

9985

Diagrams 4115-2 & 4116-2

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

Type of Survey ... Hydrographic
Field No. RA-80-2-81
Office No. H-9985

LOCALITY

State Hawaii
General Locality Alenuihaha Channel
Locality Southeast of Maui

1981

CHIEF OF PARTY
CDR R.J. Land

LIBRARY & ARCHIVES

DATE November 9, 1983

9985

119320
119320
193-??
7310?
1900?
1120?
1120?
1120?

HYDROGRAPHIC TITLE SHEET

H-9985

INSTRUCTIONS - 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.

RA-80-2-81

State Hawaii

General locality Alenuihaha Channel

Locality Southeast of Maui

Scale 1:80,000 Date of survey Nov. 5 - Dec. 3, 1981

Instructions dated June 11, 1981 Project No. OPR-T126-RA-81

Vessel NOAA Ship RAINIER (2020)

Chief of party CDR R. J. Land

Surveyed by NOAA Ship RAINIER Personnel

Soundings taken by echo sounder, ~~hand lead, pole~~ Raytheon LSR

Graphic record scaled by Ship's Personnel

Graphic record checked by Ship's Personnel

Verification

~~Reviewed~~ by A. A. Luceno

Automated plot by PMC Xynetics Plotter

Evaluation

~~Verification~~ by K. M. Scott

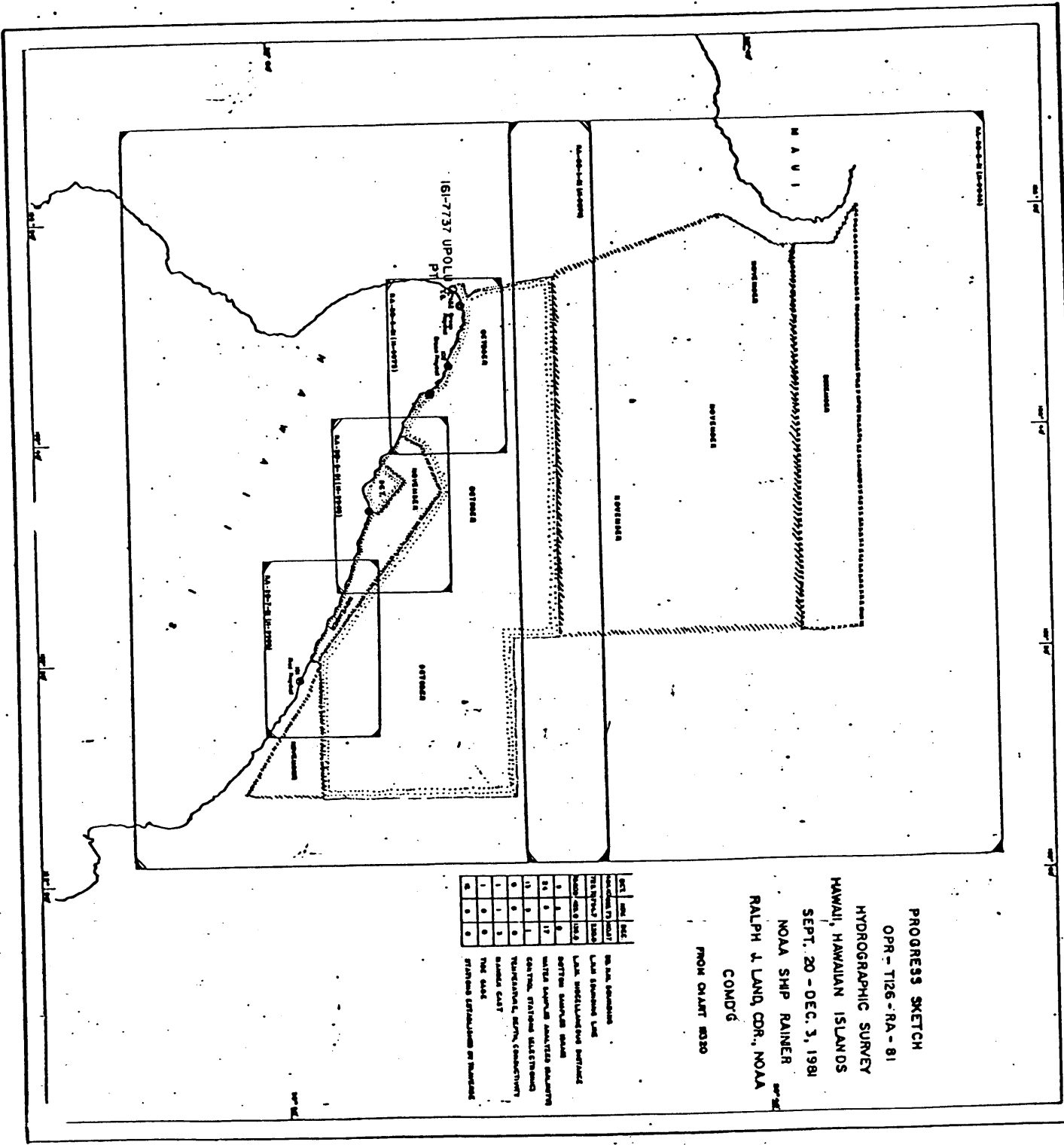
Soundings in fathoms ~~feet~~ at ~~MDR~~ MLLW

REMARKS:

STANDARDS CK'D 11-18-83

C. Coy

AWOIS ✓ 12/1/83 RWD



PROGRESS SKETCH
 OPR - T126 - RA - 81
 HYDROGRAPHIC SURVEY
 HAWAII, HAWAIIAN ISLANDS
 SEPT. 20 - DEC. 3, 1981
 NOAA SHIP RAINIER
 RALPH J. LANG, CDR., NOAA
 COMD'G

FROM CHART 18350

NO.	DATE	DESCRIPTION
1	9/20	Initial sounding
2	9/20	Chart sounding
3	9/20	Chart sounding
4	9/20	Chart sounding
5	9/20	Chart sounding
6	9/20	Chart sounding
7	9/20	Chart sounding
8	9/20	Chart sounding
9	9/20	Chart sounding
10	9/20	Chart sounding
11	9/20	Chart sounding
12	9/20	Chart sounding
13	9/20	Chart sounding
14	9/20	Chart sounding
15	9/20	Chart sounding
16	9/20	Chart sounding
17	9/20	Chart sounding
18	9/20	Chart sounding
19	9/20	Chart sounding
20	9/20	Chart sounding
21	9/20	Chart sounding
22	9/20	Chart sounding
23	9/20	Chart sounding
24	9/20	Chart sounding
25	9/20	Chart sounding
26	9/20	Chart sounding
27	9/20	Chart sounding
28	9/20	Chart sounding
29	9/20	Chart sounding
30	9/20	Chart sounding

A. PROJECT

Survey H-9985 was conducted under instructions OPR -T126-RA-81, dated 11 June, 1981 and supplemented by Change No. 1, dated 13 July, 1981.

B. AREA SURVEYED

The survey covered the waters north of the Island of Hawaii and east of the Island of Maui. The approximate limits were between longitudes $155^{\circ} 22' W$ and $156^{\circ} 00' W$ and between latitudes $20^{\circ} 24' N$ and $20^{\circ} 49' N$.

The survey was divided into two boat sheets at latitude $20^{\circ} 44' N$.

Operations began 5 November, 1981 (JD 309) and were concluded on 3 December, 1981 (JD 337).

C. SOUNDING VESSELS

The NOAA Ship RAINIER was used exclusively on this survey. The EDP number was 2120. No unusual problems or configurations were encountered.

D. SOUNDING EQUIPMENT

Echo soundings obtained during survey H-9985 were taken by the Ship RAINIER (2120). The ship is equipped with an EDO model 248 transceiver, a Raytheon model LSR 1811-19 analog trace recorder and a digitrak model 261-C digitizer. The table below summarizes component serial numbers for the RAINIER.

Table I

Echo Sounding Component Serial Numbers

Vessel	2120
Transceiver	202
Analog recorder	C255
Digitizer	204

SOUND VELOCITY CORRECTORS

Sound velocity corrections for echo soundings were derived from data obtained from three Nansen casts performed during the project. No Martek casts were taken because the equipment was undergoing repairs and recalibration. Details of the casts are summarized below.

Table II
Nansen Cast Data

<u>Date</u>	<u>Location</u>	<u>Velocity Table No.</u>
6 Oct., 1981	20° 30.0' N 155° 39.6' W	1 & 2
21 Nov., 1981	20° 16.4' N 155° 16.1' W	1 & 2
1 Dec., 1981	20° 23.0' N 155° 58.5' W	1 & 2
	20° 03.8' N 156° 00.6' W	1 & 2
	20° 02.2' N 156° 08.3' W	1 & 2

The three Nansen casts on 1 December, 1981 were conducted with five bottles at each location. This explains the multiple casts for the one date. The water samples collected from the Nansen casts were analyzed for salinity using standard laboratory procedures (see H.O. 607, Instruction Manual for Obtaining Oceanographic Data, Third Edition, U.S. Naval Oceanographic Office, 1968). The salinometer used for salinity analyses was Beckman model no. RS7B, s/n 59265. The unit was last calibrated May, 1981 by the Northwest Regional Calibration Center, Bellevue, Washington (see separates following text for calibration results). Results from the Nansen casts were input into computer program RK-530, Velocity Correction Computations (10 May, 1976 version) and run on the RAINIER's PDP 8/e digital computer, s/n 1015, to yield velocity correctors for all surveys in this

project. Nansen casts on 21 November, 1981 and 1 December, 1981 checked the accuracy and stability of the water column. A separate deep water corrector table for soundings gathered by the RAINIER was made. A list of the computed correctors from the casts are provided in the separates following the text. The velocity correctors from the Nansen casts agreed within 0.2% at each depth listed. The largest corrector difference was 0.5 fathoms at a depth of 1290 fathoms. This indicates an extremely stable water column. Because of the negligible change between Nansen casts, correctors derived from the first Nansen cast were used for all surveys.

SHIP DRAFT CORRECTIONS

Since no changes in loading or configuration have been made to cause a change in the draft, the historic TRA value of 2.6 fathoms was used in plotting all ship hydrography.

SHIP SETTLEMENT AND SQUAT CORRECTIONS

Settlement and squat corrections for the Ship RAINIER was considered insignificant according to paragraph 4.9.2., page 4-67 of the Hydrographic Manual (Fourth Edition, 1976).

SOUNDING EQUIPMENT CORRECTIONS

Problems of the EDO deep water system in obtaining an accurate trace over a steeply sloping bottom did occur. If the area had no digitized depth or analog trace, the area was run again with special attention given to both the digitizer and recorder. Fortunately, this did not happen very often. If only the analog recorder was producing a readable trace and the digitizer wasn't following the depth of the water, values were simply picked off the trace and inserted on the punched paper and the print out.

E. HYDROGRAPHIC SHEETS

The field sheets were prepared onboard the NOAA Ship RAINIER. All field records were sent to the Pacific Marine Center for verification. The sheet was plotted as a modified transverse mercator projection. A copy of the parameter tape is included in the separates following this report.

F. CONTROL STATIONS

Horizontal control for RA-80-2-81 was provided by the recovery of 23 existing stations and the establishment of 23 new stations. A copy of the Master Station List is included in the attachments to this report. The stations used each day are listed in the raw records and found on the Master Station List. The new stations were established using Third Order, Class I traverse methods, and were monumented and described. The North American Datum of 1927 was used in the survey. Details concerning the location and recovery of each station, including the field records and processing computations, are located in the Horizontal Control Report, OPR-T126-RA-81. No unconventional survey methods were used for determining the positions of horizontal control stations. There were no anomalies in the control adjustment or in closure and ties.

G. HYDROGRAPHIC POSITION CONTROL

Range-range methods utilizing Teledyne-Hastings Raydist were used exclusively for this survey.

Some positional accuracy was sacrificed in the area near $20^{\circ} 49' N$ $155^{\circ} 59.5' W$, where the angle of intersection for the lines of position was 27° .

However, only five soundings were involved and no unreasonable inaccuracies resulted ($d_{rms} = 0.35$ mm at the scale of the survey).

RAYDIST SHORE INSTALLATIONS

A summary of Raydist shore installations is as follows:

<u>Station</u>	<u>Raydist Transmitter</u>	<u>Frequency</u>	<u>Antenna</u>
101	Red S/N 233	1648.015 KHZ	75 ft.
122	Green S/N 120	1648.425 KHZ	65 ft.

The stations normally provided an arc of intersection of between 30° & 150° . Shore stations were positioned over Third Order, Class I geodetic control stations. Power was supplied by propane fueled thermal generators.

RAYDIST CALIBRATION METHODS

Fixes on at least Third Order, Class I stations. Check fixes were utilized where available. Where check fixes were applied, a minimum of 3 final calibration fixes were acquired to determine correctors. Where no check fix was available, a minimum of 5 final calibration fixes were acquired to determine corrector values. The only exception to this is on JD 336 and 337, where beginning and ending calibrations were accomplished using ranges from miniranger codes on Third Order, Class I stations. This technique, initiated last year aboard the ship, worked quite well.

All calibration records and computations are included with the raw data. Correctors were dialed directly into the Hydroplot system.

A summary of calibration data correctors and Raydist utilization is included in the addenda to this report.

H. SHORELINE

No shoreline is included in this area. ✓

I. CROSSLINES

Crosslines comprised 143.5 miles of hydrography or 27.3% of the mainscheme ✓
mileage.

Crossline agreement was excellent and met the criteria set forth in section ✓
1.1.2, part B.II.1. of the Hydrographic Manual with the following exceptions:

1. at $20^{\circ}25' N$, $155^{\circ}48' W$; XL position 140 + 4, 596 fms and MS position 47 + 4, 609 fms.
2. at $20^{\circ}43' N$, $155^{\circ}55' W$; XL position 429 + 4, 404 fms and MS position 285 + 1, 425 fms.
3. at $20^{\circ}44' N$, $155^{\circ}55' W$; XL position 393 + 5, 253 fms and MS position 414 + 4, 241 fms.
4. at $20^{\circ}41' N$, $155^{\circ}57.5' W$; XL position 396 + 5, 393 fms and MS position 441, 372 fathoms.

The above discrepancies are attributed to small position errors over an ✓
extremely broken bottom. The lesser depths are more significant for charting
purposes.

J. JUNCTIONS

This survey junctions with the following contemporary surveys:

1. H-8826 (1:10,000, 1963) junctions alongshore the Island of Maui. There ✓
were no coincident soundings; however, the contour fit was good.
2. H-8719 (1:10,000, 1963) also junctions alongshore the Island of Maui. ✓
There were no coincident soundings and the general contour fit was good.
3. H-9129 (1:40,000, 1970) junctions along the west edge of both sheets. ✓
Three comparison soundings were possible and agreement was excellent.

See
Eval
Rpt
See 5

4. RAINIER survey H-9974 (1:80,000, 1981) was conducted to the south at this time by continuous operations. also using the RAINIER. ✓

The comparisons above were made by transferring soundings from the 1:10,000 sheets and by direct inspection on a reduction table on the 1:40,000 sheet. ✓

K. COMPARISON WITH PRIOR SURVEYS

There were no presurvey review items in this area. This survey junctioned with the following prior surveys: ✓

1. H-3519 (1:60,000, 1914) had eight coincident soundings; all comparisons agreed within 3% of the depth. ✓

2. H-3652 (1:60,000, 1914) had only two soundings in this area; none were coincident. —

3. H-5052 (1:80,000, 1929) junctioned on the west edge of sheet B with 21 comparable soundings. Agreement was excellent except for the following: ✓

A. at 20°24' N, 155°50' W; RAINIER position 3+ 3, 454 fms disagreed with 520 fms. This discrepancy may indicate a contour line adjustment is needed. —

B. at 20°35' N, 155°48' W, the prior survey shows a flat area at 1000 fms that does not correspond with the RAINIER contours or soundings at 1072 fms. This flat does not appear on the fathometer trace and may be a prior systems error. —

See
Eval
Rpt
Sec. 6

L. COMPARISON WITH THE CHART

Comparison was made with the 12th edition of chart 19320 (1:250,000, 1978) by enlargement on a light table. Of seventeen comparisons, eight were discrepancies: ✓

See
Eval
Rpt
Sec. 7

1. at 20°42' N, 155°46' W; RAINIER sounding 299 + 5, 810 fms disagree with charted depth of 758. This discrepancy can be attributed to a position error.

2. at 20°25' N, 155°41' W; RAINIER sounding 173 + 2, 777 fms and charted depth of 580 fms.

3. at 20°26' N, 155°40' W; position 173, 828 fms and charted depth 955 fms.

4. at 20°28' N, 155°41' W; position 61 + 1, 1689 fms and charted depth 1425 fms.

5. at 20°31' N, 155°33' W; position 104 + 2, 2037 fms and charted depth 2095 fms. This could be a position error.

6. 20°26' N, 155°32' W; position 31 + 5, 1383 fms and charted depth 1307 fms. This could also be a position error.

7. at 20°37' N, 155°27' W; charted depth 733 fms does not fit and could be in error. (see discussion below)

8. at 20°47' N, 155°55' W; position 436 + 4, 415 fms and charted depth of 254 fms. As in 1, 5, and 6 above, this could be a positioning error, either in the original data or in the transcription.

In items 2, 3, 4 and 7 above, a systems error is indicated. This survey should be more accurate due to modern survey methods and should supercede the chart. ✓

At approximately 20°36.5' N, 155 27.5' W, several crosslines were run to verify a chart sounding of 733 fms. These lines indicated a flat bottom at about 1100 fms. No rise on peak was indicated and it is recommended that the charted sounding be removed from the chart. Correspondence to PMC concerning this feature is included in the separates following this report. ✓

New features included two peaks that were developed at 20°46' N, 155°55' W and at 20°45' N, 155°55' W. The least depths found were 223 fms and 178 fms, respectively. These peaks were developed by 800 meter spacing. ✓

It is recommended that these peaks be included in future charts of the area. ✓

M. ADEQUACY OF SURVEY

This survey is complete and adequate for charting this area. ✓

N. AIDS TO NAVIGATION

There were no aids to navigation in this area. ✓

O. STATISTICS

This survey contained 480 positions in 665.5 linear nautical miles of hydrography. The area covered approximately 768 square nautical miles. ✓

No bottom samples were taken in this area. ✓

Three velocity casts were taken during this survey which produced two complete sets of velocity data. ✓

P. MISCELLANEOUS

Sounding positions numbers 458 to 547 were not used. Position 548 follows position 457. ✓

Some lines of hydrography contain gaps, as at $20^{\circ}43' N, 155^{\circ}44' W$ and at $20^{\circ}43' N, 155^{\circ}26' W$. These were missed depths caused by the extremely rough seas encountered at this point. ✓

Q. RECOMMENDATIONS

It is recommended that survey H-9985 update and supersede all previous hydrography for charting purposes. ✓

R. AUTOMATED DATA PROCESSING

Data acquisition and processing were accomplished as per instructions in the Hydrographic Manual (4th edition), Instruction Manual for Automated Hydrographic Surveys, Hydrographic Survey Guidelines, PMC OORDER, and Hydrographic Data Requirements for the 1981 field season.

Soundings and positions were taken by a Hydroplot system using range-range program RK 111. There are daily master tapes and corresponding corrector tapes which include the TRA, electronic control calibration correctors for Raydist or baseline correctors for Mini-ranger, and all depth corrections. Velocity tapes were generated from Nansen cast data. The following is a list of all computer programs and version dates used for data acquisition or processing:

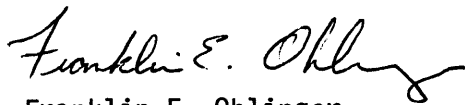
<u>PDP 8/e Program</u>	<u>Version Date</u>
RK 111 Range/Range Real-Time Hydroplot	1/30/76
RK 201 Grid, Signal and Lattice Plot	4/18/75
RK 211 Range/Range Non-Real Time Plot	2/02/81
RK 300 Utility Computations	10/21/81
RK 330 Reformat and Data Check	5/04/76
PM 360 Electronic Corrector Abstract	2/02/76
RK 407 Geodetic Inverse/Direct Computation	9/25/78
AM 500 Predicted Tide Generator	11/10/72
RK 530 Layer Corrections for Velocity	5/10/76
RK 561 H/R Geodetic Calibration	2/19/75
AM 602 ELINORE - Line Oriented Editor	5/20/75
RK 606 Tape Duplicator	8/22/74
RK 612 Line Printer List	3/22/78

The HP-9815 and HP-97 calculators were used to compute geographic positions of electronic control stations and visual signals used for calibrations.

S. REFERRAL TO REPORTS

Additional data on this report can be found in the Horizontal Control Report, the Electronic Control Report, and the Corrections to Echo Soundings Report, submitted separately.

Submitted by,



Franklin E. Ohlinger
LTJG, NOAA

Approved and forwarded,



Ralph J. Land
CDR, NOAA
Commanding

FIELD TIDE NOTE

OPR-T126-RA-81

~~HAWAII, HAWAIIAN ISLANDS~~

This report covers the tide data gathered September - December 1981 in support of hydrographic survey OPR-T126-RA-81, along the northeast coast of the Island of Hawaii.

Field tide reduction of soundings was based on predicted tides from Honolulu, Hawaii, corrected to Hilo, Hawaii, and were interpolated by PDP 8/e computer utilizing AM 500 (version dated 11/10/72). All times of both predicted and recorded tides are GMT.

In addition to the permanent Hilo, Hawaii tide gage (161-7760) used for the project, one Metercraft bubbler tide gage was installed in the project area. Its location and period of operation are as follows:

<u>Site</u>	<u>Location</u>	<u>Period</u>
Upolu Point	20° 15.2' N 155° 53.4' W	65 days* (28 September - 4 December)

*(see discussion in next section)

UPOLU POINT (161-7737)

Gage (S/N 7601-753634) was installed on September 26 and began operation on September 28, 1981.

The first staff support structure was knocked out by high surf on October 7, 1981 at approximately 1700 GMT (Although data after 0600Z on 10/7 was not retrievable). A much heavier, stronger structure was installed on October 10, 1981 and data collection resumed at 0206 GMT on that date. This does not seriously affect the data because, as per section 5.8.2. of Project Instructions OPR-T126-RA-81, the hydrography run on these days was ship hydro done in greater than 100 fathoms (with the exception of 4 soundings, none of which was shoaler than 77 fathoms). This new staff and orifice support structure withstood occasional high surf batterings which completely inundated the entire structure.

It should be noted here that, when the gage and staff support structure were removed on December 4, 1981, the U-bolt which secured the orifice to the

angle iron support was missing. It is not known when the U-bolt broke off. The next point of attachment to the support was roughly 20 inches higher along the tubing. (See illustration on next page). This would have permitted movement of the orifice with the surge. The motion would tend to dampen the wave action, resulting in a tide height lower than it should be. An inspection of the marigrams yields no apparent evidence of the degree of this motion.

Similarly, an inspection of the gage/staff difference shows no differences indicative of significant orifice movement.

During the period of September 28 to October 7, the original staff read 13.2 ft. greater than the marigram. During the remaining period of October 10 through December 4, the new staff read 7.6 ft. greater than the marigram. The marigram speed of the gage proved to be somewhat erratic, calling for the tide observer to almost continually reset the chart at each observation. Additionally, the observer tried to adjust the speed of the marigram drive on October 31, Nov. 2, Nov. 3, and Nov. 7 with little or no success.

HILO (161-7760)

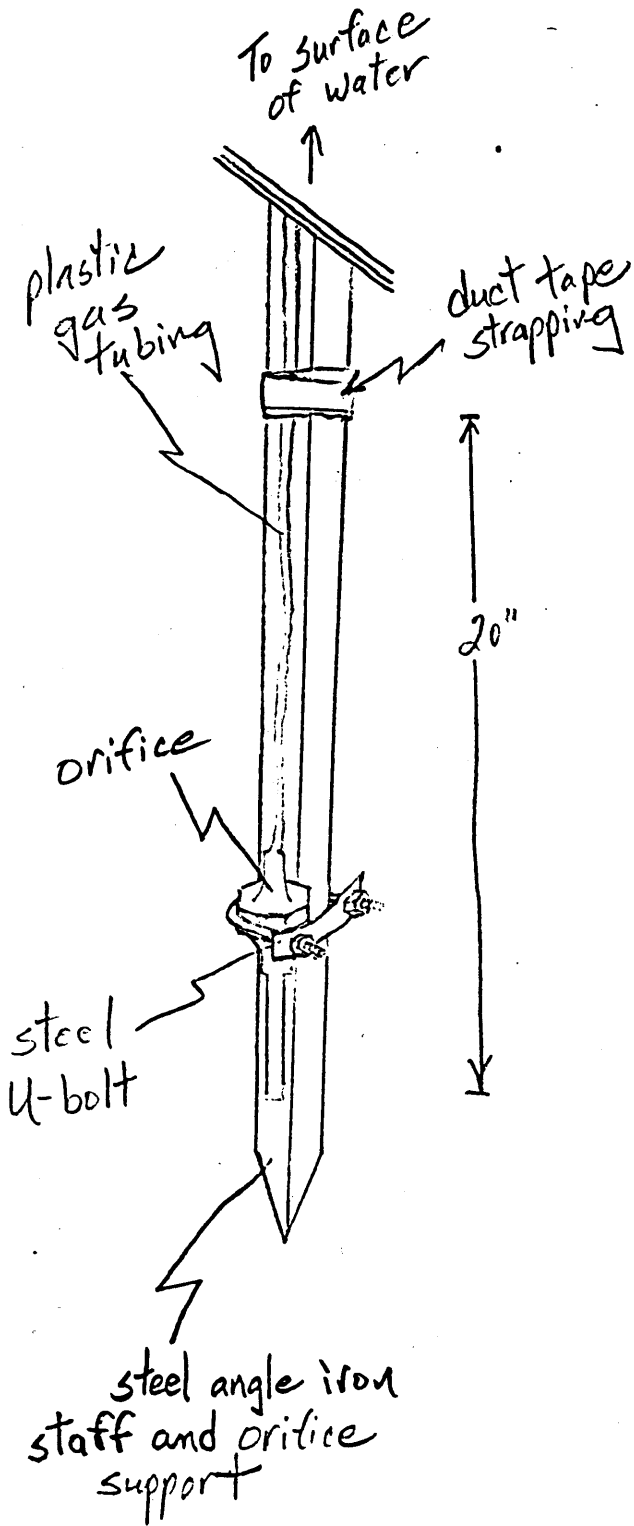
This gage (S/N 7601 A1469M11) is a primary gage installed and maintained by the Pacific Tides Party. It is permanently installed at $19^{\circ}44.0' N$, $155^{\circ}3.5' W$. Levels were run before and after the project but, aside from that, there was no work done with the gage.

LEVELS

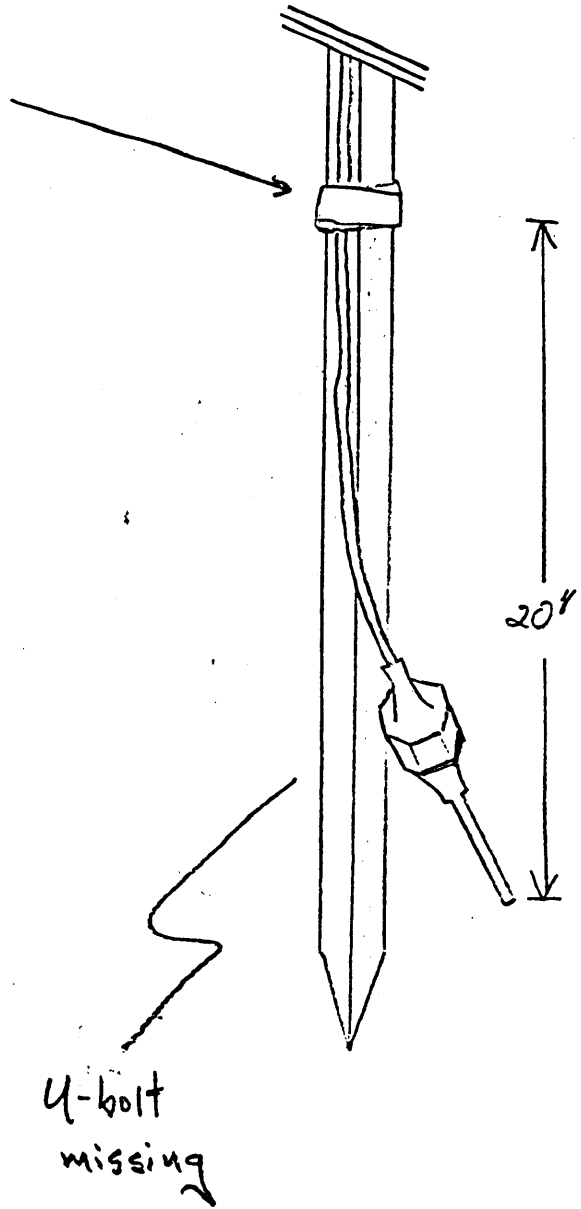
UPOLU POINT

An inspection of the gage levels run at installation and at removal yields the following:

AT INSTALLATION



UPON REMOVAL



Height Between Benchmarks

<u>Height Measured</u>	<u>2 Nov. 80</u>	<u>17 Dec. 80</u>	<u>23 Sept. 81</u>	<u>5 Dec. 81</u>	<u>Mean</u>	<u>Mean-Excluding 23 Dec. 81</u>
Staff Stop - BM Pier 3	4.341 ft.	4.337 ft.	4.331 ft.	4.327 ft.	4.334 ft.	4.335 ft.
BM Pier 3 - BM F	.091 ft.	.099 ft.	.075 ft.	.092 ft.	.089 ft.	.094 ft.
BM F - BM 5	.006 ft.	.007 ft.	.006 ft.	.006 ft.	.006 ft.	.006 ft.
BM 5 - BM 4	2.510 ft.	2.506 ft.	2.523 ft.	2.497 ft.	2.509 ft.	2.504 ft.

Height Between Benchmarks

<u>Height Measured</u>	<u>At Installation</u>	<u>At Removal</u>	<u>Difference</u>
BM A - BM B	4.612 ft.	4.619 ft.	2.1 mm
BM B - BM C	16.162 ft.	16.158 ft.	1.2 mm
BM C - BM D	10.988 ft.	10.991 ft.	0.9 mm
BM D - BM E	.728 ft.	.728 ft.	none

	<u>New Staff Installation</u>	<u>Removal</u>	<u>Difference</u>
Staff Stop - BM A	.787 ft.	.781 ft.	1.8 mm

Total Cumulative Difference: 6.0 mm

HILO

An inspection of the gage levels run prior to and after completion of the project yields the following:

Height Between Benchmarks

<u>Height Measured</u>	<u>23 Sept. 81</u>	<u>5 Dec. 81</u>	<u>Difference</u>
Staff Stop - BM Pier 3	4.331 ft.	4.327 ft.	1.2 mm
BM Pier 3 - BM F	.075 ft.	.092 ft.	5.2 mm
BM F - BM 5	.006 ft.	.006 ft.	none
BM 5 - BM 4	2.523 ft.	2.497 ft.	7.9 mm

Total Cumulative Difference: 14.3 mm

The large differences here are believed to be the result of leveling errors during the 23 Sept. 81 leveling. Indications of that lies in a comparison of levels run on 2 Nov. 80 and 17 Dec. 80 with the 1981 levels (see following page).

Levels were run twice on 23 Sept. 81, due to the disparity in results with previous levelings. Still, it seems there was a problem on the Pier 3 -

BM F and the BM 5- BM 4 sections.

Further, it appears there is a slumping of the dock. The Staff Stop - Pier 3 section shows a trend, as does the BM 5 - BM 4 section (if we ignore the 23 September levels).

These results should be compared with the levels run by the Pacific Tides Party.

Respectfully submitted,

Richard L. Hastings, SST
for Michael J. Kretsch
LT, NOAA

Approved and Forwarded,

Ralph J. Land
Ralph J. Land
CDR, NOAA
Commanding

GEOGRAPHIC NAMES

H-9985

Name on Survey	A ON CHART NO. 19320 B ON PREVIOUS SURVEY NO. C ON U.S. QUADRANGLE MAPS D FROM LOCAL INFORMATION E ON LOCAL MAPS F P.O. GUIDE OR MAP G RAND McNALLY ATLAS H U.S. LIGHT LIST K										
	ALENUHAHA CHANNEL	X									
HAWAII (title)											2
MAUI (title)											3
											4
											5
											6
											7
											8
											9
											10
											11
											12
											13
											14
											15
											16
											17
									Approved:		18
											19
									<i>Charles E. Harrington</i>		20
									Chief Geographer - N/CG2x5		21
									18 MAY 1983		22
											23
											24
											25

PARAMETER TAPE LISTING
RA-80-2-81 (H-9985)

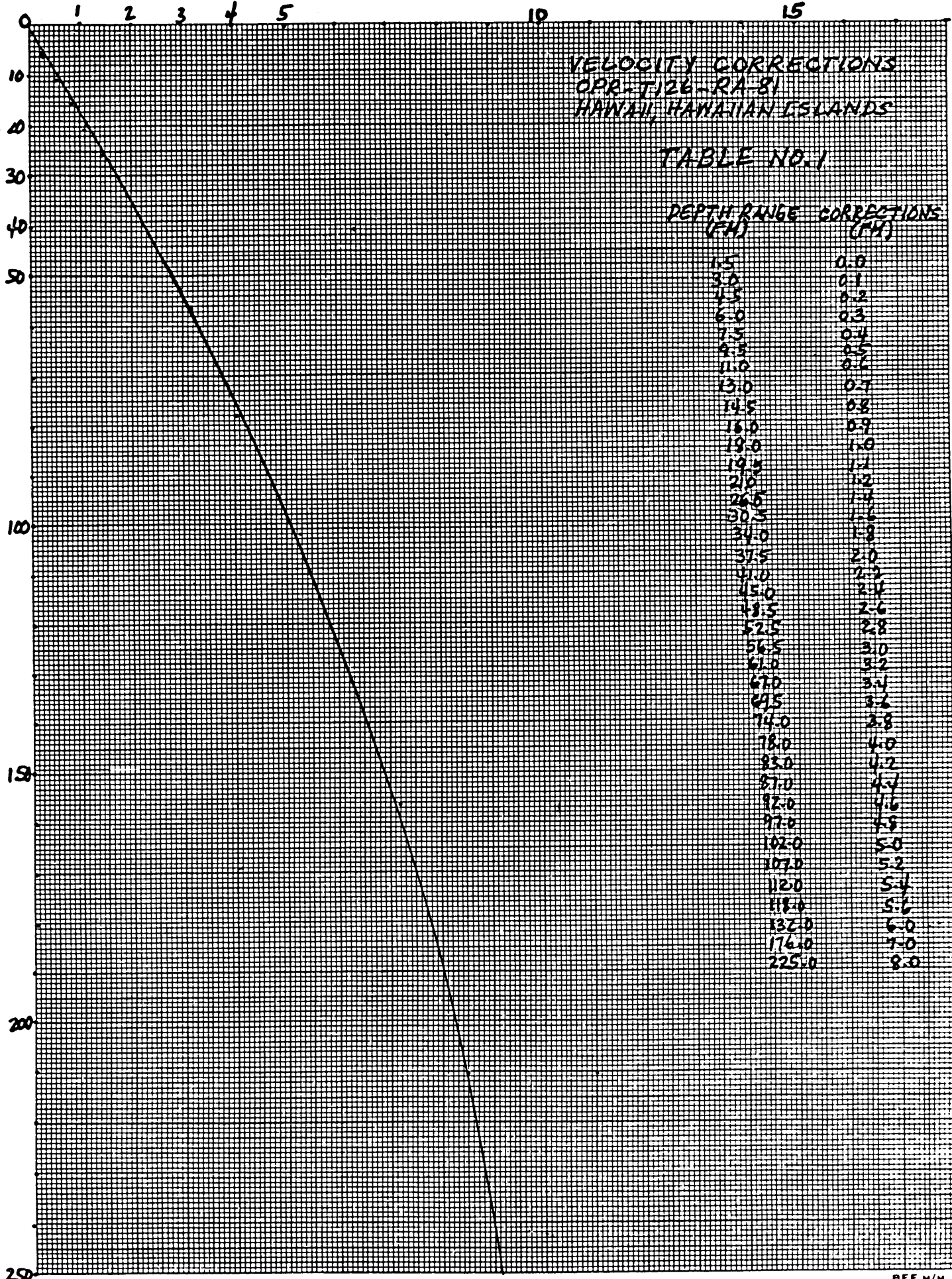
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.. CLAT=2176000
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GRID=4/0
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PLAT=20/40/00
PLON=156/02/00
VESNO=2120
YR=81
ANDIST=33.5

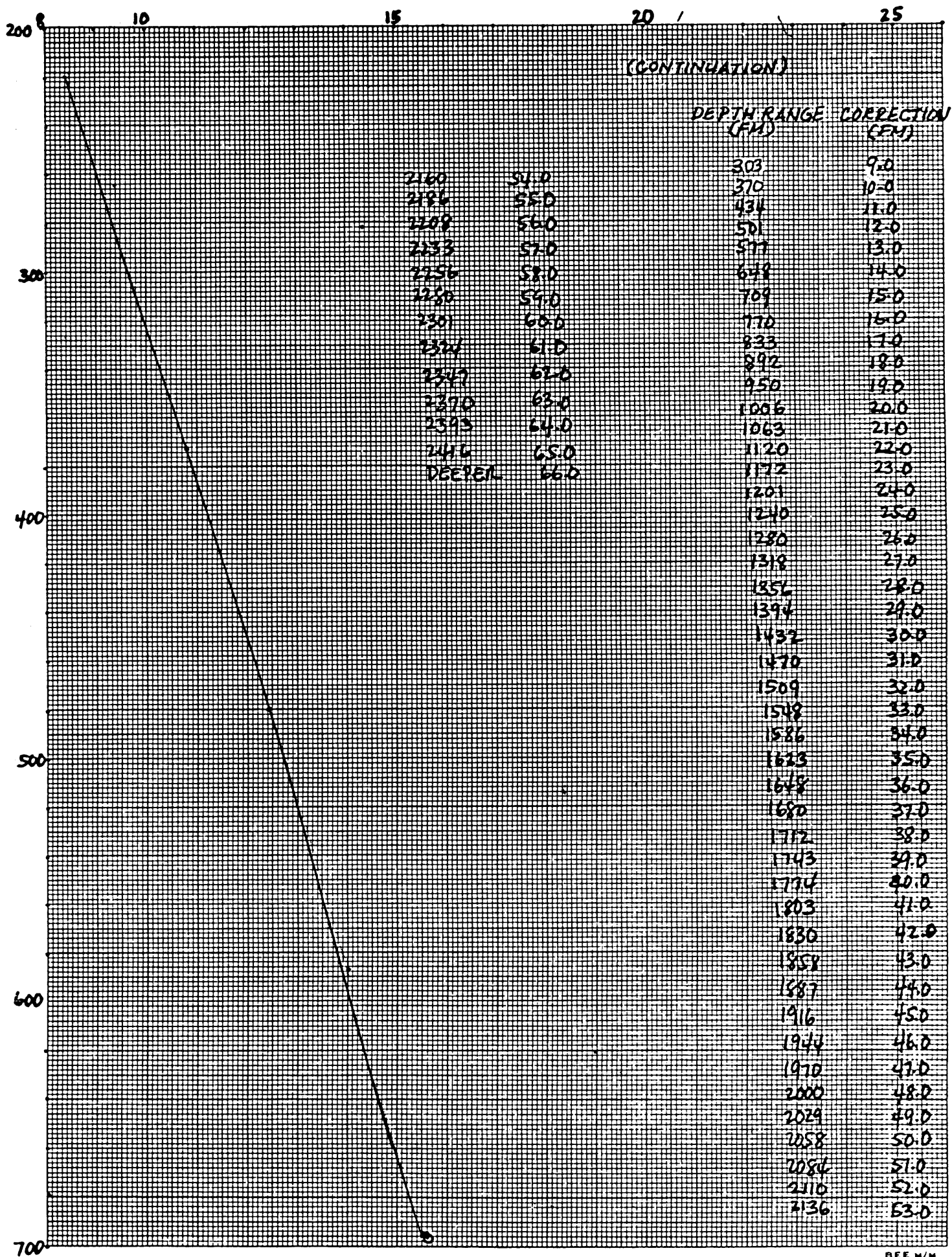
PA-80-2B-81
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FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=4/0
FLSCL=80000
PLAT=20/20/00
PLON=156/02/00
VESNO=2120
YR=81
ANDIST=33.5

VELOCITY CORRECTIONS
OPR. T-126-RA-81
HAWAII, HAWAIIAN ISLANDS

TABLE NO. 1

DEPTH RANGE (FM)	CORRECTIONS (FM)
1.5	0.0
3.0	0.1
4.5	0.2
6.0	0.3
7.5	0.4
9.0	0.5
11.0	0.6
13.0	0.7
14.5	0.8
16.0	0.9
18.0	1.0
19.5	1.1
21.0	1.2
24.5	1.4
30.5	1.6
34.0	1.8
37.5	2.0
41.0	2.2
45.0	2.4
48.5	2.6
52.5	2.8
56.5	3.0
61.0	3.2
67.0	3.4
73.5	3.6
74.0	3.8
78.0	4.0
83.0	4.2
87.0	4.4
92.0	4.6
97.0	4.8
102.0	5.0
107.0	5.2
112.0	5.4
118.0	5.6
132.0	6.0
174.0	7.0
225.0	8.0





(CONTINUATION)

		DEPTH RANGE (FM)	CORRECTION (FM)
2160	54.0	303	9.0
2184	55.0	370	10.0
2208	56.0	434	11.0
2233	57.0	501	12.0
2256	58.0	577	13.0
2280	59.0	648	14.0
2301	60.0	709	15.0
2324	61.0	770	16.0
2347	62.0	833	17.0
2370	63.0	892	18.0
2393	64.0	950	19.0
2416	65.0	1006	20.0
DEEPEN	66.0	1063	21.0
		1120	22.0
		1172	23.0
		1201	24.0
		1240	25.0
		1280	26.0
		1318	27.0
		1356	28.0
		1394	29.0
		1432	30.0
		1470	31.0
		1509	32.0
		1548	33.0
		1586	34.0
		1623	35.0
		1648	36.0
		1680	37.0
		1712	38.0
		1743	39.0
		1774	40.0
		1803	41.0
		1830	42.0
		1858	43.0
		1887	44.0
		1916	45.0
		1944	46.0
		1970	47.0
		2000	48.0
		2029	49.0
		2058	50.0
		2086	51.0
		2110	52.0
		2136	53.0

700

20

25

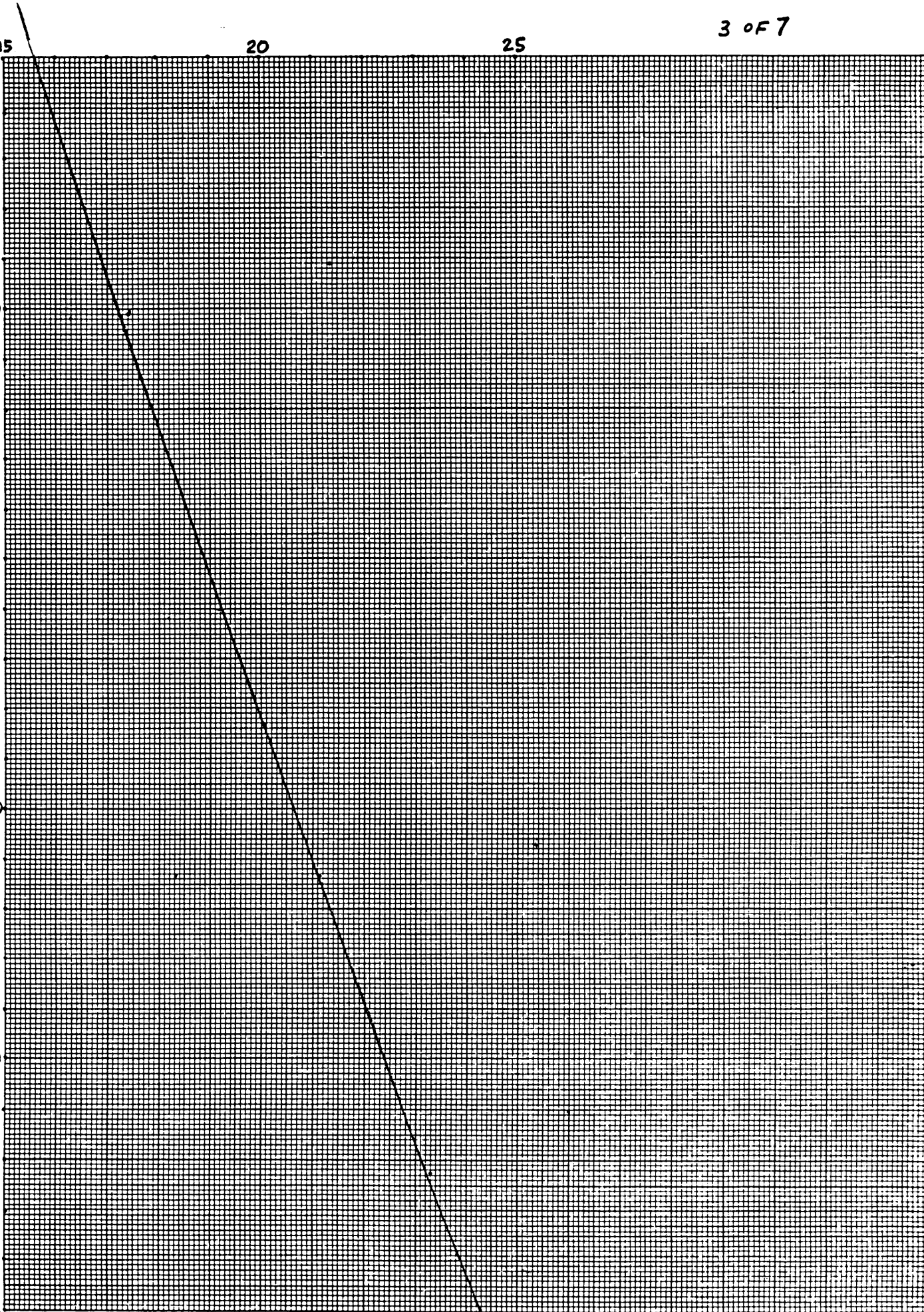
800

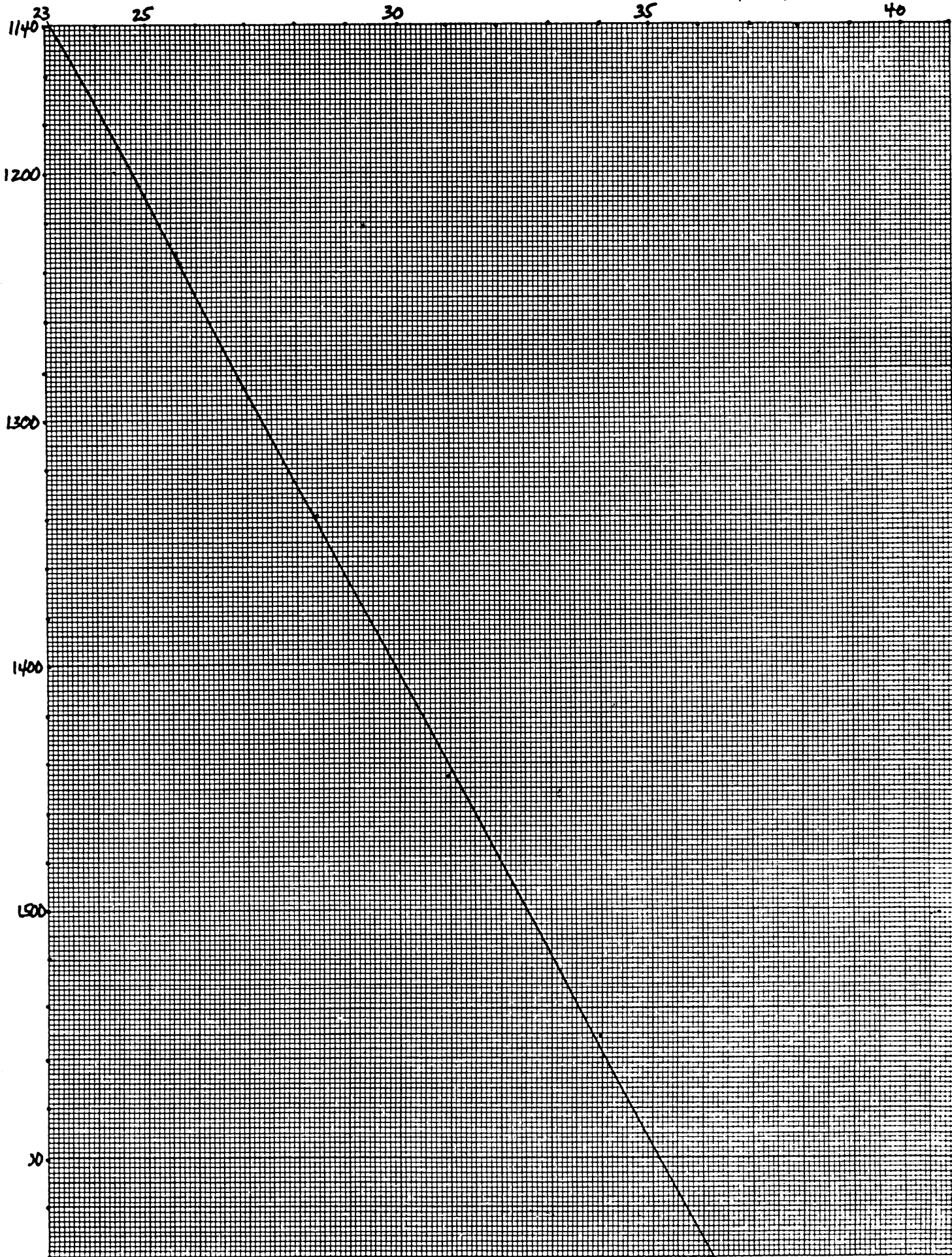
900

1000

1100

1200





1640³⁴

40

45

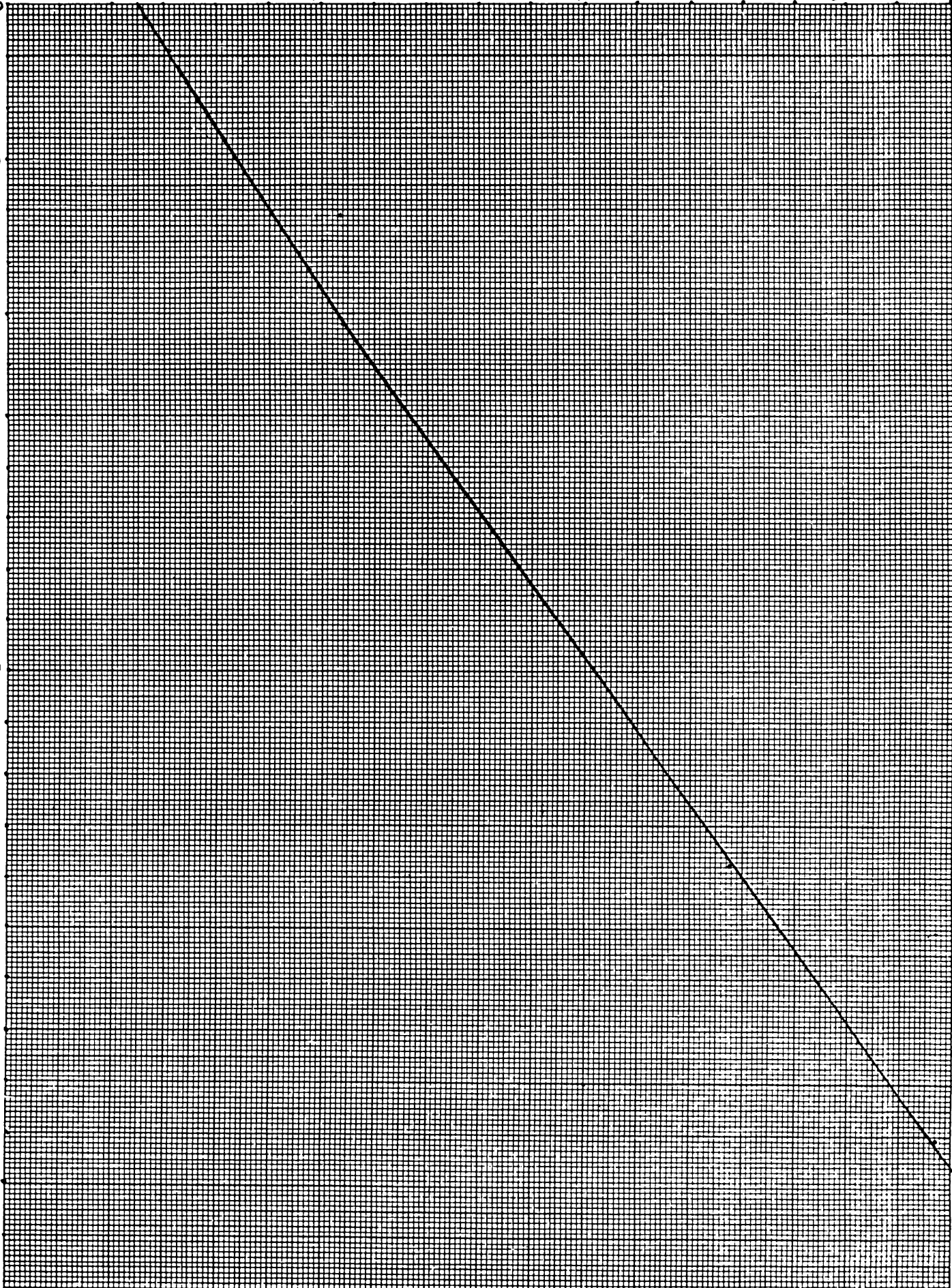
50

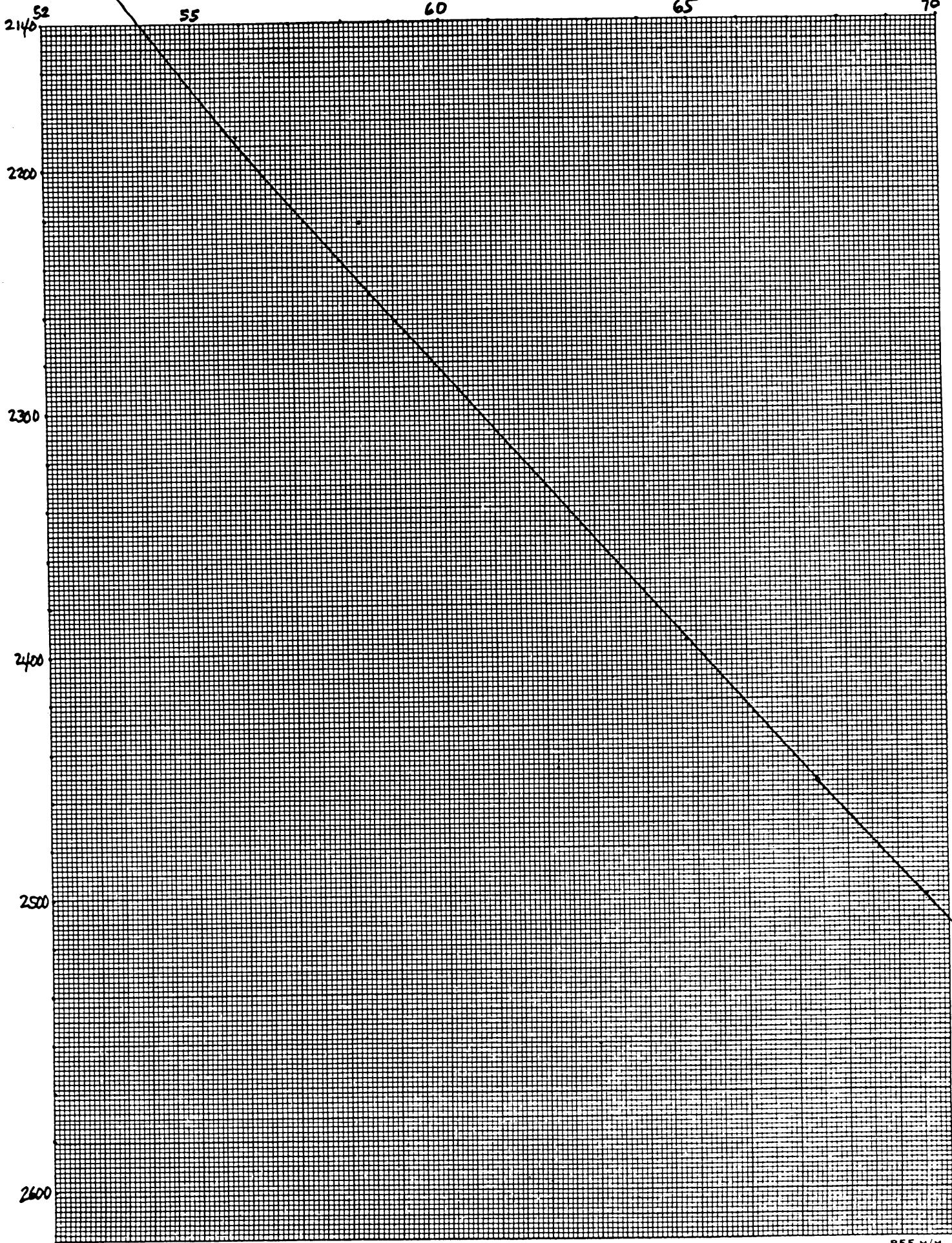
1700

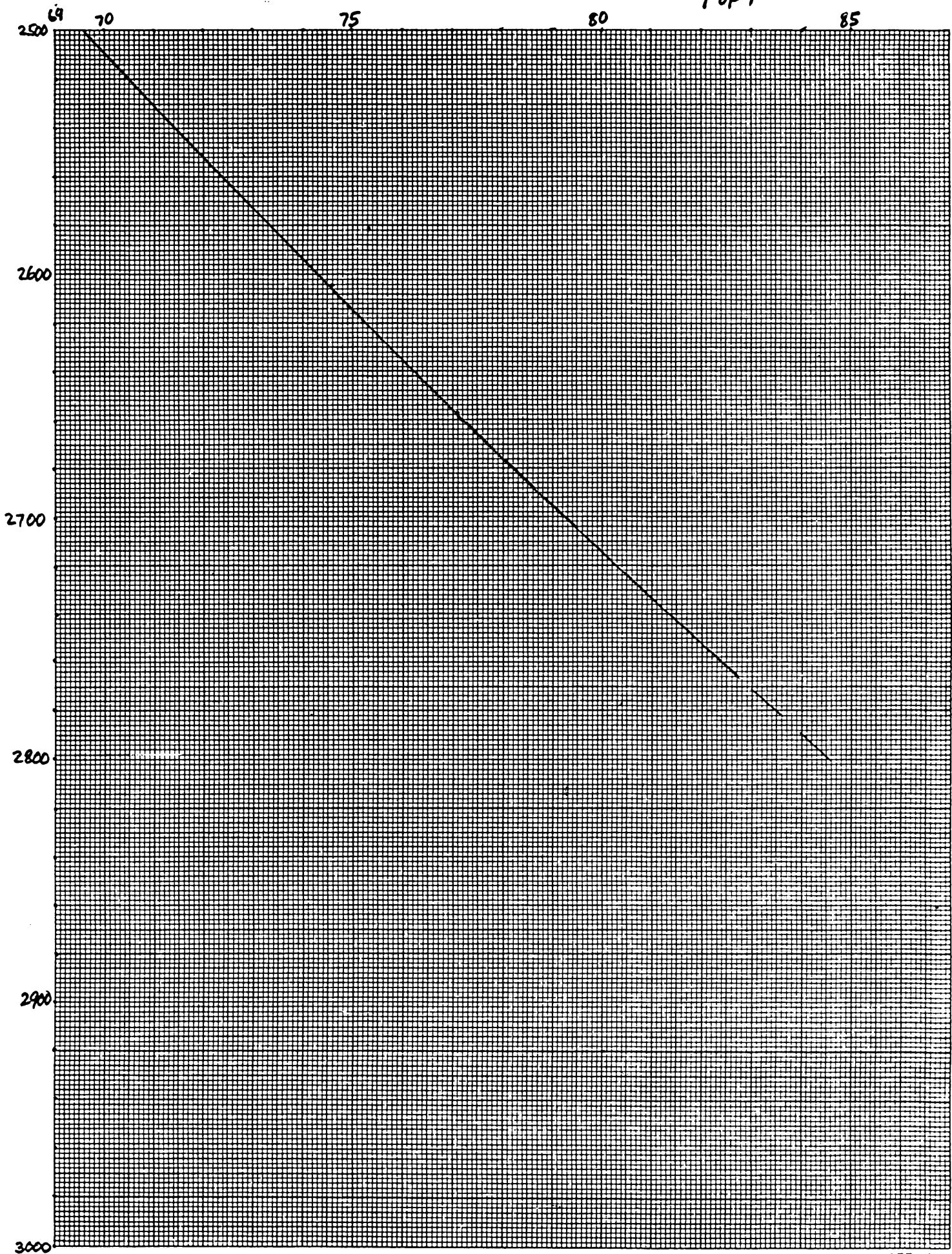
1800

1900

2000







CORRECTIONS IN FEET, FATHOMS

NOAA FORM 78-2 (10-72) U.S. DEPARTMENT OF COMMERCE NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship _____ Comdg _____

These corrections are to be used between _____ 19____ and _____ 19____ in the locality _____ for hydrographic surveys Nos. _____

UPDATE
CRINAL VEL CORRECTORS

(For deep water add a 0 to these figures)

DEPTHS IN FATHOMS

10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

192.0 - 7.0		
250.0 - 8.0		
318.0 - 9.0		
384.0 - 10.0	1462.0 - 30.0	
452.0 - 11.0	1494.0 - 31.0	
520.0 - 12.0	1526.0 - 32.0	
590.0 - 13.0	1559.0 - 33.0	2056.0 - 30.0
670.0 - 14.0	1592.0 - 34.0	2081.0 - 51.0
732.0 - 15.0	1624.0 - 35.0	2106.0 - 52.0
794.0 - 16.0	1658.0 - 36.0	2133.0 - 53.0
858.0 - 17.0	1690.0 - 37.0	2158.0 - 54.0
922.0 - 18.0	1724.0 - 38.0	2184.0 - 55.0
984.0 - 19.0	1757.0 - 39.0	2210.0 - 56.0
1022.0 - 20.0	1790.0 - 40.0	2237.0 - 57.0
1068.0 - 21.0	1811.0 - 41.0	2258.0 - 58.0
1114.0 - 22.0	1847.0 - 42.0	2278.0 - 59.0
1160.0 - 23.0	1873.0 - 43.0	2300.0 - 60.0
1208.0 - 24.0	1900.0 - 44.0	2320.0 - 61.0
1254.0 - 25.0	1926.0 - 45.0	2341.0 - 62.0
1300.0 - 26.0	1951.0 - 46.0	2362.0 - 63.0
1348.0 - 27.0	1977.0 - 47.0	2383.0 - 64.0
1393.0 - 28.0	2003.0 - 48.0	2404.0 - 65.0
1429.0 - 29.0	2029.0 - 49.0	2425.0 - 66.0

46 1240

KOE 20 X 20 TO THE INCH 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

200

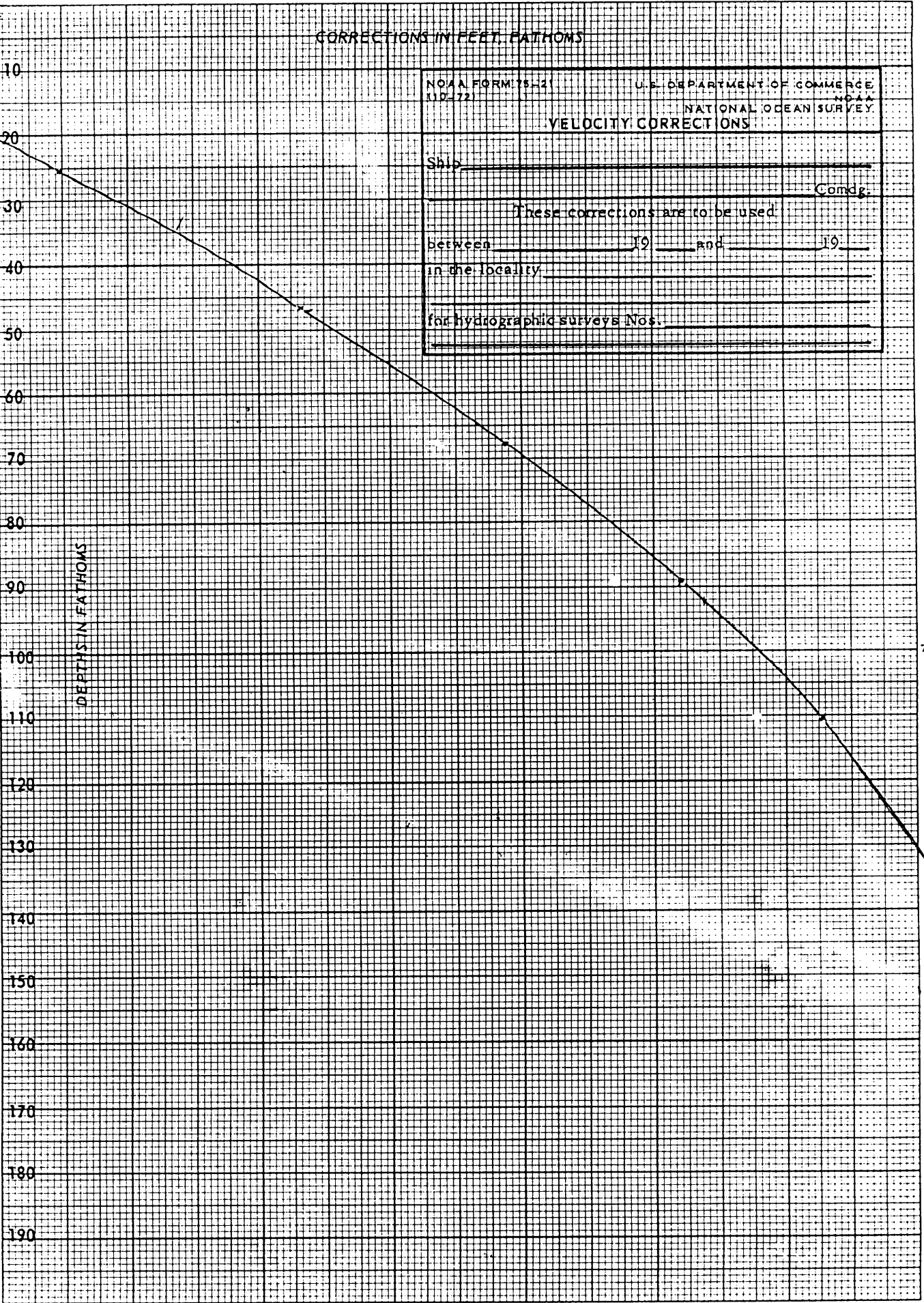
56 58 60 (Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.) 6.2 6.4 6.6 6.8 7.0 7.2 7.4 7.6 7.8 8.0 8.2 8.4

CORRECTIONS IN FEET, FATHOMS

NOAA FORM 75-21 (10-72)	U.S. DEPARTMENT OF COMMERCE NOAA NATIONAL OCEAN SURVEY
VELOCITY CORRECTIONS	
Ship _____ Comdg. _____	
These corrections are to be used:	
between _____ and _____	
in the locality _____	
for hydrographic surveys Nos. _____	

DEPTH IN FATHOMS

(For deep water add a 0 to these figures)

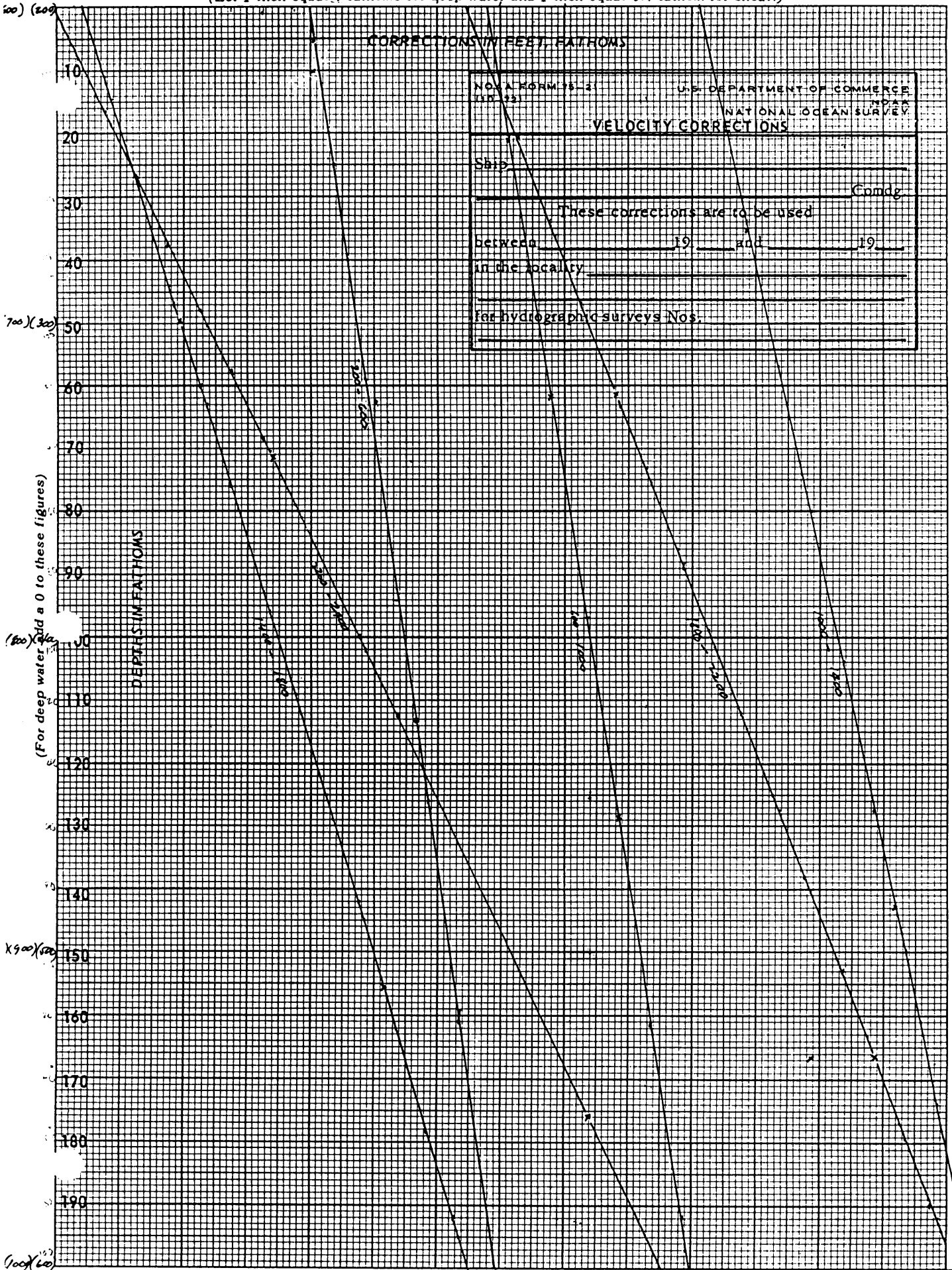


46 1240

K&E
20 X 20 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

300

(Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)



(Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)

CORRECTIONS IN FEET (FATHOMS)

NOAA FORM 15-2
 (10-73) U.S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY

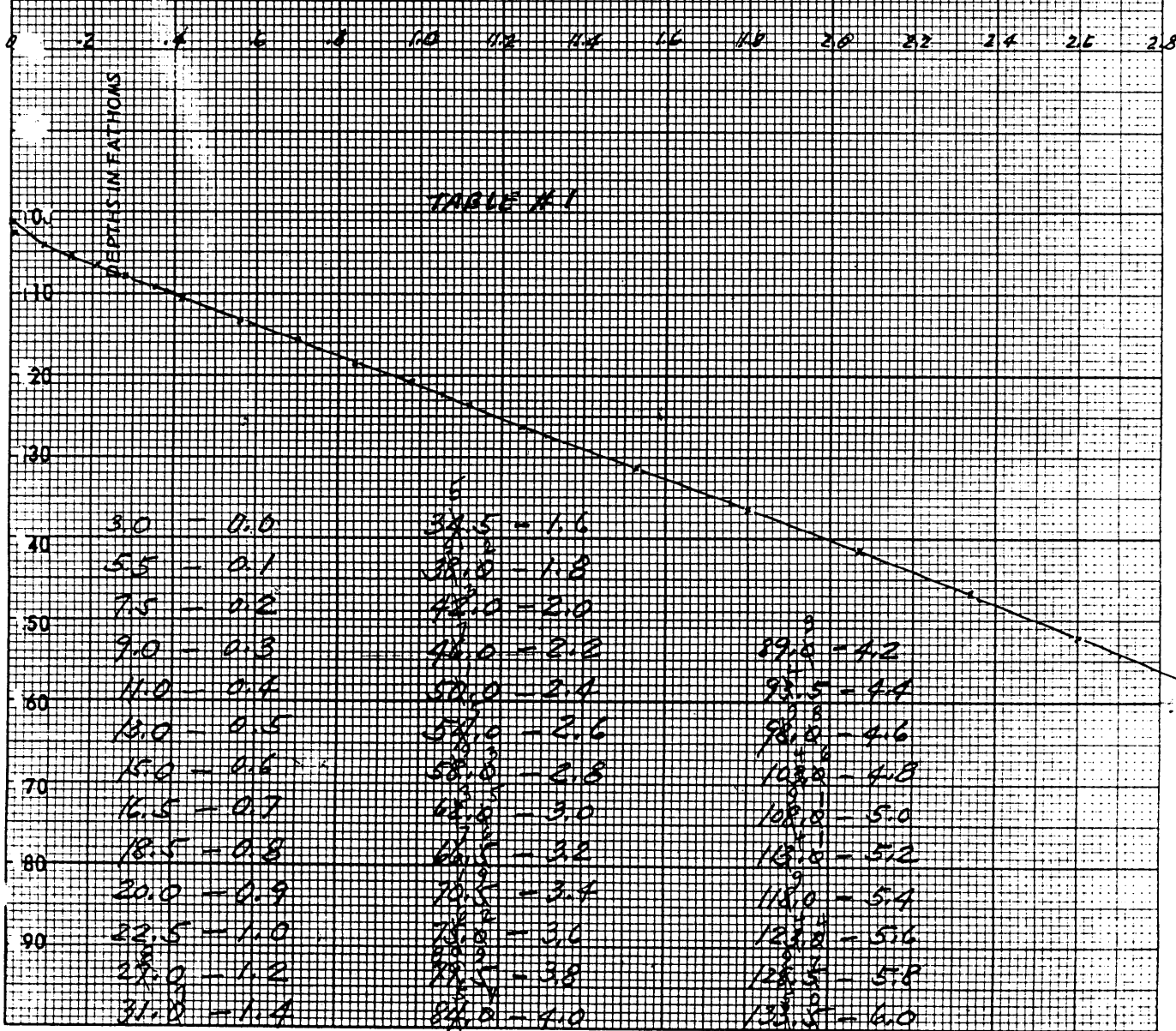
VELOCITY CORRECTIONS

Ship RAINIER
 Comdg. Cdr. R. J. LAND
 These corrections are to be used
 between OCT. 1981 and 19
 in the locality NE COAST, ISLAND
OF HAWAII
 for hydrographic surveys Nos. H-9983 (222)

(UPDATE)

FINAL CORRECTIONS

TABLE A-1



46 1.24U

KEUFFEL & ESSER CO. MADE IN U.S.A.

100

VELOCITY CORRECTOR TAPE LISTING
RA-80-2-81
H-9985

* SHIP ONLY.
Used for Smooth Field Sheet.
Not to be used for Smooth Sheet.

000350 0 0018 0001 001 000000 000000
000390 0 0020
000430 0 0022
000470 0 0024
000510 0 0026
000550 0 0028
000590 0 0030
000630 0 0032
000670 0 0034
000710 0 0036
000750 0 0038
000795 0 0040
000840 0 0042
000880 0 0044
000930 0 0046
000970 0 0048
001015 0 0050
001060 0 0052
001110 0 0054
001250 0 0060
001530 0 0070
001920 0 0080
002520 0 0090
003150 0 0100
003850 0 0110
004570 0 0120
005250 0 0130
006000 0 0140
006650 0 0150
007350 0 0160
007970 0 0170
008330 0 0180
009130 0 0190

RA-80-2-81 (CONT.)

009670 0 0200
010180 0 0210
010650 0 0220
011130 0 0230
011850 0 0240
012050 0 0250
012430 0 0260
012900 0 0270
013300 0 0280
013700 0 0290
014100 0 0300
014450 0 0310
014600 0 0320
015150 0 0330
015550 0 0340
016000 0 0350
016350 0 0360
016650 0 0370
016950 0 0380
017270 0 0390
017570 0 0400
017870 0 0410
018170 0 0420
018450 0 0430
018750 0 0440
019050 0 0450
019300 0 0460
019570 0 0470
019850 0 0480
020120 0 0490
020380 0 0500
020650 0 0510
020900 0 0520
021150 0 0530
021400 0 0540
021650 0 0550
021900 0 0560
022100 0 0570
022350 0 0580
022600 0 0590
022850 0 0600
999999 0 0610

VELOCITY TAPE LISTING
RA-80-2-81 (H-9985)



TABLE NO. 1

* This tape is to be used for the Smooth Sheet
for both the Ship and the Launch.

0000	0	0000	0001	0001	212000	000000
0000	0	0001				
0000	0	0002				
0000	0	0003				
0000	0	0004				
0000	0	0005				
0001	0	0006				
0001	0	0007				
0001	0	0008				
0001	0	0009				
0001	0	0010				
0001	0	0011				
0001	0	0012				
0001	0	0014				
0001	0	0016				
0001	0	0018				
0001	0	0020				
0001	0	0022				
0001	0	0024				
0001	0	0026				
0001	0	0028				
0001	0	0030				
0001	0	0032				
0001	0	0034				
0001	0	0036				
0001	0	0038				
0001	0	0040				
0001	0	0042				
0001	0	0044				
0001	0	0046				
0001	0	0048				
0001	0	0050				
0001	0	0052				
0001	0	0054				
0001	0	0056				
0001	0	0060				
0001	0	0070				
0001	0	0080				
0001	0	0090				
0001	0	0100				
0001	0	0110				
0001	0	0120				
0001	0	0130				
0001	0	0140				
0001	0	0150				
0001	0	0160				
0001	0	0170				
0001	0	0180				

~~9840~~
009500 0 0190
~~101000~~
010000 0 0200
~~106000~~
010500 0 0210
~~111000~~
011000 0 0220
~~116000~~
011500 0 0230
~~121000~~
012000 0 0240
~~126000~~
012500 0 0250
~~131000~~
013000 0 0260
~~136000~~
013500 0 0270
~~141000~~
014000 0 0280
~~146000~~
014500 0 0290
~~151000~~
015000 0 0300
~~156000~~
015500 0 0310
~~161000~~
016000 0 0320
~~166000~~
016500 0 0330
~~171000~~
017000 0 0340
~~176000~~
017500 0 0350
~~181000~~
018000 0 0360
~~186000~~
018500 0 0370
~~191000~~
019000 0 0380
~~196000~~
019500 0 0390
~~201000~~
020000 0 0400
~~206000~~
020500 0 0410
~~211000~~
021000 0 0420
~~216000~~
021500 0 0430
~~221000~~
022000 0 0440
~~226000~~
022500 0 0450
~~231000~~
023000 0 0460
~~236000~~
023500 0 0470
~~241000~~
024000 0 0480
~~246000~~
024500 0 0490
~~251000~~
025000 0 0500
~~256000~~
025500 0 0510
~~261000~~
026000 0 0520
~~266000~~
026500 0 0530
~~271000~~
027000 0 0540
~~276000~~
027500 0 0550
~~281000~~
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030500 0 0610
~~311000~~
031000 0 0620
~~316000~~
031500 0 0630
~~321000~~
032000 0 0640
~~326000~~
032500 0 0650
~~331000~~
033000 0 0660
999999 0 0660
23250
999999 0 0660

TC/TI TAPE LISTING ✓
RA-80-2-81(H-9985)

SHIP RAINIER - 2120

100820 0 00²⁶~~00~~ 0001 309 212000 000000
141200 0 00²⁶~~00~~ 0001 337 000000 000000

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 2120

SHEET : RA-80-2-81

TIME	DAY	PATTERN 1	PATTERN 2
100820	309	+00016	-00051
211414		+00016	+02349
212234		+00016	+03149
212554		+00016	+04749
212914		+00016	+04849
000023	310	+00016	+04849
084533	318	-00036	-00064
213557	326	+00160	-00080
000108	327	+00160	-00080
022555	335	+00055	-00050
012356	337	+00004	+00012

RAYDIST UTILIZATION

RA-80-2-81

H-9985

I. D.	SHORE INSTALLATION STATIONS		CALIBRATION DATA		COMMENTS
	RED RAYDIST	GREEN RAYDIST	BEGINNING	ENDING	
309/310	101	122	R +0.01 G -0.28	R +0.19 G +48.19	lost 48 lanes but recovered them through analysis of strip chart
318	101	122	R -0.53 G -0.60	R -0.20 G -0.67	Beginning calibration included only 4 files (no check files taken)
326/327	101	122	R +1.99 G -0.90	R +1.20 G -0.70	
334	101	122	R 0.55 G -0.50		Sea conditions were too poor to do ending calibration. Study of strip chart showed no lane jumps
336/337	101	122	R -0.05 G +0.04	+0.13 +0.19	Beginning and ending calibrations used M/R codes C and F on stations AKOHA 1913 (#134) and KUKUIHAELE LT ECC. (#116) RESPECTIVELY
<p>No unusual methods of operating or calibrating were used, except for I.D. 336/337, nor were any unusual conditions encountered</p>					

ABSTRACT OF POSITIONS
RA-80-2-81
H-9985

VESSEL: 2120 (Ship Rainier)

ANDIST: 33.5

<u>Day</u>	<u>Positions</u>	<u>Control</u>	<u>Sl,M,S2</u>	<u>Remarks</u>
309/310	0001-0135	04	101-122	Mainscheme
310	0136-0142	04	101-122	Crossline
318	0143-0165	04	101-122	Mainscheme
318	0166-0174	04	101-122	Crossline
326	0175-0181	04	101-122	Crossline
326/327	0181-0206	04	101-122	Mainscheme
327	0207-0208	04	101-122	Crossline
327	0208-0210	04	101-122	Mainscheme
327	0211-0213	04	101-122	Crossline
327	0214-0281	04	101-122	Mainscheme
327	0282	04	101-122	Detached Position
327	0283-0293	04	101-122	Mainscheme
335	0294-0301	04	101-122	Crossline
335	0302-0391	04	101-122	Mainscheme
335	0392-0399	04	101-122	Crossline
337	0402-0414	04	101-122	Crossline
337	0414-0426	04	101-122	Mainscheme
337	0427-0430	04	101-122	Crossline
337	0431-0437	04	101-122	Dev. @ 20/44.6 x 155/54.7
337	0438-0445	04	101-122	Mainscheme
337	0446-0480	04	101-122	Crossline

Duplicate Positions: None.

Rejected Positions: 0006-0010,0366,0400-0401.

MASTER STATION LIST
OPR-T126-RA-81
HAWAII, HAWAIIAN ISLANDS

FINAL VERSION

101	3	20	01	40714	155	18	23484	254	0000	329649	
/RED RAYDIST 1981								VOL.1 PAGE 10			
102	3	20	14	50767	155	46	19068	250	0000	329649	
/KAUHOLA AZ. 1981 GREEN RAYDIST NO. 1								VOL.1 PAGE 1			
103	3	20	13	14204	155	44	01327	250	0000	000000	
/AKOKOA AZ MARK 1981								VOL.1 PAGE 36			
104	2	20	13	21203	155	44	03002	250	0000	000000	
AKOKOA 1913-1981 RM 1								VOL.1 PAGE 35			
105	3	20	16	06465	155	52	02252	250	0000	000000	
/CITABRIA 1981								VOL.1 PAGE 14			
106	3	20	16	15523	155	51	15525	250	0000	000000	
/EVELYN 1981								VOL.1 PAGE 20			
107	7	20	01	40612	155	18	23458	250	0000	000000	
/KAHOLO AZ MARK 1981								VOL.1 PAGE 10			
108	3	20	13	55873	155	44	50012	250	0020	000000	
/KALALAE 1981								VOL.1 PAGE 31			
109	2	20	01	40509	155	18	23786	250	0000	000000	
/KAHOLO AZ "A" PT 1981								VOL.1 PAGE 11			
110	3	20	16	10289	155	50	40551	250	0000	000000	
/TULLY 1981								VOL.1 PAGE 23			
111	3	20	15	40246	155	51	35859	250	0000	000000	
/TULLY'S SILO 1981								VOL.1 PAGE 23			
112	3	20	16	02598	155	50	01229	139	0022	000000	
/KEPUHI 2 1948								201553(1042)			
113	3	20	14	18619	155	45	22464	139	0023	000000	
/KAPAAIKI 1913								201553(1021)			
114	7	20	14	52767	155	46	19068	250	0000	000000	
/KAUHOLA AZ 1981								VOL.1 PAGE 1			

~~115 4 20 14 57863 155 46 27251 250 0010 000000
/KAUHOLA 1881 1967 201553(1023)~~

116 3 20 07 51743 155 33 31620 250 0045 000000
/KUKUIHAELE LT ECC 1981 VOL.1 PAGE 41

~~117 3 20 07 47719 155 33 10379 250 0025 000000
/LIAT 1981 VOL.1 PAGE 44~~

118 3 20 06 54111 155 29 56689 250 0012 000000
/KAMAKAMAKAA 1981 VOL.2 PAGE 1

119 6 20 06 22352 155 28 31412 250 0020 000000
/MONGOOSE 1981 VOL.2 PAGE 4

120 3 20 05 40777 155 27 34247 250 0152 000000
/IKI 2 1966 201552(1008)

~~121 3 20 07 44515 155 33 58879 250 0123 000000
/WAIKOEKOE 3 1948 201553(1023)~~

122 3 20 15 55907 155 51 54038 254 0042 329649
/AIRPORT RAYDIST GREEN 2 1981 VOL.1 PAGE 37

~~123 5 20 05 42395 155 26 25816 250 0000 000000
/ALAPII 1981 VOL.2 PAGE 23~~

124 5 20 04 42150 155 24 17701 250 0053 000000
/MAILE 1981 VOL.2 PAGE 27

125 6 20 03 06912 155 20 54001 250 0011 000000
/PAENA 1981 VOL.2 PAGE 29

126 3 20 01 16370 155 17 02522 243 0094 000000
/TP 3 1981 VOL.2 PAGE 33

127 3 20 05 39637 155 26 56167 243 0100 000000
/TP 2 1981 VOL.2 PAGE 14

128 3 20 00 57443 155 16 27981 243 0000 000000
/TP 4 1981 VOL.2 PAGE 38

129 3 19 59 48781 155 14 33862 250 0000 000000
/LAUPAHOEHOE 2 1981 VOL.2 PAGE 39

~~130 3 19 58 43362 155 13 08612 243 0000 000000
/TP 5 1981 VOL.3 PAGE 7~~

131	3	19	58	15784	155	13	52047	250	0280	000000	
/PAPAALOA 1877											
											191551(1129)
132	3	19	57	18174	155	11	30481	250	0122	000000	
/LONE HALE 2 1981											
											VOL.3 PAGE 16
133	3	20	00	05515	155	16	47981	250	0231	000000	
/HUMUULA 1877											
											201552(1006)
134	3	20	13	21333	155	44	03383	250	0000	000000	
/AKOKOA 1913-1981 RM 2											
											VOL.1 PAGE 34
200	3	20	15	01276	155	53	17859	139	0187	000000	
/LORAN C TOWER 1964											
											201553(1051)
201	0	20	14	22440	155	49	55371	139	0024	000000	
/HIND STACK 1948											
											201553(1011)
202	3	20	14	13643	155	46	55121	139	0041	000000	
/KOHALA MILL STACK 1948											
											201553(1044)
203	7	20	07	51742	155	33	31619	139	0046	000000	
/KUKUIHAELE LIGHT 1981											
											VOL.1 PAGE 41
204	6	20	14	57687	155	46	27146	139	0025	000000	
/KAUHOLA POINT LIGHT 1948											
											201553(1026)
205	3	20	04	50792	155	28	00315	139	0045	000000	
/HONOKAA HAWAIIAN TEL MICROWAVE 1967											
											201552(1004)
206	3	20	05	24916	155	26	16037	139	0000	000000	
/PAUHAU SUGAR CO STACK 1913											
											201552(1025)
207	7	20	13	21424	155	44	03232	139	0028	000000	
/AKOKOA 1913											
											201553(1001)
208	6	19	59	48364	155	14	35963	139	0008	000000	
/LAUPAHOEHOE PT LT 1981											
											VOL.2 PAGE 39
209	3	20	01	01963	155	18	32630	139	0291	000000	
/KAHOLO 1877											
											201552(1011)
210	3	20	03	14546	155	38	18626	139	1214	000000	
/KAALA 1877											
											201553(1017)
211	3	20	02	40827	155	22	35995	139	0253	000000	
/SPIHILALA 1881											
											201552(1022)

~~212 6 20 15 57506 155 51 53076 139 0057 000000
/NAWI UPOLU AIRPORT BEACON 1981 VOL.1 PAGE 17~~

~~213 0 20 16 04160 155 52 14446 139 0016 000000
/KEALAHEWA 2 1948 201553(1037)~~

~~214 4 20 13 59178 155 51 51643 139 0290 000000
/PUU ULA HTS 1913 201553(1075)~~

~~215 3 20 03 15155 155 21 47830 139 0030 000000
/PAAUILO STACK 1948 201552(1027)~~

~~300 6 20 00 04277 155 16 48514 139 0000 000000
/OOKALA MICROWAVE TWR 1981 VOL.3 PAGE 5-6~~

~~301 3 20 35 10963 156 24 53462 139 0022 000000
/HANAMANIOA POINT LIGHT 1969 201561(1033)~~

~~302 3 20 38 01599 156 30 01091 139 0057 000000
/MOLOKINI LIGHTHOUSE 1950 201564(1104)~~

~~303 3 20 46 50428 156 31 32652 139 0022 000000
/MC GREGOR PT. LIGHT 1950 201564(1099)~~

ASCII SIGNAL TAPE LISTING
 OPR-T126-RA-81
 HAWAII, HAWAIIAN ISLANDS
 FINAL VERSION

101	3	20	01	40714	155	18	23484	254	0000	329649
102	3	20	14	52767	155	46	19068	250	0000	329649
103	3	20	13	14204	155	44	01327	250	0000	000000
104	2	20	13	21203	155	44	03002	250	0000	000000
105	3	20	16	06465	155	52	02252	250	0000	000000
106	3	20	16	15523	155	51	15525	250	0000	000000
107	7	20	01	40612	155	18	23458	250	0000	000000
108	3	20	13	55873	155	44	50012	250	0020	000000
109	2	20	01	40509	155	18	23786	250	0000	000000
110	3	20	16	10289	155	50	40551	250	0000	000000
111	3	20	15	40246	155	51	35859	250	0000	000000
112	3	20	16	02598	155	50	01229	139	0022	000000
113	3	20	14	18619	155	45	22464	139	0023	000000
114	7	20	14	52767	155	46	19068	250	0000	000000
115	4	20	14	57863	155	46	27251	250	0010	000000
116	3	20	07	51743	155	33	31620	250	0045	000000
117	6	20	07	47719	155	33	10379	250	0025	000000
118	3	20	06	54111	155	29	56689	250	0012	000000
119	3	20	06	22352	155	28	31412	250	0020	000000
120	3	20	05	40777	155	27	34247	250	0152	000000
121	3	20	07	44515	155	33	58879	250	0123	000000
122	3	20	15	55907	155	51	54038	254	0042	329649
123	5	20	05	42395	155	26	25816	250	0008	000000
124	5	20	04	42150	155	24	17701	250	0053	000000
125	6	20	03	06912	155	20	54001	250	0011	000000
126	3	20	01	16370	155	17	02522	243	0094	000000
127	3	20	05	39637	155	26	56167	243	0100	000000
128	3	20	00	57443	155	16	27981	243	0000	000000
129	3	19	59	48781	155	14	33861	250	0000	000000
130	3	19	58	43362	155	13	08612	243	0000	000000
131	3	19	58	15784	155	13	52047	250	0280	000000
132	3	19	57	18174	155	11	30481	250	0122	000000
133	3	20	00	05515	155	16	47981	250	0331	000000
134	3	20	13	21333	155	44	03383	250	0000	000000
200	3	20	15	01276	155	53	17859	139	0187	000000
201	0	20	14	22440	155	49	55371	139	0024	000000
202	3	20	14	13643	155	46	55121	139	0041	000000
203	7	20	07	51742	155	33	31619	139	0046	000000
204	6	20	14	57687	155	46	27146	139	0025	000000
205	3	20	04	50792	155	28	00315	139	0045	000000
206	3	20	05	24916	155	26	16037	139	0000	000000
207	7	20	13	21424	155	44	03232	139	0028	000000
208	6	19	59	48364	155	14	35963	139	0008	000000
209	3	20	01	01963	155	18	32630	139	0291	000000
210	3	20	03	14546	155	38	18626	139	0000	000000
211	3	20	02	40827	155	22	35995	139	0000	000000
212	6	20	15	57506	155	51	53076	139	0057	000000
213	0	20	16	04160	155	52	14446	139	0016	000000
214	4	20	13	59178	155	51	51643	139	0290	000000
215	3	20	03	15155	155	21	47630	139	0030	000000
300	6	20	00	04277	155	16	48514	139	0000	000000
301	3	20	35	10963	156	24	53462	139	0022	000000
302	3	20	38	01599	156	30	01091	139	0057	000000
303	3	20	46	50428	156	31	32652	139	0022	000000

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ORIGINATING ACTIVITY

- HYDROGRAPHIC PARTY
 - GEODETIC PARTY
 - PHOTO FIELD PARTY
 - COMPILATION ACTIVITY
 - FINAL REVIEWER
 - QUALITY CONTROL & REVIEW GRP.
 - COAST PILOT BRANCH
- (See reverse for responsible personnel)

- TO BE CHARTED
- TO BE REVISED
- TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

NOAA Ship RAINIER

HAWAII

LOCALITY

NE Coast, Island of Hawaii

DATE

1/12/82

The following objects HAVE **HAVE NOT** been inspected from seaward to determine their value as landmarks.

OPR PROJECT NO.

OPR-T126-RA-81

JOB NUMBER

H-9985

DATUM

Old Hawaiian

POSITION

DESCRIPTION
(Record reason for deletion of landmark or aid to navigation.
Show triangulation station names, where applicable, in parentheses)

NONE

LATITUDE

LONGITUDE

° / ' " ° / ' " // // D.P. Meters D.P. Meters

METHOD AND DATE OF LOCATION
(See instructions on reverse side)

OFFICE

FIELD

CHARTS
AFFECTED

RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	<input type="checkbox"/> PHOTO FIELD PARTY <input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
POSITIONS DETERMINED AND/OR VERIFIED	FIELD ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	OFFICE ACTIVITY REPRESENTATIVE <input type="checkbox"/> REVIEWER <input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' (Consult Photogrammetric Instructions No. 64.)	
OFFICE I. OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75	FIELD (Cont'd) B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982
FIELD I. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection 5 - Field Identified 6 - Theodolite 7 - Planetable 8 - Sextant A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75 *FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.	II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75 III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75 **PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

1

ZCZCCGA011
RTTUZYUW RHWISGG7756 3250106-UUUU--RUHPGIA.
ZNR UUUUU
R 202317Z NOV 81
FM NOACPM SEATTLE WA
TO RUHPGIA/NOAAS RAINIER
CM GRNC
BT
UNCLAS

NMO	6855 MHZ
PJL	0130 21/NOV/81

RA186/CPM1

1. REGISTRY NO. FOR RA-20-7-81 (UU) IS H-9986
 2. 733 FM SOURCE IS 1940 NAVY TRACKLINE. C351 RECOMMENDS 800 OR 1600 METER SPACING IN THE VICINITY OF THIS SDG TO VERIFY OR DISPROVE.
 3. NS PER CONVERSATION MCGEE/WINTERMYRE PRIOR TO YOUR PM DEPARTURE, TRUCK REPORTS HAVE NOT BEEN SUBMITTED FOR SEPTEMBER AND OCTOBER. REQUEST THESE BE SUBMITTED ASAP.
- BT
#7756

APPROVAL SHEET

DESCRIPTIVE REPORT TO ACCOMPANY

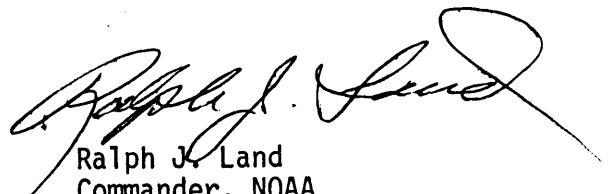
HYDROGRAPHIC SURVEY

H-9985

OPR-T126-RA-81

In producing this sheet standard procedures were observed in accordance with the Hydrographic Manual, PMC OORDER, and the Instruction Manual for Automated Hydrographic Surveys. The data was examined daily during the execution of the survey.

The boatsheet and the accompanying records have been examined by me, are considered complete and adequate for charting purposes, and are approved.



Ralph J. Land
Commander, NOAA
Commanding Officer

PACIFIC MARINE CENTER
EVALUATION REPORT

REGISTRY NO: H-9985

FIELD NO: RA-80-2-81

Hawaii, Alenuihaha Channel, Southeast of Maui

SURVEYED: November 5 - December 3, 1981

SCALE: 1:80,000

PROJECT NO: OPR-T126-RA-81

SOUNDINGS: Raytheon LSR

CONTROL: Hastings
Raydist - Range/Range

Chief of Party.....CDR R. J. Land
Surveyed by.....NOAA Ship RAINIER Personnel
Automated Plot by.....PMC Xynetics Plotter
Verified by.....A. Luceno
Evaluated by.....K. M. Scott

1. INTRODUCTION

H-9985 is a basic hydrographic survey of the eastern portion of Alenuihaha Channel which lies between the Islands of Maui and Hawaii. This survey was accomplished by NOAA Ship RAINIER in accordance with project instructions dated June 11, 1981 and Change No. 1 dated July 13, 1981.

Predicted tides based on the Honolulu, Hawaii gage with time and range adjustments were used during shipboard processing. With the nature of the survey being offshore and with depths greater than 110 fathoms, approved tide reducers were not required (see section 4.9.2 of the Hydrographic Manual).

The projection parameters revised signal list, velocities, and TC/TI tables are listed in the smooth printouts accompanying the smooth sheet and are noted in the descriptive report.

2. CONTROL AND SHORELINE

The control stations governing the positions of H-9985 are newly established stations preliminarily adjusted and referenced to the Old Hawaiian Datum. See section F of the descriptive report for additional information on horizontal control.

Position control system and calibration method are adequately reported in section G of the descriptive report.

No shoreline is required for this survey.

3. HYDROGRAPHY

Crossline soundings incorporated within this survey are in good agreement. Any differences are attributed to the bottom characteristics.

Standard depth curves have been completed. The bottom configuration and least depths have been adequately delineated.

4. CONDITION OF SURVEY

The hydrographic records and reports are adequate and conform to the Hydrographic Manual of July 4, 1976, with the exception that the capability to digitize line data into the hydro file is presently not available at PMC. Therefore, all depth curves, prior survey soundings, notes, and geographic names are not in digital format.

5. JUNCTIONS

H-9985 joins four contemporary surveys to the west and south. There are not contemporary surveys to the north and east. Each junction survey is addressed below:

a. H-8719 (1:10,000) 1963-65 joins this survey to the northwest. All soundings are in good agreement. Soundings have been transferred to complete the depth curves in the junction area. The junction note and depth curves are inked.

b. H-8826 (1:10,000) 1963-65 lies south of H-8719 along the western perimeter. Soundings at the survey limits are in good agreement as well. The junction note and depth curves are inked in coincidence.

c. H-9129 (1:40,000) 1970 joins to the southwest. Junction soundings are in excellent agreement. Although the 1100 fm curve is not drawn on H-9129, soundings have been transferred to complete that curve on the present survey. The depth curves and junction note are inked accordingly.

d. H-9974 (1:80,000) 1981 was accomplished during the same field season by the same ship. There are no lines of hydrography common with this survey. One sounding overlaps and is in agreement. The junction note and depth curves are inked.

6. COMPARISON WITH PRIOR SURVEYS

H-3519 (1913-14) 1:60,000
 H-3652 (1914) 1:60,000
 H-5052 (1928-29) 1:80,000

Prior survey soundings are comparable, for the most part, with present survey sounding being less deep. The only three differences of note originate with H-3519. These are:

<u>Prior Sounding</u>	<u>Approx. Present Sounding</u>	<u>Latitude</u>	<u>Longitude</u>
131	224	20°43'24"N	155°57'06"W
298	323	20°45'30"N	155°55'48"W
458	318	20°49'00"N	155°58'24"W

The difference in methods of sounding acquisition and older, less accurate positioning systems are probably the reasons for disagreement, as the remainder of soundings point to a stable bottom.

There are no presurvey review items within the survey limits.

H-9985 is adequate to supersede all prior surveys within the area of common hydrography.

7. COMPARISON WITH CHARTS

19004 (29th Ed., May 1, 1982)
 19320 (12th Ed., June 17, 1978)
 19340 (20th Ed., October 3, 1981)

a. Hydrography - The charted soundings identified on the appended chartlets originate with the prior surveys and junction surveys, and are discussed in sections 5 and 6 of this report. Those soundings that have not been marked are from unknown sources. The greatest differences are approximately 300 fathoms in areas with depths of 1100 and 1700 fathoms, latitude 20°36'45"N, longitude 155°27'30"W and latitude 20°32'30"N, longitude 155°31'45"W respectively.

This survey is adequate to supersede all charted hydrography within the common area.

b. Controlling depths - There are no controlling depths within the limits of this survey.

c. Aids to Navigation - There are no aids to navigation in the area of this survey.

8. COMPLIANCE WITH PROJECT INSTRUCTIONS

H-9985 (RA-80-2-81) adequately complies with Project Instructions OPR-T126-RA-81, Hawaii.

9. ADDITIONAL FIELD WORK

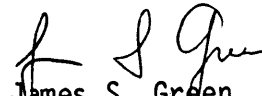
This is a good basic survey. No additional field work is required.

Respectfully submitted,



Karol M. Scott
Cartographer
February 25, 1983


This survey has been verified and evaluated. I have examined the survey and it meets Charting and Geodetic Services survey standards and requirements for use in nautical charting except as noted in the Evaluation Report. The survey is recommended for approval.



James S. Green
Supervisory Cartographer

ATTACHMENT TO DESCRIPTIVE REPORT FOR H-9985

I have reviewed the smooth sheet, accompanying data, and reports of this hydrographic survey. Except as noted in the Evaluation Report, the hydrographic survey meets or exceeds Charting and Geodetic Services (C&GS) standards, complies with instructions, and is accurately and completely represented by the smooth sheet and digital data file for use in nautical charting.

 3/16/83
Chief, Nautical Chart Branch (Date)

CLEARANCE:

N/MOP2:KWJeffers

SIGNATURE AND DATE:

 3/17/83

After review of the smooth sheet and accompanying reports, I hereby certify this survey is accurate, complete, and meets appropriate standards with only the exceptions as noted above. The above recommendations are forwarded with my concurrence.

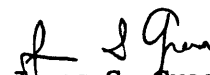
 3/18/83
Director, Pacific Marine Center (Date)

ADDENDUM TO EVALUATION REPORT FOR H-9985

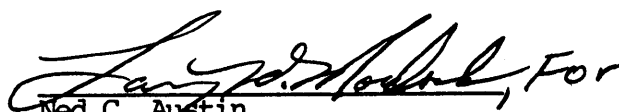
The Evaluation Report for this survey is supplemented by the following statement:

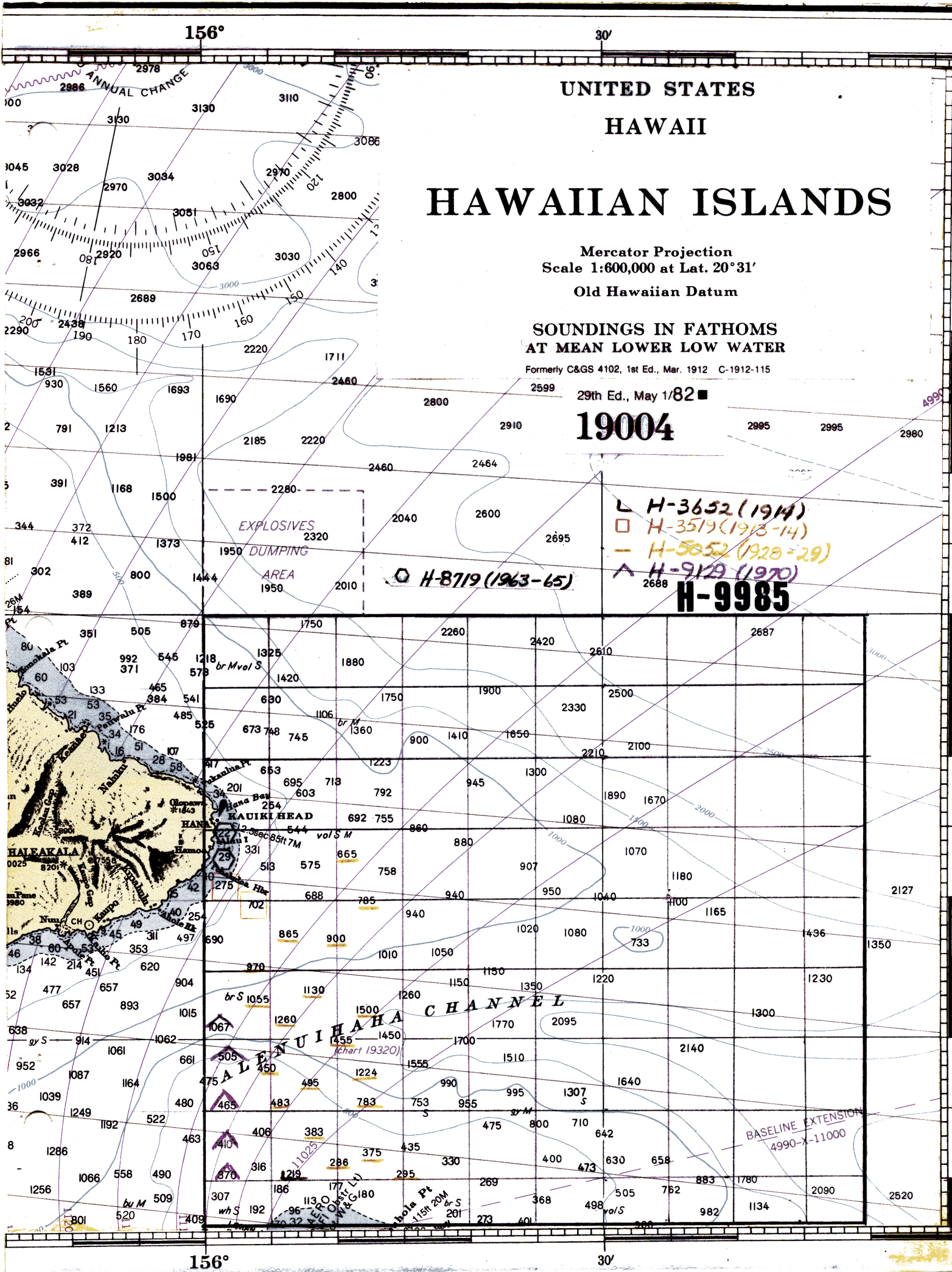
This survey has been reviewed to assure categories of information required to comply with N/CG2 Hydrographic Survey Guideline No. 23, Completion of Digital Hydrographic Surveys, September 7, 1983 are included in the digital record.

Respectfully submitted,


James S. Green
Supervisory Cartographer
October 13, 1983

APPROVED:


Ned C. Austin
Chief, Nautical Chart Branch



UNITED STATES
HAWAII

HAWAIIAN ISLANDS

Mercator Projection
Scale 1:600,000 at Lat. 20°31'
Old Hawaiian Datum

SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER

Formerly C&GS 4102, 1st Ed., Mar. 1912 C-1912-115

29th Ed., May 1/82

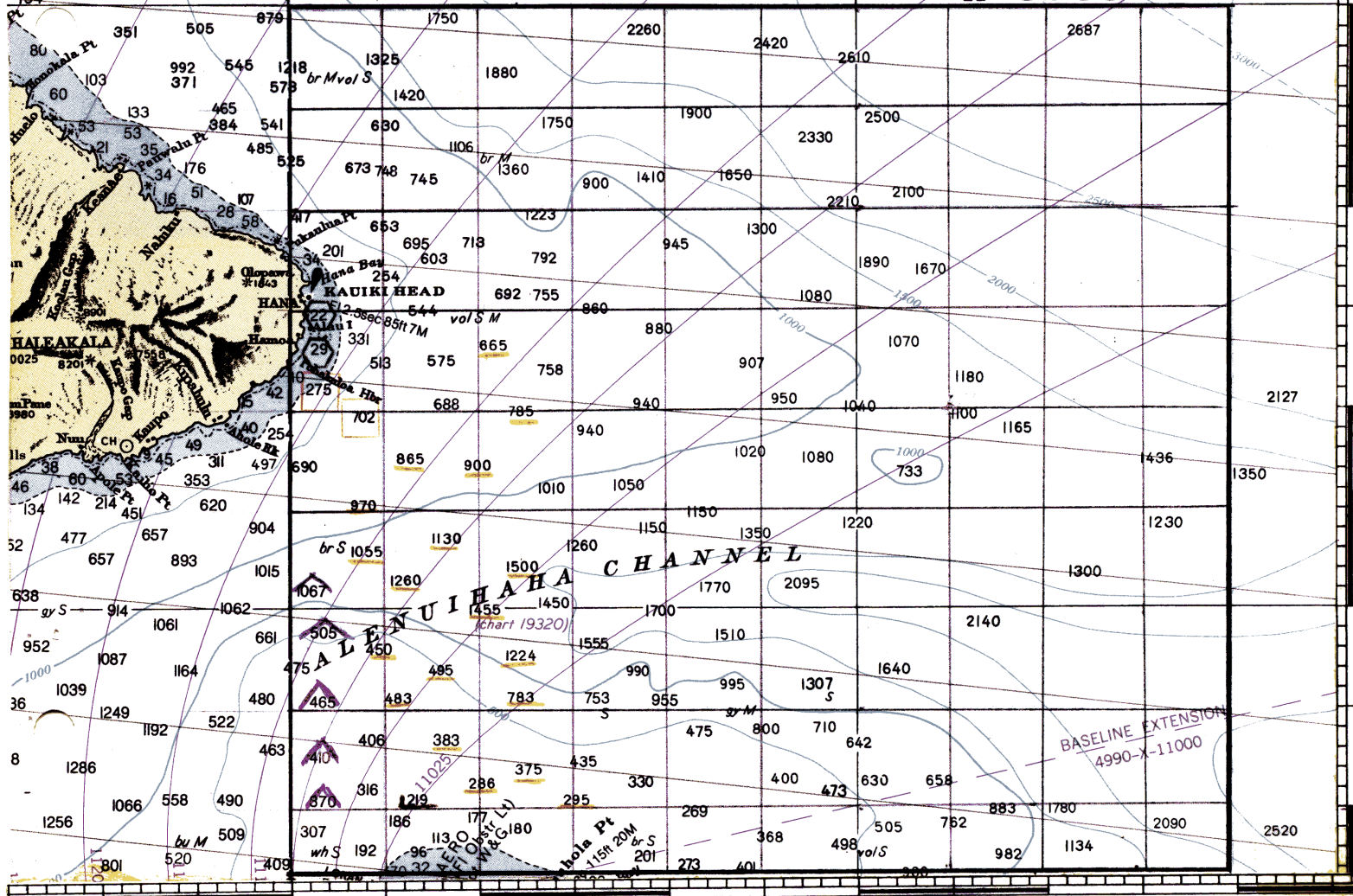
19004

- △ H-3652 (1914)
- H-3519 (1913-14)
- H-5852 (1928-29)
- ▲ H-9129 (1970)
- H-8719 (1963-65)
- H-9985**

EXPLOSIVES
1950 DUMPING
AREA
1950

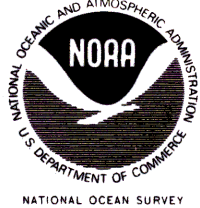
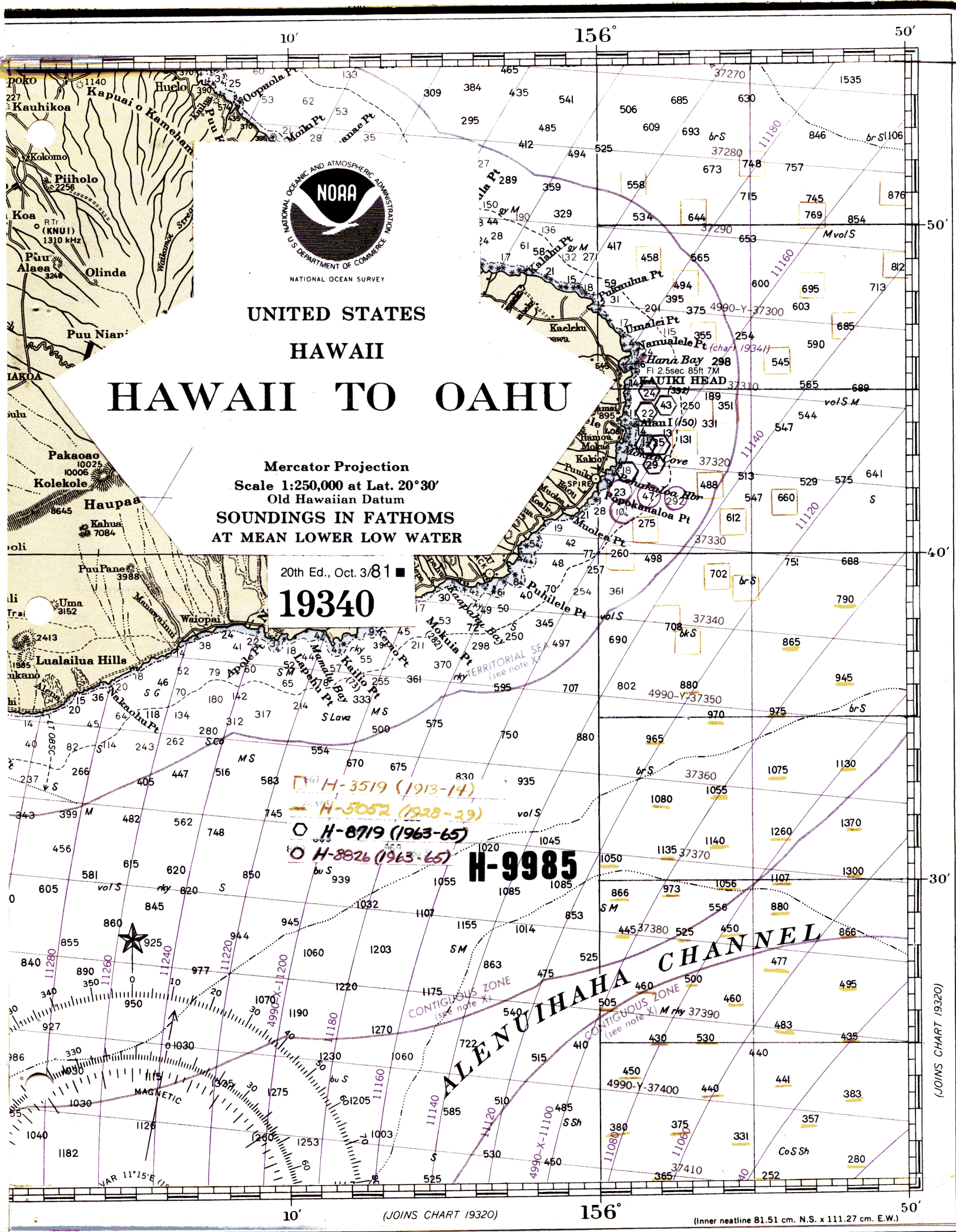
○ H-8719 (1963-65)

H-9985



(CONTINUED ON CHART 530)

BASELINE EXTENSION
4990-X-11000



UNITED STATES
HAWAII
HAWAII TO OAHU

Mercator Projection
Scale 1:250,000 at Lat. 20° 30'
Old Hawaiian Datum
SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER

20th Ed., Oct. 3/81
1934

- H-3519 (1913-14)**
- H-3052 (1928-29)**
- H-8719 (1963-65)**
- H-8826 (1963-65)**

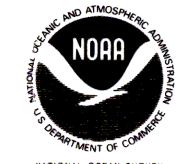
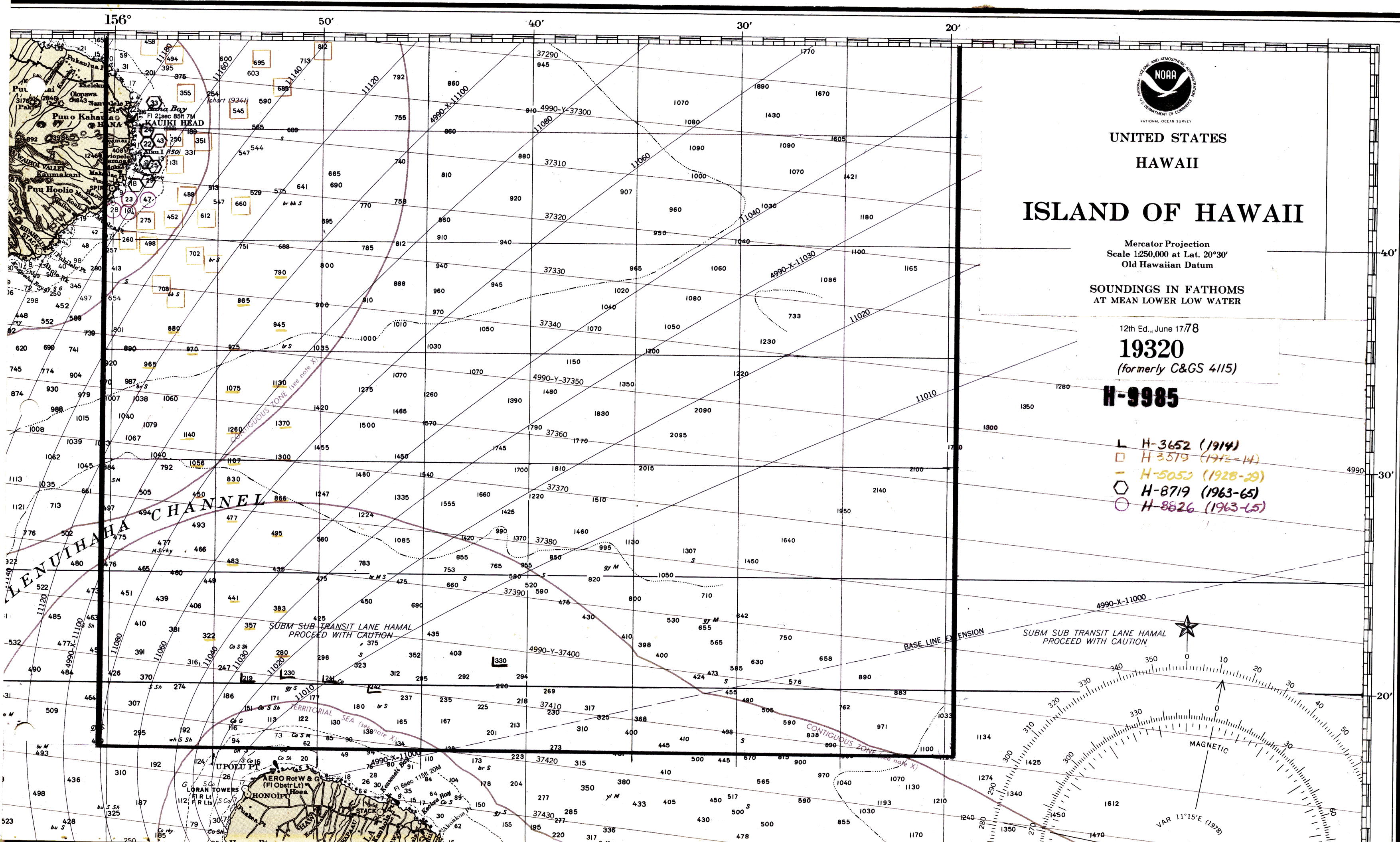
H-9985

AENUIHAHA CHANNEL

(JOINS CHART 19320)

(JOINS CHART 19320)

(Inner neatline 81.51 cm. N.S. x 111.27 cm. E.W.)



UNITED STATES
HAWAII

ISLAND OF HAWAII

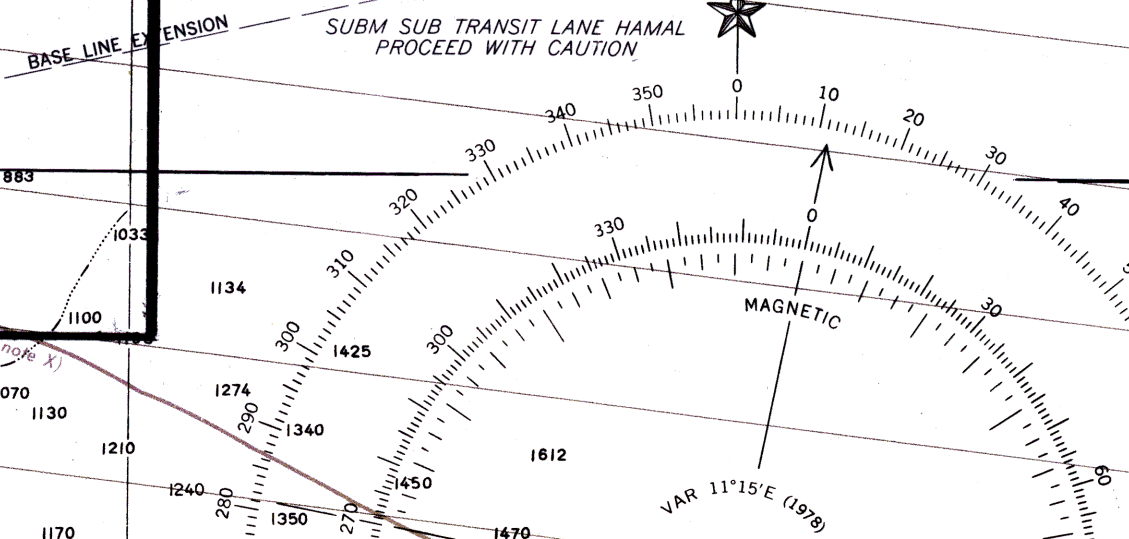
Mercator Projection
Scale 1:250,000 at Lat. 20°30'
Old Hawaiian Datum

SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER

12th Ed., June 1778
19320
(formerly C&GS 4115)

H-9985

- L H-3652 (1914)
- H-3519 (1913-14)
- H-5052 (1928-29)
- H-8719 (1963-65)
- H-8826 (1963-65)



LORAN-C OVERPRINTED (formerly C&GS 4115) 19320

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9985

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
19320	1/3/84	K. Van Ness	Full Part Before After Verification Review Inspection Signed Via Drawing No. 16 Fully applied HYDRO
530	4/24/84	J. Bailey	Full Part Before After Verification Review Inspection Signed Via Drawing No. 32 Exam. for critical corr. NO corr.
540	5/16/84	J. Bailey	Full Part Before After Verification Review Inspection Signed Via Drawing No. 17 Exam. for critical corr. NO corr.
19340	7-17-84	Open Standard	Full Part Before After Verification Review Inspection Signed Via Drawing No. 23 Fully applied thru chart 19320
19010	9/24/84	^{to c} B. Fawcett	Full Part Before After Verification Review Inspection Signed Via Drawing No. 15, Fully app'd through 19320
19320		K V	Full Part Before After Verification Review Inspection Signed Via Drawing No. 16
540	5-1-90	Roy Diamond	Full Part Before After Verification Review Inspection Signed Via Drawing No. 18
19004		show thru 19010	Full Part Before After Verification Review Inspection Signed Via Drawing No.
19007	4-11-91	KR. Foster	Full Part Before After Verification Review Inspection Signed Via Drawing No. 15 show thru cht 19010.
19013	4-17-91	KR. Foster	
19013	4-17-91	KR. Foster	Full Part Before After Verification, Review Inspection Signed Via Drawing No. 18 Fully applied thru cht 19004.
530	6-17-91	KR. Foster	Full after verification review inspection signed via Dwg #34. Exam. OK.