[redacted]
[redacted]STEMATIC RE
GUIDELINES AS DESCRIBED IN SECT.
3.3(a), EXECUTIVE ORDER 12356.

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No. PF 40351 *Office No.* H 7951

LOCALITY

State ALASKA

General locality BERING SEA

Locality CENTRAL BERING SEA

19451

CHIEF OF PARTY

Charles Pierce

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Form 537
(Ed. June 1946)

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.

REGISTER No. H 7951

Field No. PF 40351

State ALASKA

General locality BERING SEA

Locality CENTRAL BERING SEA

Scale 1:500 000 Date of survey 10 Jul - 3 Sep 1951

Instructions dated 6 March 1951

Vessel USC&GSS PATHFINDER

Chief of party Charles Pierce

Surveyed by J.C. Tribble, K.S. Ulm, W.C. Russell, F.J. Bryant

Soundings taken by fathometer, graphic recorder, [illegible]

Fathograms scaled by Lippold, Watkins, Hodges, Arnold, Ellis

Fathograms checked by Lippold, Hodges

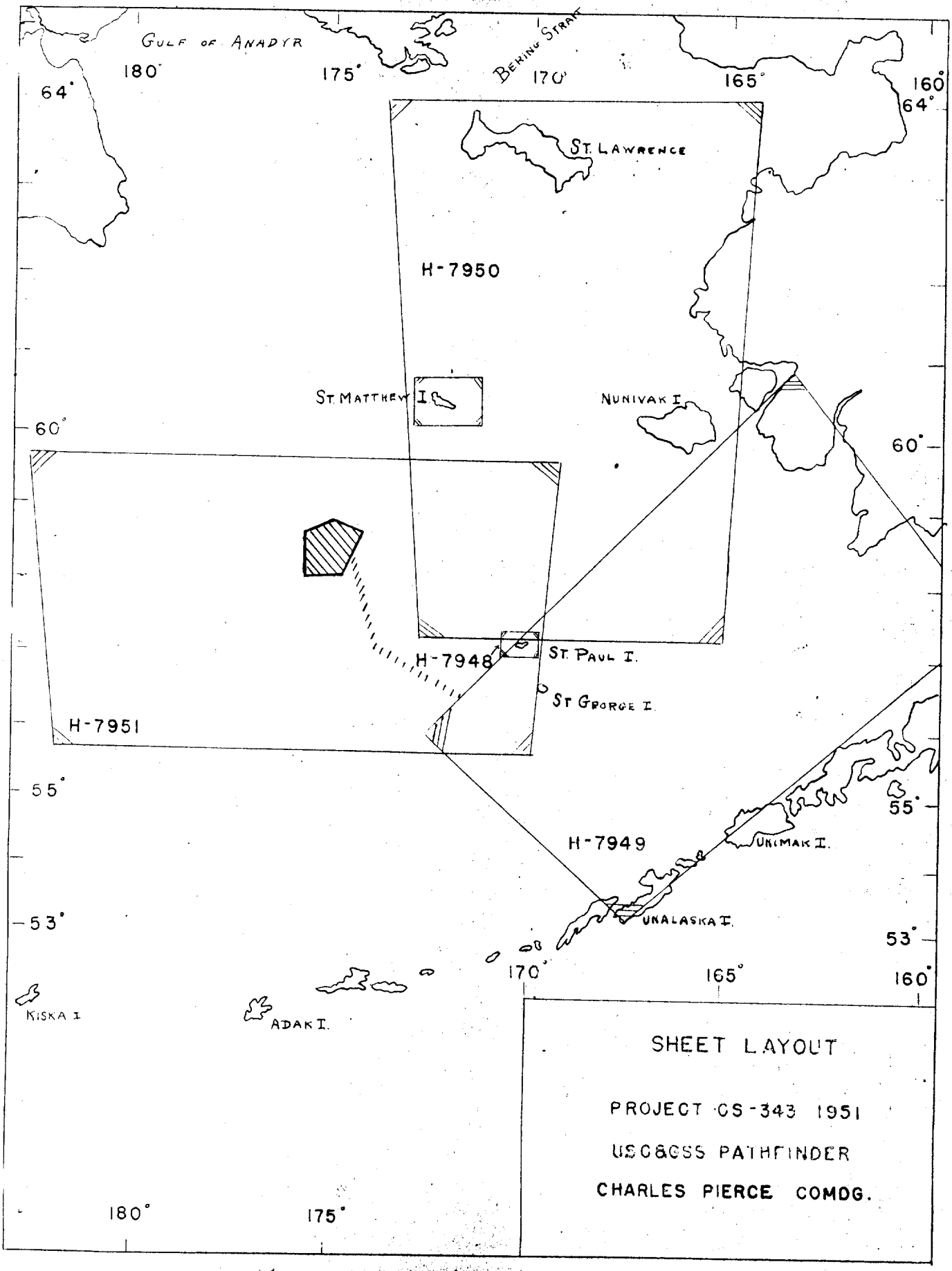
Protracted by J.B. Watkins

Soundings penciled by J.B. Watkins

Soundings in fathoms [illegible] at [illegible] MLLW

REMARKS: Incomplete survey

U. S. GOVERNMENT PRINTING OFFICE 777032


GULF OF ANADYR
BERING STRAIT
180°
175°
170°
165°
160°
64°
ST. LAWRENCE
H-7950
ST. MATTHEW I.
NUNIVAK I.
60°
H-7948
ST. PAUL I.
ST GEORGE I.
H-7951
55°
H-7949
UNIMAK I.
53°
UNALASKA I.
KISKA I.
ADAK I.
SHEET LAYOUT
PROJECT OS-343 1951
USC&GSS PATHFINDER
CHARLES PIERCE COMDG.

DESCRIPTIVE REPORT TO ACCOMPANY

HYDROGRAPHIC SURVEY, H-7951 (Field No. PF-40351) (Incomplete)

BERING SEA, ALASKA 1951
CENTRAL BERING SEA

SCALE: 1:500,000

CHARLES PIERCE, Chief of Party

USC&GSS PATHFINDER

J.C. Tribble
K.S. Ulm
W.C. Russell
F.J. Bryant

HYDROGRAPHERS

A. PROJECT CS-343 - Instructions dated 6 March 1951 with supplemental instructions of 1 August 1951 (Directors ltr. of 1 Aug 51 file S-1-PF)

B. SURVEY LIMITS AND DATES - That portion of the Bering Sea Area from St, Paul Island westward, to a line five (5) nautical miles southeast of and parallel to the line of demarcation established by the Conference of 1867 between the United States and Russia, and northward to Latitude 59°- 40. The western limit was later changed to a line fifty (50) nautical miles southeast of and parallel to the line of demarcation. The survey is joined on the east by surveys H-7950 and H-7949, both at 1/500,-000 scale and H-7948, scale 1/40,000. All are incomplete contemporary surveys. There are no previous surveys of this area. Field work began 10 July 1951 and ended 3 September 1951.

C. VESSEL AND EQUIPMENT - The major part of the sounding accomplished was done by USC&GSS PATHFINDER as EPI controlled hydrography. The vessel operated primarily at standard speed (115 rpm) with reductions to 2/3 speed (75 rpm) when Bathythermograph observations were being made. On one occasion heavy seas necessitated slowing the vessel to 100 rpm for a short period. The turning radius of the Ship PATHFINDER is estimated to be 200 meters at standard speed of 115 rpm.

Sounding equipment used on this survey by the PATHFINDER was; 808 type Fathometer No. 130-S, N.J.-3 Type Fathometer No. 22, and NMB-1 type Fathometer No. 106. The depths at which these instruments were generally used are tabulated below.

808 type	0 to 155	fathoms
NJ-3	155 to 400	fathoms
NMB-1	400 to 1200	fathoms

Several sounding lines in the southeast part of the area were accomplished by USC&GSS EXPLORER. A brief report by C.O. EXPLORER is included in this report.

D. TIDES AND CURRENTS - A Standard Automatic Tide Gage was maintained at at Dutch Harbor, Amaknak Island, Alaska, and a Portable Automatic Tide Gage was maintained at Village Cove, St Paul Island, Alaska, during the period of the field work. For the purpose of reducing soundings the Dutch Harbor tide gage was used as a reference station. The survey area was zoned according to the tidal zoning system devised by the Washington Office and corrections for time and range differences were applied accordingly. (Reference: Director's letter 36 kh, Subject- "Tide Reducers, Bering Sea, 1951", 15 Oct 1951.

A copy of the applicable Tide Zone Diagram is included in this report. Range factors applied vary from 0.5 to 1.0 and time corrections from 0.0 to + 2.0 hours.

No current stations were occupied within the area of the survey.

E. THE SMOOTH SHEET was constructed by hand at the Seattle Processing Office in accordance with conventional methods. The scale of the Boat Sheet is 1: 400 000; the scale of the Smooth Sheet was changed to 1:500 000 to reduce the overall size of the sheet to 36 by 60 inches. Boat and Smooth Sheets cover the same areas.

EPI distance circles constructed on the Smooth Sheet are arcs of circles drawn through the plotted positions of selected points on the circles for which geographic positions have been computed. Except for ease of construction, the Polyconic Projection is not well adapted to coverage of areas of the extent of this sheet. Scale distortion along the meridian when more that 3° of longitude away from the central meridian is such that distance arcs are no longer true circles and the geographic positions of numerous points on the arc must be computed in order to delineate the curve with sufficient accuracy for plotting purposes.

F. CONTROL STATIONS - All hydrography accomplished on this survey was controlled by Electronic Position Indicator distance measurements using EPI Ground Stations "B", "E", and "D". These stations were located by triangulation connections and EPI line measurements by PATHFINDER and EXPLORER during the season. EPI "D" was located by triangulation based on the NA 1927 Datum by the party of M.J. Tonkel in 1951. EPI"B" and EPI "E" were located by trilateration using EPI line measurements to control stations on the NA 1927 Datum. The positions plotted on the smooth sheet were furnished by the washington Office and are from incompletely adjusted positions of the control triangulation. The final adjustment of the control triangulation was not complete at the time the smooth sheet was constructed. (Reference: Director's letter 22/MEK, S-1-PF, Subject-"Report on Adjustment of EPI Observations", 7 Nov 1951).

G. SHORELINE AND TOPOGRAPHY.- Shoreline and topography have been omitted from the smooth sheet in accordance with Section 151 of the Hydrographic Manual, Paragraph (c). St. Paul Island, Otter Island and Walrus Island, the features so omitted, are in the area common to H-7948, scale 1:40,000.

H. SOUNDINGS - Fathometer velocity corrections, as such, have not been applied to the soundings recorded during this survey. (Reference: Director's ltr. 21/MEK S-1-PF, "Fathometer Corrections Alaska", 21 June 51). 808 type Fathometer No. 130-S, used on this Survey, was converted to a calibration velocity of 800 fathoms per second on 16 July 1951. Soundings recorded prior to that time have been corrected for the change in calibration velocity from 820 to 800 fathoms per second. NJ-3 fathometer No. 22 and NMB-1 fathometer No. 106 were initially controlled to a velocity of 800 fathoms per second and no velocity corrections were applied to soundings recorded by these fathometers. The corrections for calibration velocity of the 808 type fathometer No. 130-S have been designated "CVC", in the sounding record, and apply only to "A" day, positions 1 to 4 inclusive.

Instrumental Corrections for 808 type fathometer No. 130-S have been deduced from numerous Simultaneous Comparisons and Phase Comparisons taken throughout the season. Instrumental Corrections for NJ-3 fathometer No. 22 present a different problem since the major part of the error appears to result from variations in frequency of the line voltage from the designed frequency of 60 cycles per second. Prior to the use of the NJ-3 fathometer on this survey, a frequency meter was installed in the power circuit and an attempt was made to regulate the frequency within a comparatively narrow range. Frequent checks were made of the transmitted signal cycle. The attempt was partially sucessful; variations in frequency of line voltage were reduced to the extent that variation in timing of the emitted signal from the designed frequency of one per second were held to a maximum of -1.33% and an average of -0.86%. These divergences in the timing cycle of the emitted signal correspond to errors of ± 1.35% and ± 0.90% of the registered depth, respectively. Corrections have been computed from frequent timing checks noted and applied to the recorded soundings. The indicated accuracy of the computed corrections is within 0.33% of the observed depths.

No instrumental corrections have been applied to the soundings taken by the NMB-1 fathometer No. 106, used for depths over 400 fathoms. The indicated instrumental correction for this fathometer is approximately 1 fathom, which is less than the uncertainty in scaling soundings from the graph.

All instrumental corrections applied have been entered in the Sounding Records in the correction column headed "Echo Correction".

Draft corrections have been applied to the recorded soundings when warranted. Since the vessel was sounding continously, the fathometer initials were maintained at a constant setting of 2.0 fathoms and the change in mid-ship draft plotted as a graph from draft readings taken at intervals. The algebraic differences between 2.0 fathoms and the instantaneous draft have been entered as corrections in the correction column headed "Draft".

Initial corrections, that is the difference in the value on the fathogram and the adopted value of 2.0 fathoms, were applied at the time the fathomgrams were scanned and have not been separately entered in the Sounding Record.

Settlement and squat corrections have not been applied since no value has ever been determined for USC&GSS PATHFINDER. However, the combined effect of settlement and squat is estimated to be not greatly in excess of 0.1 fathoms.

For detailed information concerning the derivation of the corrections discussed, reference should be made to the report, "Fathometer Corrections 1951, USC&GSS PATHFINDER", forwarded separately.

I. CONTROL OF HYDROGRAPHY - Hydrography was controlled by EPI distance measurements from two stations for each fix. The observed EPI distances have been adjusted by applying corrections derived from simultaneous EPI and Shoran measurements observed at intervals during the season. For information concerning the derivation of these corrections reference should be made to letter Commanding Officer PATHFINDER 426/CP/gaa, 24 October 1951, "EPI and Shoran Corrections", a copy of which is attached.

J. ADEQUACY OF SURVEY - The survey of this area is incomplete. Sounding in the area of the reported 8 and 13 fathom shoals, at Latitude 58° 30 N, Longitude 175° 16 W, on H. O. Chart No. 0068, was partially accomplished. No indication of the shoal was noted but additional development is required. It is recommended that the charted soundings be retained pending further investigation. The 100 fathom curve was partially delineated but is not completely developed. Disregard reported 8 & 13 fms. These depths considered adequately discredited in area investigated RHK 5/2/67

No junctions were made with adjoining surveys. Chief of Div L G Taylor concurred 5/15/67

Sounding done thus far does not clearly define all applicable depth curves in the area.

K. CROSSLINES - One line in the system completed may be considered a crossline. This line makes eight (8) crossings and was run approximately normal to the principal system of lines in the investigation of the reported shoal soundings at Latitude 58° 30 N., Longitude 175° 16 W, The crossline amounts to 12.5 per cent of the principal system in the area. Discrepencies in crossings range from 0.0 to 2.1 per cent. The discrepancies are explicable in that the crossings were over steep slopes in an area of bold bottom relief.

L. COMPARISON WITH PREVIOUS SURVEYS - There are no previous surveys by the Bureau in the area.

M. COMPARISON WITH CHART - Two charts cover the area of the Survey. These are C&GS Chart No. 9302, First Edition, 1900, and H. O. Chart No. 0068, First Edition, 1917. In addition, part of the survey area in the vicinity of St. Paul Island is covered by C&GS Chart No. 8996, First Edition, 1909. Reference should be made to the descriptive report accompanying H-7948 for comparison in this area.

Comparison with C&GS Chart 9302 and H O Chart 0068 is not significant because of the small number of charted soundings in the western part of the survey area and the incomplete nature of the present survey. The hydrography completed indicates some diplacement of the 100 fathom curve from that charted. The reported 8 and 13 fathom soundings at Latitude 58°-30' N, Longitude 175°- 16' W, were not found but the hydrographic coverage is inadequate to disprove the charted depths. 8 and 13 considered adequately discredited. EHC | Chief of Div. L G Taylor concurs 5/15/67

N. DANGERS AND SHOALS - The following listed shoal depths are in the area common to the incomplete contemporary survey H-7948 (PF4151) which should be consulted for detailed information.

Latitude	Longitude	Least Depth (Fms)
57° - 18.5 N	169° - 59.0' W	5.8
57° - 03.7' N	170° - 19.5' W	6.3
57° - 10.6' N	170° - 38.6' W	3.0

O. COAST PILOT INFORMATION - The Descriptive Report accompanying Hydrographic Survey H-7948 and Coast Pilot notes previously submitted should be consulted for applicable information under this heading.

P. AIDS TO NAVIGATION - No Aids to Navigation are maintained within the area of this survey.

Z. TABULATION OF APPLICABLE DATA -

1. Submitted with this report:
   Report to accompany H-7951 (EX-PF 40351), USC&GSS EXPLORER

2. Submitted separately:
   Report to accompany Hydrographic Survey H-7948 (PF 4151)
   Fathometer Corrections 1951

Fair J. Bryant
Lieut Comdr, USC&GS

John B. Watkins
Ensign, USC&GS

REPORT TO ACCOMPANY H-7951 (EX-PF-40351)

USC&GSSHIP EXPLORER
George L. Anderson, Comdg.

1951

During the field season, all work in this area was plotted on either the EX-40151 or EX-40251 boat sheet. (H-7949 or H-7950.)

After the changes in scale and limits of the smooth sheets H-7949, H-7950, and H-7951, the following small segments of hydrography fell within the limits of neither H-7949 nor H-7950 (40151 and 40251), and so were plotted on H-7951.

Day	Positions	Original sheet
P	10-16	H-7950 (EX-40251)
Z	1-4	H-7949 (EX-40151)
HA	18-21	H-7950 (EX-40251)
JA	1-16	H-7950 (EX-40251)
QA	1-5	H-7949 (EX-40151)

Since the quantity of hydrography accomplished on this sheet was so small, there will be no formal descriptive report submitted. For methods of control, soundings, corrections, etc., see Descriptive Reports to accompany sheets H-7949 and H-7950.

Since the proper EPI circles were not on sheet H-7951, positions 1-4Z were plotted on a dog-ear from sheet H-7949, and then transfered to sheet H-7951 by means of a tracing. The tracing will accompany the smooth sheet for H-7951.

Respectfully submitted,

William D. Barbee

William D. Barbee
Ensign, USC&GS

Approved and Forwarded:

George L. Anderson

George L. Anderson
Capt. USC&GS
Comdg. Ship EXPLORER

STATISTICS FOR HYDROGRAPHIC SURVEY H-7951

(Field PF-40351)

PATHFINDER CS 343

VOL.NO.	DAY LTR.	DATE	H.L. WIRE	POSITIONS	STAT. MILES
I	A	10 July 51	0	4	22.2
I	B	23 July 51	0	4	23.0
I	C	10 Aug. 51	0	6	31.5
I	D	1 Sept 51	0	60	333.9
I	E	2 "	0	72	342.2
I & II	F	3 "	0	68	301.4
		Total, 1951	0	214	1054.2

Area, 1951 1178 square statute miles

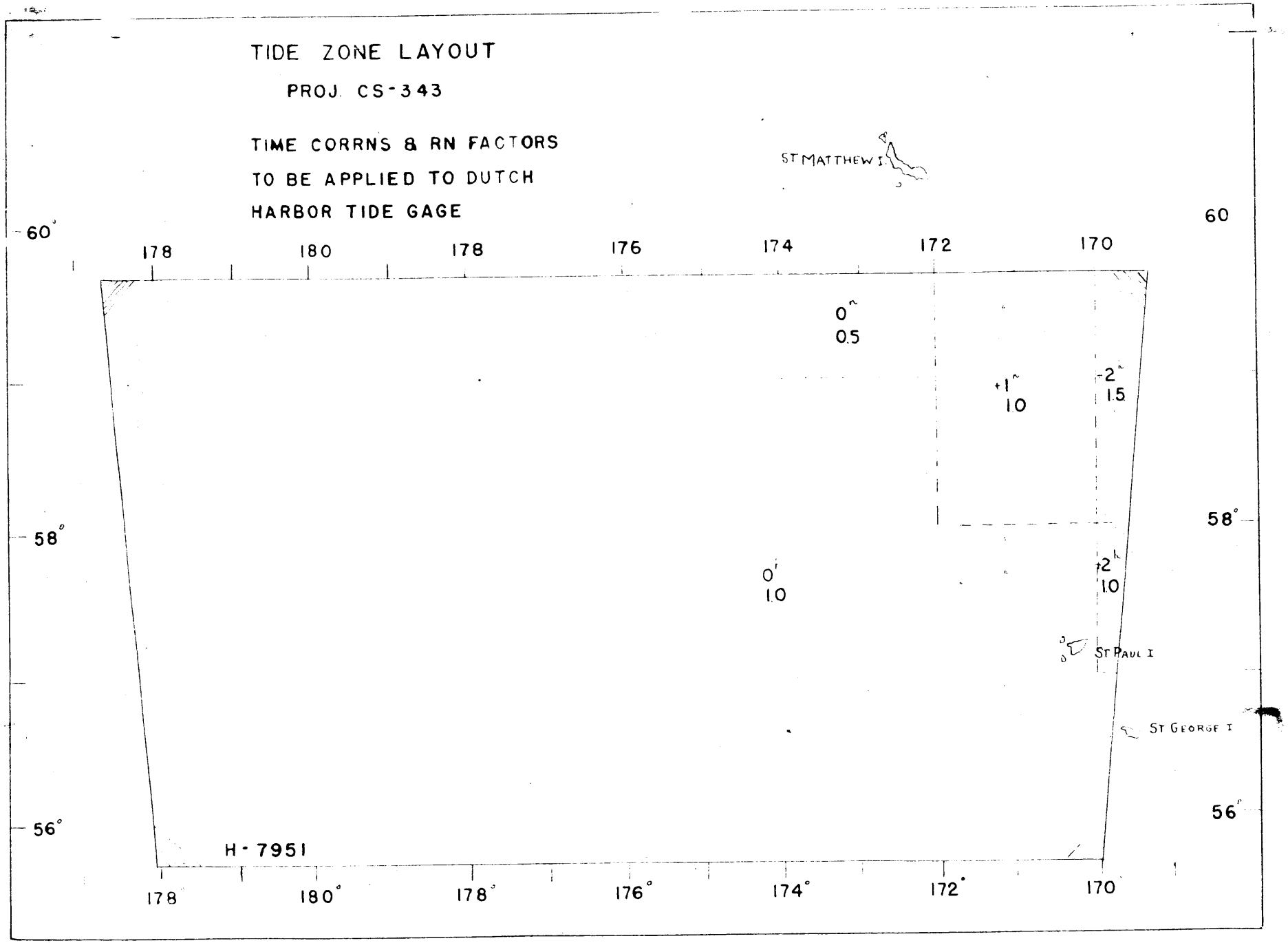
TIDE NOTE

A Standard Automatic Tide Gage was maintained at Dutch Harbor at Latitude 53 53.6N, Longitude 166 32.1W. Three point three (3.3) feet on the staff was mean lower low water. Tide curves were plotted from the hourly heights furnished by the Washington Office. Correction for time and height differences were applied in accordance with the Tide Zone Diagram as furnished by the Washington Office.

TIDE ZONE LAYOUT

PROJ. CS-343

TIME CORRNS & RN FACTORS
TO BE APPLIED TO DUTCH
HARBOR TIDE GAGE



CALIBRATION VELOCITY CORRECTIONS FROM 820 to 800 FATHOMS PER SECOND

1951 FIELD SEASON

CORRECTION IN FATHOMS	TO DEPTH IN FATHOMS
-0.0	2
-0.1	6
-0.2	10
-0.3	14
-0.4	18
-0.5	22
-0.6	27
-0.7	31
-0.8	35
-0.9	39
-1.0	43
-1.1	47
-1.2	51
-1.3	55
-1.4	59
-1.5	63
-1.6	67
-1.7	71
-1.8	76
-1.9	80
-2.0	84
-2.1	88
-2.2	92
-2.3	96
-2.4	100
-2.5	101
-2.6	108
-2.8	117
-3.0	125
-3.2	133
-3.4	141
-3.6	150
-3.8	158
-4.0	160

Corrections to be applied to 808 fathometer readings only before July 16, 1951.

Refer to File
426/CP/gaa

24 October 1951

To: The Director
U. S. Coast and Geodetic Survey
Dept. of Commerce Bldg.

Subject: EPI and shoran corrections

Reference: My letters dated 17 July 1951 (426/CP/gaa) and 3 August 1951

There are forwarded abstracts of shoran and EPI corrections by the PATHFINDER subsequent to 1 August 1951. An abstract of all corrections obtained prior to 1 August 1951 were forwarded with my letters described under reference. There is also forwarded an abstract of a few line measurments made from the ship at anchor.

It is noted that the final shoran corrections at EPI BAKER and EPI EASY increase the "Zero Set" by 0.009 and 0.012 statute miles from the values obtained early in the season. The final shoran corrections have not been meaned with the earlier corrections for deriving EPI corrections to apply to positions on the hydrography because the change in microseconds would be too small to affect the plotting of any position on a scale of 1/400,000.

No final shoran correction was obtained on the equipment at EPI DOG. (Nunivak) Island) because weather conditions prevented doing so. A preliminary value of the shoran correction for the shore equipment used at Nunivak Island and the ship equipment as calibrated in Seattle in October furnished a value within 0.006 statute miles of the shoran correction submitted with my letter of 17 July 1951 and which was used in computing the length measurments in the Bering Sea.

Shoran calibration observations taken on equipment at EPI DOG on 10 June and 8 July show considerable range in individual values when finally plotted on an aluminum mounted sheet and using geodetic positions furnished in September by Norman Sylar. However, the value submitted to Washington on the 17th of July, 1950 agree within 0.01 statute miles which variation will have no sensible effect on the computations of lengths involving EPI DOG.

The EPI corrections derived from shoran comparisons for the several shore stations appear to be reasonably consistent throughout the season. The exception to this occured at EPI BAKER on 2 August when EPI corrections increased about 1.6 microseconds from the mean of values derived prior to this date. This has been attributed to changes in the modulator and transmitter at the shore station but it is noted that on the 19th of August the correction decreased again in agreement with to the early season values.

The method followed aboard the PATHFINDER for determining the EPI corrections by comparison with shoran readings was as follows: Place the ship on a bearing

normal to the line between the EPI and shoran transmitters by EPI control and at a distance close to the maximum range of the shoran equipment. Run this normal line at 1/3 speed taking simultaneous readings of the shoran and EPI distances at regular intervals. Twenty such readings are usually taken. After completion of this set, shift from the "A" to the "B" side of the ships "Scope" and taken 20 additional readings. The mean of each set of readings is used for computing the EPI correction. The individual shoran and EPI distance readings can be plotted and any wild values rejected. It is considered worth the time on EPI calibration tests to make the comparisons on both the A and B sides of the scope if for no other reason than to serve as a check on the particular observation. ZERO checks on the ship EPI equipment during the season showed the "B" side of the scope to be 0.3 microseconds bigger then the A side.

Reference has frequently been made in the abstract of shoran and EPI calibration forwarded to Washington to the "Calibration volume". This work book has been retained aboard and contains all the observational data for shoran and EPI corrections calibrations. All data has been checked.

Information is requested whether this calibration volume is desired in Washington. If not it will be retained aboard for reference purposes next season.

All line crossing observations, length determinations at anchor and metrological data for line crossings are entered in sounding volumes which have been forwarded to Washington.

Sgd/ CHARLES PIERCE
Captain, USC&GS
Comdg. Ship PATHFINDER

cc: Cabin
Field works officer

SHEET 40351 PATHFINDER

ABSTRACT OF EPI CORRECTIONS

DAY LTR	1951 DATE	TIME	"A" side of recvr. STATION	EQUIP	CORR	"B" side of recvr. STATION	EQUIP	CORR	REMARKS	SHIP SET
A	7-10	0930-1100	B	3-5	-4.2	D	7-8	-4.5		2
B	7-23	1930-2100	E	2-3	-4.7	B	3-5	-4.2		2
C	8-19	0430-0530	E	2-3	-4.7	B	3-5	-5.1		2
C	8-19	0600-0700	E	2-3	-4.7	D	7-8	-4.5		2
D	9-1	0000-2340	E	2-3	-4.7	B	3-5	-5.1		2
E	9-2	0000-2340	E	2-3	-4.7	B	3-5	-5.1		2
F	9-3	0000-2220	E	2-3	-4.7	B	3-5	-5.1		2

APPROVAL SHEET

Hydrographic Survey H- 7951 (PF- 40351)

The field work was done under my immediate supervision and the Boat Sheet was frequently inspected as the work progressed.

The survey is incomplete; only a small part of the area has been sounded. The additional work necessary to complete the survey is recommended.

The completed smooth plot of hydrography so far accomplished and the accompanying records have been examined by me and are approved.

Charles Pierce

Charles Pierce
Chief of Party

(7406) **BRITISH COLUMBIA—Queen Charlotte Sound—Egg Island—Light reestablished.**—Egg Island Light has been reestablished showing *flashing white* every *15 seconds*. The light is now exhibited at an elevation of 94 feet from a red iron lantern on a tower above a white rectangular concrete building.

Approx. position: 51°15′ N., 127°50′ W.

Noté.—The temporary light has been discontinued.

(See N. M. 52 (7112) of 1948 and 34 (4690) of 1949.)

(N. M. 53, Dec. 31, 1949.)

(N. M. 106 (336), Ottawa, 1949.)
H. O. Charts 1767, 5361, 0903.
H. O. Light List, Vol. I, 1949, No. 10406.
U. S. Light List, Pacific Coast, 1949, No. 1976.
H. O. Pub. 176, 1941, page 43.

(7407) **BRITISH COLUMBIA—Queen Charlotte Islands—Graham Island—Skidegate Channel—West Narrows—Daybeacon established.**—A daybeacon consisting of a white slatwork marker on a white pole has been established on Graham Island in 53°09′00″ N., 132°21′48″ W.

(N. M. 53, Dec. 31, 1949.)

(N. M. 106 (337), Ottawa, 1949.)
H. O. Chart 1771 (and Plan A).
H. O. Pub. 176, 1941, page 280.

(7408) **ALASKA—Shumagin Islands—Shoal—Amended depths.**—A sounding of 6 fathoms, by lead, has been reported in 54°14′12″ N., 160°54′00″ W.

(See N. M. 21 (2529) of 1947.)

(N. M. 53, Dec. 31, 1949.)

(A4-3/Dec. 3, 1947.)
H. O. Charts 0068, 0527.
U. S. Coast Survey Charts 8859, 8802, 9302, 9000.
U. S. Coast Pilot, Alaska, Part II, 1947, page 351.

(7409) **ALASKA—Bering Sea—Pribilof Islands—Shoal reported northwestward.**—A depth of 8 fathoms is reported to exist in 58°30′30″ N., 175°20′00″ W., and a depth of 13 fathoms in 58°30′30″ N., 175°09′00″ W.

(N. M. 53, Dec. 31, 1949.)

(A4-3/Dec. 3, 1947.)
H. O. Charts 0068, 6604, 5799, 0528.
U. S. Coast Survey Chart 9302.
U S. Coast Pilot, Alaska, Part II, 1947, page 546.

U. S. NAVAL OCEANOGRAPHIC OFFICE
WASHINGTON, D. C. 20390

Code 5640:pas
3 May 1967

MEMORANDUM

From: Mr. M. Magnusen
To: Mr. Englebrecht

1. Attached is a copy of a portion of the report of a training patrol by the submarine USS BERGALL in 1947 as requested by your telephone call of 2 May 1967.

2. Method of obtaining position is not given in most instances; however, the summary states: "In the Bering Sea area, navigation was largely by Loran, with only fair results."

M. Magnusen

M. Magnusen

1250 (X) Submerged to 300 feet for BT card and trim. Commenced battery discharge at the 6 hour rate.

1915 (X) Surfaced, battery discharge completed. 99.4% capacity.

2100 (X) Star sights.

2119 (X) Sent BERGALL Serial SIXTY-ONE to ComSubPac.
Ship icing. Temperature 29°F.

19 April 1947

0030 (X) Number 3 FBT dry, converted it to a main ballast tank.

0545 (X) Submerged for 12 hour dive. Went to 300 feet to obtain BT card. During day held depth control drills and schools.

0735 (X) Sighted a small floe of drift ice sharp on port bow about 2000 yards. Came right to clear it. Ice appeared to be moving in a southerly direction at about 2 knots.

1200 (X) POSIT: LAT. 59-02.0 N. LONG. 175-39.0 W

1741 (X) Made battle surface. Average CO2, 2.7%. One can (15 pounds) CO2 absorbent used.

1746 (X) Secured from battle stations, surface.

1812 (X) Sent VP-AM1 our 202000Z predicted posit and told them that this would be the last day we needed them.

2145 (X) Sent BERGALL Serial SIXTY-FOUR to ComSubPac.

2330 (X) Bottom began shoaling rapidly from 35 fathoms.

2335 (X) Passed over 8 fathom shoal. POSIT: LAT. 58-30.5 N. LONG. 175-20.0 W. Stopped to break out leadline to verify reading, leadline frozen tight in topside locker. Decided to accept fathometer reading, and pulled clear slowly. This position is shown on USC&GS chart 9302 as being five miles

Subject: U.S.S. BERGALL (SS320) - Report of First Training Patrol outside the 1000 fathom curve.

20 April 1947

0005 (X) Resumed course, water deepening.

0427 (X) Passed over bank again, least depth 13 fathoms. Position Lat. 58-30.5N, Long. 175-09.0W. This apparently is continuation of same bank experienced last night. Water deepened rapidly to 250 fathoms on course 027T.

0740 (X) Sighted ice floe 010°T distant 5 miles. Radar has been unable to pick these up, as they are fairly low in the water.

0813 (X) Began ice shoot, all guns slightly iced but melting slowly. Both 5 inch guns registered hits at about 2000 yards. 40 MM pistols and machine guns stopped the near cubes cold. All guns functioned satisfactorily except as noted in remarks, paragraph (V).

0831 (X) Shooting over, ammunition expended: 5 inch - 20 rounds; 40MM - 64 rounds; 50 cal. - 220 rounds; 30 cal. - 100 rounds; 45 cal. - 50 rounds.

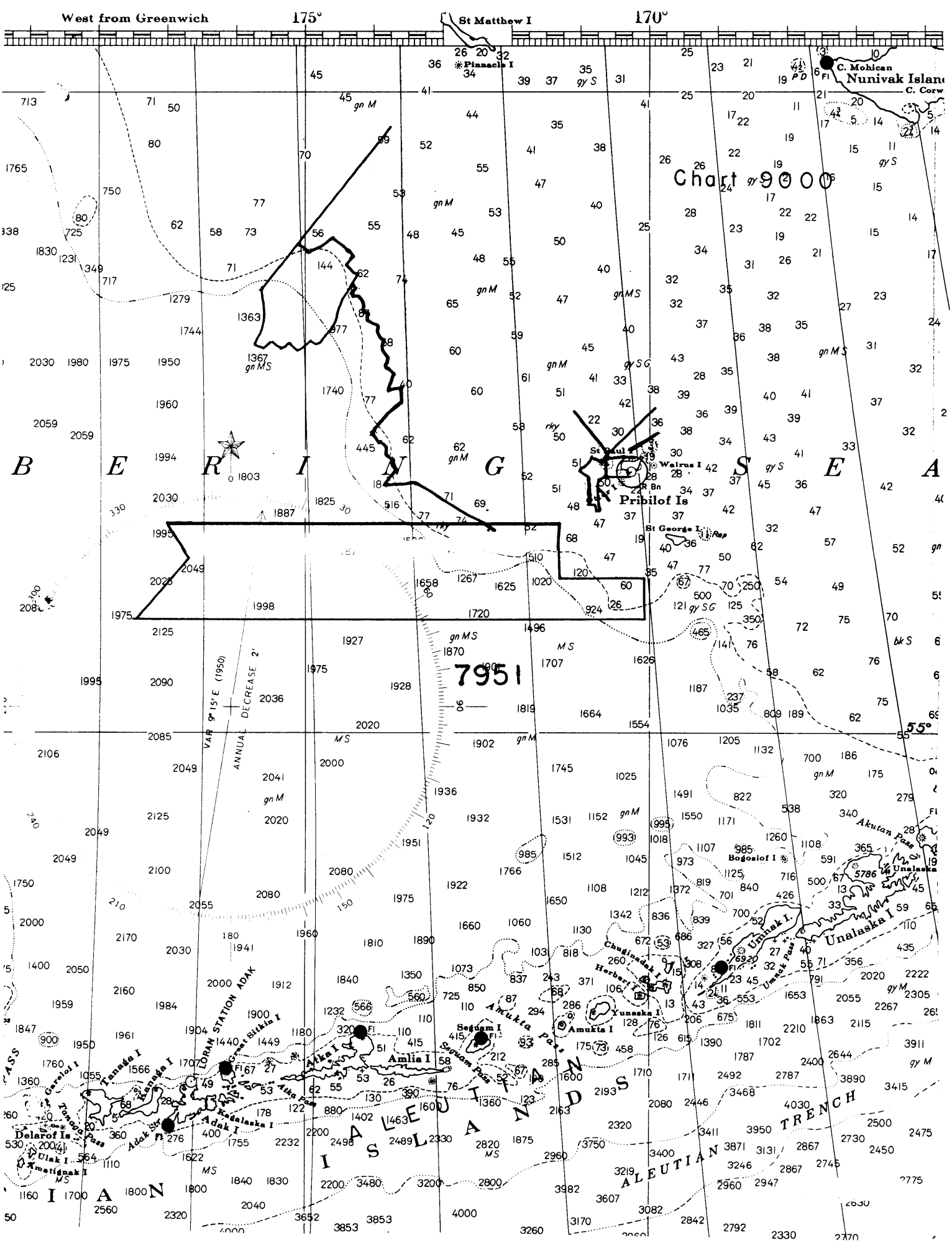
0936 (X) Took surface BT reading. Isothermal to 450 feet.

0950 (X) VP-AM1 tells us that he must have more advanced notice of our requirements and that he is unable to send a plane today. Evidently he did not receive our message of 1812(X) yesterday.

1022 (X) Sent message to VP-AM1 telling him we would not require his services anymore.

1200 (X) POSIT: LAT. 58-30 ON Long. 174-40.0 W

1415 (X) Small arms practice using ice cubes and cans as targets.


West from Greenwich
175°
St Matthew I
170°
Pinnacle I
C. Mohican
Nunivak Island
C. Corwin
Chart 9000
BERING SEA
St Paul I
Walrus I
Pribilof Is
St George I
Rep
R Bn
7951
55°
VAR 9° 15' E (1950)
ANNUAL DECREASE 2'
Akutan Pass
Bogoslof I
Unalaska
Unalaska I
Umnak I
Umnak Pass
Chuginadak I
Herbert I
Yunaska I
Amukta I
Amukta Pass
Seguam I
Seguam Pass
Amlia I
Atka I
Atka Pass
Great Sitkin I
LORAN STATION ADAK
Kagalaska I
Adak I
Adak Str
Tanaga I
Tanaga Pass
Gareloi I
Tanaga I
Delarof Is
Ulak I
Amatignak I
ALEUTIAN ISLANDS
ALEUTIAN TRENCH

7951 [redacted]

[redacted]

PURS[redacted]
GUI[redacted]
3.3(a), EXECUTIVE ORDER 12356.

Drag. Cl. No. 9000-1, 9302 & 8802-3

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No. PI-503-52 Office No. H-7951

LOCALITY

State ALASKA

General locality BERING SEA

Locality CENTRAL BERING SEA

19X52

CHIEF OF PARTY

THOS. B. REED

LIBRARY & ARCHIVES

DATE Aug 9 - 1952

B-1870-1 (1)

DECLASSIFIED BY NOAA
AUTHORITY DOC SYSTEMATIC REVIEW
DATE 3 DESCRIBED IN SECTION
EXECUTIVE ORDER 12356.

DECLASSIFIED BY NOAA
AUTHORITY DOC SYSTEMATIC REVIEW
DATE 3 DESCRIBED IN SECTION
EXECUTIVE ORDER 12356.

7951

Form 537
(Ed. June 1946)

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.

REGISTER No. H-7951

Field No. PI-503-52

State Alaska

General locality Bering Sea

Locality Central Bering Sea

Scale 1:500,000 Date of survey 20 August to 24 August '52

Instructions dated 6 March 1951, 28 May 1951, 21 June 1951, and 21 March 1952

Vessel Ship PIONEER

Chief of party Thos. B. Reed

Surveyed by Ship's Officers

Soundings taken by fathometer, ~~graphic recorder, hand lead, wire~~

Fathograms scaled by Fathometer readers and Ship's Officers

Fathograms checked by Ship's Officers

Protracted by G.E. Haraden

Soundings penciled by G.E. Haraden

Soundings in fathoms ~~feet~~ at ~~MLW~~ MLLW

REMARKS:

RWW 6/17/91

U. S. GOVERNMENT PRINTING OFFICE 777032

DESCRIPTIVE REPORT TO ACCOMPANY HYDROGRAPHIC SURVEY

H-7951 (PI-503-52)

CENTRAL BERING SEA

Project CS-343
Ship PIONEER
Scale 1:500,000

Season of 1952
Thos. B. Reed, Chief of Party
Surveyed by Ship's Officers

A. PROJECT

The work was done in accordance with instructions for Project CS-343 dated 6 March 1951, 28 May 1951, 21 June 1951, and 21 March 1952.

B. SURVEY LIMITS AND DATES

The survey covered the area between latitudes 56° 00' and 56° 45' and between longitudes 170° 05'E and 177° 00'E. This sheet was not completed and work in the remaining area to the north will be continued at a later date.

This sheet was begun in 1951 by the PATHFINDER at which time a meander line was run in a northwesterly direction. The 1952 work crosses this line three times with good agreement at each crossing.

To the east this sheet makes a junction with PF-401-51, completed by the PATHFINDER in 1952.

Junctions were also made with contemporary surveys H-7993 on the west and H-7973 on the south.

Hydrography was begun 20 August and ended 24 August, 1952.

C. VESSEL AND EQUIPMENT.

The hydrography was performed exclusively by the Ship PIONEER.

The NMC fathometer, serial number I-766 was used in depths over 400 fathoms. In depths less than 400 fathoms the NMC-2 fathometer, serial number 117 was used. The 808 fathometer, serial number S-108 was used simultaneously with the NMC-2 in depths less than 100 fathoms.

The turning radius of the ship was approximately 400 meters.

D. TIDE AND CURRENT STATIONS.

No tide or current stations were used in connection with this survey.

E. SMOOTH SHEET

The smooth sheet was drawn in 1951, by the Seattle Processing Office. All the EPI arcs were also drawn in 1951 with the exception of the SEGuam arcs. These were drawn on the Ship PIONEER by computation of points on the arcs.

F. CONTROL STATIONS

EPI station PAUL was located in 1951 and the same location was used for this survey.

EPI station SEGuam was located by triangulation by personnel from the Ship PIONEER. All stations used in its location were established by the Coast and Geodetic Survey and are on the 1927 datum. For details see Special Report, "Computation of EPI Station Positions", "Season of 1952," forwarded to Washington Office 12 January 1953.

G. SHORELINE AND TOPOGRAPHY

This is an off shore survey and no shoreline or topographic work was done.

H. SOUNDINGS

All soundings were taken with the previously mentioned fathometers. All soundings recorded on the fathograms were scanned and verified.

Due to the depth worked in no tide corrections were applied.

In accordance with the Director's letter, dated 21 June, 1951, 21/mek, S-1-P1, no velocity corrections were applied to the soundings.

I. CONTROL OF HYDROGRAPHY

The survey was controlled exclusively by EPI stations PAUL and SEGuam.

Weak control was encountered on the eastern portion of the sheet because the sounding lines were run between the two control stations where the arcs become tangent to one another. This made it necessary to adjust positions 6A to 1B, 6 to 12C, and positions 17 to 23C. This was done by plotting the appropriate arcs for each position to fix its location in a north-south direction and then, by using the individual logged distances, each position was fitted in so as to best agree with the total distance between reliable fixes. A total of 19 positions were adjusted in this manner.

J. ADEQUACY OF SURVEY

This survey is incomplete but that which has been done in the western half is considered adequate.

All junctions made with adjoining surveys are satisfactory.

K. CROSSLINES

Crosslines on this sheet will be run when the survey is completed. There is a total of eight crossings on the sheet, all of which are in close agreement.

L. COMPARISON WITH PRIOR SURVEYS

There are no prior surveys of this area.

M. COMPARISON WITH CHART

The largest scale chart available for comparison is C&GS chart 9302 (16th edition) July 1945. Due to the wide line spacing of this survey and the acarcity of soundings on the published chart no individual soundings could be compared.

U. MISCELLANEOUS

This is an offshore survey and there are no dangers to surface navigation, coast pilot information, aids to navigation, landmarks for charts, new geographic names, or silted areas to report within the limits of this survey.

This boat sheet was forwarded to the Washington Office for Photostating in the fall of 1952 and is being retained by this party for use during the 1953 field season.

V. DATA INCLUDED IN THIS REPORT

1. Abstract of EPI Corrections.
2. Abstract of Statistics.
3. Abstract and Computation of Arc Points.
4. Approval Sheet.

W. TABULATION OF APPLICABLE DATA

1. Special Report "Computation of EPI Corrections" to be submitted.
2. Special Report "Computation of EPI Station Positions" submitted, 1/12/53.
3. Notes from Seattle Processing Office regarding distortion of smooth sheet. Submitted with, but not in this report.

Respectfully submitted:

Gerard E. Haraden

Gerard E. Haraden
Ensign, U.S.C.& G.S.

Approved and forwarded:

Thos. B. Reed
CAPT., USC&GS
Com'd'g. Ship PIONEER

SUMMARY OF EPI CORRECTIONS

Survey H-7951 Field No. PI-503-52

Shore Equipment	Period	Correction
EPI PAUL		
T-5 C-2	Entire Period	-5.3 ms
EPI SEGuam		
T-4 C-6	Entire Period	-1.8 ms

STATISTICS FOR HYDROGRAPHIC SURVEY H-7951 (1952)

Ship PIONEER Project CS-343

Day	Vol. No.	Date	No. of Pos.	No. of Stat. Miles
A	1	20 August	10	54.0
B	1	21 August	72	445.0
C	1	22 August	72	442.7
D	1&2	23 August	70	427.8
E	2	24 August	42	257.6
		TOTAL	266	1627.1

Total Area of Survey: 13,950 square statute miles.

ARC POINTS

Survey H-7951 Field No. PI-503-52

EPI SEGuam

Distance	Azimuth	Latitude	Longitude
2800 ms	161°	55° 55' 52.03"	174° 35' 22.84"E
3200 ms	161°	56° 26' 02.23"	174° 56' 03.20"E
3600 ms	161°	56° 56' 08.75"	175° 17' 16.71"E
5600 ms	161°	59° 25' 40.00"	177° 12' 36.26"E
3200 ms	145°	55° 50' 18.88"	176° 47' 42.68"E
3600 ms	145°	56° 15' 28.97"	177° 23' 52.77"E
2800 ms	180°	56° 09' 18.85"	172° 24' 19.36"E
3200 ms	180°	56° 41' 36.65"	172° 24' 19.36"E
2800 ms	192°	56° 03' 54.68"	171° 00' 20.96"E
3200 ms	192°	56° 35' 21.09"	170° 47' 02.85"E
3600 ms	192°	57° 06' 45.89"	170° 33' 22.36"E

Form 26a
U. S. COAST AND GEODETIC SURVEY
DEPARTMENT OF COMMERCE
(Ed. Sept. 1945)

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

		°	′	″			°	′	″
α	2 to 3				α	3 to 2			
2d ∠	&	+			3d ∠	&	−		
α	2 EPI SEGUAM to 1 Arc Pt. 3200μ	145			α	3 EPI SEGUAM to 1 Arc Pt. 3200μ	161		
Δα					Δα				
		180	00	00.00			180	00	00.00
α′	1 to 2				α′	1 to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	52	23	09.35	2 EPI SEGUAM	λ	172	24	19.36
				s= 479 503.04	Δλ	+ 4	23	23.32
φ′	55	50	18.88	1 Arc Pt. 3200μ 145°	λ′	176	47	42.68

φ	52	23	09.35	3 EPI SEGUAM	λ	172	24	19.36
				s= 479 503.04	Δλ	+ 2	31	43.84
φ′	56	26	02.23	1 Arc Pt. 3200μ 161°	λ′	174	56	03.20

Δφ	583.83	(log s= b=(y/10,000)^2	1542.8076)
sin α	0.573 576 44 +	x cor.= $-\frac{1}{2}$fb	6310.1602 173.55
cos α	0.819 152 04 n	x′	+ 274 858.10
x=s sin α	+ 275 031.65	H	.057 457 630
y= −s cos α	+392 785.89	Hx′ = (approx. Δλ″)	+15 792.695
a= (x′/10,000)^2	755.4697	Arc−sin cor = $+\frac{V\ (Va)}{15}$	6729.1022 10.627
y cor.=+fa	6179.8177 242.73	Δλ″	+15 803.32
y_0	5.806 068.49	sin φ	
y′	+ 393 028.62	sin φ′	
y_1	6 199 097.11	1 + cos Δφ	
Va	− 8 732.38	$\frac{\sin\phi + \sin\phi'}{1 + \cos\Delta\phi}$	
y_2	6 190 3~~64.73~~ 75.84	−Δα″ (approx.)	
V	11.55888	+ F (Δλ″)^3	
K (Va/1,000)^2	+ .1326 × 76.2546 10.11	− Δα″	

Δφ	69.04	(log s= b=(y/10,000)^2	2055.5254)
sin α	0.325 568 15 +	x cor.= $-\frac{1}{2}$fb	8407.2017 131.25
cos α	0.945 519 58 n	x′	+ 155 979.67
x=s sin α	+ 156 110.92	H	.058 352 405
y= −s cos α	+ 453 379.03	Hx′ = (approx. Δλ″)	+ 9101.789
a= (x′/10,000)^2	243.2966	Arc−sin cor = $+\frac{V\ (Va)}{15}$	2257.6092 2.055
y cor.=+fa	1990.1905 90.23	Δλ″	+ 9103.84
y_0	5.806 068.49	sin φ	
y′	+ 453 469.26	sin φ′	
y_1	6 259 537.75	1 + cos Δφ	
Va	− 2 870.37	$\frac{\sin\phi + \sin\phi'}{1 + \cos\Delta\phi}$	
y_2	6 256 667.~~37~~ 8.49	−Δα″ (approx.)	
V	11.79783	+ F (Δλ″)^3	Comp HCA
K (Va/1,000)^2	+ .1346 × 8.2390 1.11	−Δα″	by log HCA

f= 8.1801 λ/2 = 4.09005

U. S. GOVERNMENT PRINTING OFFICE 16—34867-3

Form 26a
U. S. COAST AND GEODETIC SURVEY
DEPARTMENT OF COMMERCE
(Ed. Sept. 1945)

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

			°	′	″				°	′	″
α	2 to 3					α	3 to 2				
2d ∠	&		+			3d ∠	&		−		
α	2 EPI SEGUAM to 1 ARC POINT 3600μ		161			α	3 EPI SEGUAM to 1 ARC POINT 3600μ		192		
Δα						Δα					
			180	00	00.00				180	00	00.00
α′	1 to 2					α′	1 to 3				

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
φ	52	23	09.35	2 EPI SEGUAM	λ	172	24	19.36	φ	52	23	09.35	3 EPI SEGUAM	λ	172	24	19.36
				s = 539 440.92	Δλ	+ 2	52	57.35					s = 539 440.92	Δλ	− 1	50	57.00
φ′	56	56	08.75	1 ARC POINT 3600μ (161°)	λ′	175	17	16.71	φ′	57	06	45.887	1 ARC POINT 3600μ (192°)	λ′	170	33	22.36

Δφ	270.73	(log s = b = (y/10,000)²)	2601.5244
sin α	+ 0.325 568 15	x cor. = −½fb	186.871 10 640.3649
cos α	− 0.945 518 58	x′	+ 175 437.911
x = s sin α	+ 175 624.782	H	.059 133 584
y = −s cos α	+ 510 051.413	Hx′ = (approx. Δλ″)	+ 10 374.272
a = (x′/10,000)²	307.7846	Arc−sin cor = +V(Va)/15	3080 2968.6757
y cor. = +fa	128.416 2517.7088	Δλ″	+ 10 377.35
y₀	5 806 068.49	sin φ	
y′	+ 510 179.83	sin φ′	
y₁	6 316 248.32	1 + cos Δφ	
Va	− 3 702.12	(sin φ + sin φ′)/(1 + cos Δφ)	
y₂	6 312 546.20 (8.07)	−Δα″ (approx.)	
V	12.028 (28)	+ F (Δλ″)³	
K (Va/1,000)²	+ .1366 x 13.7057 (1.87)	− Δα″	

Δφ	1419.49	(log s = b = (y/10,000)²)	2784.1752
sin α	− 0.207 911 69	x cor. = −½fb	127.717 11 387.4158
cos α	− 0.978 147 60	x′	+ 112 028.356
x = s sin α	− 112 156.073	H	.059 415 21[7]
y = −s cos α	+ 527 652.841	Hx′ = (approx. Δλ″)	− 6 656.189
a = (x′/10,000)²	125.5035	Arc−sin cor = +V(Va)/15	−85 1225.1576
y cor. = +fa	54.170 1026.6312	Δλ″	− 6657.00
y₀	5 806 068.49	sin φ	
y′	+ 527 707.01	sin φ′	
y₁	6 333 775.50	1 + cos Δφ	
Va	− 1 518.69	(sin φ + sin φ′)/(1 + cos Δφ)	
y₂	6 332 256.81 (7.15)	−Δα″ (approx.)	
V	12.100 (80)	+ F (Δλ″)³	Comp HCA
K (Va/1,000)²	+ .1372 x 2.3064 (.32)	− Δα″	✓ GEH Copy ✓

t − 8.1801

U. S. GOVERNMENT PRINTING OFFICE 16—34867-3

Form 26a
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DEPARTMENT OF COMMERCE
(Ed. Sept. 1945)

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

		°	′	″			°	′	″
α	2 to 3				α	3 to 2			
2d ∠	&	+			3d ∠	&	−		
α	2 EPI SEGUAM to 1 Arc Pt. 2800μ	180			α	3 EPI SEGUAM to 1 Arc Pt. 2800μ	192		
Δα					Δα				
		180	00	00.00			180	00	00.00
α′	1 to 2				α′	1 to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	52	23	09.35	2 EPI SEGUAM	λ	172	24	19.36
				s= 419 565.16	Δλ	−		
φ′	56	09	18.85	1 Arc Pt 2800μ 180°	λ′	172	24	19.36

	°	′	″			°	′	″
φ	52	23	09.35	3 EPI SEGUAM	λ	172	24	19.36
				s= 419 565.16	Δλ	− 1	23	58.40
φ′	56	03	54.68	1 Arc Pt 2800μ 192°	λ′	171	00	20.96

Δφ	582.98	(log s= b=(y/10,000)^2	−)
sin α	0	x cor.= $-\frac{1}{2}$fb	−
cos α	1.0 n	x′	−
x=s sin α	0	H	.0579 29295
y= −s cos α	+ 419 565.16	Hx′ = (approx. Δλ″)	
a= (x′/10,000)^2	−	Arc−sin cor = $+\frac{V\,(Va)}{15}$	
y cor.=+fa	−	Δλ″	
y_0	5 806 068.49	sin φ	
y′	+ 419 565.16	sin φ′	
y_1	6 225 633.65	1 + cos Δφ	
Va	− −	$\frac{\sin\phi + \sin\phi'}{1 + \cos\Delta\phi}$	
y_2	6 225 633.65	−Δα″ (approx.)	
V	−	+ F (Δλ″)^3	
K (Va/1,000)^2 +	−	− Δα″	

Δφ	1691.05	(log s= b=(y/10,000)^2	1684.2541)
sin α	0.207 911 69 n	x cor.= $-\frac{1}{2}$fb	6888.6835 60.09
cos α	0.978 147 60 n	x′	− 87 172.41
x=s sin α	− 87 232.50	H	.057 794 201
y= −s cos α	+ 410 396.65	Hx′ = (approx. Δλ″)	−5038.060
a= (x′/10,000)^2	75.9903	Arc−sin cor = $+\frac{V\,(Va)}{15}$	684.8589 .34
y cor.=+fa	621.6083 25.51	Δλ″	−5038.40
y_0	5 806 068.49	sin φ	
y′	+ 410 422.16	sin φ′	
y_1	6 216 490.65	1 + cos Δφ	
Va	− 883.54	$\frac{\sin\phi + \sin\phi'}{1 + \cos\Delta\phi}$	
y_2	6 215 607.~~11~~ .21	−Δα″ (approx.)	
V	11.626 96	+ F (Δλ″)^3	Comp HCA
K (Va/1,000)^2 +	.1332 × 0.7 × .10 806	−Δα″	r by log HCA

copy r HCA

f: 8.1801 f/2: 4.09005

U. S. GOVERNMENT PRINTING OFFICE 16—34867-3

Form 26a
U. S. COAST AND GEODETIC SURVEY
DEPARTMENT OF COMMERCE
(Ed. Sept. 1945)

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

			°	′	″				°	′	″
α	2	to 3				α	3	to 2			
2d ∠		&	+			3d ∠		&	−		
α	2 EPI SEGUAM to 1 ARC POINT 2800 (16)		161			α	3 EPI SEGUAM to 1 ARC POINT 5600 (161)		161		
Δα						Δα					
			180	00	00.00				180	00	00.00
α′	1	to 2				α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
φ	52	23	09.35	2 EPI SEGUAM	λ	172	24	19.36	φ	52	23	09.35	3 EPI SEGUAM	λ	172	24	19.36
				s = 49 565.16	Δλ	+ 2	11	03.48					s = 839 130.32	Δλ	+ 4	48	16.90
φ′	55	55	52.03	1 ARC POINT 2800 (1610)	λ′	174	35	22.84	φ′	59	25	39.995	1 ARC POINT 5600 (1610)	λ′	177	12	36.26

Δφ	1609.13	(log s =) b = (y/10,000)²	1573.7617
sin α	+ 0.325 568 15	x cor. = −½fb	87.924 6 436.7640
cos α	− 0.945 518 58	x′	+ 136 509.129
x = s sin α	+ 136 597.053	H	.057 594 49 (2)
y = −s cos α	+ 396 706.654	Hx′ = (approx. Δλ″)	+ 7 862.174
a = (x′/10,000)²	186.3474	Arc−sin cor = +V(Va)/15	1.308 1 664.0166
y cor. = +fa	60.472 1 524.3404	Δλ″	+ 7 863.98
y₀	5 806 068.49	sin φ	
y′	396 767.13	sin φ′	
y₁	6 202 835.62	1 + cos Δφ	
Va	− 2 156.68	(sin φ + sin φ′)/(1 + cos Δφ)	
y₂	6 200 678.94 (9.56)	−Δα″ (approx.)	
V	11.573 48 (6)	+ F (Δλ″)³	
K (Va/1,000)² + .1326 x 4.6514	.62	− Δα″	

f = 8.1801 f/2 = 4.0905

Δφ	1237.67	(log s =) b = (y/10,000)²	6 295.0468
sin α	+ 0.325 568 15	x cor. = −½fb	− 703.394 25 747.0562
cos α	− 0.945 518 58	x′	+ 272 490.712
x = s sin α	+ 273 194.106	H	.063 421 62 (2)
y = −s cos α	+ 793 413.309	Hx′ = (approx. Δλ″)	+ 17 281.803
a = (x′/10,000)²	742.5119	Arc−sin cor = +V(Va)/15	15.094 8 734.3439
y cor. = +fa	481.905 6 073.8216	Δλ″	+ 17 296.90
y₀	5 806 068.49	sin φ	
y′	793 895.21	sin φ′	
y₁	6 599 963.70	1 + cos Δφ	
Va	− 9 863.08	(sin φ + sin φ′)/(1 + cos Δφ)	
y₂	6 590 (14.97) 100.62	−Δα″ (approx.)	
V	13.28340	+ F (Δλ″)³	Comp H&A
K (Va/1,000)² + .1475 x 97.2813	14.349	− Δα″	− GFH Copy − H&A

U. S. GOVERNMENT PRINTING OFFICE 16—34867-3

Form 26a
U. S. COAST AND GEODETIC SURVEY
DEPARTMENT OF COMMERCE
(Ed. Sept. 1945)

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

		°	′	″
α	2 to 3			
2d ∠	&	+		
α	2 EPI SEGUAM to 1 Arc Pt. 3200μ	180		
Δα				
		180	00	00.00
α′	1 to 2			

First Angle of Triangle

		°	′	″
α	3 to 2			
3d ∠	&	−		
α	3 EPI SEGUAM to 1 Arc Pt. 3200μ	192		
Δα				
		180	00	00.00
α′	1 to 3			

	°	′	″			°	′	″
φ	52	23	09.35	2 EPI SEGUAM	λ	172	24	19.36
				s= 479 503.04	Δλ			
φ′	56	41	36.65	1 Arc Pt. 3200μ 180°	λ′	172	24	19.36

	°	′	″			°	′	″
φ	52	23	09.35	3 EPI SEGUAM	λ	172	24	19.36
				s= 479 503.04	Δλ	-1	37	16.51
φ′	56	35	21.09	1 Arc Pt. 3200μ 192°	λ′	170	47	02.85

Δφ	1133.71	(log s= b=(y/10,000)^2	)
sin α	0	x cor. = $-\frac{1}{2}$fb	
cos α	1.0 η	x′	—
x=s sin α	0	H	.058 753 304
y= −s cos α	479 503.04	Hx′ = (approx. Δλ″)	
a= (x′/10,000)^2	—	Arc−sin cor = $+\frac{V\,(Va)}{15}$	
y cor. = +fa	—	Δλ″	
y_0	5 806 068.49	sin φ	
y′	+ 479 503.04	sin φ′	
y_1	6 285 571.53	1 + cos Δφ	
Va	— —	$\frac{\sin\phi + \sin\phi'}{1 + \cos\Delta\phi}$	
y_2	6 285 571.53	−Δα″ (approx.)	
V		+ F (Δλ″)^3	
K (Va/1,000)^2 +		− Δα″	

Δφ	652.45	(log s= b=(y/10,000)^2	2199.8422)
sin α	0.207 911 69 η	x cor. = $-\frac{1}{2}$fb	8997.4646 89.70
cos α	0.978 147 60 η	x′	− 99 604.59
x=s sin α	− 99 694.29	H	.058 591 370
y= −s cos α	+469 024.75	Hx′ = (approx. Δλ″)	− 5835.969
a= (x′/10,000)^2	99.2107	Arc−sin cor = $+\frac{V\,(Va)}{15}$	930.4230 .543
y cor. = +fa	811.5534 38.06	Δλ″	− 5836.512
y_0	5 806 068.49	sin φ	
y′	+ 469 062.81	sin φ′	
y_1	6 275 131.30	1 + cos Δφ	
Va	− 1 176.70	$\frac{\sin\phi + \sin\phi'}{1 + \cos\Delta\phi}$	
y_2	6 273 954.79 60	−Δα″ (approx.)	
V	11.860 ~~60~~ 58	+ F (Δλ″)^3	Comp HCA
K (Va/1,000)^2 +	.1352×1.3846 .19	−Δα″	✓ by log HCA

f: 8.1801 f/2 = 4.09005

U. S. GOVERNMENT PRINTING OFFICE 16—34867-3

copy GEH
comp + [illegible]

Form 26a
U. S. COAST AND GEODETIC SURVEY
DEPARTMENT OF COMMERCE
(Ed. Sept. 1945)

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

			°	′	″
α	2 to 3				
$2^d\angle$	&	+			
α	2 EPI SEGUAM to 1 Arc Pt. 3600 μ	145			
$\Delta\alpha$					
		180	00	00.00	
α'	1 to 2				

First Angle of Triangle

ϕ	52	23	09.35	2 EPI SEGUAM	λ	172	24	19.36
				s = 539 440.92	$\Delta\lambda$	+ 4	59	33.41
ϕ'	56	15	28.97	1 Arc Pt. 3600 μ (145°)	λ'	177	23	52.77

896.06

			°	′	″
α	3 to 2				
$3^d\angle$	&	−			
α	3 EPI SEGUAM to 1 Arc Pt. 2800 μ	150			
$\Delta\alpha$					
		180	00	00.00	
α'	1 to 3				

ϕ	52	23	09.35	3 EPI SEGUAM	λ	172	24	19.36
				s = 419 565.16	$\Delta\lambda$	+ 3	19	40.44
ϕ'	55	36	23.03	1 Arc Pt. 2800 μ (150°)	λ'	175	43	59.80

712.30

$\Delta\phi$	
$\sin\alpha$	0. 573 576 44 +
$\cos\alpha$	0. 819 152 04 n
$x = s\sin\alpha$	+ 309 410.602
$y = -s\cos\alpha$	+ 441 884.130
$a = (x'/10{,}000)^2$	955.8207
y cor. $= +fa$	345.496 7818.7089
y_o	5 806 068.49
y'	+ 442 229.63
y_1	6 248 298.12
Va −	11 233.64 61.42
y_2	6 237 064.48
V	11.752887
K $(Va/1{,}000)^2$ +	.1342×126.1947 16.94

f = 8.1801 f/2 = 4.09005

(log s = b = $(y/10{,}000)^2$	1952.6158)
x cor. $= -\frac{1}{2}fb$	247.184 7986.2963
x′	+ 309 163.498
H	.058084495
Hx′ = (approx. $\Delta\lambda''$)	+ 17 957.606
Arc−sin cor $= +\frac{V(Va)}{15}$	15.806 8801.8340
$\Delta\lambda''$	+ 17 973.41
sin ϕ	
sin ϕ'	
1 + cos $\Delta\phi$	
$\frac{\sin\phi + \sin\phi'}{1+\cos\Delta\phi}$	
$-\Delta\alpha''$ (approx.)	
+ F $(\Delta\lambda'')^3$	Comp HCA
$-\Delta\alpha''$	✓ GEH copy GEH

$\Delta\phi$	
$\sin\alpha$	0.500 +
$\cos\alpha$	0.866 02540 n
$x = s\sin\alpha$	+ 209 782.58
$y = -s\cos\alpha$	+ 363 354.09
$a = (x'/10{,}000)^2$	439.6122
y cor. $= +fa$	3596.0718 (130.66)
y_o	5 806 068.49
y'	+ 363 484.75
y_1	6 169 553.24
Va −	5031.14
y_2	6 164 522.10 5.43
V	11.44449
K $(Va/1{,}000)^2$ +	.1316×25.3124 3.33

(log s = b = $(y/10{,}000)^2$	1320.2619)
x cor. $= -\frac{1}{2}fb$	113.28 + 5 399.9372
x′	+ 209 669.30
H	.057117763
Hx′ = (approx. $\Delta\lambda''$)	+ 11975.841
Arc−sin cor $= +\frac{V(Va)}{15}$	4597 3838.5888
$\Delta\lambda''$	+ 11 980.44
sin ϕ	
sin ϕ'	
1 + cos $\Delta\phi$	
$\frac{\sin\phi + \sin\phi'}{1+\cos\Delta\phi}$	
$-\Delta\alpha''$ (approx.)	
+ F $(\Delta\lambda'')^3$	Comp HCA
$-\Delta\alpha''$	✓ by log copy HCA Copy ✓ HCA

U. S. GOVERNMENT PRINTING OFFICE 16—84867-3

APPROVAL SHEET TO ACCOMPANY

Survey H-7951 (PI-503-52)

The field work was supervised closely and the boat sheet inspected daily.

The records and smooth sheet have been inspected and are approved.

The survey is incomplete but is believed to be adequate in the western portion. Additional lines should be run in the eastern part to develop the depth curves.

Thos. B. Reed
CAPT., USC&GS
Com'd'g. Ship PIONEER

GEOGRAPHIC NAMES

Survey No. H-7951

Wk. for 1951 & 1952

Name on Survey	On Chart No. A	On previous survey No. B	On U. S. quadrangle Maps C	From local information D	On local Maps E	P. O. Guide or Map F	Rand McNally Atlas G	U. S. Light List H	K	
Alaska										1
Bering Sea									BGN	2
										3
										4
										5
					Names underlined in red are approved 1-23-53. L Heck					6
										7
										8
										9
										10
										11
										12
										13
										14
										15
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										17
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										22
										23
										24
										25
										26
										27

M 234

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. H-7951 Work for 1951 & 1952

Records accompanying survey:

Boat sheets 1 for 1951; sounding vols. 2 for 1952 2 for 1951; wire drag vols. .....;

bomb vols. .....; graphic recorder rolls 1 Env. for 1952 1 Env. for 1951;

special reports, etc. 1 Smooth Sheet for 1951; 1 Descriptive Report for 1952;

1 Cahier for 1951 -EPI Plotting Abstracts; 1 Cahier for 1952-Notes on Distortion of HYDROGRAPHIC SMOOTH SHEET:

1-Graphs of Serial Temperatures & Salinities; 1 Record Serial Temperatures & Salinities; 1-Fathometer Corrections; Filed With 7948;

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

Number of positions on sheet		480
Number of positions checked		49
Number of positions revised		0
Number of soundings revised (refers to depth only)		42
Number of soundings erroneously spaced		18
Number of signals erroneously plotted or transferred		
Topographic details	Time	
Junctions	Time	49
Verification of soundings from graphic record	Time	29

Verification by W.L.JONNS Total time 78 Date 7-18-72

Reviewed by ..... Time ..... Date .....

M-2232-1

VERIFIER'S REPORT OF HYDROGRAPHIC SURVEY NO. H- 7951
Work for 1951 & 1952

The verifier should deal with the present hydrographic survey only, as the reviewer considers its relation to previous surveys and published charts. He should be thoroughly familiar with Chapters 3, 7 and 9 of the Hydrographic Manual.

1. The descriptive report was consulted and appropriate notes were made in soft pencil regarding action taken. ✓

2. Soundings originating with the survey and mentioned in the descriptive report have been verified, including latitude and longitude. ✓

3. All reference to survey sheets mentioned in the descriptive report include the registry number and year. ✓

4. Geographic names of hydrographic features if on sheet are in slanting lettering and of topographic features in vertical lettering. ✓

5. All items affecting the plotting of the survey which are entered in the remarks columns of the sounding records were noted and check marked. In all cases appropriate action was taken. ✓

6. All positions verified instrumentally were check marked in the sounding records.

7. All critical soundings are clear and legible and are a little larger than the adjacent soundings. ✓

8. The metal protractor has been checked within the last three months. N/A

9. The protracting and plotting of all bad crossings were verified. ✓

10. All detached positions locating critical soundings, rocks or buoys were verified. N/A

11. The boat sheet was compared with the smooth sheet. N/A

12. The spacing of soundings as recorded in the records was closely followed. ✓

13. The bottom characteristics were shown on outstanding shoals. N/A

14. The reduction and plotting of doubtful soundings were checked. ✓

15. The transfer of contemporary topographic information was carefully examined. N/A

16. All junctions were transferred and overlapping curves made identical. ✓

17. The notation "JOINS H- (19--)" was added in ink for all contemporary adjoining or overlapping sheets now registered. Those not verified are shown in pencil. ✓

18. The depth curves have been inspected before inking.

19. All triangulation stations and transfer of topographic and hydrographic signals were checked.

20. Heights of rocks were checked against range of tide.

21. Rocks transferred from topographic surveys have a dotted curve where shown thereon. Rocks located accurately by hydrographer are encircled by dotted red curve. N/A

22. Unnecessary pencil notes have been removed. ✓

23. Objects on which signals are located and which fall outside of the low water line have been described on the sheet. N/A

24. The low water line and delineation of shoal areas have been properly shown. N/A

25. Degree and minutes values and symbols have been checked.

26. Questionable soundings have been checked on the fathograms. ✓

27. Source of shoreline and signals (when not given in report). NA

28. All notes on sheet are in accordance with figure 171 in the Hydrographic Manual. ✓

29. All aids located, with those on contemporary topographic sheets, have been shown on survey. NA

30. Depth curves were satisfactory except as follows:

31. Sounding line crossings were satisfactory except as follows: ✓

32. Junctions with contemporary surveys were satisfactory except as follows: See verifiers Note to Reviewer. ✓

33. Condition of sounding records was satisfactory except as follows: —

34. The protracting was satisfactory except as follows: ✓

35. The field plotting of soundings was satisfactory except as follows: —

36. Notes to reviewer: See following note.

Verified by W.L. JONNS Date 18 July 1972

Note to Reviewer
Survey H-7951 (1971)

Item# 32

Depth curve agreement could not be verified in the area of the single hydro line Between Lat. 57°20' to 58°20' at Long 174°00' on H-8103 because the junctional soundings are not available at this office.

The depth curves on verified survey H-8103 should be changed to conform with the changes caused b y additional hydrography of this survey.

Item 36.

No junctions were made with survey H-7949 to the southeast, H-7993 to the west or with H-7948 and H-8103 in the vicinity of St. Paul Island. The junctional surveys were not available to this office.

In the vicinity of St. Paul Island the following sounding lines were transfered to this survey by the field party from H-7949 and H-7950. The records for these positions were not available at this office. The unverified soundings were inked on the smooth sheet as per telcon with the Rockville office 16 July 72.

Positions	10-16	P	day	(blue)	from H-7950	field records
	18-21	HA	"	"	"	"
	8-10	HA	"	(green)	"	"
	1-16	JA	"	(blue)	"	"
	1-4	Z	"	"	H-7949	"
	1-5	QA	"	"	"	"

See enclosed report by W.O Barbee, 1951 season

WLJ

Hugh L. Proffitt
Chief Ver. Br. AMC

Attach to H-7951

U. S. COAST AND GEODETIC SURVEY

R. F. A. STUDDS DIRECTOR

NOTES ON DISTORTION
OF
HYDROGRAPHIC SMOOTH SHEET
REGISTER NO. H - 7951
FIELD NO. PI - 50352
BY
SEATTLE PROCESSING OFFICE

CENTRAL BERING SEA
ALASKA

PROJECT CS - 343

1952

U. S. C. & G. S. S. PIONEER

THOS. B. REED - COMMANDING

Seattle, Wash.
12 November 1952.

Memorandum to Commander Grinell concerning
Bering Sea Sheet H 7891 Pf-Ex 40351,
smooth sheet scale 1/ 500 000.

This sheet was returned from the Washington office. A small amount of work done in 1951 to locate the 100 fathom curve was plotted upon it. No work was done on the sheet this year by the party of the PATHFINDER. The sheet has been completed by the PIONEER.

The Director's letter 825/MEK D-1-NW of 17 Oct.1952 implies that the sheet should be checked for distortion and accuracy.

Between the northern and southern parallels of the projection the sheet has stretched one millimeter. East and west directions hold true.

Thirteen first order GPSs were computed to check the EPI curves. With one exception, no distances greater than 2 000 M/S were used in the computations. Where greater distances were used the azimuth was corrected at the 2 000 M/S point and the line proceeded ahead the additional distance required using an azimuth 180 degrees from the back azimuth. The exception was a check point where a 3500 M/S distance was used on Az. 30°.

The plotted points fall exactly on the curves, except Point H which misses the curve about 0.38 MM.

The sheet is considered to be in very good condition.

After consulting with Captain Pierce, as well as with Captain Heaton and yourself, the sheet is being forwarded to the PIONEER. The Director's letter and our computations will accompany it.

Edgar E. Smith
Cdr., USC&GS
Seattle Processing Office.

OCT 21 1952

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
WASHINGTON 25

IN REPLY ADDRESS THE DIRECTOR
U. S. COAST AND GEODETIC SURVEY
AND NOT THE SIGNER OF THIS LETTER
AND REFER TO NO. 223/MEK
D-1-NW

17 October 1952

To: Supervisor, Northwestern District
U. S. Coast and Geodetic Survey
705 Federal Office Building
Seattle 4, Washington

Subject: Smooth Sheet H-7951

Smooth sheet H-7951 (PF-40351) has been forwarded to you this date by registered mail for the addition of the 1952 field season's work on sheet PI-50352. If it is impracticable to make this addition due to distortion, the 1951 work shall be replotted on a new smooth sheet, thereby combining smooth sheets PF-40351 and PI-50352.

Earl O. Heston
Acting Director.

cc. Ship PATHFINDER
Ship PIONEER

E.E. Smith:-

Suggest you carefully check projection on H-7951 and discuss plotting of 1952 work with Capt. Pierce.

Geod. Pos. Comp. for H-7951 (PF-EX 40351)

from EPI Baker

A	2000 MS	@	80° 00' 00"
B	4000 MS	@	75° 58' 38"
C	2000 MS	@	110° 00' 00"
D	4000 MS	@	105° 58' 57"

from EPI Easy

E	2000 MS	@	50° 00' 00"
F	4000 MS	@	46° 35' 59"
G	2000 MS	@	00° 00' 00"
H	3000 MS	@	00° 00' 00"

— (out 0.3 of mm.)

from EPI Dog

J	2000 MS	@	30° 00' 00"
K	3000 MS	@	27° 49' 32"

from EPI Fox

L	2000 MS	@	30° 00' 00"
M	3500 MS	@	27° 43' 19."
N	3500 MS	@	30° 00' 00"

H 7951

Computations to investigate curves on Sheet H 7951 PF-EX 40351 Bering Sea.
Made in Seattle Proc. Off. by C.A.J.P. October 1952.

H 7951

19 N 52

In addition to the points computed and used for verification, A,B,C...etc. which were sent to you, many other control points were used when the sheet was made. Those controlling EPI E curves pertinent to this discussion are lettered on the sheet as U,V,W,X,Y & Z. The computations for these points were not sent you. The only place where the curves are not satisfactory is at Point H. If any adjustment is to be made the line GH should be subdivided and the correction faired into the curves toward Y and Z.

This correction was not made here because Captain Pierce is of the impression that you have already made a new sheet. If you have not done so I recommend that you use this sheet.

E.E.Smith 11/13/52

19 NOV 1952

1

EPI-E
44-7951

Sum 4.237 57 8½ / 8.475 1562 / 8.230 7841 / 6.705 9403

S+A' 3.985 37 9½ / 7.970 7438 / 8.230 7841 / 6.201 5279

4.222 68 7½ / 8.445 3750 / 8.230 78 41 / 6.676 1591

3.985 38 9½ / 7.970 7794 / 8.230 7841 / 6.201 5635

H-7951

PF. EX 40351

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 26—Rev. Apr. 11, 1930

5081

POSITION COMPUTATION—FIRST-ORDER TRIANGULATION

1590 ° ' "

7951 Ex-Pf

4744

1591 ° ' "

α	2		to 3				α		to 2			
2d ∠			&	+			3d ∠	40951	&	−		
α	2 EPI "B"		to 1 2000 M. Sec.		80	00	00 00	α	3 EPI "B" ~ 2000 MS / PBO to 1 4000 MS		75	58	37.78
Δα				−	4	01	22 22	Δα					
		A		+	180	00	00.00		B		180	00	00.00
α'	1		to 2		255	58	37.78	α'	1	to 3			

First Angle of Triangle

	°	'	"			°	'	"		°	'	"			°	'	"
φ	57	07	31.45	2 EPI "B"	λ	170	15	54.97	φ	56	33	53.65	3 "B" 2000 MS	λ	175	04	10.23
Δφ	− 0	33	37.80		Δλ	+ 4	48	15.26	Δφ	− 0	44	36.95		Δλ	+ 4	38	31.02
φ'	56	33	53 65	1 2000 MS.	λ'	175	04	10.23	φ'	55	49	16.70	1 "B" 4000 MS	λ'	179	42	41.25

	Logarithms		"		Logs		° ' "		Logarithms		"		Logs		° ' "
s	5.476 6714	(1)	+ 1682.29	½	9.699	½(φ+φ')	56 50 4253	s	5.476 6714	(1)	+ 2347.68	½	9.699	½(φ+φ')	
cos α	9.239 6702	P (2)	+ 340.73	s²	0.953	Logarithms		cos α	9.384 3690	P (2)	+ 336.29	s²	0.953	Logarithms	
B	8.509 5585	Sum	2023.02	K	2.532	s	5.476 6714	B	8.509 5981	Sum	2683.97	K	2.527	s	5.476 6714
(1)=h	3.225 9001 P	(3)	+ 0.09	E	6.523	sin α	9.993 3515	P (1)=h	3.370 6385	(3)	+ 0.16	E	6.536	sin α	9.986 8608 P
s²	0.953 3428	(4)	− 4.89	(5)	9.707	A'	8.508 7005	s²	0.953 3428	(4)	− 6.82	(5)	9.715	A'	8.508 7183
sin² α	9.986 7030	(5)	− 0.51	3	0.477	sec φ'	0.258 8547	P sin² α	9.973 72	(5)	− 0.52	3	0.477	sec φ'	0.250 4370
C	1.592 36	(6)	+ 0.05	cos² α	8.479	Sum	4.237 5781	C	1.599 65	(6)	+ 0.09	cos² α	8.769	Sum	4.222 6875
(2)=K	2.532 4058	(7)	+ 0.04	(6)	8.663	Arc—sin corr.	+ 3491	(2)=K	2.526 71	(7)	+ 0.07	(6)	8.961	Arc—sin corr.	+ 3153
(δφ)²	6.60 97	−Δφ	+ 20 17.80	(colog) E	3.477	Δλ	4.237 9272	P (δφ)²	6.85 52	−Δφ	2676.95	(colog) E	3.464	Δλ	4.223 0028
D	2.35 31	Δφ/2	0 16' 48.90	A²arc²1"/3	5.912	sin ½(φ+φ')	9.922 8274	P D	2.35 00	Δφ/2	0° 22' 18.48	A²arc²1"/3	5.912	sin ½(φ+φ')	24
(3)	8.96 28			sec² φ	0.531	sec Δφ/2	0.000 0052	P (3)	9.20 52			sec² φ	0.518	sec Δφ/2	2601
−h	3.22 59	Δφ	0°33'37.80	(7)	8.588	(approx.) −Δα	4.160 7598	−h	3.370 6	Δφ	0° 44' 36.95"	(7)	8.855	(approx.) −Δα	
s² sin² α	0.9400					do	+ 14479.71	P s² sin² α	0.9271					do	"
E	6.5233	Arc—sin corr.	Numbers		Logs	(8)	+ 2.51	P E	6.5361	Arc—sin corr.				(8)	"
(4)	0.6892 N	for s	− 1590	(Δλ)²	2.7138 P	−Δα	14482.22	(4)	0.8338	for s	− 1591	(Δλ)²		−Δα	"
		for Δλ	+ 5081	F	7.686		− 4° 01' 22.23"			for Δλ	+ 4744	F	7.678		
		Total	3491	(8)	0.400	Δλ	+ 17295.26			Total	3153	(8)		Δλ	16711.02

U. S. GOVERNMENT PRINTING OFFICE: 1930

11—0500

See back of sheet for Plotting

56° 33' 53.65"

53.65
3.093
16

Value 13 min 61241.6
37115.4
24126.2
Value 53.65 sec → 1659.4

50) 25785.6 (515.7 meters

56° 20' + 515.7 M Ahead

175° 04' 10.23"

Value 4 min 4098.6
Value 10 23 sec 174.7

50) 4273.3 (85.47

175° 00' + 85.5M Ahead

55° 49' 16.70"

10 43.30

Value 10 min 18556.9
Value 43.30 sec 13392

50) 19896.1 (397.92

56° 00" - 397.9 M Back

179° 42' 41.25"

Value 2 min = 2088.3
Value 41.25 sec = 716.5

50) 2804.8 (56.09

179° 40' + 56.1 M

4.133 5964
8.467 1928
8.230 7841
6.697 9769

3.985 3393
7.970 6686
8.230 7841
6.201 4527

4.251 3931
8.502 7862
8.230 7841
6.733 5703

3.985 3244
7.970 6488
8.230 7841
6.201 4329

H-7951

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 26—Rev. Apr. 11, 1930 4989

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

PF EX 40351

	1590	°	′	″					5415	1590	°	′	″				
α	2	to 3						7951	3	to 2							
2d∠		&			+					&				−			
α	2 EPI "B"	to 1 2000 MS			110	00	0000		α	3 EPI "B" 2000 MS	to 1 4000 MS			105	58	57.32	
Δα					− 4	01	02.68		Δα								
		C			105 180	00	00.00				D			180	00	00.00	
α′	1	to 2			285	58	57.32		α′	1	to 3						

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
φ	57	07	31.45	2 EPI "B"	λ	170	15	54.97	φ	57	57	25.86	3 "B" 2000 MS	λ	175	01	32.01
Δφ	+ 0	49	54.41		Δλ	+ 4	45	37.04	Δφ	+ 0	38	44.33		Δλ	+ 4	57	35.65
φ′	57	57	25.86	1 2000 MS	λ′	175	01	32.01	φ′	58	36	10.19	1 "B" 4000 MS	λ′	179	59	07.66

	Logarithms		″		Logs		° ′ ″		Logarithms		″		Logs		° ′ ″
s	5.476 6714	(1)	− 3313.46	½	9.699	½(φ+φ′)	57 32 28.66	s	5.476 6714	(1)	−2667.16	½	9.699	½(φ+φ′)	
cos α	9.534 0517	W (2)	+ 310.22	s²	0.953	Logarithms		cos α	9.439 8776	W (2)	+ 335.19	s²	0.953	Logarithms	
B	8.509 5585	Sum	−3003.24	K	2.491	s	5.476 6714	B	8.509 5005	Sum	−2331.97	K	2.525	s	5.476 6714
(1)=h	3.520 2816	W (3)	+ 0.20	E	6.523	sin α	9.972 9858	P (1)=h	3.426 0495	(3)	+ 0.12	E	6.547	sin α	9.982 8793 P
s²	0.953 3428	(4)	+ 8.79	(5)	9.666	A′	8.508 6679	s²	0.953 34	(4)	+ 7.81	(5)	9.724	A′	8.508 6530
sin² α	9.945 9716	(5)	− 0.46	3	0.477	sec φ′	0.275 2713	P sin² α	9.965 76	(5)	− 0.53	3	0.477	sec φ′	0.283 1894 P
C	1.592 36	(6)	+ 0.16	cos² α	9.068	Sum	4.233 5964	C	1.606 19	(6)	+ 0.12	cos² α	8.880	Sum	4.251 3931
(2)=K	2.491 67	(7)	+ 0.14	(6)	9.211	Arc−sin corr.	+ 3393	(2)=K	2.525 29	(7)	+ 0.12	(6)	9.081	Arc−sin corr.	3825
(δφ)²	6.952 6	−Δφ	− 2994.41	(colog) E	3.477	Δλ	4.233 9357	(δφ)²	6.732 7	−Δφ	−2324.33	(colog) E	3.543	Δλ	4.251 7756
D	2.353 1	Δφ/2	0 24 57.20	A²arc²1″/3	5.912	sin ½(φ+φ′)	9.926 2284	P D	2.347 3	Δφ/2		A²arc²1″/3	5.912	sin ½(φ+φ′)	7599
(3)	9.3057			sec² φ	0.531	sec Δφ/2	0.000 0114	P (3)	9.080 0			sec² φ	0.551	sec Δφ/2	243)157
−h	3.520 3 N	Δφ	+0° 49′ 54.41	(7)	9.131	(approx.) −Δα	4.160 1755	−h	3.426 06		+ 0° 38′ 44.33	(7)	9.087	(approx.) −Δα	
s² sin² α	0.899 3					do	+14460.24	s² sin² α	0.919 10					do	"
E	6.5233	Arc−sin corr.				(8)	+ 2.44	E	6.5473	Arc−sin corr.				(8)	"
(4)	0.9429	for s	− 1596	(Δλ)³	2.702 P	−Δα	14462.68	(4)	0.8924	for s	−1590	(Δλ)³		−Δα	"
		for Δλ	+4989	F	7.685		− 4° 01′ 02.68″			for Δλ	+5415	F	7.670		
		Total	3393	(8)	0.387	Δλ	17137.04			Total	3825	(8)		Δλ	17855.65

U. S. GOVERNMENT PRINTING OFFICE: 1930

11—9509

58 00 00.00

57° 57' 25."86

2 3414

Value 2 min 3712.64

Value 34.14 sec 1056.2

50) 476858 (95.37

58 00 — 95.4 M

175 01 3201

Value 1 min 986.8

Value 3201 526.4

50) 1513.2 (30.26

175 00 + 30.3 M

58° 36' 10."19

Value 16 min 29701.8

Value 10.19 sec 315.3

50) 30017.1 (600.3

58 20 + 600.3 M

179° 59' 07 66

Value 52"34 sec = 845.29

50) 845.3 (16.9 M

180 00 — 16.9 M

4.152 3729
8.304 7458
8.230 7841
6.555 3299

3.985 3252
7.970 6504
8.230 7841
6.201 4345

4.106 7196
8.213 4392
8.230 7841
6.444 2233

3.985 3695
7.970 7390
8.230 7841
6.201 5231

H-7951

PF-EX 40351

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 26—Rev. Apr. 11, 1930 3432

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

1590 — 2781 — 1591

7951

α	2		to 3					3d ∠		&	to 2			~~46~~	~~35~~	~~59.05~~
2d ∠			&	+				α	3 EPI "E" 2000	to 1	4000 MS			46	35	59.05
α	2 EPI "Easy		to 1 2000 MS	50	00	00 00		$\Delta\alpha$		"F"						
$\Delta\alpha$			"E"	− 3	24	00.95										
				46 180	00	00.00								180	00	00.00
α'	1		to 2	226	35	59.05		α'	1		to 3					

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
ϕ	60	21	40.33	2 EPI E	λ	172	42	45.11	ϕ	58	34	15.42	3 EPI "E" 2000	λ	176	39	33.90
$\Delta\phi$	− 1	47	24.91		$\Delta\lambda$	+ 3	56	48.79	$\Delta\phi$	− 1	54	00.88		$\Delta\lambda$	+ 3	33	09.06
ϕ'	58	34	15.42	1 2000 MS.	λ'	176	39	33.90	ϕ'	56	40	14.54	1 4000 MS	λ'	180	12	42.96

	Logarithms		″		Logs		° ′ ″		Logarithms		″		Logs		° ′ ″
s	5.476 6714	(1)	+ 6224.08	$\frac{1}{3}$	9.699	$\frac{1}{3}(\phi+\phi')$	59 27 52.88	s	5.476 6714	(1)	+ 6654.93	$\frac{1}{3}$	9.699	$\frac{1}{3}(\phi+\phi')$	
cos α	9.808 0675	P (2)	+ 234.02	s^2	0.953	Logarithms		cos α	9.837 0142	(2)	+ 196.08	s^2	0.953	Logarithms	
B	8.509 3366	Sum	+ 6458.10	K	2.369	s	5.476 6714	B	8.509 4577	Sum	+ 6851.01	K	2.292	s	5.476 6714
(1)=h	3.794 0755	P (3)	+ 0.88	E	6.622	sin α	9.884 2540	P (1)=h	3.823 1433	(3)	+ 1.03	E	6.566	sin α	9.861 2784
s^2	0.953 343	(4)	− 13.72	(5)	9.643	A′	8.508 6538	s^2	0.953 343	(4)	− 11.62	(5)	9.510	A′	8.508 6981
$\sin^2\alpha$	9.768 508	(5)	− 0.44	3	0.477	sec φ′	0.282 7937	P $\sin^2\alpha$	9.722 557	(5)	− 0.32	3	0.477	sec φ′	0.260 0717
C	1.647 40	(6)	+ 0.05	$\cos^2\alpha$	9.616	Sum	4.152 3729	C	1.616 54	(6)	+ 0.41	$\cos^2\alpha$	9.674	Sum	4.106 7196
(2)=K	2.369 25	(7)	+ 0.04	(6)	8.736	Arc−sin corr.	1842	(2)=K	2.292 44	(7)	+ 0.37	(6)	9.661	Arc−sin corr.	1190
$(\frac{1}{2}\phi)^2$	7.618 3	$-\Delta\phi$	6444.91	(colog) E	3.378	$\Delta\lambda$	4.152 5571	$(\frac{1}{2}\phi)^2$	7.670 1	$-\Delta\phi$	16840.88	(colog) E	3.434	$\Delta\lambda$	4.106 8386
D	2.327 6	$\frac{\Delta\phi}{2}$	0° 53′ 42.45″	$\frac{A^2 arc^2 1''}{3}$	5.912	$\sin\frac{1}{2}(\phi+\phi')$	9.935 1626	D	2.342 6	$\frac{\Delta\phi}{2}$		$\frac{A^2 arc^2 1''}{3}$	5.912	$\sin\frac{1}{2}(\phi+\phi')$	339 66 200
(3)	9.945 9			$\sec^2\phi$	0.612	P sec $\frac{\Delta\phi}{2}$	0.000 0530	P (3)	0.012 7			$\sec^2\phi$	0.566	sec $\frac{\Delta\phi}{2}$	
−h	3.794 07 N	$\Delta\phi$	1° 47′ 24.91″	(7)	8.638	(approx.) $-\Delta\alpha$	4.087 7727	−h	3.823 1	$\Delta\phi$	1 54 00.88	(7)	9.573	(approx.) $-\Delta\alpha$	
$s^2\sin^2\alpha$	0.721 85					do	12239.75	$s^2\sin^2\alpha$	0.675 9					do	″
E	6.621 6	Arc−sin corr.	Number		Logs	(8)	″ 1.20	E	6.566 1	Arc−sin corr.				(8)	″
(4)	1.137 5 N	for s	−1590	$(\Delta\lambda)^3$	2.458	$-\Delta\alpha$	″ 12240.95	P (4)	1.065 1	for s	− 1591	$(\Delta\lambda)^3$		$-\Delta\alpha$	″
		for $\Delta\lambda$	+3432	F	7.620					for $\Delta\lambda$	+ 2781	F			
		Total	1842	(8)	0.078	$\Delta\lambda$	″ 14208.79			Total	1190	(8)		$\Delta\lambda$	12 789.06

U. S. GOVERNMENT PRINTING OFFICE 1930

11—9509

58° 34' 15.42

5' 44.58

Value 5 min 9282.4

Value 44.58 sec 1379.3

50)10661.7(212.3

58° 40 — 212.3 M

176° 39' 33.9"

Value 26.1 sec = 421.9

$\frac{421.9}{50} = 8.5$

176 40 — 08.5 M

56° 40' 14"54

Value 14.54 = 449.75

$\frac{449.7}{50} = 9.0$

56° 40' +09.0 M

180° 12' 42.96

Value 12 min 12263.3

Value 42.96 sec 731.5

50)12994.8(260.0

180° 00' + 260.0M

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 26—Rev. Apr. 11, 1930

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

PF EX 40351

7951

				°	′	″								°	′	″
α	2	to 3					α	3	to 2							
2d ∠		&		+			3d ∠		&				−			
α	2 EPI Esay	to 1	2000 MS	00	00	0000	α	3 EPI E	to 1	3000 MS				00	00	0000
Δα		G					Δα		H							
				180	00	00.00								180	00	00.00
α′	1	to 2					α′	1	to 3							

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
φ	60	21	40.33	2 EPI Esay	λ	172	42	45.11	φ	60	21	40.33	3 EPI Esay	λ			
Δφ	-2	41	24.57		Δλ				Δφ	-04	02	08.92		Δλ			
φ′	57	40	15.76	1 2000 MS	λ′	172	42	45.11	φ′	56	19	31.41	1 3000 MS	λ′	172	42	45.11

s	Logarithms 5.476 6714	(1)	″	½	Logs 9.699	½(φ+φ′)	° ′ ″	s	Logarithms 5.652 7626	(1)	″	½	Logs 9.699	½(φ+φ′)	° ′ ″
cos α	0.000 0000	(2)	+	s²		Logarithms		cos α		(2)	+	s²		Logarithms	
B	8.509 3366	Sum	96 82.58	K		s		B	8.509 3366	Sum	14524.43	K		s	
(1)=h	3.986 0080	(3)	+ 1.99	E		sin α		(1)=h	4.162 0992	(3)	+ 4.49	E		sin α	
s²	54	(4)		(5)		A′		s²	862	(4)		(5)		A′	
sin² α	15926	(5)	−	3	0.477	sec φ′		sin² α	299)130	(5)	−	3	0.477	sec φ′	
C		(6)	+	cos² α		Sum		C		(6)	+	cos² α		Sum	
(2)=K		(7)	+	(6)		Arc−sin corr.		(2)=K		(7)	+	(6)		Arc−sin corr.	
(δφ)²	7.9720	−Δφ	9684.57	(colog) E		Δλ		(δφ)²	8.3242	−Δφ	14528.92	(colog) E		Δλ	
D	2.3276	Δφ/2		A²arc²1″/3	5.912	sin½(φ+φ′)		D	2.3276	Δφ/2		A²arc²1″/3	5.912	sin½(φ+φ′)	
(3)	0.2996			sec²φ		sec Δφ/2		(3)	0.6518			sec²φ		sec Δφ/2	
−h		Δφ	02 41 24.57	(7)		(approx.) −Δα		−h		Δφ	04 02 08.92	(7)		(approx.) −Δα	
s² sin² α						do	″	s² sin² α						do	″
E		Arc−sin corr.				(8)	″	E		Arc−sin corr.				(8)	″
(4)		for s	−	(Δλ)³		−Δα	″	(4)		for s	−	(Δλ)³		−Δα	″
		for Δλ	+	F						for Δλ	+	F			
		Total		(8)		Δλ	″			Total		(8)		Δλ	″

U. S. GOVERNMENT PRINTING OFFICE: 1930

11—9509

3.956 5320
7.9130640
8.2307841
6.1438481
1393

3.985 3452
7.9706904
8.2307841
6.2014745
1590

3.6107275
7.2214550
8.2307841
5.4522391
283

3.684 3633
7.3687266
8.2307841
5.599 5107
398

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POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

7951

PF EX 40051

α	2	to 3				α	3	to 2			
2d ∠		&	+			3d ∠		&	−		
α	2 EPI Dog	to 1 2000 MS	30	60	00 00	α	3 EPI Dog 2000 MS	to 1 3000 MS	27	49	32.35
$\Delta\alpha$		J	− 2	10	27.65	$\Delta\alpha$		K			
			27 180	00	00.00				180	00	00.00
α'	1	to 2	207	49	32.35	α'	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
ϕ	60	03	32.31	2 EPI Dog	λ	167	14	21.66	ϕ	57	42	13.36	3 EPI Dog 2000 MS	λ	169	45	08.82
$\Delta\phi$	− 2	21	18.95		$\Delta\lambda$	+ 2	30	47.16	$\Delta\phi$	− 1	11	42.65		$\Delta\lambda$	+ 1	08	00.52
ϕ'	57	42	13.36	1 2000 MS	λ'	169	45	08.82	ϕ'	56	30	30.71	1 3000 MS.	λ'	170	53	09.34

	Logarithms		″		Logs		° ′ ″		Logarithms		″		Logs		° ′ ″	
s	5.476 6714	(1)	+ 8386.08	$\frac{1}{3}$	9.699	$\frac{1}{2}(\phi+\phi')$	59 52 52.84	s	5.175 6414	(1)	+ 4283.46	$\frac{1}{3}$	9.699	$\frac{1}{2}(\phi+\phi')$		
cos α	9.937 5306	(2)	+ 98.49	s^2	0.953		Logarithms	cos α	9.946 6350	(2)	+ 19.48	s^2	0.351		Logarithms	
B	8.509 3567	Sum	+ 8484.57	K	1.993	s	5.476 6714	B	8.509 5179	Sum	+ 4302.94	K	1.290	s	5.175 6614	
(1)=h	3.923 5587	(3)	+ 1.54	E	6.612	sin α	9.698 9700	(1)=h	3.631 7943	(3)	+ 0.41	E	6.540	sin α	9.668 1560	P
s^2	0.953 343	(4)	− 7.71	(5)	9.257	A′	8.508 6738	s^2	0.35 128	(4)	− 0.72	(5)	7.880	A′	8.508 7019	
$\sin^2\alpha$	9.397 940	(5)	− 0.18	3	0.477	sec ϕ'	0.272 2164	$\sin^2\alpha$	9.33 631	(5)	− 0.01	3	0.477	sec ϕ'	0.258 2082	
C	1.642 12	(6)	+ 0.41	$\cos^2\alpha$	9.815	Sum	3.956 5320	C	1.60 196	(6)	+ 0.02	$\cos^2\alpha$	9.893	Sum	3.6107275	
(2)=K	1.993 403	(7)	+ 0.32	(6)	9.609	Arc−sin corr.	− 197	(2)=K	1.28 955	(7)	+ 0.01	(6)	8.250	Arc−sin corr.	− 115	
$(\delta\phi)^2$	7.85 65	$-\Delta\phi$	8478.96	(coleg) E	3.388	$\Delta\lambda$	3.9565123	$(\delta\phi)^2$	7.26 74	$-\Delta\phi$	+ 4302.65	(coleg) E	3.450	$\Delta\lambda$	3.6107160	
D	2.3303	$\frac{\Delta\phi}{2}$	01° 10′ 39.5	$\frac{A^2 \text{arc}^2 1''}{3}$	5.912	$\sin\frac{1}{2}(\phi+\phi')$	9.937 0101	D	2.34 91	$\frac{\Delta\phi}{2}$	0° 35′ 51.32	$\frac{A^2 \text{arc}^2 1''}{3}$	5.912	$\sin\frac{1}{2}(\phi+\phi')$	7134	
(3)	0.1868			$\sec^2\phi$	0.604	sec $\frac{\Delta\phi}{2}$	0.000 0917	(3)	9.61 65			$\sec^2\phi$	0.544	sec $\frac{\Delta\phi}{2}$	106/26	
−h	3.923 56	$\Delta\phi$	− 02° 21 18.95	(7)	9.513	(approx.) $-\Delta\alpha$	3.8936141	−h	3.63 18	$\Delta\phi$	1′ 11′ 42.65	(7)	8.156	(approx.) $-\Delta\alpha$		
$s^2\sin^2\alpha$	0.351 283					do	7827.34	$s^2\sin^2\alpha$	9.68 76					do		
E	6.6121	Arc−sin corr.				(8)	0.31	E	6.5402	Arc−sin corr.				(8)		
(4)	0.88694	for s	− 1590	$(\Delta\lambda)^2$	1.869	$-\Delta\alpha$	7827.65	(4)	9.8596	for s	− 3478	$(\Delta\lambda)^2$		$-\Delta\alpha$		
		for $\Delta\lambda$	+ 1393	F	7.627		7827.65			for $\Delta\lambda$	+ 283	F				
		Total	− 197	(8)	9.496	$\Delta\lambda$	9047.16			Total	− 115	(8)		$\Delta\lambda$	4080.52	

U. S. GOVERNMENT PRINTING OFFICE: 1930

11—0509

57° 42' 13.36"

Value 2 min = 1856 24.2 / 3712.48

Value 13.36 sec = 413.32 / 4125.8
(30.937)

$\frac{4125.8}{50} = 82.5\,M$

57° 40' + 82.5 M

169° 45' 08".82

Value 5 min = 4967.5

Value 08.82 sec = 145.9 / 5113.4
(16.541)

$\frac{5113.4}{50} = 102.3\,M$

169° 40 + 102.3 M

56° 30' 30".71

Value 10 min = 55673.9 / 37 115.4 / 18 558.5

Value 30.71 = 949.9 / 19508.4
(30.931)

$\frac{19508.4}{50} = 390.2\,M$

56° 20' + 390.2 M

170° 53' 09".34

6' 50.66

Value 6 min = 5132.3 / 1026.5 / 6158.8

Value 50.66 sec = 866.7 / 7025.5
(17.108)

$\frac{7025.5}{50} = 140.5\,M$

171° 00 − 140.5 M

1

3.974 6790
7.949 3580
8.230 7841
6.180 1421

3.965 3114
7.930 6228
8.230 7841
6.201 4069

3.796 3753
7.592 7506
8.230 7841
5.823 5347

3.860 4142
7.720 8280
8.230 7841
5.951 6121

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DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
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POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

Pt. EX 40351

1514 — 1590 — 666 — 894

7951

α	2		to 3				α	3	224,767.05	to 2							
$2^d\angle$			&		+		$3^d\angle$			&		−					
α	2 EPI FOX		to 1 2000 MS		30	00	00.00	α	3 EPI FOX 2000 M	to 1	3500 MS		27	43	19.26		
$\Delta\alpha$			L		− 2	16	40.74	$\Delta\alpha$			M						
					180	00	00.00						180	00	00.00		
α'	1		to 2		207	43	19.26	α'	1		to 3						

First Angle of Triangle

	°	′	″			°	′	″			°	′	″			°	′	″
ϕ	61	31	58.47	2 EPI FOX	λ	166	05	51.88	ϕ	59	10	36.13	3 EPI FOX + 2000 MS	λ	168	43	05.35	
$\Delta\phi$	− 2	21	22.34		$\Delta\lambda$	+ 2	37	13.47	$\Delta\phi$	− 1	47	54.46		$\Delta\lambda$	+ 1	44	16.79	
ϕ'	59	10	36.13	1 2000 MS	λ'	168	43	05.35	ϕ'	57	22	41.67	1 3500 MS.	λ'	170	27	22.14	

	Logarithms		″		Logs		° ′ ″		Logarithms		″		Logs		° ′ ″
s	5.476 6714	(1)	+8384.20	$\frac{1}{2}$	9.699	$\frac{1}{2}(\phi+\phi')$	60 21 17.30	s	5.351 7326	(1)	6429.80	$\frac{1}{2}$	9.699	$\frac{1}{2}(\phi+\phi')$	
cos α	9.937 5306	P (2)	+ 104.60	s^2	0.953	Logarithms		cos α	9.947 0487	P (2)	+ 46.30	s^2	0.703	Logarithms	
B	8.509 2596	Sum	+8488.80	K	2.020	s	5.476 6714	B	8.509 4163	Sum	+6476.10	K	1.665	s	5.351 7326 P
(1)=h	3.928 4616	(3)	+ 1.49	E	6.659	sin α	9.698 9700	P (1)=h	3.808 1976	(3)	+ 0.91	E	6.585	sin α	9.667 6231
s^2	0.953 343	(4)	− 8.60	(5)	9.331	A′	8.508 6400	P s^2	0.703 465	(4)	− 2.70	(5)	8.653	A′	8.508 6814
$\sin^2\alpha$	9.397 940	(5)	− 0.21	3	0.477	sec ϕ'	0.290 3976	$\sin^2\alpha$	9.335 246	(5)	− 0.04	3	0.477	sec ϕ'	0.268 3382
C	1.668 23	(6)	+ 0.48	$\cos^2\alpha$	9.875	Sum	3.974 6790	C	1.626 81	(6)	+ 0.11	$\cos^2\alpha$	9.894	Sum	3.796 3753
(2)=K	2.019 513	(7)	+ 0.38	(6)	9.683	Arc−sin corr.	− 76	(2)=K	1.665 57	(7)	+ 0.08	(6)	9.013	Arc−sin corr.	− 228
$(\delta\phi)^2$	7.8569	$-\Delta\phi$	+8482.34	(colog) E	3.341	$\Delta\lambda$	3.9746714	P $(\delta\phi)^2$	7.6223	$-\Delta\phi$	+6474.46	(colog) E	3.415	$\Delta\lambda$	3.796 3515
D	2.3167	$\frac{\Delta\phi}{2}$	1° 10′ 41″17	$\frac{A^2 arc^2 1''}{3}$	5.912	$\sin\frac{1}{2}(\phi+\phi')$	9.939 0723	P D	2.337 8	$\frac{\Delta\phi}{2}$		$\frac{A^2 arc^2 1''}{3}$	5.912	$\sin\frac{1}{2}(\phi+\phi')$	3493
(3)	0.1736			$\sec^2\phi$	0.643	sec $\frac{\Delta\phi}{2}$	0.000 0918	P (3)	9.9601			$\sec^2\phi$	0.581	sec $\frac{\Delta\phi}{2}$	70/6
−h	3.9235	$\Delta\phi$	2° 21 22.34	(7)	9.579	(approx.) $-\Delta\alpha$	3.9138355	−h	3.808 20	$\Delta\phi$	1° 47 54.46	(7)	8.931	(approx.) $-\Delta\alpha$	
$s^2\sin^2\alpha$	0.3513					do	+8200.41	$s^2\sin^2\alpha$	0.038 71					do	"
E	6.6596	Arc−sin corr.				(8)	" 0.33	E	6.584 6	Arc−sin corr.				(8)	"
(4)	0.9344	for s	−1590	$(\Delta\lambda)^2$	1.924	$-\Delta\alpha$	8200.74	(4)	0.431 5	for s	− 894	$(\Delta\lambda)^2$		$-\Delta\alpha$	"
		for $\Delta\lambda$	+1514	F	7.594					for $\Delta\lambda$	+666	F			
		Total	− 76	(8)	9.518	$\Delta\lambda$	9433.47			Total	−228	(8)		$\Delta\lambda$	6256.79

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11—0500

57° 22' 41.67

Value 2 min $\begin{array}{r} 4083.7 \\ 3712.5 \\ \hline 3712.2 \end{array}$

Value 41.67 sec $\begin{array}{r} 1289.0 \\ \hline 5001.2 \end{array}$

(30.935)

$\frac{5001.2}{50} = 100.0$

57° 20' + 100.0M

170° 27' 22.14

Value 7 min $\begin{array}{r} 3007.4 \\ 4009.9 \\ \hline 7017.3 \end{array}$

Value 22.14 sec $\begin{array}{r} 369.9 \\ \hline 7387.2 \end{array}$

(16.71)

$\frac{7387.2}{50} = 147.75$

170° 20' + 147.8 M

Δλ 4.195 6977 / 2 / 8.391 3954 / 8.230 7841 / 6.622 1795 — 4190

S 4.228 3913 / 8.456 7826 / 8.230 7841 / 6.687 5667 — °4870 ″

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 26—Rev. Apr. 11, 1930

POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

7951

α	2	to 3				α	3	to 2			
2d ∠		&	+			3d		&	−		
α	2 EPT Fox	to 1 3500 MS	30	00	00 00	α	3	to 1			
Δα		N				Δα					
			180	00	00.00				180	00	00.00
α′	1	to 2				α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″		°	′	″			°	′	″
φ	61	31	58.47	2 EPI Fox	λ	166	05	51.88	φ				3	λ			
Δφ	−4	09	17.28		Δλ	4	21	30.25	Δφ					Δλ			
φ′	57	22	41.19	1 3500 M/S	λ′	170	27	22.13	φ′				1	λ′			

	Logarithms		″		Logs		° ′ ″		Logarithms		″		Logs		° ′ ″
s	5.719 7095	(1)	14672.35	½	$\bar{9}$.699	½(φ+φ′)		s		(1)		½	$\bar{9}$.699	½(φ+φ′)	
cos α	9.937 5306	(2)	+ 320.32	s²	1.439	Logarithms		cos α		(2)	+	s²		Logarithms	
B	8.509 2596	Sum	+14992.67	K	2.505	s	5.719 7095	B		Sum		K		s	
(1)=h	4.166 4997	(3)	+ 4.64	E	6.659	sin α	9.698 9700	(1)=h		(3)	+	E		sin α	
s²	1.439 4190	(4)	− 46.08	(5)	0.302	A′	8.508 6818	s²		(4)		(5)		A′	
sin² α	9.397 940	(5)	− 2.01	3	0.477	sec φ′	0.268 3364	sin² α		(5)	−	3	0.477	sec φ′	
C	1.66823	(6)	+ 4.51	cos² α	9.875	Sum	4.195 6977	C		(6)	+	cos² α		Sum	
(2)=K	2.505 589	(7)	+ 3.55	(6)	0.654	Arc−sin corr.	680	(2)=K		(7)	+	(6)		Arc−sin corr.	
(δφ)²	8.349 4	−Δφ	14957.28	(colog) E	3.341	Δλ	4.195 6297	(δφ)²		−Δφ		(colog) E		Δλ	
D	2.3167	Δφ/2		A²arc²1″/3	$\bar{5}$.912	sin½(φ+φ′)	6229	D		Δφ/2		A²arc²1″/3	$\bar{5}$.912	sin½(φ+φ′)	
(3)	0.6661			sec²φ	0.643	sec Δφ/2	277/68	(3)				sec²φ		sec Δφ/2	
−h	4.1665			(7)	0.550	(approx.) −Δα		−h				(7)		(approx.) −Δα	
s² sin² α	0.8374					do	″	s² sin² α						do	″
E	6.6596					(8)	″	E						(8)	″
(4)	1.6635					−Δα	″	(4)						−Δα	″
						Δλ	15690.25″							Δλ	″

Arc−sin corr.			
for s	−4870	(Δλ)³	
for Δλ	+4190	F	7.594
Total	−680	(8)	

Arc−sin corr.			
for s	−	(Δλ)³	
for Δλ	+	F	
Total		(8)	

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RHC

Form 712
DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
Rev. Apr. 1950

TIDE NOTE FOR HYDROGRAPHIC SHEET

~~Division of Coast and Geodetic Surveys~~ 28 January 1953

Division of Charts: R. H. Carstens

Plane of reference approved in 4 volumes of sounding records for

HYDROGRAPHIC SHEET 7951

Locality Bering Sea, Alaska

Chief of Party: C. Pierce) T. B. Reed) in 1951-52

Plane of reference is mean lower low water, reading
3.3 ft. on tide staff ~~at~~ (1951) at Dutch Harbor
15.3 ft. below B. M. 2 (1934)

NOTE: In Volumes 1 and 2, 1951, time and height corrections are in accordance with tide zones as indicated on sketch enclosed in letter of 21 November 1951 to Commanding Officer of U.S.C.&G.S. Ship PATHFINDER.

In Volumes 1 and 2, 1952, tide reducers not entered and are unnecessary on account of deep soundings.

Condition of records satisfactory except as noted below:

E. C. McKay
Section of Tides
Chief, Division of Tides and Currents.

U. S. GOVERNMENT PRINTING OFFICE 877933

NAUTICAL CHARTS BRANCH

SURVEY NO. H-7951 Wk. for 1951 & 1952

Position of continental shelf - classified information

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
Sept '52	9302		Partially applied thru boat sheets Before After Verification and Review
3/21	9302	GJE	~~Before After~~ Verification and Review Depth curves added after de-classification of area
4/4/55	8802	GJE	Before ~~After~~ Verification and Review
4-9-70	8995	H. Rodd	Before ~~After~~ Verification and Review Added two edges partially
3/30/76	8802	Raitor	~~Before~~ After Verification ~~and Review~~ Exam DR only for critical corrs. No corr
1/30/78	8802	C.S. Forbes	~~Before~~ After Verification ~~and Review~~ Consider application as final. No additional corrections.
			Before After Verification and Review
4/10/90	16006	DMMCALLISTER	CONSIDER FULLY ~~APPROPRIATELY~~ APPLIED CAT I
6/22/90	16382	L. ARKENAU	~~Before~~ After Verification and Review CONSIDERED FULLY APPLIED / CATEGORY I
			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.