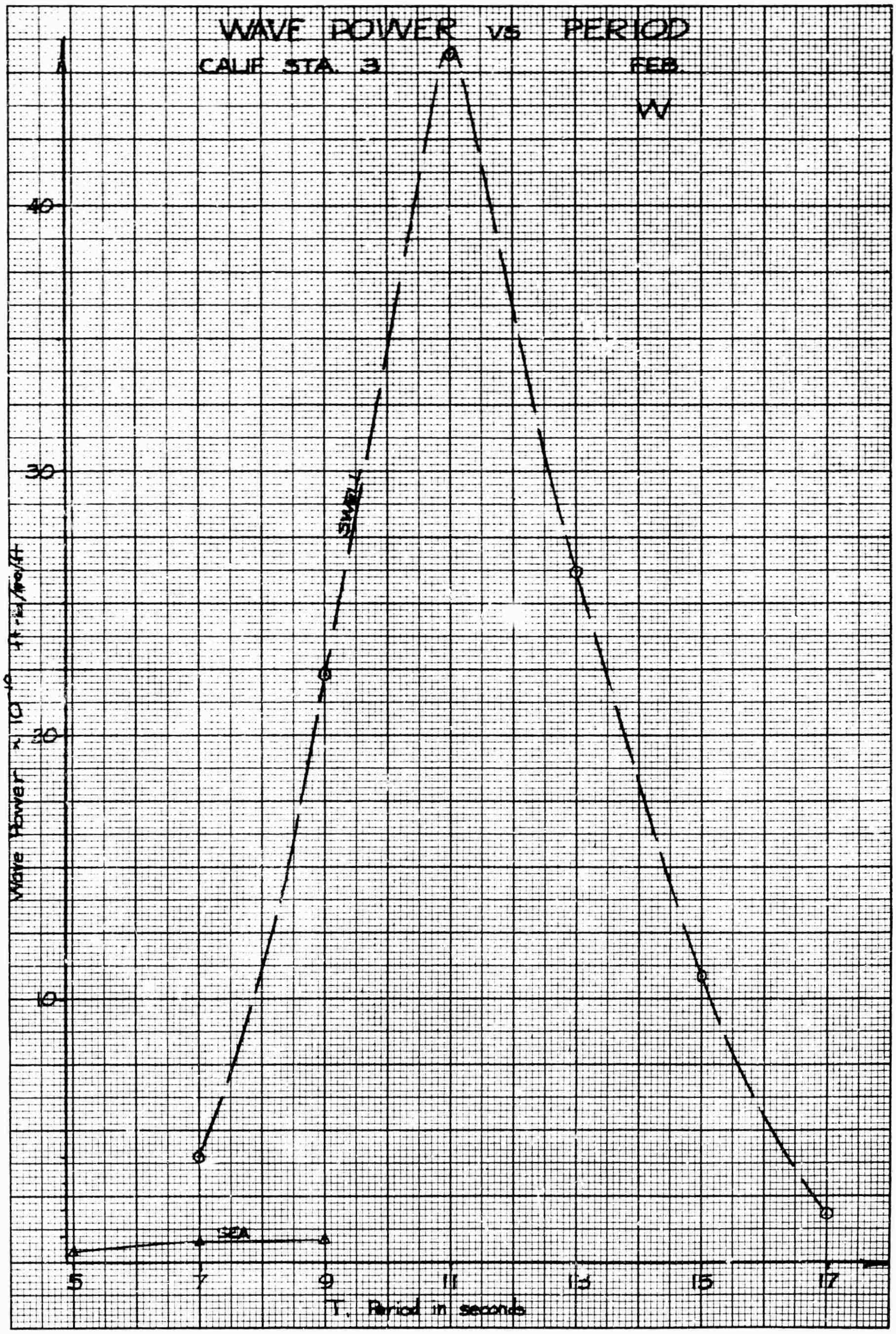


K&E 10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

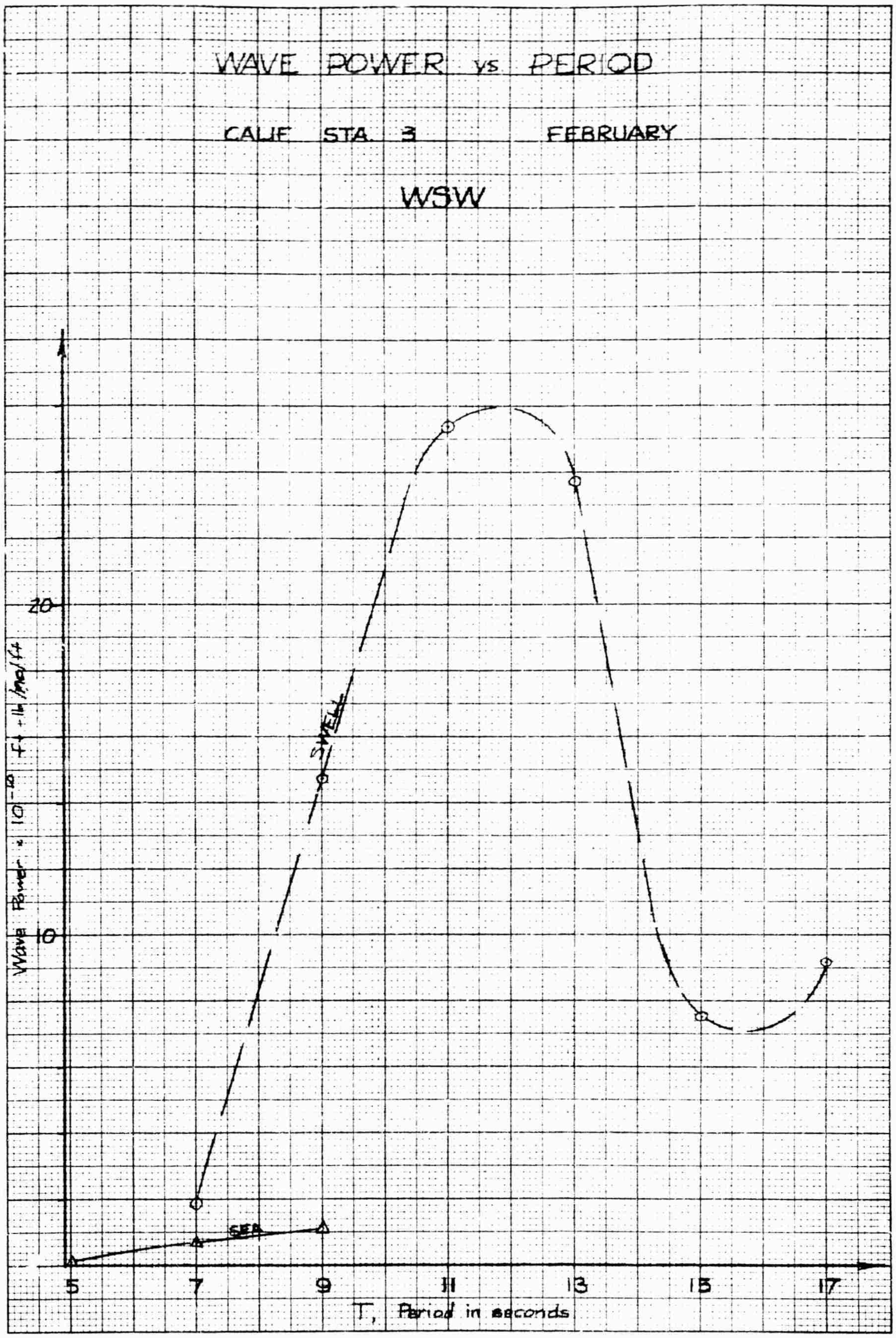

WAVE POWER vs. PERIOD
CALIF. STA. 3
FEB.
NW
SWELL
SEA
30
20
10
5
7
9
11
13
15
17
T, Period in sec.



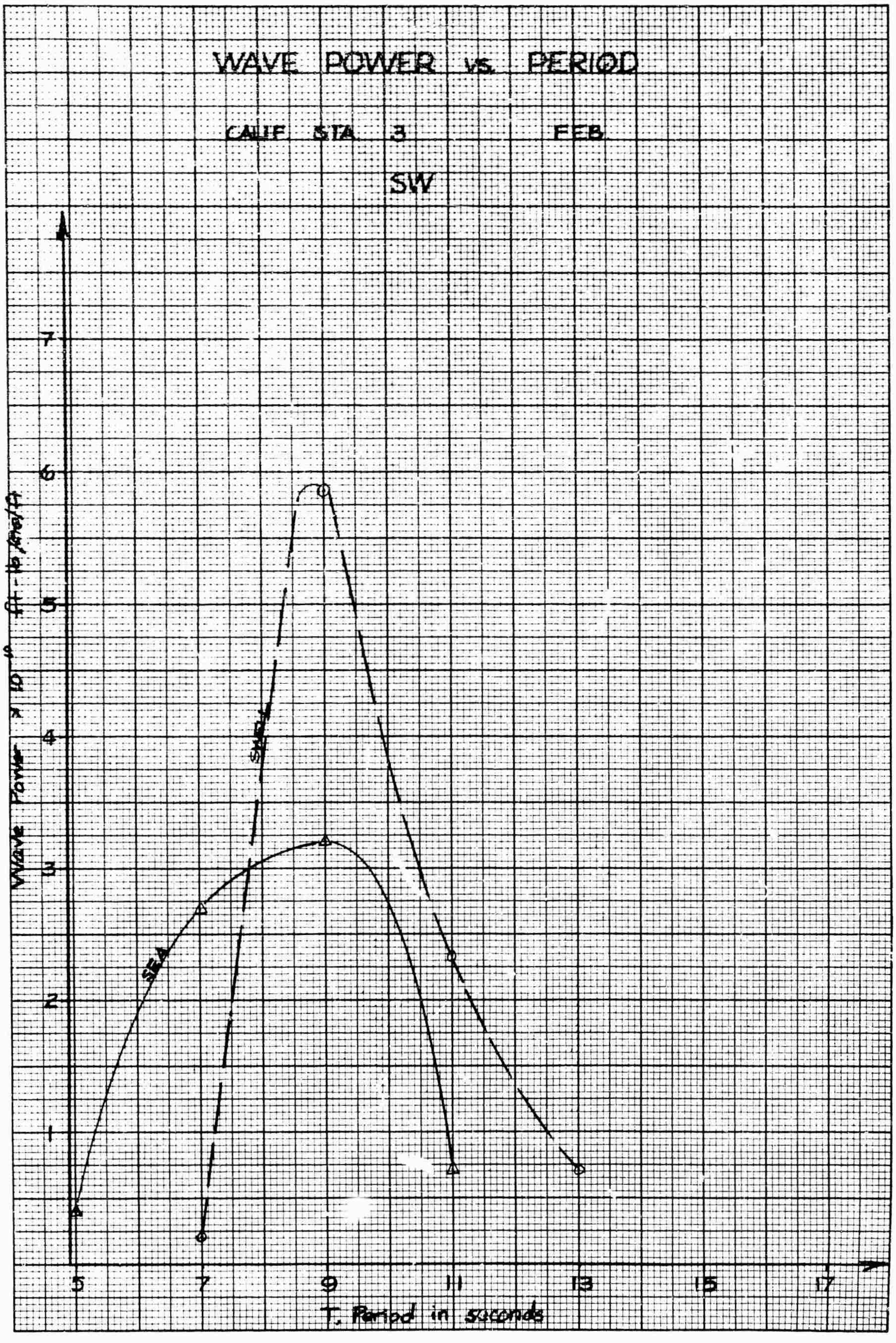
K+E 10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

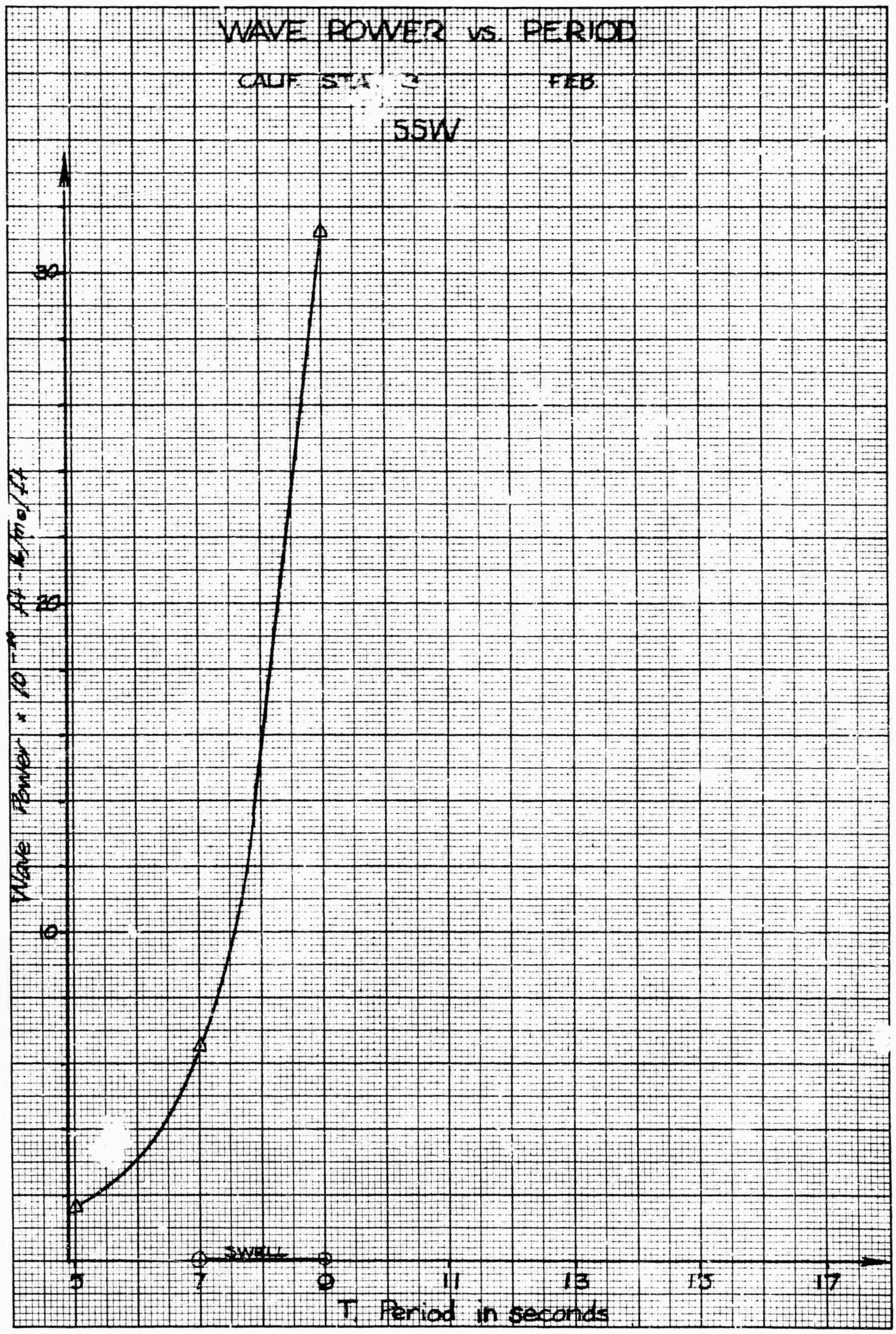


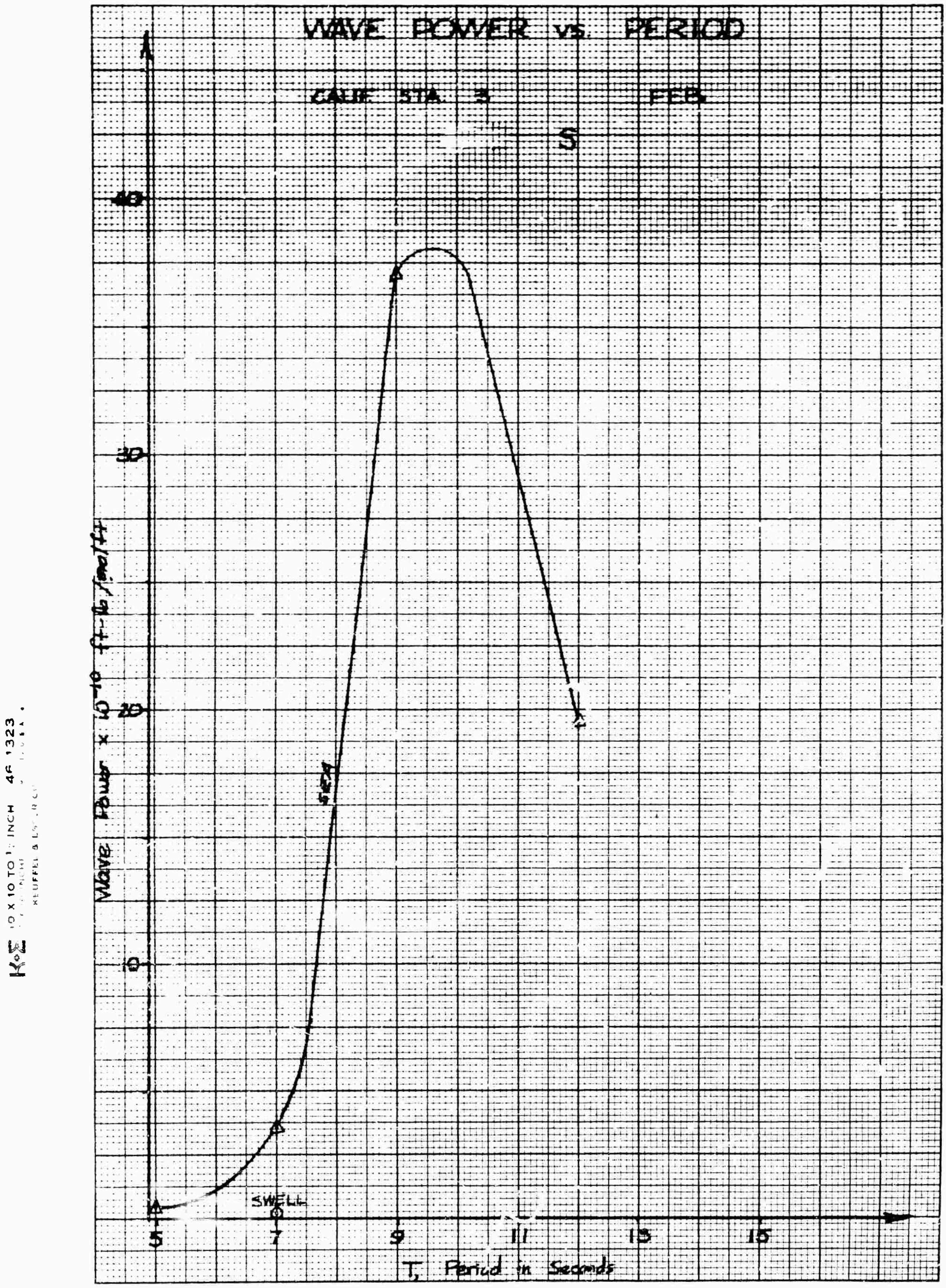
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

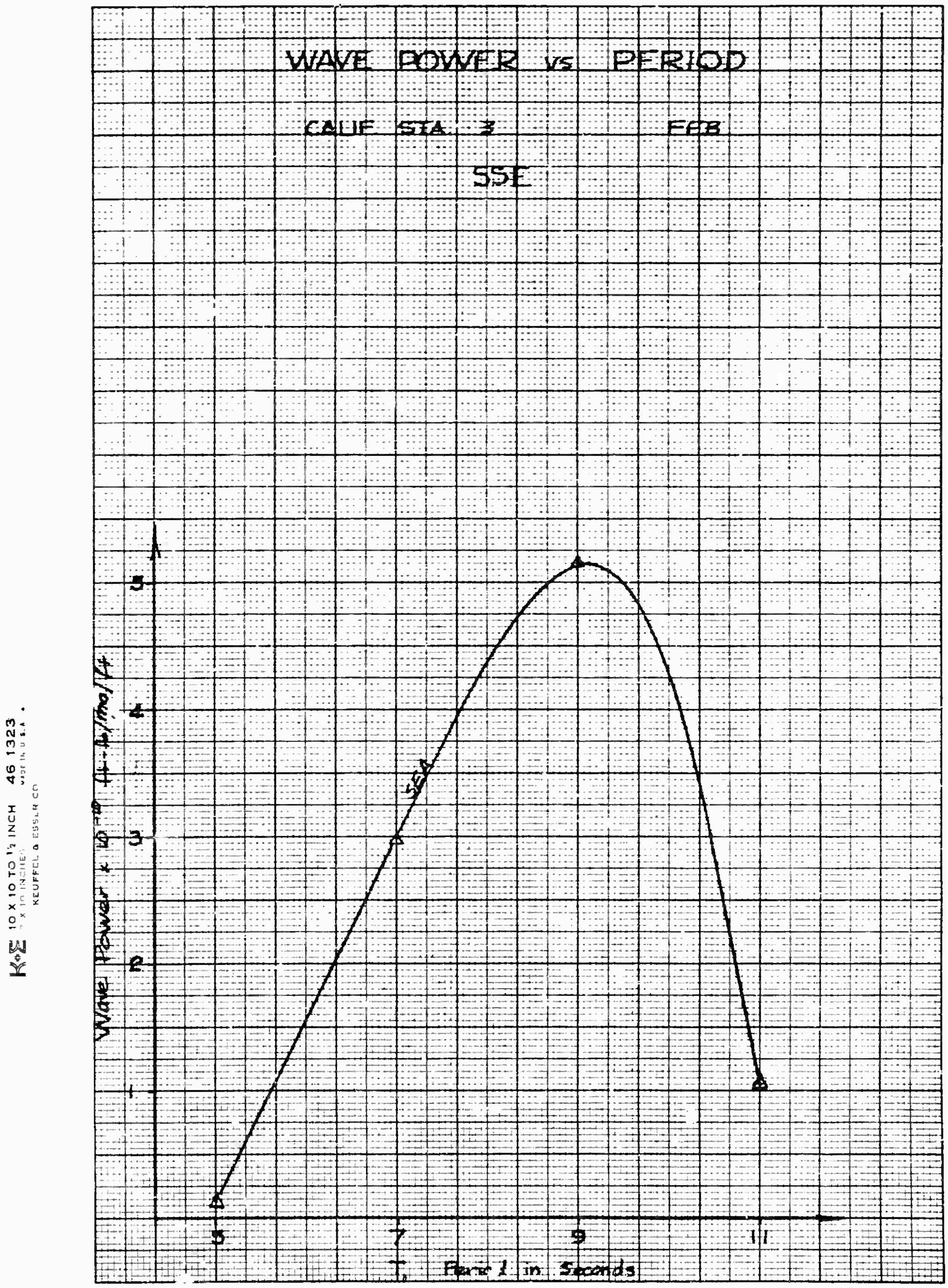


WAVE POWER vs PERIOD
CALIF. STA. 3 FEBRUARY
WSW
SWELL
SEA
Wave Power x 10⁻⁶ ft-lb/mo/ft
20
10
5
7
9
11
13
15
17
T, Period in seconds

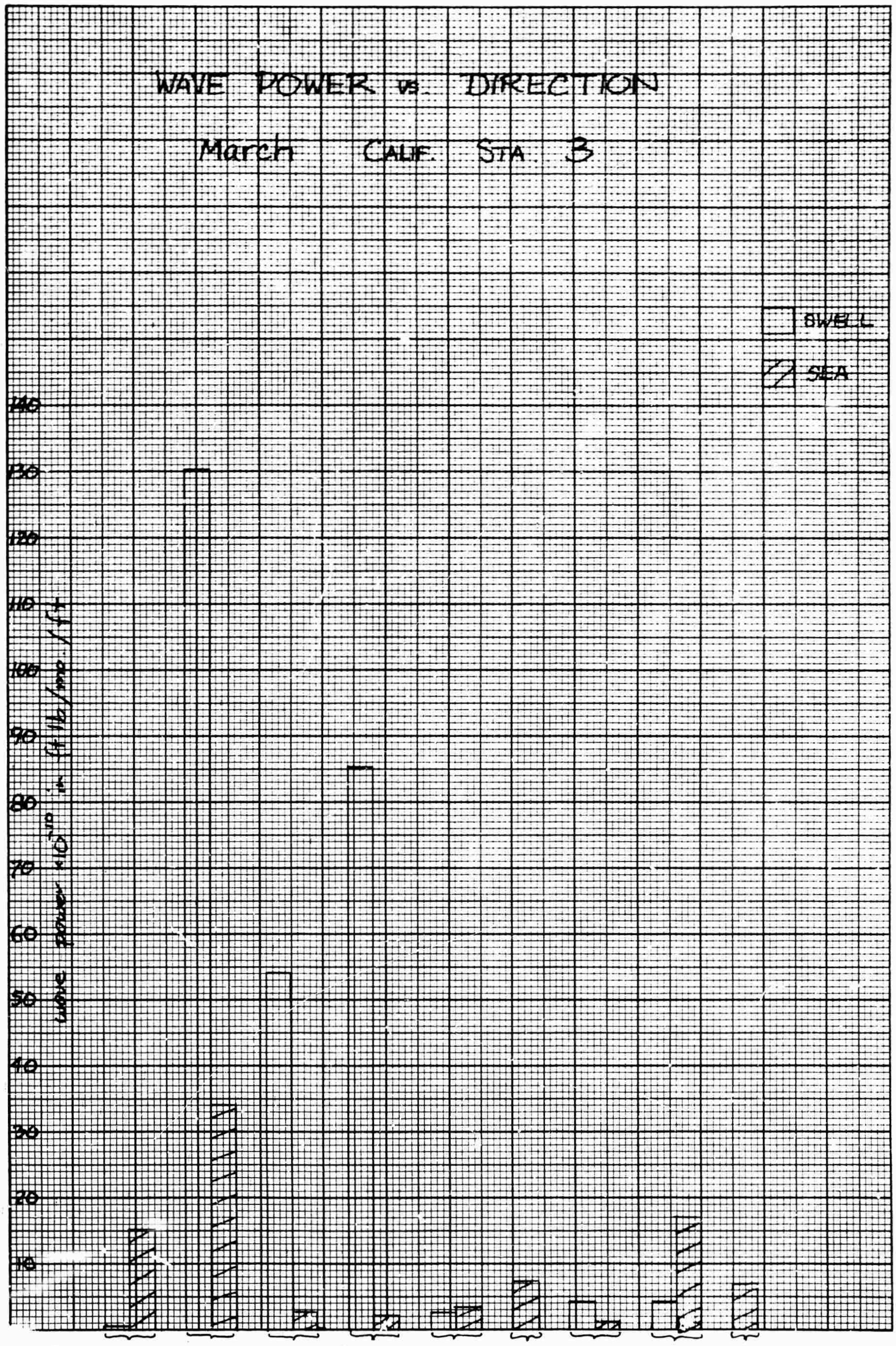

WAVE POWER vs. PERIOD
CALIF. STA. 3
FEB.
SW
Wave Power x 10^5 ft-lb/sec/ft
SEA
SWELL
1
2
3
4
5
6
7
5
7
9
11
13
15
17
T, Period in seconds


WAVE POWER vs. PERIOD
CALIF. STA
FEB
SSW
Wave Power
30
20
10
SWELL
5
7
9
11
13
15
17
T, Period in seconds

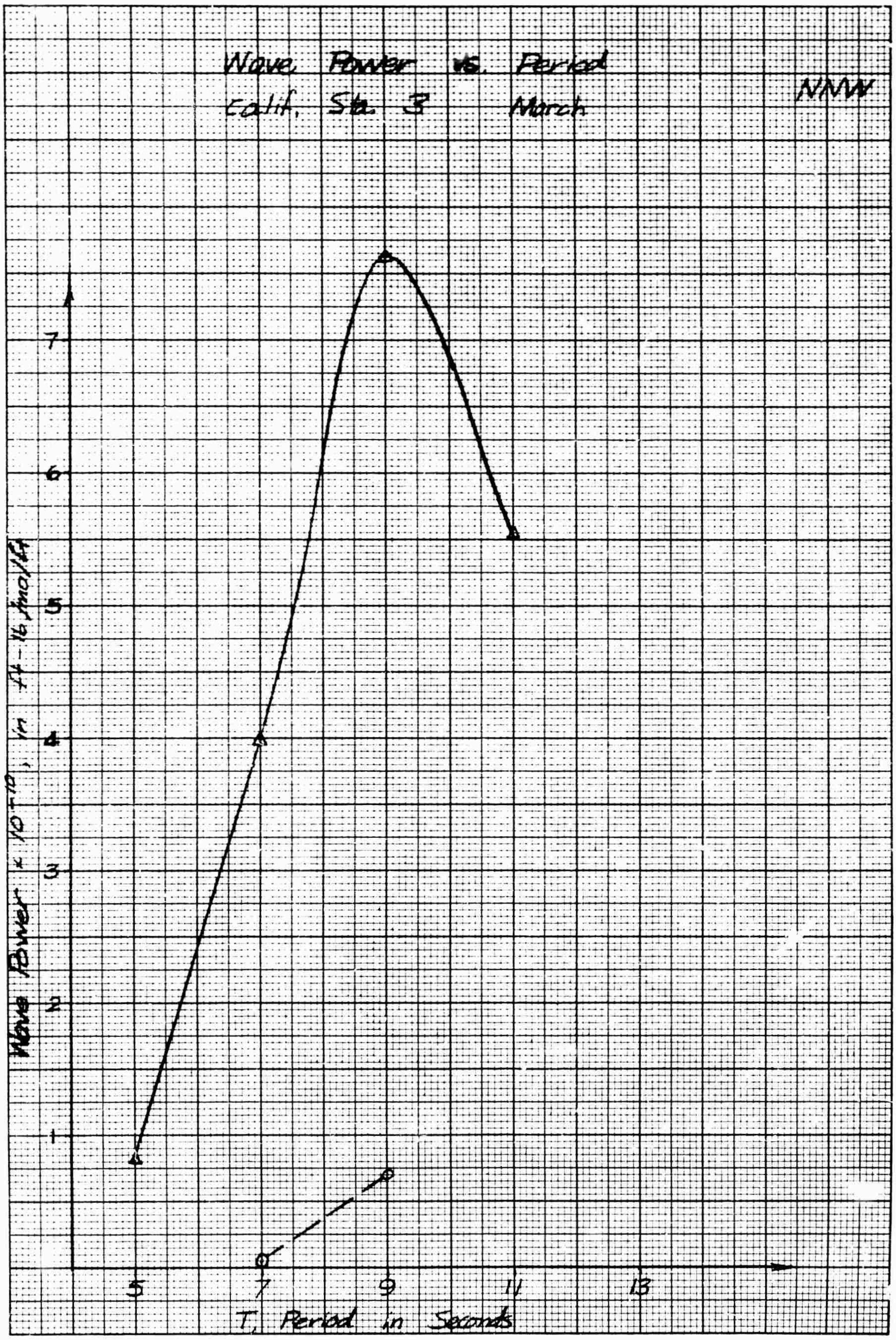

WAVE POWER vs. PERIOD
CALIF. STA. 3
FEB.
S
40
30
20
10
Wave Power x 10^10 ft-lb/mo/ft
SEA
SWELL
5
7
9
11
13
15
T, Period in Seconds
K+E 10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

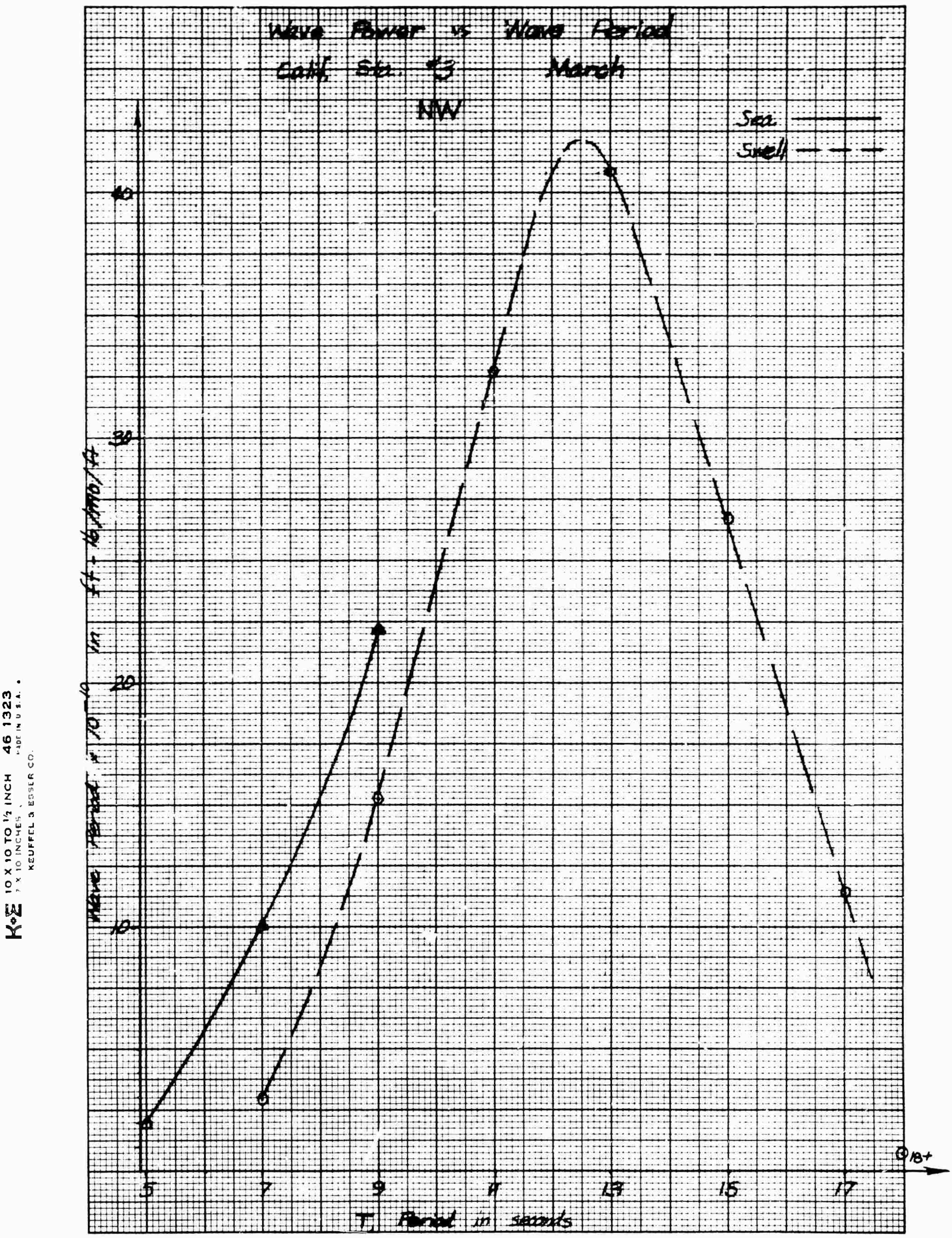

WAVE POWER vs PERIOD
CALIF STA 3
FEB
SSE
Wave Power x 10^10 ft-lb/mo/ft
Period in Seconds
5
7
9
11
1
2
3
4
5
SSE

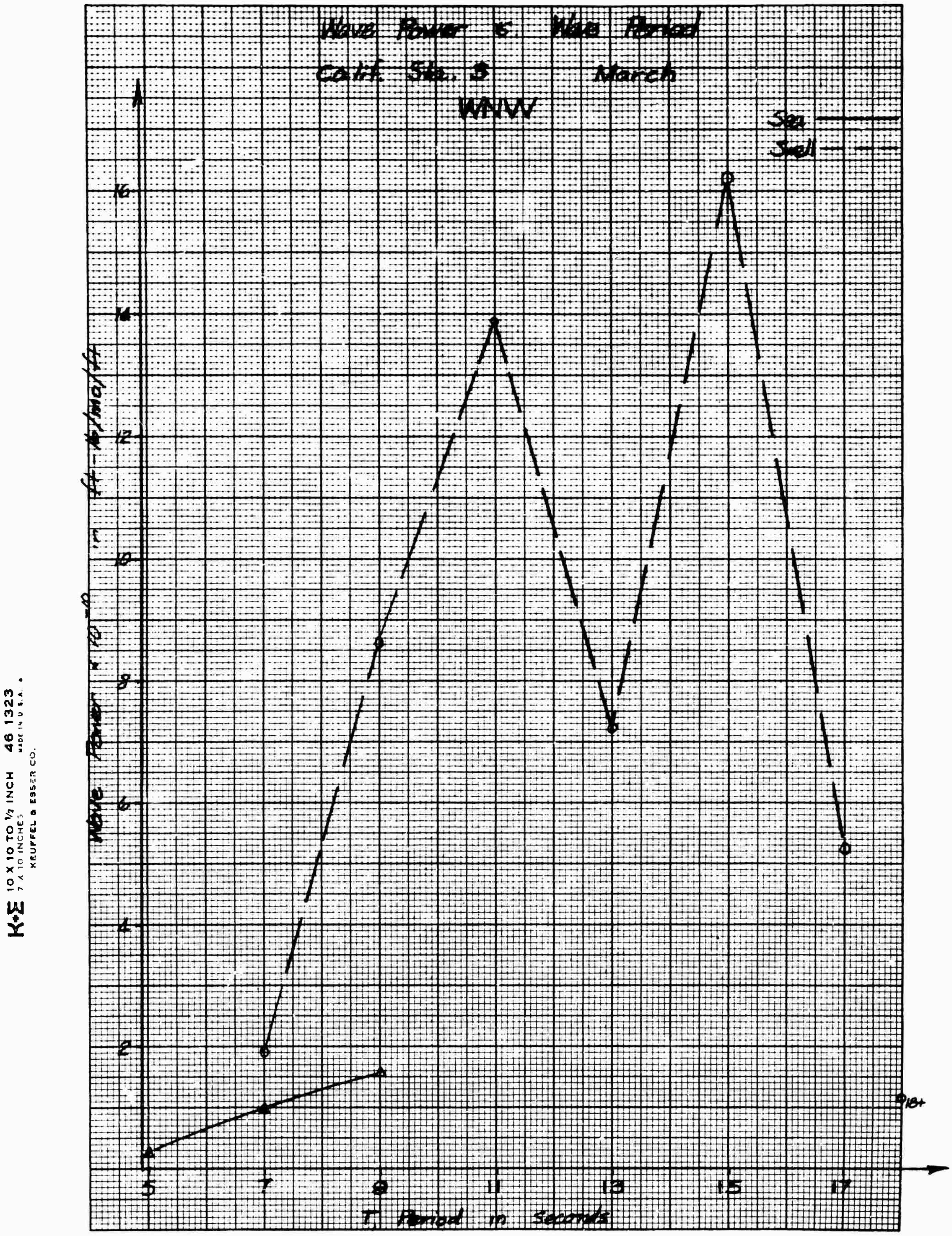
STATION 3 - MARCH

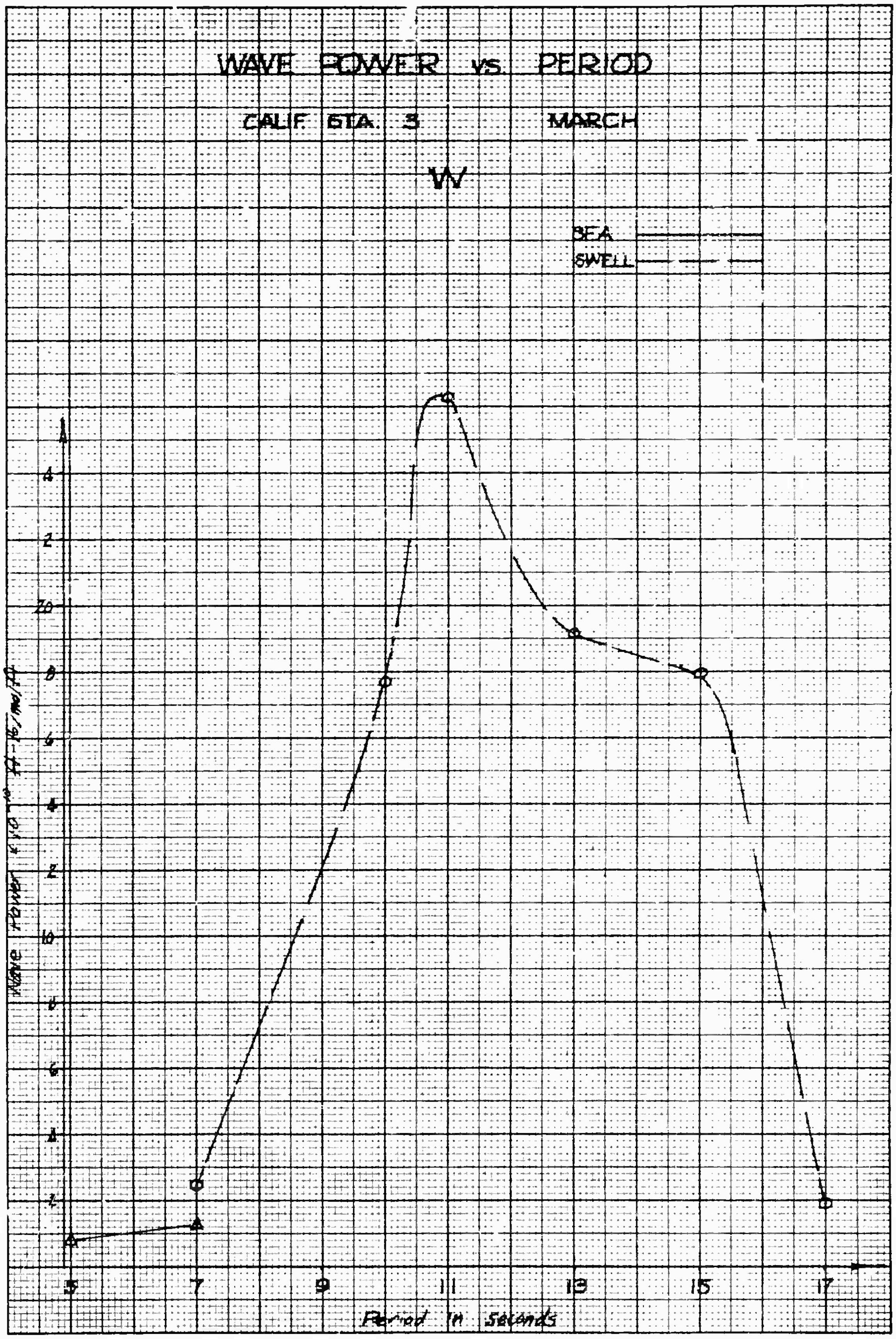


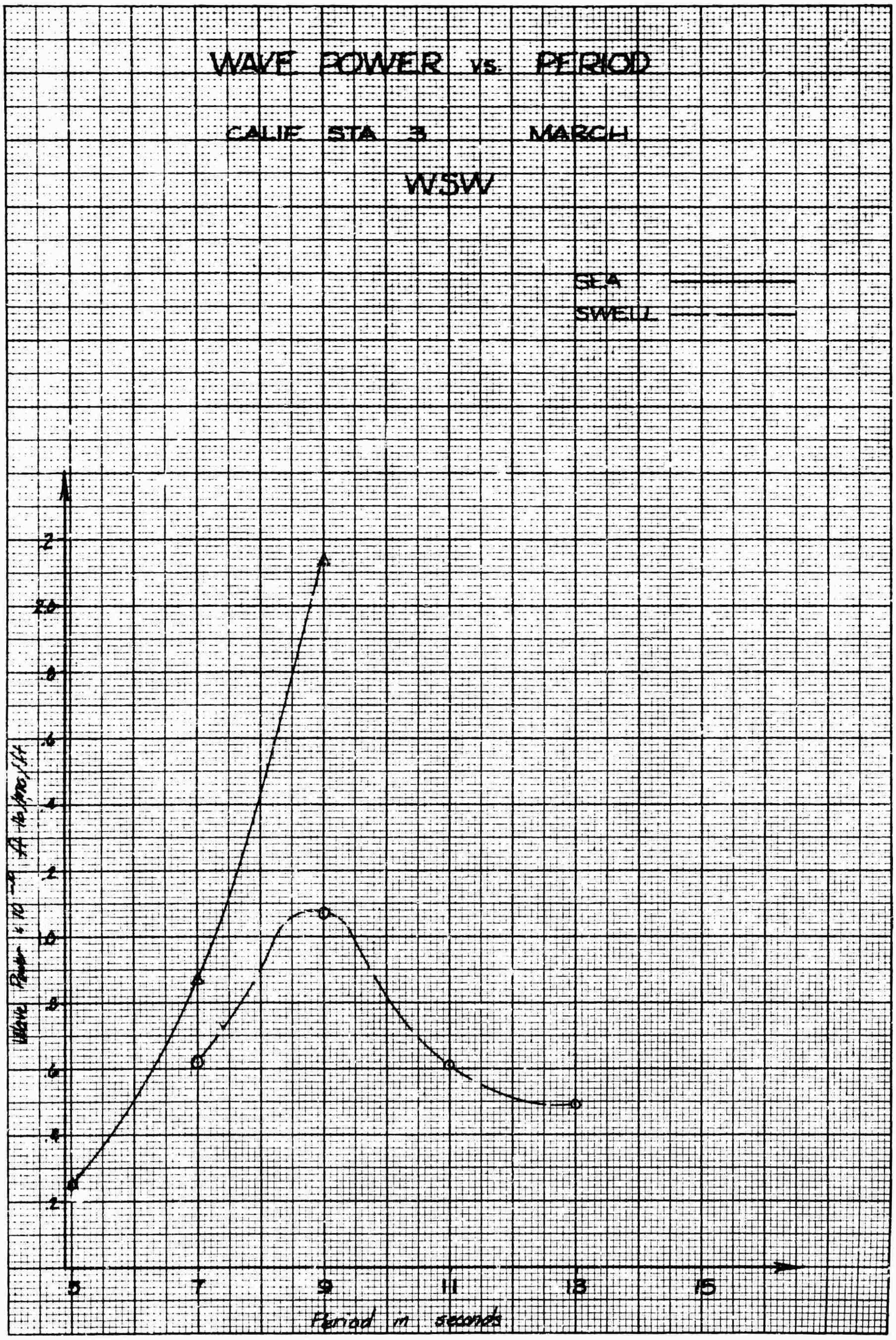
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

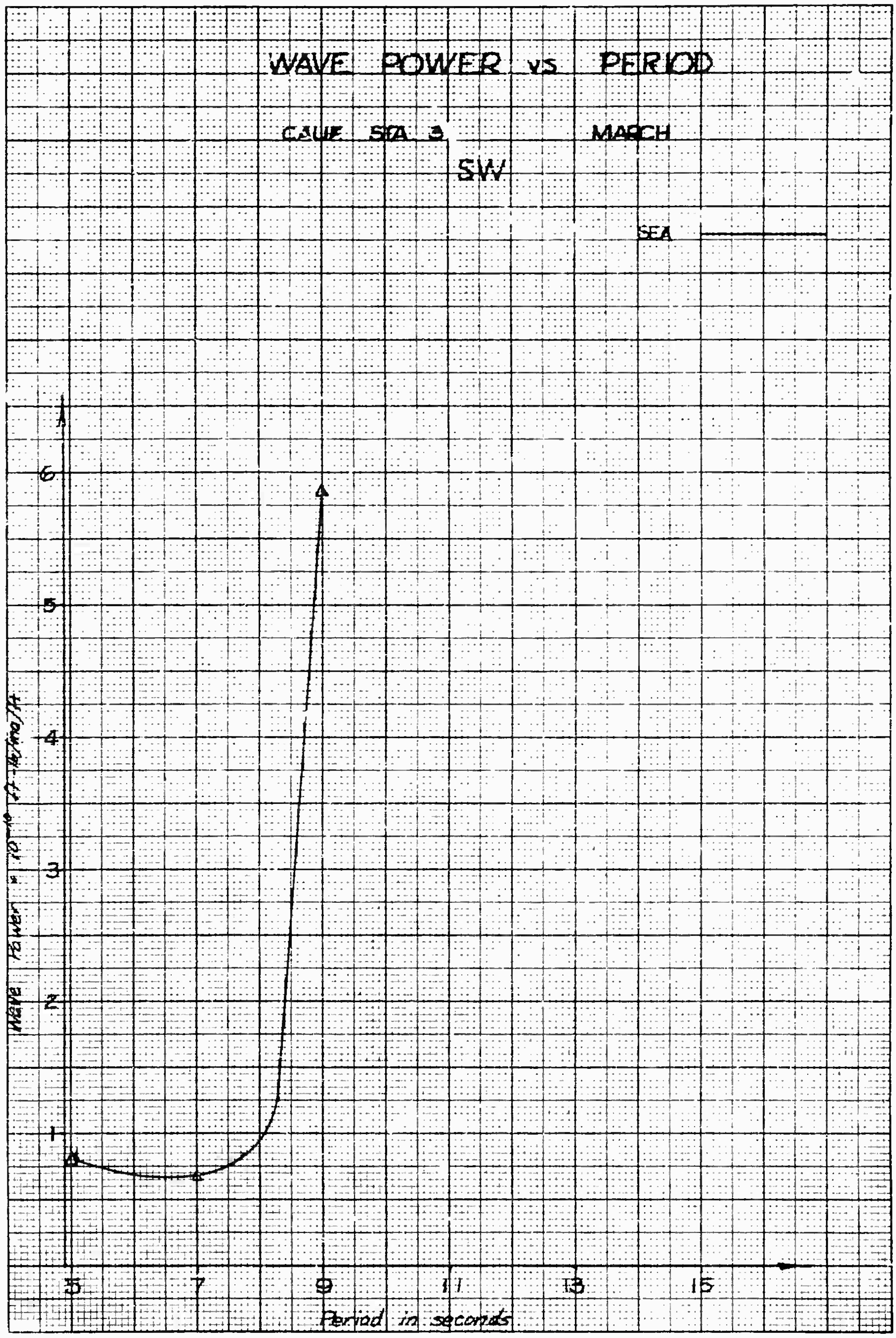

Wave Power vs. Period
Calif. Sta. 3
March
NNW
Wave Power × 10⁻¹⁰, in ft-lb/mo/ft
T, Period in Seconds
1
2
3
4
5
6
7
5
7
9
11
13

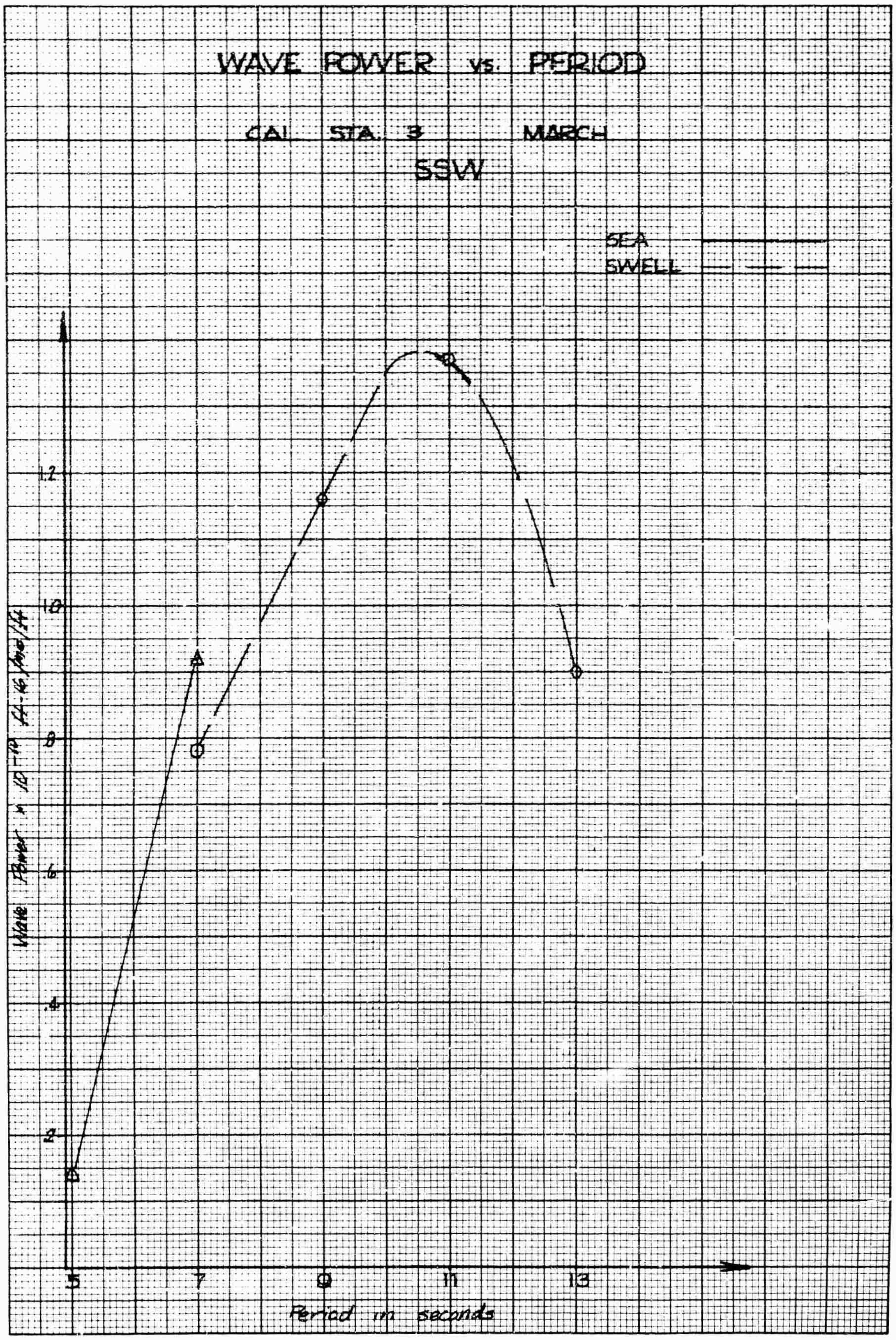

Wave Power vs Wave Period
Calif. Sta. #3 March
NW
Sea
Swell
Wave Period * 10^-10 in ft - lb/mo/ft
40
30
20
10
5
7
9
11
13
15
17
18+
T, Period in seconds
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


Wave Power vs Wave Period
Calif. Sta. 3 March
WNW
Sea
Swell
Wave Power × 10⁻¹⁰ ft-lb/mo/ft
T, Period in Seconds
5
7
9
11
13
15
17
2
4
6
8
10
12
14
16
18+
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

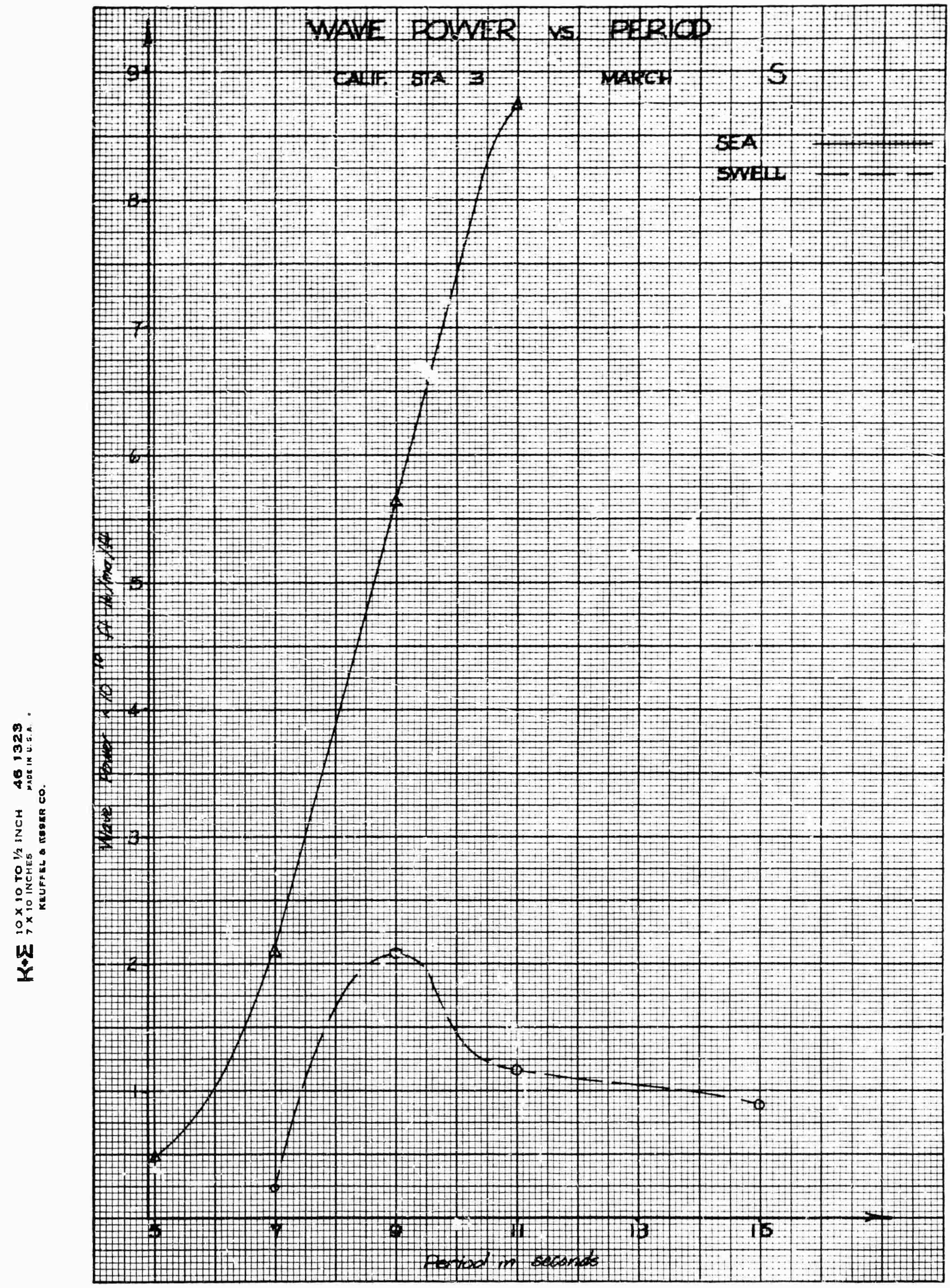

WAVE POWER vs. PERIOD
CALIF STA. 3
MARCH
W
SEA
SWELL
4
2
20
8
6
4
2
10
8
6
4
2
5
7
9
11
13
15
17
Period in seconds

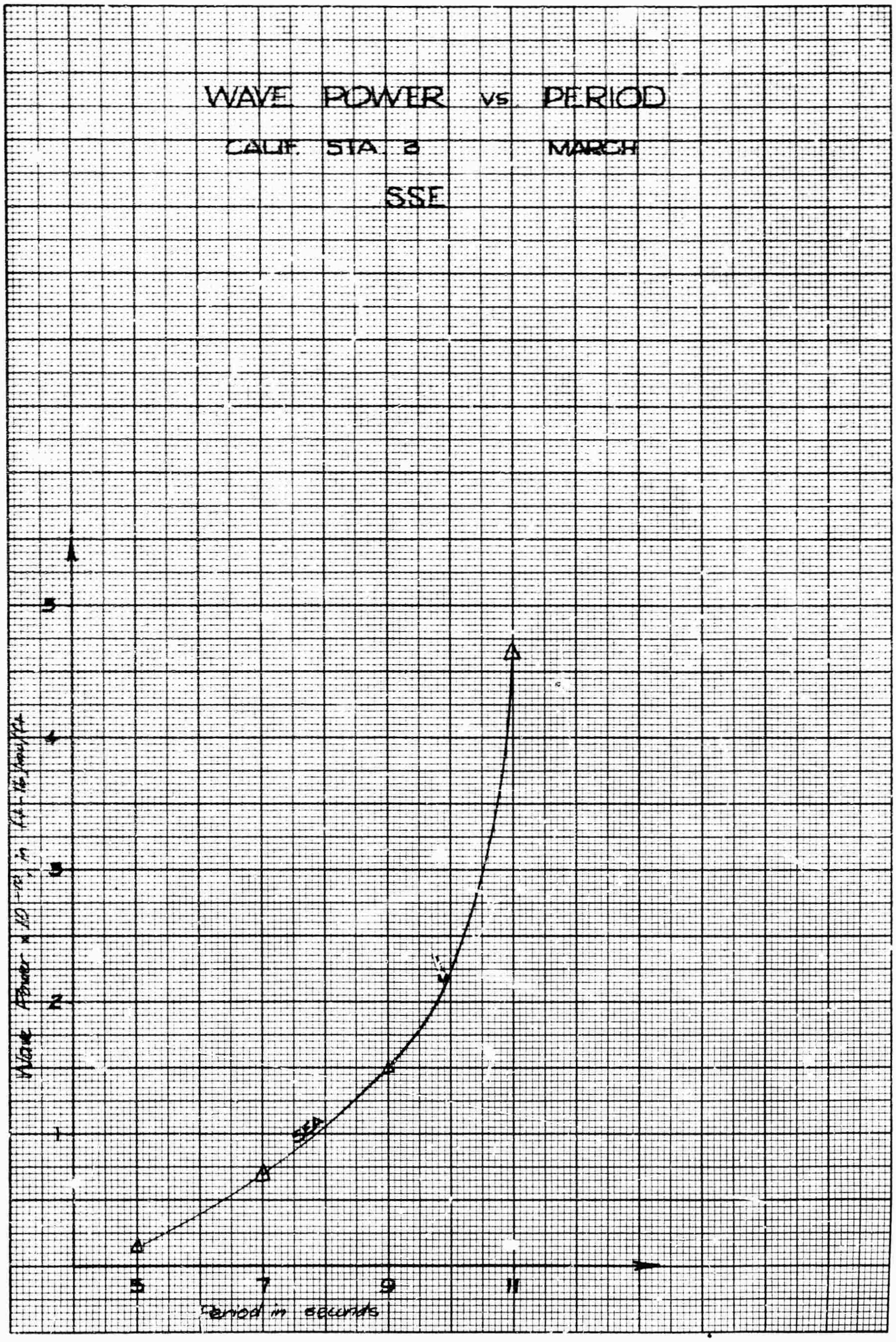

WAVE POWER vs. PERIOD
CALIF STA 3
MARCH
WSW
SEA
SWELL
5
7
9
11
13
15
Period in seconds


WAVE POWER vs PERIOD
CALIF. SEA 3
MARCH
SW
SEA
Wave Power × 10^-10 ft-lb/mo/ft
1
2
3
4
5
6
5
7
9
11
13
15
Period in seconds

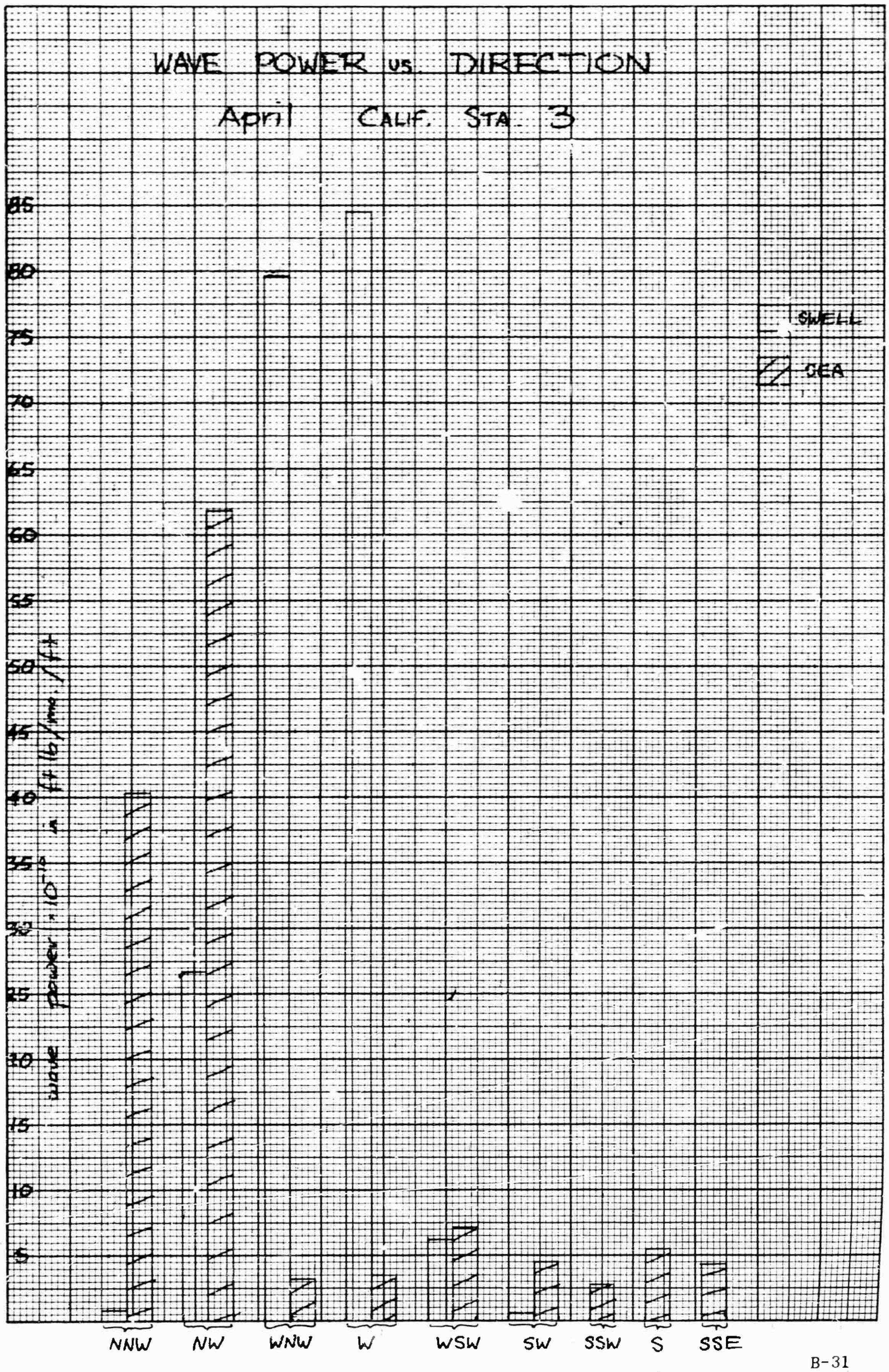


K+E 10 X 10 TO ½ INCH 46 1323
7 x 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

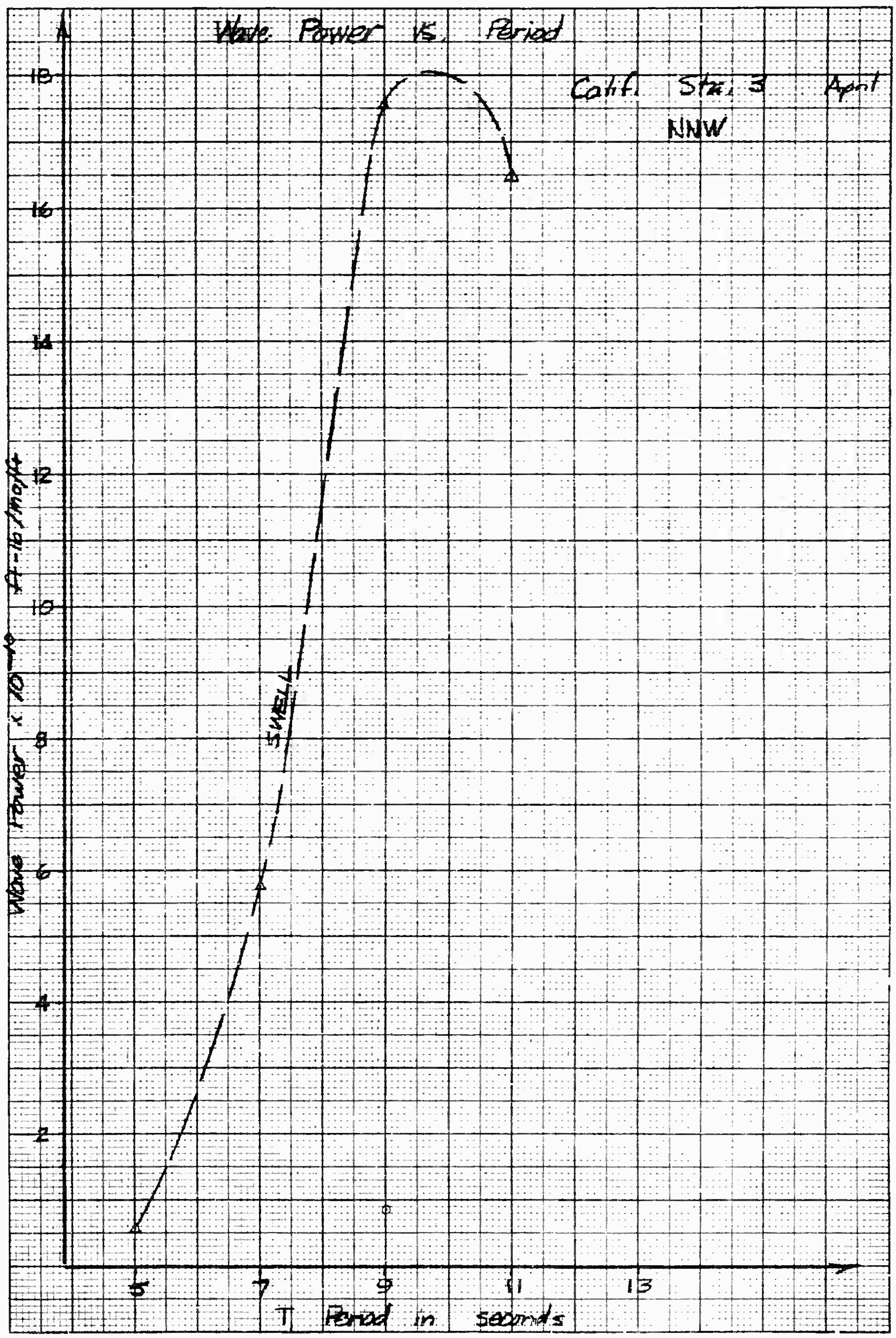

WAVE POWER vs PERIOD
CALIF. STA. 3
MARCH
S
SEA
SWELL
Wave Power x 10 ft. lb./ma./ft.
Period in seconds
1
2
3
4
5
6
7
8
9
5
7
9
11
13
15
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
CALIF. STA. 3
MARCH
SSE
Wave Power
5
4
3
2
1
SEA
5
7
9
11
Period in seconds

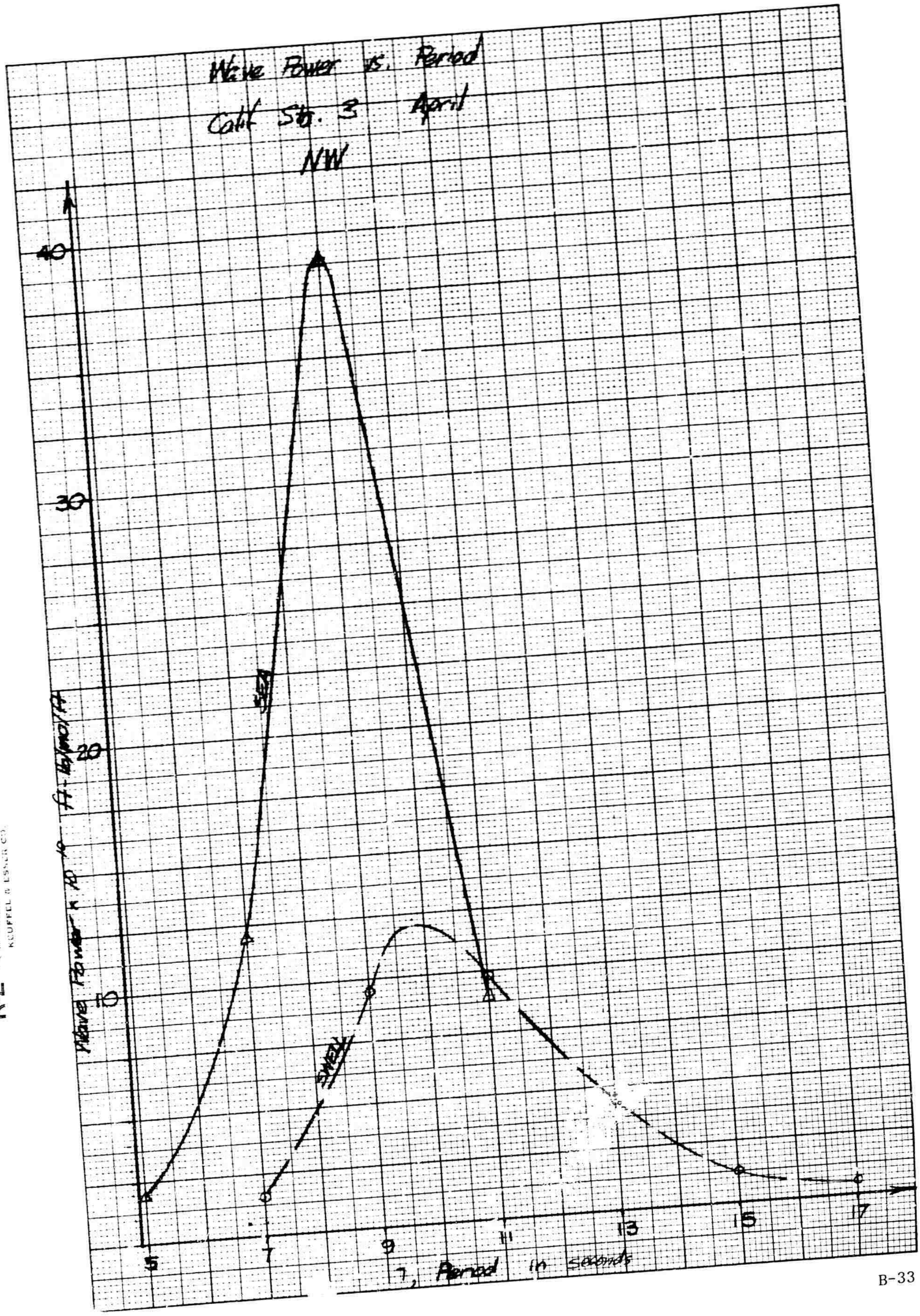
STATION 3 - APRIL



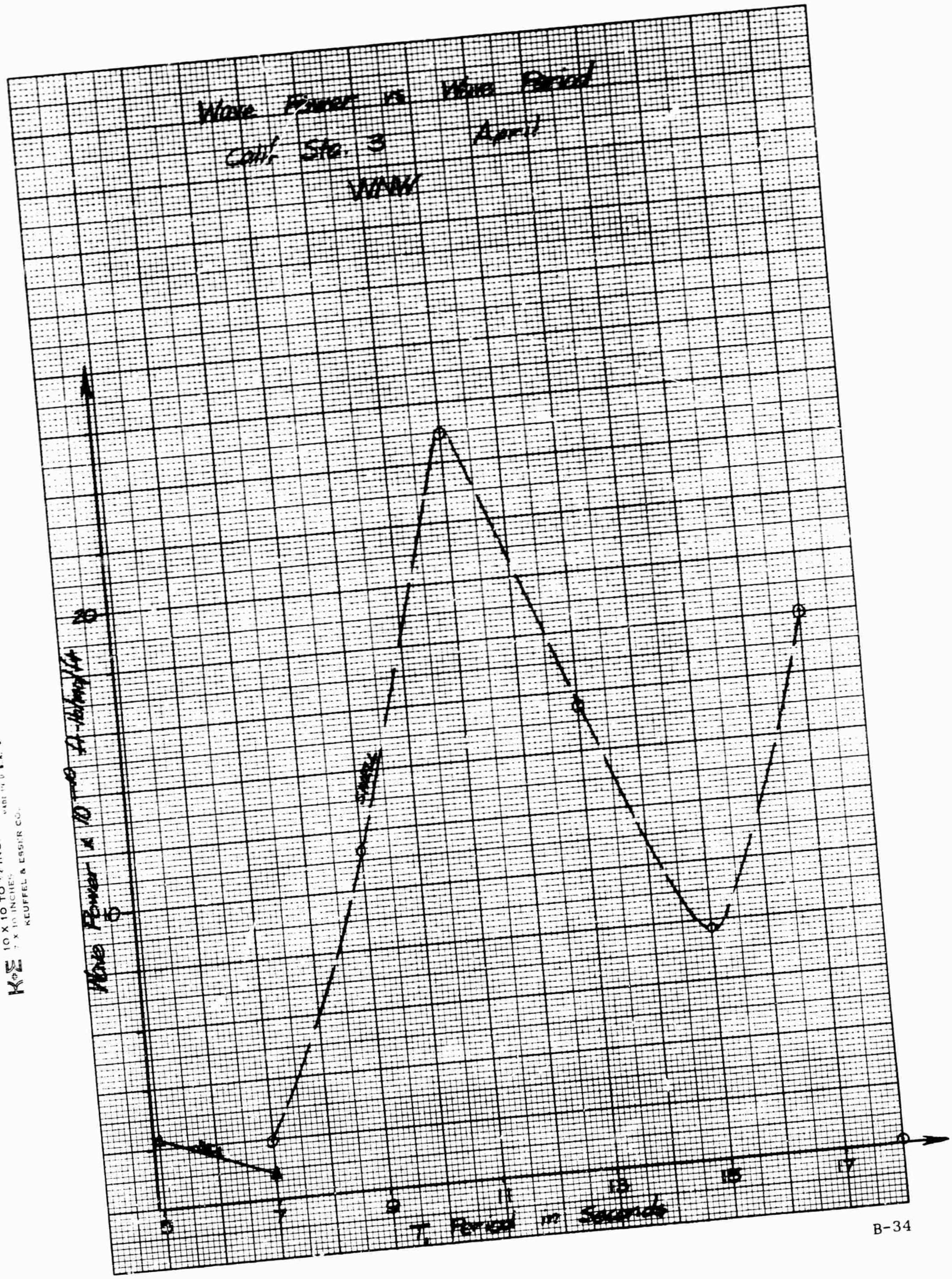
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



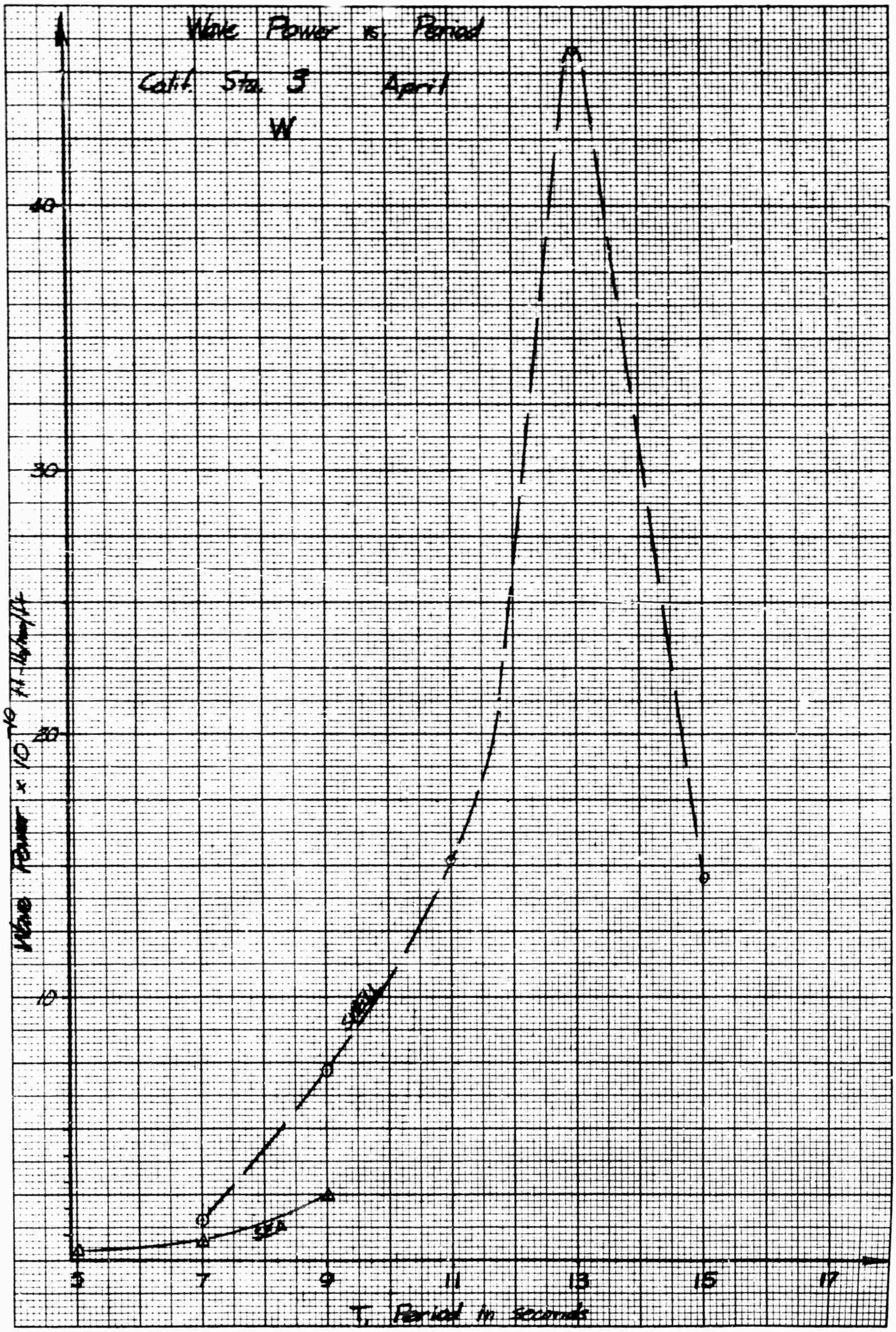
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



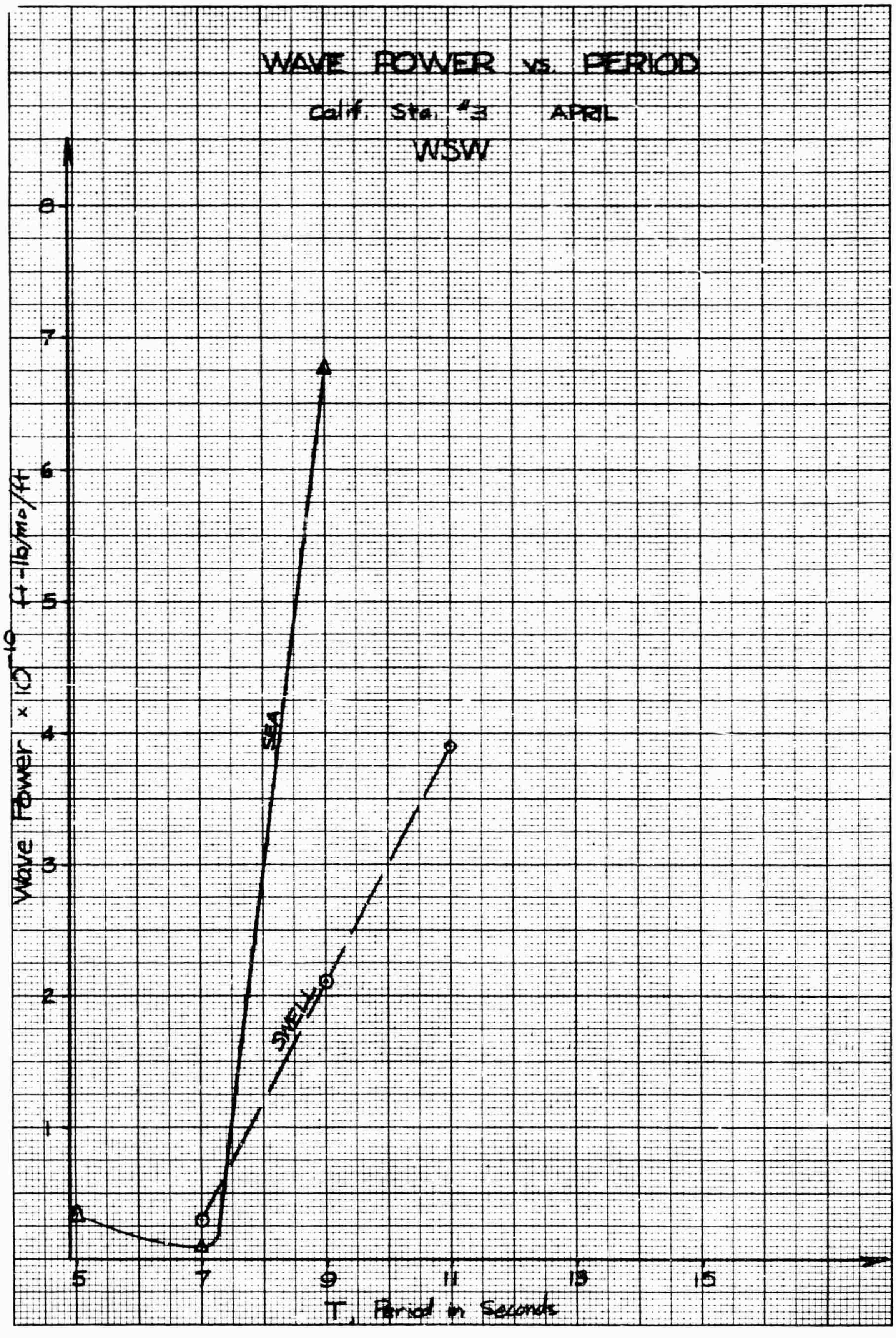
Wave Power vs. Period
Calif Sta. 3 April
NW
40
30
20
10
Wave Power x 10^10 ft-lb/mo/ft
SEA
SWELL
5
7
9
11
13
15
17
T, Period in seconds

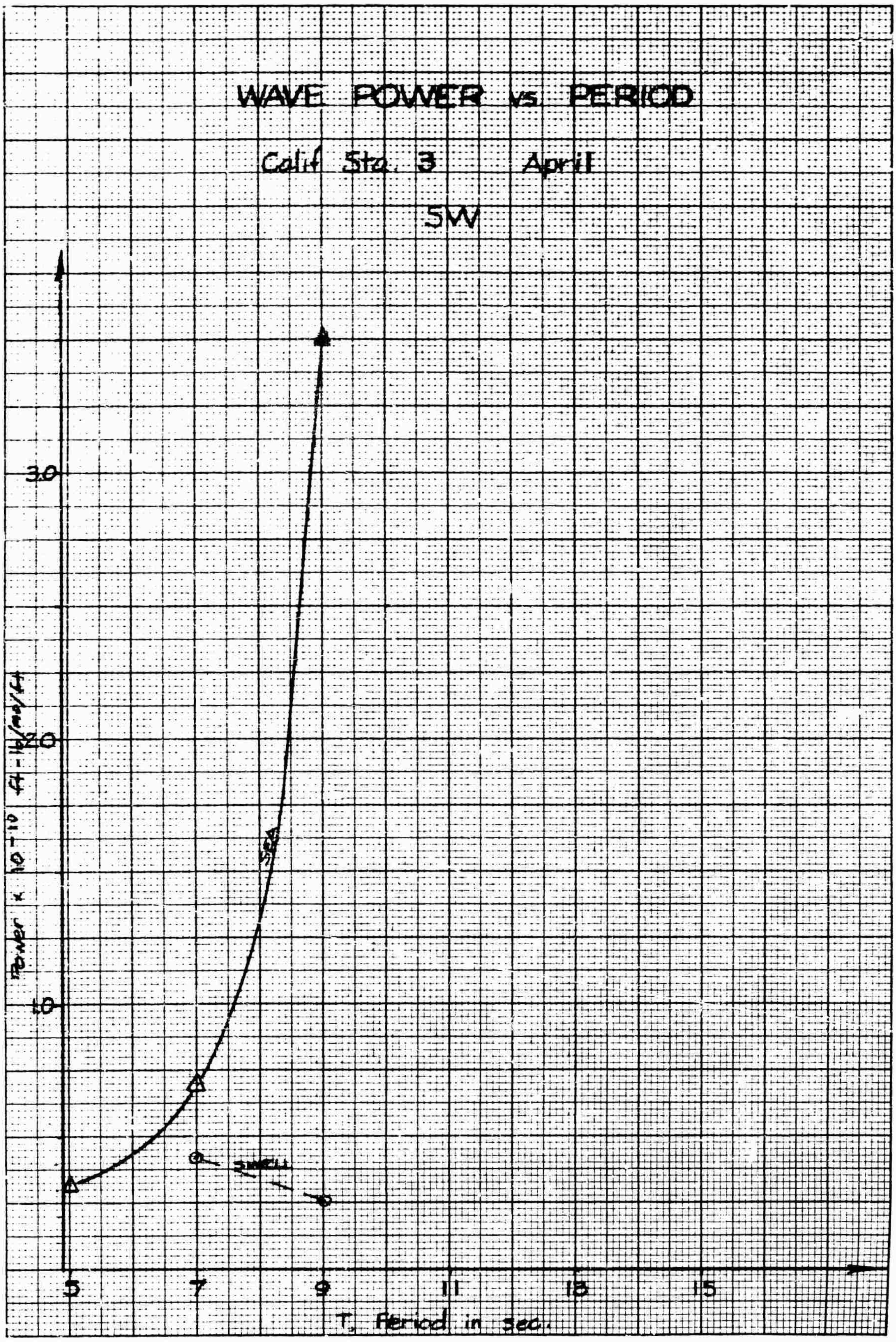

Wave Power vs. Wave Period
Calif. Sta. 3
April
WNW
Wave Power
T, Period in Seconds
5
7
9
11
13
15
17
10
20

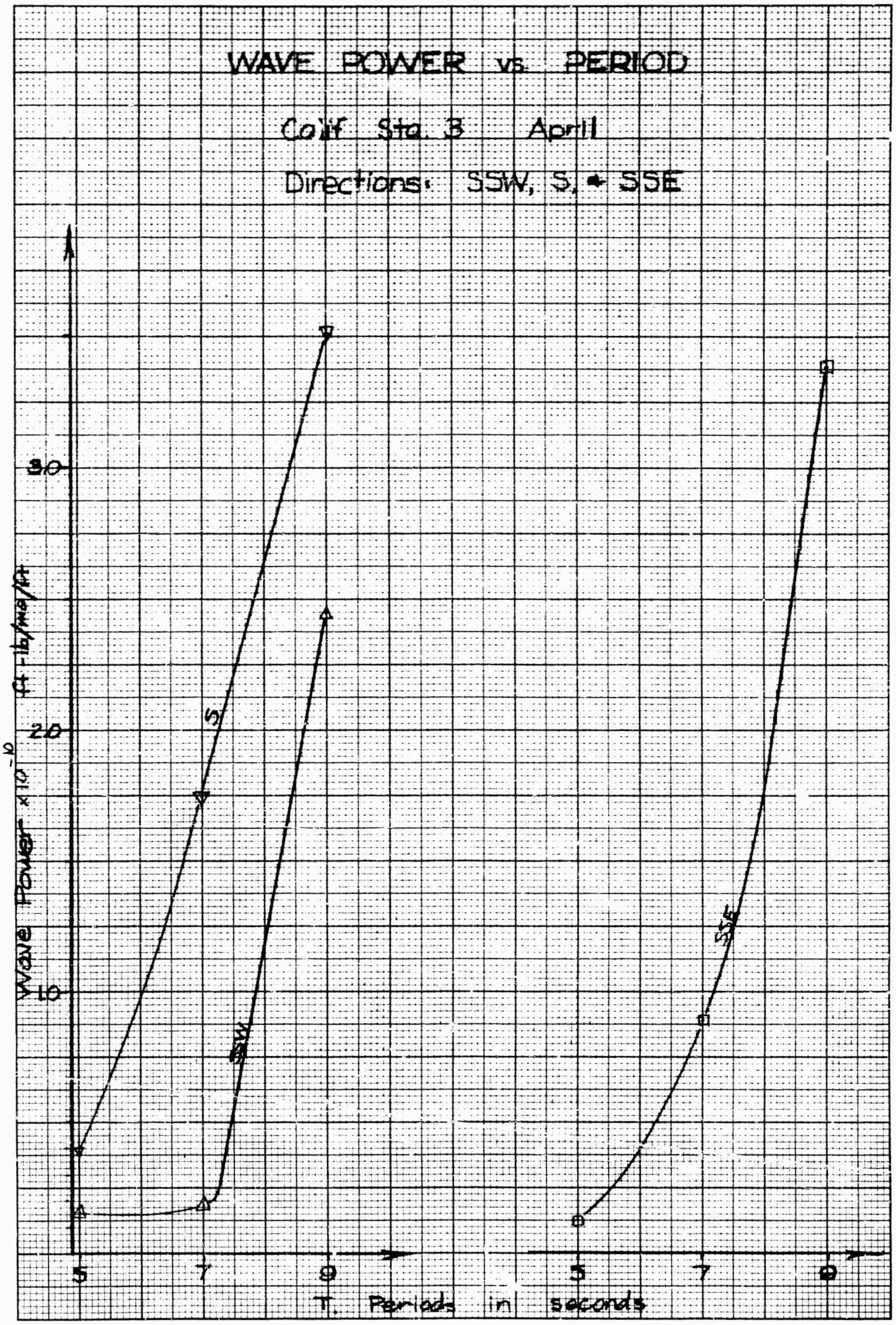
B-34



Wave Power vs. Period
Calif. Sta. 3 April
W
Wave Power × 10^10 ft-lb/sec/ft
40
30
20
10
5
7
9
11
13
15
17
T, Period in seconds

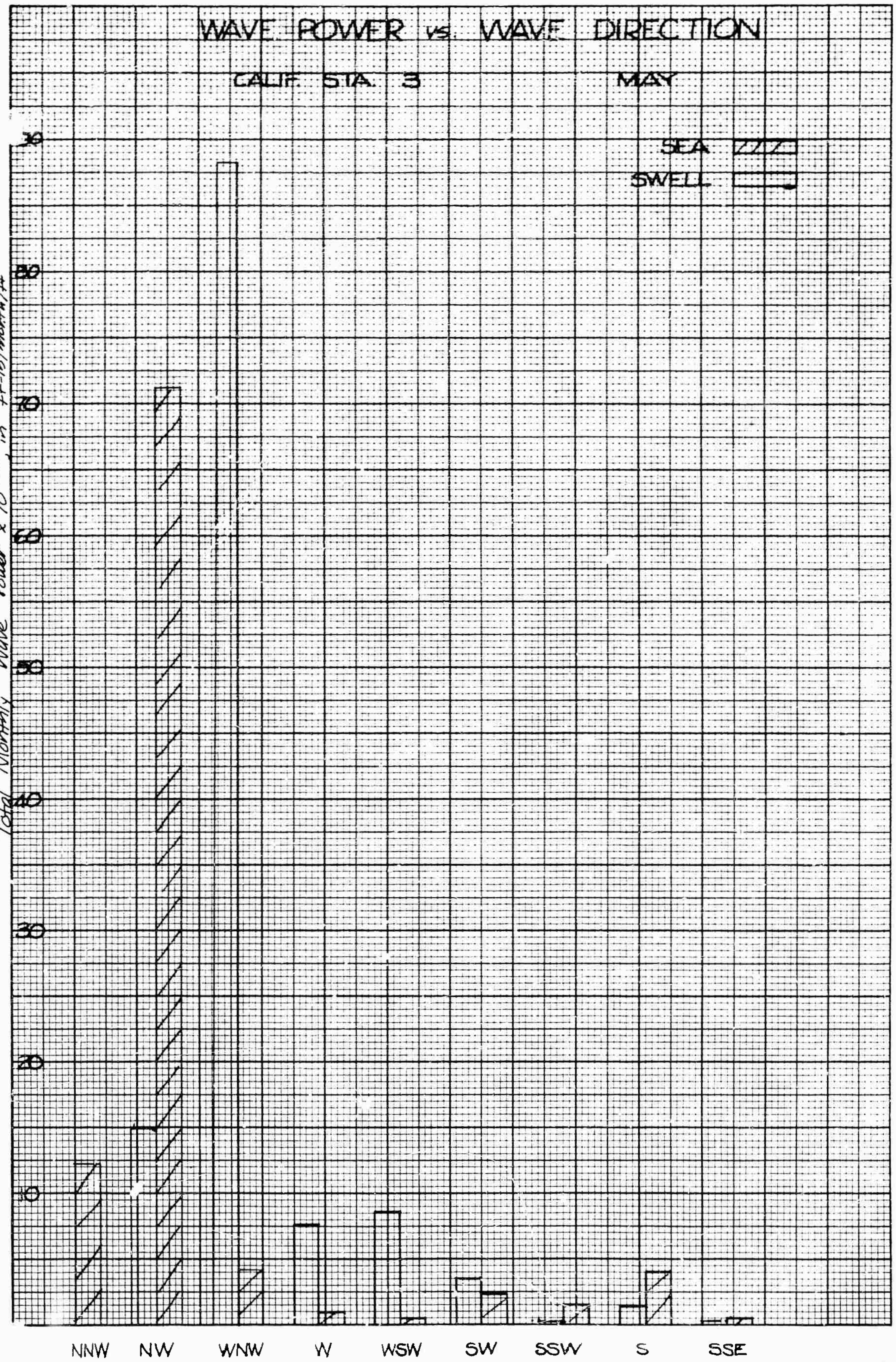

WAVE POWER vs. PERIOD
Calif. Sta. #3 APRIL
WSW
Wave Power × 10^{-10} ft-lb/mo/ft
SEA
SWELL
T, Period in Seconds
1
2
3
4
5
6
7
8
5
7
9
11
13
15

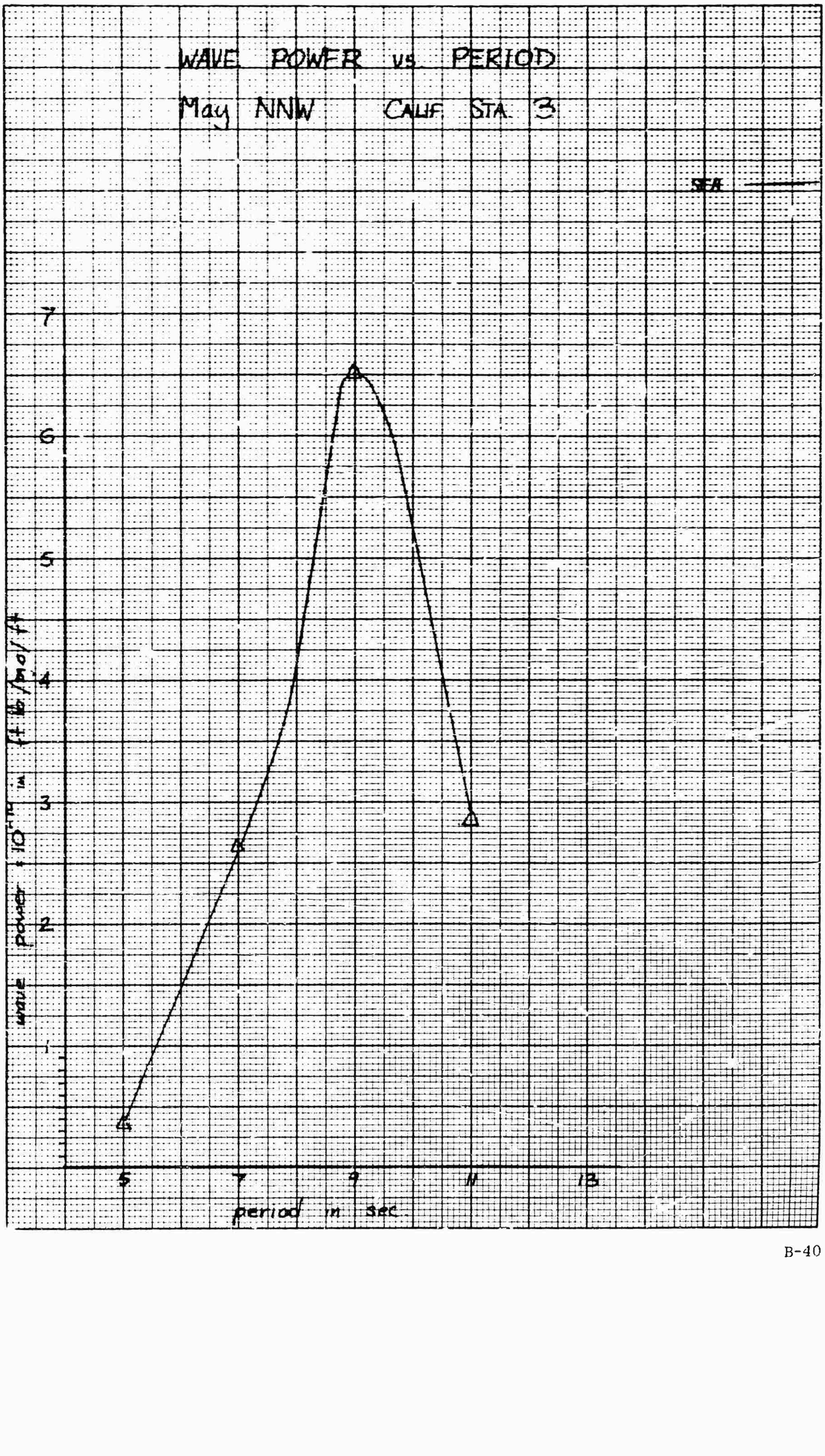

WAVE POWER vs. PERIOD
Calif. Sta. 3 April
5W
Power x 10⁻¹⁰ ft-lb/sec/ft
3.0
2.0
1.0
SEA
SWELL
5
7
9
11
13
15
T, Period in sec.



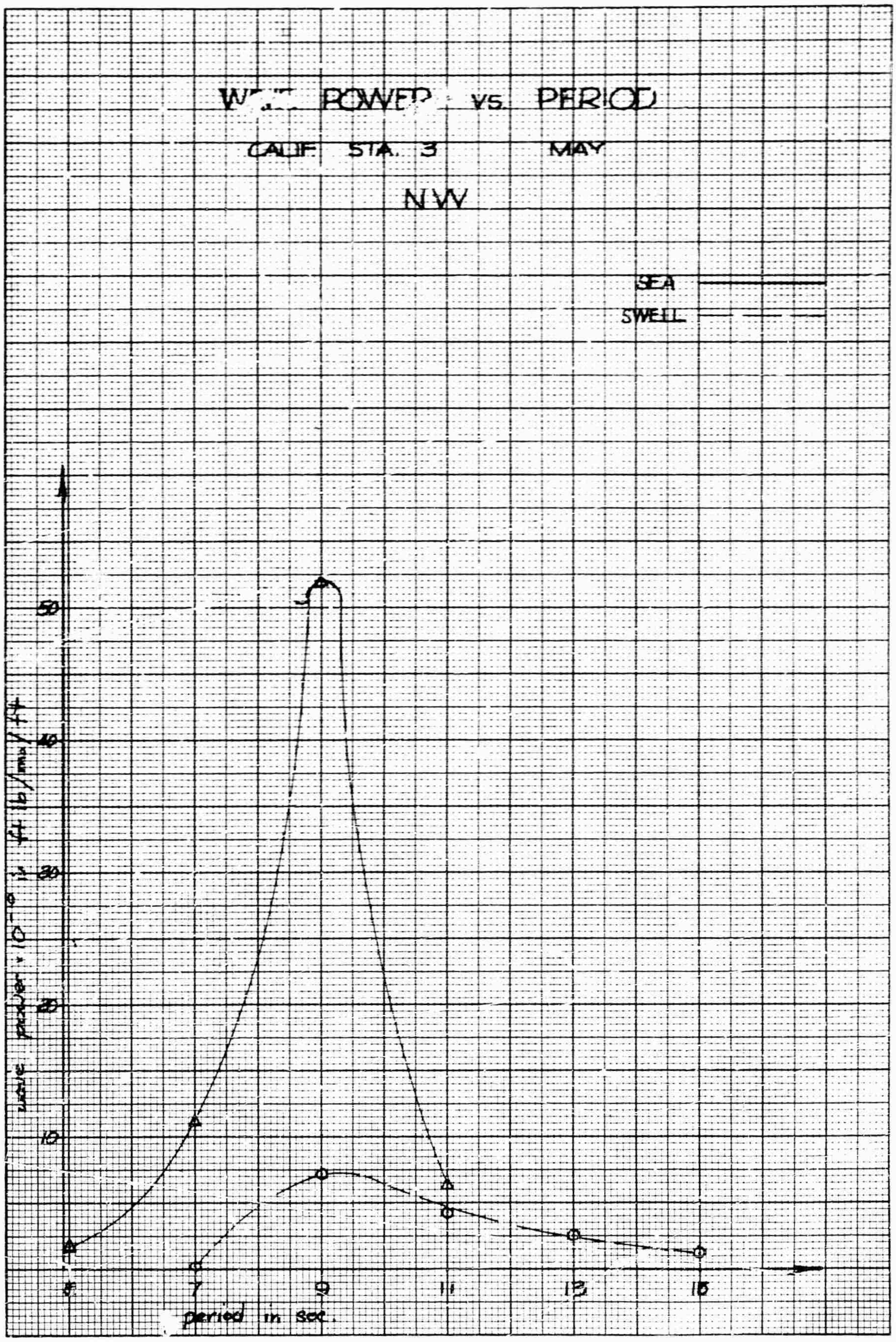
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

STATION 3 - MAY

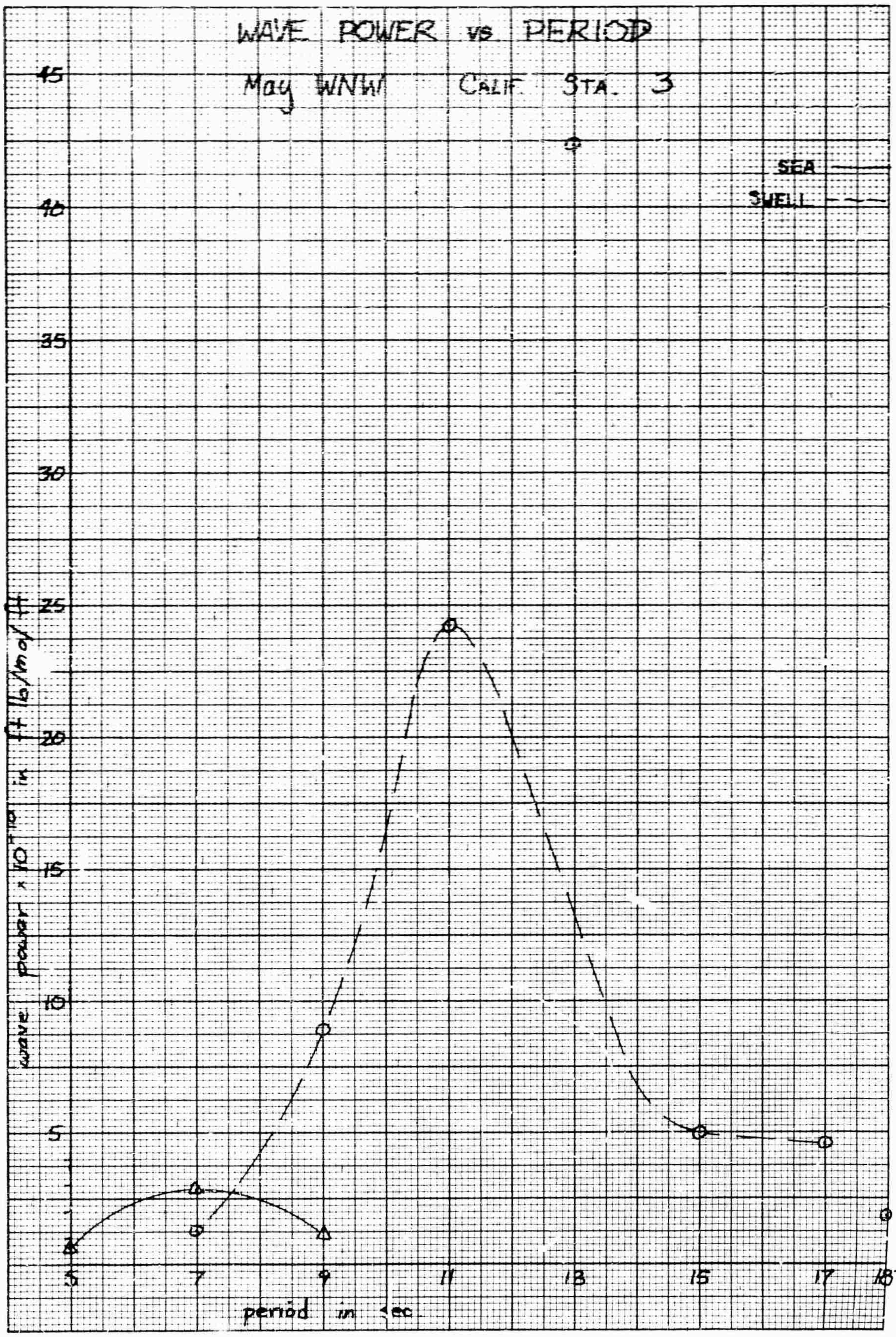

WAVE POWER vs. WAVE DIRECTION
CALIF. STA. 3
MAY
SEA
SWELL
Total Monthly Wave Power x 10^-10 in ft-lb/month/ft
10
20
30
40
50
60
70
80
90
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE



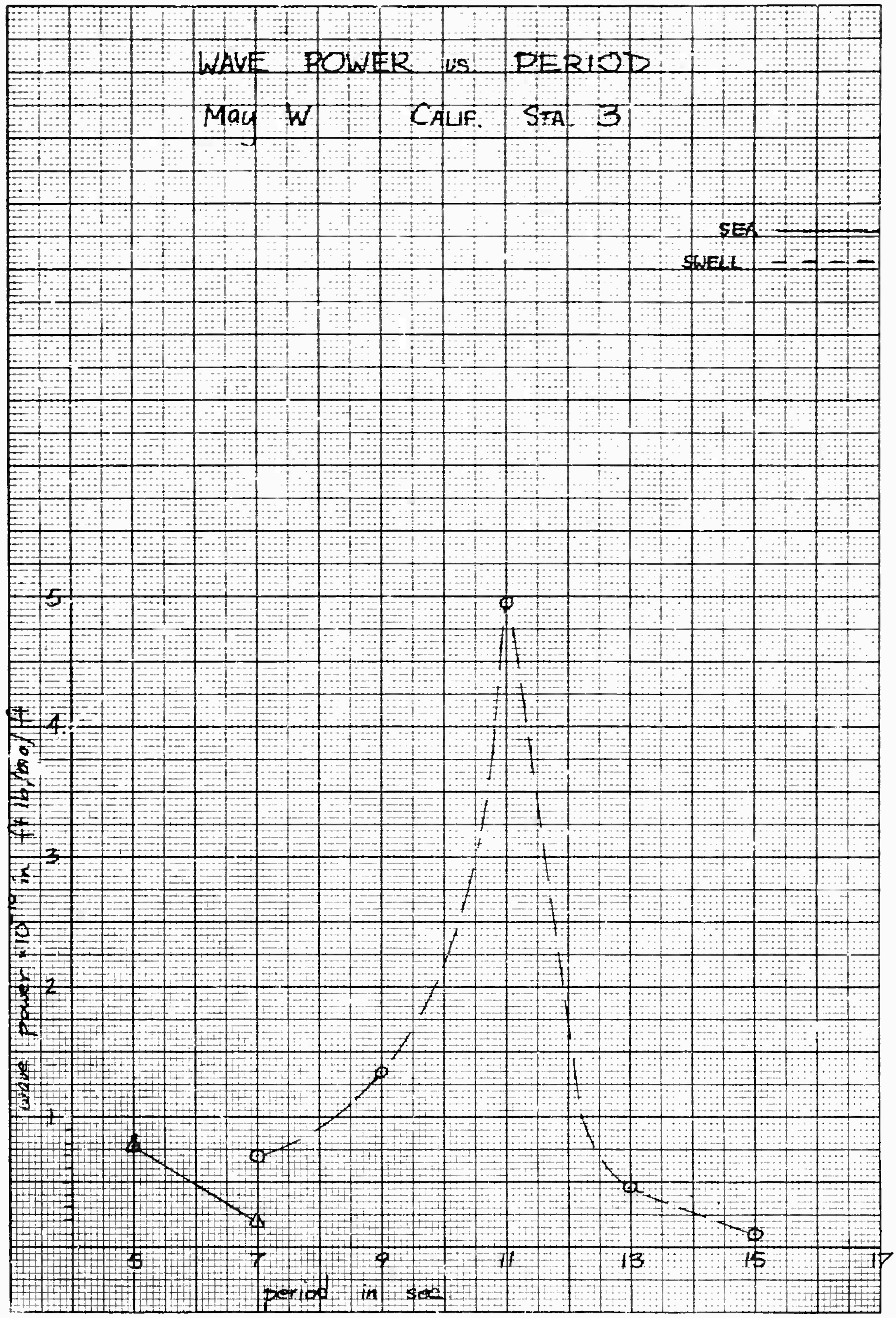
K-E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

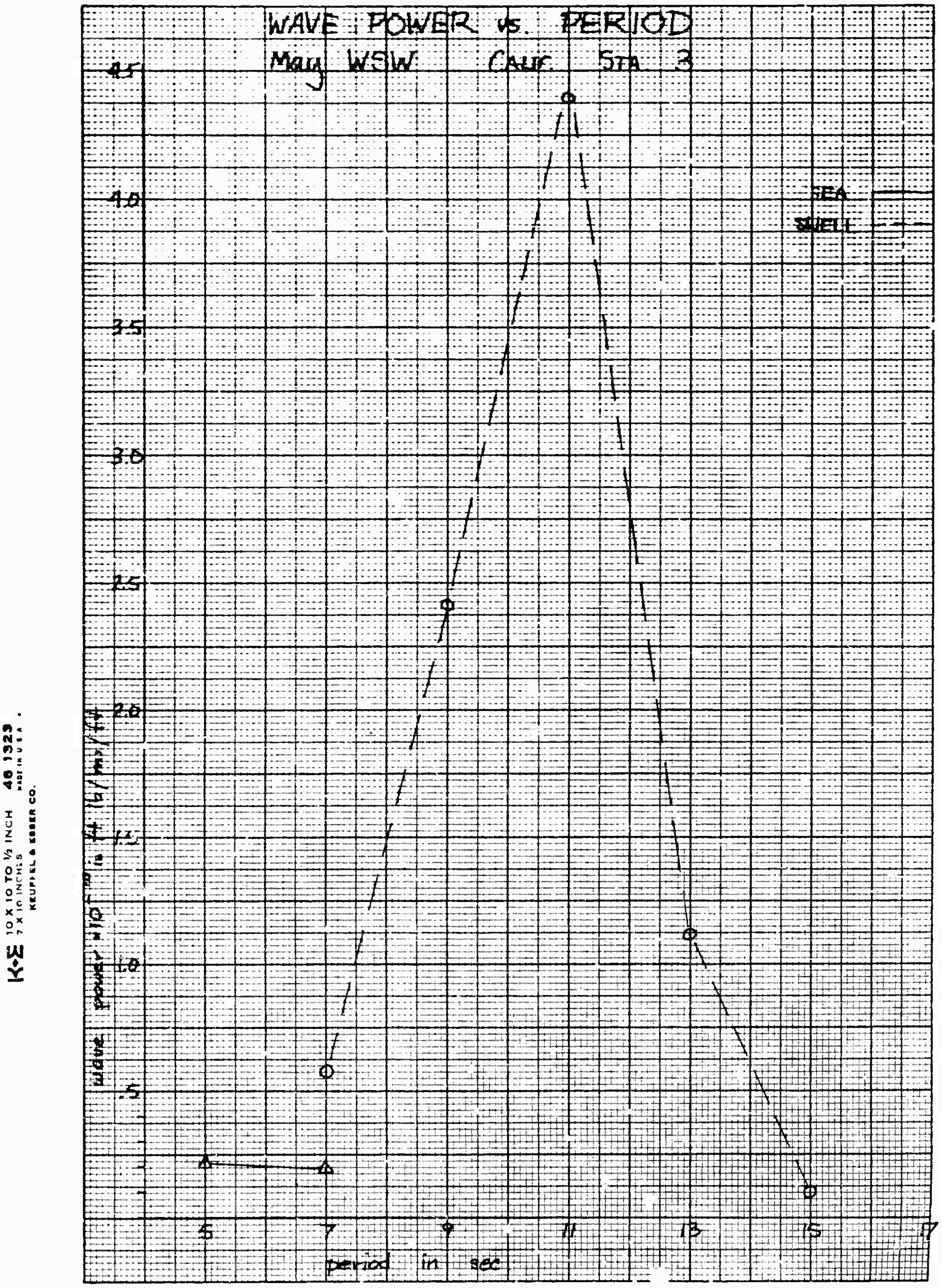


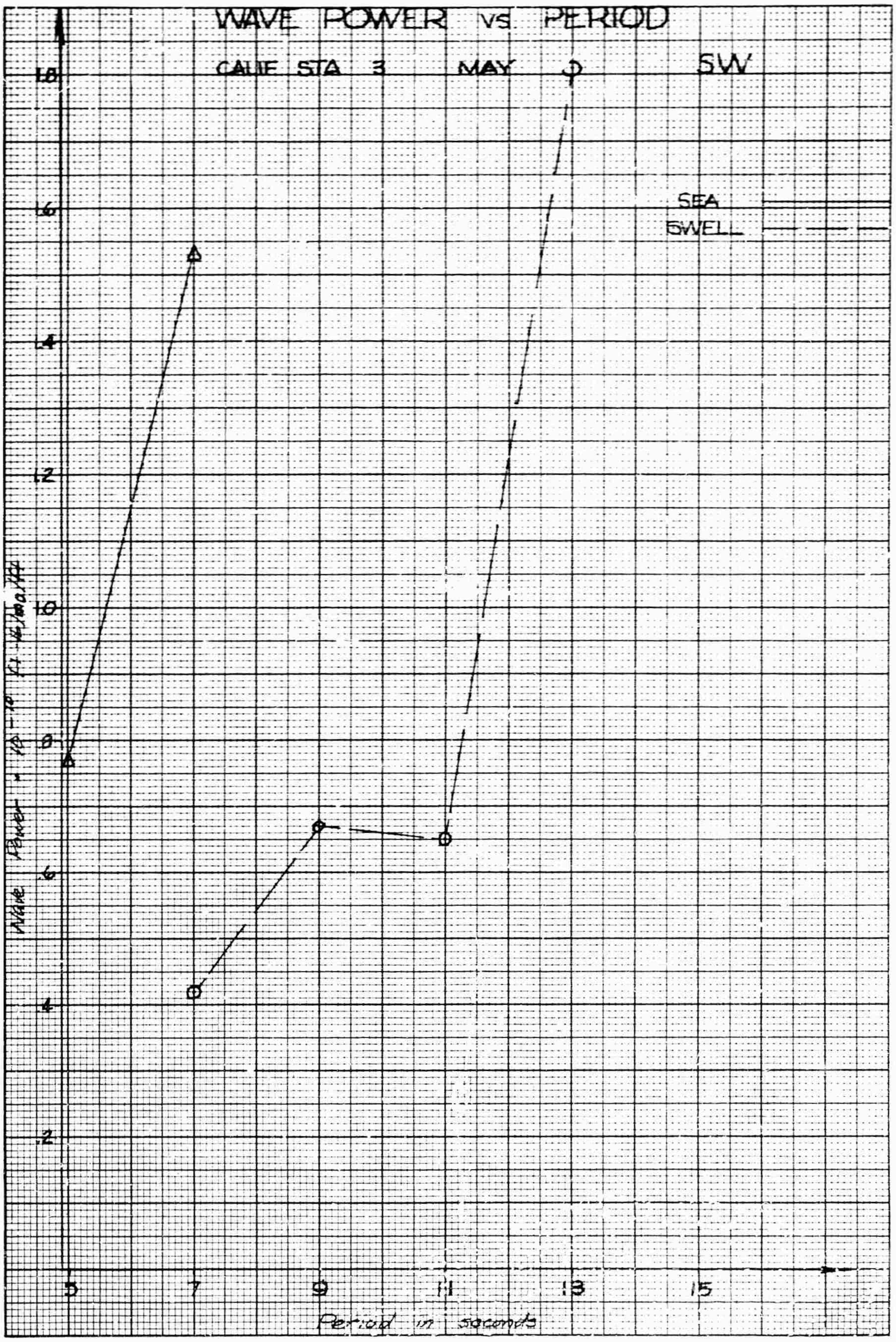
K+E 10 X 10 TO ½ INCH 7 X 10 INCHES 46 1323 MADE IN U.S.A. KEUFFEL & ESSER CO.



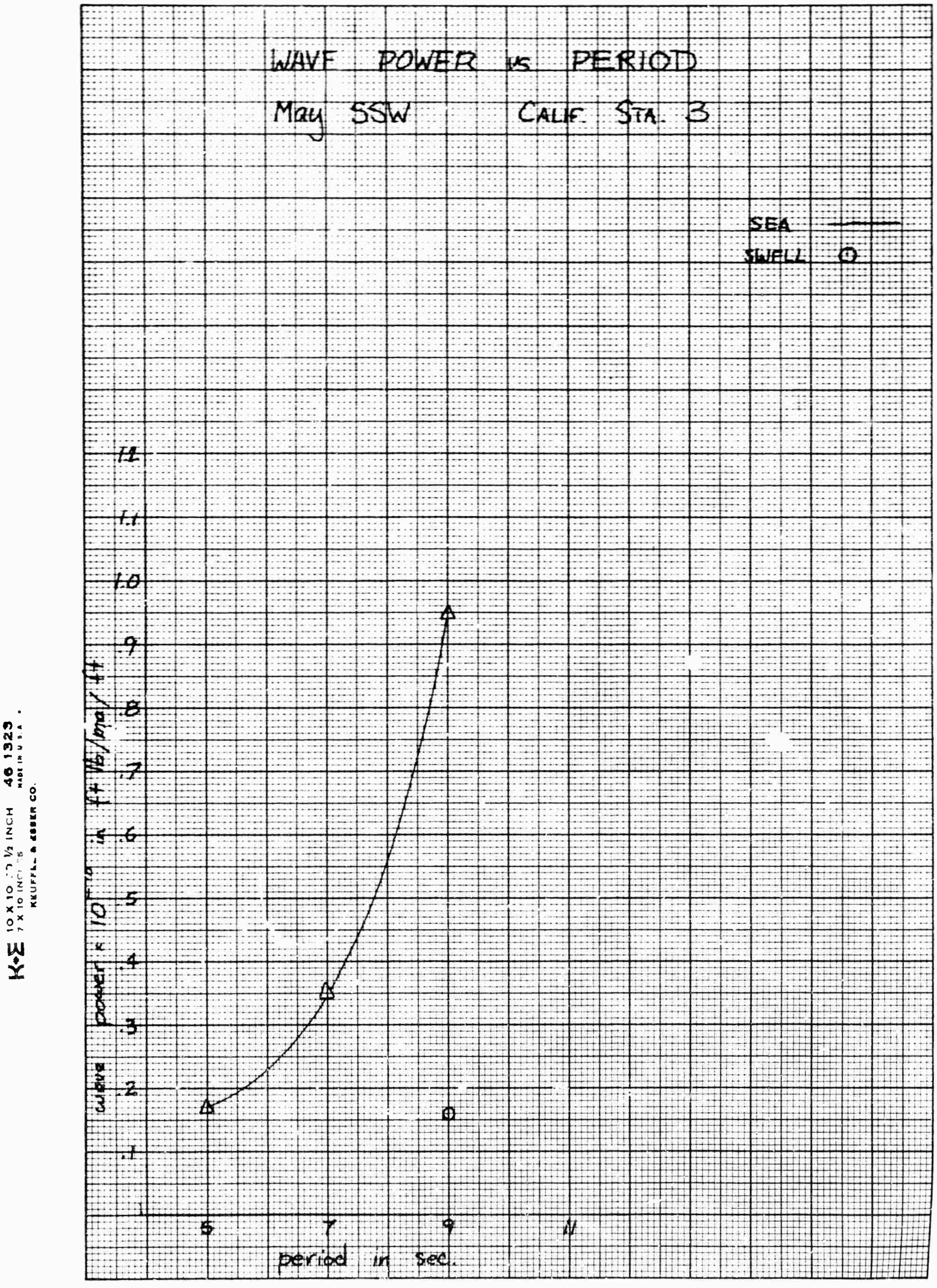
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

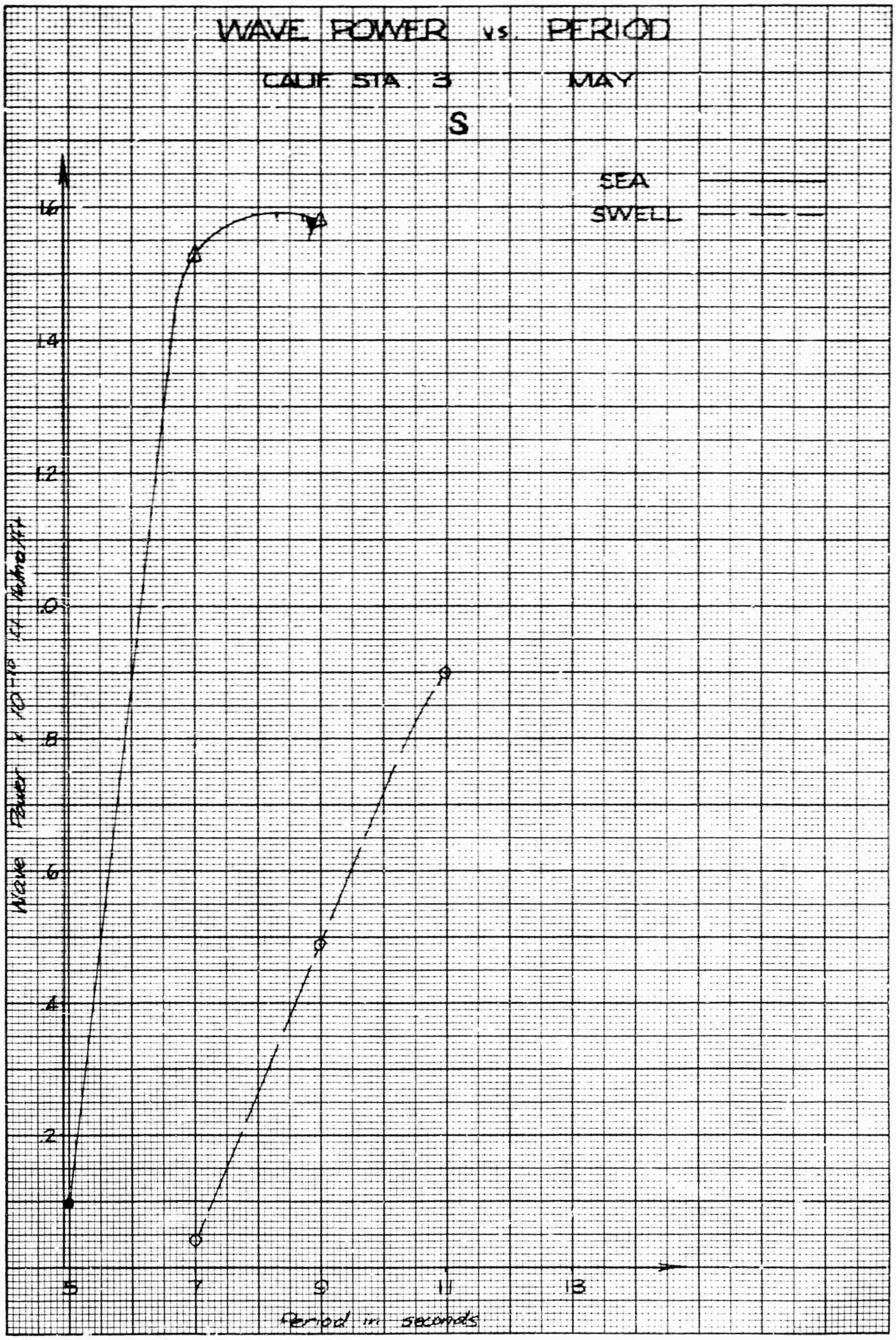

WAVE POWER vs PERIOD
May W CALIF. STA 3
SEA
SWELL
wave power x10^10 in ft lb/mo/ft
1
2
3
4
5
5
7
9
11
13
15
17
period in sec


WAVE POWER vs. PERIOD
May WSW CALIF. STA 3
4.5
4.0
3.5
3.0
2.5
2.0
1.0
.5
SEA
SWELL
5
7
9
11
13
15
17
period in sec
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



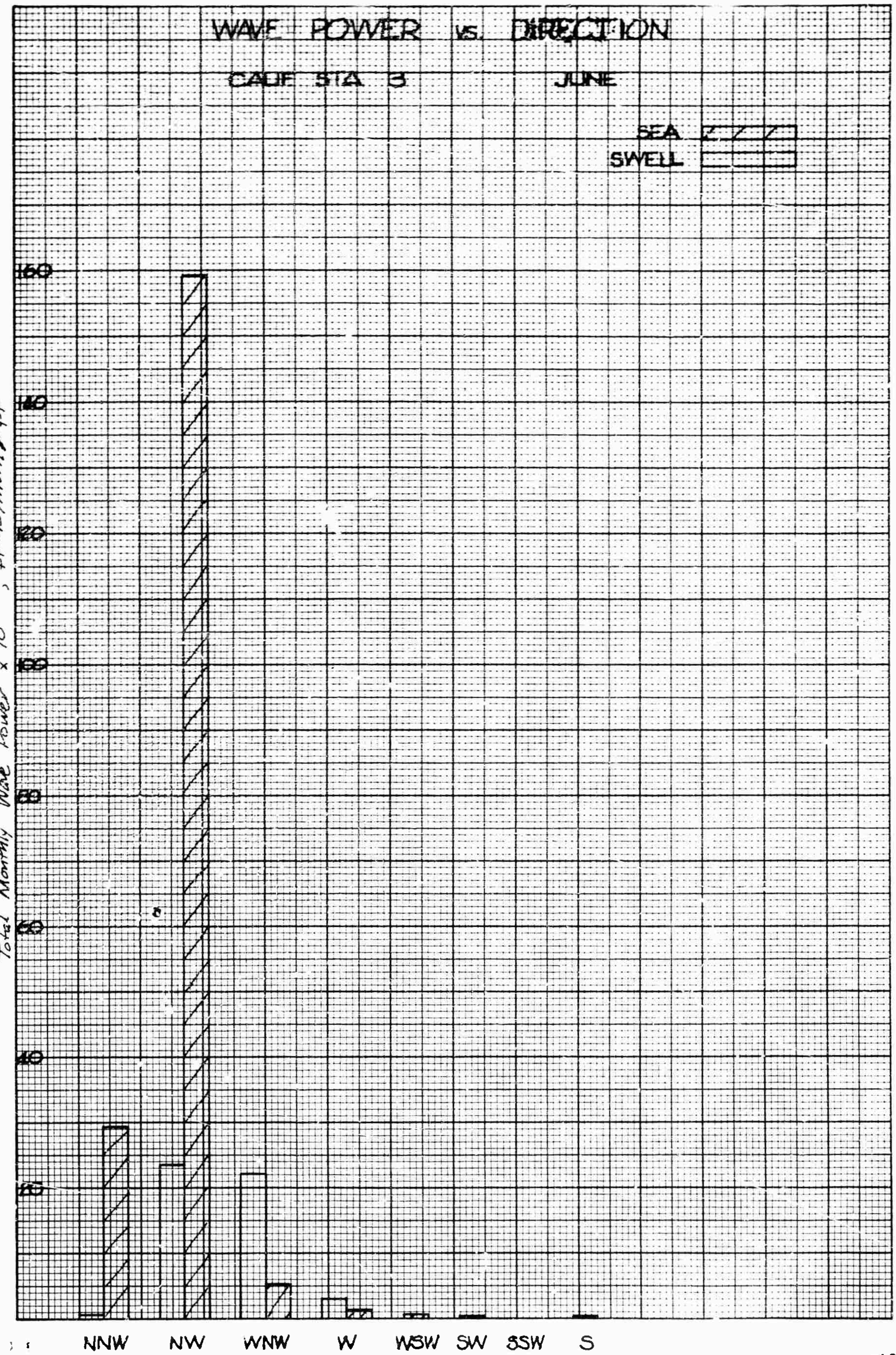
K·E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
May SSW
CALIF. STA. 3
SEA
SWELL
wave power × 10 in ft lb/bya/ft
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
period in sec.
K•E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

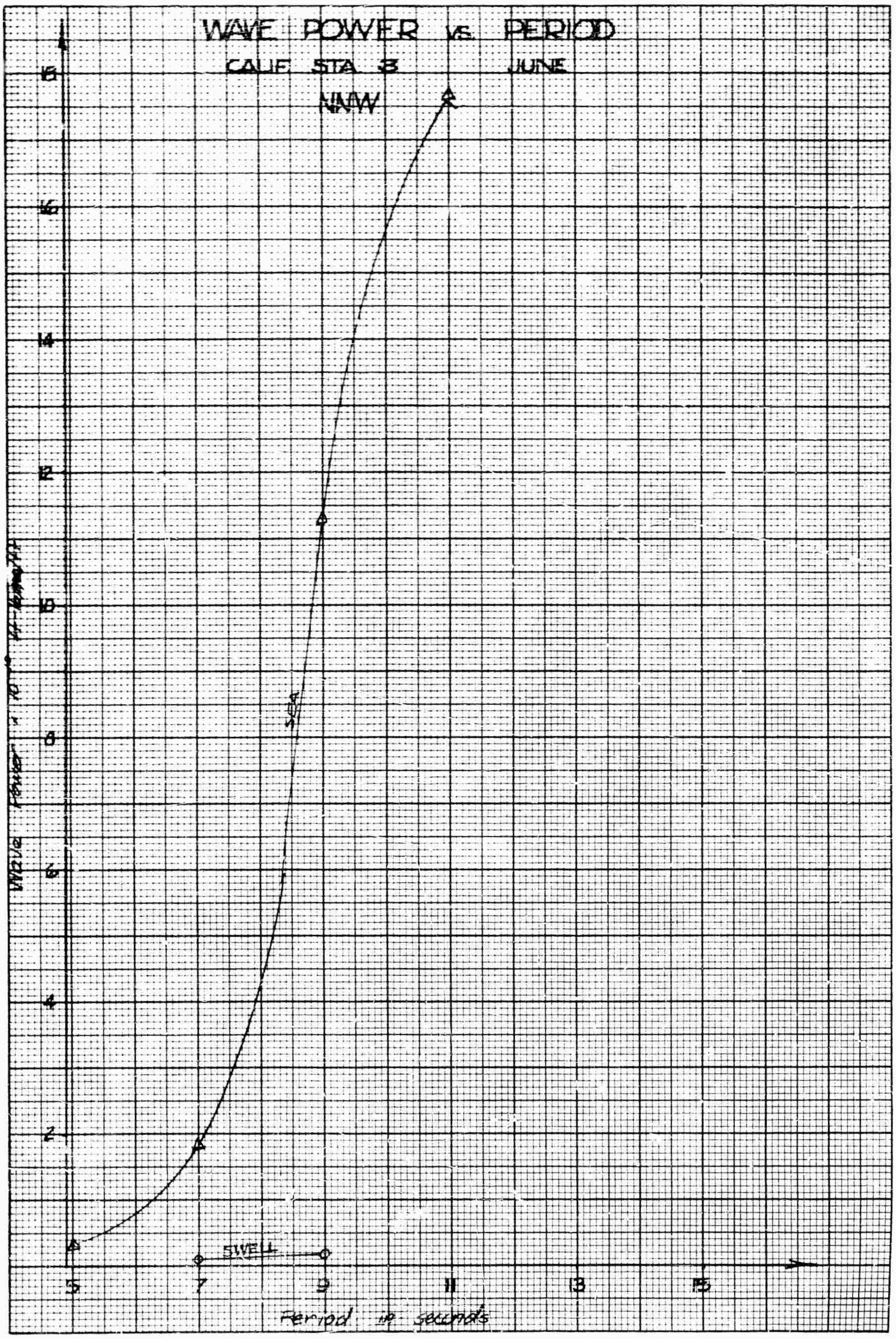


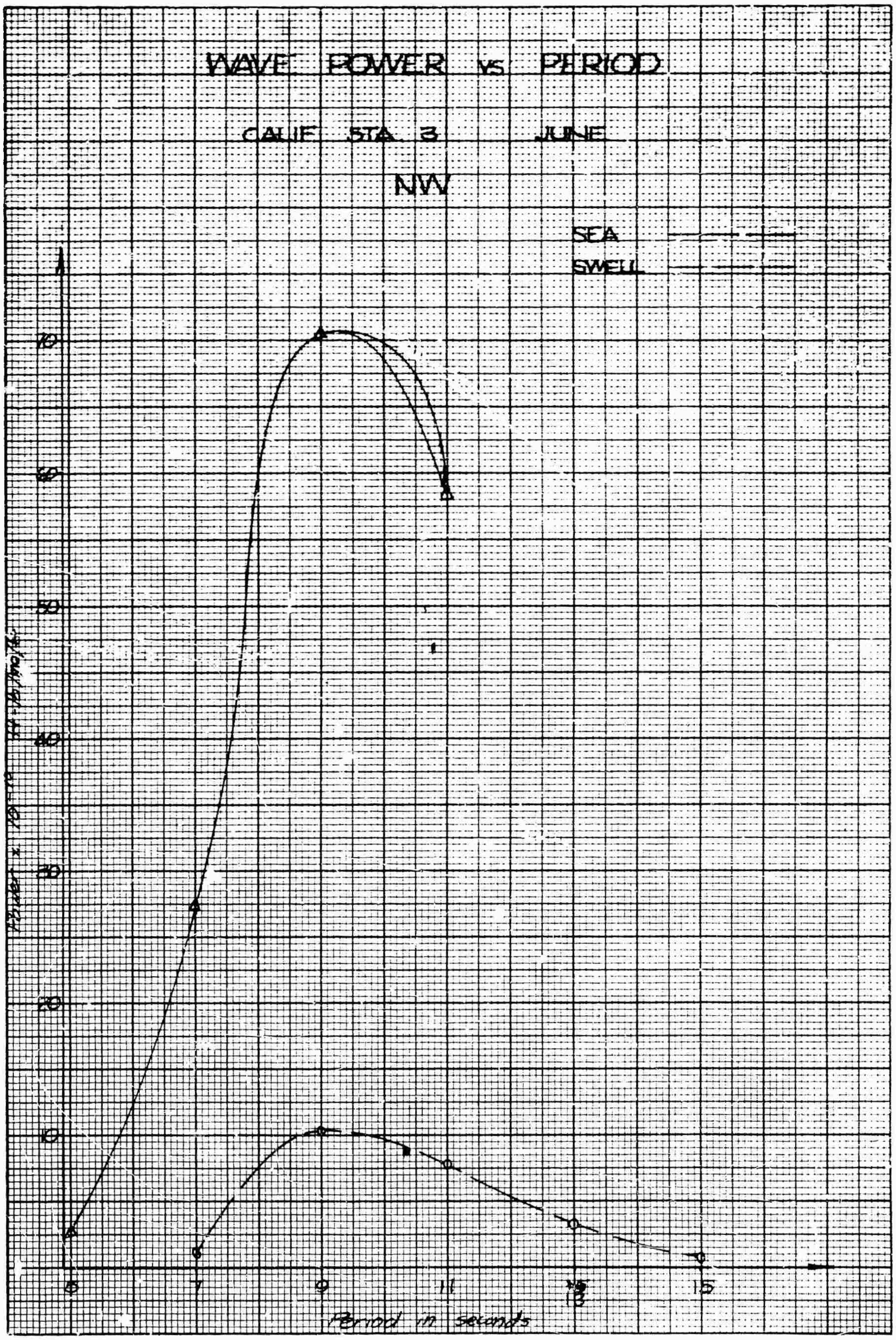
WAVE POWER vs PERIOD
CALIF. STA. 3
MAY
S
SEA
SWELL
16
14
12
10
8
6
4
2
Wave Power x 10^{-10} ft-lb/mo/ft
5
7
9
11
13
Period in seconds

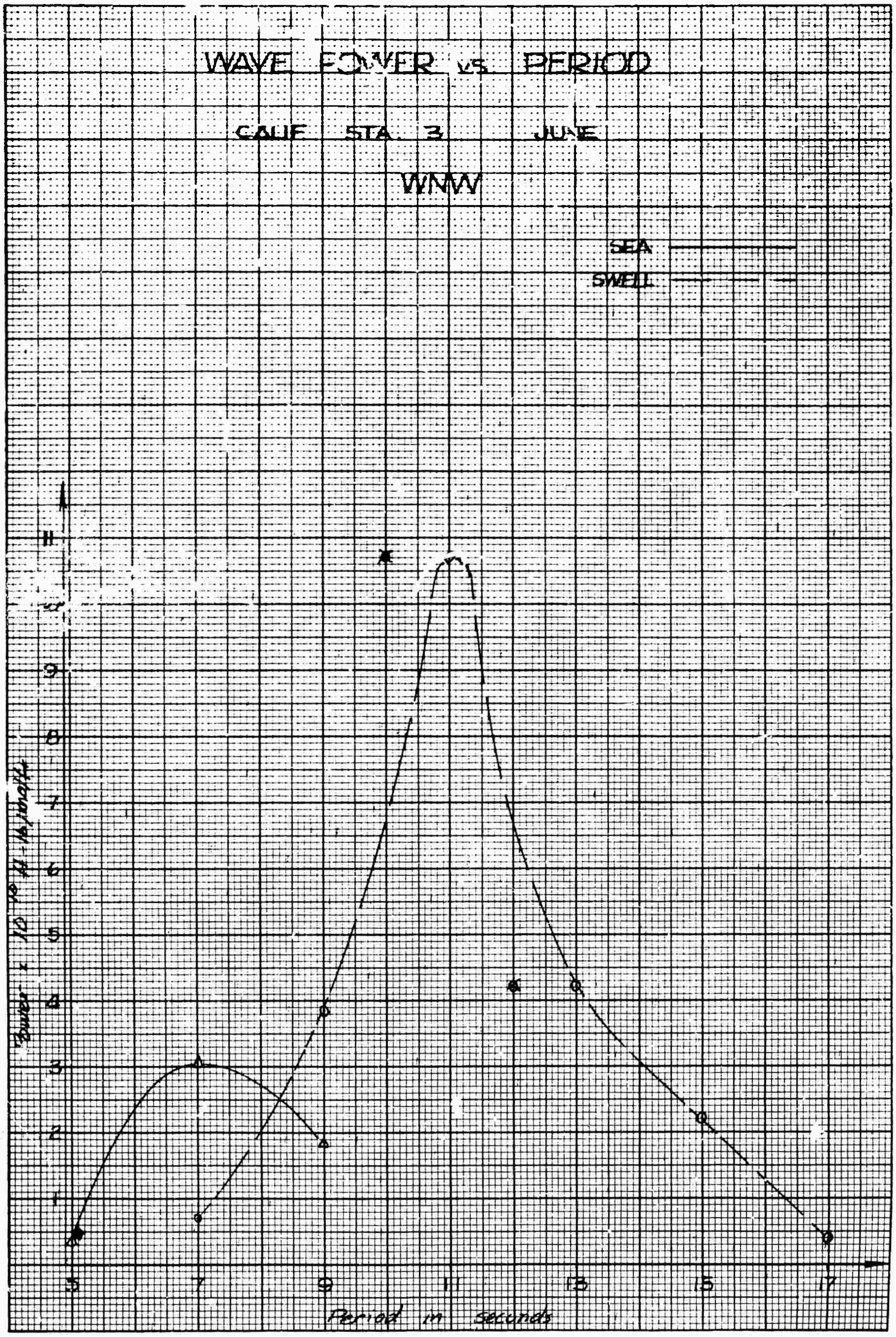
STATION 3 - JUNE



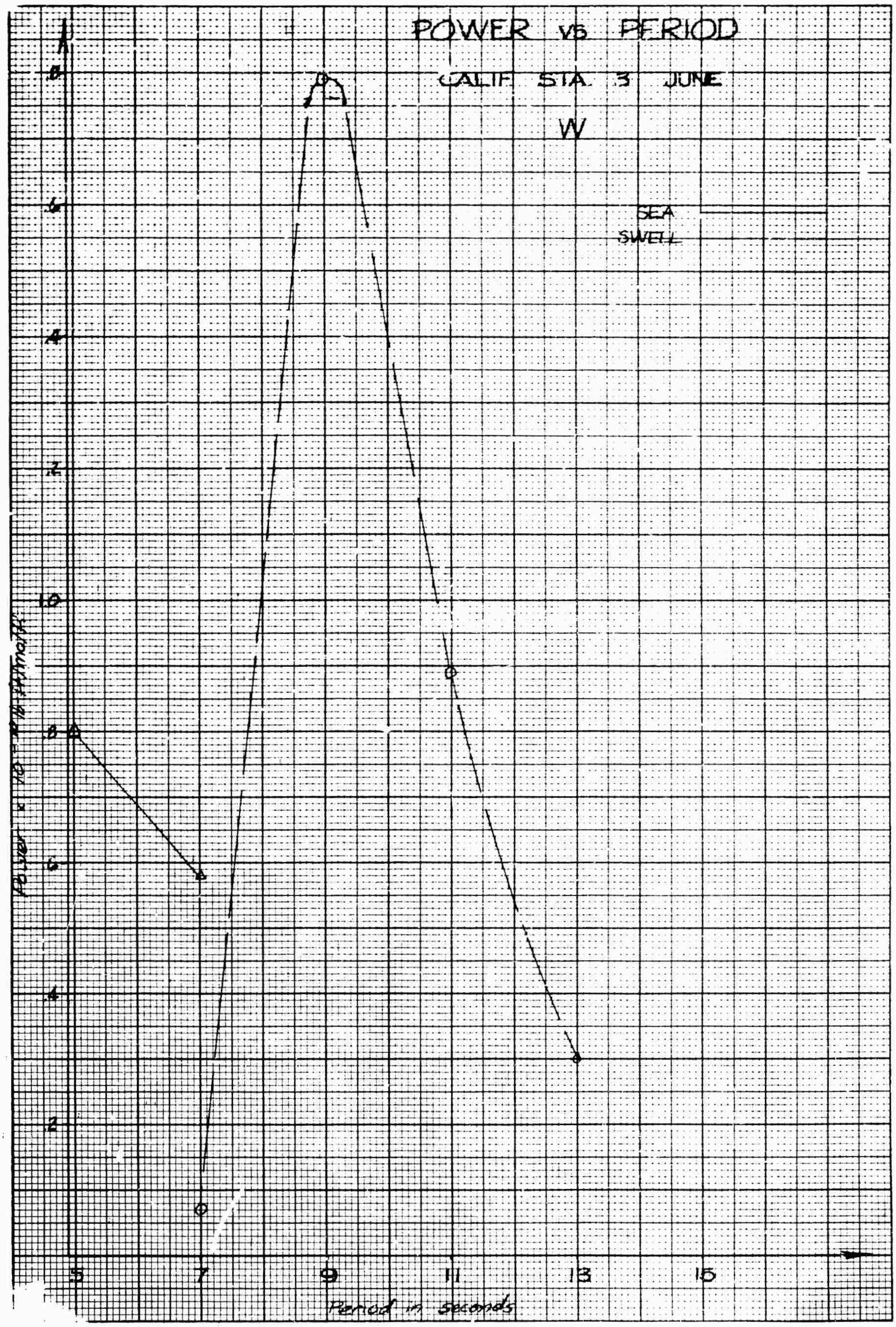
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
CALIF. STA. 3 JUNE
NNW
SEA
SWELL
Wave Power × 10
18
16
14
12
10
8
6
4
2
5
7
9
11
13
15
Period in seconds

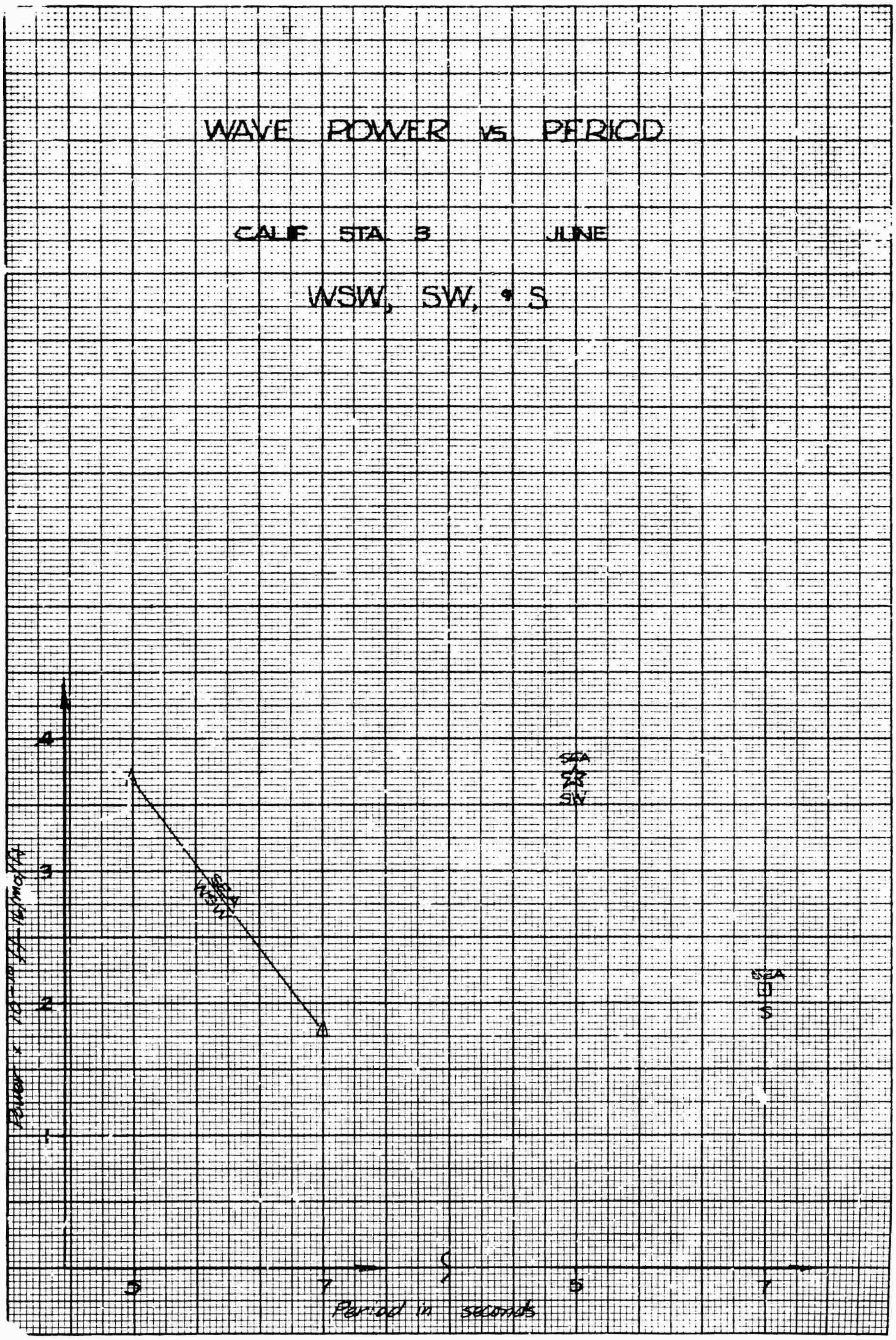

WAVE POWER vs PERIOD
CALIF STA 3 JUNE
NW
SEA
SWELL
70
60
50
40
30
20
10
7
9
11
13
15
Period in seconds



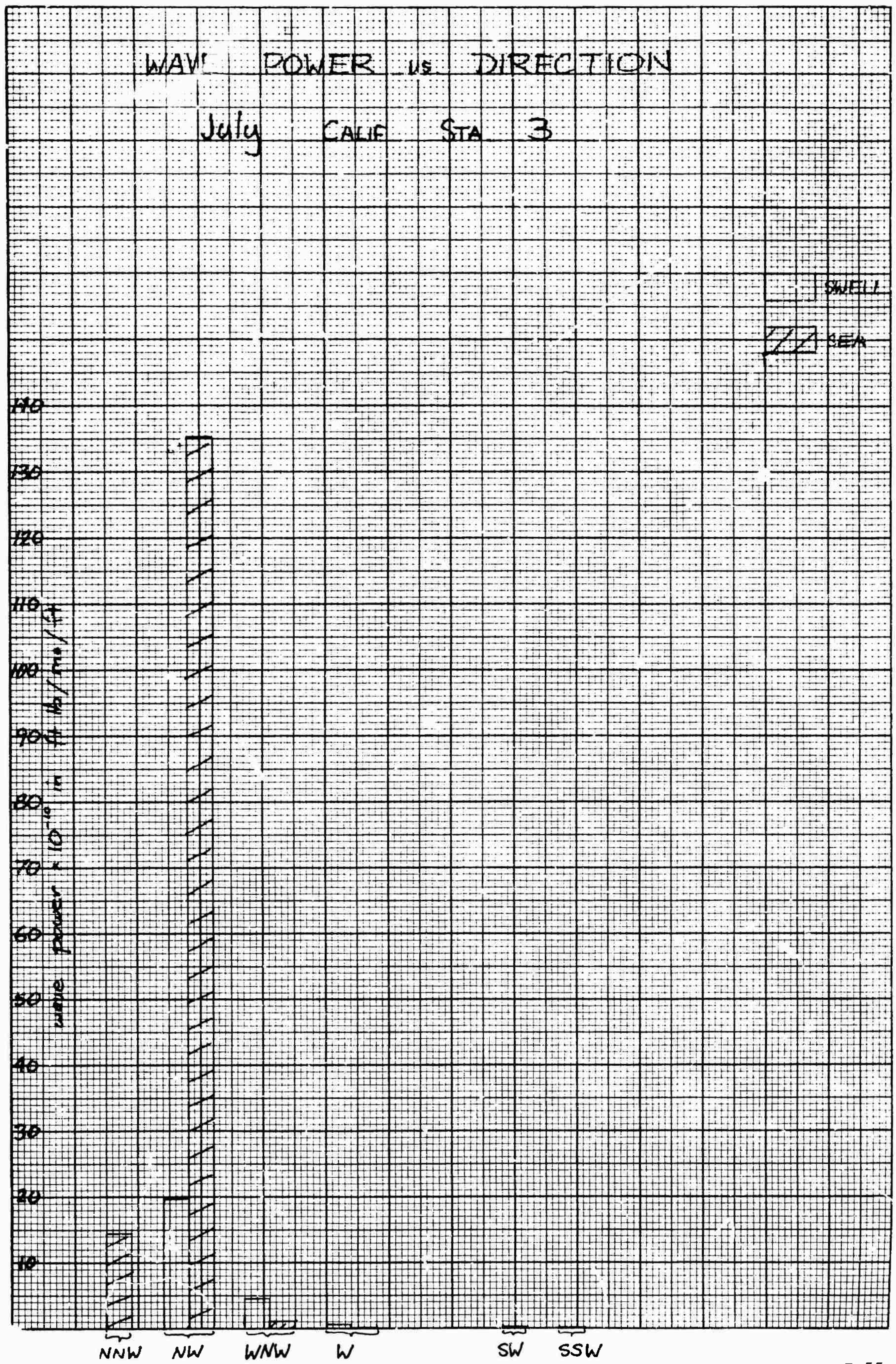
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



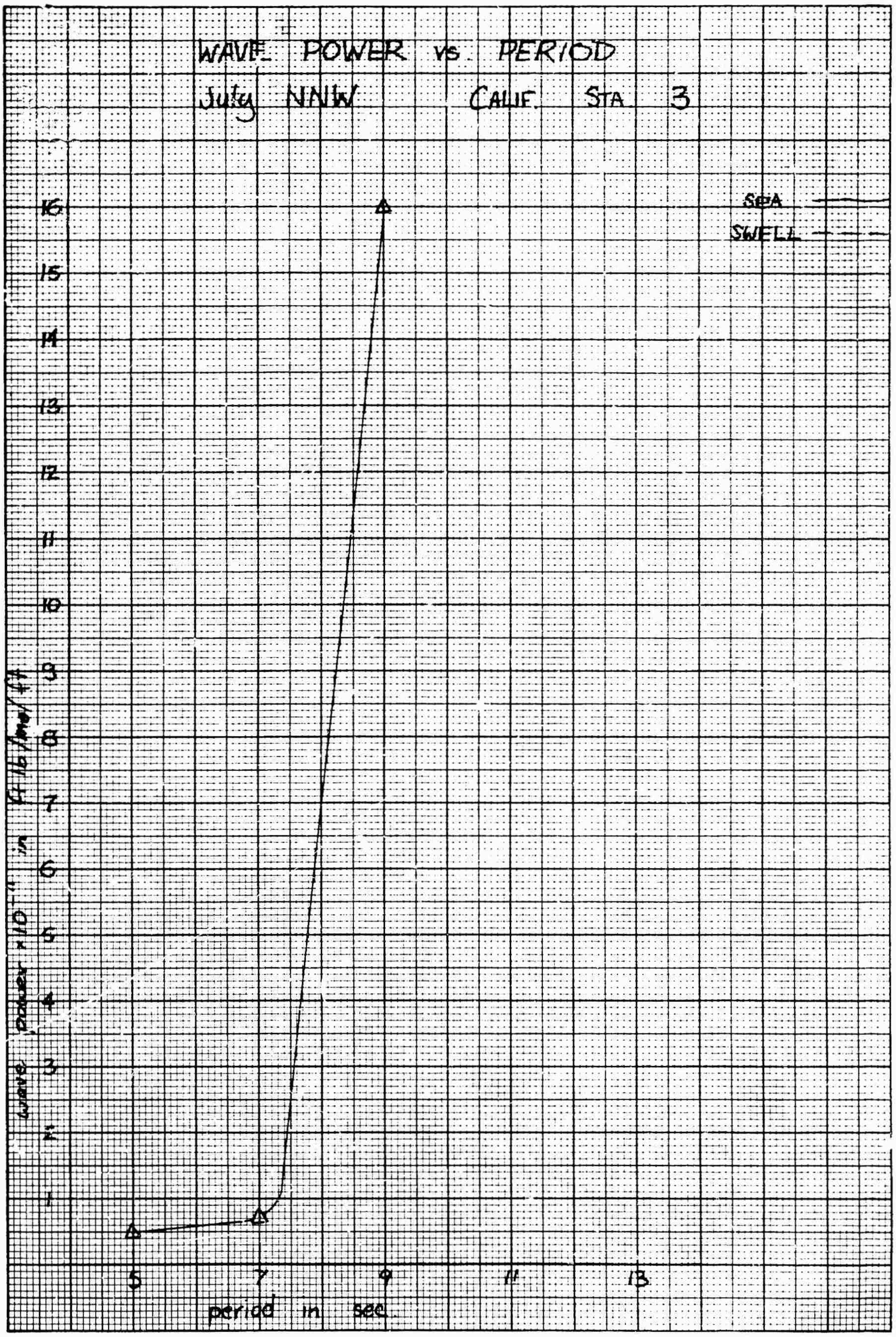
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
CALIF STA 3 JUNE
WSW, SW, & S
SEA
SW
SEA
WSW
SEA
S
4
3
2
1
5
7
5
7
Period in seconds

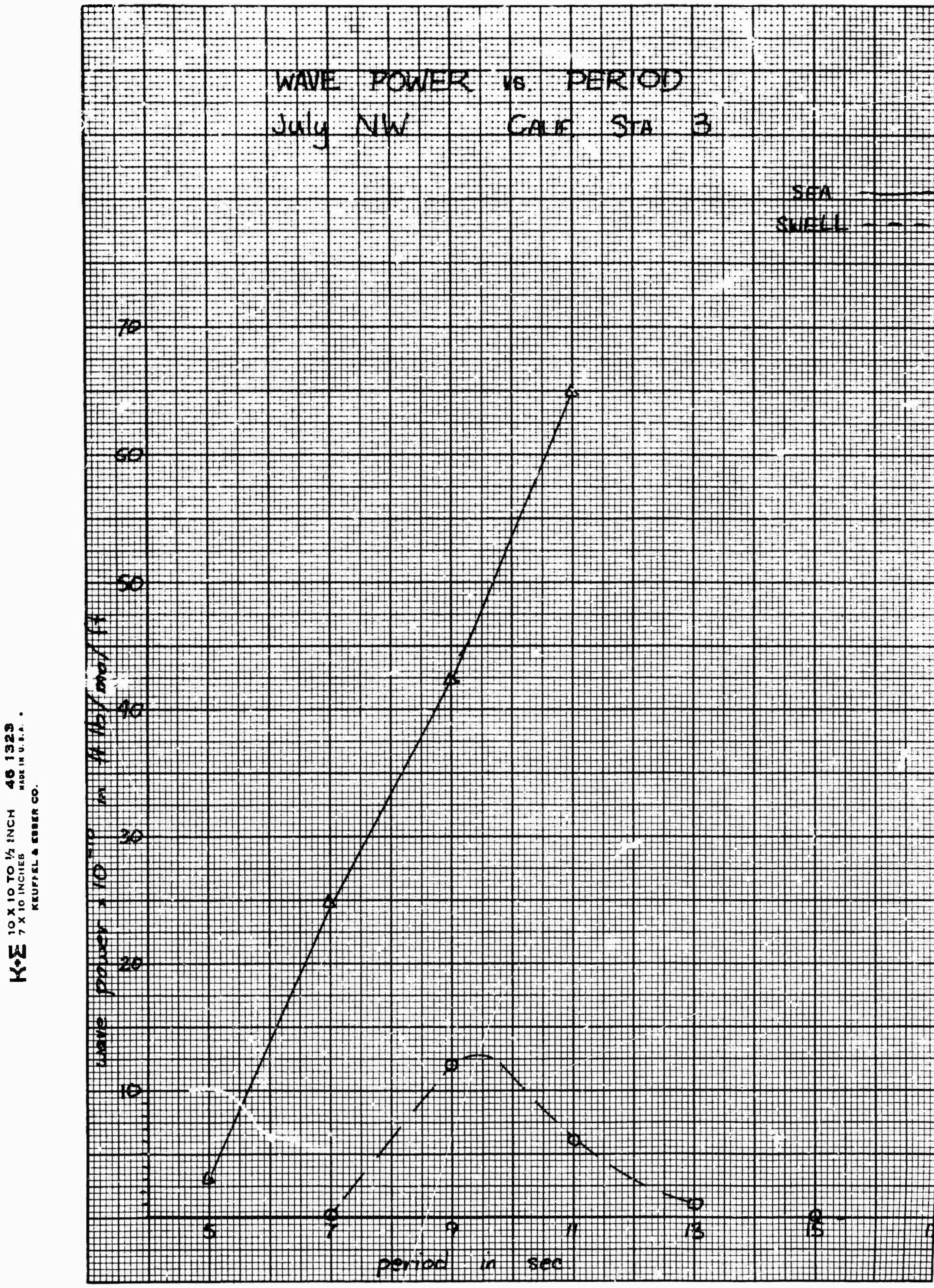
STATION 3 - JULY

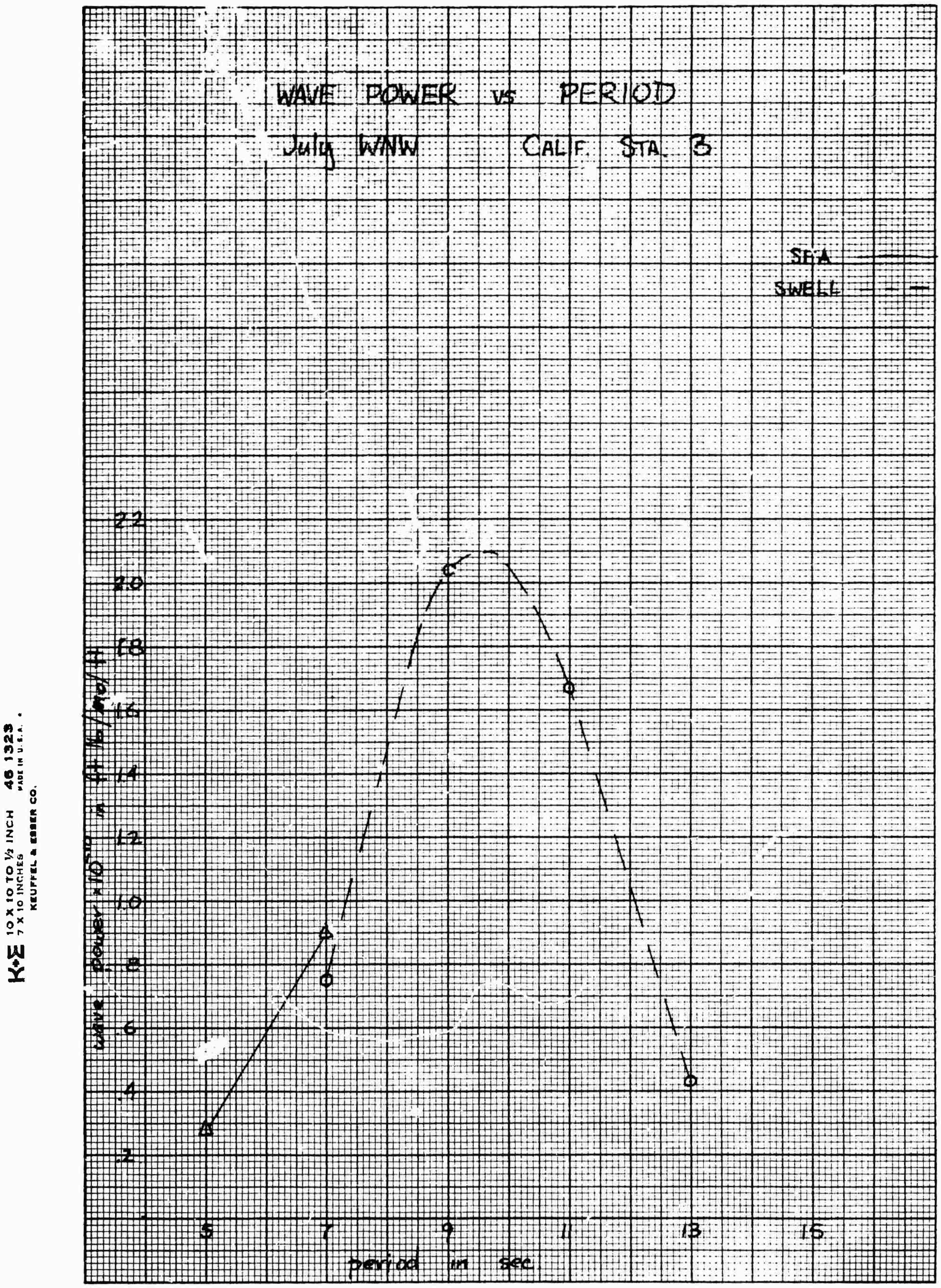


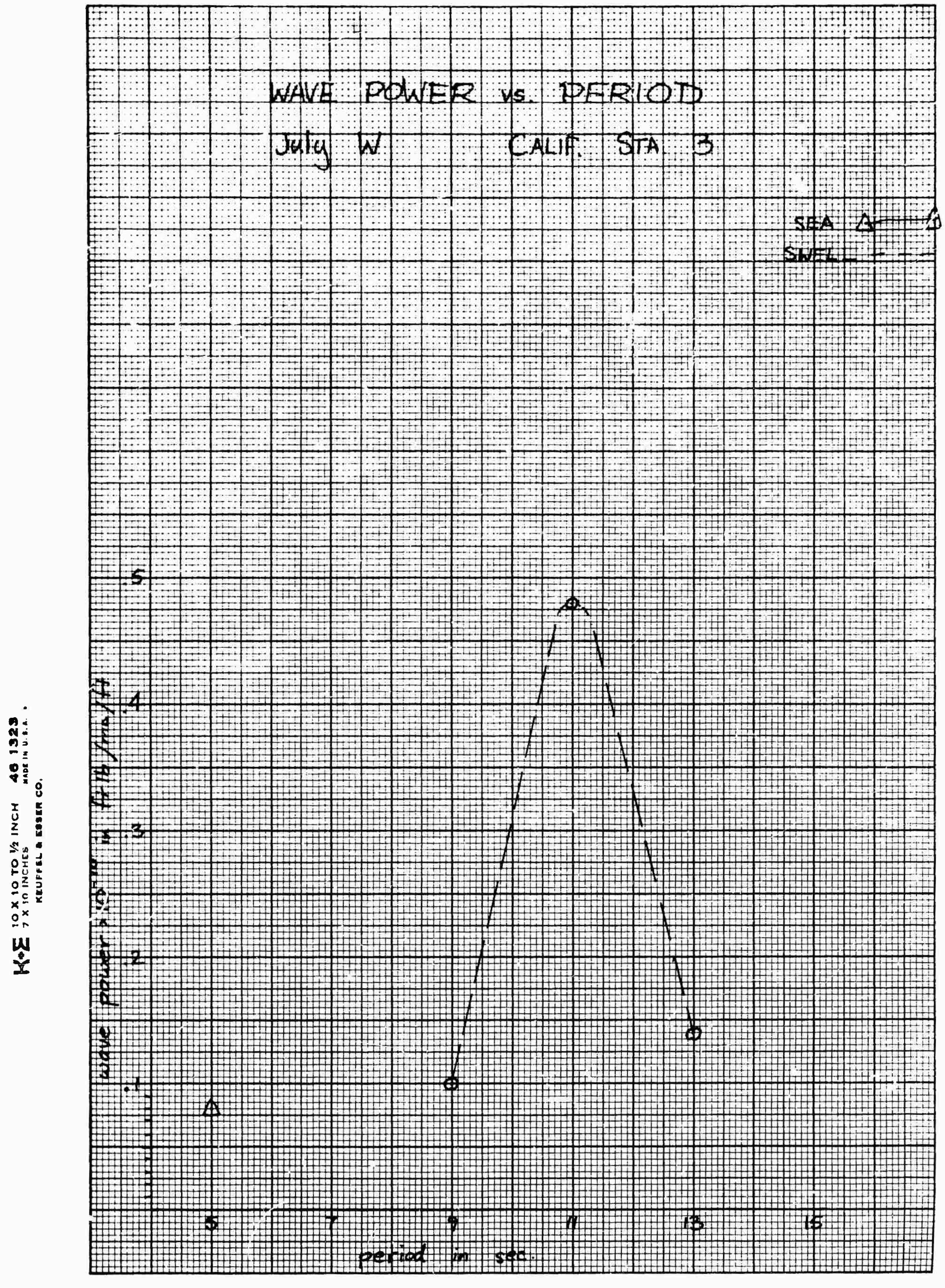
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

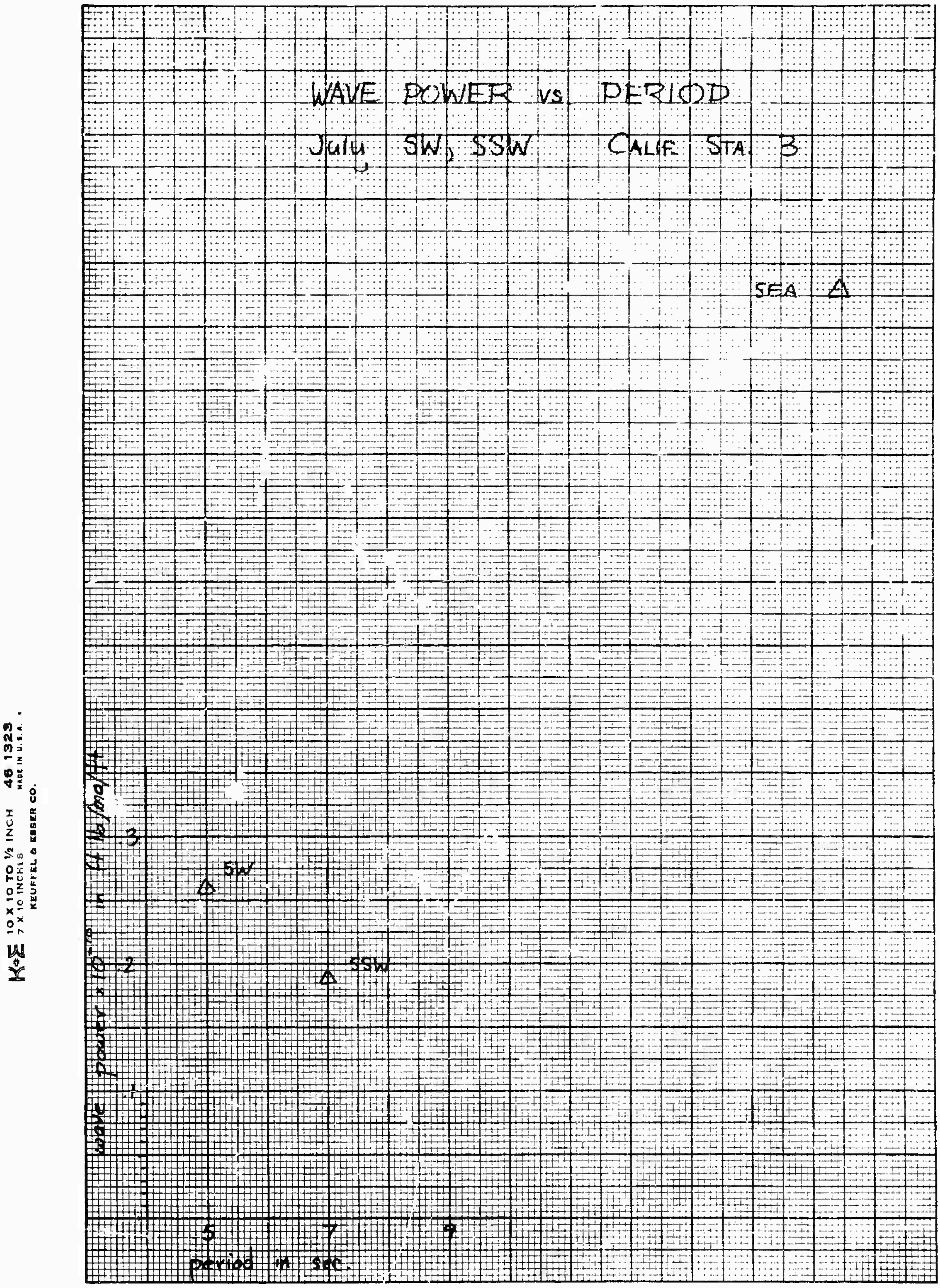


K+E 10 X 10 TO ½ INCH 7 X 10 INCHES KEUFFEL & ESSER CO. 46 1323 MADE IN U.S.A.

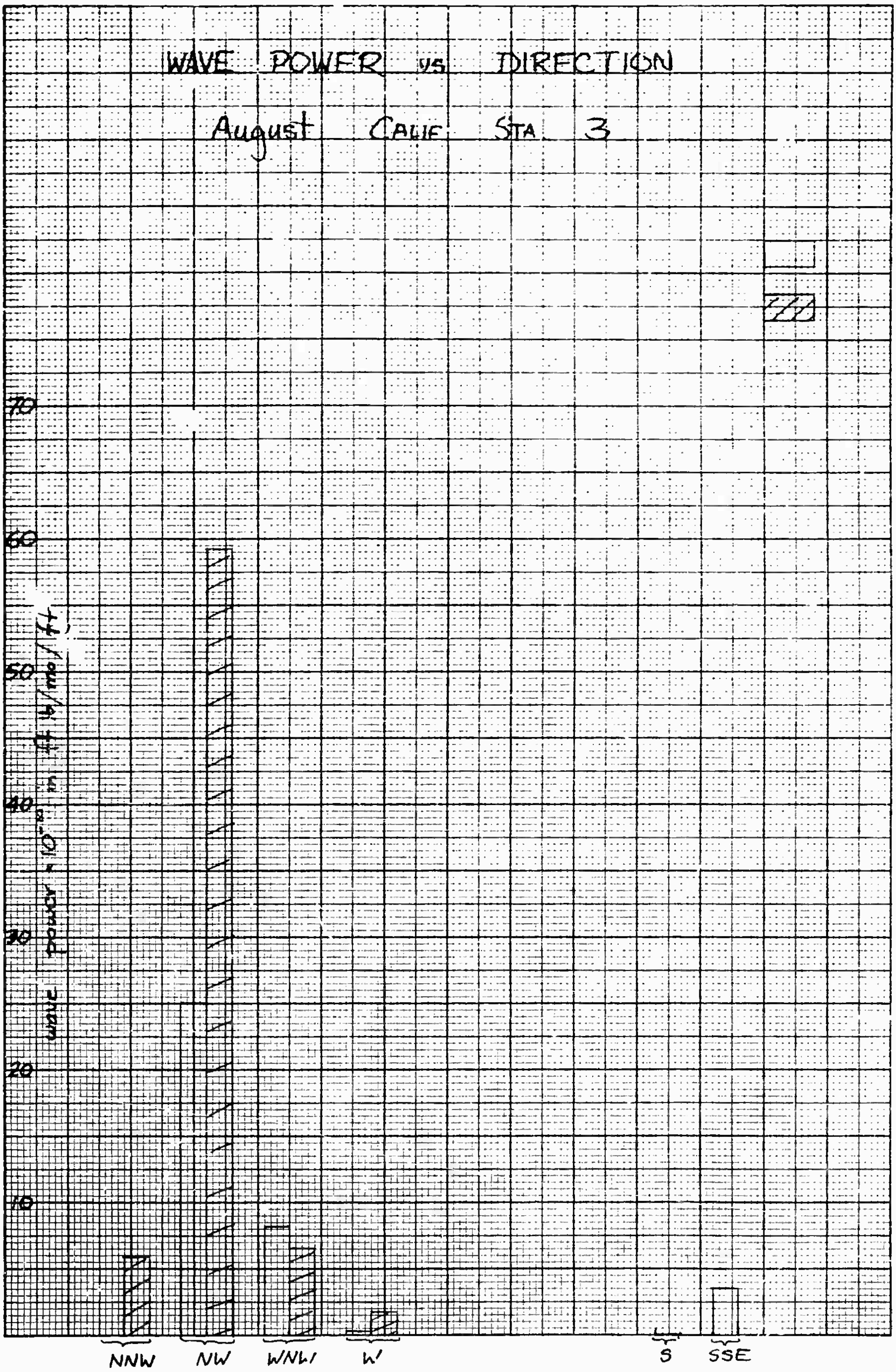

WAVE POWER vs. PERIOD
July NW
CALIF. STA 3
SEA
SWELL
wave power x 10^-10 in ft lb/mo/ft
10
20
30
40
50
60
70
5
7
9
11
13
15
17
period in sec
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

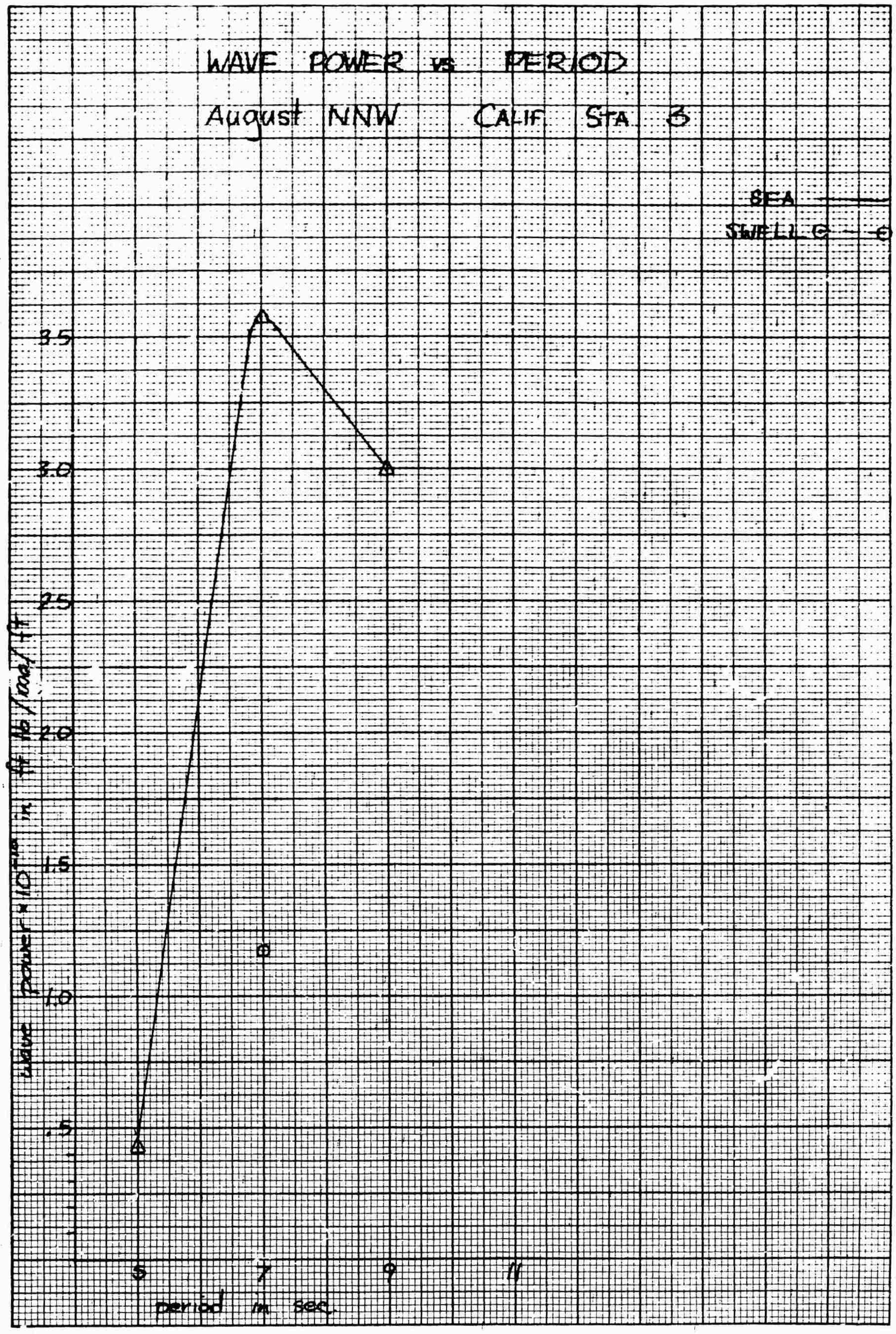

WAVE POWER vs PERIOD
July WNW CALIF STA 3
SEA
SWELL
wave power x10 in ft lb/sec/ft
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
5
7
9
11
13
15
period in sec
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
July W CALIF. STA. 3
SEA
SWELL
.5
.4
.3
.2
.1
wave power x 10^-10 in ft lb/sec/ft
5
7
9
11
13
15
period in sec.
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

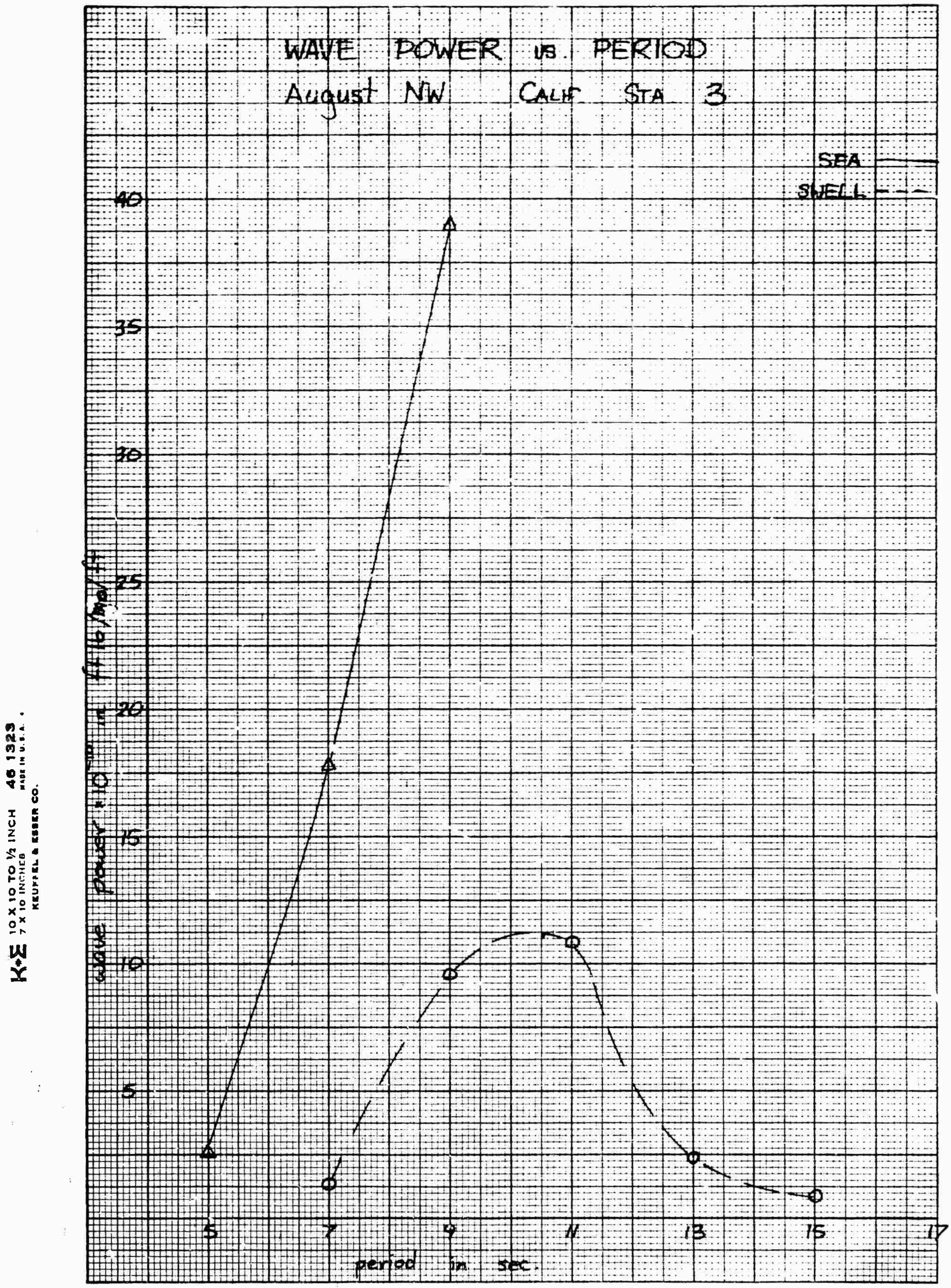

WAVE POWER vs. PERIOD
July SW, SSW CALIF. STA. 3
SEA
SW
SSW
wave power x 10^-10 in ft lbs/mo/ft
3
2
1
5
7
9
period in sec.
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

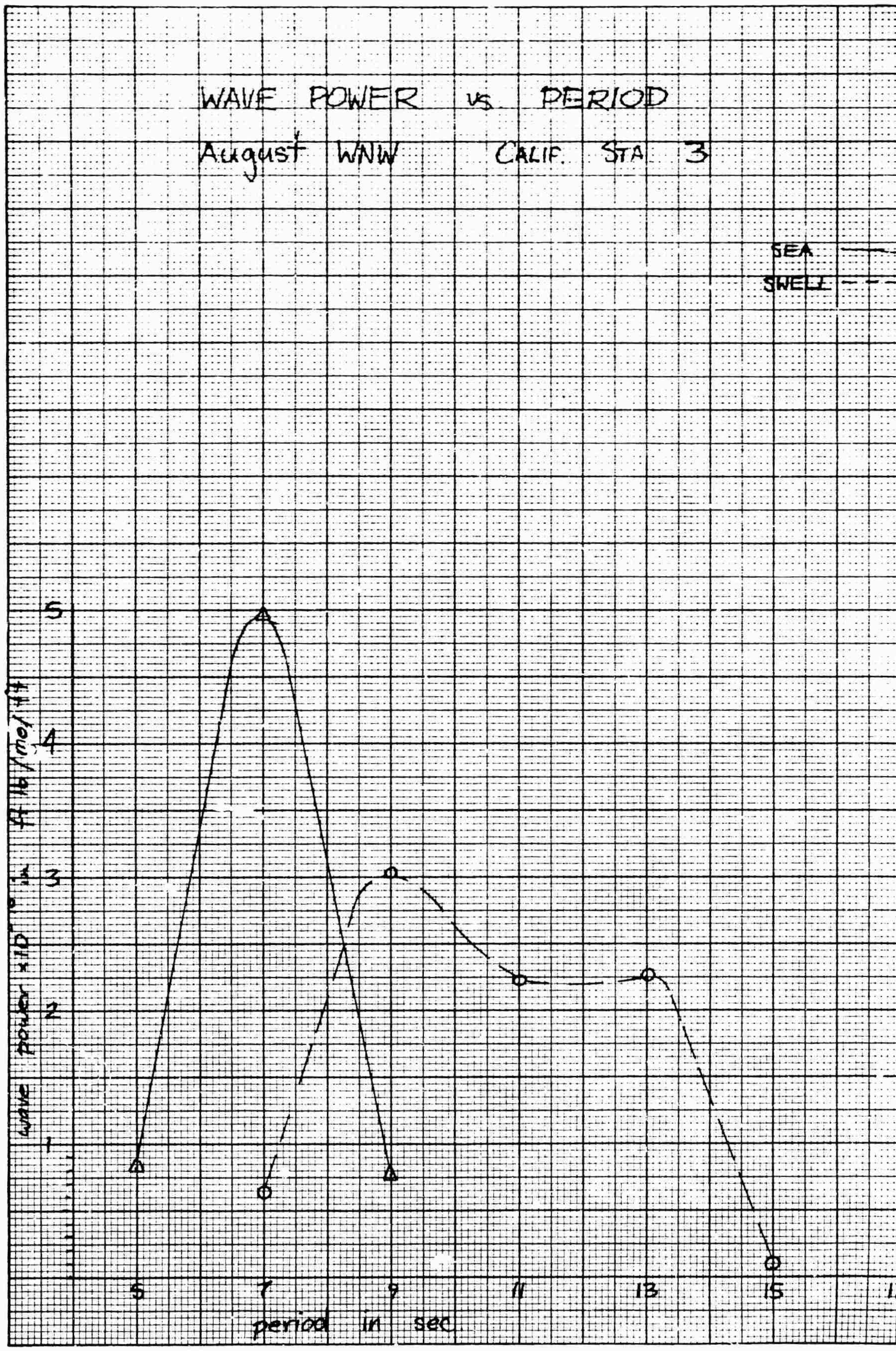
STATION 3 - AUGUST


WAVE POWER vs DIRECTION
August CALIF STA 3
70
60
50
40
30
20
10
NNW
NW
WNW
W
S
SSE

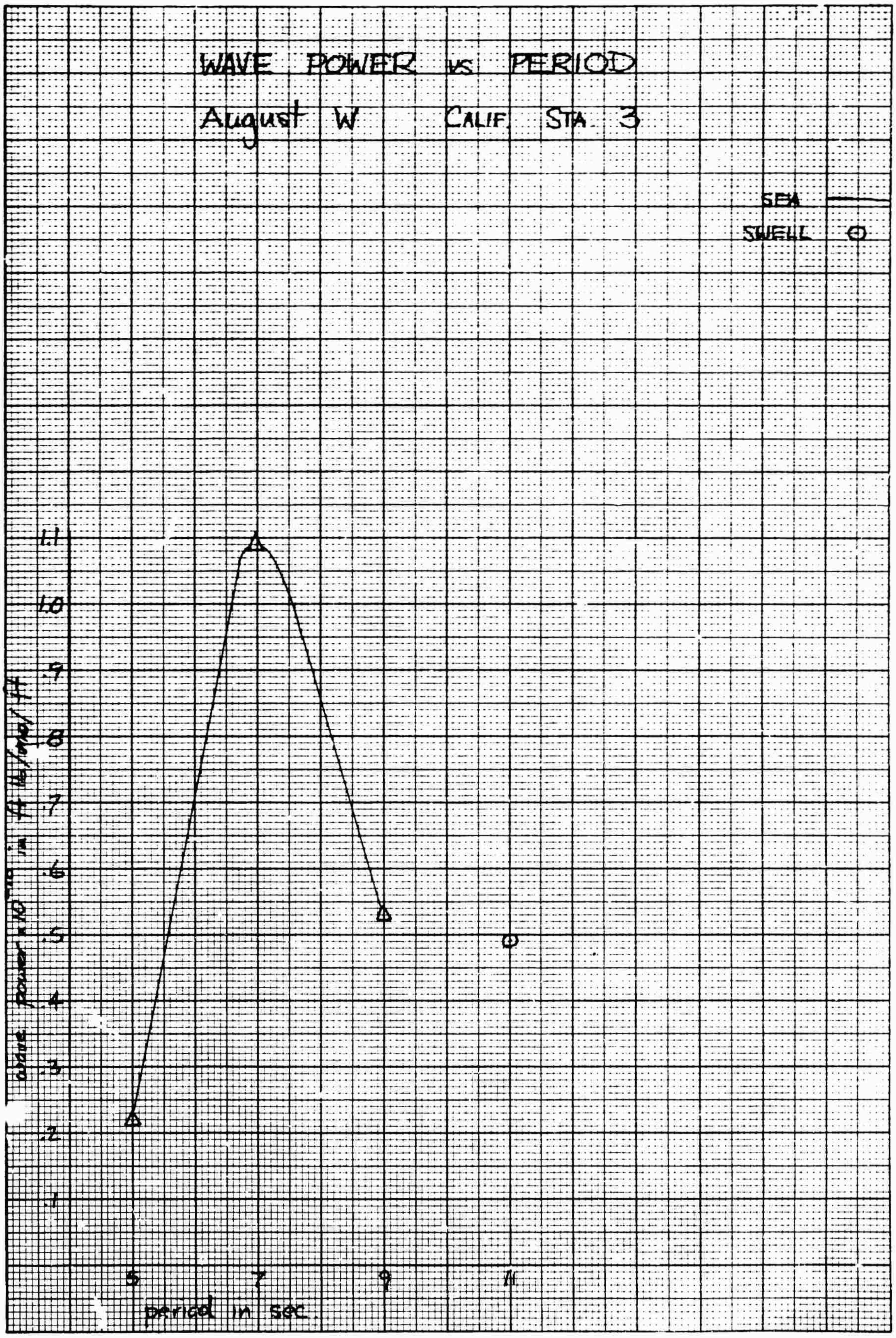


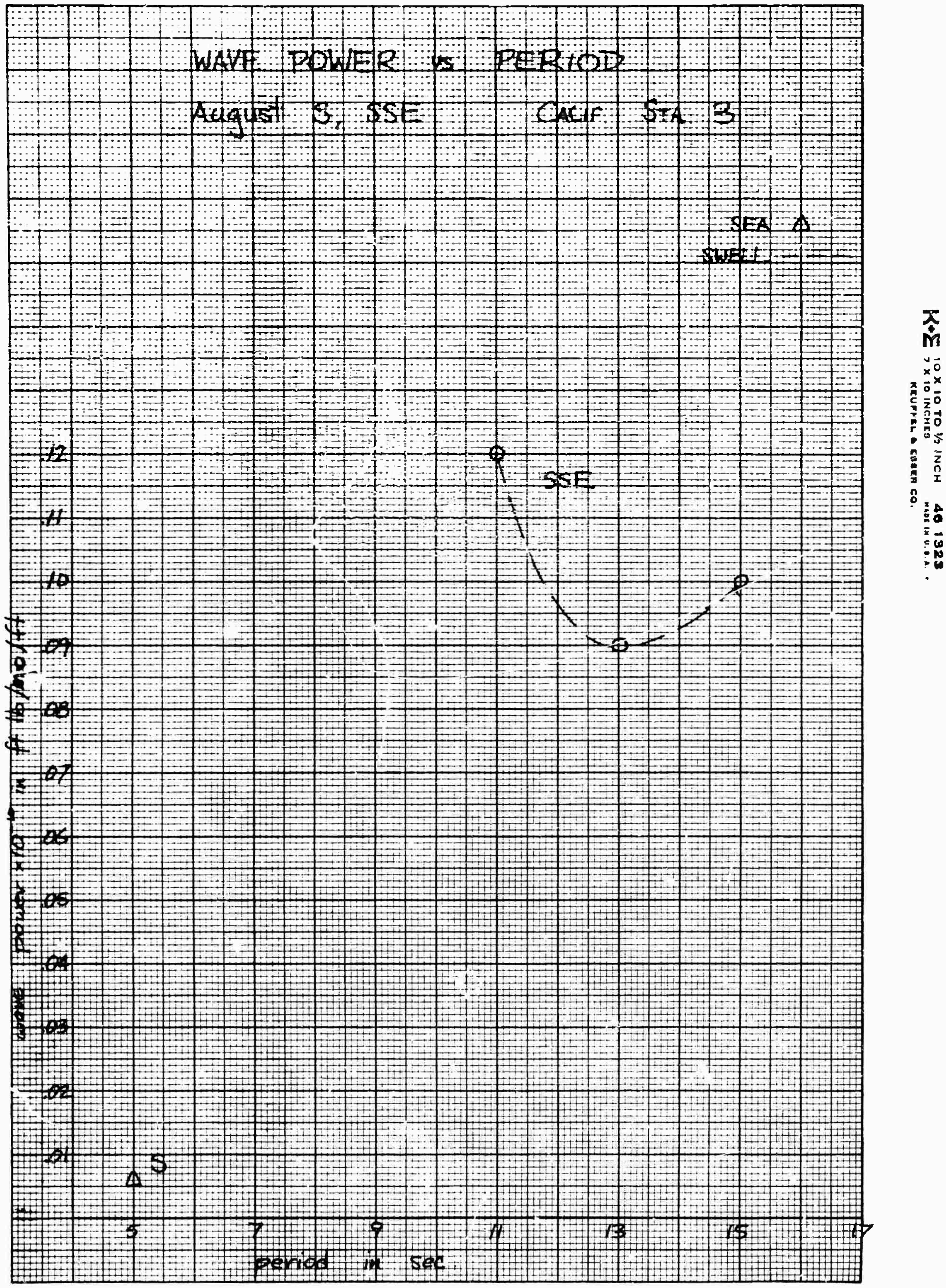
WAVE POWER vs PERIOD
August NNW CALIF STA 3
SEA
SWELL
3.5
3.0
2.5
2.0
1.5
1.0
.5
5
7
9
11
period in sec


WAVE POWER vs. PERIOD
August NW CALIF STA 3
SEA
SWELL
wave power ×10 in ft lb/mol/ft
40
35
30
25
20
15
10
5
5
7
9
11
13
15
17
period in sec.
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

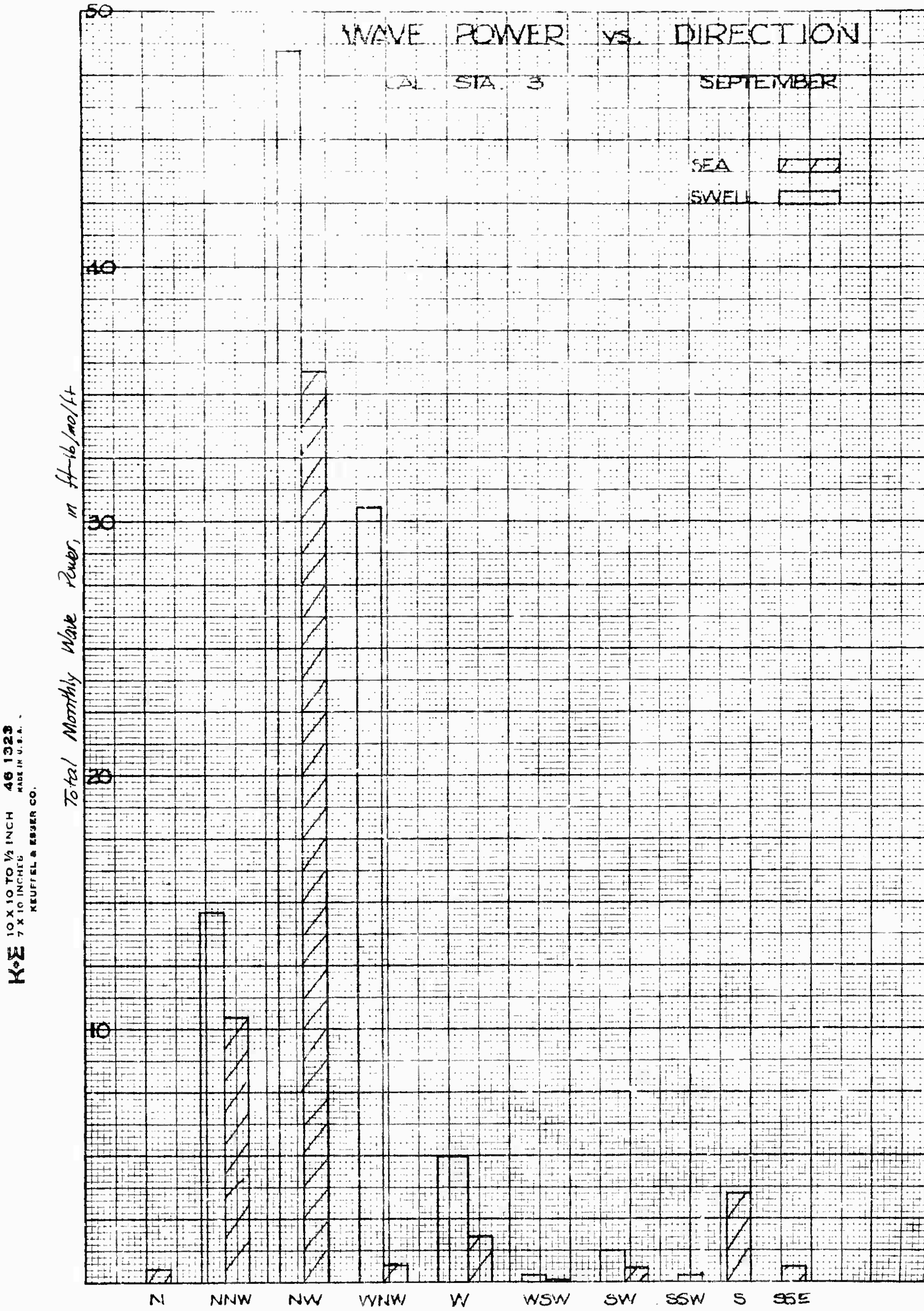


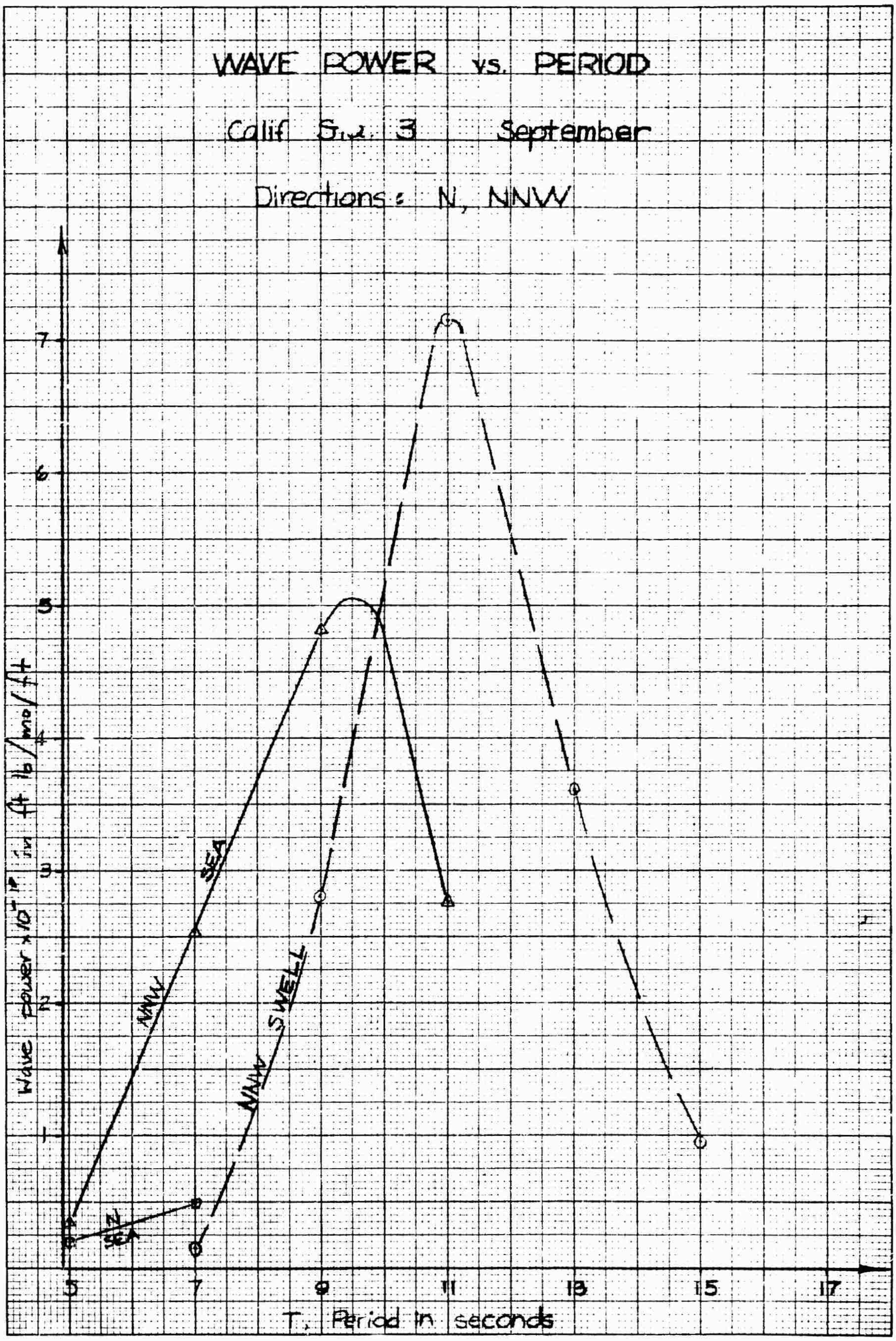
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

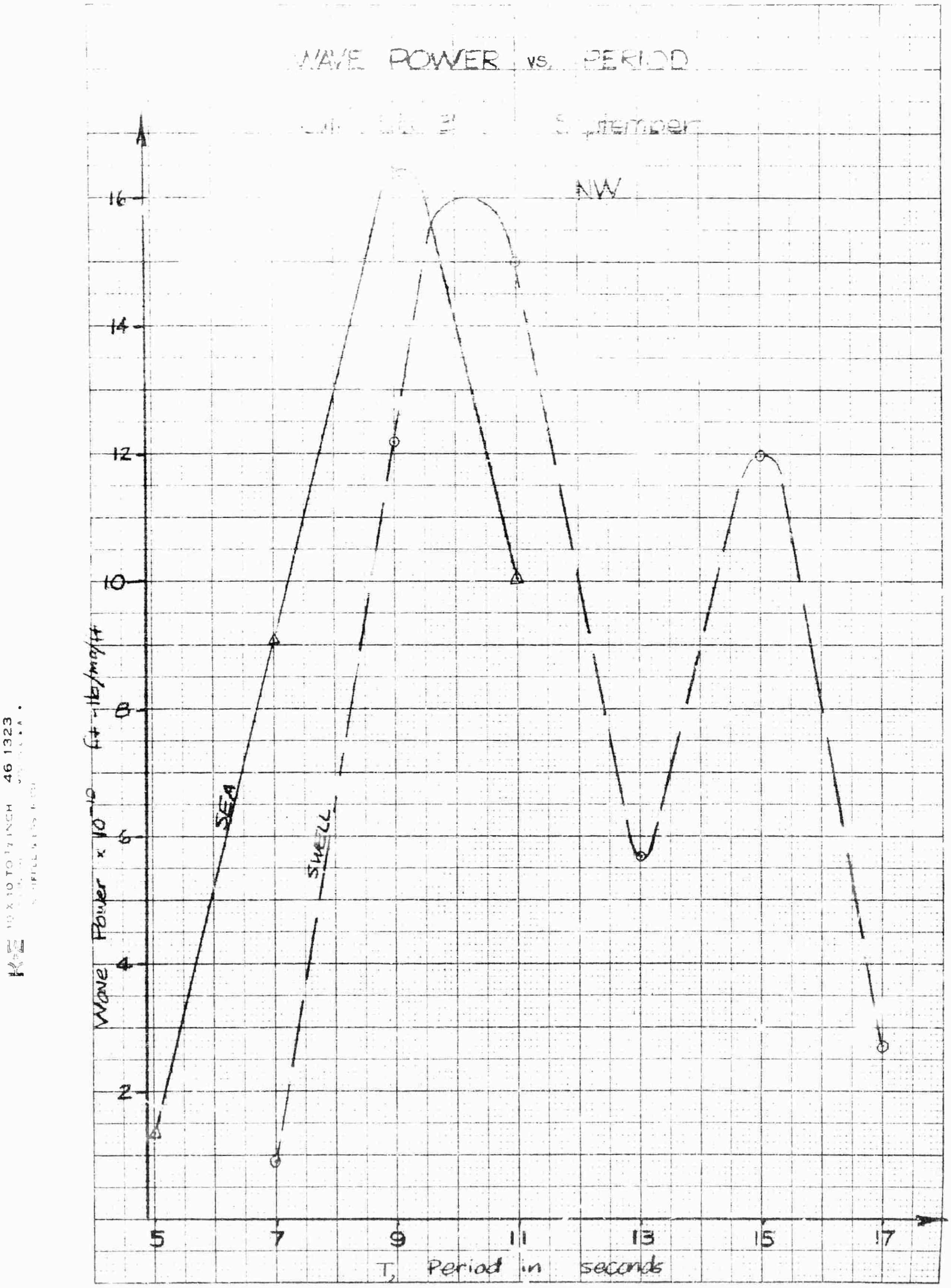

WAVE POWER vs PERIOD
August W CALIF. STA. 3
SEA
SWELL
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
period in sec.

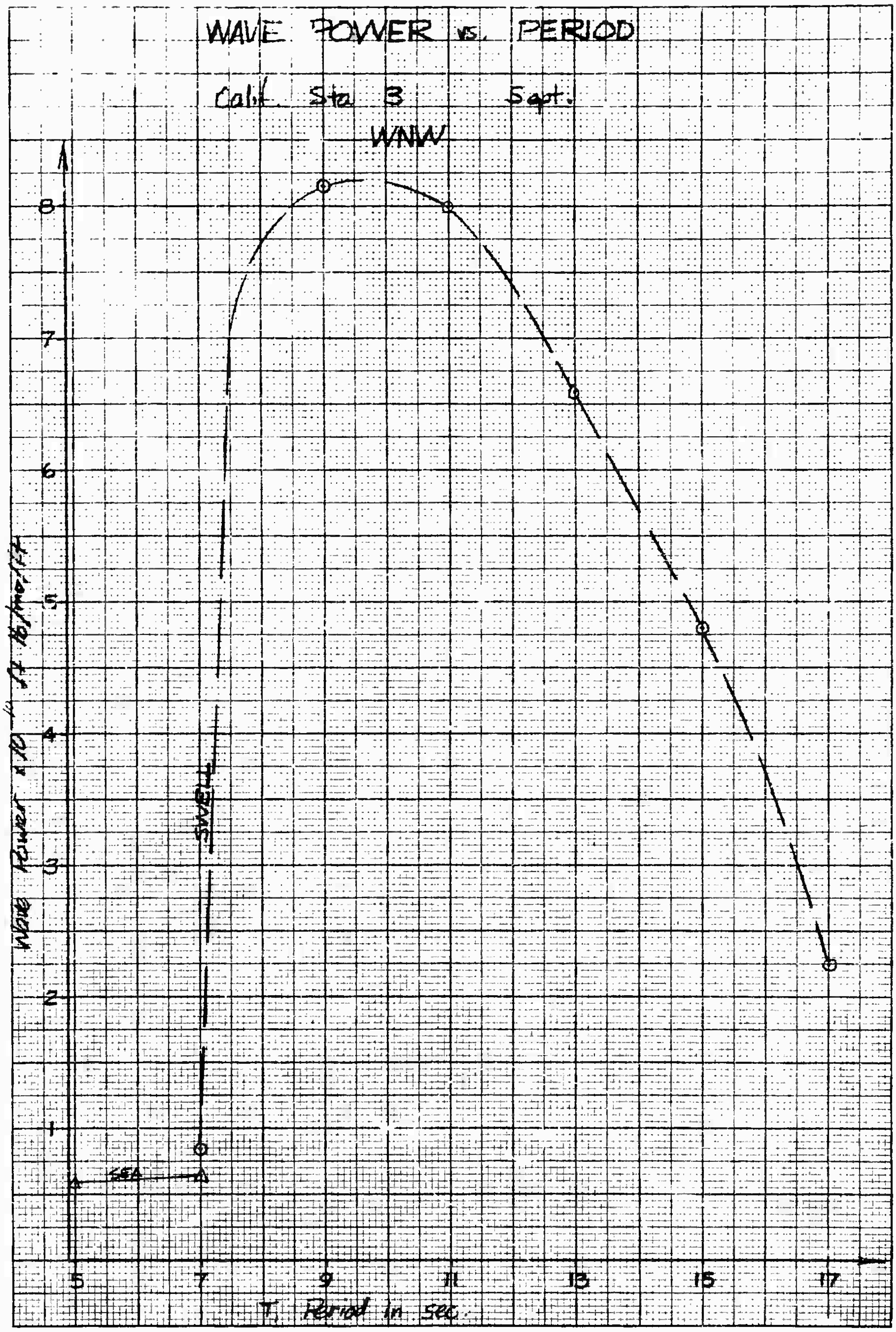

WAVE POWER vs PERIOD
August 3, SSE CALIF STA 3
SEA
SWELL
SSE
S
.12
.11
.10
.09
.08
.07
.06
.05
.04
.03
.02
.01
5
7
9
11
13
15
17
period in sec
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES
KEUFFEL & ESSER CO.
MADE IN U.S.A.

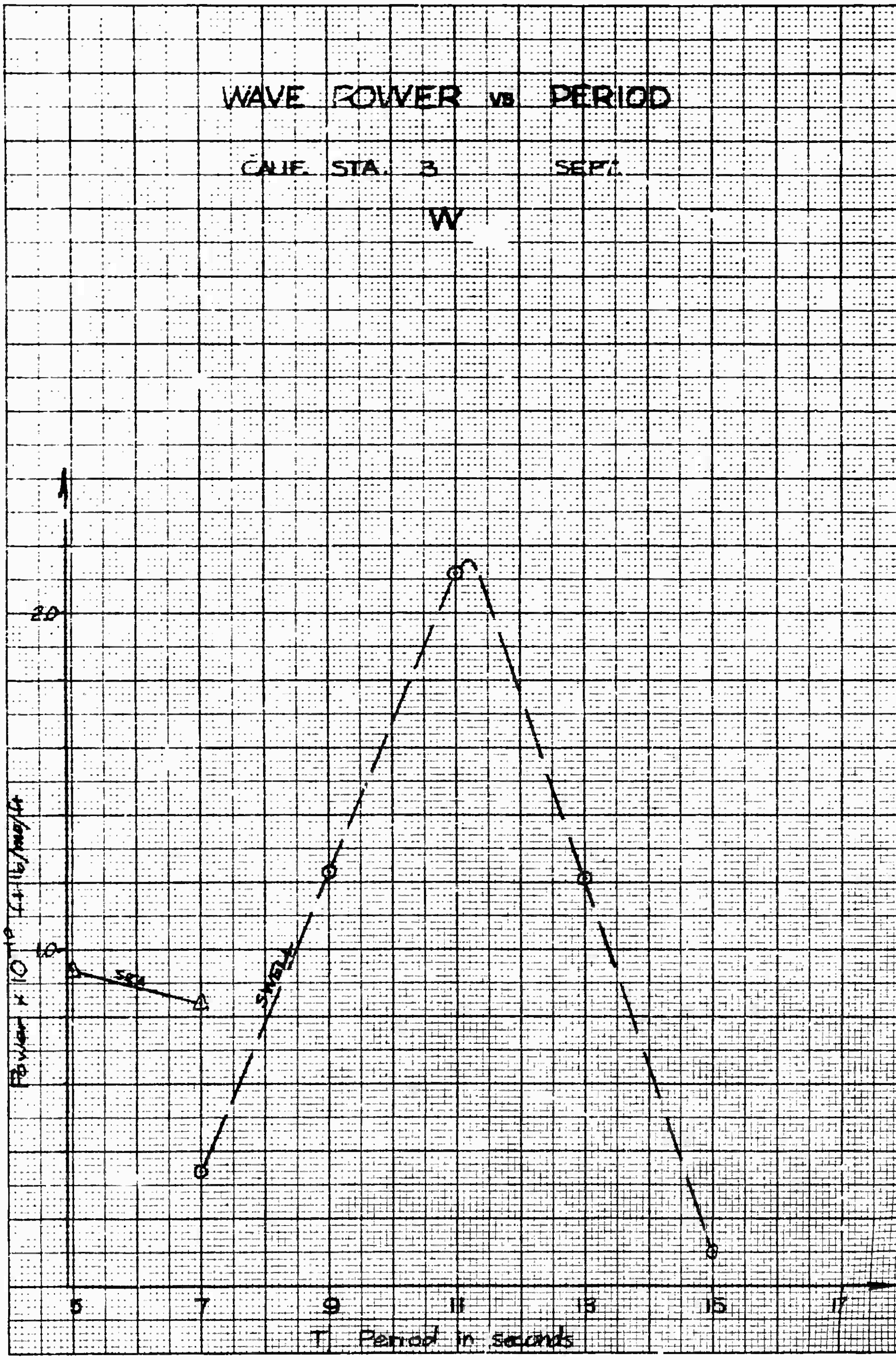
STATION 3 - SEPTEMBER

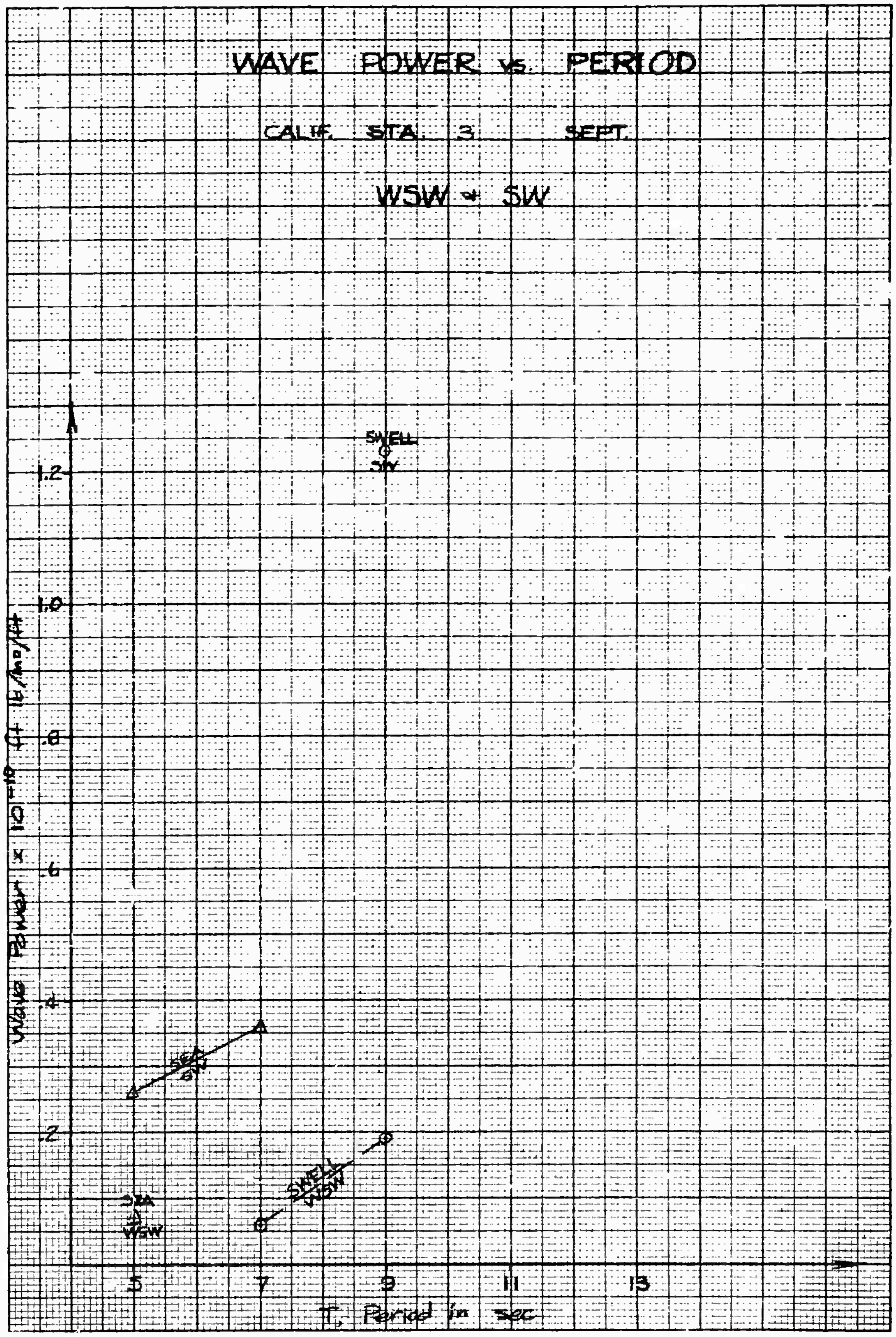

WAVE POWER vs. DIRECTION
CAL. STA. 3
SEPTEMBER
SEA
SWELL
50
40
30
20
10
Total Monthly Wave Power, in ft-lb/mo/ft
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
Calif S. 3 September
Directions: N, NNW
Wave power x 10^-14 in ft lb/mo/ft
T, Period in seconds
NNW SEA
NNW SWELL
N SEA
1
2
3
4
5
6
7
5
7
9
11
13
15
17

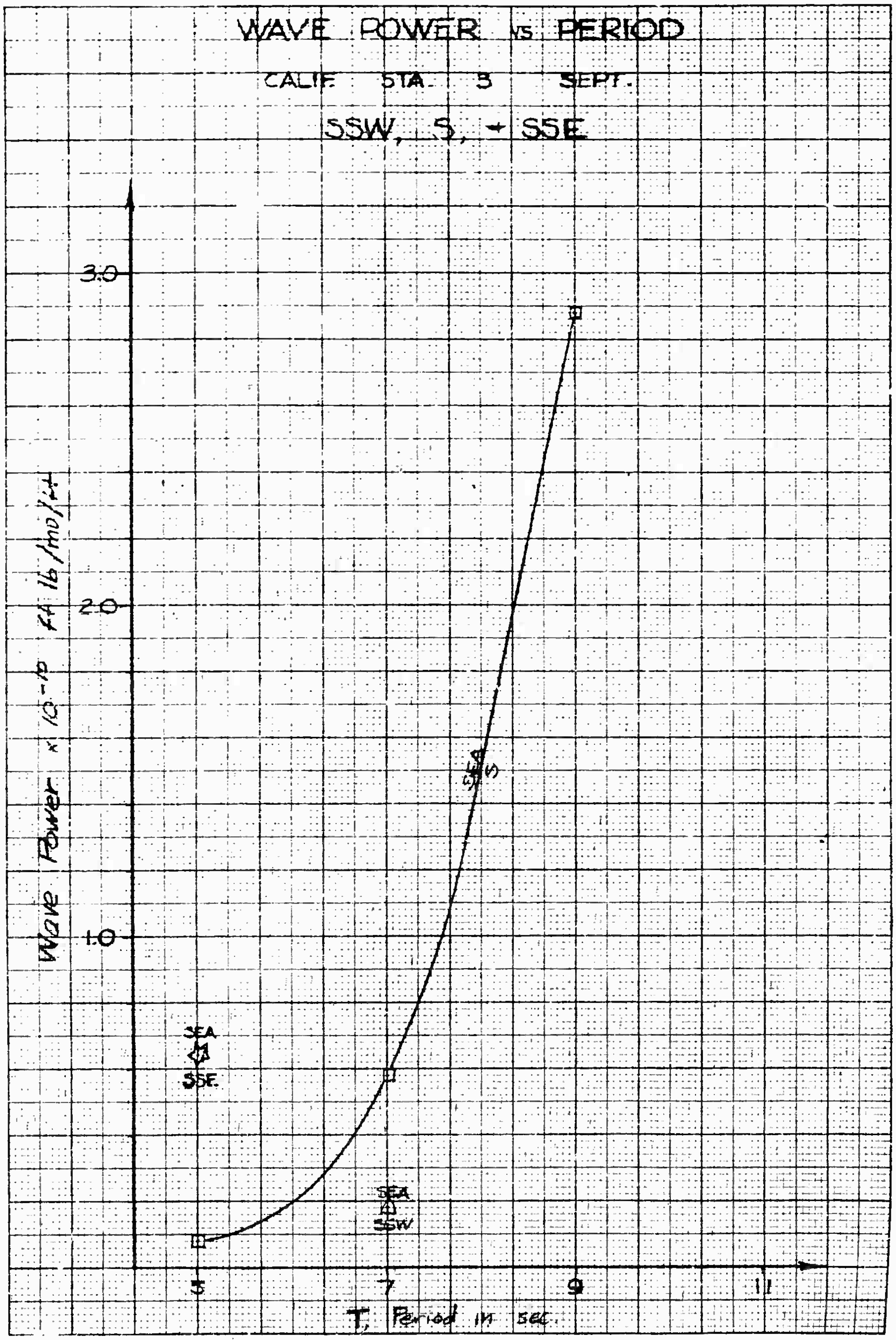

WAVE POWER vs. PERIOD
NW
16
14
12
10
8
6
4
2
Wave Power × 10⁻¹⁰ ft-lb/mo/ft
SEA
SWELL
5
7
9
11
13
15
17
T, Period in seconds


WAVE POWER vs. PERIOD
Calif. Sta 3 Sept.
WNW
SWELL
SEA
5
7
9
11
13
15
17
1
2
3
4
5
6
7
8
T, Period in sec.

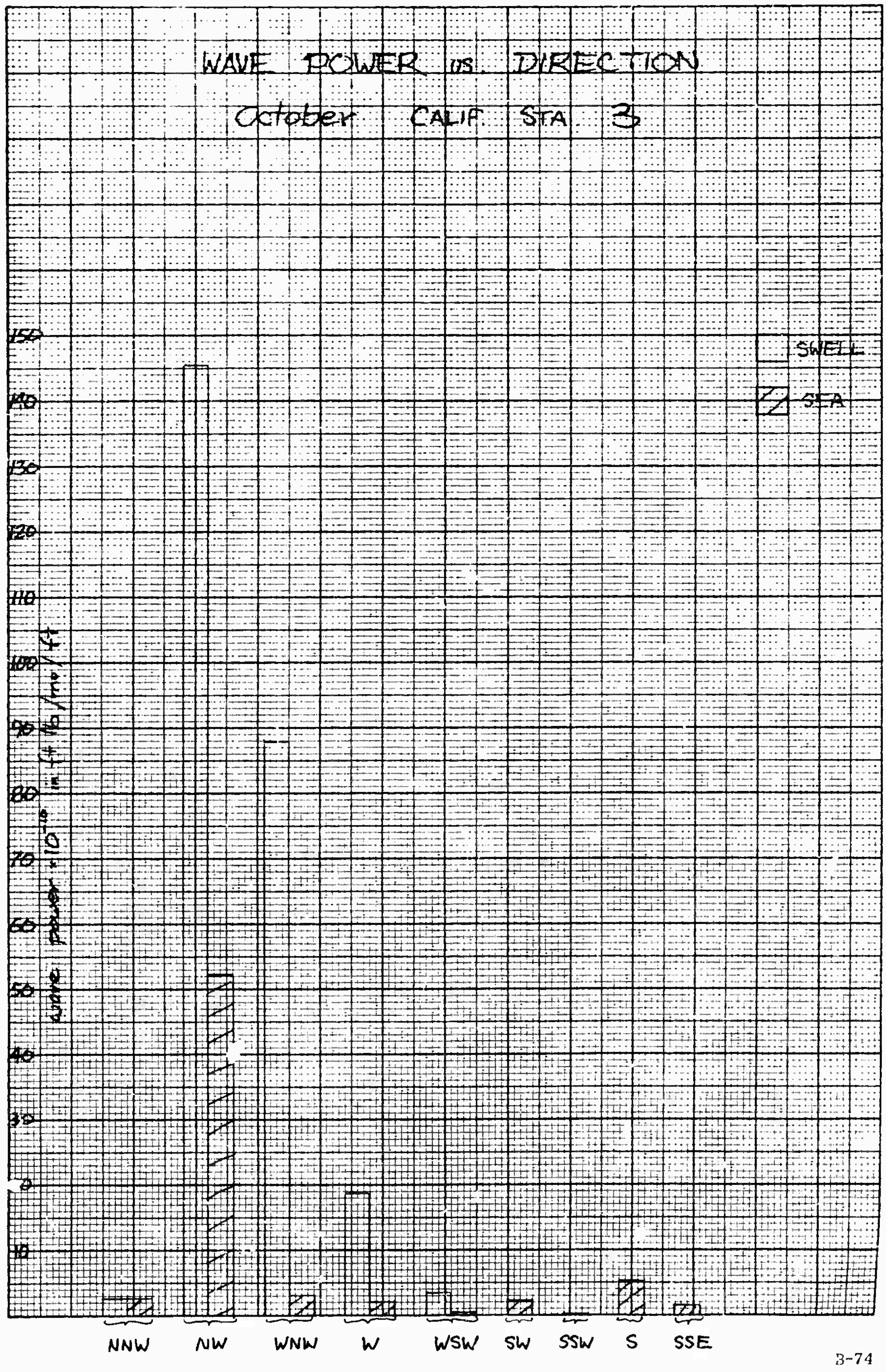

WAVE POWER vs PERIOD
CALIF. STA. 3 SEPT.
W
Power × 10
1.0
2.0
SEA
SWELL
5
7
9
11
13
15
17
T Period in seconds



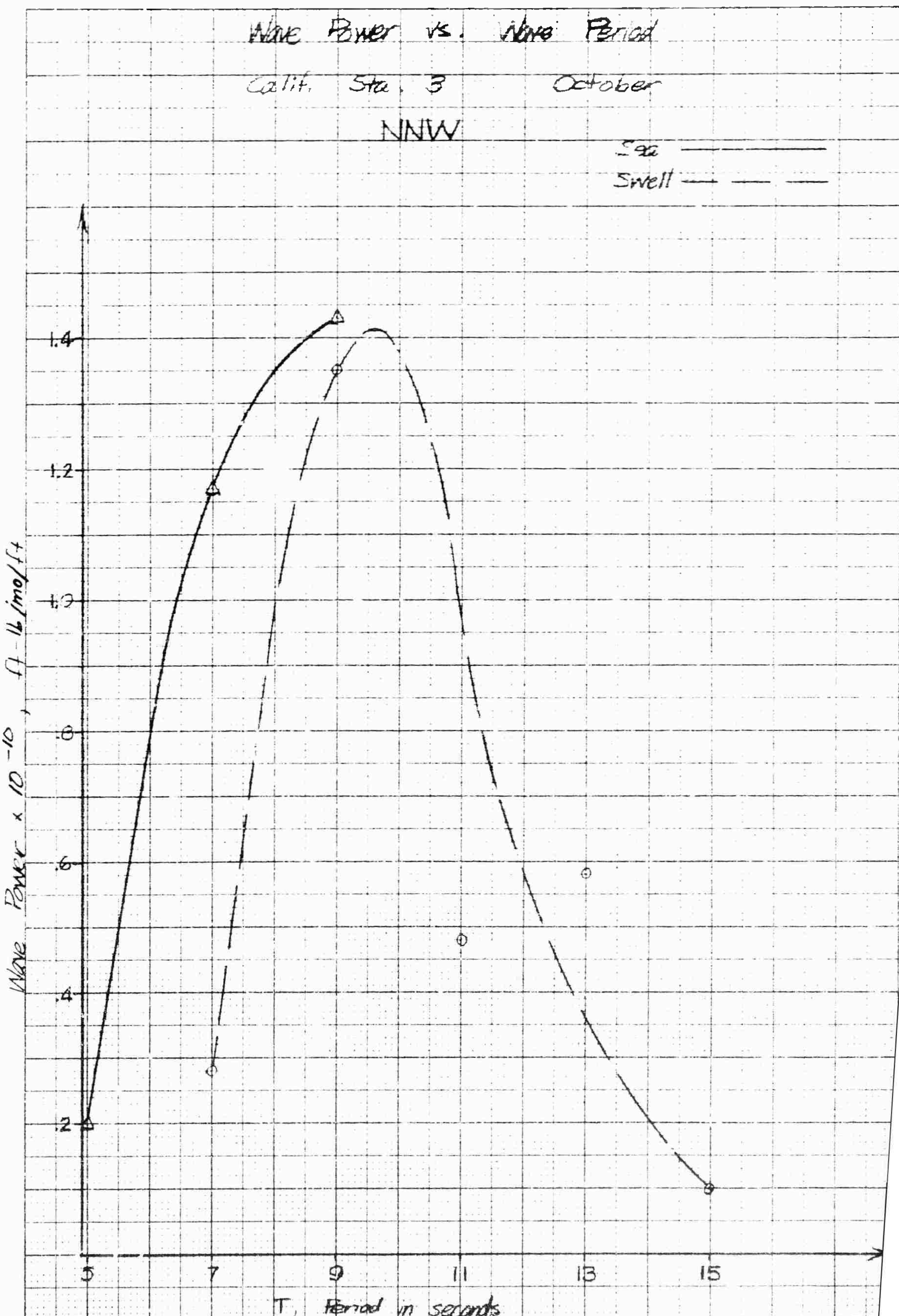
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

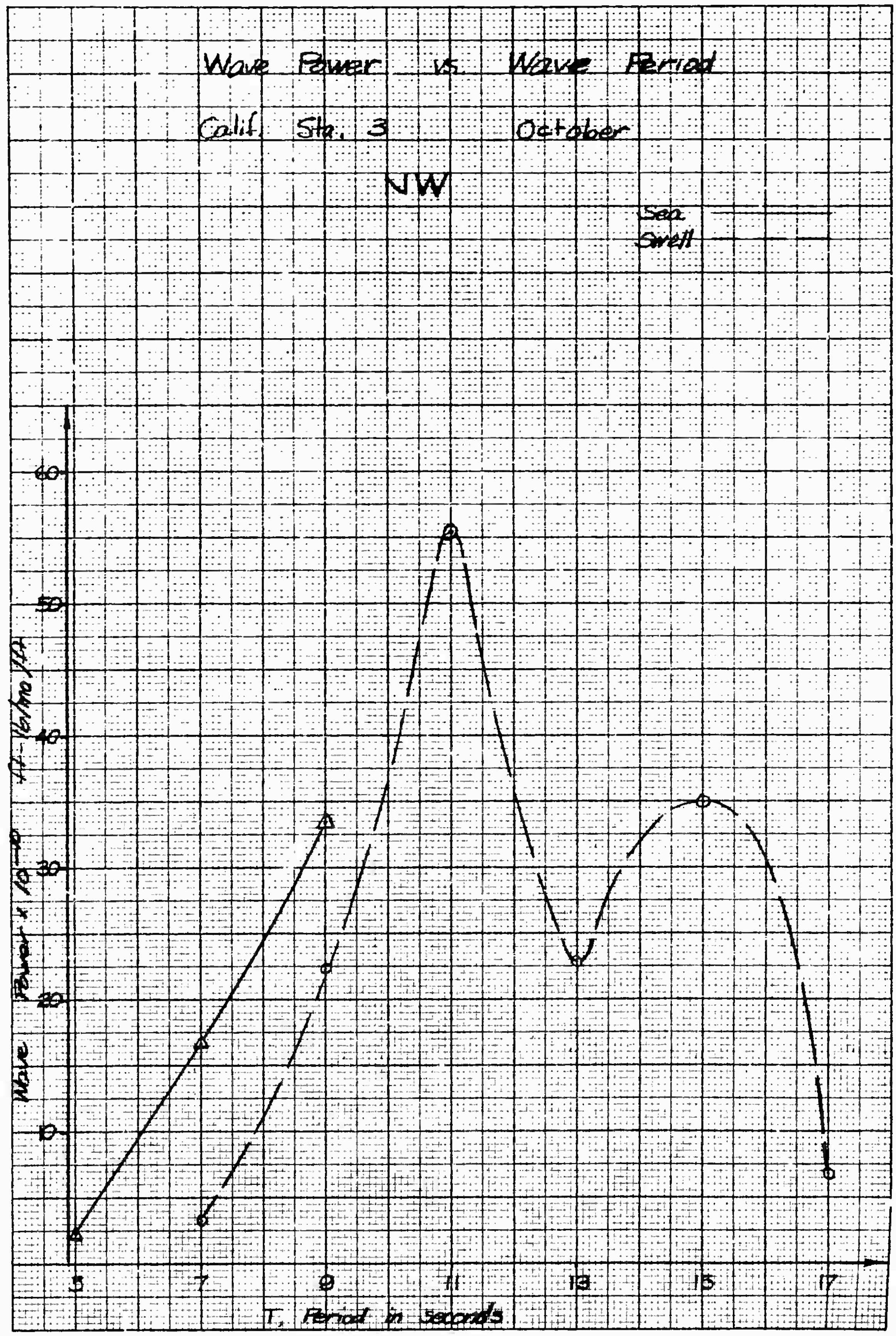

WAVE POWER vs PERIOD
CALIF. STA. 3 SEPT.
SSW, S, + SSE
Wave Power x 10^-10 ft lb/mo/ft
3.0
2.0
1.0
SEA
SSE
SEA
SSW
SEA (S)
5
7
9
11
T, Period in sec.

STATION 3 - OCTOBER

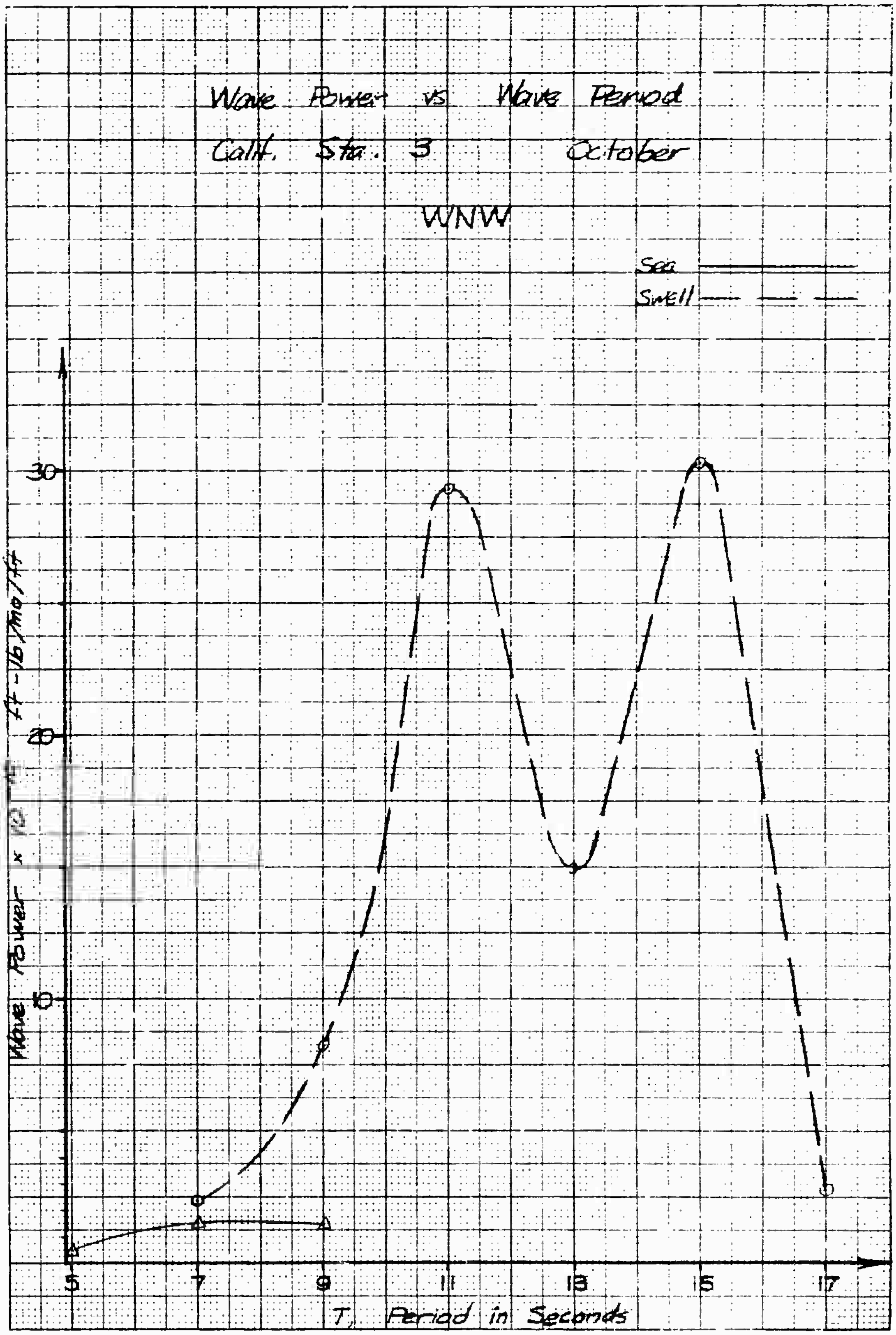


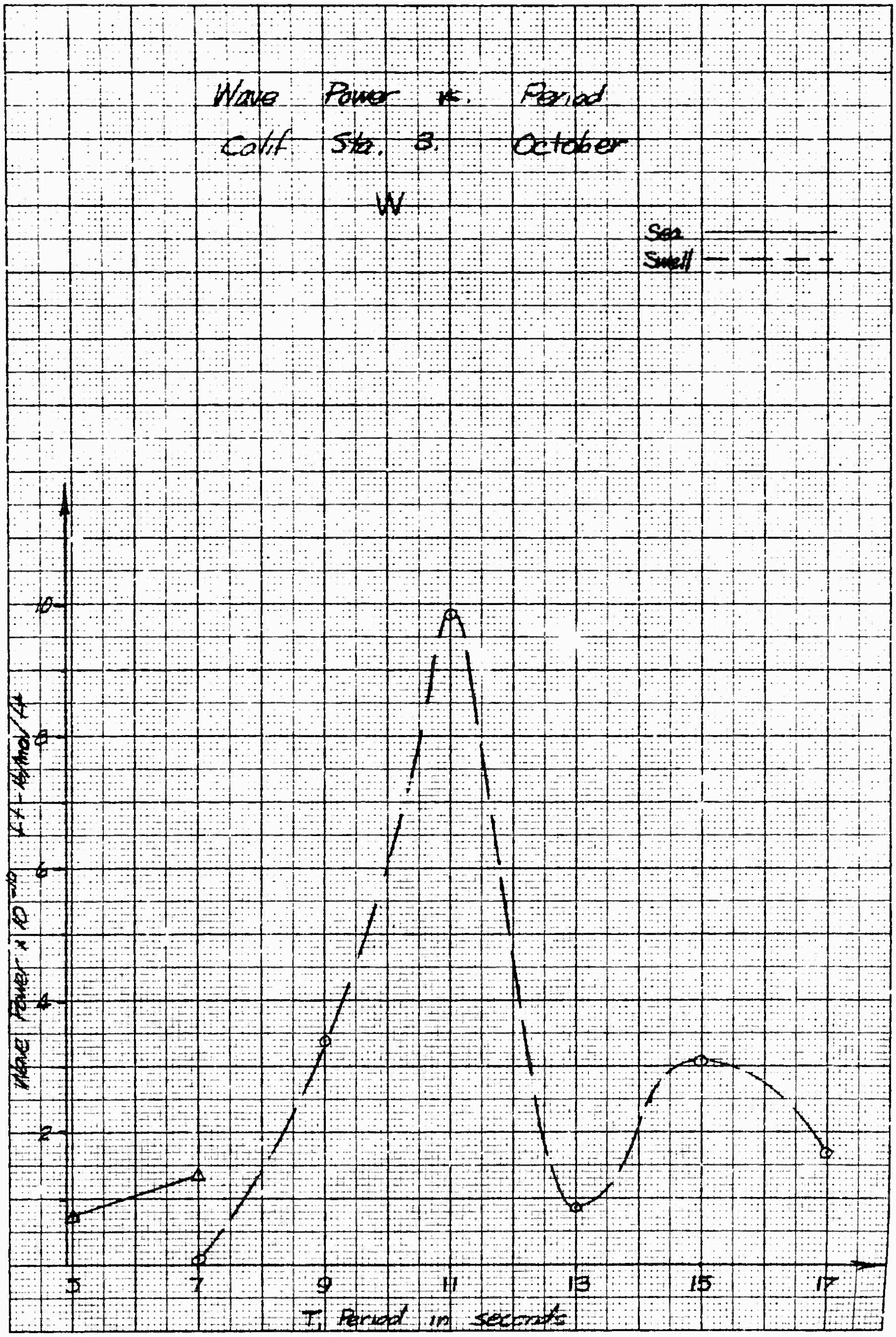
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


Wave Power vs. Wave Period
Calif. Sta. 3 October
NNW
Sea
Swell
Wave Power × 10⁻¹⁰, ft-lb/mo/ft
1.4
1.2
1.0
.8
.6
.4
.2
5
7
9
11
13
15
T, Period in seconds

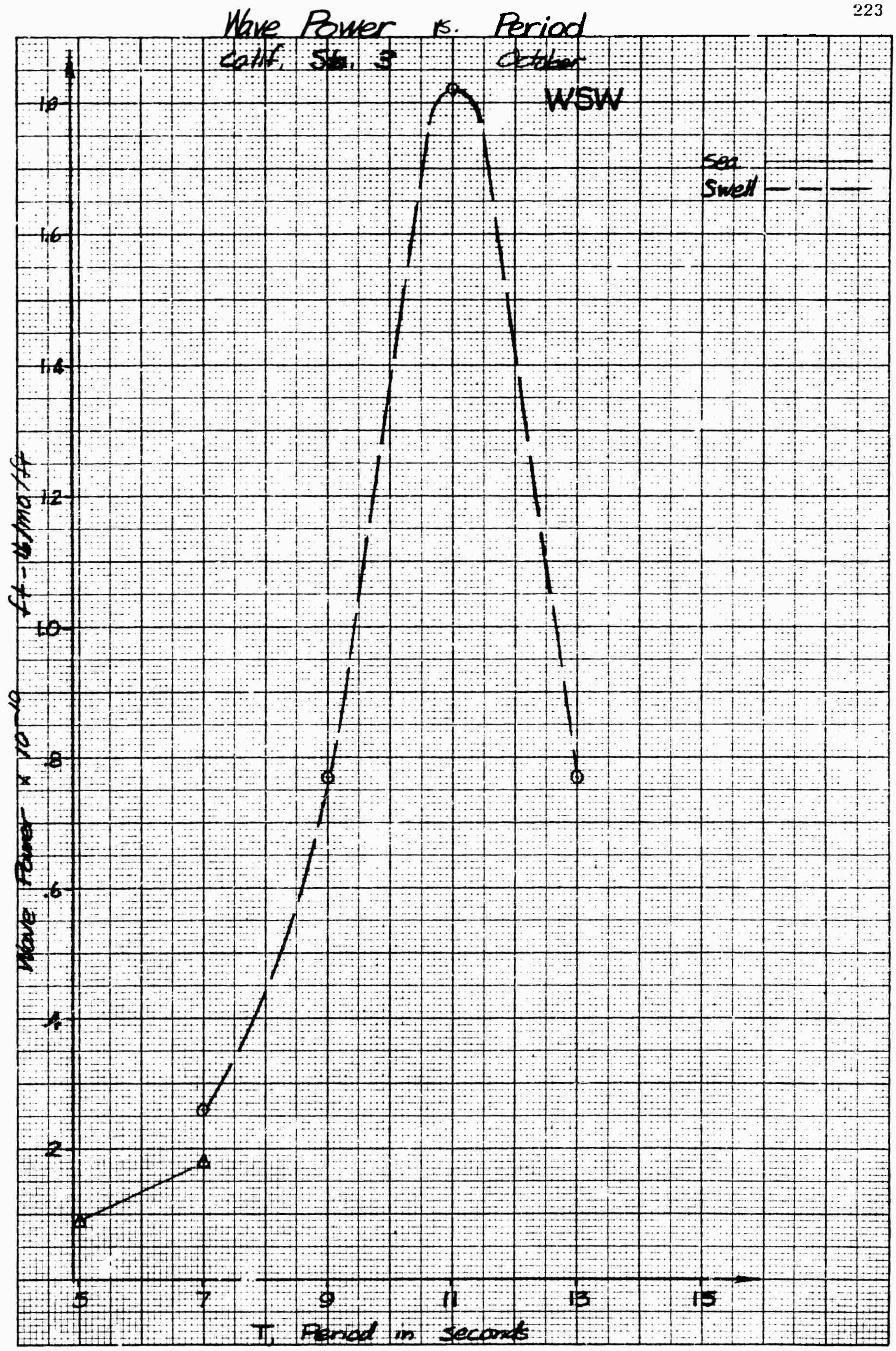


Wave Power vs. Wave Period
Calif. Sta. 3
October
NW
Sea
Swell
Wave Power x 10^-10 ft-lb/mo ft
T, Period in seconds
10
20
30
40
50
60
5
7
9
11
13
15
17
10 X 10 TO 1/2 INCH 46 1323

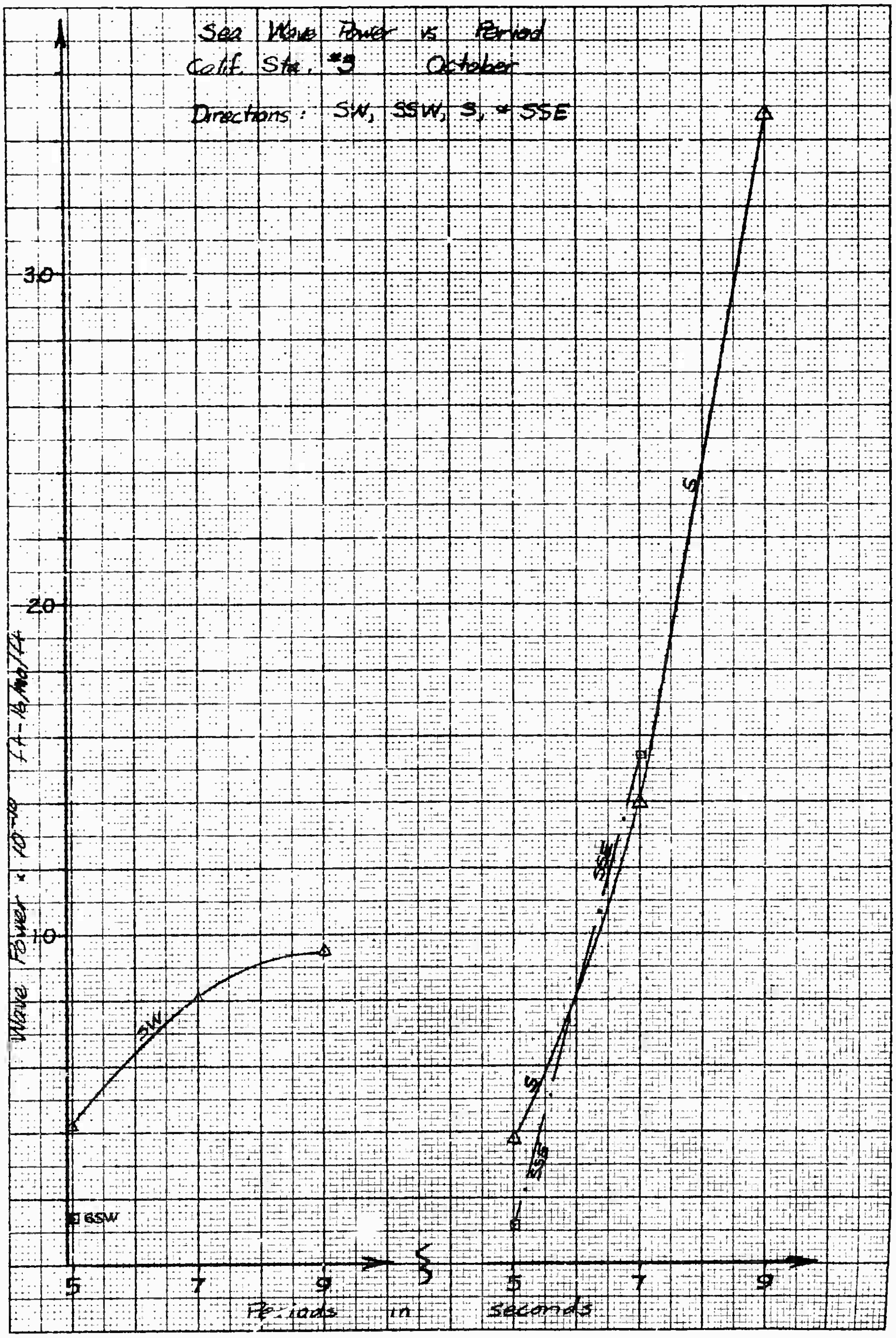

Wave Power vs Wave Period
Calif. Sta. 3 October
WNW
Sea
Swell
Wave Power x 10^6 ft-lb/mo/ft
30
20
10
5
7
9
11
13
15
17
T, Period in Seconds



Wave Power vs. Period
Calif. Sta. 3. October
W
Sea
Swell
Wave Power x 10^-10 ft-lb/mo/ft
10
8
6
4
2
5
7
9
11
13
15
17
T, Period in seconds

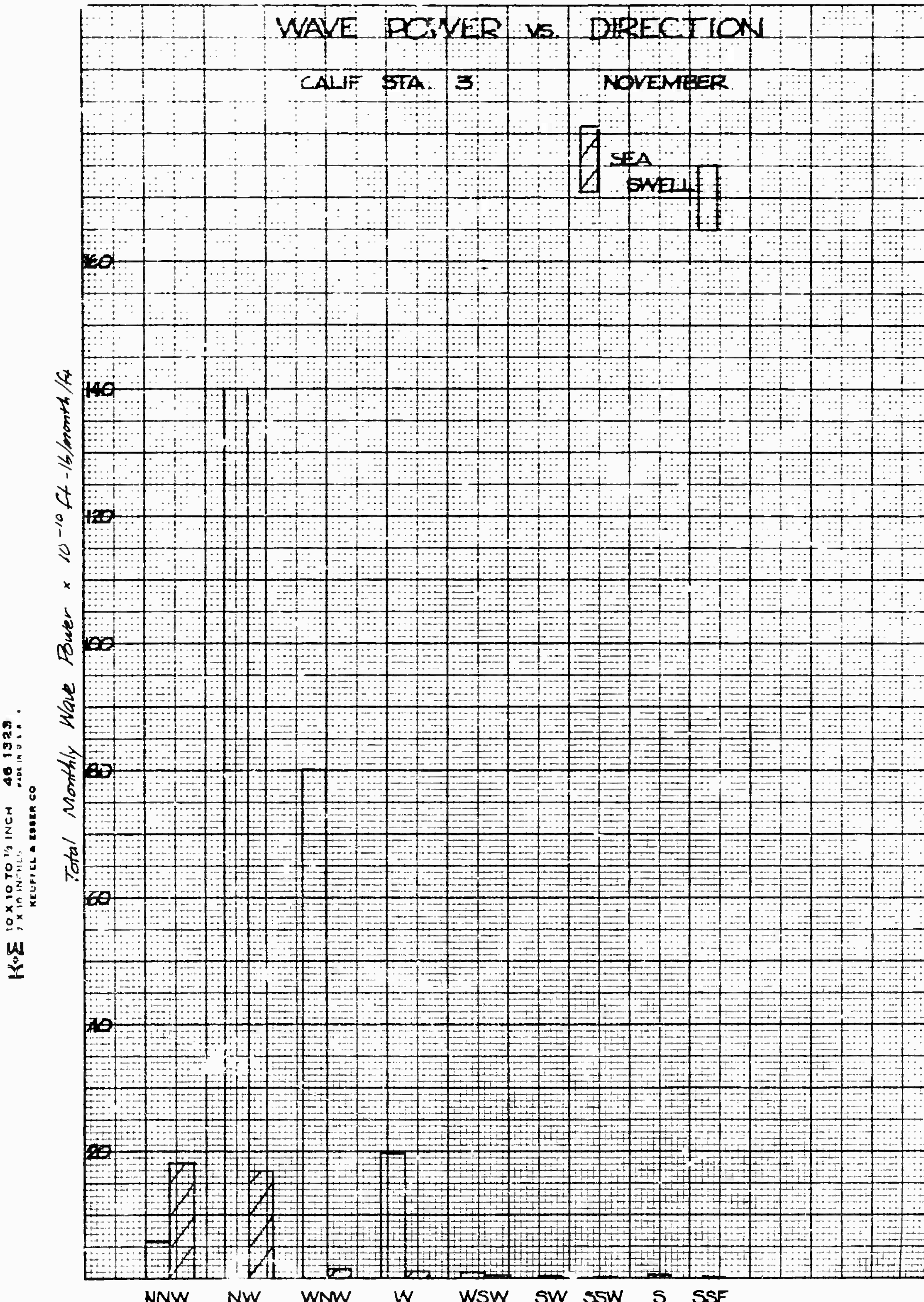


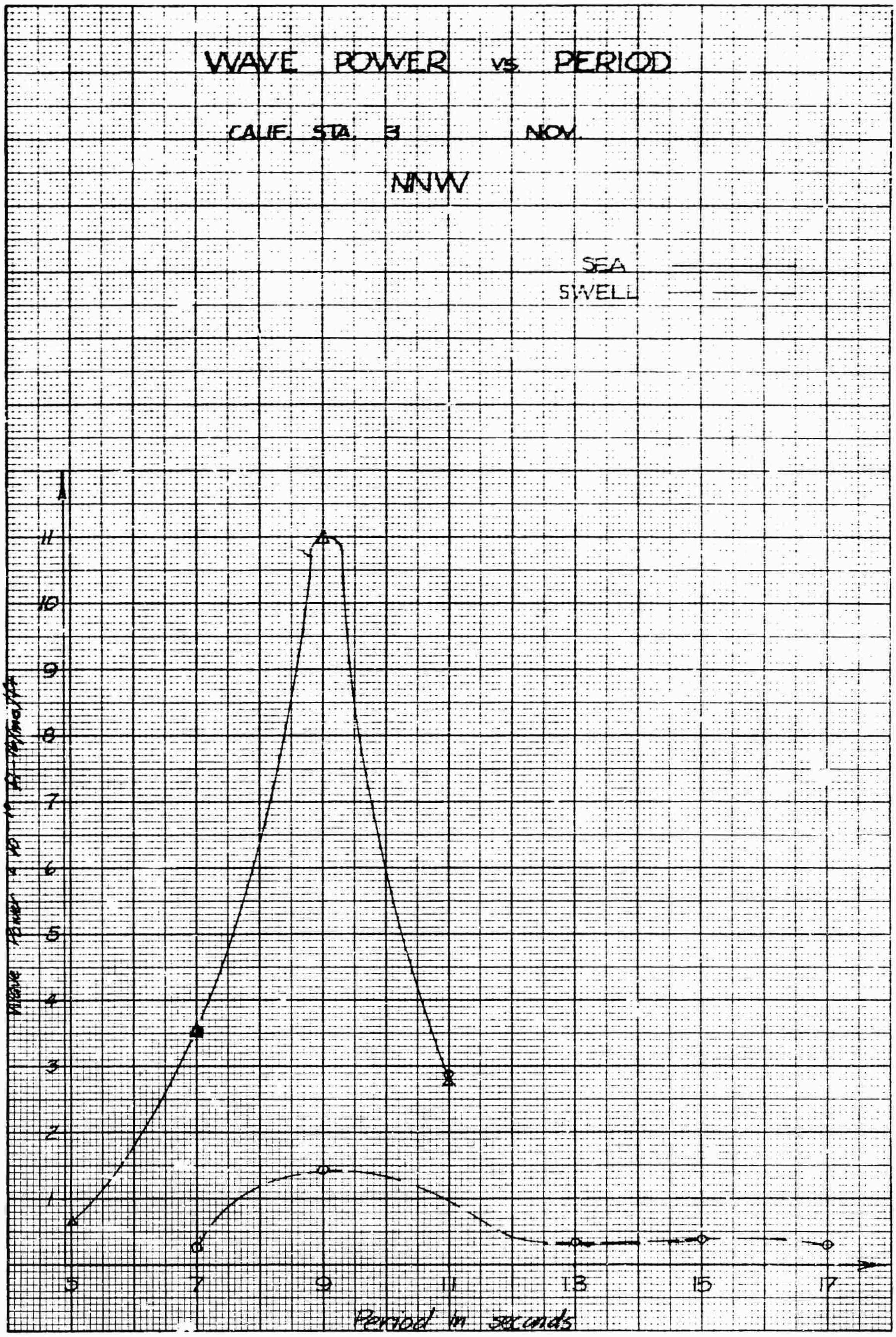
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



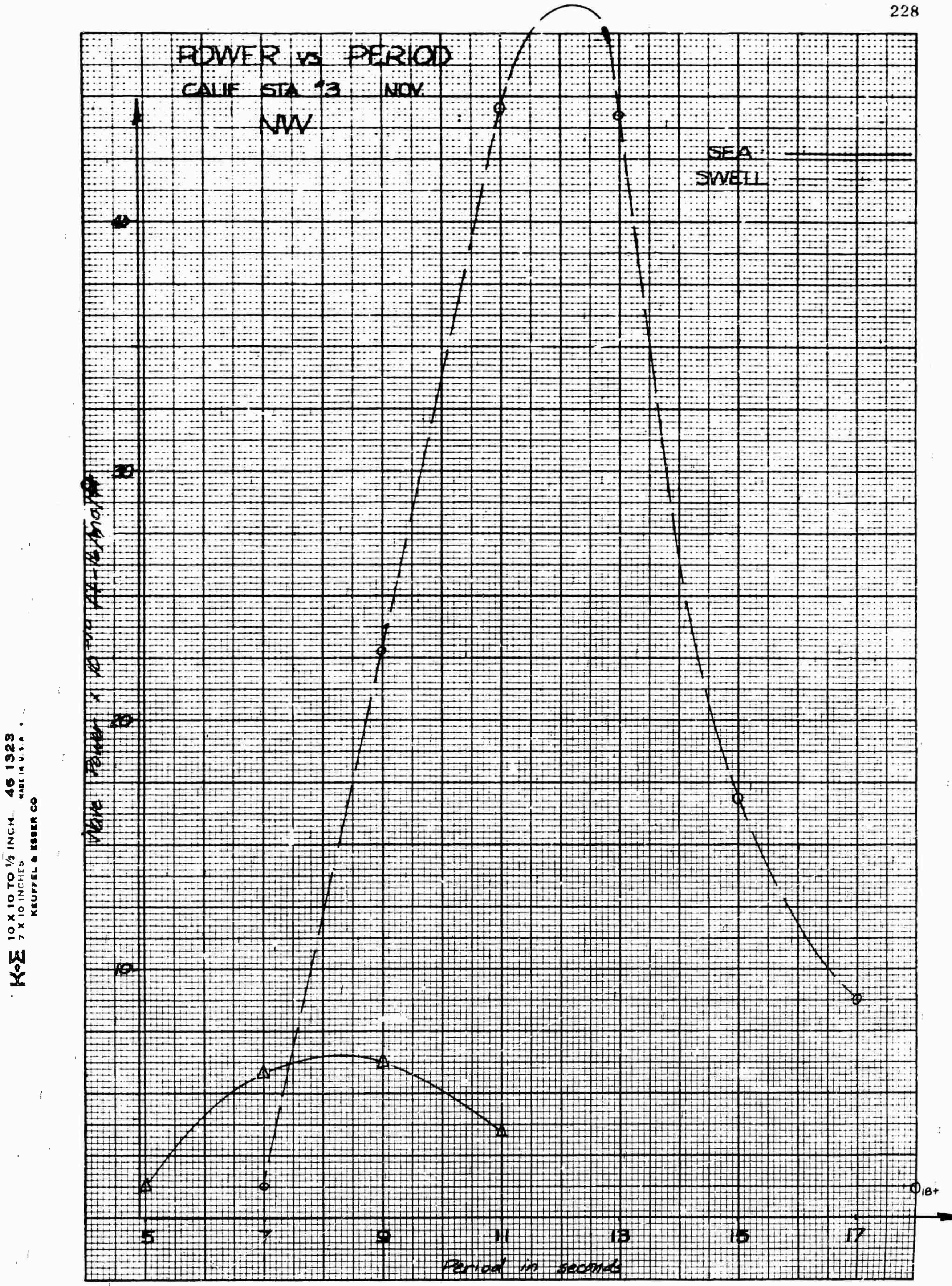
K+E 10 X 10 TO 1/2 INCH 46 1323
KEUFFEL & ESSER CO.

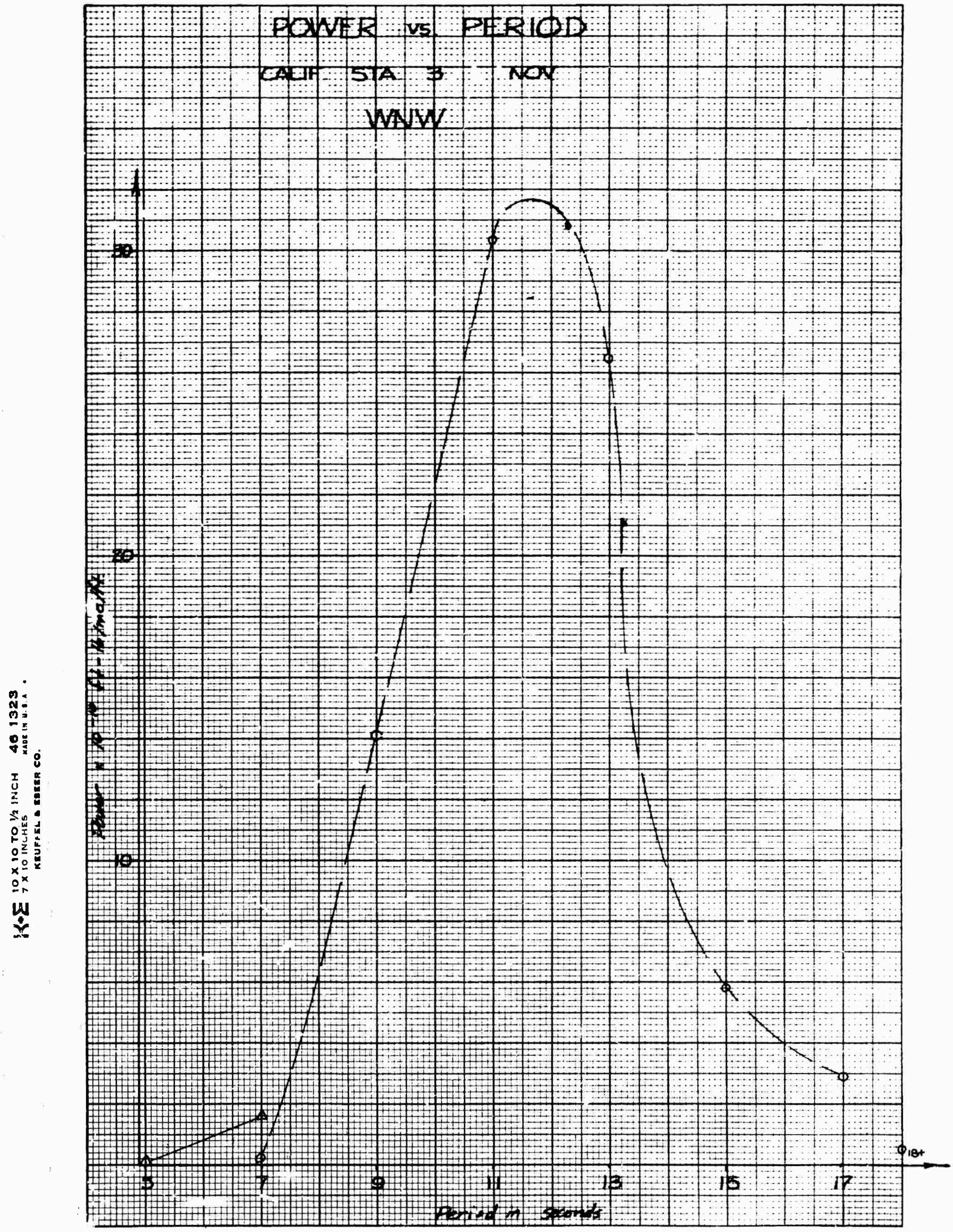
STATION 3 - NOVEMBER

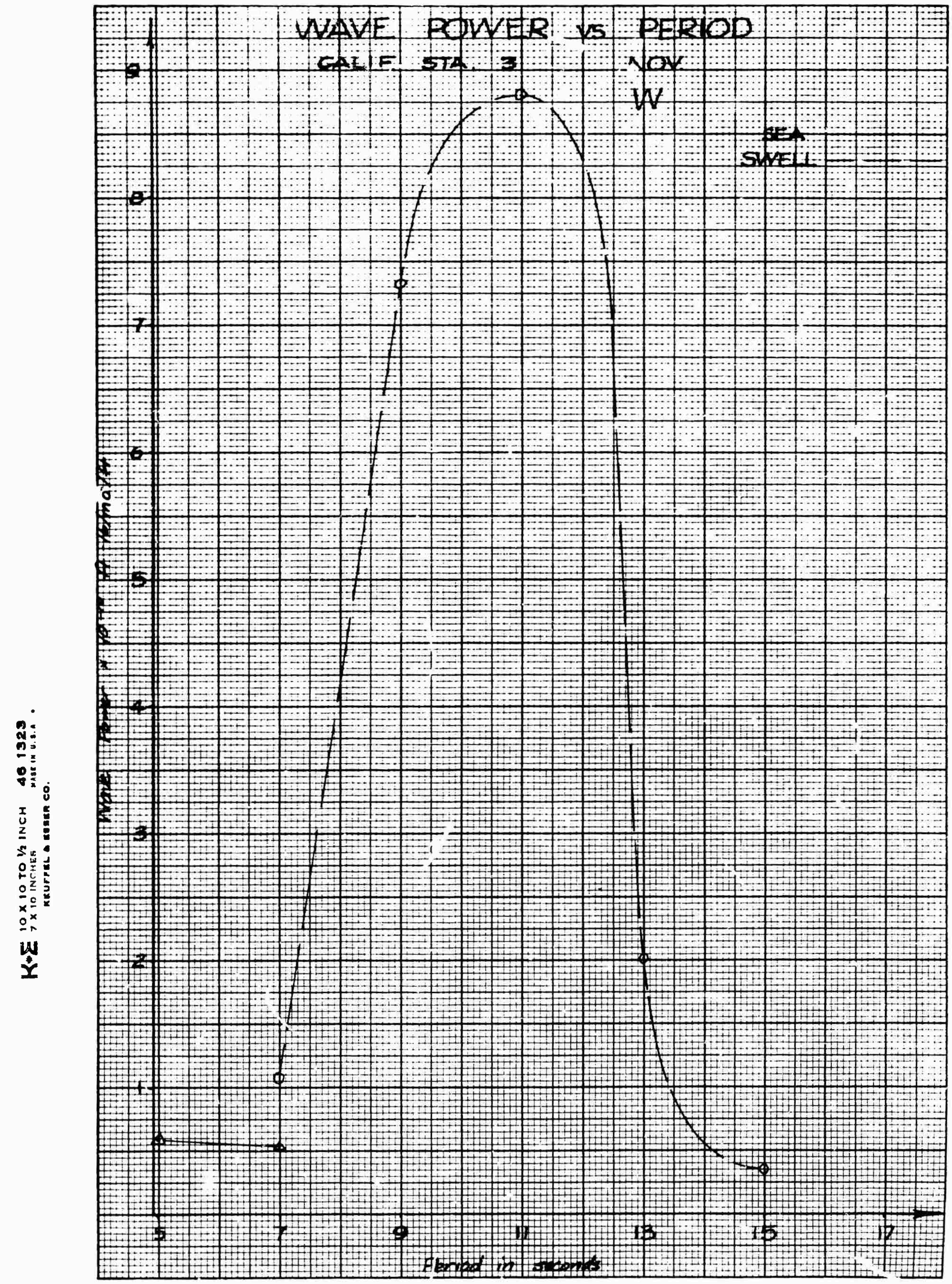

WAVE POWER vs. DIRECTION
CALIF STA. 3
NOVEMBER
SEA
SWELL
Total Monthly Wave Power × 10⁻¹⁰ ft-lb/month/ft
160
140
120
100
80
60
40
20
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
K&E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO

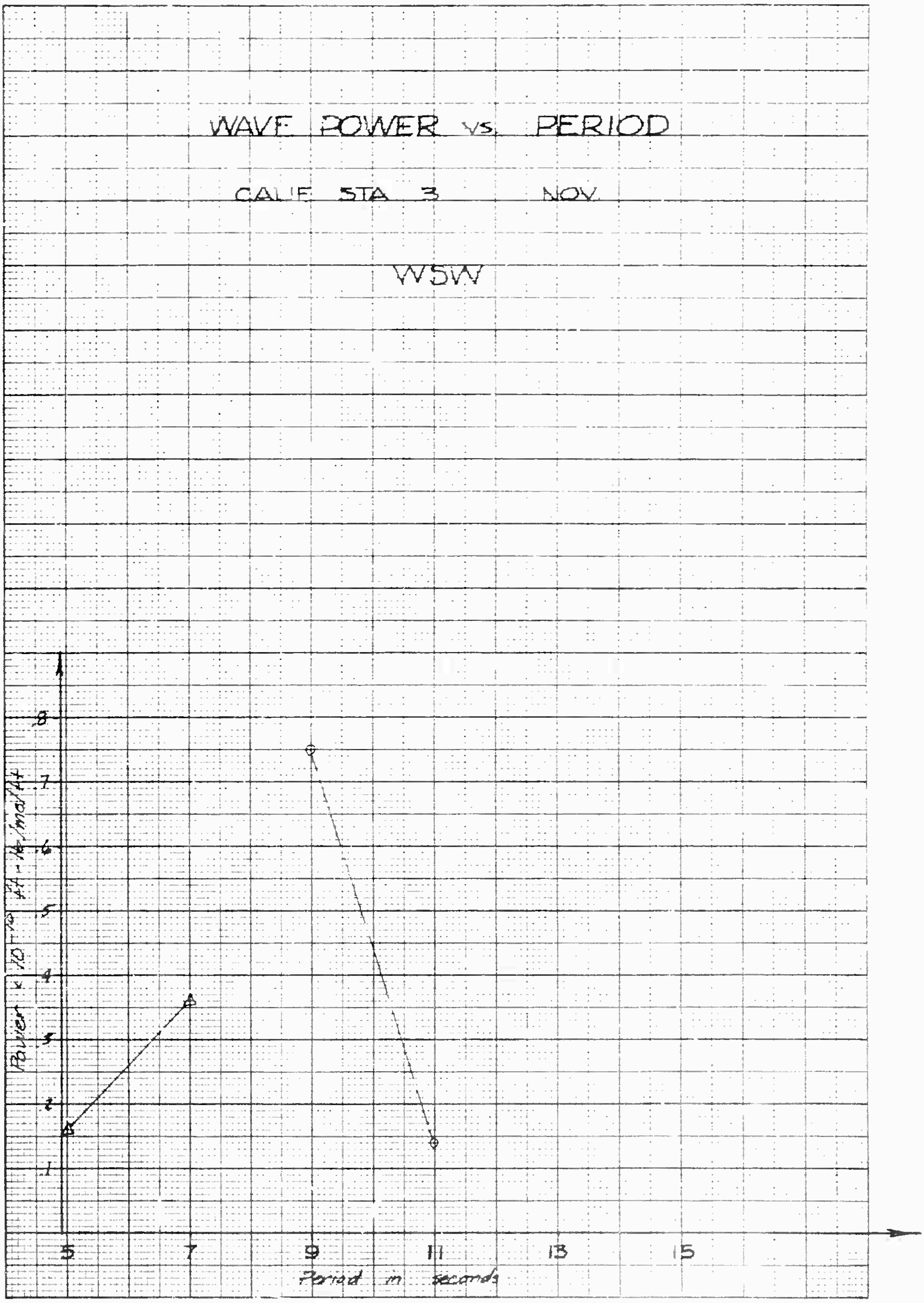


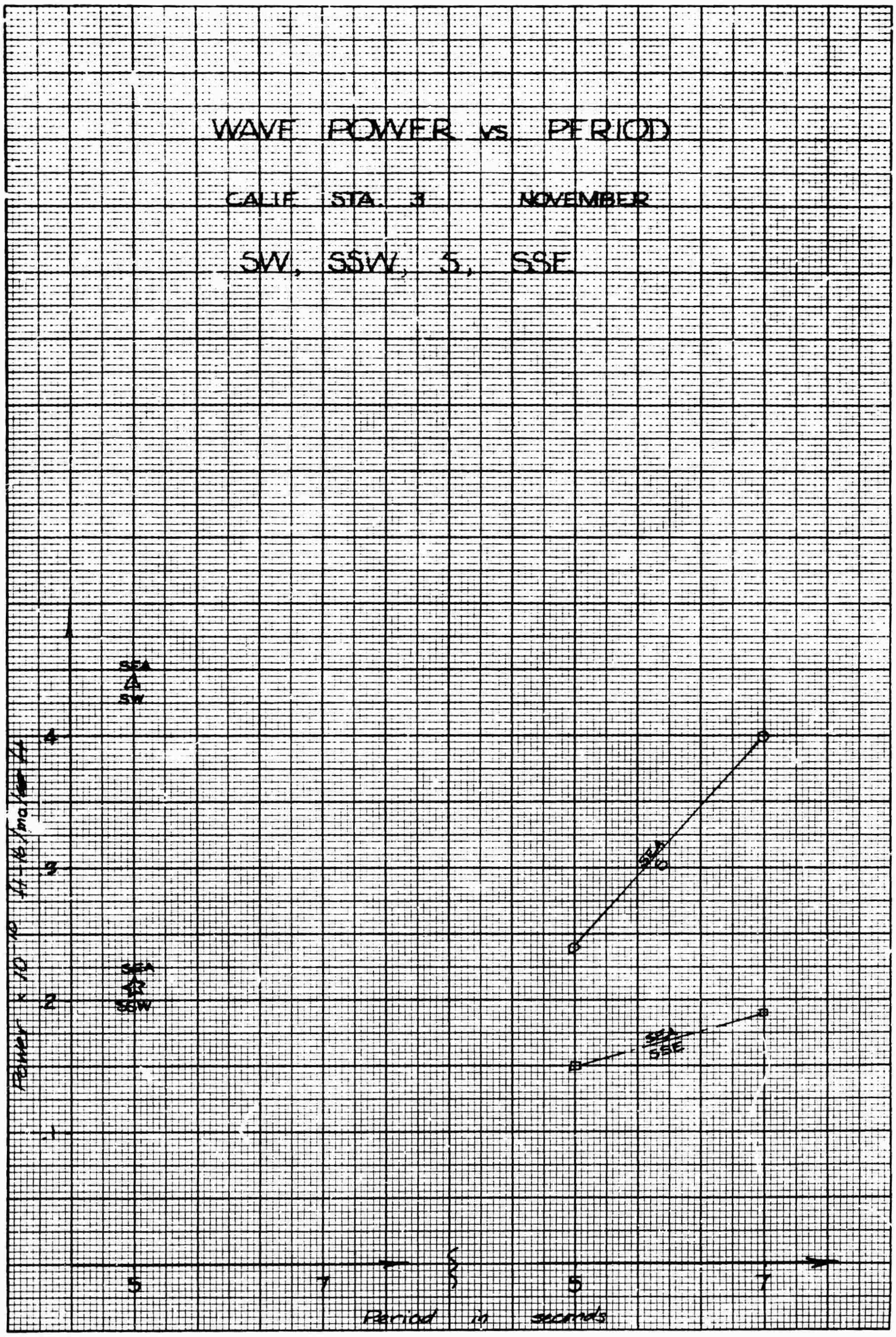
WAVE POWER vs PERIOD
CALIF. STA. 3
NOV.
NNW
SEA
SWELL
11
10
9
8
7
6
5
4
3
2
1
5
7
9
11
13
15
17
Period in seconds


POWER vs PERIOD
CALIF STA 13 NOV.
NW
SEA
SWELL
40
30
20
10
5
7
9
11
13
15
17
18+
Period in seconds
K&E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO


POWER vs PERIOD
CALIF STA 3 NOV
WNW
30
20
10
5
7
9
11
13
15
17
18+
Period in seconds

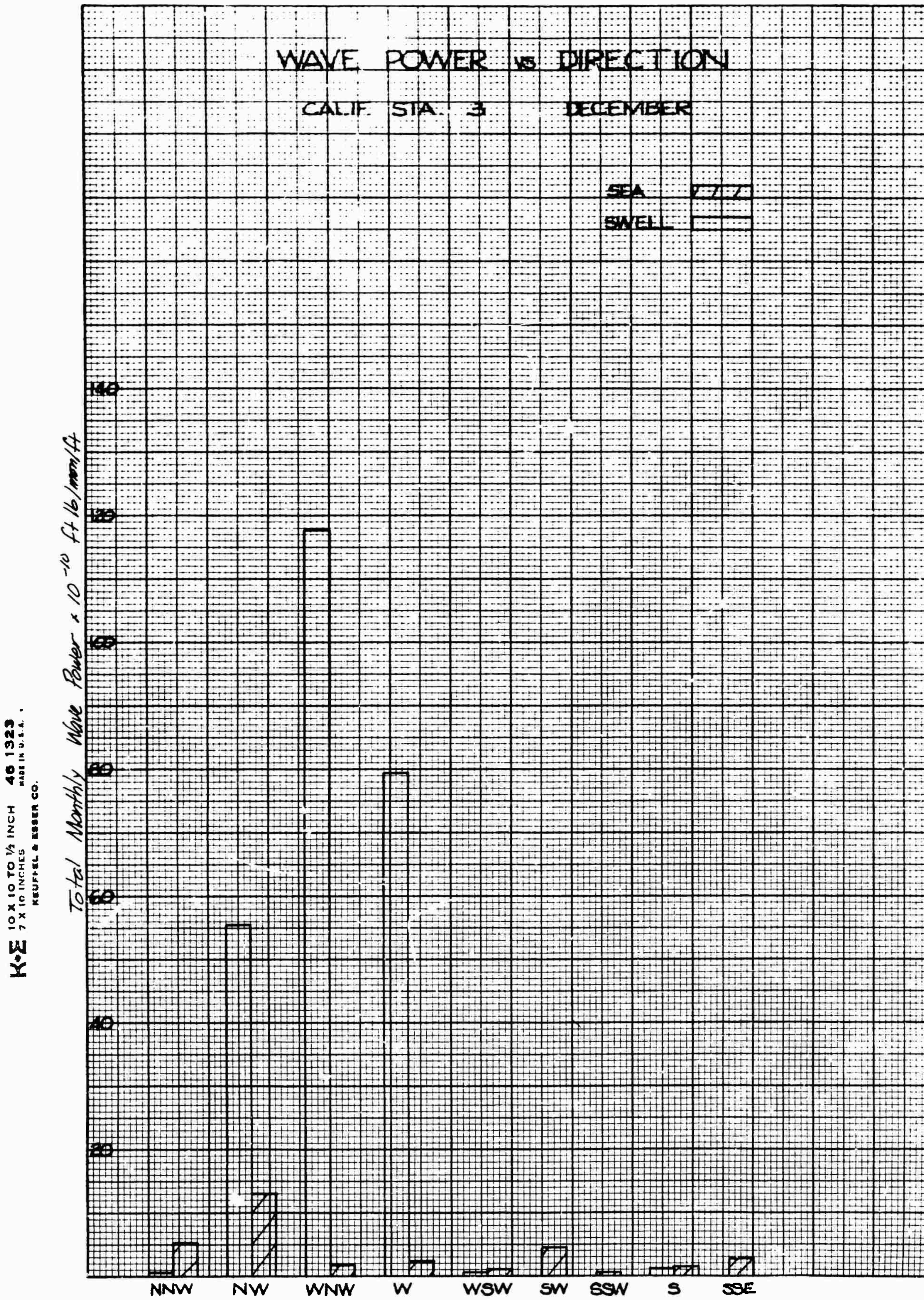

WAVE POWER vs PERIOD
CALIF. STA. 3
NOV
W
SEA
SWELL
Period in seconds
5
7
9
11
13
15
17
1
2
3
4
5
6
7
8
9

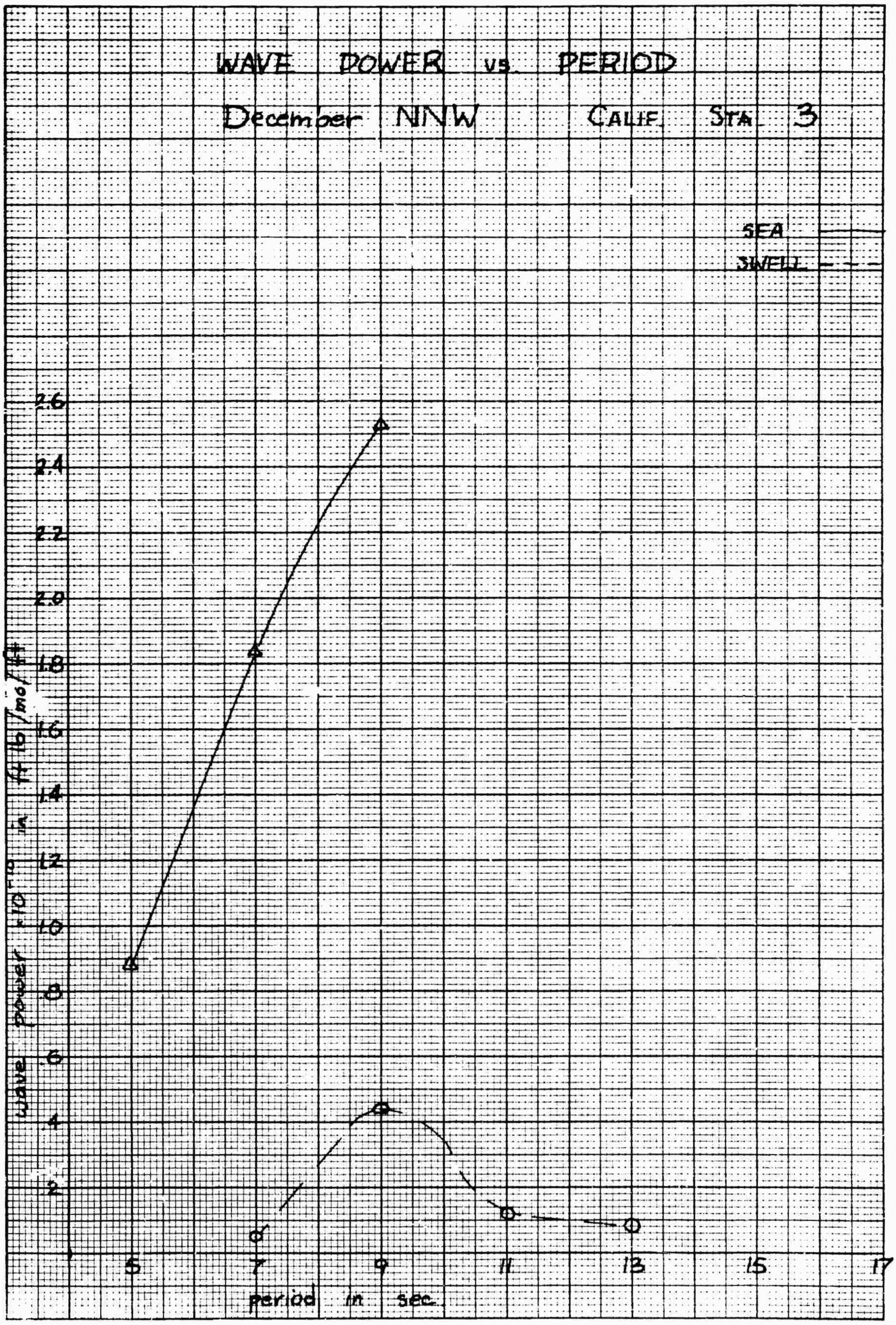

WAVE POWER vs. PERIOD
CALIF. STA. 3 NOV.
WSW
Power x 10^10 ft-lb/mo/ft
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
15
Period in seconds

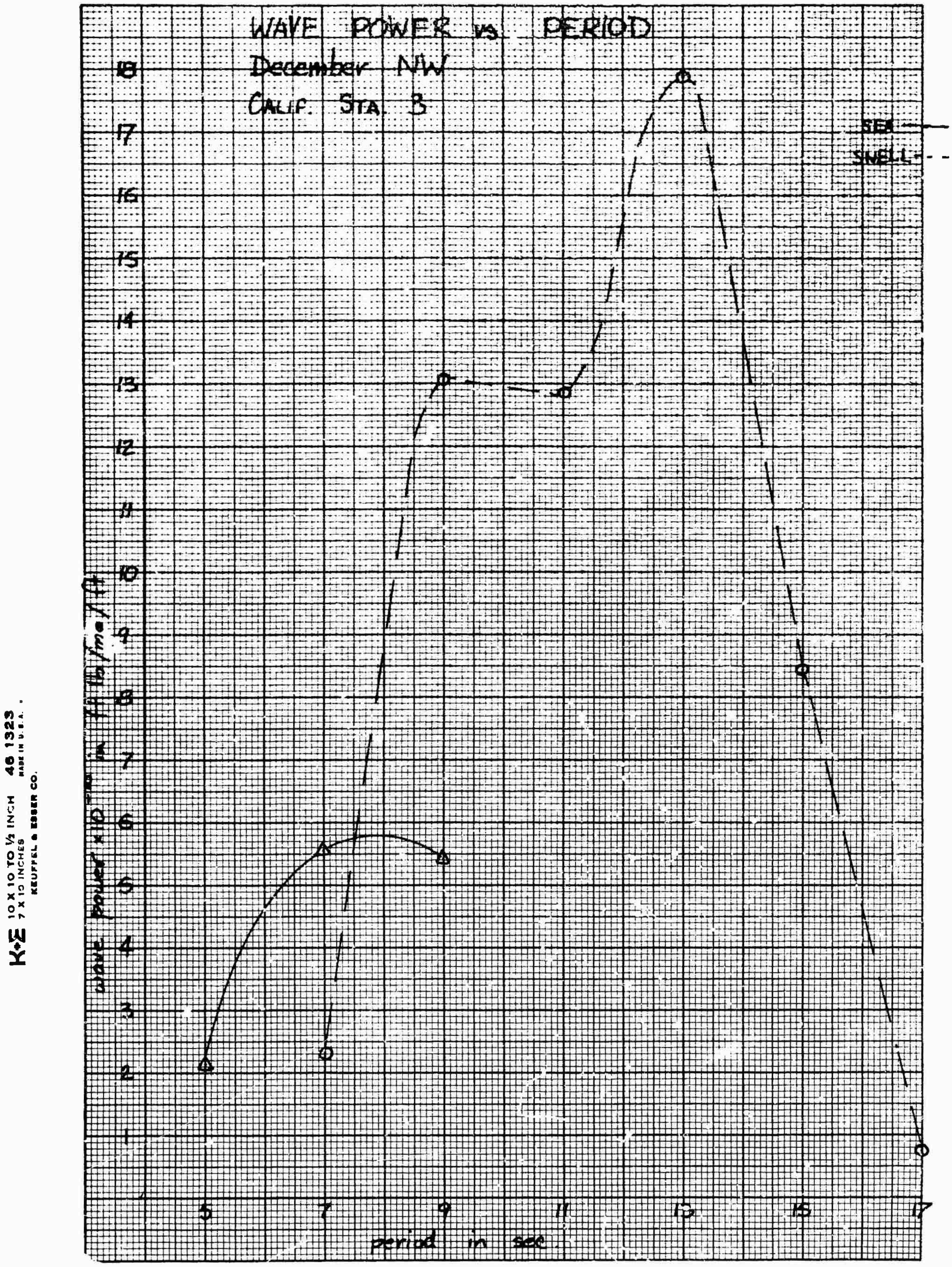


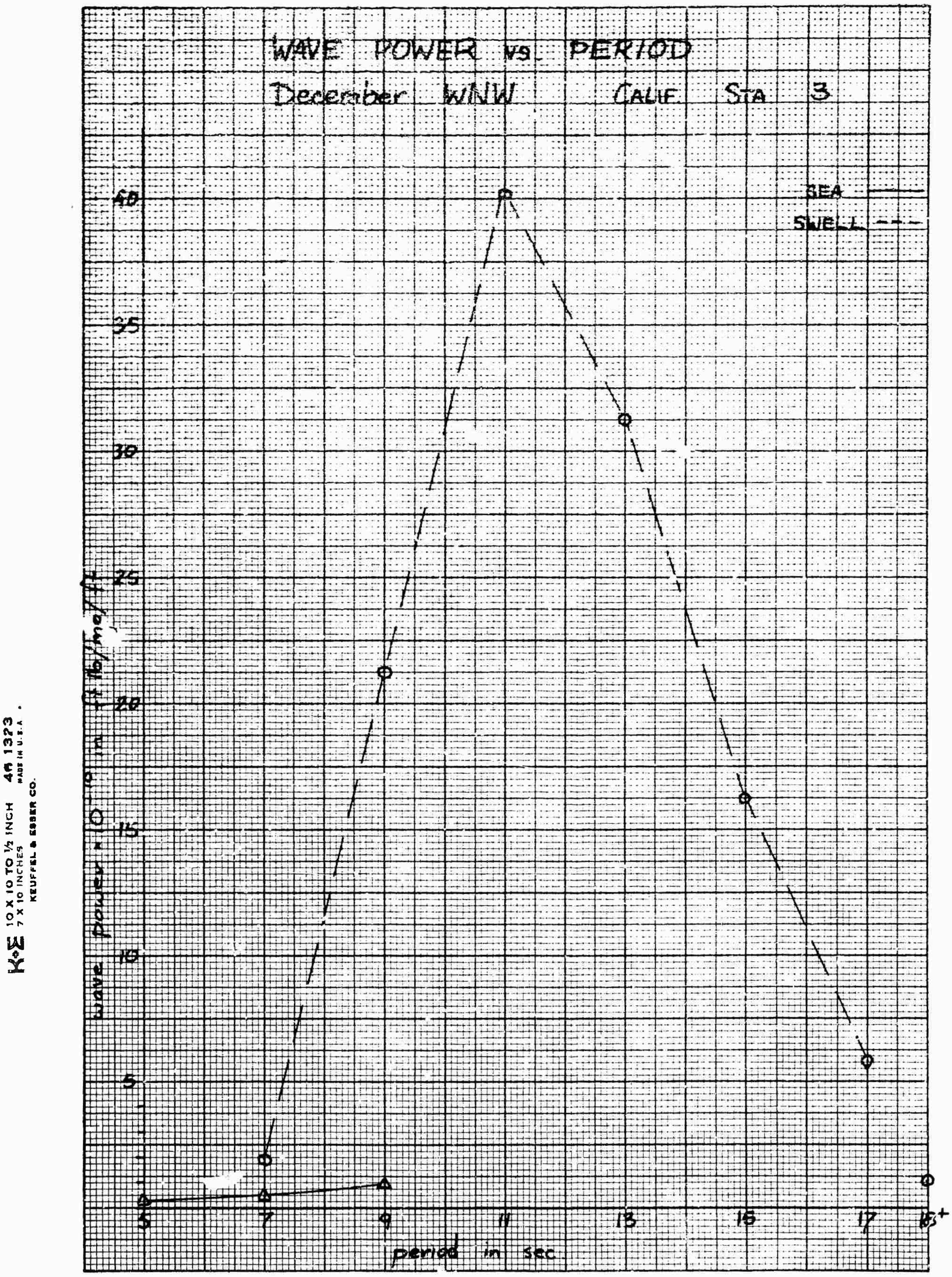
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

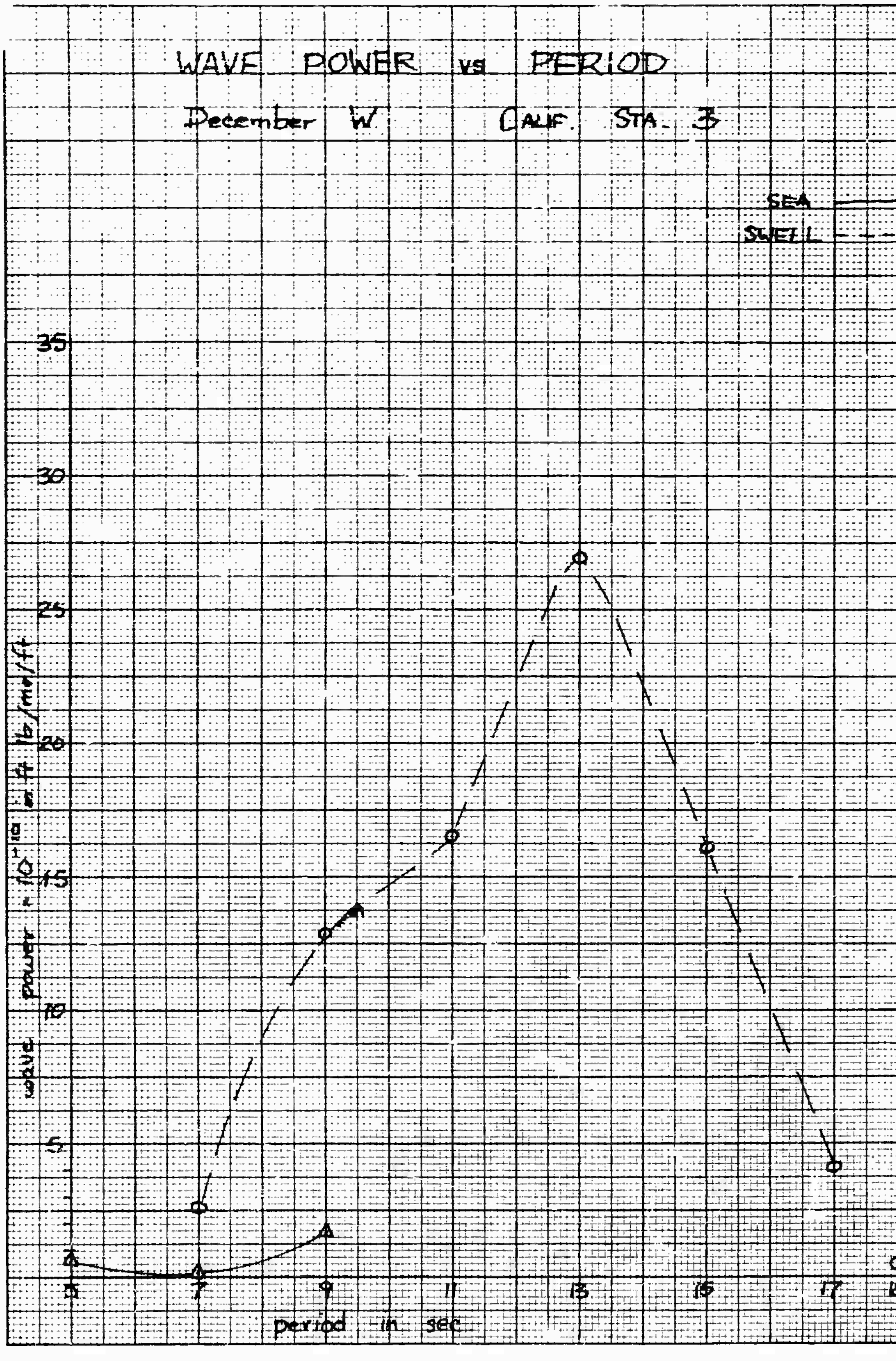
STATION 3 - DECEMBER

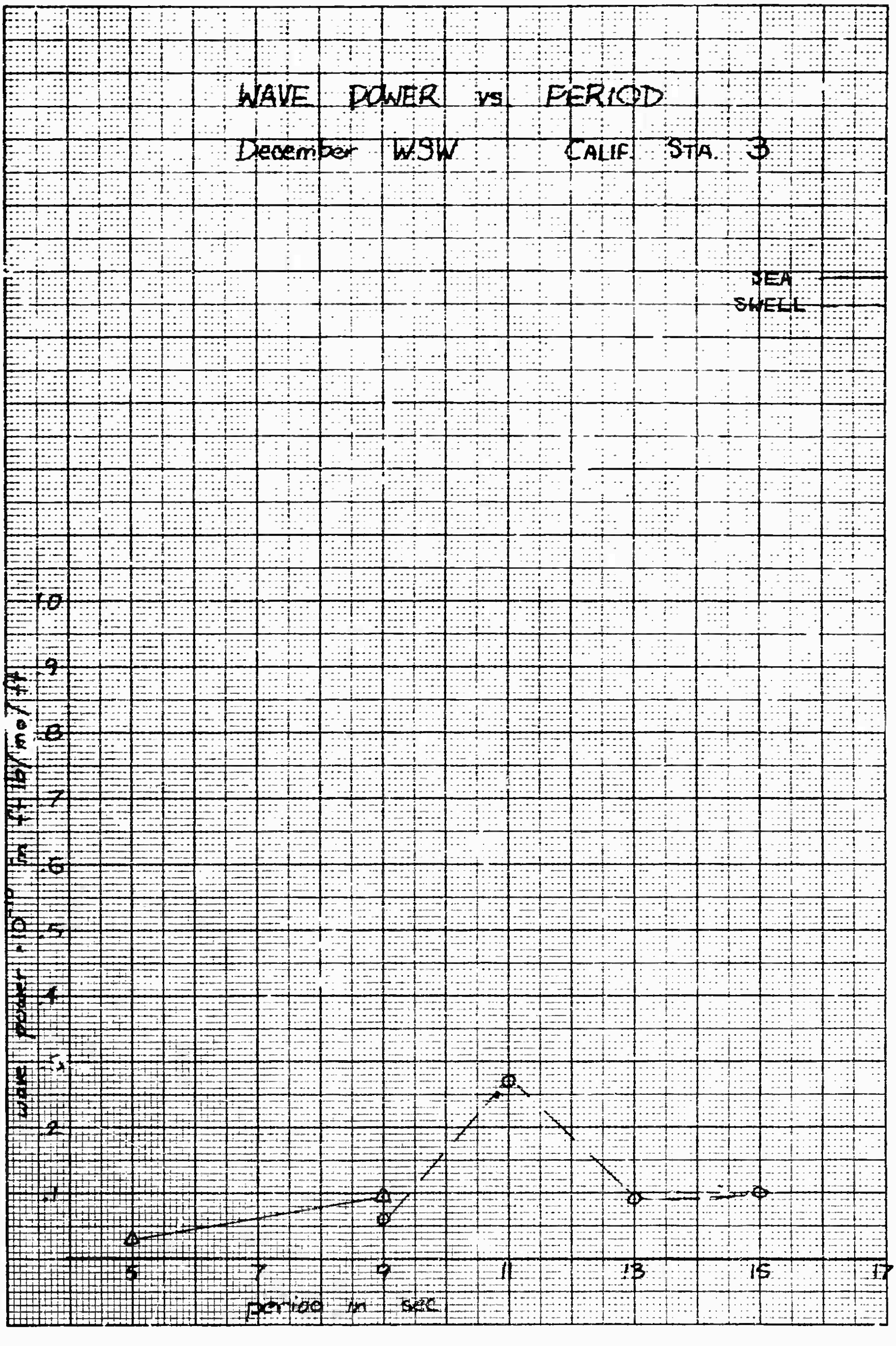

WAVE POWER vs DIRECTION
CALIF. STA. 3 DECEMBER
SEA
SWELL
Total Monthly Wave Power x 10^-10 ft lb/mon/ft
140
120
100
80
60
40
20
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
K-E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
December NNW CALIF. STA. 3
SEA
SWELL
Wave Power ×10^-10 in ft lb/mo/ft
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
5
7
9
11
13
15
17
period in sec.

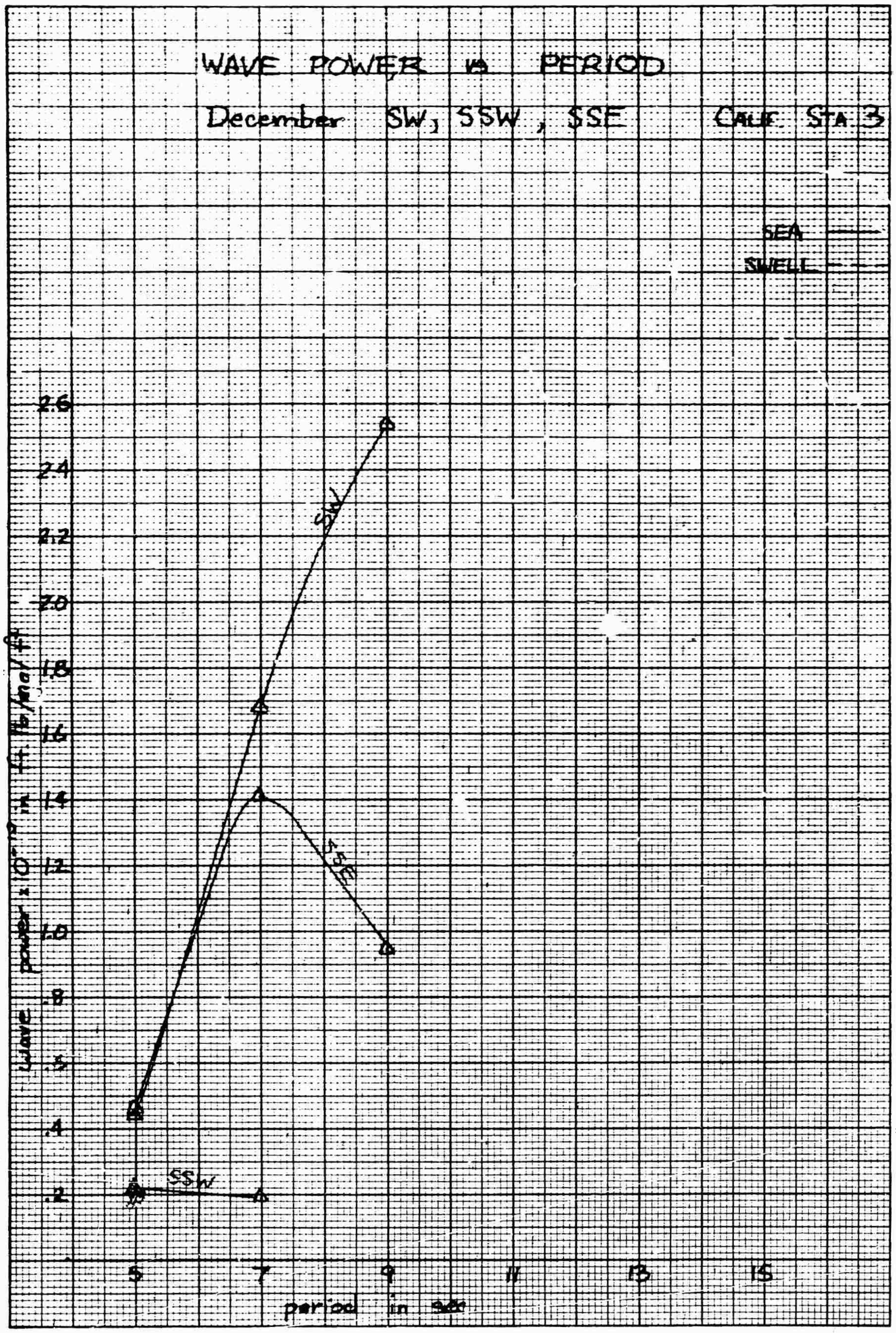

WAVE POWER vs PERIOD
December NW
CALIF. STA. 3
SEA
SWELL
period in sec
5
7
9
11
13
15
17
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs. PERIOD
December WNW CALIF. STA 3
SEA
SWELL
40
35
30
25
20
15
10
5
5
7
9
11
13
15
17
18+
period in sec
K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

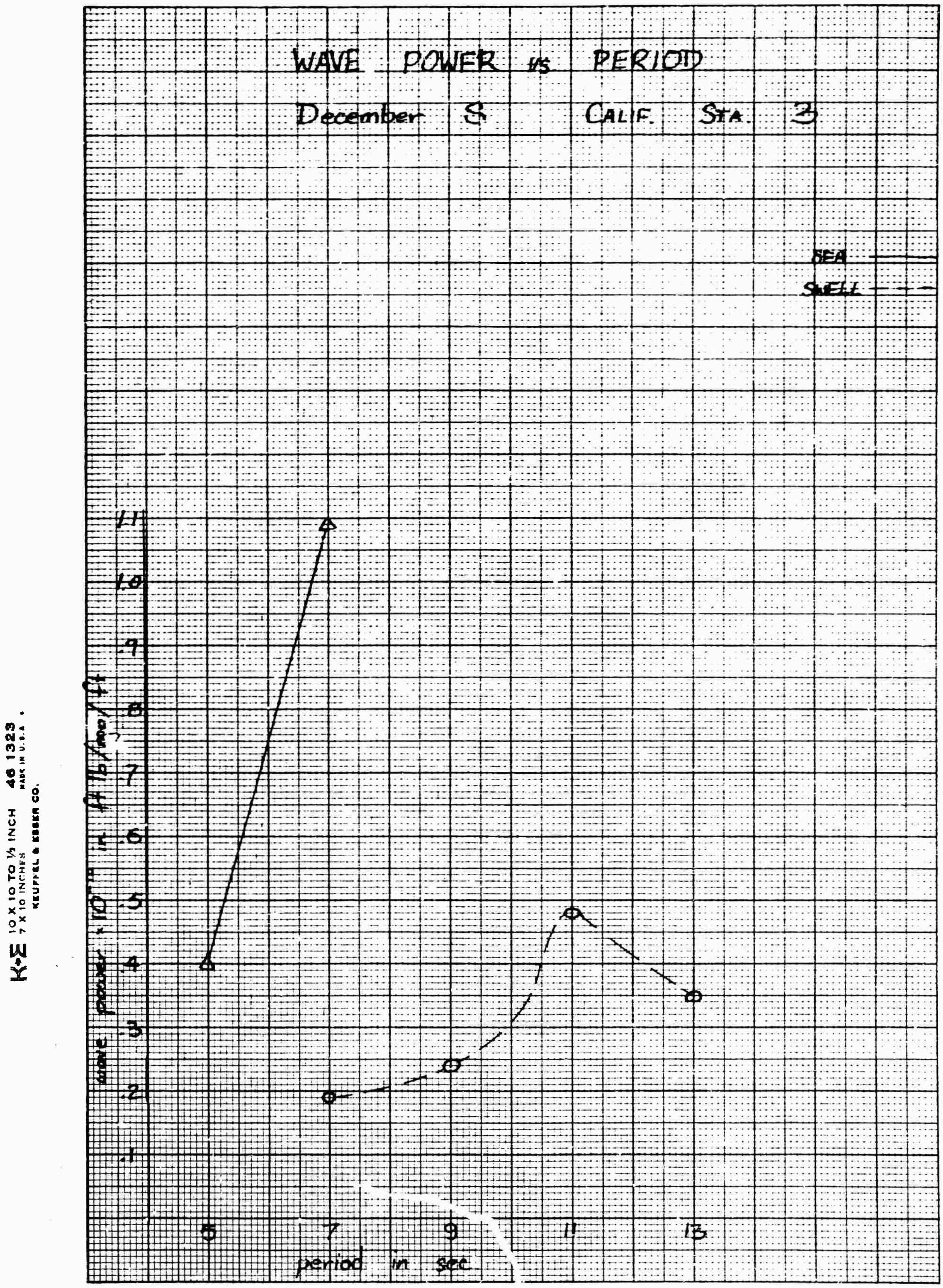

WAVE POWER vs PERIOD
December W. CALIF. STA. 3
SEA
SWELL
wave power × 10^-10 ft lb/mo/ft
35
30
25
20
15
10
5
5
7
9
11
13
15
17
18+
period in sec



K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.



K+E 10 X 10 TO 1/2 INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.


WAVE POWER vs PERIOD
December 8 CALIF. STA. 3
SEA
SWELL
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
5
7
9
11
13
period in sec.
K+E 10 X 10 TO ½ INCH 46 1323
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.