

9856

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-80-2-79
Office No. H-9856

LOCALITY

State Hawaii
General Locality Island of Hawaii
Locality Offshore Palima Pt.
to Cape Kumukahi
1979-80
CHIEF OF PARTY
CAPT W.L. Mobley

LIBRARY & ARCHIVES

DATE June 2, 1982

9856

AREA 5
CAT

193201	250,000
19010 ✓	675,000
19004 ✓	600,000
19007 ✓	1,650,000
540 ✓	3,121,170
530 ✓	4,860,700
501	10,000,000

HYDROGRAPHIC TITLE SHEET

H-9856

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-80-2-79

State Hawaii

General locality Island of Hawaii

Locality Offshore Palima Pt. to Cape Kumukahi

Scale 1:80,000 Date of survey December 5-6, 1979

Instructions dated July 20, 1979 Project No. OPR-T126-RA-79

Vessel NOAA Ship RAINIER

Chief of party CAPT. W. L. Mobley

Surveyed by LT A. Anderson, LT R. Morris, LTJG M. McCluskey, LTJG J. Greene,
ENS D. Kruth, SST R. Hastings

Soundings taken by echo sounder, ~~XXXXXX, XXXX~~

Graphic record scaled by RAINIER Survey Department

Graphic record checked by RAINIER Survey Department

Verification ~~XXXXXX~~ by G. E. Kay Automated plot by PMC Xynetics Plotter

Evaluation ~~XXXXXX~~ by B. A. Olmstead

Soundings in fathoms feet at MLW MLLW

REMARKS: This is an incomplete survey. Time Meridian is 0° (GMT)

SURVEY COMPLETED IN 1980 *JE*

See other title page included in the report
for 1980 work.

ANNEX/SURF 2/28/86 AAA

A. Project

Hydrographic Survey H-9856 is a basic survey conducted in accordance with Project Instructions OPE-T126-RA-79, Hawaii, Hawaiian Islands, dated July 20, 1979; Change No. 1, Supplement to Instructions, dated August 2, 1979; Change No. 2, Supplement to Instructions, dated August 6, 1979; Change No. 3, Supplement to Instructions, dated August 21, 1979; and Change No. 4, Supplement to Instructions, dated October 3, 1979.

See
Verification
Report
Sec I

B. Area Surveyed

The area of Hydrographic Survey H-9856 lies on the southeastern coast of the Island of Hawaii. The northern and southern boundaries are 19°16'00" N and 19°07'30" N respectively. The eastern boundary is 155°07'00" W with the western boundary being 155°27'30" W. Hydrographic survey operations began on December 5, 1979 (JD 339) and were completed on December 6, 1979 (JD 340). Boundaries for 1979 work; also included, in this report, 1980 work.

See
Verification
Report
Sec

C. Sounding Vessel

The NOAA Ship RAINIER (S221)(2120) was used to conduct this hydrographic survey.

D. Sounding Equipment and Corrections to Echo Soundings

Sounding Equipment

Echo soundings collected for H-9856 were obtained by the RAINIER (2120). The RAINIER is equipped with an EDO Model 248 Transceiver, RAYTHEON-UGR (Universal Graphic Recorder), and a DIGITRAK Model 261-C digitizer.

Table 1

Echo Sounder Component Serial Numbers

<u>Component</u>	<u>RAINIER (2120)</u>
Transceiver	202
Analog Recorder	75
Digitizer	204

✓

Corrections to Echo Soundings

The following corrections to echo soundings are discussed: sound velocity corrections and Ship draft corrections. Considerations of sea-swell errors is not included as it is felt that the irregular nature of the bottom, in addition to the extreme depths found, makes a consideration of the state of the sea and swell an unrealistic exercise. ✓

Sound Velocity Corrections

Sound velocity corrections for echo soundings were derived from data obtained from two Nansen casts performed during OPR-T126-RA-79. (See H.O. 607 Instruction Manual for Obtaining Oceanographic Data, Third Edition, U.S. Naval Oceanographic Office, 1968). The details relating to these casts are presented in Table II: ✓

Table II

Nansen Cast Data, OPR-T126-RA-79

<u>Nansen Cast #</u>	<u>Date Time (local)</u>	<u>Location</u>	<u>Applicable Survey</u>	<u>Velocity Table Number</u>
1	Sep 27, 1979 1045	18°48'12"* 155°47'48"	H-9852 H-9858 (inclusive)	1, 2
2	Dec 1, 1979 1000	18°46'00"* 155°25'00"	H-9852 H-9858 (inclusive)	1, 2

* Both Nansen casts fall off the sheet limits of H-9856. ✓

The samples collected in these casts were analyzed for salinity using standard laboratory procedures (See H.O. 607). The salinometer used for these analyses was a Bissett/Berman Model 6210, S/N 1043, which was last calibrated in March 1979, by the Northwest Regional Calibration Center, Bellevue, Washington. ✓

In order to compute the appropriate velocity correctors, the results of the two Nansen casts and associated salinity data were input into computer program RK-530-Velocity Correction Computations, and run on RAINIER's PDP 8/e digital computer, S/N 1015. ✓

Listings of computed velocity corrector values are provided in the separates-to-the-text portion of this report. These correctors were derived ✓

graphically by co-plotting data from both Nansen casts on the same graph and these graphs are also presented in the separates-to-the-text section of this report. (Figs. II-VIII). At the shallower depths, extremely close agreement is noted in the values from the two different casts. In depths approaching and greater than 2000 fathoms, variation between data points between the two casts starts to become evident, and in these cases, the resultant velocity correctors were picked from a curve drawn to reflect mean values between the two sets of data. ✓

From a consideration of the corrector values obtained in the two casts, it is seen that a relatively stable water column was maintained throughout the course of OPR-T126-RA-79. ✓

TRA Determination for RAINIER (2120)

Historically, 2.6 fathoms has been used for the TRA of the RAINIER (2120), and although no attempt to verify this value was made during OPR-T126-RA-79, it is strongly believed that this value correctly reflects the depth of the Ship's transducer. No modification in the position of the transducer was made prior to or during OPR-T126-RA-79. No unusual equipment loading, on board fuel supply, or Ship's operating speed occurred, and no visible evidence of changes in the Ship's draft were noted. ✓

For further information concerning echo sounding corrections, please refer to Corrections to Echo Sounding Report, OPR-T126-RA-79. ✓

E. Hydrographic Sheets

All hydrographic field sheets including the smooth field sheet were prepared via the PDP 8/e Complot system on board the Ship RAINIER. A modified transverse mercator projection was used for plotting of the hydrographic data. The list of parameters used to define the hydrographic sheets are included in the separates following the text. ✓

Field records will be sent to Pacific Marine Center, Seattle, Washington.

F. Control Stations

Horizontal control for this survey was provided by the recovery of ✓

fourteen existing stations and the establishment of five new stations. Additionally, two new reference marks were positioned near the stations Kamilo 1898-~~1979~~ and Kaena PT USGS, 1977 in order to locate Raydist shore stations. The recovered stations are as follows: Umis Ahu, 1887-~~1938~~, Wind, 1964, Ka Lae 2, 1948, Palahemo, 1898, Mahana HGS, 1898-~~1967~~, Kamilo 1898-~~1979~~, Kipaepae, 1898, Peak 2, 1949, Honuapo, 1914, Luu, 1929, Kamehame New HTS, 1949, Kaena PT USGS, 1977, Laeapuki, 1914, and Panau, 1914. The five new stations established were: Meshera, 1979, Haole, 1979, Desolation, 1979, 8739A, and Pelini, 1979. These stations served as positions for Mini-Rangers and visual hydro signals. The stations Kamilo, ¹⁸⁹⁸~~1938-1979~~, Kamehame New HTS, 1949, and Kaena PT USGS, 1977 were also used as sites for Raydist shore stations. All stations were positioned utilizing Third Order Class I geodetic methods and all were described and monumented.

See
Verification
Report
Sec. 4

For further information regarding horizontal control methods and data, refer to Horizontal Control Report OPR-T126-RA-79. ✓

G. Hydrographic Position Control

Sounding line positioning during this survey was accomplished entirely by operating Teledyne Hastings Raydist equipment in a hyperbolic mode. That is, a master station and two slave stations were positioned over Third Order Class I (or better) triangulation stations. ✓

The left slave, ^{(KAMILO, 1898 RM 3),} was located at latitude $18^{\circ}58'20.955''$ N, longitude $155^{\circ}36'18.901''$ W. The antenna consisted of 7 ten-foot sections of structural tower topped by a 35-foot whip antenna and the station was located approximately five meters above MSL. The master station, ^{(KAMEHAME NEW HTS, 1949),} was located at latitude $19^{\circ}08'52.334''$ N, longitude $155^{\circ}28'07.488''$ W. The antenna consisted of 2 sections of 10-foot structural tower topped by a 35-foot whip antenna. ^{(KAENA POINT US} The station was approximately ten meters above MSL. The right slave station, ^{1977 RM,} was positioned in a lava field at latitude $19^{\circ}16'55.404''$ N, longitude $155^{\circ}07'27.806''$ W. The antenna consisted of 7 sections of ten-foot structural tower and, again, topped by a 35-foot whip antenna. The station was approximately ten meters above MSL.

All Raydist systems were operated on a frequency of 3296.47 KHz and power for those units was provided by propane-fueled thermal generators. ✓

Positioning equipment aboard the survey vessel was as follows:

<u>Vessel</u>	<u>Transmitter</u>	<u>Navigator</u>	<u>Position Indicator</u>	<u>Panalogic</u>
RAINIER (2120)	166	119	117	17

One shore station was recovered and two were established for positioning of Raydist transmitting stations. Shore station names, numbers and dates of operation were as follows:

RA-80-2-79 (H-9856)

Hyperbolic Raydist Stations

<u>Station No.</u>	<u>Station Name</u>	<u>Dates</u>
104	Kamilo, 1898- 1979 RM-3 (left slave)	
109	Kamehame New ^{HTS, 1949} 1977 RM-1 (master station)	339-340
108	Kaena PT ^{USGS, 1917 RM3} 1977-1979 RM-3 (right slave)	

Note: All Raydist operations on this survey sheet occurred in the hyperbolic mode.

A problem that became evident with regard to hyperbolic Raydist operations involved the presence, on both channels of the system's Gould strip chart recorder, of an apparently sinusoidal drift. This wavering drift pattern which oscillated at approximately one cycle per seven seconds was reduced somewhat through the efforts of the Ship's electronics personnel but never completely eliminated during the course of OPR-T126-RA-79.

Attempts to eliminate the problem were both numerous and varied. They included retuning and/or replacing the various shore transmitters, increasing the number of ground plane radials at shore sites and checking for the possible existence of a non-NOAA transmitter inducing these unwanted harmonics.

The problem was encountered on both RA-3 (2123) and on the RAINIER (2120) - the only two vessels involved in Raydist controlled data gathering efforts. A switching of receiving equipment between these two provided no solution indicating that the anomaly was not peculiar to only one of the

vessels but possibly external in origin.

Taking this problem into account, theoretical position accuracies were determined using the applicable formula on page 23 of the NOS Hydrographic Manual, Fourth Edition. All positions on this survey were well within the standard of .5 mm at the scale of the survey (40 meters). ✓

Several lane jumps were detected on both Raydist rates during the course of this survey. The major causes of these losses were land path interference between the Ship and the master station and an occurrence referred to as "capturing" (when both rates track the same slave because of the relatively close proximity of the Ship to one slave shore transmitter). All lane jumps were detected as verified by the end-of-day calibration and correctors were applied in the appropriate locations. See Verification Report Sec 2

Two Mini-Ranger baseline calibrations were performed in conjunction with this survey. Although no data was collected in the course of this survey while using Mini-Rangers for position control, the fact that these two calibrations were performed bears mentioning here since the Mini-Rangers were utilized for Raydist-calibration purposes. All Mini-Ranger baseline calibration field sheets and graphs are contained in attachment # 5 of the Electronic Control Report OPR-T126-RA-79, which accompanies this descriptive report. A listing of the final Mini-Ranger baseline correctors, in addition to the electronic corrector abstracts are also enclosed in attachment # 5. ✓

Raydist calibration was by Mini-Ranger range values, with the ending calibration being a direct comparison of visual and Mini-Ranger calibration methods. The agreement between the two was excellent. All visual calibration signals were located over Third Order Class I (or better) triangulation stations and each visual calibration consisted of at least five sextant fixes. See Verification Report Sec 2

Finally, although at present no satisfactory explanation exists for the presence of the previously described "drift" problem, atmospheric anomalies seem unlikely as none were apparent during the course of this survey. ✓

H. Shoreline

There was not any shoreline involved in Survey H-9856. ✓

See
Verification
Report
Sec 2

I. Crosslines

Crosslines for H-9856 total 31 miles or 24% of all sounding lines. ✓
Crosslines were run at 50 and 90 degrees to the main scheme lines. All
crosslines are plotted in red ink. ✓

Crossline soundings generally agree with the main scheme sounding. ✓
With only 14% of the 28 soundings showing depth differences. These dif-
ferences may be attributed to the irregularity of the bottom in the area
and the noncoincidence of the comparison soundings.

J. Junctions

H-9856 consists of one field sheet. It junctions on its western ✓
border with Survey H-9858 (RA-80-1-79) at latitude $19^{\circ}07'30''$. There is
a slight overlap. The soundings agree with the exception of one at lati- ✓
tude $19^{\circ}09'00''$ and longitude $155^{\circ}25'45''$. This discrepancy may be attributed
to the steep, irregular shape of the bottom and the noncoincidence of the
soundings. The southeastern border of H-9856 junctions with RAINIER Survey
H-9855 (RA-80-3-79) at latitude $19^{\circ}07'30''$ and longitude $155^{\circ}08'00''$. There
is slight overlap but the soundings agree.

K. Comparison with Prior Surveys

The only known prior survey to the area covered by H-9856 is H-4655a ✓
Reconnaissance April 12-13, 1927. Comparison with H-4655 shows no discre-
pancies with survey H-9856. *see Verification Report Sec. 7.*

L. Comparison with the Chart

Survey H-9856 was done in the area offshore of southeast Hawaii,
Hawaiian Islands. The chart of the area is 19320, 12th Edition, June 17,
1978, a 1:250,000 scale chart. *see Verification Report Sec. 7.* ✓

In comparing the survey with the chart, no discrepancies were found.

M. Adequacy of Survey

Survey H-9856 is a complete and adequate survey to supersede all prior
surveys for charting in the common area. *This survey is incomplete with additional
work to be accomplished in 1980. See paragraph P, Miscellaneous and paragraph A, Recommen-
dations. 1980 work included at time H-9856 made available for g.e.*

N. Aid to Navigation

No aids to navigation exist within the area of H-9856. ✓

See Verification Report, Sec 7c

O. Statistics

Survey H-9856 contains 152 positions with 129 nautical miles of hydrography, covering 120 square miles. ✓

Four tide stations were used for this project. Honuapo tide gage was the only station used for sounding reduction on H-9856. ✓

P. Miscellaneous

The sounding data on H-9856 was collected during one day which left this smooth sheet incomplete. The work was done on the last day of the project and was an attempt to complete the survey area covered by the existing Raydist hyperbolic net, thus simplifying subsequent electronic position control planning and set-up efforts. ✓

All field smooth sheet data has been inadvertantly plotted with an ANDIST corrector of +32.2 meters. The final smooth sheet should be plotted using the actual ANDIST of -3.2 meters. The final field sheet was not replotted because of the very slight change that would occur taking into account the scale of the sheet. ✓

Q. Recommendations

It is recommended that this survey be completed in the future as a part of the next regularly ^hscheduled project. The area covered by this year's work is complete and accurate for charting. ✓

R. Automated Data Processing

Data acquisition and processing were accomplished per instructions in the Hydrographic Manual (4th Edition), Manual Automated Hydrographic Surveys and the PMC OORDER. ✓

Soundings and positions were taken by a Hydroplot system using hyperbolic range-range program RK 110. There are daily master tapes and corresponding corrector tapes which include the TRA for the Ship, electronic control ✓

calibration correctors for Raydist 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 Programs</u>	<u>Version Date</u>
RK 110 HYPERBOLIC REAL TIME PLOT	1-30-76
RK 201 GRID SIGNAL & LATTICE PLOT	4-18-75
RK 300 UTILITY COMPUTATIONS	2-05-76
RK 330 REFORMAT AND DATA CHECK	5-04-76
PM 360 ELECTRONIC CORRECTOR ABSTRACT	2-02-76
AM 500 PREDICTED TIDE GENERATORS	11-10-72
RK 530 LAYER CORRECTIONS FOR VELOCITY	5-10-76
RK 561 GEODETIC H/R CALIBRATION	2-19-75
AM 602 ELINORE-LINE ORIENTED EDITOR	5-20-75
AM 603 TAPE CONSOLIDATOR	10-10-72
RK 606 TAPE DUPLICATOR	8-22-74

The WANG series 700 and HP 97 calculators were used to compute geographic positions of electronic control stations and visual signals for calibrations.

S. Reference to Reports

The following reports contain information related to this survey:

Horizontal Control Report, OPR-T126-RA-79
Electronic Control Report, OPR-T126-RA-79
Field Edit Reports, OPR-T126-RA-79
Corrections to Echo Sounding Report, OPR-T126-RA-79.

Respectfully submitted,

James R. Gordon
James R. Gordon
Ensign, NOAA

✓
Approval Sheet

Descriptive Report To Accompany
Hydrographic Survey

H-9856

RA-80-2-79

OPR-T126-RA-79

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.

Wayne E. Mobley
Wayne E. Mobley, Captain, NOAA
Commanding Officer

✓
MASTER STATION LIST
DPR-T126-RA-79

FINAL VERSION

101	4	18	54	56570	155	41	04290	250	0008	000000	
/KA LAF 2, 1948-1949 M/R PG. 27 G-9279											
102	4	18	55	54401	155	39	40233	250	0050	000000	
/PALHEMO, 1398-1948 M/R PG. 27 G-9279											
103	4	18	56	46169	155	39	02560	250	0073	000000	
/MAIANA, 1898-1949 M/R PG. 19 G-9279											
104	3	13	58	20955	155	36	18901	250	0005	329647	<i>off sheet</i>
/KAMILI, 1898- 1979 R43 (LEFT SLAVE) PG. 19 G-9279											
105	1	19	05	16647	155	32	59609	250	0003	000000	<i>off sheet</i>
/HONJAPU, 1914- 1949 M/R PG. 28 G-9279											
106	3	19	07	36455	155	30	43106	250	0015	000000	<i>off sheet</i>
/LUJ, 1930 M/R PG. 67 G-446											
107	1	19	08	26595	155	29	21880	250	0006	000000	
/PUN, 1930 M/R PG. 67 G-446											
108	1	19	16	55404	155	07	27306	250	0010	329647	<i>ok</i>
/KAENA 2, 1977-1979-1983 (RIGHT SLAVE) POINT USGS, 1977 RM3											
109	1	19	08	52334	155	28	07488	250	0015	329647	
/KAMEHAME NEW, 1977-1981 (MASTER STATION) PG. 1 G-16025 <i>ok</i> HTS, 1949											
110	1	13	58	23300	155	36	15919	250	0003	000000	<i>off sheet</i>
/KAMILI, 1898- 1949 M/R											
111	3	19	08	52345	155	28	07623	250	0015	000000	
/KAMEHAME NEW, 1977 M/R											
112	4	18	55	15983	155	41	12404	250	0012	000000	
/YESHERA, 1979 M/R											
113	2	18	55	25485	155	41	13019	250	0013	000000	
/HABLE, 1979 M/R											
114	4	18	57	44421	155	37	52340	250	0045	000000	
/PILINI, 1979 M/R											
115	3	19	05	16336	155	32	59353	250	0000	000000	
/HONJAPU RMI M/R											
200	4	18	58	13373	155	41	22642	250	0235	000000	
/JMS AU, 1887-1949 M/R PG. 19 G-9279											
201	6	18	56	43150	155	41	13888	250	0000	000000	
/WIND, 1964 M/R PG. 122 G-13429											

~~202 1 18 54 57671 155 41 04143 250 0010 000000~~
~~/KA LAE, 1887-1948 M/R PG.40 G-9279~~

203 6 18 54 54432 155 41 04553 139 0010 000000 *off sheet*
/KA LAE LIGHT, 1948-78 G-16108

~~204 1 18 56 43366 155 41 13310 139 0000 000000~~
~~/NORTH TELEMETRY BORESIGHT POLE, 1964 PG.188 G-13429~~

~~205 1 18 56 46146 155 39 02311 139 0000 000000~~
~~/MAHANA, 1898-1949 RM2 PG.19 G-9279~~

206 4 19 02 16794 155 34 20973 250 0142 000000 *off sheet*
/KIPAEPAE, 1898-1938 M/R PG.19

~~207 4 19 05 01720 155 34 30659 250 0399 000000~~
~~/PEAK 2, 1949 M/R PG.27~~

~~208 1 18 55 24119 155 40 24017 250 0029 000000~~
~~/DESOLATION, 1979 M/R~~

~~209 3 18 55 09977 155 40 16307 139 0005 000000~~
~~/LEVEL MARK 8709A~~

~~210 2 18 56 16533 155 33 44564 139 0000 000000~~
~~/HS 1~~

✓
 ASCII SIGNAL TAPE LISTING
 OPR-T126-RA-79
 HAWAIIAN ISLANDS, HAWAII

FINAL VERSION

101	4	18	54	56579	155	41	04290	250	0003	000000
102	4	18	55	54401	155	39	40293	250	0050	000000
103	4	18	56	46169	155	39	02560	250	0078	000000
104	3	18	53	20955	155	36	18901	250	0003	329647
✓105	1	19	05	16647	155	32	59609	250	0003	000000
✓106	3	19	07	36455	155	30	48106	250	0015	000000
107	1	19	03	26595	155	29	21330	250	0006	000000
108	1	19	16	55404	155	07	27306	250	0010	329647
109	1	19	08	52334	155	28	07433	250	0015	329647
110	1	18	53	23300	155	36	15919	250	0003	000000
111	3	19	08	52345	155	28	07623	250	0015	000000
112	4	18	55	15983	155	41	12404	250	0012	000000
113	2	18	55	25435	155	41	13319	250	0013	000000
114	4	18	57	44421	155	37	52340	250	0045	000000
115	3	19	05	16836	155	32	59853	250	0000	000000
200	4	18	53	13373	155	41	22642	250	0235	000000
201	6	18	56	43150	155	41	13833	250	0000	000000
202	1	18	54	57671	155	41	04143	139	0010	000000
203	6	18	54	54432	155	41	04553	139	0010	000000
204	1	18	56	43366	155	41	13810	139	0000	000000
205	1	18	56	46146	155	39	02311	139	0000	000000
206	4	19	02	16794	155	34	20973	250	0142	000000
207	4	19	05	01720	155	34	30659	250	0309	000000
208	1	18	55	24119	155	40	24017	250	0029	000000
209	3	18	55	09977	155	40	16307	139	0005	000000
210	2	18	56	16538	155	38	44564	139	0000	000000

✓
VELOCITY CORRECTOR TAPE LISTING
OPR-T126-RA-79
HAWAIIAN ISLANDS, HAWAII

TABLE NO.1
SCALE - FATHOMS
FOR SHIP RAINIER (2120) ONLY

000200	0	0010	0001	001	000000	000000
000270	0	0012				
000310	0	0014				
000340	0	0016				
000350	0	0018				
000400	0	0020				
000450	0	0022				
000490	0	0024				
000540	0	0026				
000600	0	0028				
000650	0	0030				
000700	0	0032				
000750	0	0034				
000780	0	0036				
000800	0	0038				
000850	0	0040				
000880	0	0042				
000920	0	0044				
001000	0	0046				
001050	0	0048				
001120	0	0050				
001600	0	0060				
002100	0	0070				
002600	0	0080				
003400	0	0090				
004100	0	0100				
004900	0	0110				
005600	0	0120				
006400	0	0130				
007100	0	0140				
007700	0	0150				
008300	0	0160				
008800	0	0170				
009450	0	0180				
010100	0	0190				
010600	0	0200				
011100	0	0210				
011600	0	0220				
012000	0	0230				
012400	0	0240				
012800	0	0250				
013200	0	0260				
013700	0	0270				
014100	0	0280				

014600 0 0290
015000 0 0300
015400 0 0310
015700 0 0320
016000 0 0330
016350 0 0340
016650 0 0350
017100 0 0360
017400 0 0370
017700 0 0380
018000 0 0390
018300 0 0400
018600 0 0410
018900 0 0420
019200 0 0430
019500 0 0440
019800 0 0450
020100 0 0460
020400 0 0470
020700 0 0480
021000 0 0490
021300 0 0500
021600 0 0510
021850 0 0520
022200 0 0530
022450 0 0540
022700 0 0550
023000 0 0560
023200 0 0570
023500 0 0580
023700 0 0590
024000 0 0600
024200 0 0610
024400 0 0620
024650 0 0630
024900 0 0640
025100 0 0650
025350 0 0660
025600 0 0670
025800 0 0680
026000 0 0690
026300 0 0700
026600 0 0710
026800 0 0720
027000 0 0730
027200 0 0740
027400 0 0750
027600 0 0760
027700 0 0770
028000 0 0780
028250 0 0790
028500 0 0800

028600 0 0810
028850 0 0820
029100 0 0830
029300 0 0840
029500 0 0850
029700 0 0860
029900 0 0870
030100 0 0880
030300 0 0890
030500 0 0900
030700 0 0910
030900 0 0920
031100 0 0930
031300 0 0940
031500 0 0950
031700 0 0960
031900 0 0970
032100 0 0980
032300 0 0990
032500 0 1000
032800 0 1010
999999 0 1020

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

CORRECTIONS IN FEET, FATHOMS

FORM CAGS-117
(11-13)

U.S. DEPARTMENT OF COMMERCE
U.S.A.
COAST AND GEODESIC SURVEY

VELOCITY CORRECTIONS

Ship RAINIER Comdr. W. K. MOBLEY
 These corrections are to be used
 between D 267 1977 and D 340 1977
 in the locality HAWAII
 for hydrographic surveys Nos. 11-9852
11-9853

(For deep water at 0 to these figures

DEPTH IN FATHOMS

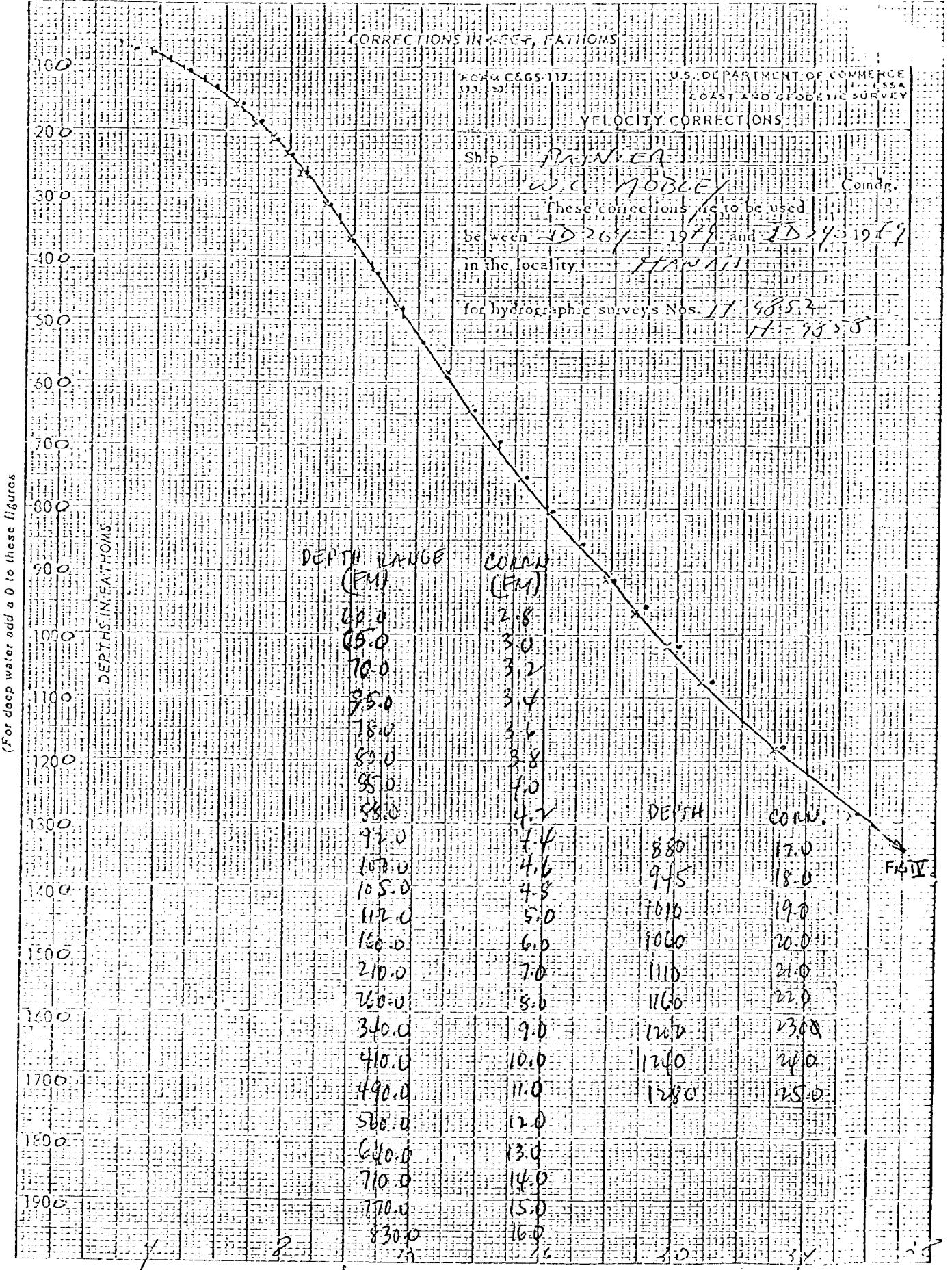
DEPTH RANGE
(FM)

CORRECTIONS
(FM)

0-2.0	0.0
5.0	0.1
8.0	0.2
11.0	0.3
14.0	0.4
17.0	0.5
20.0	0.6
23.0	0.7
26.0	0.8
29.0	1.0
32.0	1.2
35.0	1.4
38.0	1.6
41.0	1.8
44.0	2.0
47.0	2.2
50.0	2.4
54.0	2.6

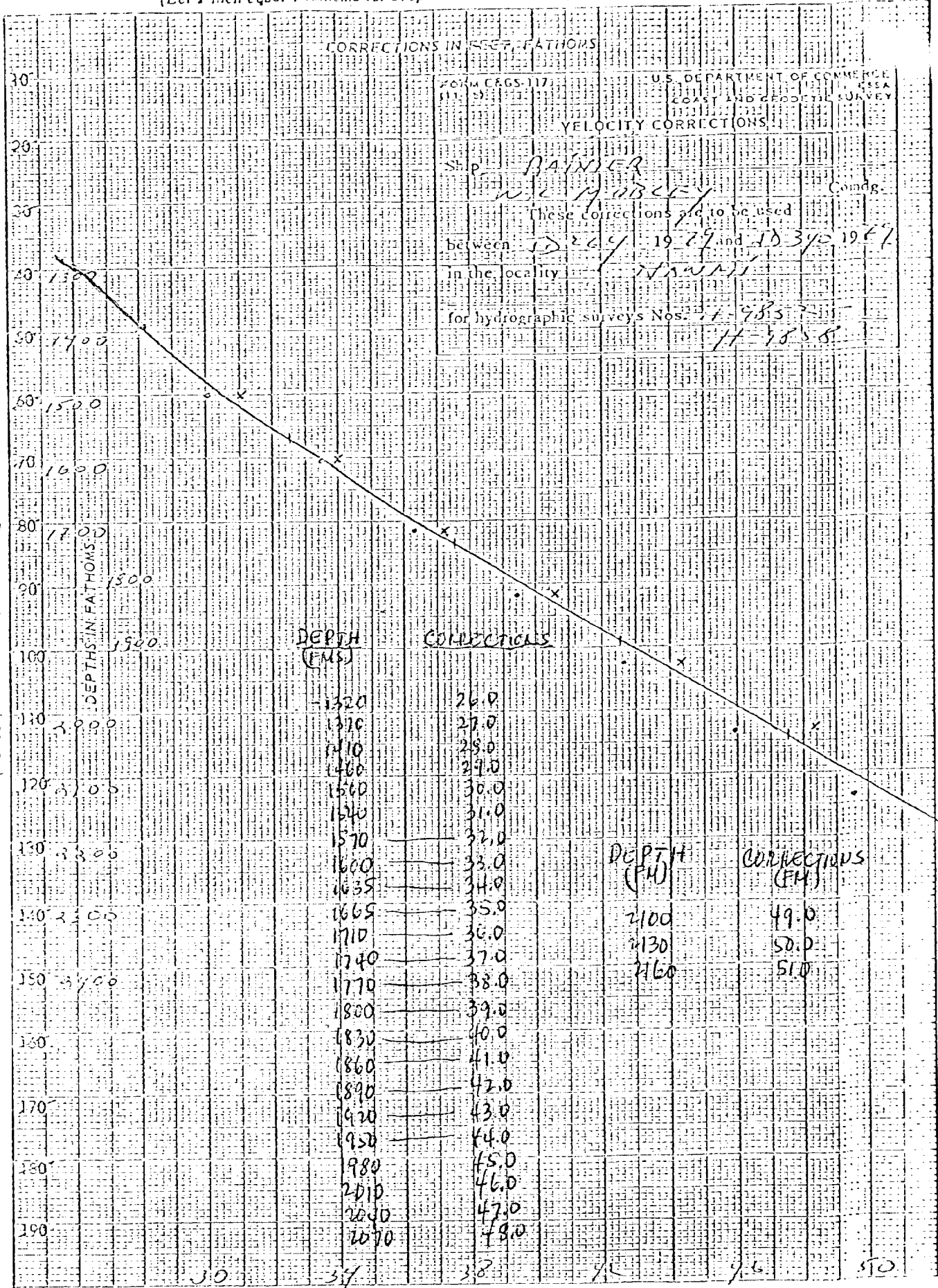
0.4 0.8 1.2 1.6 2.0 2.4

(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.)

(For deep water add a 0 to these figures)



DEPTH (FMS)	CORRECTIONS
1320	26.0
1370	27.0
1410	28.0
1460	29.0
1500	30.0
1540	31.0
1570	32.0
1600	33.0
1635	34.0
1665	35.0
1710	36.0
1740	37.0
1770	38.0
1800	39.0
1830	40.0
1860	41.0
1890	42.0
1920	43.0
1950	44.0
1980	45.0
2010	46.0
2040	47.0
2070	48.0

DEPTH (FM)	CORRECTIONS (FM)
2100	49.0
2130	50.0
2160	51.0

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

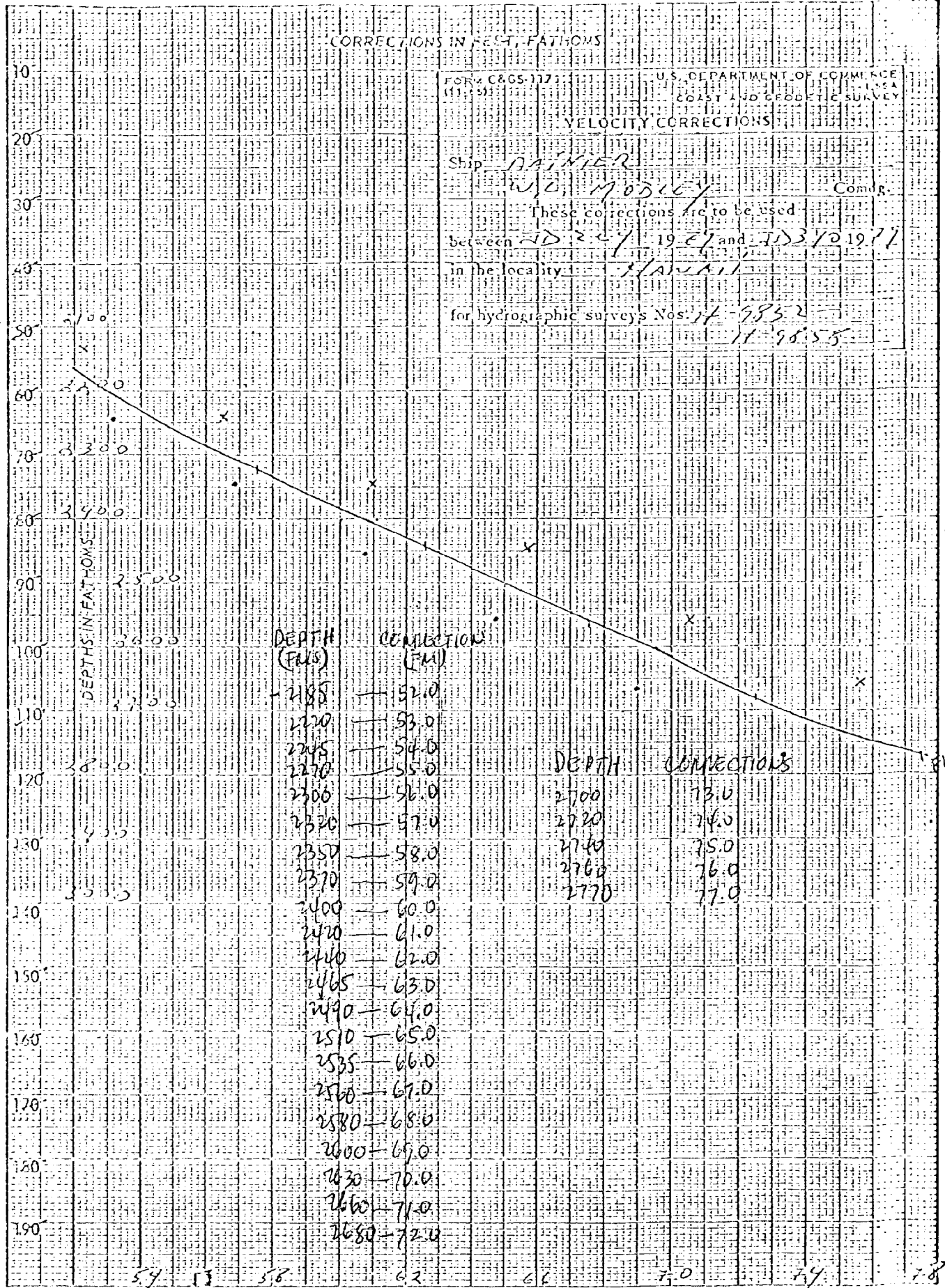


Fig. 11

54 58 62 66 70 74 78

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

CORRECTIONS IN FEET, FATHOMS

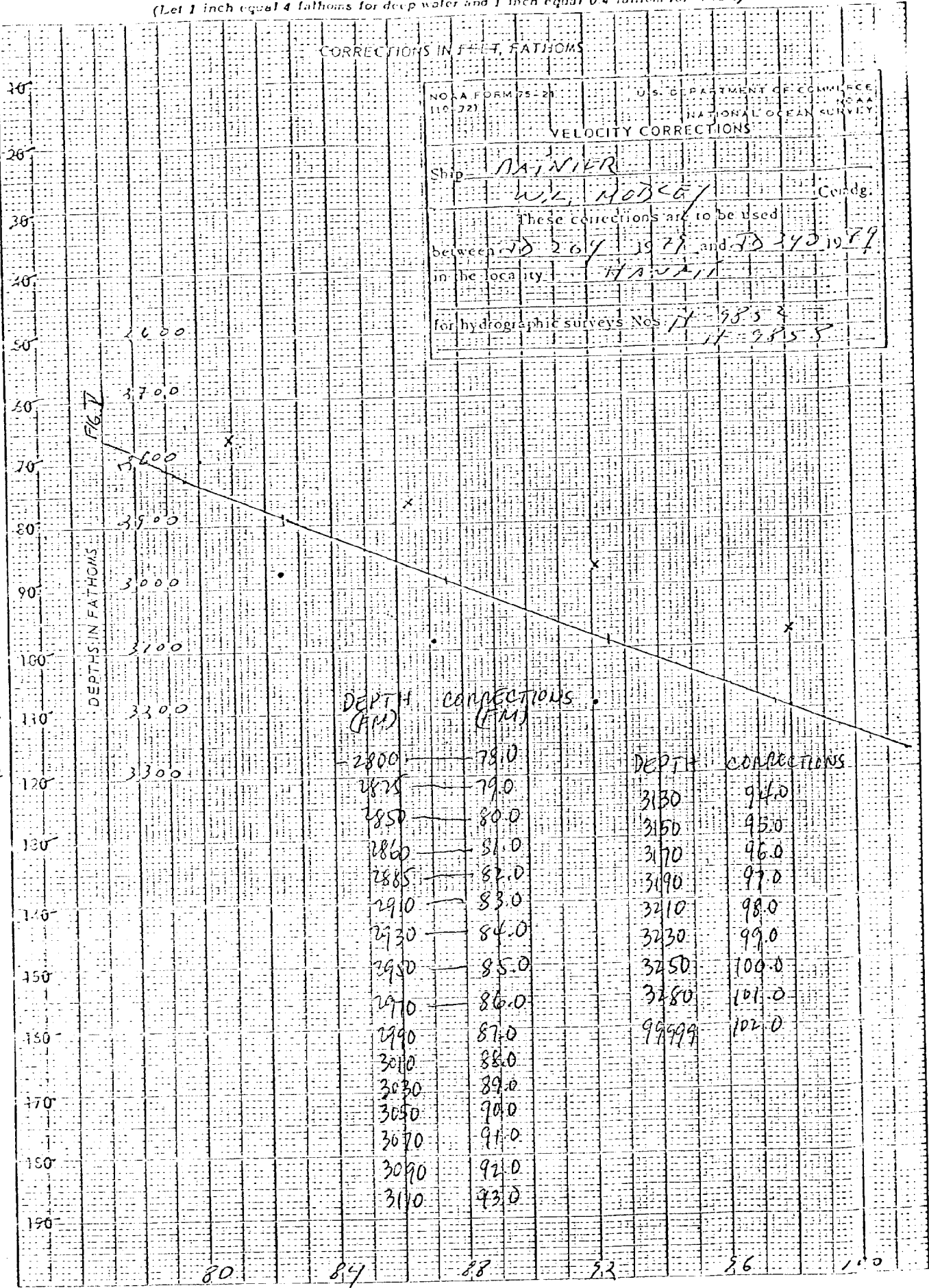
NOAA FORM 75-21 (11-72)
 U.S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship NAI-NIER
 Comdg. W.L. MOSEY

These corrections are to be used
 between JD 267 1978 and JD 343 1979
 in the locality HAWAII
 for hydrographic surveys Nos 11-983 & 11-985

(For deep water add a 0 to these figures)



46 1240

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

✓
FIELD TIDE NOTE

OPR-T126-RA-79

Field tide reduction of soundings for OPR-T126-RA-79 was based on predicted tides from Honolulu, Hawaii, corrected to Honuapo, Hawaii. These predicted tides were interpolated by PDP 8/E computer utilizing AM 500. Due to the small range of tide at Honuapo (mean range 1.7 feet, diurnal range 2.5 feet), tide correctors were applied to soundings only on the smooth copies of field sheets. All times of predicted tides are GMT.

Four Metercraft bubbler tide gages were installed at four locations in the project area. Location and period of operation for each gage are as follows:

<u>SITE</u>	<u>LOCATION</u>	<u>PERIOD</u>
Milolii (161-8431)	19°11.3'N 155°54.5'W	18 Sep - 7 Oct 17 Oct - 28 Nov
Ka Lae East (161-8739)	18°56.4'N 155°38.7'W	19 Sep - 23 Nov 30 Nov - 4 Dec
Honuapo (161-8578)	19°05.3'N 155°33.2'W	21 Sep - 6 Dec
Pohoiki (161-8062)	19°27.6'N 154°50.6'W	20 Oct - 6 Dec 20 Oct - 2 Nov usable
Milolii		

Final field sheet and Smooth Sheet used for sounding reduction.

(In operation during survey but were not used for sounding reduction, on Smooth Sheet. See comments under recommended zoning.)

A 0-10 ft. scale Metercraft gage (S/N 7601-7536-34) was installed 17 September and began operation 18 September. The staff was installed 17 September and leveled 18 September. The gage operated satisfactorily from 18 September to 7 October with two one-day gaps in the marigram on 23 September and 2 October due to ink flow problems. On 7 October, waves from a storm damaged the gage. The gage was replaced with 0-10 ft. scale Metercraft (S/N 7601-7536-31) on 17 October, which operated satisfactorily until removal on 28 October. The staff and orifice were unaffected by the 7 October storm. The last staff observation was on 27 October, and the last 13 hours of tides were inferred from a marginal trace (ink flow problems). Removal levels were run 16 November. The marigram zero line is at 5.7 ft. on the staff. Gage times on the marigram are Zulu. Watch times are local (Zulu - 10 hours) except where noted.

Ka Lae East

A 0-10 ft. scale Metercraft gage (S/N 7601-7536-29) was installed 18 September and began operation 19 September. The staff was installed 18 September and leveled 19 September. The gage operated satisfactorily from 19 September to 23 November with the following exceptions: On 4 and 5 October, the clock wound down and the gage was out of service for about half a day. This happened again on 28 and 29 October, resulting in a one-day gap. On 17 through 21 October, overinking caused bleed through of the tide curve on the marigram paper. On 3 and 4 November, a low nitrogen flow rate caused a one-day gap. On 24 November,

the clock stopped. The gage was restarted again on 30 November and ran satisfactorily until removal on 4 December. However, a stopped clock on 4 December prevented an ending observation for this time period. Removal levels were run 5 December. The marigram zero line equals 0.2 ft. on the staff. All times on the marigram are Zulu unless otherwise noted. The gage was kept on Zulu time.

Honuapo

A 0-10 ft. scale Metercraft gage (S/N 7601-7536-32) was installed and began operation 21 September. The staff was installed 21 September and leveled 22 September. The gage ran satisfactorily until removal on 6 December with one 5-hour gap in data on 28 and 29 October caused by a stopped clock. Removal levels were run 5 December. The gage was kept on Zulu time. All times on the marigram are Zulu unless otherwise noted. The marigram zero line equals 1.1 ft. on the staff.

Pohoiki

A 0-10 ft. scale Metercraft gage (S/N 7601-7536-30) was installed 19 October and began operation 20 October. The staff was installed 19 October and leveled 20 October. The gage ran satisfactorily until removal on 6 December. However, the contract observer's observations are inadequate. He apparently estimated the time without using a watch. Thus, the only usable data from this gage is that from the period covered by shipboard personnel observations, from 20 October to 2 November. Hourly heights are tabulated for this period only. This should be sufficient data to determine sufficiently accurate correctors for Pohoiki. Removal levels were run 6 December. All times on the marigram are local unless noted Zulu. The gage was kept on Zulu time. The marigram zero line equals 3.7 ft. on the staff.

Levels

All levels between marks were within acceptable limits. The levels for all four tide stations indicate no significant staff movements. The following tables show bench mark elevations above staff zero for installation and removal at each tide station.

Milolii (161-8431) BM Elevations (Ft)

<u>BM#</u>	<u>9-18-79</u>	<u>11-16-79</u>	<u>Difference</u>
1	21.293	21.286	-.007
2	15.352	15.312	-.013
3	14.603	14.590	-.013
A	19.744	19.738	-.006
B	19.324	19.321	-.003

Ka Lae East (161-8739) BM Elevations (Ft)

<u>BM#</u>	<u>9-19-79</u>	<u>12-5-79</u>	<u>Difference</u>
A	18.409	18.412	+.003
B	25.732	-	-
C	9.551	9.554	+.003
D	9.951	9.947	-.004
E	9.869	9.869	0

Honuapo (161-8578) BM Elevations (Ft)

<u>BM#</u>	<u>9-22-79</u>	<u>12-5-79</u>	<u>Difference</u>
3	11.381	11.375	-.006
D	9.085	9.081	-.004
E	8.494	8.487	-.007
F	12.188	12.175	-.013
G	9.252	9.239	-.013
H	9.357	-	-

Pohoiki (161-8062) BM Elevations (Ft)

<u>BM#</u>	<u>10-20-79</u>	<u>12-6-79</u>	<u>Difference</u>
A	10.521	10.512	-.009
B	13.034	13.025	-.009
C	12.126	12.126	0
D	14.257	14.252	-.005
E	13.557	13.556	-.001

Recommended Zoning

As differences in times and heights of tides for the various tide stations were small, correctors obtained from Honuapo predicted tides were judged adequate for all smooth field sheets on OPR-T126-RA-79. However, for maximum accuracy, tide correctors could be applied as follows:

<u>Sheet</u>	<u>Tide Station</u>
W	Milolii and Ka Lae East
CC	Ka Lae East
BB	Ka Lae East
DD	Ka Lae East and Honuapo
EE	Ka Lae East and Honuapo
FF	Honuapo
GG	Honuapo

Tide correctors are not considered necessary for the 1:80,000 offshore sheets as the depths on these sheets are all sufficient to make the tide corrector insignificant.

July 3, 1980

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 Form 362

Tide Station Used (NOAA Form 77-12): 161-8578 Honuapo, Hawaii

Period: December 5-6, 1979

HYDROGRAPHIC SHEET: H-9856

OPR: T126

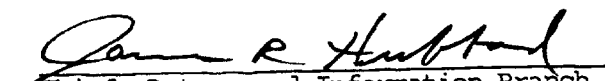
Locality: Off the southeastern coast of Hawaii, HI

Plane of reference (mean lower low water): 3.0 ft.

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

REMARKS: Recommended zoning

- (1) West of 155°10' zone direct.
- (2) East of 155°10' apply - 15 minute time correction.


Chief, Datums and Information Branch

HYDROGRAPHIC TITLE SHEET

H-9856

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-80-2-79

State Hawaii

General locality Island of Hawaii

Locality Offshore Palima Pt. to Cape Kumukahi

Scale 1:80,000 Date of survey Sept. 17 - Nov. 7, 1980

Instructions dated August 4, 1980 Project No. OPR-T126-RA-80

Vessel NOAA Ship RAINIER (2120)

Chief of party CAPT W. L. Mobley

Surveyed by LCDR A. Anderson, LT R. Morris

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

Graphic record scaled by RAINIER Survey Department

Graphic record checked by RAINIER Survey Department

Verification

~~Reviewed~~ by G. E. Kay Automated plot by PMC Xynetics Plotter

Evaluation

~~Verification~~ by B. A. Olmstead

Soundings in fathoms feet at MLW MLLW

REMARKS: This survey completes the work begun on H-9856 by the RAINIER in 1979.

Time Meridian is 0° (GMT)

A. PROJECT

Hydrographic survey RA-~~80-2-80~~^{80 79} (H-9856) is a basic survey conducted in accordance with project instructions OPR-T126-RA-80, Hawaii, Hawaiian Islands, dated August 4, 1980, Change #1, supplement to instructions dated August 8, 1980, Change #2, supplement to instructions, dated August 15, 1980, Change #3, ammendment to instructions, dated September 9, 1980 and Change #4, ammendment to instructions dated November 28, 1980. This survey completes the smooth sheet started on Survey H-9856 by the RAINIER in 1979.

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Change #4 issued after field work completed.

B. AREA SURVEYED

The area of this survey lies off the southeast coast of the Island of Hawaii. The area surveyed is rectangular except where it follows the coast of Hawaii along the northwest side of the survey. The survey area is entirely offshore, extending from the northern limit, 19°27'N, southwest along the coast at approximately the 150 fathom curve about ¼ to ½ mile offshore, to the west limit at 155°16'W, then south to the south limit at 19°06'30"N, east to the east limit at 154°33'W, and north to the north limit. Hydrographic survey operations began on September 17, 1980 (J.D. 261) and were completed on November 7, 1980 (J.D. 312).

✓ See
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Sec 1

C. SURVEY VESSEL

The NOAA Ship RAINIER, S221 (EDP #2120) was used to obtain all soundings, bottom samples and Nansen casts on this survey. No unusual vessel configurations were employed nor were any problems encountered with the sounding vessel.

✓ ✓

D. SOUNDING EQUIPMENT & CORRECTIONS TO ECHO SoudINGS

Echo soundings obtained during OPR-T126-RA-80 were taken by the Ship RAINIER equipped with an EDO Model 248 transceiver, Raytheon UGR (Universal Graphic Recorder) and a Digital Model 261-C Digitizer. The Skeg transducer was used during all ship hydrography (ANDIST= 33.5 m). Table 1 summarizes the serial numbers of the components used in each vessel.

✓ ✓

Table 1

Echo Sounder Component Serial Numbers:

<u>Component</u>	<u>RAINIER (S2120)</u>
Transceiver	202
Analog Recorder	75
Digitizer	204

✓

Correction to Echo Soundings

The following corrections to echo soundings are discussed: sound velocity corrections, draft corrections, settlement and squat corrections, and instrument corrections. Sea and swell corrections were not applied due to the insignificance of the seas versus the depth of water encountered in this project. ✓

Sound Velocity Corrections

Sound velocity corrections for echo soundings were derived from data obtained from 1 Martek TDC and 1 Nansen cast performed in the survey area during this project. The details of these casts are presented in Table II ✓

Table II
Nansen & Martek Cast Data

<u>Cast-Type</u>	<u>Date</u>	<u>Location</u>	<u>Velocity Table No.</u>
Nansen	Sept 20, 1980	Lat 19 ⁰ 14'48" Lon154 ⁰ 43'36"	1 & 2
Martek	Nov 4, 1980	Lat 19 ⁰ 09'42" Lon155 ⁰ 22'42"	Not Used

The samples collected from the Nansen casts were analyzed for salinity using standard laboratory procedures (see H.O. 607). The salinometer used for these analyses was a Industrial Instruments Model RS-7B, S/N 28298, which was last calibrated in April 1980 by Northwest Regional Calibration Center, Bellevue, Washington. The Martek S/N 358 was also calibrated there in February 1980. The Nansen cast was used to compute the sound velocity correction for all surveys in this project. It was compared to the Martek cast to check its accuracy and the stability of the water column. Two separate tables were made: A Deep Water Table for the ship and a shallow water table for the launches. A copy of the velocity corrector tape listing for the ship and deep water (Table 1) is provided in the separates following the text. For more detailed information and raw data records concerning the determination of sound velocity corrections refer to the Correction To Echo Sounding Report for this project (OPR-T126-RA-80). ✓

A comparison of the data collected from NOAA Ship FAIRWEATHER (2020) on November 20, 1980 at latitude 19⁰46'00" North, Longitude 154⁰55'00" West was made. The FAIRWEATHER was working on the Island of Hawaii north of Cape Kumakahi. This comparison indicates a stable water column throughout the area at the time of hydrography.

Draft Corrections for RAINIER (2120)

TRA corrections for Ship RAINIER (2120) were calculated by lead-line comparison. These were done on November 16 and 17, 1980 (J.D. 321 and 322). They were done in calm water, while the ship was anchored in Kealakaiha Bay. The TRA, corrected for velocity of sound was found to be 2.7 fathoms. This verifies the historic data for TRA of the RAINIER. Calculations of the lead-line comparison and the raw data ✓

are contained in the Corrections to Echo Soundings Report for this project.

Settlement and Squat Corrections

Settlement and squat corrections for the ship were not applied as they were insignificant at the depths surveyed. ✓

Sounding Instrument Corrections

Analog depths were substituted for missed digital soundings during on-line or end of day field record scanning. The analog and digital depths compared quite closely during the ship's TRA determination test in shallow water. ✓

Problems did occur with the operating reliability of the digitizer and the legibility of the analog recorder while sounding over steep bottom contours. In some situations both records were unacceptable and had to be rejected. In other areas only one of the two records was reliable. In these situations an educated decision was made as to the correct depth. The analog trace was acceptable over most of the gently sloping areas which comprised most of the survey area. Therefore most of the data was usable. The digitizer however worked poorly most of the time, demanding constant attention, meaning that it was not designed realistically to track over steep bottom contours and it required the constant attention of a very knowledgeable individual to operate it for any period of time under any conditions. ✓

E. HYDROGRAPHIC SHEETS

All hydrographic field sheets including the smooth field sheets were prepared using the PDP 8/e complot system onboard the RAINIER. A modified transverse mercator projection was used for plotting the hydrographic data. The list of parameters used to define the field sheets is included in the separates following this text. This survey is complete on one smooth field sheet with no expansions or insets. ✓

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

F. CONTROL STATIONS

Horizontal control during this project was provided by the recovery of twenty-one existing stations and the establishment of twenty-three new stations. This survey was controlled using a good portion of those marks from Capt³ Kumukahi southeast to Kaena Pt. including a station at South Cape. A copy of the master station list is included in the attachments, and the stations used each day are listed in the raw records. ✓

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The new stations were established using Third Order Class I methods, and were monumented and described. All work was performed on the Old Hawaiian Datum. The new stations between Cape Kumukahi and Kaena Pt. were established by traverse methods. The stations south of there were

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Sec 214

in an arid, isolated area and were located by intersection methods. Helicopters were used extensively for this work.

The details concerning the location and recovery of each station, including the field records and processing computations are located in the Horizontal Control Report for this project. ✓

G. HYDROGRAPHIC POSITION CONTROL

Three types of electronic control were used for survey RA-80-2-⁷⁹80. Raydist and Motorola Miniranger were used for range-range control, and Miniranger was used for range-azimuth control. The wild T-1 and T-2 theodolites were also used to provide azimuths for the range-azimuth control. ✓

Position control for this survey was unusual in that redundant lines of position were taken whenever possible. For the periods when Raydist was used for range-range control, Miniranger range-range data was often logged on a separate logger. Azimuths were also taken where appropriate. Where range-azimuth was the primary control, an additional range was recorded where available. For the periods where Miniranger range-range control was used, no other logs were obtained. The abstract of positions lists the various types of position data collected during the survey. ✓

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When Raydist position control was used, Miniranger range-range fixes were used to verify the Raydist lane count and locate lane jumps. The additional tapes and printouts necessitated by the collection of this extra data are included in the raw data package. ✓

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Sec 2

Description of Shore Stations

During this survey three stations were established and eight stations recovered to be used for electronic control stations. All stations used are Third Order Class I hydrographic control stations. The use of stations for electronic position control is itemized in the following table: ✓

<u>Station #</u>	<u>Raydist</u>			<u>Julian Date</u>
	<u>Station Name</u>	<u>Pattern</u>	<u>Base Station</u>	
101	Kaena Pt. ^{USGS 1977 RM3} R#3	Red	232	261-265, 290 311-312
102	Fix, 1966	Green	233	261-264 311-312
109 ✓	Ka Lae 2, 1948	Green	233	265-290

Miniranger

<u>Station #</u>	<u>Station Name</u>	<u>Code</u>	<u>Transponder S/N</u>	<u>Julian Date</u>
103	Laka, 1980	A	001	261-265
		D	777	311-312
104	Kee, 1980	B	775	261-263
				311-312
105	Hakuma, 1914	C	776	261-262
		B	775	263-265
106	Kupapau, 1914	D	777	261-265
		E	824281	311-312
107	Laeapuki, 1914 USGS 1917RM3	E	824281	261-265
108	Kaena Pt. Rm-3	C	776	263-264
110	Luu, 1930	B	775	290
115 ✓	Kamilo, 1898	A	001	290
123	Finnegan, 1980	A	001	311-312

Shore Station Performance

There were no Miniranger transponder or Raydist base station failures during this survey, and shore station performance was generally good. Miniranger signals were occasionally weakened or lost when high winds along the coast disturbed transponder pointing or actually knocked down the signal to which a transponder was secured, but due to the redundancy of the positioning information collected during survey operations, no time or data were lost. ✓

The Red Raydist shore station (located over Kaena Point Rm3) performed very well during the survey. The Green base station (located over Station Fix) appeared to operate well but produced a much weaker signal at the ship. The ship was generally much farther from the Green base station than from Red, contributing to the problem, but Green lane jumps and weak signals occurred predominantly in a particular swath across the survey area, indicating a possible land path or object interference problem with the Green station location. The Green base station performed quite well later in the project when moved to a different location for another survey. ✓

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Sec 2

Mobile Station Performance

All survey operations were accomplished using the NOAA Ship RAINIER (2120) with Miniranger console number 715 and R/T unit number 713302. The shipboard Raydist equipment was as follows: Transmitter #36, Navigator #108, Lane Follower #S 2599 & 11462, Panalogic #35. ✓

Miniranger signal strengths varied considerably over the survey area as the system ranges and antenna coverages were pushed to their limit. Where Miniranger was used for position control, signal strengths were above the cutoff values and ranges were steady. ✓

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Sec 2

Raydist performance was fair, with the Red base station showing a strong signal and tracking well. The Green signal, generally more distant from the ship, was usually weaker and suffered frequent lane jumps. ✓

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except when it was located at Ka Lae. The Green signal was captured by the Red on one occasion when the ship approached too close to the Red station. Hydrography for this period was rejected. Frequent comparison of Miniranger data to Raydist data while on line and the simultaneous logging of Miniranger range-range information enabled the hydrographer to monitor Raydist performance and locate Raydist lane jumps.

Description of the Baseline Calibrations

Two Miniranger base line calibrations were performed during OPR-T126-RA-80. Both took place at Hilo Municipal Airport. The first was on JD 248 and the second on JD 329. ✓

The initial calibration determined initial correctors and the low signal strength cut off values for each Miniranger console, R/T unit and transponder combination. The ending correctors from the second calibration were meaned with the initial correctors to determine the final correctors used to plot the smooth field sheet. This smooth field sheet was mistakenly plotted with the Miniranger correctors having the wrong signs. The sheet was not replotted because the resulting error is insignificant at the scale of the survey. All field data contains accurate correctors. ✓

The details of these calibrations and the raw data and graphs are included in the Electronic Control Report for this project. ✓

Description of Daily Calibrations

Visual sextant fixes were used to verify Miniranger operation during the survey. Raydist was calibrated by both visual sextant fixes and Miniranger range-range fixes. When Miniranger was used to calibrate the Raydist, care was taken to assure that Miniranger signal strengths were well above the cut off values and that Miniranger intersection angles were approximately 90°. ✓

Signals for visual fixes were located over Third Order Class I or better stations. Each calibration consisted of at least three visual fixes or at least five Miniranger fixes. In addition to the Raydist calibrations before and after each period of data collection, Miniranger range-range data was logged continuously or recorded frequently during Raydist controlled data collection, to allow monitoring of the Raydist lane count. ✓

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Sec 2

H. SHORELINE

There is no shoreline on this survey. The shoreline in the vicinity of this survey can be found on 1:20,000 scale contemporary survey RA-20-5-80 (H-9916), RA-20-6-80 (H-9917) and RA-20-7-80 (H9918), with which this survey junctions. H-9914 (RA-20-4-80) is also an inshore junctional sheet with shoreline information. ✓

I. CROSSLINES

Crosslines on this survey total 91 nautical miles or 24% of the mainscheme sounding lines. Eighty-three crossings were compared, in depths ranging from about 450 fathoms to about 2600 fathoms. All crossings were very good with 90% agreeing within 1% of the depth, and about 80% agreeing within 0.05% of the depth. It is difficult to make a comparison of crossings in the four-hundred to six-hundred fathom range near shore because the bottom is very steep in this area and crossing soundings are not exactly coincident. Even here, though agreement was within about 2% of the depth. The fathometer beam width and side echoes obtained ✓

off the steeply sloping bottom in this area coupled with the non coincident sounding locations probably attributed to this less precise agreement of crossings.

J. JUNCTIONS

The following statistics should be viewed with the understanding that no sounding pairs compared were exactly coincident and that this alone can generate significant differences that bias the overall comparison. ✓

This survey junctions with eight contemporary surveys, including RA-80-2A-79 (H-9856), the first half of this smooth sheet, surveyed by the RAINIER in 1979. A junction comparison was made with this year's work in spite of the fact that both year's work has the same registry number and will make up the same smooth sheet. ✓

The junction with H-9856 (RA-80-1A-79) is along the west edge of this survey. This survey overlaps RA-80-2A-79 by about 8 miles to develop steeply sloped areas of irregular topography found on the first field sheet. Thirty-six junctioning sounding pairs were compared in depths of 130 to 1150 fathoms. All agree within 1% of the depth except one which agrees within 2%. ✓

This survey junctions along its south border with 1:80,000 survey H-9855 (RA-30-3B-79), with approximately a 2.5 mile overlap. Only eight sounding pairs were near enough to coincidence to allow depth comparison. All agreed very well within less than 1% of the depth. There was also good agreement of the general trend of the contours on both surveys. ✓

This survey junctions at its southwest corner with 1:80,000 scale survey H-9858 (RA-80-1A-79), with overlap in a 3 by 8 mile area. Thirty sounding pairs were compared with all showing good agreement, agreeing within 1% of the depth. In the steep areas adjacent soundings of different depths appear to disagree, but allowing for the steep slope of the bottom and the non-coincidence of the soundings shows the soundings to be in good agreement. Depth contours also agreed very well. ✓

This survey junctions along its northwest side with 1:20,000 scale H-9916 (RA-20-5-80), with fair agreement. H-9916 fills the gap between part of this survey and the shoreline. The junction overlap is slight and generally in areas of very steeply sloping bottom. Of ten comparisons, only two agreed within 1% of the depth. Half agreed within 3%, and the worst disagreement was eleven percent. Agreement was better in areas which were less steep. Soundings from this survey were always shoaler than those of H-9916 except in one instance where the soundings were not coincident. This disagreement can be attributed in part to the difference in fathometer transducer beam widths between the ship and the launches. All sounding on H-9916 were collected by the RAINIER's hydrographic launches using ✓

Ross depth sounding equipment and transducers having a 7.5° beam width. The ship's transducer beam width, nominally 35°, may be considerably wider in these shallow depths (130 to 200 fathoms) where these surveys junction. Echoes picked up by the ship from the side of the transducer beam in the steeply sloped areas can account for the observed junction disagreement. It is suggested the launch work be allowed to govern in areas of overlap, as the launch obtained depths should be more accurate. ✓

This survey junctions along its northwest side with H-9917 (RA-20-6-80), a 1:20,000 scale survey which continues along the coast north of H-9916. Five sounding pairs were compared with fair agreement. As with H-9916, the H-9917 soundings are deeper by 0 to 16% in depths from 115 to 180 fathoms. This is attributable to transducer beam width differences. See the discussion for the junction with H-9916. ✓

H-9918 (RA-20-7-80) is the third RAINIER 1"20,000 scale survey completing the area between H-9856 and the shore to the northwest. As in the previous two surveys, the junction with H-9918 is a slight overlap in steeply sloped areas of 100 to 190 fathoms depth. Of the five sounding pairs compared, the H-9856 soundings are shoaler by 4% to 11%. This is attributable to the differences in ship and launch transducer beam widths. See the discussion for the junction with H-9916. ✓

This survey junctions along its north edge with H-8991 (AR-30-1-68), a 1:30,000 scale survey. The overlap is up to three miles. Of the 15 sounding pairs compared, 73% agreed with 1% of the depth, with the remainder disagreeing by up to 5%. Lack of direct sounding overlap and the steep and irregular bottom can account for the few discrepancies. Contour agreement was good. ✓

This survey junctions along its north edge with 1:30,000 scale survey H-8992 (AR-30-2-68) with good agreement. Of 13 sounding pairs compared, all agreed within 1% of the depth except two which were within 2%. Contour agreement was good. ✓

K. COMPARISON WITH PRIOR SURVEYS

The only known prior survey in this area is H-4655a Rec, an April 1927 1:250,000 scale reconnaissance single trackline survey. Fifteen comparisons were made. Soundings did not exactly overlap and the bottom is steep so comparison was difficult. 25% of the comparisons agreed within 1% of the depth with the remaining 75% disagreeing by as much as 30%. The prior survey is of questionable accuracy and value. It is suggested ~~this~~ ^{that the present} survey supersede the prior survey for charting. ✓

There were no presurvey review items in the area of this survey. However, several significant shoaler soundings from prior data warrant further discussion. ✓

L. COMPARISON WITH THE CHART

This survey was compared with chart 19320, 12th edition, June 17, 1978. ✓ There are numerous differences between this survey and the chart. A comparison with chart 19004 28th Edition, June 7, 1980 was not made. ✓

See
Verification
Report
Sec 7

See
Verification
Report
Sec 7

Ninety-seven sounding pairs were compared with 32% agreeing within 1% of the depth. Seventy-six agreed within 10% of the depth with the remaining comparisons disagreeing by up to 38%. In 86% of the disagreement, the charted depth was shoaler. Compared depths on the survey range from 155 to 2550 fathoms. ✓

The charted 100 fathom curve falls between 130 and 400 fathoms on this survey. It is recommended that junctioning contemporary surveys H-9916, H-9917 and H9918 be used to accurately relocate this curve on the chart. ✓

The charted 1000 fathom curve ^{falls} ~~fell~~ between ¹¹²⁵ ~~125~~ and 1200 fathom on this survey, generally near 1100 fathoms. ✓

The charted seamount at $19^{\circ} 11.7'$ north, $154^{\circ} 40.5'$ west was developed by a series of radial lines on this survey. A depth of 1910 fathoms, compared to the charted 1913, was obtained. However, the charted peak is one mile northeast of the peak as determined by this survey. ✓

See
Verification
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Sec 7

The charted 910 fathom peak at $19^{\circ} 18.7'$ north, $154^{\circ} 51.0'$ west was developed by a series of north-south and east-west lines at 1000 meter spacing for the east-west lines and 1500 meter spacing for the north-south lines. The least depth obtained was about 1300 fathoms. No evidence of a peak was seen. However, due to lane jumps in the position control equipment (see paragraph P), the development lines were displaced somewhat and no sounding line fell over the charted peak. This peak was not disproved, but its existence is doubtful. The hydrographic source for this peak is not known and should be investigated. ✓

See
Verification
Report
Sec 7

See OC

It is recommended that this survey supersede the chart for future charting in this area. ✓

M. ADEQUACY OF SURVEY

This survey is complete and adequate to supersede prior surveys for charting. ✓

N. AIDS TO NAVIGATION

There are no fixed or floating aids, bridges, overhead or submarine cables in the area of this survey.

See
Verification
Report
Sec 7

O. STATISTICS

This survey contains 725 positions with 534.5 nautical miles of hydrography covering 667 square nautical miles. Mainscheme mileage was 374.5, crossline totaled 91.0 and developments totaled 69.0. Four bottom samples were taken in the survey area. Two tide gages were operated in the vicinity, at Honuapo and Pohoiki, during this survey, and one Nansen cast was taken during the survey at $19^{\circ} 14' 48''$ north, $154^{\circ} 43' 36''$ west on September 20, 1980. For additional information on tides, see the attached field tide note. Refer to the Corrections to Echo Soundings Report, OPR-T126-RA-80 for further information on the Nansen cast. ✓

P. MISCELLANEOUS

Several factors influenced position control on this survey. First, the wrong geographic position was used for Station Kaena Point RM3 during the first part of data collection. This station was the location of the Red Raydist Base Station and Miniranger Code "C". The incorrect G.P. (The G.P. for Kaena Point Triangulation Station) was used for data collected through day 263. This caused an error in the steering while on line, which caused the sounding lines to bend in the vicinity of the Red Station. This error coupled with the fact that many lane jumps occurred in the Raydist Control while on line, caused a shift in the plotted positions of some of the sounding lines when these lines were replotted using the correct position for Kaena Point RM3 and the correct lane count. ✓

Due to the above errors, the allowable sounding line spacing was exceeded by varying amounts in several areas. These are as follows:

<u>Approx. Position</u>	<u>Allowable Spacing</u>	<u>Actual Spacing</u>
19°07'N, 155°03'W	3200m	3600m
19°14'N, 155°07'W	3200m	3800m
19°16'N, 154°55'W	3200m	3700m
19°18'N, 154°58'W	3200m	3500m
19°18'N, 154°55'W	3200m	4400m
19°22'N, 154°51'W	3200m	4400m
19°16'N, 155°07'W	1600m	1800m
19°26'N, 154°52'W	1600m	1900m

These gaps between sounding lines were not noticed until the lines were replotted using the correct G.P.'s and lane count after data collection. It was determined that, due to the depth and the lack of indications of any significant features in the areas in question, these gaps do not seriously affect the completeness of this survey for charting purposes. ✓

A development in the area of 19°10'N and 155°10'W was the result of a reported (by local fisherman) shoal area that came up to approximately 100 fathoms. No such shoal was found and it is doubtful that any exists in this area. ✓

Although the ship's TRA corrector was measured to be 2.7 fathoms (see paragraph D), a corrector of 2.6 fathoms was used to plot all field sheets. Due to the range of depths on this survey (none shoaler than 100 fathoms) this error is insignificant and has not been corrected. ✓

The sounding lines run on J.D. 290 (fixes 1617-1648) were run to densify the line spacing in an area whose depths were close to the point at which the required spacing jumps from 1600 to 3200 meters. Some of the inshore ends of these lines lie within the 30° intersection limit prescribed by the Hydro Manual. However, the Raydist signal on this day was very strong and steady. As a result it is felt that the position fixes are strong enough for the data to be plotted at the scale of this survey. Anything that was determined to be unreliable has already been rejected. ✓

Q. RECOMMENDATIONS

This survey is considered complete and adequate for charting. It is recommended that this survey supersede all prior surveys for charting.

See
Verification
Report
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R. AUTOMATED DATA PROCESSING

Data acquisition and processing were accomplished per instructions in the Hydrographic Manual (4th Edition), Manual Automated Hydrographic Surveys and the PMC OORDER.

✓

Soundings and positions were taken by a Hydroplot system using range-azimuth program FA181 and range-range program RK111. There are daily master tapes and corresponding corrector tapes which include the TRA for the ship, electronic control calibration for Raydist and baseline correctors for M/R Consoles and R/T units 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 Programs</u>	<u>Version Dates</u>
RK111 RANGE-RANGE REAL TIME PLOT	01/30/76
FA181 RANGE-AZIMUTH LOGGER	02/23/78
RK201 GRID, SIGNAL AND LATTICE PLOT	04/18/75
RK211 RANGE-RANGE NON-REAL TIME PLOT	
RK212 VISUAL STATION TABLE LOAD	04/01/74
RK216 RANGE-AZIMUTH NON-REAL TIME PLOT	02/05/76
RK300 UTILITY COMPUTATIONS	02/05/76
RK330 REFORMAT AND DATA CHECK	05/04/76
PM360 ELECTRONIC CORRECTOR ABSTRACT	02/02/76
AM500 PREDICTED TIDE GENERATOR	11/10/72
RK530 LAYER CORRECTIONS FOR VELOCITY	05/10/76
RK561 GEODETIC H/R CALIBRATION	02/19/75
AM602 ELINORE-LINE ORIENTED EDITOR	05/20/75
AM603 TAPE CONSOLIDATOR	10/10/72
RK606 TAPE DUPLICATOR	08/22/74

✓

The HP97 and HP9815 calculators were used to compute geographic positions of electronic control stations and visual signals for calibration.

S. REFERRAL TO REPORTS

The following reports contain information related to this survey:

- HORIZONTAL CONTROL REPORT, OPR-T126-RA-80
- ELECTRONIC CONTROL REPORT, OPR-T126-RA-80
- CORRECTIONS TO ECHO SOUNDINGS, OPR-T126-RA-80
- FIELD TIDE NOTE, OPR-T126-RA-80

✓

Respectfully Submitted,
Roger A. Morris
Roger A. Morris
Lieutenant, NOAA

Approved and Forwarded,
Wayne L. Mobley
Wayne L. Mobley
Captain, NOAA
Commanding

✓
APPROVAL SHEET

DESCRIPTIVE REPORT TO ACCOMPANY

HYDROGRAPHIC SURVEY

H-9856

~~RA-80-2-80~~

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 accompanying records have been examined and are complete and adequate for charting purposes and are approved.

Wayne L. Mobley
Wayne L. Mobley
Captain NOAA

MASTER STATION LIST
 OPR-T126-RA-80
 HAWAIIAN ISLANDS, HAWAII

✓
 FINAL VERSION

101	1	19	16	55404	155	07	27806	250	0000	329649	
/KAENA PT. RM 3 RED RAYDIST STATION RA-79 ✓ ✓											
POINT USGS, 1977 RM 3											
102	1	19	31	09221	154	48	47412	250	0000	329649	
/FIX, 1966-1980 GREEN RAYDIST STATION RA-80 ✓ ✓											
103	1	19	27	12889	154	51	03305	250	0000	000000	
/LAKA, 1980 RA-80 ✓											
104	1	19	24	06000	154	55	18553	250	0000	000000	
/KEE, 1980 RA-80 ✓ ✓											
105	1	19	20	56109	154	58	54856	250	0000	000000	
/HAKUMA, 1914 G-16241 ✓ ✓											
106	1	19	19	54935	155	01	10910	250	0000	000000	
/KUPAPAU, 1914 G-16241 ✓ ✓											
107	1	19	18	09600	155	05	22586	250	0000	000000	
/LAEAPUKI, 1914 G-16241 ✓											
108	3	19	16	55404	155	07	27806	250	0000	000000	
/KAENA PT 1977 RM 3 M/R RA-79 ✓											
POINT USGS,											
109	1	18	54	56570	155	41	04290	250	0000	329649	
/KA LAE 2, 1948-1949 GREEN RAYDIST PG.27 G-09279 ✓											
110	1	19	07	36455	155	30	48106	250	0000	000000	
/LUU, 1930 PG.67 G-446 ✓											
111	1	19	09	10376	155	30	49687	250	0000	000000	
/PUNALUU, 1949 G-09279											
112	1	19	08	52349	155	28	07649	250	0000	000000	
/KAMEHAME NEW HTS 1949 G-09279											
113	1	19	12	24452	155	26	00452	250	0000	000000	
/PUU ULAULA HTS, 1914 G-09279											
114	1	19	08	26595	155	29	21880	250	0000	000000	
/PUN, 1930 PG.67 G-446											
115	1	19	08	53389	155	27	44321	250	0000	000000	
/ALFA, 1980 RA-80 ✓											
116	1	19	09	19447	155	26	56863	250	0000	000000	
/BRAVO, 1980 RA-80											

117	1	19	10	14477	155	25	57639	250	0000	000000	
/CHARLIE, 1980											
118	1	19	12	28051	155	21	55840	250	0000	000000	
/DELTA, 1980											
119	1	19	14	47650	155	19	06795	250	0000	000000	
/ECHO, 1980											
120	1	19	15	32967	155	11	41090	250	0000	000000	
/FOXTROT, 1980											
121	1	19	17	40026	155	18	57509	250	0000	000000	
/HALIMA AZI, 1980											
122	1	19	17	51107	155	18	36324	250	0000	000000	
/HILINA RESET 1975 1980											
123	1	19	19	05904	155	09	51023	250	0000	000000	✓
/FINNEGAN, 1980 RA-80											
124	1	19	16	43355	155	15	44461	250	0000	000000	✓
/PUU KAPUKAPU, 1914 G-16241											
125	1	19	10	14231	155	25	57295	254	0000	000000	
/CHARLIE, 1980 ECC. RA-80											
126	1	19	16	34120	155	08	01502	250	0000	000000	
/GOLF, 1980 RA-80											
127	1	19	15	35165	155	11	40018	254	0000	000000	
/FOXTROT ECC. 1980 RA-80											
128	1	19	17	06042	155	07	10580	254	0000	000000	
/KASNA AID, 1980 RA-80											
129	1	19	19	00739	155	03	42583	250	0000	000000	
/KASNA, 1980 RA-80											
130	1	19	19	37783	155	01	52960	250	0000	000000	✓
/WAIKOLA, 1980 RA-80											
131	1	19	21	01936	154	58	45999	250	0000	000000	
/PANA, 1980 RA-80											
132	1	19	22	31420	154	57	12839	250	0000	000000	
/MOANA HAAAE USGS, 1978 G-16241											
133	1	19	25	06205	154	53	32829	250	0000	000000	
/KALUPO, 1980 RA-80											
134	1	19	26	21328	154	52	02887	250	0000	000000	
/MAI, 1980 RA-80											

~~135 1 19 27 49995 154 50 20735 250 0000 000000
/HULA, 1980 RA-80~~

~~136 1 19 28 29295 154 49 45134 250 0000 000000
/HAL, 1980 RA-80~~

~~137 1 19 22 49224 154 56 43746 250 0000 000000
/KIKA, 1980 RA-80~~

~~138 1 19 23 21490 154 56 09086 250 0000 000000
/WAIPUKU, 1980 RA-80~~

~~139 1 19 25 43275 154 52 53989 250 0000 000000
/OPIHI, 1980 RA-80~~

~~140 1 19 30 01441 154 50 31048 250 0000 000000
/KAPONO HGS, 1896 G-16241~~

141 1 19 27 37580 154 50 43442 250 0000 000000
/POHOIKI BAY BREAKWATER LIGHT 2, 1980 RA-80

200 1 19 31 09621 154 48 49076 139 0000 000000
/CAPE KUMAKAHI LIGHTHOUSE, 1949 RA-80

~~201 1 18 55 24119 155 40 24017 139 0000 000000
/DESOLATION, 1979 RA-79~~

202 1 18 54 54432 155 41 04553 139 0000 000000
/KA LAE LIGHT, 1948-18 G-16108

off sheet

~~203 1 19 27 37932 154 50 42526 139 0000 000000
/NOS BENCHMARK 161-3062 E 1979 RA-80~~

RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	LTJG DAVID KRUTH
POSITIONS DETERMINED AND/OR VERIFIED	LTJG DAVID KRUTH
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	

ORIGINATOR
 PHOTO FIELD PARTY
 HYDROGRAPHIC PARTY
 GEODETIC PARTY
 OTHER (Specify)

FIELD ACTIVITY REPRESENTATIVE

OFFICE ACTIVITY REPRESENTATIVE

REVIEWER
 QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'
 (Consult Photogrammetric Instructions No. 64.)

OFFICE	FIELD (Cont'd)
<p>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</p>	<p>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</p>
<p>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</p> <p>A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75</p> <p>*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.</p>	<p>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</p> <p>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75</p> <p>**PHOTOGAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.</p>

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

Ship RAINIER

STATE

HAWAII

LOCALITY

Hawaii Island
Southeast Coast

DATE

Oct. 1980

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

LANDMARKS FOR CHARTS

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)*

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.

JOB NUMBER

OPR-T126-RA-80

SURVEY NUMBER

H-9856

DATUM

Old Hawaiian

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

OFFICE

FIELD

LATITUDE

LONGITUDE

D.M. METERS

D.P. METERS

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

See 1980 work for H-9913, 9914, 9916, 9917, 9918. See also 1979 work for H-9856.

CHARTING NAME

CHARTS AFFECTED

RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	LTJG DAVID KRUTH
POSITIONS DETERMINED AND/OR VERIFIED	LTJG DAVID KRUTH
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	<input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
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 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.

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)
 Ship RAINIER

STATE
 HAWAII

LOCALITY
 Hawaii Island
 Southeast Coast

DATE
 Oct. 1980

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

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)

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.

JOB NUMBER

SURVEY NUMBER

DATUM

DATE

OPR-T126-RA-80

H-9856

Old Hawaiian

Old Hawaiian

DATE

CHARTING NAME

DESCRIPTION
 (Record reason for deletion of landmark or aid to navigation.
 Show triangulation station names, where applicable, in parentheses)
 See 1980 work for H-9913, 9914, 9916,
 9917, 9918. See also 1979 work for H-9856.

LATITUDE
 // /
 D.M. Meters

LONGITUDE
 // /
 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	LTJG DAVID KRUTH
POSITIONS DETERMINED AND/OR VERIFIED	LTJG DAVID KRUTH
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	
<p align="center">INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' (Consult Photogrammetric Instructions No. 64,</p>	
<p>OFFICE</p> <p>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</p> <p>FIELD</p> <p>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</p> <p>A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75</p> <p>*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.</p>	<p>FIELD (Cont'd)</p> <p>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</p> <p>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</p> <p>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75</p> <p>**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.</p>
<p>ORIGINATOR</p> <p><input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)</p> <p>FIELD ACTIVITY REPRESENTATIVE</p> <p>OFFICE ACTIVITY REPRESENTATIVE</p> <p><input type="checkbox"/> REVIEWER <input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE</p>	

✓
VELOCITY CORRECTOR LISTING

OPR-T126-RA-80

S-T114-RA-80

S-T101-RA-81

TABLE NO. 1 (SCALE-FATHOMS)

000790	0	0040	0001	001	212000	000000
000910	0	0045				
001030	0	0050				
001400	0	0060				
001830	0	0070				
002050	0	0080				
002760	0	0090				
003750	0	0100				
004400	0	0110				
005000	0	0120				
005600	0	0130				
006250	0	0140				
006850	0	0150				
007750	0	0160				
008050	0	0170				
008700	0	0180				
009360	0	0190				
009850	0	0200				
010450	0	0210				
010950	0	0220				
011500	0	0230				
011950	0	0240				
012400	0	0250				
012850	0	0260				
013250	0	0270				
013650	0	0280				
014050	0	0290				
014400	0	0300				
014750	0	0310				
015100	0	0320				
015450	0	0330				
015700	0	0340				
016300	0	0350				
016420	0	0360				
016740	0	0370				
017050	0	0380				
017350	0	0390				
017620	0	0400				
017800	0	0410				
018130	0	0420				
018480	0	0430				
018650	0	0440				
019000	0	0450				
019170	0	0460				
019500	0	0470				
019750	0	0480				
020000	0	0490				

TAELE NO.1 (CONTINUED)

020250 0 0500
 020750 0 0520
 021000 0 0530
 021250 0 0540
 021500 0 0550
 021700 0 0560
 022000 0 0570
 022250 0 0580
 022500 0 0590
 022700 0 0600
 022820 0 0610
 023150 0 0620
 023380 0 0630
 023550 0 0640
 023800 0 0650
 024000 0 0660
 024250 0 0670
 024450 0 0680
 024650 0 0690
 024850 0 0700
 025000 0 0710
 025200 0 0720
 025500 0 0730
 025650 0 0740
 025800 0 0750
 025950 0 0760
 026200 0 0770
 026550 0 0780
 026650 0 0790
 026750 0 0800
 026900 0 0810
 027100 0 0820
 027220 0 0830
 027450 0 0840
 027650 0 0850
 027800 0 0860
 028000 0 0870
 028150 0 0880
 028350 0 0890
 028450 0 0900
 028650 0 0910
 028850 0 0920
 029000 0 0930
 029150 0 0940
 029350 0 0950
 029500 0 0960
 029650 0 0970
 029850 0 0980
 030000 0 0990
 030150 0 1000
 030300 0 1010
 030450 0 1020
 030600 0 1030
 030750 0 1040
 030900 0 1050
 031050 0 1060
 999999 0 1070

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

CORRECTIONS IN FEET, FATHOMS

NOAA FORM 75-21
(10-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEAN SURVEY

TRA
VELOCITY CORRECTIONS

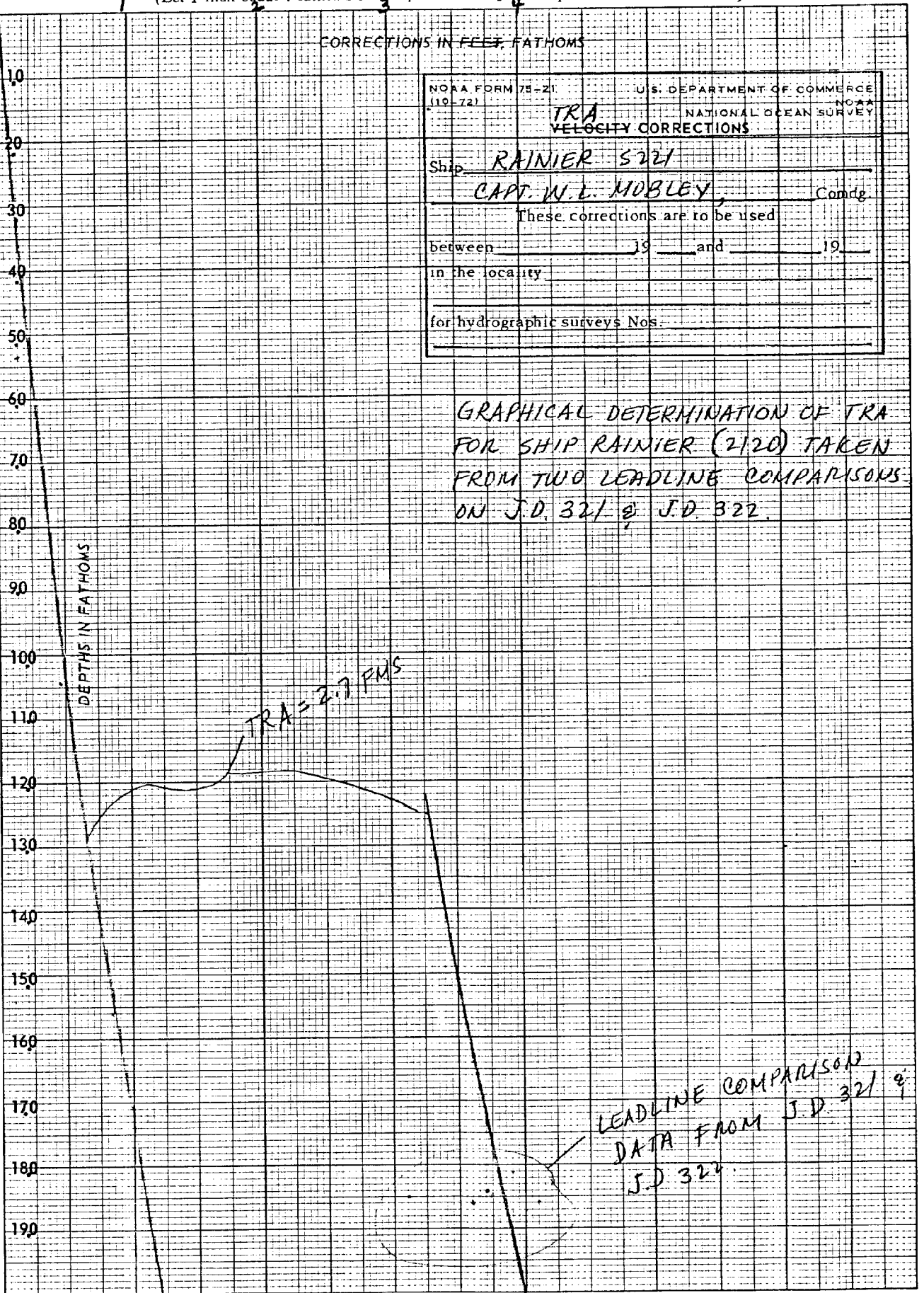
Ship RAINIER 521

CAPT. W.L. MOBLEY, Comdg.

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

GRAPHICAL DETERMINATION OF TRA
FOR SHIP RAINIER (2120) TAKEN
FROM TWO LEADLINE COMPARISONS
ON J.D. 321 & J.D. 322.

(For deep water add a 0 to these figures)



46 1240

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

✓
FIELD TIDE NOTE
OPR-T126-RA-80

Field tide reduction of soundings for OPR-T126-RA-80 was based on predicted tides from Honolulu, Hawaii, corrected to Honuapo, Hawaii. These predicted tides were interpolated by PDP 8/e computer utilizing AM 500. Due to the small range of tide at Honuapo (mean range 1.7 feet, diurnal range 2.5 feet), tide correctors were applied to soundings only on the smooth copies of field sheets. All times of predicted tides are GMT.

Metercraft bubbler tide gages were installed at two locations in the project area. Their location and time of operation are as follows:

<u>SITE</u>	<u>LOCATION</u>	<u>PERIOD</u>
Honuapo (161-8578) (Used for reduction of soundings on Final Field sheet and smooth sheet)	19°05.3'N 155°33.2'W	6 Sep - 25 Nov
Pohoiki (161-8062) (In operation during Survey but not used for sounding reduction on smooth sheet.)	19°27.6'N 154°50.6'W	6 Sep - 25 Nov
<u>Honuapo</u>		

A 0-10 feet scale Metercraft gage (S/N 7601-7536-31) was installed and began operation 7 September. The staff was installed and leveled on 7 September also. The time meridian was 000° for this gage. The gage performed well through the project except that the clock/paper drive stopped at 0300 Z November 21; it was restarted 1927 Z November 21, resulting in a two-thirds of a day loss of data. The gage ran out of nitrogen on November 24 about 0900 Z and was leveled on November 21. The gage was removed November 25. There were no unusual tides during the period of operation of this gage. Zero on the marigram equals 16.31 feet on the tide staff.

Pohoiki

A 0-10 feet scale Metercraft gage (S/N 7601-7536-29) was installed and began operation 6 September. The staff was installed on 6 September and the leveling done on 5-6 September. The time meridian was 000° for this gage. There were several minor problems during September. The pen was marking intermittently between September 8, 1600 Z and September 10, 2307 Z. Some scattered hourly heights were recovered during this period. On September 25, beginning about 0400 Z, there is a strange pressure build-up which released at 0610 Z. Comparison of staff and gage difference before and after this period are consistent, suggesting a one-time problem. The hourly heights 04-06 Z were interpolated. Finally, the paper slipped off its sprockets September 28 at 1100 Z and was not fixed until October 1 0200 Z, a loss of 2½ days of data. The remainder of the time the gage performed well. It was leveled November 19 and removed November 25. There were no unusual tides during the period of operation of this gage. Zero on the marigram equals 3.51 feet on the tide staff.

Levels

In addition to Honuapo and Pohoiki gages, the Hilo control station (161-7760) was leveled September 5 and November 25.

All levels between marks were within acceptable limits. The levels for both tide stations indicate no significant staff movements. The following tables show bench mark elevations above staff zero for installation and removal.

<u>Honuapo (161-8578)</u>		<u>BM Elevations (ft)</u>	
<u>BM#</u>	<u>9/6/80</u>	<u>11/21/80</u>	<u>Difference</u>
3	24.160	24.170	+ 0.010
D	21.873	21.877	+ 0.004
E	21.273	21.286	+ 0.013
F	24.957	24.980	+ 0.023
G	22.018	22.034	+ 0.016

<u>Pohoiki (161-8062)</u>		<u>BM Elevations (ft)</u>	
<u>BM#</u>	<u>9/6/80</u>	<u>11/19/80</u>	<u>Difference</u>
A	10.522	10.525	+ 0.003
B	13.038	13.041	+ 0.003
C	12.139	12.136	+ 0.003
D	14.265	14.268	+ 0.003
E	13.570	13.570	+ 0.000

Recommended Zoning

The differences in times and heights of tides for the various tide stations were small, and correctors obtained from predicted tides at Honolulu, adjusted for Honuapo, were judged adequate for the 1:5,000 and 1:20,000 smooth field sheets. However, for maximum accuracy tide correctors could be applied as follows:

<u>Sheet</u>	<u>Tide Station</u>	
HH (RA-5-4-80)	Honuapo	H-9913
JJ (RA-20-4-80)	Honuapo	H-9914
KK (RA-20-5-80)	Honuapo	H-9916
LL (RA-20-6-80)	Pohoiki	H-9917
MM (RA-20-7-80)	Pohoiki	H-9918

The correctors are not considered necessary for the 1:40,000 and 1:80,000 offshore sheets as the depths on these sheets are all sufficient to make the tide corrector insignificant.

Miscellaneous

A comparison of actual and predicted tide heights at Honuapo was performed. There was reasonable agreement between them.

U.S. DEPARTMENT OF COMMERCE
October 8, 1981 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): 161-8578 Honuapo, HI

Period: September 17 - October 16, 1980

HYDROGRAPHIC SHEET: H-9856

OPR: T-126

Locality: Southeast Coast of Hawaii

Plane of reference (mean lower low water): 161-8578 = 0.6 ft

Height of Mean High Water above Plane of Reference is 161-8578 = 2.0 ft.

REMARKS: Recommended Zoning:

Zone Direct

Donald Carrier
for Chief, Datums and Information Branch

GEOGRAPHIC NAMES

H-9856

Name on Survey	A ON CHART NO. 19320 19004		B ON PREVIOUS SURVEY NO. H-4655a		C ON U.S. QUADRANGLE MAPS		D FROM LOCAL INFORMATION		E ON LOCAL MAPS		F P.O. GUIDE OR MAP ATLAS		G GRAND MCNALLY ATLAS		H U.S. LIGHT LIST		K	
CAPE KUMUKAHI	X	X																1
HAWAII (ISLAND OF)	X	X																2
PALIMA PT.	X	X																3
HOHONU SEAMOUNT																		4
																		5
																		6
																		7
																		8
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																		25

Approved:

Chas. E. Harrington

Chief Geographer - NCG 2x5

22 MARCH 1983

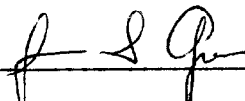
APPROVAL SHEET

FOR

SURVEY H-9856

- A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position print-out has been made. A new final sounding print-out has been made.
- B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the Hydrographic Manual. Exceptions are listed in the verifier's report.

Date: April 22, 1982



Chief, Verification Branch

REGISTRY NO. H-9856

The magnetic tape containing the data for this survey has not been corrected to reflect the changes made during evaluation and review.

When the magnetic tape has been updated to reflect the final results of the survey, the following shall be completed:

MAGNETIC TAPE CORRECTED

DATE _____ TIME REQUIRED _____ INITIALS _____

REMARKS:

HYDROGRAPHIC SURVEY STATISTICS

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS & PRELIMINARY OVERLAYS	9
DESCRIPTIVE REPORT	1	SMOOTH OVERLAYS: POS. ARC, EXCESS Tide	3

DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES	3		1-row			
CAHIERS	1					
VOLUMES						
BOXES						

T-SHEET PRINTS (List) None

SPECIAL REPORTS (List) None

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			824
POSITIONS CHECKED		824	
POSITIONS REVISED		470	
SOUNDINGS REVISED		31	
SOUNDINGS ERRONEOUSLY SPACED		0	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED		0	
	TIME - HOURS		TOTALS
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	7	* (VER)/(EVAL)	
VERIFICATION OF CONTROL		02	02
VERIFICATION OF POSITIONS		19	19
VERIFICATION OF SOUNDINGS		19	19
COMPILATION OF SMOOTH SHEET		08	08
APPLICATION OF TOPOGRAPHY		NA	NA
APPLICATION OF PHOTOBATHYMETRY		NA	NA
JUNCTIONS		11/31	42
COMPARISON WITH PRIOR SURVEYS & CHARTS		06/06	12
VERIFIER'S REPORT		02/13	15
OTHER (Quality Control)		00/45	45
TOTALS		67/95	162

Pre-Verification by James S. Green	Beginning Date 6/24/80; 5/27/81	Ending Date 6/24/80 5/27/81
Verification by Gordon E. Kay	Beginning Date December 3, 1980	Ending Date April 14, 1982
Verification Check by Stanley Otsubo, James S. Green	Time (Hours) 36	Date April 20, 1982
Marine Center Inspection by HIT	Time (Hours) 5	Date May 5, 1982
Quality Control Inspection by Quintan	Time (Hours) 48	Date 15 Nov 1983
Requirements Evaluation by	Time (Hours)	Date

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

H-9856 3/18/83

PACIFIC MARINE CENTER
VERIFIER'S REPORT

REGISTRY NO. H-9856

FIELD NO. RA-80-2-79

Hawaii, Island of Hawaii, Offshore Palima Pt. to Cape Kumukahi

SURVEYED: December 5-6, 1979; September 17-November 7, 1980

SCALE: 1:80,000

PROJECT NO: OPR-T126-RA-79-80

SOUNDINGS: 1979 Raytheon UGR
1980 Raytheon UGR

CONTROL:
1979 Hyperbolic/Raydist
1980 Range-Range/Mini-Ranger
Range-Range/Raydist
Range-Azimuth/Mini-
Ranger

Chief of Party.....1979 W. L. Mobley
1980 W. L. Mobley

Surveyed by.....1979 LT A. Anderson,
LT R. Morris, LTJG M.
McCluskey, LTJG J. Green
ENS D. Kruth, SST R.
Hastings
1980 LCDR A. Anderson,
LT R. Morris

Automated plot by.....PMC Kynetics Plotter

Verified by.....Gordon E. Kay

Evaluated by.....Bruce A. Olmstead

1. INTRODUCTION

NOTE: This survey has been processed utilizing a procedure developed to work in conjunction with the Verification Branch realignment, which established an evaluation process. The survey data was first verified and a smooth sheet compiled by a verifier. Then, an evaluator reviewed the work of the verifier, made the necessary comparisons with prior surveys and charts and wrote the Verification/Evaluation Report.

H-9856 (~~FA-80-2-79~~) is a basic survey conducted under the current National Ocean Survey methods of planning, executing and processing a hydrographic survey as defined in the Hydrographic Manual, 4th Edition. The PMC OPORDER and the Data Requirements Letter for 1979 and 1980 further define field procedures. Project Instructions OPR-T126-RA-79 and OPR-T126-RA,FA-80, Hawaii, Hawaiian Islands dated July 20, 1979 and August 4, 1980 were generated to supplement the Hydrographic Manual. Four supplements to instructions were appended for the 1979 field work; Change 1 dated August 2, 1979; Change 2 dated August 6, 1979; Change 3 dated August 21, 1979 and Change 4 dated October 3, 1979. Change 1 dated August 8, 1980; Change 2 dated August 15, 1980; Change 3 dated September 9, 1980 and Change 4 dated November 28, 1980 were supplements to the 1980 project instructions. *Change #4 issued after field work completed.*

H-9856 (~~RA-80-2-79~~) is an offshore survey situated along the southeastern coast of the Island of Hawaii. The area of hydrography approximates the 200 fathom curve as an inshore limit from Palima Point to Cape Kumukahi and extends 1 mile to 9.5 miles offshore. Specifically, latitude 19°06'00"N to latitude 19°27'00"N, longitude 154°33'00"W on the east ~~and~~ latitude 19°08'00"N to latitude 19°11'00"N, longitude 155°27'00"W on the west and paralleling the coastline. Hydrography was conducted from December 5-6, 1979 and from September 17 to November 7, 1980. There is no shoreline on this survey. Two tide gages, Honuapo and Pohoiki were installed and operating during the survey. However, Honuapo was considered adequate for office reduction of sounding data. Field tide reduction of soundings was based on predicted tides from Honolulu, Hawaii, corrected to Honuapo, Hawaii. Sounding differences between the final field sheet and the smooth sheet are attributed to the application of approved tidal zoning during processing at the Marine Center. Depths of water range from 46 fathoms to 3042 fathoms.

The Projection Parameters, Signal List and Electronic Corrector Abstract were amended during the verification process. All corrected data is listed in the smooth printouts to accompany the final PMC plot.

2. CONTROL AND SHORELINE

Stations located to Third Order, Class I standards were used to control the hydrographic survey. One station, POHOIKI BAY BREAKWATER LIGHT 2, 1980, was considered a Third Order, Class II (no check) position. Four types of positioning systems were employed during ship operations: 1979 work utilized exclusively the Teledyne Hastings Raydist equipment in a hyperbolic mode; 1980 work used the Hastings Raydist and Motorola Mini-Ranger III electronic systems in a range-range option. Additionally, the Mini-Ranger III was configured in a range-azimuth set-up with Wild T-1, T-2 theodolites for azimuth control. Calibration was accomplished using either Motorola Mini-Ranger III or visual fixes. The following comment speaks to the positioning validation procedures used during Raydist operations. Multiple lane jumps were experienced continuously during 1979 and 1980. As a means of recovering this data, the Mini-Ranger III was used to capture a second set of independent rates. Rates were then converted to lanes for a check comparison in positioning the vessel track. However, in many instances, this short

range system was used in excess of 30,000 meters. Specific information and procedures are adequately described in Parts F and G of the ship's descriptive report and the Horizontal Control Report.

An offshore survey at 1:80,000, H-9856 (~~RA-80-2-79~~), does not require any shoreline delineation. Graphic depiction of the photogrammetric manuscripts is referenced to the inshore adjoining surveys.

3. HYDROGRAPHY

Soundings at crossings are in good agreement.

The bottom configuration and determination of least depths are adequate. It should be noted that line spacing on this survey is generally 3200 meters or 2 miles between sounding lines. As this area is volcanically active, it is possible that shoaler depths could exist.

Development of all standard depth curves is satisfactory. Again, line spacing is such that the depth curves are basically interpolated between data points.

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports are adequate and conform to the requirements as stated in the Hydrographic Manual, PMC OORDER and the Data Requirements Letter with the exception of:

- (1980) a. Junctions with H-9914 (~~RA-20-4-80~~)⁽¹⁹⁸⁰⁾, H-9916 (~~RA-20-5-80~~)^{because (1980)}, H-9917 (~~RA-20-6-80~~) and H-9918 (~~RA-20-7-80~~)⁽¹⁹⁸⁰⁾ are poor. Generally, very few soundings from the inshore surveys overlap with this offshore sheet. This necessitated drawing depth curves in many areas without supporting sounding data. See Hydrographic Manual Section 4.3.2, Junctions and Overlaps.
- b. Junctional survey H-9914 (~~RA-20-4-80~~)⁽¹⁹⁸⁰⁾ was not discussed in the ship's descriptive report. See Hydrographic Manual Section 5.3.4, Descriptive Report Text.
- c. Third Order, Class I stations as described in the 1979 and 1980 descriptive reports, signal lists and the horizontal control report are not standardized. Abbreviations, incorrect descriptions and wrong years all contributed to confusion during office processing.
- d. Cape Kumukahi lighthouse was not correctly identified. Lighthouses and other fixed aids are identified by the name as shown in the most recent edition of the U. S. Coast Guard Light List. See 3.1.1.3, Station Marks and Descriptions.
- e. The two hand plotted soundings ^{on the field sheet} 980 fathoms at latitude 19°11'20"N, longitude 154°41'30"W and 926 fathoms at latitude 19°11'55"N, longitude 154°41'00"W are in error by 1,000 fathoms. The records were inspected for any possible indication of such depths. No

significant departure from the surrounding depths was noted. The least depth on the present survey is 1905 fathoms.

in this area

5. JUNCTIONS

H-9856 (~~RA-80-2-79~~)¹⁹⁷⁹ is bordered on the west, northwest, northeast, east and south by eight contemporary surveys. There is no adjoining survey on the eastern limits of the current work.

- a. H-9914 (~~RA-20-4-80~~) (1980)
- H-9916 (~~RA-20-5-80~~) (1980)
- H-9917 (~~RA-20-6-80~~) (1980)
- H-9918 (~~RA-20-7-80~~) (1980)

These contemporary inshore surveys junction along the entire north-western limits of the present survey; latitude 19°09'00"N to latitude 19°26'00"N, longitude 154°51'00"W to longitude 155°27'00"W in depths of water from 100-200 fathoms. Generally, few soundings from these larger scale surveys overlap with this offshore sheet. However, good agreement was made in the adjoining areas where supporting data was available. The junctional note is inked accordingly.

- b. H-9855 (~~RA-80-3-79~~) (1979)
- H-9858 (~~RA-80-1-79~~) (1979)

These two offshore surveys join the entire southern boundary of the present survey; latitude 19°05'00"N to latitude 19°09'00"N, longitude 154°34'00"W to longitude 155°27'00"W. An extensive overlap between these surveys necessitated the transfer of numerous soundings to support the matching of standard depth curves. Depths of water range from 100 fathoms to over 3000 fathoms. The junction has been effected and the note is inked accordingly. However, adjustments to the curves in the adjoining areas on H-9855 (1979) and H-9858 (1979) to conform to those shown on this survey will have to be accomplished during Quality Control.

Junctions completed during QC.

- c. H-8991 (~~AR-30-1-68~~) (1968)
- H-8992 (~~AR-30-2-68~~) (1968)

These contemporary surveys junction the northeastern limits of the present survey; latitude 19°22'00"N to latitude 19°27'00"N, longitude 154°35'00"W to longitude 154°53'00"W. An extensive overlap with H-8991 (1968) necessitated the transfer of numerous soundings to support the matching of standard depth curves. H-8992 (1968) was joined with very little redundant data. Depths of water range from 300 fathoms to an excess of 2300 fathoms. The junction has been effected and the note is inked accordingly. However, adjustments to the curves in the adjoining area on H-8991 (1968), to conform to those shown on this survey, will have to be accomplished during Quality Control.

Junctions completed during QC.

6. COMPARISON WITH PRIOR SURVEYS

H-4655^a (1927) 1:250,000

The comparison with this reconnaissance survey accomplished in 1927 reveals little information about how the area has changed. Basically, no significant changes appear to have occurred in the last 52-53 years. The displacement of soundings and the lack of sounding line data can create discrepancies of up to 100 fathoms between surveys. There appears to be no pattern of either a subsistence or uplifting. The area has likely remained fairly stable except where active volcanic processes are taking place.

The sunken rock at latitude 19°20'00"N, longitude 155°00'00"W plots in depths of 200-300 fathoms of water on the present survey. This feature *on the chart* is probably displaced some 800 meters from its true inshore position. Refer to H-9917 (~~RA-20-6-80~~)¹⁹⁷⁸ an inshore 1:20,000 scale survey for dis- *concur* position of this item.

H-8991 (1968) 1:30,000

The charted soundings from this survey reflect excessive overlap in the junction area. This sheet is spoken to in Section 5, Junctions.

There were no numbered or dashed Pre-Survey Review items for investigation.

H-9856 (~~RA-80-2-79~~)¹⁹⁷⁸ is adequate to supersede the prior surveys within the common area.

7. COMPARISON WITH CHART

a. Hydrography - A chart comparison was made with Chart 19320, 12th Edition, June 17, 1978 and Chart 19004, 28th Edition, June 7, 1980. The charted information originates with the previously discussed prior surveys and an unknown source(s). A comparison with those soundings charted from an undetermined source reveals the same trends as discussed in Section 6, Comparison with Prior Surveys. However, four individual soundings merit further discussion:

(1) 1460 fathoms (ED) - No attempt was made to locate this item during the present work. The geographic position, latitude 19°13'55"N, longitude 154°51'30"W falls between sounding lines. The evaluator recommends that the chart compiler research the origin of this sounding. Although existence may be doubtful it is recommended that the 1460 fathoms (ED) be retained. *Charted sounding from sonic data furnished by U.S. Navy (CL86, 1940; BP33912)* *See QC.*

(2) 910 fathoms (latitude 19°18'45"N, longitude 154°51'00"W) - The ship ran a series of development lines near the charted position. However, the Raydist equipment experienced multiple lane jumps during this investigation and consequently missed the charted position. A least depth of 1286 fathoms was found. The evaluator concurs with the ship's discussion of this item. Although existence may be doubtful, it is recommended that the 910 fathoms continue to be charted. *See QC.*

(3) 415 fathoms - No attempt was made to locate this item during the present work. The geographic position, latitude 19°07'30"N,

longitude 155°16'00"W falls approximately 1 mile southeast of a present survey depth of 412 fathoms. The evaluator recommends charting the present survey soundings. *concur*
charted 415 from uncorrected depths of 1956 US Navy track line survey, BP 57977.

(4) 1839 fathoms (Chart 19004), 1913 fathoms (Chart 19320) - latitude 19°11'50"N, longitude 154°40'30"W. A development of this area by the ship produced a least depth of 1905 fathoms approximately $\frac{1}{2}$ mile west of the charted depth. However, a least depth of 1839 fathoms on Chart 19004 originating from an unknown source, was compiled in 1980. The evaluator recommends retaining this shoaler depth for charting.

See Qc

The ship did not compare the present survey with Chart 19004, 28th Edition, June 7, 1980. Several additional soundings have been added to this area since the 1978 compilation of Chart 19320, 12th Edition, June 17, 1978.

and appended quality control comments

With consideration of the above items, the present survey is adequate to supersede the charted hydrography within the common area.

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

c. Aids to Navigation - Two fixed aids, Cape Kumukahi Light, and Pohoiki Bay Breakwater Light 2 are located within the limits of this survey. Both aids were located by Third Order methods and appear to meet the intended purposes.

8. COMPLIANCE WITH INSTRUCTION

H-9856 (~~RA-80-2-79~~¹⁹⁷⁹) adequately complies with the project instructions except as noted in Section 4, Condition of Survey.

9. ADDITIONAL FIELD WORK

H-9856 (~~RA-80-2-79~~¹⁹⁷⁹) is a good basic survey. Additional field work is not required.

Respectfully submitted,

Bruce Alan Olmstead

Bruce Alan Olmstead
 Evaluator

Examined and Approved,

f. S. Green

James S. Green
 Chief, Verification Branch



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

May 12, 1982

TO: CPM - Charles K. Townsend *[Signature]*

FROM: CPM3 - John W. Carpenter *[Signature]*

SUBJECT: PMC Hydrographic Inspection Team Report for Survey H-9856

This survey is a basic hydrographic survey offshore Palima Point to Cape Kumukahi, Island of Hawaii, Hawaii. This survey was conducted by NOAA Ship RAINIER in 1979 and 1980 in accordance with Project Instructions OPR-T126-RA-79 dated July 20, 1979; Change No. 1 dated August 2, 1979; Change No. 2 dated August 6, 1979; Change No. 3 dated August 21, 1979; Change No. 4 dated October 3, 1979 and Project Instructions OPR-T126-RA,FA-80 dated August 4, 1980; Change No. 1 dated August 8, 1980; Change No. 2 dated August 15, 1980; Change No. 3 dated September 9, 1980 and Change No. 4 dated November 28, 1980.

Change #4 issued after field work completed.

This survey was processed using the evaluation system wherein the verification and evaluation of the survey are divided into two distinct phases.

The following items were noted:

1. The sounding line gap at approximately 19°11.5'N and 154°50'W is due to loss of the echogram trace. Due to the depth of water, this does not affect the survey. ✓

2. From latitude 19°-21'N to the northern hydro limits, line spacing between the 500 fathom and 1500 curves exceeds the 3200 meter requirements. Due to the depth of water and the adjacent depth curve configuration, this does not adversely affect the survey. ✓

The inspection team finds H-9856 to be a basic survey adequate to supersede common areas of prior surveys and charted hydrography. Administrative approval is recommended. ✓

[Signature]
 John W. Carpenter

See Verifier's Report Sec. 7 and Q.C.
[Signature]
 Roger A. Morris

[Signature]
 James W. Steensland

[Signature]
 James S. Green



10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration

A young agency with a historic tradition of service to the Nation

ADMINISTRATIVE APPROVAL
H-9856

Offshore Palima Point to Cape Kumukahi, Island of Hawaii, Hawaii

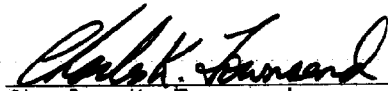
The smooth sheet and reports of this survey have been examined and the survey is adequate for charting and to supersede common areas of prior surveys.

The sources of each of the following charted soundings should be investigated:


1. 1460 fathoms (ED), reference Section 7(1) of the Verifier's Report
See Verifier's Report for quality control comment.
2. 910 fathoms, reference Section 7(2) of the Verifier's Report *See QC*
3. 1839 fathoms, reference Section 7(4) of the Verifier's Report *See QC*

If these sources are not substantiated by specific data which add credence to their accuracy, they should not be carried forward for charting and this survey should supersede them.

These soundings from miscellaneous sources are not carried forward to smooth sheet, however recommendations for charting purposes are noted in the Descriptive Report.



Charles K. Townsend
Director
Pacific Marine Center



Date



**UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration**

NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
ROCKVILLE, MARYLAND 20852

N/CG242:LQ

October 29, 1984

TO: Roy K. Matsushige *RM*
Chief, Hydrographic Surveys Branch

THRU: Chief, Standards Section *gm*

FROM: Lisa Quinlan *Lisa Quinlan*
Quality Evaluator

SUBJECT: Quality Control Report for Survey H-9856 (1979-80), Hawaii, Island of
Hawaii, Offshore Palima Point to Cape Kumukahi

A quality control inspection of survey H-9856 was accomplished to monitor the survey for adequacy with respect to data acquisition, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, smooth plotting, decisions made and actions taken by the verifier, and the cartographic presentation of data. Revisions and additions to the smooth sheet, plus helpful comments made to the verifier, are identified on a one-half scale copy of the survey to be furnished the verifier. In general, the survey was found to conform to National Ocean Service standards and requirements except as stated in the Verifier's Report and the HIT Report. The following supplements the Verifier's Report.

1. The charted 910- and 1,460-fathom soundings, at latitude 19°18'45"N, longitude 154°51'00"W and latitude 19°13'55"N, longitude 154°51'30"W respectively, originate with sonic data furnished by the U.S. Navy (C/L 86, 1940; BP-33912). These charted soundings fall along gradual slopes near present depths which are at least 400 fathoms deeper. It is recommended that the depths shown on the present survey be charted.
2. The 1,839-fathom sounding charted on chart 19004 (28th Edition, dated June 7, 1980) at latitude 19°11'50"N, longitude 154°40'30"W originates with 1969 data furnished by Scripps Institution of Oceanography (BP-100576). Some development was accomplished in this area; however, it is considered insufficient to prove or disprove the existence of this sounding. Additionally, this feature is a "named" seamount (Hohonu Seamount). Therefore, it is recommended that the sounding be retained on chart 19004 and included on chart 29320, and that the geographic name be applied to both charts.

cc:
N/CG241





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4115-2 (2-sheets)

Published at Washington, D. C.
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY

Scale	1:50,000
Graphic Scale	0 to 10 Miles
Graphic Scale	0 to 20 Fathoms

(Island of Hawaii) 19220
 SOUNDINGS IN FATHOMS - SCALE 1:50,000 (Formerly C&GS 4115)
 LORAN-C OVERPRINTED

FE-229

FE-230

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10° CONTINUED ON CHART FROM THE SURV. CASE 4000/30

80° 10' 15' 20' 25' 30' 35' 40' 45' 50' 55' 60' 65' 70' 75' 80' 85' 90'



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
ROCKVILLE, MARYLAND 20852

N/CG24x1:DEW

FEB 20 1986

TO: N/MOA - Wesley V. Hull
N/MOP - Robert L. Sandquist
FROM: N/CG2 - *J. Austin Yeager*
J. Austin Yeager

SUBJECT: Reports of Compliance for Hydrographic Surveys

I have decided that a special "Report of Compliance" is no longer required for those remaining hydrographic surveys processed under the Verification/Quality Control system in place prior to October 1982. You will no longer receive these reports. Statements made in the Verifier's Reports, modified as necessary by the Quality Control Reports, will suffice with regard to compliance with project instructions.

After their examination of the Descriptive Reports for Automated Wreck and Obstruction Information System (AWOIS) file revisions, Operations Section (N/CG241) personnel will insert a copy of this memorandum into each Descriptive Report to provide appropriate authority for the missing compliance report. In accordance with past practice, we will forward a copy of the Quality Control Report to you for your information.

cc:
N/CG22 - Nortrup



RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9856

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	4-5-89	Bowen S. Adams	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. 16
50	9-18-89	Russell Kennedy	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. 3
540	5/4/90	[Signature]	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. 18 13320
19004	8/8/90	ALMACEN	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. full appl. of sndgs. from 55 thru 19320.
19010	8/14/90	[Signature]	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. full application of sndgs from 55 thru 19004
19007	8/10/90	ALMACEN	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. full appl. of sndgs. from 55 thru 19004.
530	9/24/90	[Signature]	Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No. full application of sndgs from 55 thru 19004, 19010, 19007.
			Full Part Before <u>After</u> Verification Review Inspection Signed Via Drawing No.
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