5172

Form 504

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

R.S.Patton, *Director*

State: Washington

DESCRIPTIVE REPORT

~~*Topographic*~~ *Hydrographic* | *Sheet No.* *Field #122* 5172

LOCALITY

Pacific Ocean

Approach to Strait of Juan de Fuca

1931

CHIEF OF PARTY

K.T.Adams

GOVERNMENT PRINTING OFFICE

5172

DESCRIPTIVE REPORT

to accompany

HYDROGRAPHIC SHEET FIELD NO. 122.

COAST OF WASHINGTON

U. S. C. & G. S. S. GUIDE

SEASON 1931

AUTHORITY:

The authority for the hydrography on this sheet is contained in the Director's instructions dated May 7, 1931 and supplemental instructions dated May 21, 1931.

CHARACTER OF WORK:

The control for the hydrography accomplished on this sheet is Radio Acoustic Sound Ranging with the exception of a small area of fixed position hydrography in the northeast portion of the sheet.

The soundings were taken with the Fathometer red light direct whenever possible. When the red light direct method failed to give positive results, the slow speed red light times six method was used, and in the greater depths the white light method was used.

LIMITS:

The eastern limit of the sheet joins Sheets Field Nos. 44, 45 and 46; the southern limit joins Sheet Field No. 121 (1931) in Latitude 48° - 20'; the northern limit is Latitude 48° - 40' and the western limit is just beyond the one thousand fathom curve.

DATES OF SURVEY:

The hydrography on this sheet began on May 31, 1931 and was completed on October 8, 1931. During the month of August the work on this sheet was relegated to a secondary consideration in order to accomplish necessary triangulation. During clear weather fixed position hydrography was carried out on the inshore ship sheets, the work on this sheet ; for the most part,being done in foggy and hazy weather.

CONTROL:

Three radio shore stations, K V E Tatoosh Island, K V D Cape Beale,Vancouver Island and K V A Amphitrite Point, Vancouver Island, were established, using the floating type magnetophone units. In

order to simplify recording in the Bomb Records these stations were recorded as TOOSH, BEALE and AMP.

K V E TATOOSH ISLAND.

This station was established May 15. The magnetophone unit was placed about 200 meters southeast of the western extremity of the reef off Tatoosh Island in about 16 fathoms of water. The unit floated 5 fathoms up from the bottom. 2500 feet of armoured cable was used between the magnetophone unit and the shore station. The position of the unit was determined to be Latitude 48°- 23' plus 806 meters, Longitude 124°- 44' plus 759 meters. This position was not changed throughout the season.

K V D CAPE BEALE, VANCOUVER ISLAND.

This station was established May 20. The magnetophone unit was placed off Cape Beale Light in 19 fathoms of water. The unit floated 6 fathoms above the bottom. 4000 feet of armoured cable and 2200 feet of rubber covered cable was used between the magnetophone unit and the shore station. The position of the unit was determined to be Latitude 48°- 47' plus 328 meters, Longitude 125°- 13' plus 984 meters.

On June 12 the operator at this station reported severe bumping noises. The magnetophone was taken up and a new unit installed. This was replaced as close to the old position as possible. Position angles were taken to check the location.

K V D_2 CAPE BEALE.

On June 18 the operator at Beale again reported bumping noises. The unit in the magnetophone was changed and moved to a new location. The position of this location was found to be Latitude 48°- 26' plus 1513 meters, Longitude 125°- 13' plus 718 meters.

K V D_3 CAPE BEALE.

On July 10 the operator at Beale reported the cable as having a 100% leak. The cable was underrun and investigated for breaks. It was found necessary to substitute armoured cable for the rubber covered cable and necessary to install a new magnetophone unit. The location of the unit was changed and found to be Latitude 48°- 46' plus 1503 meters, Longitude 125°- 13' plus 627 meters.

K V D_4 CAPE BEALE.

The station operator again reported severe bumping noises, so on July 28 the magnetophone unit was changed to a rigid unit mounted on a concrete block. The position of the unit was changed and determined to be Latitude 48°- 47' plus 131 meters, Longitude 125°- 13' plus 743 meters. This position was used throughout the remainder of the season.

K V A AMPHITRITE POINT, VANCOUVER ISLAND.

This station was established on July 11, 1931. The magnetophone unit was placed about 115 yards off the beach in 17 fathoms of water. The unit floated 6 fathoms up from the bottom. 3250 feet of armored cable was used between the magnetophone unit and the shore station. The position of the unit was determined to be Latitude 48°- 55' plus 352 meters, Longitude 125°- 32' plus 833 meters.

K V A_2 AMPHITRITE POINT.

On September 10 the location of the magnetophone unit was moved to Latitude 48°- 54' plus 1203 meters, Longitude 125°- 32' plus 615 meters. This change was necessary because of a five fathom shoal which blocked the sound wave when on range with the ship and the magnetophone unit. This position was the final position and was used throughout the remainder of the season.

The position of the magnetophone unit at K V E, Tatoosh Island, was determined by sextant angles taken on triangulation stations and topographic signals located ashore.

The positions of the magnetophone units at K V D, Cape Beale, were determined by sextant angles taken on triangulation stations and topographic signals located by the Canadian Hydrographic Survey. During the season a scheme of triangulation was carried across from Cape Flattery to the stations on Vancouver Island. A correction in datum was determined and applied to the triangulation stations and topographic signals located by the Canadian Hydrographic Survey.

The positions of the two magnetophone units at K V A, Amphitrite Point, were also located by sextant angles taken on stations located by the Canadian Hydrographic Survey. The positions of the magnetophone units were corrected to agree with the 1931 triangulation executed by the complement of the Ship GUIDE. It was found that plus 33.3 meters in Latitude and plus 38.5 meters in Longitude had to be applied to the scaled positions of the magnetophone units. These corrections have already been applied to the positions given above.

VELOCITY OF SOUND:

In order to determine the velocity of sound to use in plotting the Radio Acoustic Sound Ranging accomplished on this sheet, velocity tests were made using three point sextant fixes taken directly over the place where the bomb was thrown over. The angles were observed from the top of the drafting room and the bombs thrown over the side from the main deck as near directly below as possible. The dates and the number of successful results are as follows:

May 29	Four bombs	One result from K V E, Toosh.
June 28	Three bombs	Three results from K V E, Toosh.
July 15	Nine Bombs	Eight results from K V E, Toosh.
		Nine results from K V D_3, Beale.
Oct. 8	Eight bombs	Seven results from K V E, Toosh.
		Four results from K V D_4, Beale.

Each visual fix was plotted on one of the inshore ship sheets. The distances to the magnetophone units were scaled off of the smooth sheet. For the first two groups, a test distance was used to compute the distortion factor of the sheet. For the second two groups, one position was computed and then an inverse computation was made between this position and the position of the magnetophone unit to give the actual distance. This distance was then divided by the scaled distance to give the factor to be applied for distortion.

The velocity of sound in meters per second was determined from the formula; V equals d over t, V being the velocity of sound in meters per second, d the distance in meters, and t the time in seconds.

The mean value for the velocity of sound for each group was determined. These results were given suitable weight and the following velocities resulted: 1476.90 m/s for K V E, Toosh and 1479.53 m/s for K V D, Beale. These results show that the experimental velocity to K V D, Beale, is 2.63 m/s greater than the experimental velocity to K V E, Toosh. The determination of the theoretical bottom velocity confirms the experimental values in that the theoretical bottom velocity to K V D, Beale, is 2.77 m/s greater than the theoretical bottom velocity to K V E, Toosh.

A study of the results of the theoretical and experimental values show that the large shoal areas in this locality have a pronounced effect on the velocity of the sound wave. Because of this it was decided to favor the experimental values determined and the following results were used to plot the smooth sheet:

K V E - Toosh.	K V D - Beale.	K V A - Amp.
1477 m/s	1479 m/s inside 100 fms. 1478 m/s to 500 fms. 1477 m/s outside 500 fms.	1478 m/s inside 100 fms. 1477 m/s outside 100 fms.

(See appendix for tabulation of results.)

PROJECTION AND PLOTTING:

The projection for the smooth sheet was made on Paragon # 118 cloth backed paper, using a scale of 1 : 120,000. The magnetophone positions were plotted on the sheet and distance circles were drawn at 10,000 meter intervals through computed points with the characteristic color assigned to the several magnetophone units.

A celluloid scale was constructed to use for plotting the bomb results. The scale is forwarded with this report.

The distances and changes of course were plotted on tracing paper and transfered to the smooth sheet by fitting the tracing paper layout to the plotted positions of the bombs.

The loops extending furthest westward are without good R. A. R. control at the outer ends. The outer ends of these loops were plotted by dead reckoning between accepted bomb positions.

APPARATUS CORRECTION:

In a special report previously submitted, will be found the Fathometer corrections which were applied to soundings taken on this sheet.

The Fathometer constant correction for this sheet is plus 0.3 fathom.

DANGERS:

There are no dangers within the limits of this sheet.

GENERAL CHARACTERISTICS OF AREA:

The greater part of the area covered by this sheet is comparitively shoal water varying in depth from 30 fathoms to 100 fathoms. This area is very irregular, having numerous valleys and ridges. After passing the 100 fathom curve to the westward, the depth gradually increases to 1100 fathoms at the westernmost limit of the sheet.

The shoalest sounding recorded was 30 fathoms in approximate Latitude 48° - 36.7', Longitude 125° - 40.0'.

CONCLUSION:

While most of the intersections of the bomb returns from the three stations were close, occasionally one with a considerable triangle is noticed. This is probably due to the irregular depths over which the sound wave traveled and the consequent difficulty in obtaining an exact velocity of sound for all sections of the area. In these cases the position selected was that deemed most probable.

Respectfully submitted,

Henry J. Healy,
Jr. H. & G. E., C. & G. Survey.

John C. Mathisson,
Jr. H. & G. E., C. & G. Survey.

Respectfully forwarded,
approved,

Fred. L. Peacock,
H. & G. E., C. & G. Survey,
Commanding Ship GUIDE.

APPENDIX

STATISTICS

SHEET FIELD NO. 122

WASHINGTON COAST
SEASON 1931

DAY	DATE	VOLUMN	SOUNDINGS		STATUTE MILES OF SOUNDING LINE	POSITIONS
			V. C.	FATHOMETER		
A	May 31	1	2	377	69.8	51
B	June 1	1		543	104.2	70
C	June 9	1	1	216	38.6	33
D	June 10	1 & 2	1	537	111.1	59
E	June 13.	2		458	94.1	56
F	June 15	2		672	149.0	85
G	June 16	2		486	95.6	52
H	June 17	2 & 3	2	460	96.2	49
J	June 18	3		495	97.3	55
K	June 28	3		144	21.7	31
L	June 29	3		262	53.5	65
M	July 12	3 & 4	1	533	91.0	78
N	July 13	4	1	476	96.5	73
P	July 16	4		528	143.0	61
Q	July 17	4		273	63.5	37
R	Aug. 26	4 & 5		414	85.0	51
S	Aug. 27	5		425	73.5	49
T	Sept. 13	5		314	65.4	41
U	Sept. 14	5 & 6		461	126.3	38
V	Sept. 15	6		549	127.0	70
W	Sept. 16	6	1	226	47.8	52
X	Sept. 26	6		499	92.6	76
Y	Sept. 27	6		203	41.6	36
Z	Oct. 8	6		53	10.5	13
		TOTALS	9	9604	1994.8	1281

Field Records Section

Report on H. 5172 — Surveyed in 1931

Pacific Ocean - Approach to Strait of Juan De Fuca

T. A. R.

Instructions dated May 7th and 21st 1931
The 'Guide' (Original April 16. 1930)

Chief of party - H. T. Adams
Surveyed by H. T. A.
Protracted by - H. J. Healy & E. H. Sheridan
Soundings by E. H. Sheridan
Verified and inked by J. Fleming.

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(1) The records are complete, legible & neatly executed.

(2) The plan character and extent of the development conforms to the requirments of both general and specific instructions except that - there is a dearth of bottom characteristics. (See Par 26 Page 6 Instruction 'Guide' 4/16/30)

(3) Crossings

Sounding line crossings are satisfactory.

(4) Junctions

Junction with H. 5111 - 5114 - 5147 - 8 - 9 which overlap the sheet on the south and east is very good and the soundings agree.

There is no C. and G. Survey on the north

(5) Depth Curves.

The usual depth curves can be completely drawn.

(6) Sufficiency of the survey

No further surveying is required in the area covered by this sheet

(7) Shoal indications

There are no indications of shoals worthy of note except at 48° 39', 126° 01', where a 52 fm sdg attract attention but is not thought to merit further investigation.

(8) Comparison with previous surveys.

There are no previous C. and G. S. surveys in this area.

(8) Continued

It is believed that the principal source of the hydrography shown in this area on Chart 6102 is the B. A. Charts or Canadian surveys. The control for which is thought to have been dead reckoning and in view of this assumption a rigid comparison was considered inadvisable.

Recommendations

It is recommended that this survey supersede all other surveys in the area covered by this sheet.

The above recommendation is based upon the belief that the control and sounding methods used in this survey give a correlation between the several features characteristic of the area and a uniform accuracy in depth determination not obtainable by the older methods under which the previous surveys were executed.

The entire work is considered Excellent.

Respectfully submitted

J. Fleming

Aug. 16th 1932

LIST OF SIGNALS

SHEET FIELD NO. 122

WASHINGTON COAST

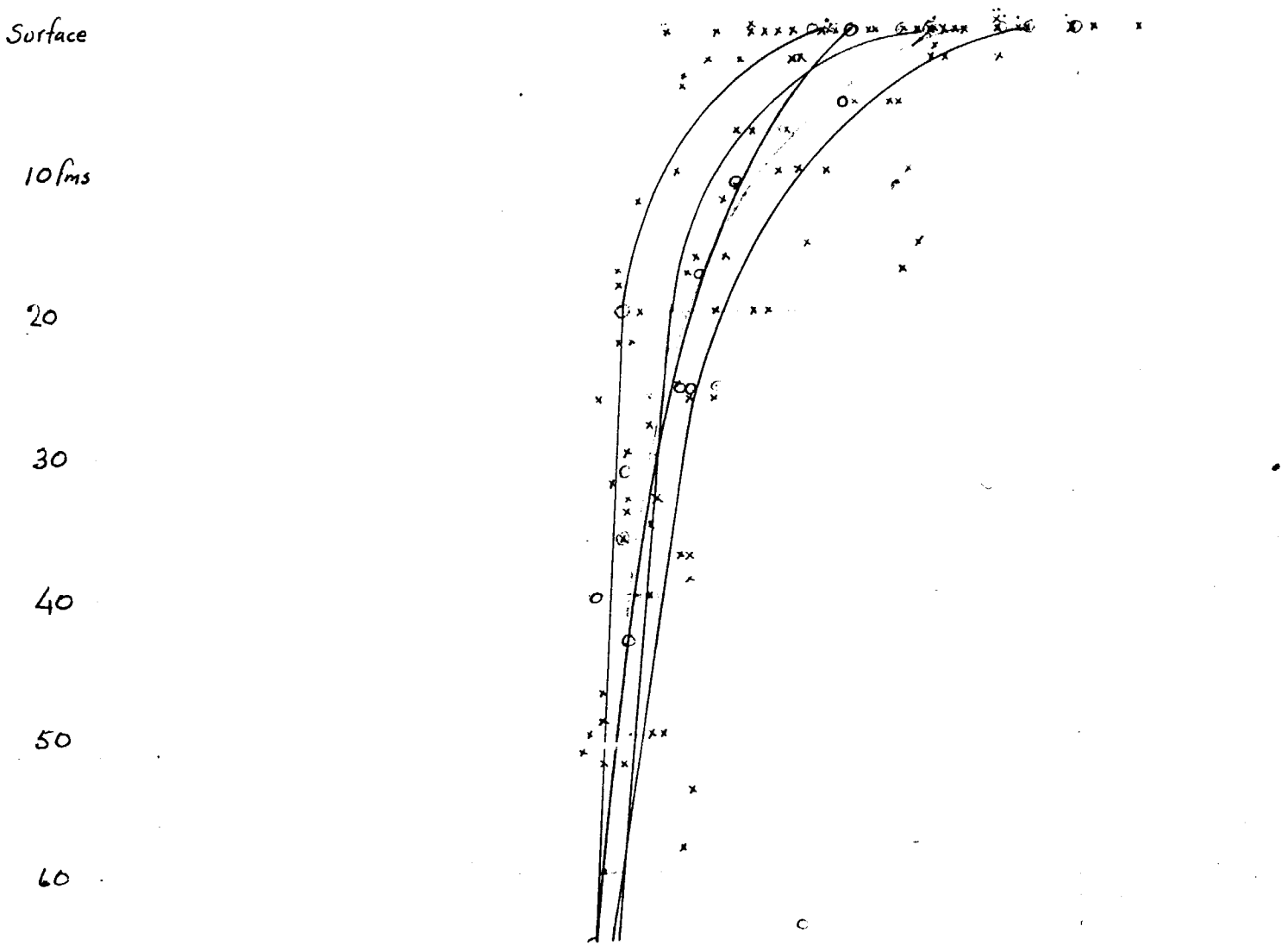
1931

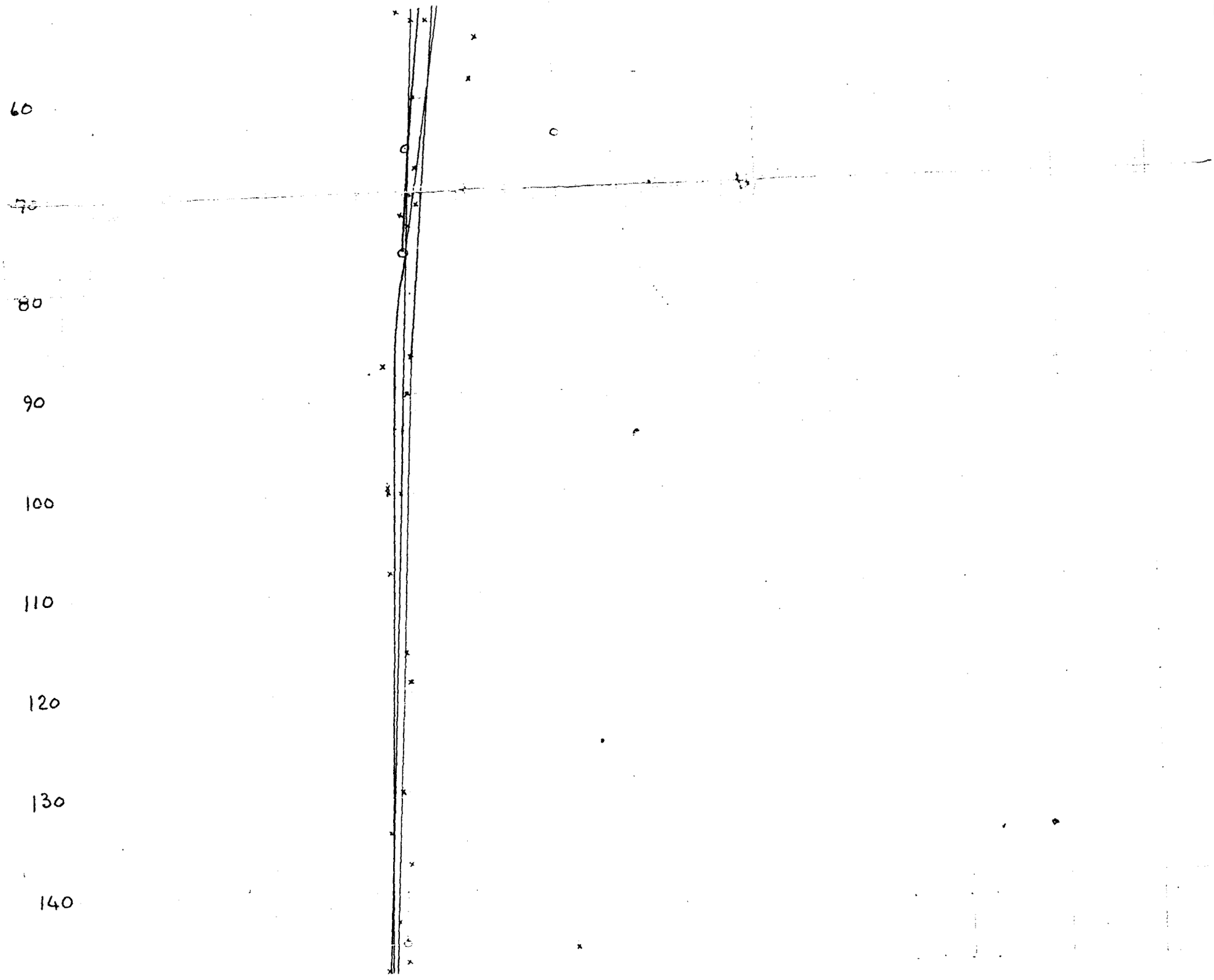
Hydrographic Name	Triangulation or Topographic Name	Location from
Beale	Cape Beale Lighthouse	Triangulation 1931
Bold Bluff	Bold Bluff	Triangulation 1931
Bode	Bode	Topo. Sheet Reg. #4450
Carm	Carmanah Lighthouse	Triangulation 1931
Carmanah Mt.	Carmanah Mt.	Triangulation 1931
Nit	Nitnat Cone	Triangulation 1931
Ozard	Ozard Mt.	Triangulation 1931
Pach	Pachena Lighthouse	Triangulation 1931
Three	Peak 3	Triangulation 1913
Toosh	Tatoosh Lighthouse	Triangulation 1931

— Temperatures —

— May — Sept.
— June — Oct.
— July

2°C 4°C 6°C 8°C 10°C 12°C 14°C 16°C

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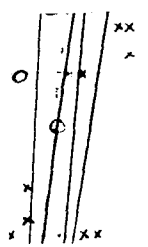

VELOCITY TESTS. (Experimental)

May 29, 1931.

STATION	Test No4	Test	
Toosh K.V.E.	16440	18500 (18532)	Scaled distance from Sheet #44. f = 18532 ÷ 18500 = log f = 0.000750.
Seconds	11.13		
% Kick	100 %		
Velocity	1479.64		

June 28,	No. 1	No. 2.	No. 3	Test	
Toosh KVE.	14892	17720	19348	19712 (19747)	Scaled distances from f = 19.747 ÷ 19712, log f = 0.0
Seconds	10.14	12.01	13.12		
% Kick	100	100	100		
Velocity	1471.25	1482.73	1477.31		

July 15,	No.1	No 2	No.3	No.4	No.5	No.6	N
Toosh KVE	26356 26389.7	25752 25785.0	25344 25376.4	24720 24751.6	23480 23510.0	23140 (23169.6)	22 22
Seconds	17.88	17.50	17.20		15.91	15.68	15
% Kick.	100	40	50		100	100	1
Velocity	1475.93	1473.43	1475.37		1477.69	1477.65	147
Beale KVD3	30404 30446.6	30920 30960.3	31276 31319.8	31824 31868.5	32904 32950.1	33200 (33247)	33 33
Seconds	20.615	20.97	21.215	21.57	22.275	22.47	22
% Kick	100	80	70	60	60	90	10
Velocity	1479.73	1476.41	1476.30	1477.44	1474.75	1479.62	1485

October 8,	No.1	No.2	No.3	No.4	No.6	No.7	N
Toosh KVE	23292	22560	21892	22988	24268 (24328.4)	24608	25
Seconds	15.80	15.30	14.83	15.59	16.48	16.68	16.
% Kick	80	80	100	100	100	100	10
Velocity	1478.12	1478.11	1479.80	1478.13	1476.24	1478.90	147
Beale KVD4	33292	34356	35648	35668	35348 (35377.5)	35256	35
Seconds				24.09	23.86	23.86[3]	23
% Kick	0	0	0	100	100	100	10
Velocity	—	—	—	1481.85	1482.71	1480.71	148

m Sheet #44.
g f = 0.000750.

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caled distances from Sheet 44
19.747 ÷ 19712, log f = 0.000770.

No.5	No.6	No.7	No.8	No.9.	
3480	23140	22760	22364	22020	Scaled distances from Sheet 45
3510.0	(23169.6)	22789.1	22392.6	22048.2	Adjusted distances, f = 1.00128. ( ) is computed distance.
15.91	15.68	15.43	15.20	14.96	
100	100	100	100	100	
477.69	1477.65	1476.93	1473.16	1473.81	
2904	33200	33530	33884	34184	Scaled distances from Sheet 46.
2950.1	(33247)	33576.9	33931.4	34231.8	Adjusted distances, f = 1.0014. ( ) is computed distance.
2.275	22.47	22.60	22.95	23.14	
60	90	100	100	100	
474.75	1479.62	1485.40	1478.51	1479.33	

No.6	No.7	No.8.	
4268	24608	25016	Scaled distances from Sheet 45.
43284)			Computed distance, log f = 0.001058
16.48	16.68	16.98	
100	100	100	
476.24	1478.90	1476.86	
5348	35256	35208	Scaled distances from Sheet 46
5377.5)			Computed distance, log f = 0.000362
23.86	23.86[3]	23.79	
100	100	100	
482.71	1480.71	1481.18	

Comp by J.B.V.
Copy by J.B.V.

THEORETICAL VELOCITY

SHEET 122 - WASHINGTON COAST

SEASON 1931

Salinity 33.5

July 15, 1931
To Station Toosh - K V E.

4/10 of distance average depth= 40 fms. 7.7°C = 1478.03 m/s x 4 = 5912.12
6/10 of distance average depth=130 fms. 6.5°C = 1473.85 m/s x 6 = 8843.10

Mean 1475.52 m/s

To Station Beale - K V D.

1/2 of distance average depth = 40 fms. 7.7°C = 1478.03 m/s
1/2 of distance average depth = 20 fms. 8.4°C = 1481.03 m/s

Mean 1479.53 m/s

October 8, 1931
To Station Toosh - K V E.

4/12 of distance average depth = 50 fms. 7.6°C = 1477.67 m/s x 4 = 5910.68
8/12 of distance average depth = 130 fms. 6.5°C = 1473.85 m/s x 8 = 11790.80

Mean 1475.12m/s

To Station Beale - K V D.

1/2 of distance average depth = 50 fms. 7.6°C = 1477.67 m/s
1/2 of distance average depth = 20 fms. 8.4°C = 1481.03 m/s

Mean 1479.35 m/s

September 26, 1931 - Position 4X.
To Station Toosh - K V E.

3/4 of distance average depth = 60 fms. 7.4°C = 1477.00 x 3 = 4431.00 m/s
1/4 of distance average depth = 130 fms. 6.5°C = 1473.85 x 1 = 1473.85 m/s

Mean = 1476.21 m/s

To Station Beale - K V D.

1/2 of distance average depth = 30 fms. 8.0°C = 1479.10 m/s
1/2 of distance average depth = 60 fms. 7.4°C = 1477.00 m/s

Mean = 1478.05 m/s

To Station Amphitrite - K V A.

1/2 of distance average depth = 30 fms. 8.0°C = 1479.10 m/s
1/2 of distance average depth = 70 fms. 7.2°C = 1476.30 m/s

Mean = 1477.70 m/s

THEORETICAL VELOCITY (continued)

June 13, 1931 - Position 17 E
To Station Toosh - K V E.

1/2 of distance average depth = 70 fms.	7.2°C = 1476.30 m/s	
1/2 of distance average depth =130 fms.	6.5°C = 1473.85 m/s	
	Mean = 1475.07 m/s	

To Station Beale - K V D.

1/3 of distance average depth = 30 fms.	8.0°C = 1479.10 m/s x 1 =	1479.10 m/s
2/3 of distance average depth = 60 fms.	7.4°C = 1477.00 m/s x 2 =	2954.00 m/s
	Mean =	1477.70.m/s

To Station Amphitrite - K V A.

1/4 of distance average depth = 30 fms.	8.0°C = 1479.10 m/s x 1 =	1479.10 m/s
3/4 of distance average depth = 70 fms.	7.2°C = 1476.30 m/s x 3 =	4428.90 m/s
	Mean =	1477.00 m/s

June 16, 1931 - Position 28 G.
To Station Toosh - K V E.

4/5 of distance average depth = 70 fms.	7.2°C = 1476.30 m/s x 4 =	5905.20 m/s
1/5 of distance average depth = 130 fms.	6.5°C = 1473.85 m/s x 1 =	1473.85 m/s
	Mean =	1475.81 m/s

To Station Beale - K V D.

1/10 of distance average depth = 30 fms.	8.0°C = 1479.10 m/s x 1 =	1479.10 m/s
3/10 of distance average depth = 40 fms.	7.7°C = 1478.03 m/s x 3 =	4434.09 m/s
3/10 of distance average depth = 70 fms.	7.2°C = 1476.30 m/s x 3 =	4428.90 m/s
3/10 of distance average depth = 80 fms.	7.0°C = 1475.64 m/s x 3 =	4426.92 m/s
	Mean =	1476.90 m/s

To Station Amphitrite - K V A.

1/5 of distance average depth = 30 fms.	8.0°C = 1479.10 m/s x 1 =	1479.10 m/s
2/5 of distance average depth = 40 fms.	7.7°C = 1478.03 m/s x 2 =	2956.06 m/s
2/5 of distance average depth = 80 fms.	7.0°C = 1475.64 m/s x 2 =	2951.28 m/s
	Mean =	1477.29 m/s

Computed by: H. J. H.
Checked by: J. C. M.
copy

SUMMARY AND CONCLUSION
from
THEORETICAL AND EXPERIMENTAL
VELOCITY DETERMINATION

THEORETICAL VALUES:

DATE	TOOSH - KVE.	BEALE - KVD.	AMPHITRITE - KVA.
JUNE 13	1475.07 m/s	1477.70 m/s	1477.00 m/s
JUNE 16	1475.81	1476.90	1477.29
JULY 15	1475.52	1479.53 *	
SEPT. 26	1476.21	1478.05	1477.70
OCT. 8	1475.12	1479.35 *	
MEAN	1475.54 m/s	1478.31 m/s	1477.33 m/s

* Mean of these = 1479.44

EXPERIMENTAL VALUES:

DATE	TOOSH - KVE.	BEALE - KVD.
MAY 29	1479.64 (1)	
JUNE 28	1477.09 (3)	
JULY 15	1475.50 (8)	1478.61 (9)
OCT. 8	1478.02 (7)	1481.61 (4)
WEIGHTED MEAN	1476.90 m/s	1479.53 m/s

Figures in parenthesis are weights.

VELOCITY USED IN PLOTTING SHEET 122.

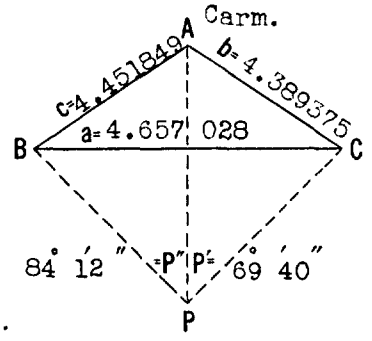
TOOSH - KVE.	BEALE - KVD.	AMPHITRITE - KVA.
1477 m/s	1479 m/s inside 100 fm. 1478 m/s to 500 fm 1477 m/s outside 500 fm.	1478 m/s inside 100 fm. 1477 m/s outside 100 fm.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 655
Ed. Jan., 1929

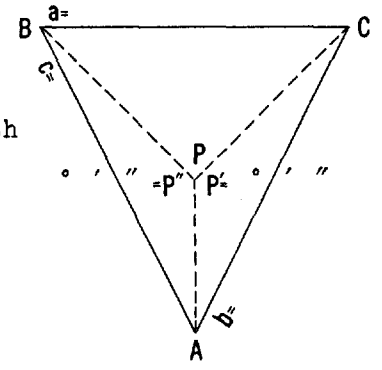
P6 July 15, 1931

COMPUTATION OF THREE-POINT PROBLEM

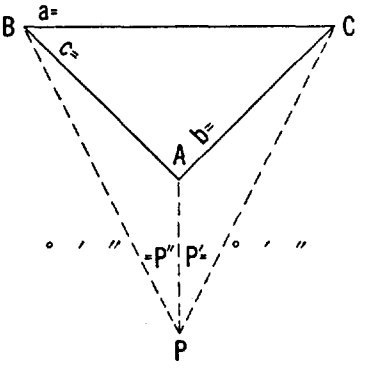
Case 1



Case 2



Case 3



Cases 1 and 2

P′	69-40
P″	84-12
A	118-21-20
Sum	272-13-20
½ Sum	136-06-40

S = 180° − ½ sum = 43-53-20

Case 3

P′
P″
Sum
A

S = ½ (A − sum) = A − sum

Log c =	4.451 849
Log sin P′ =	9.972 058
Colog b =	5.610 625
Colog sin P″ =	0.002 229
Sum = log tan Z =	0.036 761
Z =	47-25-19
Z + 45° =	92-25-19
Log cot (Z + 45°) =	8.626 300n
Log tan S =	9.983 152
Sum = log tan ϵ =	8.609 452 (sign −)

ϵ 2-19-48
S 43-53-20

(Tan ϵ+)
S + ϵ = angle ABP
S − ϵ = angle ACP

(Tan ϵ−)
S − ϵ = angle ABP
S + ϵ = angle ACP

BPA	84-12-00	APC	69-40-00	PCB	12-56-37
ABP	41-33-32	PCA	46-13-08	CBP	13-11-23
PAB	54-14-28	CAP	64-06-52	BPC	153-52-(00)
	180-00-00		180-00-00		180-00-00

(For explanation of this form see Special Publication No. 138, pages 191 and 192, or Special Publication No. 145.)

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

Bomb No. 6 July 15, 1931

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

		°	′	″
α	2 Carmanah to 3 Toosh L.H.	357	28	14
2d ∠	&	+ 64	06	52
α	2 Carmanah to 1 P6	61	35	06
Δα				
		180	*00*	*00.0*
α′	1 to 2			

		°	′	″
α	3 Toosh L.H. to 2 Carmanah	177	28	53
3d ∠	&	− 46	13	08
α	3 Toosh L.H. to 1 P6	131	15	45
Δα				
		180	*00*	*00.0*
α′	1 to 3			

First Angle of Triangle 69° 40′ ″

	°	′	″			°	′	″
φ	48	36	44.2	2 Carmanah	λ	124	45	01.4
Δφ		−4	51.5		Δλ		+13	29.1
φ′	48	31	52.7	1 P6	λ′	124	58	30.5

	°	′	″			°	′	″
φ	48	25	31.4	3 Toosh L.H.	λ	124	44	08.9
Δφ		+ 8	21.2		Δλ		+14	21.7
φ′	48	31	52.6	1 P6	λ′	124	58	30.6

	Logarithms
s	4.275 847
Cos α	9.677 474
B	8.510 189
h	2.463 510
s²	8.551 69
Sin² α	9.888 50
C	1.458 53
	9.898 72
h²	4.927 0
D	2.389 3
	7.316 3

Values in seconds	
1st term	290.74″
2d term	+ 0.79
3d term	+ ----
−Δφ	291.5

½(φ+φ′)	Logarithms	Values in seconds
s	4.275 847	
Sin α	9.944 248	
A′	8.508 900	
Sec φ′	0.179 006	
Δλ	2.908 001	809.1″
Sin ½(φ+φ′)		
−Δα		

	Logarithms
s	4.371 399
Cos α	9.819 221n
B	8.510 206
h	2.700 826
s²	8.742 80
Sin² α	9.752 08
C	1.455 20
	9.950 08
h²	5.401 6
D	2.389 7
	7.791 3

Values in seconds	
1st term	−502.14″
2d term	+ 0.89
3d term	+ ----
−Δφ	−501.2

½(φ+φ′)	Logarithms	Values in seconds
s	4.371 399	
Sin α	9.876 042	
A′	8.508 900	
Sec φ′	0.179 006	
Δλ	2.935 347	861.7″
Sin ½(φ+φ′)		
−Δα		

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

Bomb # 6
KVB Tatoosh
July 15, 1931

INVERSE POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

P_6 KVD$_3$ Beale

					°	′	″					°	′	″
α	2	to 3						α	3	to 2				
$2^d\angle$		&			+			$3^d\angle$		&		−		
α	2	to 1						α	3	to 1				
$\Delta\alpha$								$\Delta\alpha$						
					180	00	00.0					180	00	00.0
α'	1	to 2						α'	1	to 3				

FIRST ANGLE OF TRIANGLE

	°	′	″			°	′	″		°	′	″			°	′	″
ϕ	48	31	52.6	2 P_6	λ	124	58	30.6	ϕ	48	31	52.6	3 P_6	λ	124	58	30.6
$\Delta\phi$		− 8	26.5		$\Delta\lambda$		− 13	53.7	$\Delta\phi$		14	56.0		$\Delta\lambda$		15	00.1
ϕ'	48	23	26.1	1 KVB Tatoosh	λ'	124	44	36.9	ϕ'	48	46	48.6	1 KVD$_3$ Beale	λ'	125	13	30.7

	Logarithms	Values in seconds
s		
Cos α	4.193 697	
B	8.510 196	
h	2.703 893	1st term ″ 505.7
s^2		
$\sin^2\alpha$	8.466 61	
C	1.457 30	
	9.923 91	2d term + 0.8
h^2	5.407 8	
D	2.389 5	
	7.797 3	3d term +-----
		$-\Delta\phi$ 506.5

° ′ ″ $\frac{1}{2}(\phi+\phi')$	Logarithms	Values in seconds
s		
Sin α	4.233 307n	
A′	8.509 903	
Sec ϕ'	0.177 800	
$\Delta\lambda$	2.921 010	″ −833.7
$\sin\frac{1}{2}(\phi+\phi')$		
$-\Delta\alpha$		

S Sin a 4.233 307n
S Cos a 4.193 697
Tan a 0.039 610n
a 312 23 26.8

S Sin a 4.233 307
Sin a 9.868 388
S 4.364 919

S Cos a 4.193 697
Cos a 9.828 778
S 4.364 919

S 23 169.6

	Logarithms	Values in seconds
s		
Cos α	4.442 592n	
B	8.510 196	
h	2.952 788n	1st term ″ −896.99
s^2		
$\sin^2\alpha$	8.528 50	
C	1.457 30	
	9.985 80	2d term + 0.97
h^2	5.904 6	
D	2.389 5	
	8.294 1	3d term + 0.02
		$-\Delta\phi$ −896.0

° ′ ″ $\frac{1}{2}(\phi+\phi')$	Logarithms	Values in seconds
s		
Sin α	4.264 250	
A′	8.508 893	
Sec ϕ'	0.181 148	
$\Delta\lambda$	2.954 291	″ 900.1
$\sin\frac{1}{2}(\phi+\phi')$		
$-\Delta\alpha$		

S Sin a 4.264 250
S Cos a 4.442 592
Tan a 9.821 658n
a 146 36 48.5

S Sin a 4.264 250
Sin a 9.742 498
S 4.521 752

S Cos a 4.442 592
Cos a 9.920 840
S 4.521 752

S 33 247.

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

Inverse Three Peak 1913 to Pachena Three Peak 1913 to Carmanah

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

				°	′	″					°	′	″
α	2	to 3					α	3	to 2				
$2^d\angle$		&		+			$3^d\angle$		&		−		
α	2	to 1		141	30	03.0	α	3	to 1		168	11	44.9
$\Delta\alpha$					− 18	58.2	$\Delta\alpha$					−03	23.7
				180	*00*	*00.0*					*180*	*00*	*00.0*
α'	1	to 2		321	11	04.8	α'	1	to 3		348	08	21.2

FIRST ANGLE OF TRIANGLE

	°	′	″			°	′	″		°	′	″			°	′	″
ϕ	48	22	20.97	2 Three (Peak) (1913)	λ	124	40	29.38	ϕ	48	22	20.97	3 Three (Peak) (1913)	λ	124	40	29.38
$\Delta\phi$		+ 21	00.50		$\Delta\lambda$		+ 25	18.56	$\Delta\phi$		+14	23.21		$\Delta\lambda$		+04	32.07
ϕ'	48	43	21.47	1 Pachena	λ'	125	05	47.94	ϕ'	48	36	44.18	1 Carmanah	λ'	124	45	01.45

	Logarithms	Values in seconds
s	n	
Cos α	4.591 295	
B	8.510 208	
h	3.101 503	1st term −1263.29
s^2		
$\sin^2\alpha$	8.983 77	
C	1.454 96	
	0.438.73	2d term + 2.75
h^2	6.201 0	
D	2.389 8	
	8.590 8	3d term + 0.04
		$-\Delta\phi$ −1260.50

	°	′	″
$\frac{1}{2}(\phi+\phi')$	48	32	51.22

	Logarithms	Values in seconds
s		
Sin α	4.491 887	
A′	8.508 895	
Sec ϕ'	0.180 650	
$\Delta\lambda$	3.181 432	1518.56
Sin $\frac{1}{2}(\phi+\phi')$	9.874 775	
$-\Delta\alpha$	3.056 207	1138.17

S Sin a 4.491 887
S Cos a 4.591 295n
Tan a 9.900 592n
a 141° 30′ 03.0″

S Sin a 4.491 887
Sin a 9.794 142
S 4.697 745

S Cos a 4.591 295
Cos a 9.893 549
S 4.697 746

	Logarithms	Values in seconds
s	n	
Cos α	4.425 964	
B	8.510 208	
h	2.936 172	1st term − 863.32
s^2		
$\sin^2\alpha$	7.492 17	
C	1.454 96	
	8.947 13	2d term + 0.09
h^2	5.877 2	
D	2.389 8	
	8.267 0	3d term + 0.02
		$-\Delta\phi$ −863.21

	°	′	″
$\frac{1}{2}(\phi+\phi')$	48	29	32.58

	Logarithms	Values in seconds
s		
Sin α	3.746 084	
A′	8.508 898	
Sec ϕ'	0.179 699	
$\Delta\lambda$	2.434 681	272.07
Sin $\frac{1}{2}(\phi+\phi')$	9.874 405	
$-\Delta\alpha$	2.309 086	203.76

S Sin a 3.746 084
S Cos a 4.425 964
Tan a 9.320 120
a 168° 11′ 44.9″

S Sin a 3.746 084
Sin a 9.310 837
s 4.435 247

S Cos a 4.425 964
Cos a 9.990 717
s 4.435 247

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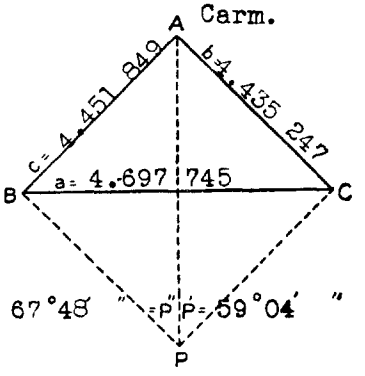
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 655

P6 Oct. 8, 1931

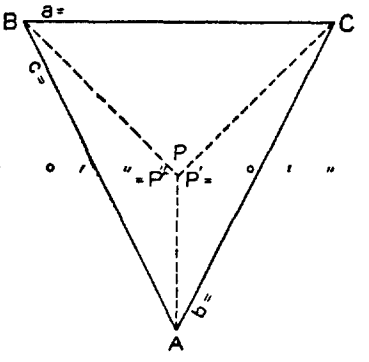
COMPUTATION OF THREE-POINT PROBLEM

Case 1

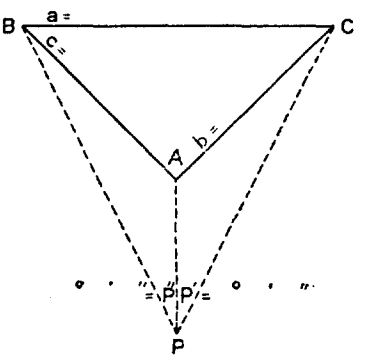


Three

Case 2



Case 3



Carm-Pach 115-49-34
Carm-Three 348-08-21
A 127-41-13

Cases 1 and 2

P′ 59-04
P″ 67-48
A 127-41-13

Sum 254-33-13
½ Sum 127-16-36

S = 180° − ½ sum = 52-43-23.5

Case 3

P′
P″

Sum
A

A − sum
S = ½ (A − sum) =

Log c =	4.451 849
Log sin P′ =	9.933 369
Colog b =	5.564 753
Colog sin P″ =	0.033 450
Sum = log tan Z =	9.983 421
Z =	43-54-24
Z + 45° =	88-54-24
Log cot (Z + 45°) =	8.280 683
Log tan S =	0.118 526
Sum = log tan ϵ =	8.399 209

(sign +)

ϵ 1° 26′ 10.6″
S 52° 43′ 23.5″

(Tan ϵ +)
S + ϵ = angle ABP
S − ϵ = angle ACP

(Tan ϵ −)
S − ϵ = angle ABP
S + ϵ = angle ACP

BPA	67-48-00	APC	59-04-00	PCB	24-35-31
ABP	54-09-34	PCA	51-17-13	CBP	28-32-28
PAB	58-02-26	CAP	69-38-47	BPC	126-52-(01)
	180-00-00		180-00-00		180-00-00

(For explanation of this form see Special Publication No. 26, 2d edition, paragraph 108, page 57)

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—9121

COMPUTATION OF TRIANGLES

State: CALIFORNIA

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						4.451 849
	1 P_6	84 12 00					0.002 229
	2 Pachena (B)	41 33 32					9.821 769
	3 Carmanah (A)	54 14 28					9.909 280
	1-3						4.275 847
	1-2						4.363 358
	2-3						4.389 375
	1 P_6	69 40 00					0.027 942
	2 Carmanah	64 06 52					9.954 082
	3 Toosh	46 13 08					9.858 530
	1-3						4.371 399
	1-2						4.275 847
	2-3						4.657 028
	1 P_6	153 52 00					0.356 092
	2 Pachena	12 56 37					9.350 232
	3 Toosh	13 11 23					9.358 270
	1-3						4.363 352
	1-2						4.371 400
	2-3					Comp. by H.J.H. ✓ by	
	1					Com. by ~~H.C.A.~~ W.C.A ✓ by [illegible]	
	2						
	3						
	1-3						
	1-2						

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—9121

COMPUTATION OF TRIANGLES

State: Washington

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						4.451 849
	1 P_6 Oct.8,31	67-48-00					0.033 450
	2 Pachena	54-09-34					9.908 833
	3 Carmanah	58-02-26					9.928 612
	1-3						4.394 132
	1-2						4.413 911
	2-3						4.435 247
	1 P_6 Oct.8,31	59-04-00					0.066 631
	2 Carmanah	69-38-47					9.972 001
	3 Peak 3 1913	51-17-13					9.892 255
	1-3						4.473 879
	1-2						4.394 133
	2-3						4.697 745
	1 P_6 Oct.8,31	126-52-(01)					0.096 893
	2 Pachena	28-32-28					9.679 236
	3 Peak 3 1913	24-35-31					9.619 253
	1-3						4.473 874
	1-2						4.413 891
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	2-3						Cop. by ✓ by J.J.N.
	1						
	2						
	3						
	1-3						
	1-2						

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U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

		°	′	″
α	2 Carmanah to 3 Peak 3 1913	348	08	21
2d ∠	&	+69	38	47
α	2 Carmanah to 1 P_6 Oct.8,31	57	47	08
Δα				
		180	*00*	*00.0*
α′	1 to 2			

First Angle of Triangle 59 ° 04 ″

	°	′	″			°	′	″
φ	48	36	44.2	2 Carmanah	λ	124	45	01.4
Δφ		-07	08.9		Δλ		+17	01.1
φ′	48	29	35.3	1 P_6 Oct.8,31	λ′	125	02	02.5

	Logarithms
s	4.394 133
Cos α	9.726 800
B	8.510 189
h	2.631 122
s^2	8.788 27
$\sin^2\alpha$	9.854 80
C	1.458 53
	0.101 60
h^3	5.262 2
D	2.389.3
	7.651 5

Values in seconds	
1st term	″ 427.68
2d term	+ 1.27
3d term	+ ----
−Δφ	428.95

½(φ+φ′)	°	′	″	Values in seconds
s	Logarithms 4.394 133			
Sin α	9.927 400			
A′	8.508 901			
Sec φ′	0.178 653			
Δλ	3.009 087			″ 1021.1
$\sin\frac{1}{2}(\phi+\phi')$				
−Δα				

	Logarithms
s	4.473 879
Cos α	9.655 689n
B	8.510 208
h	2.639 776
s^2	8.947 76
$\sin^2\alpha$	9.900 46
C	1.454 96
	0.303 18
h^3	5.279.5
D	2.389 8
	7.669 3

Values in seconds	
1st term	″ -436.29
2d term	+ 2.01
3d term	+ ---
−Δφ	-434.28

½(φ+φ′)	°	′	″	Values in seconds
s	Logarithms 4.473 879			
Sin α	9.950 232			
A′	8.508 901			
Sec φ′	0.178 653			
Δλ	3.111 665			″ 1293.2
$\sin\frac{1}{2}(\phi+\phi')$				
−Δα				

	°	′	″			°	′	″
α	3 Peak 3 1913 to 2 Carmanah					168	11	45
3d ∠	&					-51	17	13
α	3 Peak 3 1913 to 1 P_6 Oct.8,31					116	54	32
Δα								
						180	*00*	*00.0*
α′	1 to 3							

	°	′	″			°	′	″
φ	48	22	21.0	3 Peak 3 1913	λ	124	40	29.4
Δφ		+07	14.3		Δλ		+21	33.2
φ′	48	29	35.3	1 P_6 Oct.8,31	λ′	125	02	02.6

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

P6 Oct.8,1931 Inverse

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

					°	′	″								°	′	″
α	2	to 3						α	3	to 2							
2d ∠		&		+				3d ∠		&		−					
α	2	to 1						α	3	to 1							
Δα								Δα									
					180	00	00.0								180	00	00.0
α′	1	to 2						α′	1	to 3							

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
φ	48	29	35.3	2 P_{ζ} Oct.8,31	λ	125	02	02.5	φ	48	29	35.3	3 P_{ζ} Oct.8,31	λ	125	02	02.5
Δφ		-06	09.2		Δλ		-17	25.6	Δφ		+17	28.9		Δλ		+11	33.9
φ′	48	23	26.1	1 KVB_4 Toosh	λ′	124	44	36.9	φ′	48	47	04.2	1 KVB_4 Beale	λ′	125	13	36.4

	Logarithms	Values in seconds		Logarithms	Values in seconds
s			½(φ+φ′)		
Cos α	4.055 532		s	Logarithms	Values in seconds
B	8.510 198		Sin α	4.332 663n	
h	2.565 730	1st term 367.9″	A′	8.508 903	
s^2			Sec φ′	0.177 800	
$Sin^2 α$	8.665 33		Δλ	3.019 366	-1045.6″
C	1.456 73		Sin ½(φ+φ′)		
	0.122 06	2d term + 1.3	−Δα		
h^2	5.134 5		S Sin a	4.332 663n	
D	2.389 5		S Cos a	4.055 532	
	7.424 0	3d term + ----	Tan a	0.277 131n	
		−Δφ 369.2	a	297-50-48.6	

	Logarithms	Values in seconds		Logarithms	Values in seconds
s			½(φ+φ′)		
Cos α	4.510 784n		s	Logarithms	Values in seconds
B	8.510 198		Sin α	4.151 219	
h	3.020 982	1st term -1049.5″	A′	8.508 893	
s^2			Sec φ′	0.181 185	
$Sin^2 α$	8.302 44		Δλ	2.841 297	693.9″
C	1.456 73		Sin ½(φ+φ′)		
	9.759 17	2d term + 0.57	−Δα		
h^2	6.041 5		S Sin a	4.151 219	
D	2.389 5		S Cos a	4.510 784n	
	8.431 0	3d term + 0.03	Tan a	9.640 435n	
		−Δφ -1048.9	a	156-23-48.8	

S Sina 4.332 663 S Cos a 4.055 532
Sin a 9.946 550 Cos a 9.669 419
S 4.386 113 S 4.386 113

S Sin a 4.151 219 S Cos a 4.510 784
Sin a 9.602 492 Cos a 9.962 057
S 4.548 727 S 4.548 727

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16-8262 U. S. GOVERNMENT PRINTING OFFICE: 1928

STATEMENT

to accompany

HYDROGRAPHIC SHEET FIELD NO. 122.

WASHINGTON COAST

1931

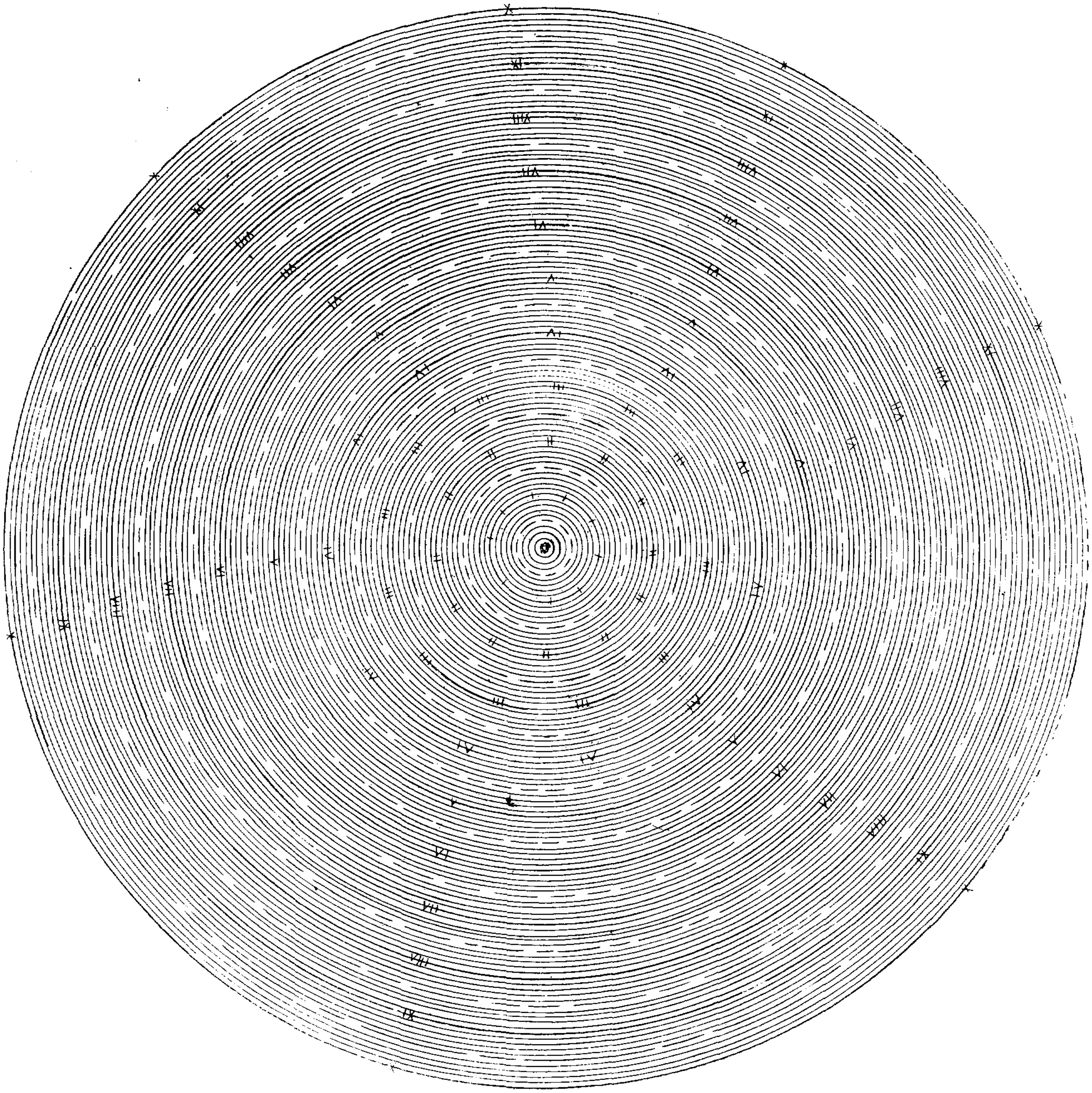
At transfer of command on November 30, 1931 no smooth plotting had been accomplished on this sheet.

I have exercised general supervision over the smooth plotting and have inspected the sheet on completion and approve the smooth plotting thereof.

Fred. L. Peacock

Fred. L. Peacock,
H. & G. E., C. & G. Survey,
Commanding Ship GUIDE.

Oakland, California.
April, 7, 1932.



Scale
1:120,000

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER

AND REFER TO No. 82-DRM

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

SECTION OF FIELD RECORDS

Review of Hydrographic Sheet No. 5172

Vicinity of Cape Flattery, Wash. - Offshore

Surveyed in 1931

Instructions dated May 7, 1931 and May 21, 1931 (GUIDE)

Fathometer soundings - Bomb control

Chief of Party, K. T. Adams

Surveyed by K.T.A.

Protracted by H. J. Healy and E. H. Sheridan

Soundings plotted by E.H.S.

Verified and inked by J. Fleming.

1. This review has been made with a view to expediting the reporting of the sheet to the Cartographic Section in order that it might be applied to chart 6102 which is now in process of being extensively corrected. Therefore only those points have been considered that might affect the compilation. The sheet and descriptive report contain much valuable information relating to the transmission of sound through sea water which it is desired to consider fully at some future time when it is proposed to study all the data received in the office subsequent to the preparation of Special Report 46 - 1931.

   Some of the points to be considered would be the following:

   (a) Comparison of theoretical and experimental velocities.
   (b) Study of bomb returns and their relation to intensity of the charge.
   (c) The diffractive effect of intervening shoals.
   (d) The blanketing effect of the five fathom shoal off Amphitrite Point.
   (e) The failure of the 3-bomb distances to intersect on La Perouse Bank.

   It is believed that anything that might be derived from the above studies will not materially affect the chart and therefore their immediate consideration is not essential.

2. Records: The records conform to the requirements of the Hydrographic Manual with the exception that more comparisons between vertical casts and fathometer should have been taken as a check on the operation of the fathometer. A comparison at the beginning and ending of each day's work would not only serve this purpose but would supply other needed information such as bottom characteristics and temperatures. On the present survey covering 26 days' work only 16 comparisons were made.

3. Specific Instructions: The work is in conformity with the specific instructions except that the spacing of lines between 500 and 800 fathoms slightly exceeds the 3-mile lines called for. There is a noticeable lack of bottom characteristics on this survey which covers approximately 1200 square miles and yet only seven bottom characteristics were obtained. The specific instructions (paragraph 26, April 16, 1930) call for one every 25 square miles in the area falling within chart 6102 which takes in the greater portion of this survey.

4. Depths curves: The usual depth curves can be completely drawn.

5. Crossings: In general there is excellent agreement between soundings on cross lines.

6. Junctions with surveys:

(a) Contemporary work: The junctions with the contemporary surveys H. 5111, H. 5114, H. 5147, H. 5148 and H. 5149 are all satisfactory.

(b) Old work: There are no old surveys executed by this Bureau within the limits of this survey.

(c) Comparison with chart 6102: The soundings on chart 6102 that fall within the limits of the present survey (H. 5172) have been taken from B.A. chart 1911. A comparison with the present survey shows a generally good agreement. Some differences are noted, but many of these are due to the incompleteness of the B.A. survey. There are two soundings on chart 6102, that fall in much greater depths on the present survey and these will be specially mentioned.

The first is a 47 fm. sounding in lat. 48° 35 1/2', long. 125° 24 1/2'. This falls in approximate 80 fm. depths on the new survey and while no sounding line runs directly over it, two lines straddle it about 1/2 mile on either side but no indication of such depth was obtained. It probably belongs on the 50 fathom bank about two miles to the southward. It is significant that it is shown on B.A. chart 1911 as an

isolated sounding and not on their regular system of lines. As the work was probably outside the limits of fixed positions, the location of an isolated sounding would naturally be subject to considerable approximation. It is recommended that this sounding be omitted from the charts.

The second charted sounding of doubtful accuracy is the 52 fm. in lat. 48° 23', long. 125° 06 1/2'. A fathometer line passes very close to the 52 on the new survey and 63 fathoms obtained with no indication whatever of a shoaling. Although there is a shoaling indicated on the new survey to the north of the 52 it is not recommended that the 52 be retained since it is not a critical depth and it is reasonably certain that it does not belong in the position charted. Any other position that would be adopted would be an approximation.

The new survey should therefore supersede everything on chart 6102 (as corrected to Oct. 16, 1931) that falls within ~~the~~ its limits with the exception of the bottom characteristics which should be retained on the charts.

7. Additional work: No additional work is recommended within the limits of this survey.

8. Velocity of sound used: The sound velocities used for the various hydrophones ~~was~~ were based upon a comparison of the theoretical and experimental values to stations Toosh (KVE) and Beale (KVD) and the theoretical bottom velocity to station Amphitrite (KVA). No experimental values were obtained to the latter station. From these the velocity to be used was determined to all three stations for depths inside 100 fathoms. For depths outside 100 fms. the velocities used were decreased by 1 meter per second to 500 fms. and by another meter per second for greater depths. This appears reasonable both from a consideration of the temperature ~~curves~~ curves for this area and from the fact that on the adjoining sheet to the south (H. 5114) the maximum difference in velocity between the inshore 3-point fix determination and the offshore 3 hydrophone station determination was only 3 meters per second. Furthermore the greater portion of this sheet lies within the 200 fm. curve so that even if the velocity of sound in the deeper areas was considerably different from the shoaler areas the net velocity to the hydrophone would probably be substantially the same as the inshore velocities.

In connection with the velocity of sound used it is worth noting that numerous tests made throughout the season to stations Toosh and Beale gave the following interesting results:

	To station Toosh (KVE)	To station Beale (KVD)
Experimental velocity (19 tests)	= 1476.90 m/s	1479.53 m/s (13 tests
Theoretical bottom velocity	= 1475.54	1479.44
Theoretical surface velocity	= 1490.7	1490.7

The mean velocities (surface to bottom) have not been computed but an inspection of the values for surface and bottom velocities will show that the mean in each case would necessarily be considerably higher than the experimental values. In the computation of theoretical bottom velocities the mean season's temperature curve was used. This does not introduce misleading results since for the depths under consideration the curves for the various months show but slight difference in temperature. It is intended to consider these comparisons in greater detail at some future time.

These results further the theory that for moderate depths the effective sound wave that reaches the hydrophone is one that closely corresponds in velocity to the theoretical velocity that would be obtained by using the mean temperature of the bottom layer of water in a vertical section from bomb to hydrophone, irrespective of what the actual path of propagation might be. A practical, workable method for obtaining sound velocities for radio acoustic ranging is thus gradually being evolved.

9. Reviewed by A. L. Shalowitz, August, 1932.

Approved:

A. M. Sobieraloki

Chief, Section of Field Records.

J. S. Dorsey

Chief, Section of Field Work.

April 27, 1932.

Division of Hydrography and Topography:

Division of Charts:

Tide Reducers are approved in
6 volumes of sounding records for

HYDROGRAPHIC SHEET 5172

Locality **Approach to Strait of Juan de Fuca, Washington Coast**

Chief of Party: **K. T. Adams in 1931**
Plane of reference is **Mean lower low water, reading**
4.1 ft. on tide staff at **Neah Bay**
22.3 ft. below B. M. 3
4.6 ft. on tide staff at Tatoosh Island
22.0 ft. below B.M. 4

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in records.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

Paul F. Whitney

Chief, Division of Tides and Currents.

10

Field Records Section (Charts)

HYDROGRAPHIC SHEET No. 5172

The following statistics will be submitted with the cartographer's report on the sheet:

Number of positions on sheet	1281
Number of positions checked	246
Number of positions revised	4
Number of soundings recorded	9604
Number of soundings revised	25
Number of signals erroneously plotted or transferred	None

Date: Aug 16, 1932

Cartographer: John Fleming

Form 537
Ed. Dec., 1930

REG. NO. 5172

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 122

REGISTER NO. 5172

State Washington

General locality ~~Washington Coast~~ Pacific Ocean

Locality ~~South of Vancouver Island~~ Approach to Strait of Juan de Fuca

Scale 1:120,000 Date of survey May to October, 1931

Vessel U. S. C. & G. S. S. GUIDE

Chief of Party K. T. Adams

Surveyed by K. T. Adams

Protracted by H. J. Healy and E. H. Sheridan

Soundings penciled by E. H. Sheridan

Soundings in fathoms ~~feet~~

Plane of reference M. L. L. W., Neah Bay Gauge

Subdivision of wire dragged areas by

Inked by

Verified by

Instructions dated May 7 and May 21, 1931

Remarks:

U. S. GOVERNMENT PRINTING OFFICE 1931

NAUTICAL CHARTS BRANCH

SURVEY NO. 5172

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
6/24/46	5022	Rivegari	~~Before~~ After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review.
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review

M-2168-1

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.