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Diagram No. 4115-2

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-80-1-81
Office No..... H-9974

LOCALITY

State Hawaii
General Locality Island of Hawaii
Locality Offshore Upolu Point to
Laupahoehoe Point

1981

CHIEF OF PARTY
CDR R.J. Land

LIBRARY & ARCHIVES

DATE November 23, 1983

AK 151
1470
88
190
190
1125

REGISTER NO.
H-9974

HYDROGRAPHIC TITLE SHEET

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-80-1-81

State Hawaii

General locality Island of Hawaii

Locality Offshore Upolu Point to Laupahoehoe Point

Scale 1:80,000 Date of survey Oct. 7 - Nov. 21, 1981

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

Vessel NOAA Ship RAINIER

Chief of party CDR R. J. Land

Surveyed by LCDR S. McGee, LT R. Morris, LT T. Clark, LT S. Ludwig, LTJG F. Ohlinger

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

Graphic record scaled by Ship's Personnel

Graphic record checked by Ship's Personnel

Verified ~~Drawn~~ by R. A. Shipley Automated plot by PMC Xynetics Plotter

Evaluated ~~Verification~~ by D. J. Hill

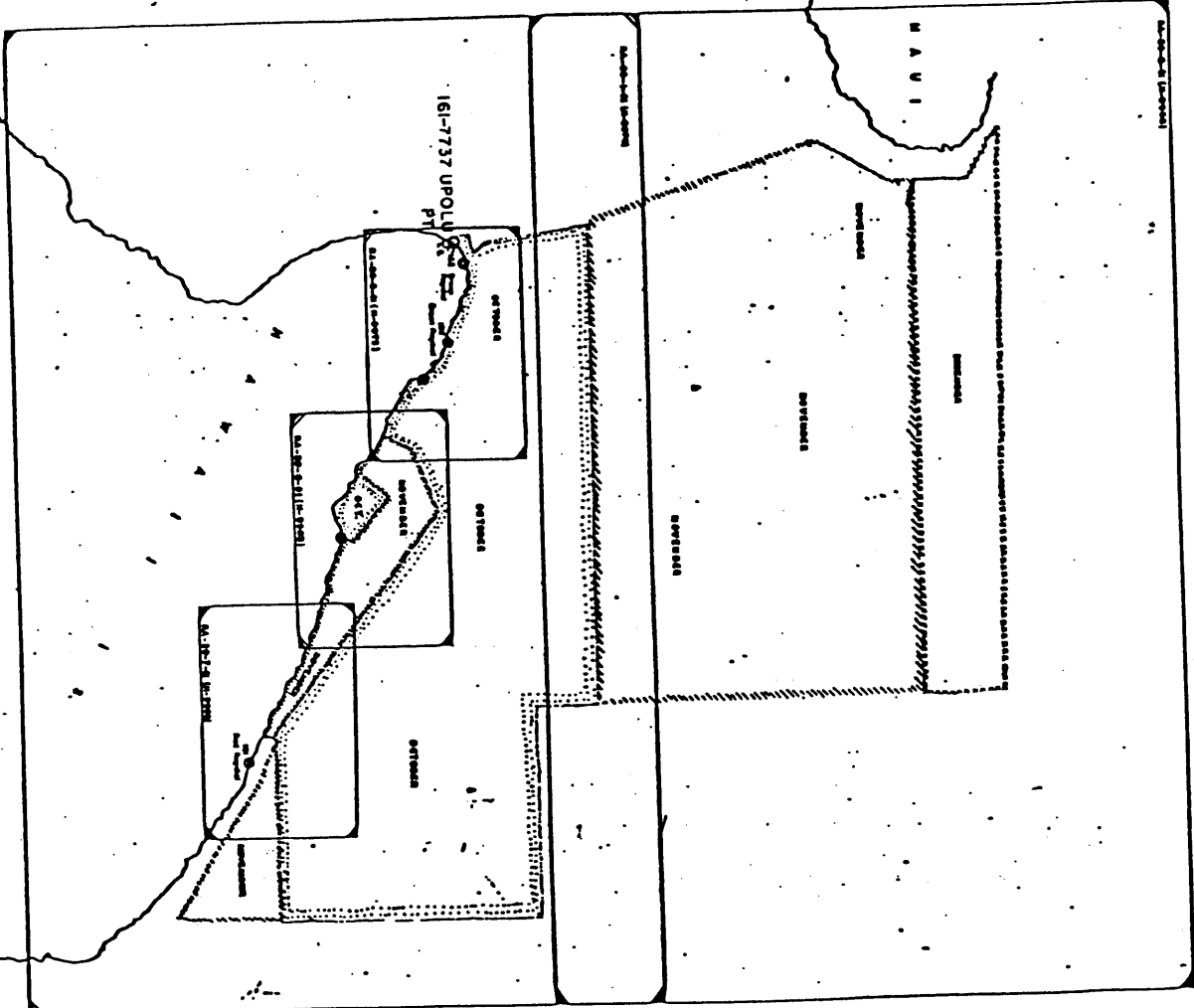
Soundings in fathoms ~~feet~~ at ~~MLLW~~ MLLW

REMARKS: This survey is complete and accurate to supersede all prior surveys in the area.

Time Meridian is 0° (CUT)

Revisions and marginal notes in black by Evaluator.

*12-02-83
STANDARDS CK'D
C. Long
Audits checked 12/19/83 SSV*



PROGRESS SKETCH

OPR - T126 - RA - 81

HYDROGRAPHIC SURVEY

HAWAII, HAWAIIAN ISLANDS

SEPT. 20 - DEC. 3, 1981

NOAA SHIP RAINIER

RALPH A. LAND, CDR., NOAA

COMD'G

FROM CHART 10330

NO.	DATE	BY	REVISIONS
1	10/1/81	RA	INITIAL SURVEY
2	10/15/81	RA	REVISIONS
3	10/25/81	RA	REVISIONS
4	11/5/81	RA	REVISIONS
5	11/15/81	RA	REVISIONS
6	11/25/81	RA	REVISIONS
7	12/5/81	RA	REVISIONS
8	12/15/81	RA	REVISIONS
9	12/25/81	RA	REVISIONS
10	1/5/82	RA	REVISIONS

A. PROJECT

Survey H-9974 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 area is located off the northeastern coast of the Island of Hawaii from approximate longitudes $155^{\circ} 08' W$ to $155^{\circ} 54' W$.

Its northern limit is $20^{\circ} 24' N$, except east of $155^{\circ} 22' W$ where the limit was $20^{\circ} 21' N$. The southern limit was the junction with the following surveys:

H-9975 (RA-20-5-81)

H-9983 (RA-20-6-81)

H-9986 (RA-20-7-81)

which generally occurred 1 mile off the coast.

Operations began on 7 October, 1981 (JD 280) and were concluded on 21 November, 1981 (JD 325).

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-9974 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 receiver	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 calibration.

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 while the RAINIER was drifting, 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 Oceano-

graphic 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~~⁶ ~~December~~^{Oct}, 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 were 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 was not following the depth of the water, values were simply picked off the trace and inserted on the printout.

E. HYDROGRAPHIC SHEETS

The field sheets were prepared onboard the NOAA Ship RAINIER using a Digital PDP 8/e Complot system. The list of projection parameters are included in the attachments.

All field data will be sent to the Pacific Marine Center, Seattle, Washington for verification.

F. CONTROL STATIONS

Horizontal control for RA-80-1-81 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~~ ^{Old Hawaiian Datum} 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 both the Teledyne Hastings Radist and the Motorola MiniRanger III Systems were used for the hydrographic positioning control.

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.
102	Green S/N 120	1648.425 KHZ	75 ft.
122	Green S/N 120	1648.425 KHZ	65 ft.

Only one Green Raydist site was utilized at a time. All station pairs provided an arc of intersection of between 30° and 150° . Shore stations were positioned over Third Order, Class I geodetic control stations. Power was supplied by propane-fueled thermal generators.

RAYDIST CALIBRATION METHODS

All but one of the Raydist calibrations were performed using standard 3 pt. sextant fixes on at least Third Order, Class I stations. The one exception was the ending calibration on JD 307 which used MiniRanger codes to calibrate the Raydist lane count. Check angles were utilized where available. Where check angles were available, a minimum of 3 final calibration fixes were acquired to determine correctors. Where no check angle was available, a minimum of 5 final calibration fixes were acquired to determine corrector values.

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.

RAYDIST OPERATIONS

Operations with Raydist went well, with only a few problems. On JD 280, there were some severe rain squalls in the operations area. In addition, we had a strip chart recorder break down. Due to these, there was the appearance of the loss of several lanes on the recorder. Subsequent calibrations show there was only 1 lost lane on the Red Raydist signal. Such an error is 0.5 mm at the scale of the survey.

On JD 306, there was a problem -- when approaching too closely to the Green Raydist station, the Red Raydist receiver locked onto the Green Raydist signal. Operations were halted, and resumed when out of the area.

*See Evaluation Report
Para. 2*

CALIBRATION METHODS FOR MINIRANGER

Two MiniRanger baseline calibrations were performed, one prior to and one after all MiniRanger data collection for this project. Both calibrations took place at Hilo Harbor on JD 287/288 and JD 338, respectively.

The initial and final corrections to electronic position control for each specific R/T-console pair and transponder combination were meant to determine the final correctors used in plotting the smooth sheet. The initial baseline calibration also determined minimum signal strength cutoff values for each system combination. The details and data regarding these calibrations are included in the Electronic Control Report.

DAILY SYSTEM FOR MINIRANGER

To provide verification of MiniRanger system operation, daily system checks were performed. Three point sextant fixes on Third Order, Class I stations were accomplished twice daily in accordance with PMC OORDER, Appendix M. Calibration records are included with the raw data. A calibration summary is provided with the MiniRanger statistics table.

There were several days on which system checks were beyond specifications (see the MiniRanger statistics summary). Each time several hours were spent on the checks. It is believed that the moderate rolling of the ship contributed to the results. (Subsequent baseline calibrations checked out well). Hydrography was conducted since the indicated error was 0.3 mm at the scale of the survey on these days.

MOBILE/SHORE M/R DATA

Electronic stations were positioned over Third Order, Class I geodetic control stations. Power to shore stations was provided by 2-12V batteries connected in series. All code pairs provided an arc of intersection between 30° and 150° .

Shore station code characteristics are as follows:

<u>Code</u>	<u>S/N</u>	<u>Antenna Type</u>
B	4951	medium gain, directional
C	1628	high gain, directional
D	1569	high gain, directional
*E	911721	medium gain, directional
*F	911615	high gain, directional
*O	911632	medium gain, directional

*Universal Station Units

A synopsis of MiniRanger mobile unit/shore unit statistics is in the separates following this report.

No unusual methods of operating were used, nor were any equipment malfunctions or unusual conditions experienced. The only unusual calibration procedure was using MiniRanger codes to calibrate the Raydist lane count. (This procedure was first used in 1979, and subsequently in 1980). MiniRanger signal strengths were generally well above cutoff values. Occasionally low signal strengths occurred, but all data collected during such instances was bracketed by acceptable signal strengths while at a constant heading and speed.

H. SHORELINE

Although this survey doesn't go to the coast, shoreline was drawn on the boat sheet.

Shoreline not drawn on smooth sheet

Shoreline was transferred by pantograph from the following field edit master ϕ ozalids: T-12528, TP-00064, TP-00065, TP-00066, TP-00067, TP-00068. All shoreline was field edited but, as the hydrography on this sheet did not junction with any shoreward feature, no field edit detail other than the actual shoreline was transferred. Further, no significant changes to the shoreline were found during field edit. For field edit data, the reader is referred to the above manuscripts and the accompanying field edit reports.

See inshore junctional surveys for field edit

I. CROSSLINES

Crosslines comprised 92 miles of hydrography or 15.2% of the mainscheme mileage.

Crossline agreement was excellent. Of 81 compared soundings, all but two agreed to the criteria set forth in section 1.1.2, part B. II.1. of the Hydrographic Manual. The apparent discrepancies were:

1. at $20^{\circ} 08.9'$ N, $155^{\circ} 14'$ W; ~~X-X~~^{crossline} position 142 + 5, $138\cancel{7}^3$ fms and ~~M-S~~^{mainscheme} position 172 + 2, $136\cancel{9}^7$ fms.
2. at $20^{\circ} 22.7'$ N, $155^{\circ} 24.6'$ W; ~~X-X~~^{crossline} position 236 + 1, $106\cancel{1}^0$ fms and ~~M-S~~^{mainscheme} position 60 + 3, $107\cancel{8}^7$ fms.

These deep soundings are felt to be accurate and their differences are attributed to the sloping bottom. No systems problem is indicated.

Overall, the pattern of crosslines served to confirm the mainscheme soundings quite exactly.

J. JUNCTIONS

This survey junctions with the following contemporary surveys:

1. RAINIER survey H-9985 (1:80,000, 1981) to the north. This survey was also done using only the RAINIER (2120), and so no overlap is necessary. Operations between these surveys were continuous and identical. A comparison of adjacent lines between the two surveys did show excellent agreement.

2. FAIRWEATHER survey H-9912 (1:80,000, 1980) junctions on the east with 58 common soundings, of which nine were nearly coincident and, with the exception of one, agreement was good. The exception was RAINIER sounding number 644, $43\cancel{7}^6$ fathoms, and FAIRWEATHER sounding of 375 fathoms at $20^{\circ} 02'$ N, $155^{\circ} 09'$ W, which occurred over a steep bottom. Further, the general fit of the contour lines was good.

3. RAINIER survey H-9975 (1:20,000, 1981) to the south and west with 15 common soundings. Of four nearly coincident soundings, all agreed to the criteria of the Hydrographic Manual. Further, the fit of the contour lines was good.

4. RAINIER survey H-9983 (1:20,000, 1981), RA-20-6-81, junctioned to the south with 16 common soundings. Of eleven nearly coincident soundings, all

agreed to 2% of the depth. Agreement was excellent as was that of the contour lines.

5. RAINIER survey H-9986 (1:20,000, 1981), RA-20-7-81, junctioned to the south and east with 22 common soundings. Of nine nearly coincident soundings, all agreed to 2% of the depth. Agreement was excellent. Further, the fit of the contour lines was good.

6. Survey H-9129 (1:40,000, 1970) had three coincident soundings. Agreement was excellent. Comparison was made on an enlarging table. The fit of contour lines was good.

7. H-10052 (1982) 1:20,000 *Sea Evaluation Report. Para. 5*

K. COMPARISON WITH PRIOR SURVEYS

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

1. Survey H-5052 (1:80,000, 1929) overlapped to the west with 18 nearly coincident soundings. All agreed to within 3% of the depth except at $20^{\circ} 24' N$, $155^{\circ} 50' W$, position $393 + 3, 448^3$ fms disagrees with prior survey sounding of 505 fms. This discrepancy can be attributed to small position errors over a steep bottom. *Concur*

2. Survey H-3652 (1:60,000, 1914) overlapped to the south with 22 comparable soundings. All agreed to 4% of the depth except at $20^{\circ} 02' N$, $155^{\circ} 16' W$, position 648, 92^2 fms disagreed with prior survey sounding of 84 fms. Again, this can be attributed to small position errors over a steep bottom. *Concur*

3. Survey H-3651 (1:20,000, 1914) also overlapped to the south. Agreement was good with 62% of comparable soundings within 2 fms. All of the rest could be accounted for by considering the entire area within the 1.5 mm radius circle (not merely the specific sounding plotted within the circle). Besides, all soundings fit the general contours of the present survey with the following two exceptions:

1. at $20^{\circ}19^{\prime.3}$ N, $155^{\circ}45^{\prime.35}$ W there is a 276 fm sounding which does not fit with the 220 fm depths of H-9974. *See Evaluation Report. Para. 6*

2. at $20^{\circ}14^{\prime.45}$ N, $155^{\circ}43^{\prime.6}$ W, there is a 66 fm sounding which does not fit with the 75-80 fm depths in the area.

No specific investigation was done, but it is likely that a slight positional error occurred on the previous survey.

L. COMPARISON WITH THE CHART

Comparison was made with the 12th edition of chart 19320 (1:250,000; 1978) by enlargement. Of 33 nearly coincident soundings, 21 agreed within 4% of the depth. However, there were five large discrepancies in the offshore area.

1. at $20^{\circ}24^{\prime.37}$ N, $155^{\circ}45^{\prime.5}$ W; position 297 + 4, 461^0 fms and charted depth 690 fms. *slightly outside hydro. limits*

2. at $20^{\circ}22^{\prime.5}$ N, $155^{\circ}34^{\prime}$ W; position 82 + 2, 454^3 fms and charted depth 398 fms.*

3. at $20^{\circ}14^{\prime}$ N, $155^{\circ}31^{\prime.5}$ W; position 285, 475 fms and charted depth 430 fms.*

4. at $20^{\circ}12^{\prime.5}$ N, $155^{\circ}29^{\prime.5}$ W; position 200 + 5, 472 fms and charted depth 203 fms.*

5. at $20^{\circ}08^{\prime.5}$ N, $155^{\circ}17^{\prime.8}$ W; a charted depth of 986 fms* falls in a 400 fm contour.

There were no specific investigations done on any of these. However, the general agreement between neighboring lines and the contours suggest strongly that the charted depths are in error. Further, the previous good agreement with the prior surveys (see section K) also support the present survey.

It is recommended that the sources of these charted depths be investigated. Also, until otherwise determined, the shoaler charted soundings should be kept, for the sake of conservatism (items #2, #3, and #4).

* Depths originate with a miscellaneous source and disposition is left to the chart compiler.

A small rise was noticed at $20^{\circ}20.5'$ N, $155^{\circ}37.5'$ W (a $23\frac{3}{4}$ fm peak in an area of 300 fm depths). To investigate, 800 meter spacing was used in 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 582 positions in 696.7 linear nautical miles covering approximately 676 square nautical miles. ✓

Seven bottom samples were taken in this area.

Two tide stations were in operation during this survey. They were the Hilo tide station (161-7760) at $19^{\circ}44.0'$ N, $155^{\circ}03.5'$ W and Upolu Point tide station (161-7737) at $20^{\circ}15.2'$ N, $155^{\circ}53.4'$ W. These stations were not necessary for this survey according to the project instructions, except that there are soundings on this sheet which are less than 100 fm.

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

*See Evaluation Report
Para. 1. b.*

P. MISCELLANEOUS

There were no unusual findings from this survey. ✓

Q. RECOMMENDATIONS

It is recommended that survey H-9974 supersede all previous hydrography. ✓

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:

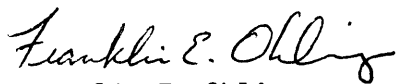
<u>PDP 8/e Program</u>	<u>Version Date</u>
RK 111 Range/Range Real-Time Hydroplot	1/30/76
RK 201 Grid, Signal and Lattice Plot	4/18/75
RK 211 Range/Range Non-Real Time Plot	2/02/81
RK 300 Utility Computations	10/21/81
RK 330 Reformat and Data Check	5/04/76
PM 360 Electronic Corrector Abstract	2/02/76
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.

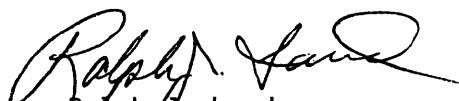
S. REFERRAL TO REPORTS

For more information, refer to the Horizontal Control Report, Electronic Control Report, and the Tides Report, submitted separately.

Respectfully submitted,


Franklin E. Ohlinger
LTJG, NOAA

Approved and forwarded,


Ralph J. Land
CDR, NOAA

INDEX TO ATTACHMENTS FOLLOWING TEXT

Parameter Tape Listing

Field Tide Note

Master Station List

Ascii Signal Tape Listing

Velocity Graphs, Table No. 1

Velocity Corrector Tape Listing

Abstracts of TC/TI Tape Computations

TC/TI Tape Listing

Abstract of Positions

Bottom Samples (Log Sheet M)

Final Baseline Correctors

Electronic Corrector Abstract

Raydist Utilization

Mini-Ranger Statistics

Abstract of Times of Hydro

Geographic Names

Nonfloating Aids or Landmarks for Charts (76-40)

Approval Sheet

PARAMETER TAPE LISTING
RA-80-1-81 (H-9974)

SKEW: 333,22,58
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=4/0
PLSCL=80000
PLAT=20/20/00
PLON=156/01/06
VESNO=2120
YR=81
ANDIST=33.5

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.

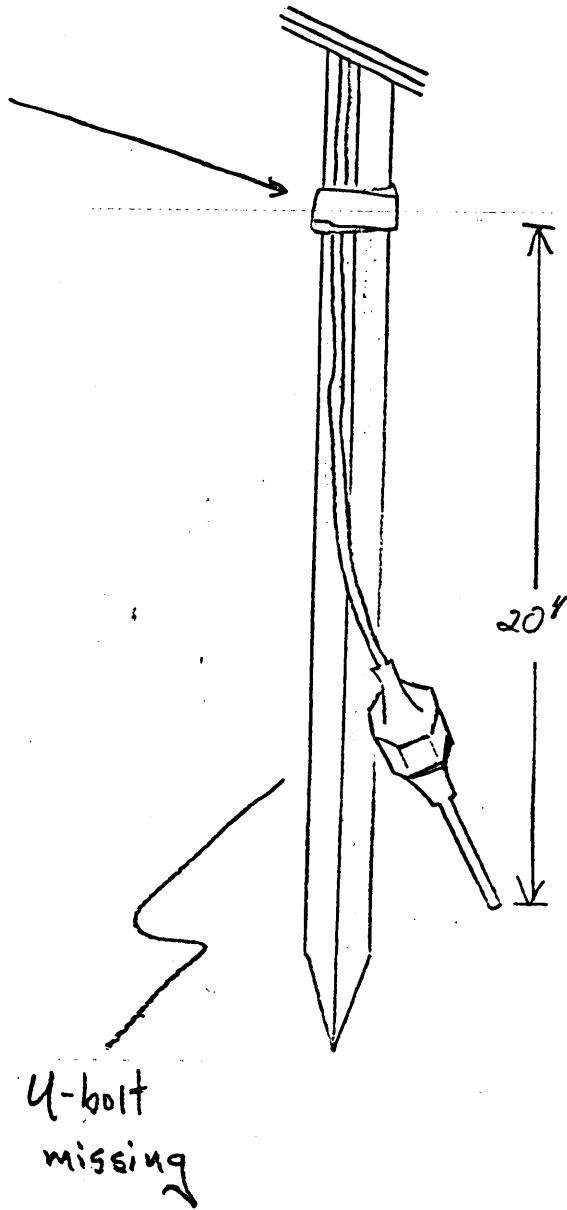
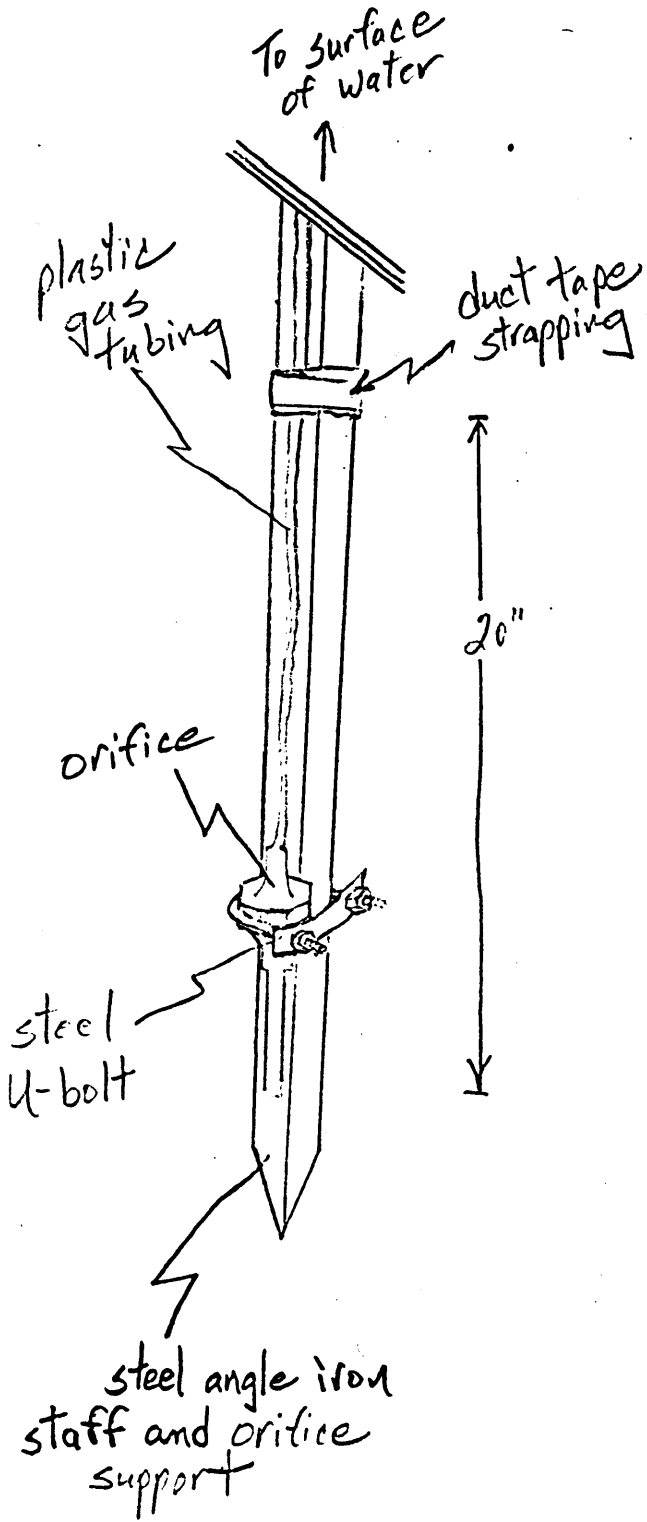
LEVELS

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.

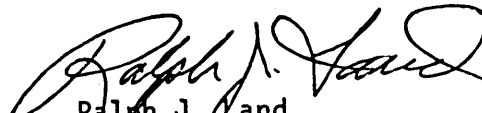
Further, it appears there is a slumping of the dock. The Staff Stop - Pier 3 section shows a trend, as does the BM 5 - BM 4 section (if we ignore the 23 September levels).

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
CDR, NOAA
Commanding

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	52767	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	201553(1023)
/KAUHOLA 1881-1967							
116 3	20 07	5174 ⁶ 3	155 33	316 ⁵⁶⁸ 20	250 0045	000000	VOL.1 PAGE 41
/KUKUIHAELE LT ECC 1981							
117 3	20 07	4771 ³ 9	155 33	103 ⁴⁴ 70	250 0025	000000	VOL.1 PAGE 44
/LIAT 1981							
118 3	20 06	541 ⁰⁰ 11	155 29	566 ⁵¹ 89	250 0012	000000	VOL.2 PAGE 1
/KAMAKAMAKAA 1981							
119 6 20 06 80350 155 08 31410 250 0020 000000							
/MONGOOSE 1981 VOL.2 PAGE 4							
120 3	20 05	40777	155 27	34247	250 0152	000000	201552(1008)
/IKI 2 1966							
121 3	20 07	44515	155 33	58879	250 0123	000000	201553(1000)
/WAIKOEKOE 3 1948							
122 3	20 15	5590 ⁵ 7	155 51	54038	254 0042	329649	VOL.1 PAGE 37
/AIRPORT RAYDIST GREEN 2 1981							
123 5	20 05	4239 ⁴ 8	155 26	258 ²¹ 10	250 0008	000000	VOL.2 PAGE 23
/ALAPII 1981							
124 5	20 04	4215 ⁴⁹ 0	155 24	1770 ⁶ 1	250 0053	000000	VOL.2 PAGE 27
/MAILE 1981							
125 6	20 03	0691 ⁶ 2	155 20	5400 ⁵ 1	250 0011	000000	VOL.2 PAGE 29
/PAENA 1981							
126 3	20 01	1637 ⁸¹ 0	155 17	0252 ³ 2	243 0094	000000-	VOL.2 PAGE 33
/TP 3 1981							
127 3	20 05	3963 ⁶ 7	155 26	5616 ⁹ 7	243 0100	000000	VOL.2 PAGE 14
/TP 2 1981							
128 3	20 00	574 ⁵ 4 3	155 16	2798 ² 1	243 0000	000000	VOL.2 PAGE 38
/TP 4 1981							
129 3	19 59	4878 ⁷ 1	155 14	3386 ⁶ 2	250 0000	000000	VOL.2 PAGE 39
/LAUPAHOEHOE 2 1981							
130 3 19 58 43362 155 13 08610 243 0000 000000							
/TP 5 1981 VOL.3 PAGE 7							

131 3	19 58	15784	155 13	52047	250 0280	000000	191551(1129)
/PAPAALOHA 1877							
132 3	19 57	1817 ⁸	155 11	30481	250 0122	000000	VOL.3 PAGE 16
/LONE HALE 2 1981							
133 3	00 00	05515	155 16	47981	250 0331	000000	201552(1006)
/HUKUULA 1877							
134 3	00 13	81333	155 44	03383	250 0000	000000	VOL.1 PAGE 34
/AKOKOA 1913-1981 RM 2							
200 3	20 15	01276	155 53	17859	139 0187	000000	201553(1051)
/LORAN C TOWER 1964							
201 0	00 14	02440	155 49	55371	139 0024	000000	201553(1011)
/HIND STACK 1948							
202 3	20 14	13643	155 46	55121	139 0041	000000	201553(1044)
/KOHALA MILL STACK 1948							
203 7	20 07	5174 ³⁶ ₂	155 33	316 ⁵⁸⁶ ₁₉	139 0046	000000	VOL.1 PAGE 41
/KUKUIHAELE LIGHT 1981							
204 6	20 14	57687	155 46	27146	139 0025	000000	201553(1026)
/KAUHOLA POINT LIGHT 1948							
205 3	00 04	50790	155 08	00315	139 0045	000000	201552(1004)
/HONOKAA HAWAIIAN TEL MICROWAVE 1967							
206 3	20 05	24916	155 26	16037	139 0000	000000	201552(1025)
/PAAUHAU SUGAR CO STACK 1913							
207 7	20 13	21424	155 44	03232	139 0028	000000	201553(1001)
/AKOKOA 1913							
208 6	19 59	4830 ⁷ ₄	155 14	359 ⁴⁵ ₈₃	139 0008	000000	VOL.2 PAGE 39
/LAUPAHOEHOE PT LT 1981							
209 3	00 01	01963	155 10	32630	139 0291	000000	201552(1011)
/KAHOLO 1877							
210 3	20 03	14546	155 38	18626	139 1214	000000	201553(1017)
/KAALA 1877							
211 3	20 02	40827	155 22	35995	139 0253	000000	201552(1022)
/OPITHILALA 1881							

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

213 0 20 16 04160 155 52 14446 139 0016 000000
/KEALAEHEWA 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 47630 139 0030 000000
/PAALO STACK 1948 201552(1027)~~

300 6 20 00 0427⁸ 155 16 4851⁵ 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 0082 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

(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
110-122

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEAN SURVEY
NOAA

VELOCITY CORRECTIONS

Ship RAINIER

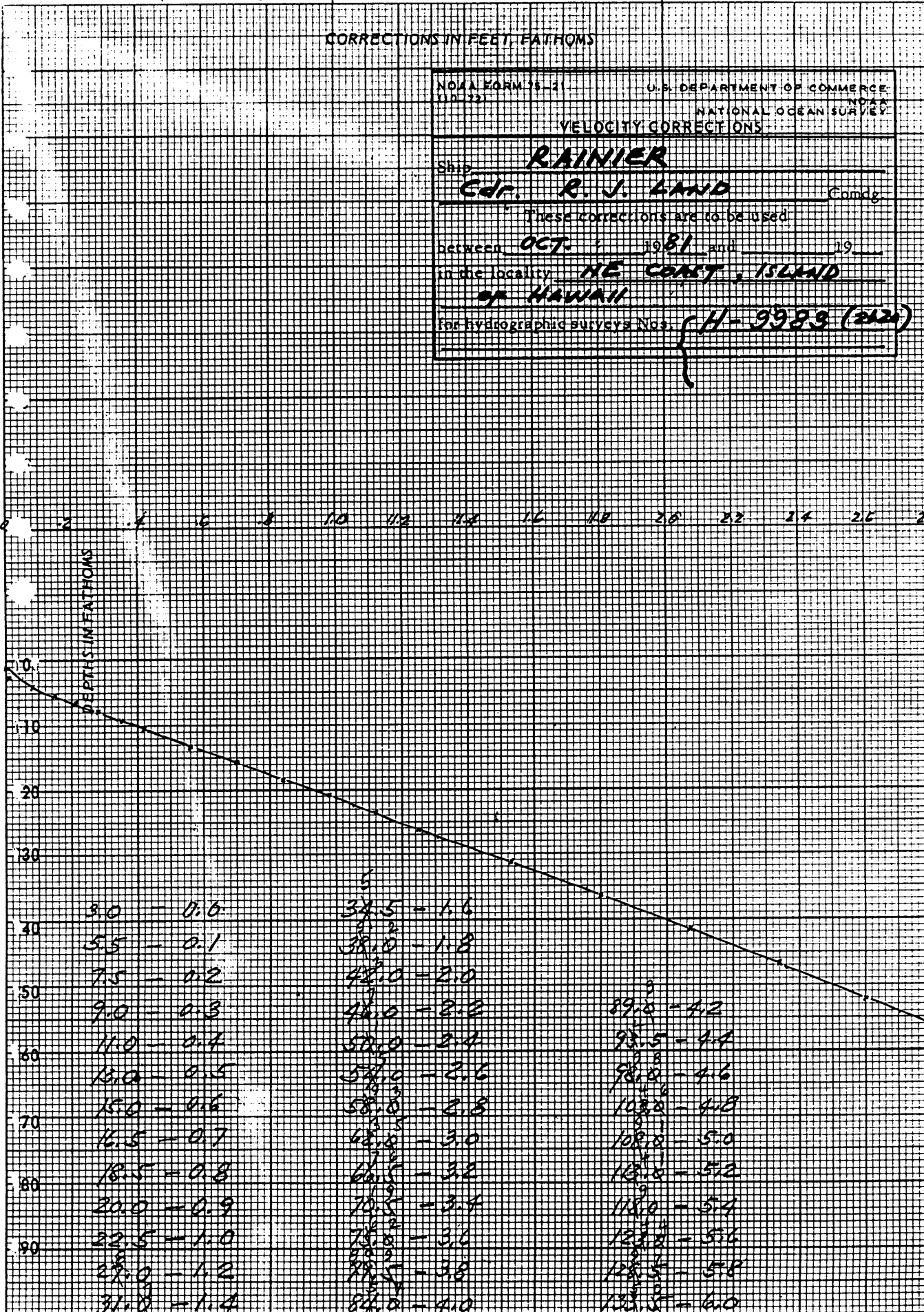
CDR. R. J. LAND Comdg.

These corrections are to be used
between OCT. 1 1981 and _____ 19____

in the locality NE COAST, ISLAND
OF HAWAII

for hydrographic surveys Nos. H-9983 (212)

(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.

100

2.8 3.0 3.2 (Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.) 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6

CORRECTIONS IN FEET, FATHOMS

NOAA FORM 18-21 (11-73) 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. _____

(For deep water add a 0 to these figures)

DEPTH IN FATHOMS	1	2	3	4	5	6	7	8	9	10
90	198.0	-7.0								
100	250.0	-8.0								
110	318.0	-9.0								
120	394.0	-10.0	1482.0	-30.0						
130	482.0	-11.0	1496.0	-31.0						
140	570.0	-12.0	1526.0	-32.0						
150	670.0	-13.0	1559.0	-33.0	2055.0	-50.0				
160	770.0	-14.0	1592.0	-34.0	2081.0	-51.0				
170	872.0	-15.0	1624.0	-35.0	2106.0	-52.0				
180	984.0	-16.0	1658.0	-36.0	2133.0	-53.0				
190	1098.0	-17.0	1690.0	-37.0	2158.0	-54.0				
200	1220.0	-18.0	1724.0	-38.0	2184.0	-55.0				
210	1344.0	-19.0	1759.0	-39.0	2210.0	-56.0				
220	1470.0	-20.0	1790.0	-40.0	2237.0	-57.0				
230	1608.0	-21.0	1819.0	-41.0	2258.0	-58.0				
240	1748.0	-22.0	1847.0	-42.0	2278.0	-59.0				
250	1890.0	-23.0	1873.0	-43.0	2300.0	-60.0				
260	2034.0	-24.0	1902.0	-44.0	2320.0	-61.0				
270	2180.0	-25.0	1930.0	-45.0	2341.0	-62.0				
280	2320.0	-26.0	1951.0	-46.0	2362.0	-63.0				
290	2468.0	-27.0	1977.0	-47.0	2383.0	-64.0				
300	2620.0	-28.0	2003.0	-48.0	2404.0	-65.0				
310	2770.0	-29.0	2029.0	-49.0	2425.0	-66.0				

46 1240

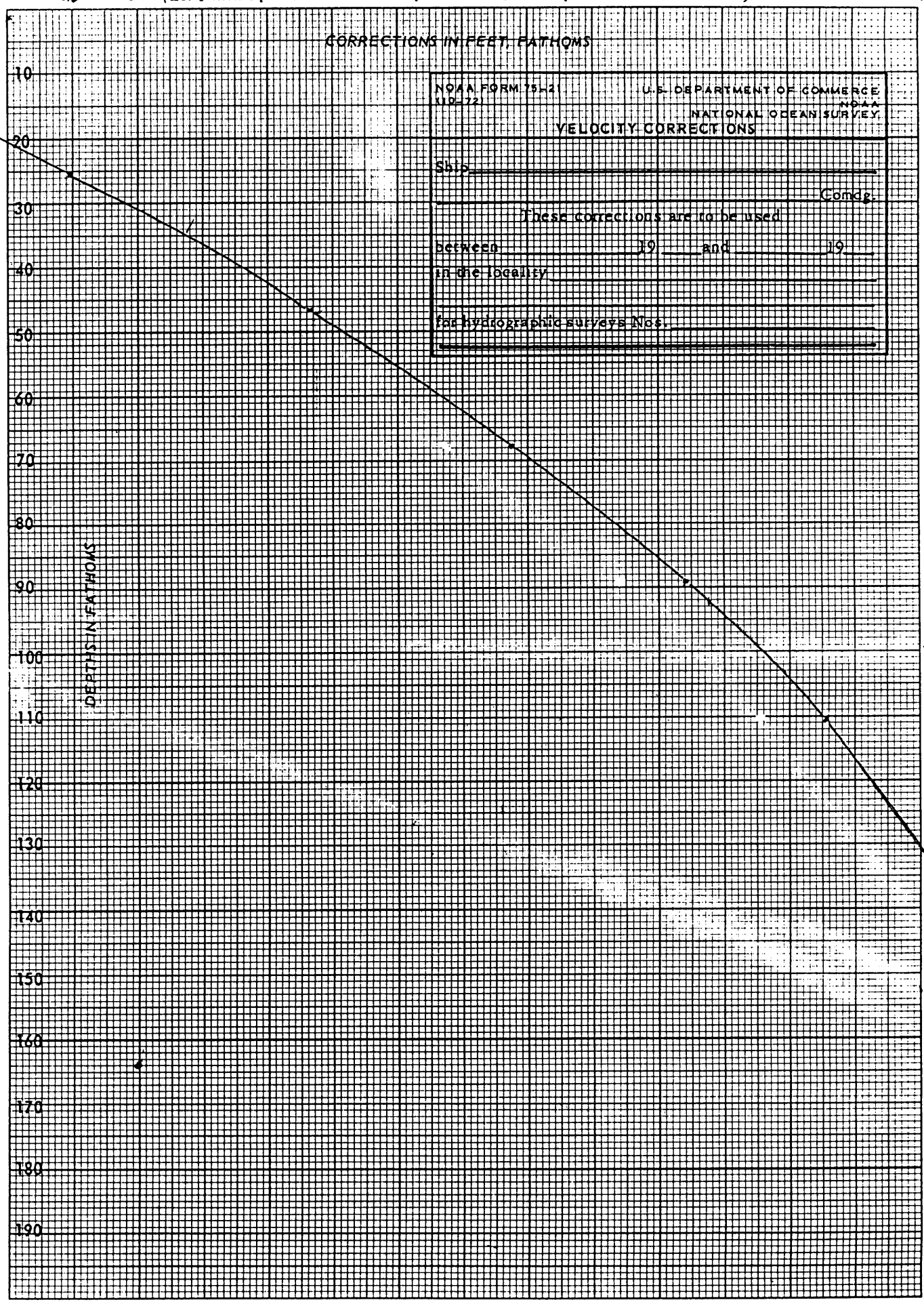
K&S 20 X 20 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

200

5.6 5.8 6.0 (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 15-2 (10-72)	U.S. DEPARTMENT OF COMMERCE NOAA NATIONAL OCEAN SURVEY
VELOCITY CORRECTIONS	
Ship _____	Comdg. _____
These corrections are to be used	
between _____ 19____ and _____ 19____	
in the locality _____	
for hydrographic surveys Nos. _____	



46 1240

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

(For deep water add a 0 to these figures)

300

(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 (11-75)		U.S. DEPARTMENT OF COMMERCE NOAA	
NATIONAL OCEAN SURVEY			
VELOCITY CORRECTIONS			
Ship _____		Comdg _____	
These corrections are to be used			
between _____ 19__ and _____ 19__		_____	
in the locality _____			
for hydrographic surveys Nos. _____			

(100)(140)(180)(200)
(2200)

(170)(120)(110)(700)(300)
(2300)

46 1240

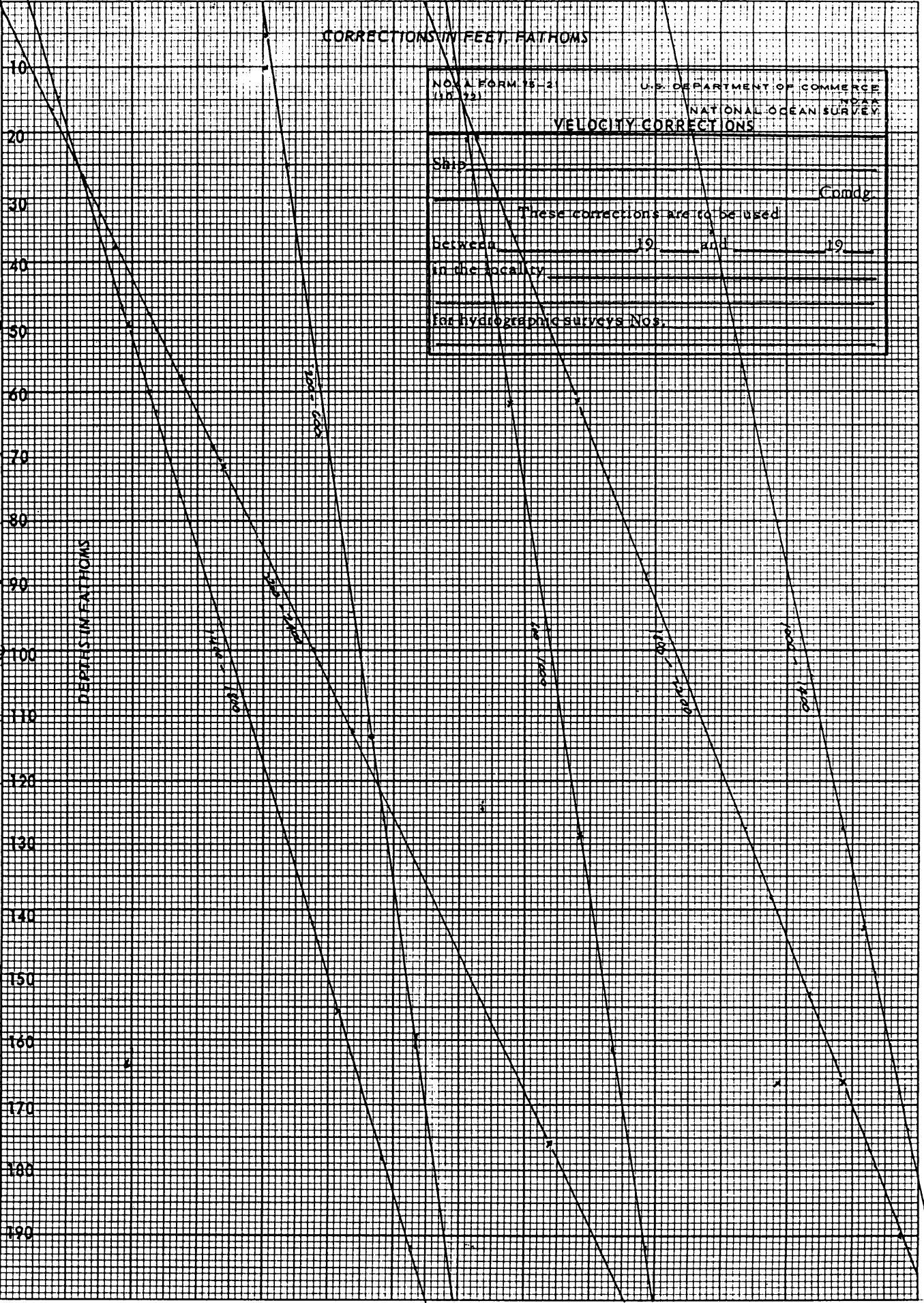
(1600)(1200)
(2000)
(2400)

(1700)(1300)(900)(600)
(2100)
(2500)

(1800)(1400)(1000)(400)
(2200)
(2600)

(For deep water add a 0 to these figures)

DEPTH IN FATHOMS



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

TRANSDUCER CORRECTION TABLES

VESSEL: 2120 YR: 81 FM

DAY	TIME	TRA COR	VEL TABLE
-----	------	---------	-----------

280	095851	2.60	1
-----	--------	------	---

302	185400	2.60	0
-----	--------	------	---

303	031858	2.60	1
-----	--------	------	---

303	121000	2.60	0
-----	--------	------	---

306	201159	2.60	1
-----	--------	------	---

323	113000	2.60	0
-----	--------	------	---

323	201711	2.60	1
-----	--------	------	---

325	235959	2.60	1
-----	--------	------	---

VELOCITY CORRECTION TABLES

TABLE#: 00 YR: 81 FM TABLE#: 01 YR: 81 FM

DEPTH	VEL COR	DEPTH	VEL COR
.00	.00	3.00	.00
99999.99	.00	5.50	.10
		7.50	.20
		9.00	.30
		11.00	.40
		13.00	.50
		15.00	.60
		16.50	.70
		18.50	.80
		20.00	.90
		22.50	1.00
		28.00	1.20
		31.70	1.40
		35.50	1.60
		39.20	1.80
		43.00	2.00
		47.00	2.20
		51.00	2.40
		55.00	2.60
		59.30	2.80
		63.50	3.00
		67.60	3.20

7

6

5

3

2

VELOCITY CORRECTION TABLES -- CONT.

TABLE#:	0 YR:	0	TABLE#:	1 YR:	81 FM	TABLE#:	0 YR:
DEPTH	VEL	COR	DEPTH	VEL	COR	DEPTH	VEL CO
			71.90		3.40		
			76.20		3.60		
			80.90		3.80		
			85.40		4.00		
			89.90		4.20		
			94.50		4.40		
			99.80		4.60		
			104.60		4.80		
			109.10		5.00		
			114.10		5.20		
			119.00		5.40		
			124.40		5.60		
			129.70		5.80		
			135.00		6.00		
			192.00		7.00		
			250.00		8.00		
			318.00		9.00		
			384.00		10.00		
			452.00		11.00		
			520.00		12.00		
			590.00		13.00		
7			670.00		14.00		
6			732.00		15.00		
5			794.00		16.00		
4			858.00		17.00		
2							

ORRECTION TABLES -- CONT.

0 YR: 0	TABLE#:	1 YR: 81 FM	TABLE#:	0 YR: 0	TABL
VEL CUR	DEPTH	VEL COR	DEPTH	VEL COR	DEF
	922.00	18.00			
	984.00	19.00			
	1022.00	20.00			
	1068.00	21.00			
	1114.00	22.00			
	1160.00	23.00			
	1208.00	24.00			
	1254.00	25.00			
	1300.00	26.00			
	1348.00	27.00			
	1393.00	28.00			
	1429.00	29.00			
	1462.00	30.00			
	1494.00	31.00			
	1526.00	32.00			
	1559.00	33.00			
	1592.00	34.00			
	1624.00	35.00			
	1658.00	36.00			
	1690.00	37.00			
	1724.00	38.00			
	1757.00	39.00			
	1790.00	40.00			
	1811.00	41.00			
	1847.00	42.00			

ITY CORRECTION TABLES -- CONT.

BL# 0 YR: 0 TABLE# 1 YR: 81 FM TABLE# 0 YR: 0
 EPTH VEL COR DEPTH VEL COR DEPTH VEL COR

		1873.00	43.00		
		1900.00	44.00		
		1926.00	45.00		
		1951.00	46.00		
		1977.00	47.00		
		2003.00	48.00		
		2029.00	49.00		
		2055.00	50.00		
		2081.00	51.00		
		2106.00	52.00		
		2133.00	53.00		
		2158.00	54.00		
		2184.00	55.00		
		2216.00	56.00		
		2237.00	57.00		
		2258.00	58.00		
		2278.00	59.00		
		2300.00	60.00		
		2320.00	61.00		
		2341.00	62.00		
		2362.00	63.00		
		2383.00	64.00		
		2404.00	65.00		
		2425.00	66.00		
		99999.99	66.00		

TC/TI TAPE LISTING
RA-80-1-81(H-9974)

SHIP RAINIER - 2120

095851	0	0000	0001	280	212000	000000
185400	0	0000	0000	302	000000	000000
031858	0	0000	0001	303	000000	000000
121000	0	0000	0000	303	000000	000000
201159	0	0000	0001	306	000000	000000
113000	0	0000	0000	323	000000	000000
201711	0	0000	0001	323	000000	000000
090000	0	0000	0001	325	000000	000000

ABSTRACT OF POSITIONS

RA-80-1-81
(H-9974)

<u>Day</u>	<u>Positions</u>	<u>Control</u>	<u>S1,M,S2</u>	<u>Remarks</u>
280/281	0001-0137	04	101-102	Mainscheme
281	0138-0147	04	101-102	Crossline
281	0148-0153	04	101-102	Mainscheme
281	0154	04	101-102	D.P. For Loran-C
281/282	0155-0227	04	101-102	Mainscheme
282	0228-0248	04	101-102	Crossline
282	0249-0271	04	101-102	Mainscheme
282	0272-0274	04	101-102	Crossline
282	0275-0291	04	101-102	Mainscheme
287	0294-0299	04	104-213	Mainscheme
287	0301-0305	04	104-213	Crossline
287	0306-0311	04	104-213	Mainscheme
302	1002-1004	04	101-122	Bottom Samples
303	0312-0348	04	116-207	Mainscheme
303	1005-1006	04	101-122	Bottom Samples
306	0349-0364	04	101-122	Mainscheme
307	0366-0395	04	101-122	Mainscheme
307	0396-0401	04	101-122	Crossline
307	0402-0405	04	101-122	Development @ 20/20.1x155/37.4
307	0406-0409	04	101-122	Crossline
308	0410-0443	04	116-207	Mainscheme
308	0444-0449	04	116-207	Crossline
308	0450-0457	04	116-207	Mainscheme
317/318	0548-0559	04	115-213	Mainscheme
323	1007-1008	04	101-122	Bottom Samples
323	0560-0571	04	125-123	Mainscheme
323	0572-0576	04	125-123	Crossline
323/324	0577-0590	04	123-118	Mainscheme
324	0591-0606	04	123-118	Mainscheme
324	0607-0610	04	123-118	Crossline
324	0611-0620	04	123-118	Mainscheme
324	0621-0626	04	132-125	Crossline
324/325	0627-0669	04	132-125	Mainscheme
325	0670-0672	04	129-125	Mainscheme

Duplicate Positions: 0453.

Rejected Positions: 0059,0195,0199,0292-0293, 0299-0300,0336-0337
0355-0356,0365,0419,0425-0427,0458-0547,0613-0614,0642-0643.

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

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

VESSEL	SERIAL NO.	DATE	PROJ. NO.		YEAR	DEPTH	WEIGHT OF SAMPLER	AP-PROX. PENETRATION	LENGTH OF CORE	COLOR OF SEDIMENT	FIELD DESCRIPTION	REMARKS	OBS. INT.
			PR-T126-RA-81	RA-80-1-81									
			LATITUDE	LONGITUDE									
	1002	10-29	20° 04' N	43° 02' W	1981	295	50 #	—			Hard Bottom	No Sample	RTG
	1003	10-29	15° 48' N	33° 18' W		453	50 #	—			BLACK SAND	SAMPLE WAS ALMOST COMPLETELY WASHED OUT ON ARRIVAL	RTG
	1004	10-29	09° 36' N	33° 36' W		162	50 #	—			BLACK SAND	SAMPLE ALMOST COMPLETELY WASHED OUT AT ARRIVAL ON SURFACE	RTG
	1005	10-30	33° 06' N	53° 06' W		395	50 #	—			BROWN BEADEN SHELL & CORAL	SAMPLE ALMOST COMPLETELY WASHED OUT AT ARRIVAL	RTG
	1006	10-30	23° 06' N	34° 08' W			50 #	—			GRAY MUD & SAND	SAMPLE ALMOST COMPLETELY WASHED OUT AT ARRIVAL	RTG
	1007	11-19	20° 24' N	23° 42' W		900	50 #	—			GRAY SAND	WASHED OUT AT ARRIVAL	RTG
	1008	11-19	11° 42' N	24° 48' W		572	50 #	—			fine sand	WASHED OUT AT ARRIVAL	RTG
	1009	11-19						—				ALMOST ALL WASHED OUT	RTG

Use more than one line per sample if necessary.

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 2120

SHEET : RA-80-1-81

TIME	DAY	PATTERN 1	PATTERN 2
095851	280	+00091	+00081
000015	281	+00091	+00081
000051	282	+00091	+00081
115816	287	-00001	+00000
031858	303	-00001	+00000
201159	306	+00130	-00120
003720	307	-00165	+00015
174253	308	+00000	-00003
000040	309	+00000	-00003
233314	317	+00000	-00003
000004	318	+00000	-00003
201711	323	+00000	-0000 ³
226028		+00000	-00000
000653	324	+00000	-00002
004459		-0000 ²³	+00000
220100	324	-*0000 ¹	-0000 ²³
000028	325	+00000	-0000 ²³

FINAL BASELINE CORRECTORS

OPR-T126-RA-81

CODE	CONSOLE R/T			
	715 1660	711 1646	30269 1636	720 2710
B	N/A	-3	N/A	N/A
C	N/A	-4	-3	N/A
D	-1	-4	0	N/A
E	0	0	0	N/A
F	-2	N/A	-1	N/A
O	0	-1	0	0

SURVEY CA-80-1-81 (4-9974)

WINNABEEL SHIP

ELECTRONIC CONTROL TYPE R/L

J.D.	MOBILE UNIT	SHORE UNIT	SYSTEM CHECK	COMMENTS					
SHIP #44444 EDP No.	CONSOLE	R/T	STATION	CODE	A.M.	P.M.	B/C		
287	2120	30269	1636	104 213	F 0	+2.93 -5.91	-4.65 -6.48	-1 0	
303	2120	30269	1636	116 207	F 0	+4.29 -3.19	-1.69 -8.28	-1 0	
308/309	2120	30269	1636	207 116	C D	-8.0 -11.97	-7.13 -12.19	-3 0	Ending Calibration not performed J.D. 510
317/318	2120	30269	1636	213 115	C E	-2.04 -14.46	+3.53 -24.35	-3 0	Codes G, D pos. 560-58
323/324	2120	30269	1636	C D	123 118	-4.14 +0.42	-5.90 -4.50	0	Codes G, D pos. 511-620
324/325	2120	30269	1636	0	125	-3.98	+1.16	0	
				C	125 129	-13.49 +1.10	-17.83 -12.34	-3 0	Codes G, E pos. 621-669
				D	132	-5.99	-14.26	-1	Codes G, D pos. 670-672
				F					

GEOGRAPHIC NAMES

H-9974

Name on Survey	ON CHART NO. 19320 12th Edition									
	A	B	C	D	E	F	G	H	I	K
	ON PREVIOUS SURVEY NO.	CON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP	GRAND McNALLY ATLAS	U.S. LIGHT LIST			
	X									1
HAWAII (island)	X									2
HAWAII (title)	X									3
LAUPAHOEHOE POINT	X									4
UPOLU POINT	X									5
										6
										7
										8
										9
										10
										11
										12
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										23
										24
										25

Approved:

Charles E. Harrington
Chief Geographer - N/C62x5

18 MAY 1983

APPROVAL SHEET

DESCRIPTIVE REPORT TO ACCOMPANY

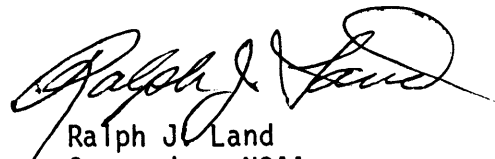
HYDROGRAPHIC SURVEY

H-9974

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

HYDROGRAPHIC SURVEY STATISTICS

H-9974

RECORDS ACCOMPANYING SURVEY: To be completed when survey is registered.

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET		1	BOAT SHEETS & PRELIMINARY OVERLAYS		1	
DESCRIPTIVE REPORT		1	SMOOTH OVERLAYS: POS. ARC, EXCESS		4	
DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES						
CAHIERS			1 Raw P/O 1 photo			
VOLUMES						
BOXES			smooth 1 P/O misc data			

T-SHEET PRINTS (List)

SPECIAL REPORTS (List) *Echograms - 1 box*

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS		
	PRE-VERIFICATION	VERIFICATION	TOTALS
POSITIONS ON SHEET			
POSITIONS CHECKED		566	
POSITIONS REVISED		209	
SOUNDINGS REVISED		38	
SOUNDINGS ERRONEOUSLY SPACED		--	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED		--	
	TIME - HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	2	* (VER)/(EVAL)	
VERIFICATION OF CONTROL		03/04	07
VERIFICATION OF POSITIONS		14/02	16
VERIFICATION OF SOUNDINGS		62/04	66
COMPILATION OF SMOOTH SHEET	4	28/00	28
APPLICATION OF TOPOGRAPHY		00/00	00
APPLICATION OF PHOTOBATHYMETRY		00/00	00
JUNCTIONS		13/09	22
COMPARISON WITH PRIOR SURVEYS & CHARTS		02/08	10
VERIFIER'S REPORT		11/07	18
OTHER		00/11	11
TOTALS	2	133/45	178
Pre-Verification by J. S. Green	Beginning Date 2/17/82	Ending Date 2/17/82	
Verification by R. A. Shipley	Beginning Date 5/5/82	Ending Date 3/28/83	
Evaluated by D. J. Hill			
Verification Check by J. L. Stringham, J. S. Green	Time (Hours) 28	Date 3/28/83	
Marine Center Inspection by HIT	Time (Hours) 7	Date 4/5/83	
Quality Control Inspection by	Time (Hours)	Date	
Requirements Evaluation by	Time (Hours)	Date	

* Time in this column is for Verification (VER) and Evaluation (EVAL)

PACIFIC MARINE CENTER
EVALUATION REPORT

REGISTRY NO: H-9974

FIELD NO: RA-80-1-81

Hawaii, Island of Hawaii, Offshore ~~Laupahoehoe~~ ^{Upolu Point} to ~~Upolu Point~~ ^{Laupahoehoe Point}

SURVEYED: October 7 - November 21, 1981

SCALE: 1:80,000

PROJECT NO: OPR-T126-RA-81

SOUNDINGS: EDO Model 248

CONTROL: Raydist and
Mini-Ranger III
Range-Range

Chief of Party.....CDR R. J. Land

Surveyed By.....LCDR S. McGee
LT R. Morris
LT T. Baxter
LT S. Ludwig
LTJG F. Ohlinger

Automated Plot By.....PMC Xynetics Plotter

Verified By.....R. A. Shipley

Evaluated By.....D. J. Hill

1. INTRODUCTION

H-9974 (1981) is a basic survey conducted in accordance with Project Instructions OPR-T126-RA-81 dated June 11, 1981 and Change 1, dated July 13, 1981.

The survey is offshore of the most northeastern coast of the island of Hawaii and southeast from Upolu Point approximately 47 nautical miles to Laupahoehoe. The approximate inshore limit is the 100-fathom curve while the other limits have been squared off with deepest depths exceeding 2300 fathoms.

Field tide reductions are based on predicted tides from Honolulu, Hawaii, corrected to Hilo, Hawaii. Tides used for reduction of final soundings are based on observations at Upolu Point (16-7737).

Velocity corrector tables were revised during processing for the following two reasons:

a. A 2.6-fathom draft correction was not used by the field in computing Table I.

b. Nansen cast data from 3 separate days and areas were averaged to result in correctors more representative than those derived in the field from casts on a single day in one area.

The signal list was revised during processing and corrected information is available in the Descriptive Report and smooth printout.

The digital records for this survey have been updated to include all categories of information required to comply with N/CG letter, Policy for Certification and Delivery of Hydrographic Surveys, December 17, 1982.

2. CONTROL AND SHORELINE

Hydrographic position control is adequately discussed in paragraphs F and G of the Descriptive Report, Horizontal Control Report for OPR-T126-RA-81, and Electronic Control Report for OPR-T126-RA-81 with the exception of Raydist control problems on Julian Day 306. An 89 lane jump in the Red station lane count was attributed to the Red station receiver locking onto the Green signal. In addition to halting operations, the hydrographer rejected the erroneous data and recalibrated prior to resuming operations.

The smooth sheet was plotted utilizing preliminary adjusted positions for newly established stations and published positions for existing stations.

There is no shoreline depicted on the smooth sheet.

3. HYDROGRAPHY

- a. Soundings at crossings are in good agreement.
- b. Standard depth curves have been completed with no significant deficiencies.
- c. The development of bottom configuration is adequate with no significant indications of shoaling remaining undeveloped.

4. CONDITION OF SURVEY

The smooth sheet and accompanying hydrographic records adequately conform to the requirements of the Hydrographic Manual.

5. JUNCTIONS

<u>Survey</u>	<u>Scale</u>	<u>Relative Location</u>
H-9129 (1970)	1:40,000	West
H-9912 (1980)	1:80,000	East
H-9975 (1981)	1:20,000	Southwest
H-9983 (1981)	1:20,000	South
H-9985 (1981)	1:80,000	North
H-9986 (1981-82)	1:20,000	Southeast
H-10052 (1982)	1:20,000	Southeast

The junctions with H-9975, H-9983 and H-9985 have been completed and are inked. The junctions with H-9912 and H-9129 have been completed with the exception of the following due to the unavailability of the smooth sheets at the Marine Center:

a. Depth curves and junction notes have not been inked on H-9129 and H-9912.

b. The 200-fathom curve on H-9912 is not in coincidence due to a 198-fathom depth on H-9974 at latitude $20^{\circ}01'03.42''N$, longitude $155^{\circ}08'45.18''W$. The curve will require revision on H-9912 to bring it into coincidence with H-9974.

The junctions with H-9986 and H-10052 were left in pencil since these surveys are not fully processed.

There are no contemporary surveys to the northeast and southeast.

6. COMPARISON WITH PRIOR SURVEYS

H-3651 (1914), 1:20,000
 H-3652 rec. (1914), 1:60,000
 H-5052 (1928-29), 1:80,000
 H-5052 (1932), 1:5,000

These prior surveys are in good agreement with the present survey and the comparison was adequately discussed by the hydrographer. However, the hydrographer's concern regarding a 276-fathom sounding on H-3651 at latitude $20^{\circ}19'18''N$, longitude $155^{\circ}45'21''W$ is obviated by a note on the smooth sheet indicating that the sounding should be omitted.

No data has been carried forward to supplement the present survey.

There are no presurvey review items within the limits of this survey.

H-9974 is adequate to supersede the prior surveys within the common area.

7. COMPARISON WITH THE CHART

19320, 12th Ed., June 17, 1978

a. Hydrography - Most soundings charted west of longitude $155^{\circ}40'$ originate with the prior surveys and have been adequately addressed.

Other soundings originate with a miscellaneous source(s) not determined during evaluation.

The present survey is adequate to supersede charted hydrography in its entirety.

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

c. Aids to Navigation - There are no aids to navigation within the limit of the survey.

8. COMPLIANCE WITH INSTRUCTIONS

This survey adequately complies with the project instructions.

9. ADDITIONAL FIELD WORK

This is an excellent basic survey and no additional field work is necessary.

Respectfully submitted,



Dennis J. Hill
Cartographer

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 SURVEY H-9974

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.


Chief, Nautical Chart Branch (Date) 4/8/83

CLEARANCE:

N/MOP2:KWJeffers

SIGNATURE AND DATE:


4/14/83

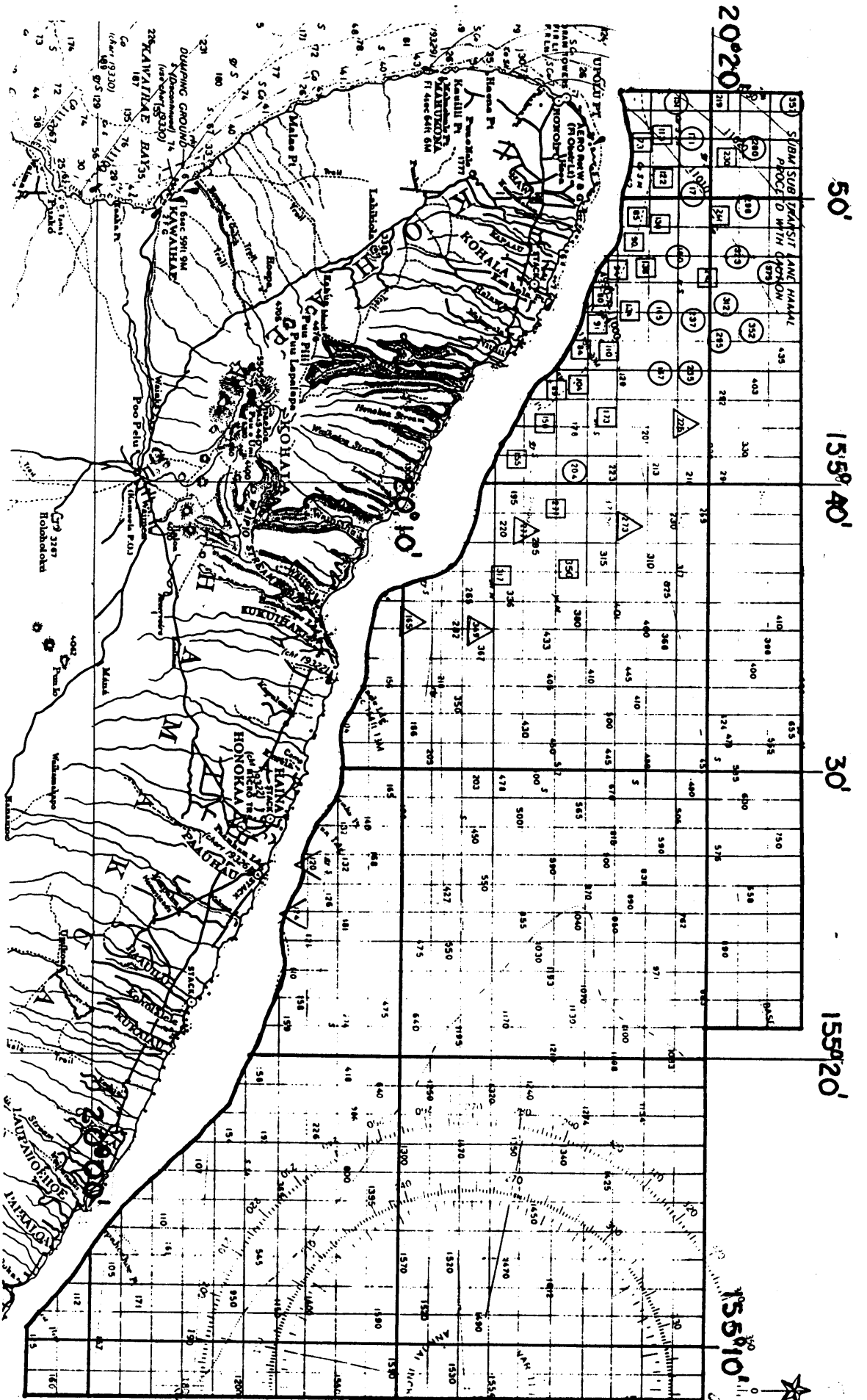
After review of the smooth sheet and accompanying reports, I hereby certify this survey is accurate, complete, and meets appropriate standards with only the exceptions as noted above. The above recommendations are forwarded with my concurrence.


Director, Pacific Marine Center (Date) 4/14/83

- H 3651 (1914)
- △ H 3652 rec. (1914)
- H 5052 (1928-29)
- ∨ H 5224 (1932)

ISLAND OF HAWAII

Chart 19320 12 Ed., June 17/78



DATE: May 21, 1982

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Pacific Marine Center:

Hourly heights are approved for

Tide Station Used (NOAA Form 77-12): 161-7737 Upolu Point, HI

Period: October 7 - November 20, 1981

HYDROGRAPHIC SHEET: H-9974

OPR: T126

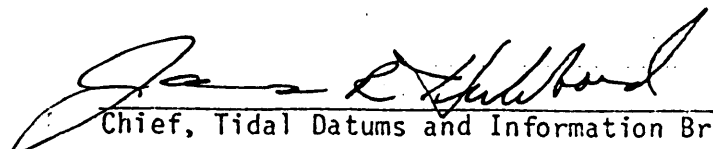
Locality: Northeast Coast, Island of Hawaii

Plane of reference (mean lower low water): 3.8 ft.

Height of Mean High Water above Plane of Reference is 1.6 ft.

REMARKS: Recommended Zoning:

1. East of longitude 155°35' apply -20 minute time correction and x1.22 range ratio.
2. West of 155°35' zone direct.


Chief, Tidal Datums and Information Branch



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102

April 8, 1983

TO: N/MOP - Charles K. Townsend

FROM: *Larry W. Mordock*
For: N/MOP21 - Ned C. Austin

SUBJECT: PMC Hydrographic Inspection Team Report for Survey H-9974

This survey is a basic hydrographic survey offshore of ^{Upolu Point to} ~~Upolu Point~~ Laupahoehoe ~~to~~ Upolu Point, Hawaii Island, Hawaii. This survey was conducted by the NOAA Ship RAINIER in 1981.

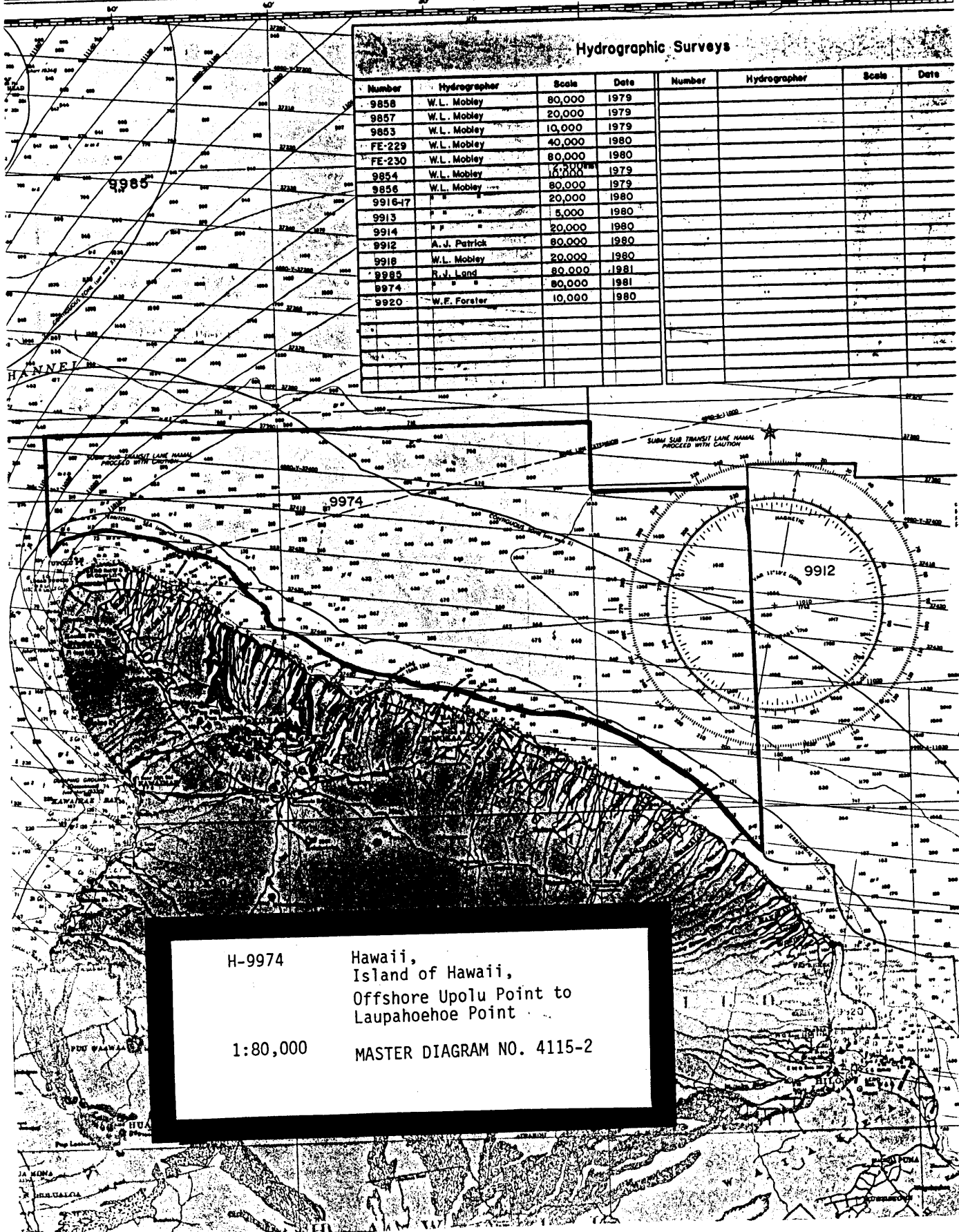
The inspection team finds H-9974 to be a good basic survey adequate to supersede common areas of prior surveys and charted hydrography. Administrative approval is recommended.

Larry W. Mordock
Larry W. Mordock

Alan D. Anderson
Alan D. Anderson

James W. Steensland
James W. Steensland





Hydrographic Surveys

Number	Hydrographer	Scale	Date	Number	Hydrographer	Scale	Date
9858	W.L. Mobley	80,000	1979				
9857	W.L. Mobley	20,000	1979				
9853	W.L. Mobley	10,000	1979				
FE-229	W.L. Mobley	40,000	1980				
FE-230	W.L. Mobley	80,000	1980				
9854	W.L. Mobley	16,000	1979				
9856	W.L. Mobley	80,000	1979				
9916-17	"	20,000	1980				
9913	"	5,000	1980				
9914	"	20,000	1980				
9912	A.J. Patrick	80,000	1980				
9918	W.L. Mobley	20,000	1980				
9885	R.J. Land	80,000	1981				
9874	"	80,000	1981				
9920	W.F. Forster	10,000	1980				

H-9974 Hawaii, Island of Hawaii, Offshore Upolu Point to Laupahoehoe Point
 1:80,000 MASTER DIAGRAM NO. 4115-2

