9975

LNM 80
1/2/80

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 Hydroagraphic

Field No. RA-20-5-81

Office No. H-9975

LOCALITY

State Hawaii

General Locality Island of Hawaii

Locality Upolu Point and Southeast

1981

CHIEF OF PARTY
CDR R.J.Land

LIBRARY & ARCHIVES

DATE February 24, 1984

☆U.S. GOV. PRINTING OFFICE: 1980—766-230

REA 6
CHTS
19004
19010
19326 to sign off see
19327 Record of Application
19340
19007
540

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

HYDROGRAPHIC TITLE SHEET

H-9975

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-20-5-81

State Hawaii

General locality Island of Hawaii

Locality Upolu Point and Southeast

Scale 1:20,000 Date of survey Oct. 14 - Oct. 31, 1981

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

Vessel NOAA Ship RAINIER (2120) and Launches 2126, 2125, and 2124

Chief of party CDR R. J. Land

Surveyed by Lt R. Morris, LT S. Ludwig, LTJG J. Gordon, ENS M. Mathwig, ENS R. Koehler

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

Graphic record scaled by Ship's Personnel

Graphic record checked by Ship's Personnel

~~Protracted~~ Verified by J. N. Shofner Automated plot by PMC Xynetics Plotter

~~Verified~~ Evaluated by K. M. Scott

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

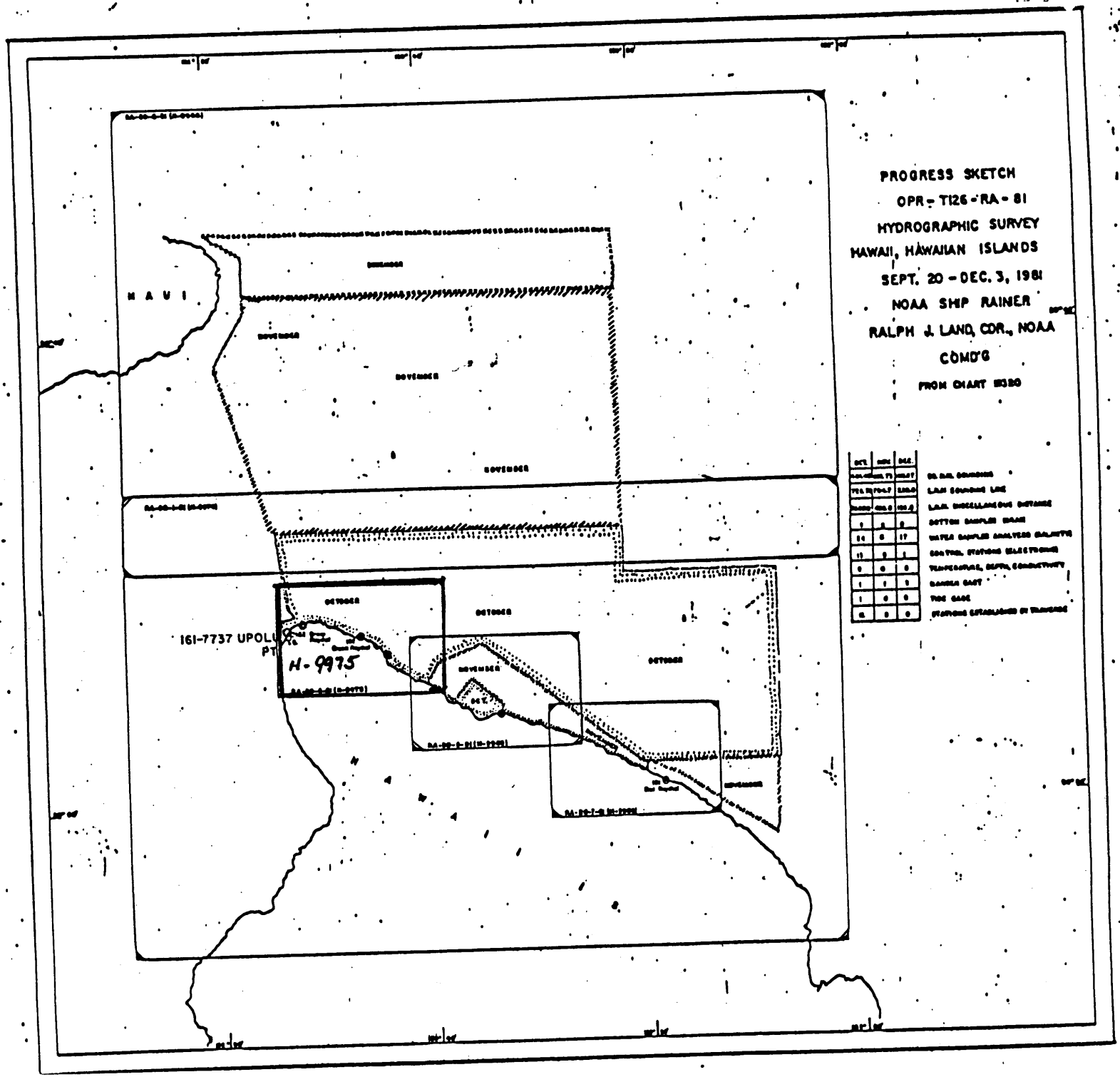
REMARKS: Revisions and marginal notes in black are by the Evaluator.

Awois checked SJV 3/19/84

Appl to Stds 2-27-84

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1976—665-661/1222 REGION NO. 6


PROGRESS SKETCH
OPR-T126-RA-81
HYDROGRAPHIC SURVEY
HAWAII, HAWAIIAN ISLANDS
SEPT. 20 - DEC. 3, 1981
NOAA SHIP RAINER
RALPH J. LAND, CDR., NOAA
CO'MD'G
FROM CHART 19380
H A W I
H-9975

A. PROJECT

This hydrographic survey was conducted in accordance with Project Instructions OPR-T126-RA-81, Island of Hawaii, Hawaii, dated June 11, 9181, and Change #1, Amendment to Instructions, dated July 13, 1981.

B. AREA SURVEYED

The area surveyed is at the northern end of the Island of Hawaii, bounded by latitudes 20° 17'~~30~~22" N and 20° 10'40" N, and by longitudes 155° 54'25" W and 155° 39'~~40~~39" W. The hydrography on this sheet was generally limited to the area within 1 mile of the coast, except for the far eastern section of the sheet, where hydrography extended 2 miles offshore. The inshore limit was to be the zero-fathom curve. Due to the heavy surf conditions and steep bottom topography, this was never achieved, although frequently the launches came quite close to the shore. Hydrography on this sheet took place from JD 287 to JD ~~303~~304.

C. SOUNDING VESSELS

Three RAINIER hydrographic survey launches were used during this survey:

	Vessel EDP Number	Hull Number
RA-4	2124	1016
RA-5	2125	1003
RA-6	2126	1013

The RAINIER (2120) was used only for bottom samples on this sheet. There were no unusual vessel configurations or problems during this survey.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

Echo sounding equipment for survey RA-20-5 was the Ross Fineline fathometer system installed in launches RA-4, RA-5 and RA-6. This system includes the Ross model 400 transceiver, Ross model 5000 analog trace recorder, Ross model 6000 digitizer and a 100 kHz transducer. The table below summarizes the component serial numbers for each vessel.

Table I

Echo Sounding Component Serial Numbers

Vessel	2124	2125	2126
Transceiver	1097	1040	1080
Analog recorder	1071	1070	1040
Digitizer	1042	1040	1080

CORRECTIONS TO ECHO SOUNDINGS

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

Table II

Nansen Cast Data

Date	Location	Velocity Table No.
6 Oct. 81	20° 30.0' N 155° 39.6' W	~~1 & 2~~ 2
21 Nov. 81	20° 16.4' N 155° 16.1' W	~~1 & 2~~ 2
1 Dec. 81	20° 23.0' N 155° 58.5' W	~~1 & 2~~ 2

Date	Location	Velocity Table No.
1 Dec. 1981	20° 03.8' N 156° 00.6' W	~~1 & 2~~ 2
	20° 02.2' N 156° 08.3' W	~~1 & 2~~ 2

The three Nansen casts on 1 December, 1981 were conducted with five bottles at each location. This explains the multiple casts for the one date. The water samples collected from the Nansen casts were analyzed for salinity using standard laboratory procedures (see H.O. 607, Instruction Manual for Obtaining Oceanographic Data, Third Edition, U.S. Naval Oceanographic Office, 1968). The salinometer used for salinity analyses was Beckman model No. RS7B, s/n 59265. The unit was last calibrated May, 1981 by the Northwest Regional Calibration Center, Bellevue, Washington (see separates following text for calibration results). See Eval. Rpt. Sect. 1

Results from the Nansen casts were input into computer program RK-530: Velocity Correction Computations (10 May, 1976 version) and run on the RAINIER's PDP - 8/e digital computer, s/n 1015, to yield velocity correctors for all surveys in this project. Nansen casts on 21 November, 1981 and 1 December, 1981 checked the accuracy and stability of the water column. Two separate corrector tables were made -- a deep water corrector table for soundings gathered by the RAINIER, and a shallow water corrector table for soundings gathered by the survey launches. A list of the computed correctors from the casts are provided in the separates following the text. The velocity correctors from the Nansen casts agreed within 0.2% at each depth listed. The largest corrector difference was 0.5 fathoms at a depth of 1290 fathoms. This indicates an extremely stable water column. Because of the negligible change between Nansen casts, correctors derived from the first Nansen cast were used for all surveys.

LAUNCH DRAFT CORRECTIONS

Section 4.9.5.1.1., page 4-71 of the Hydrographic Manual (Fourth Edition, 1976) states that "reliable and accurate bar checks can only be made under the most favorable conditions." The windward side of Hawaii seldom, if ever, had such favorable conditions. Rough waters and trade winds encountered during survey project OPR-T126-RA-81 rendered bar checks unfeasible. Three bar checks for RA-5 (2125) were done on JD 289, 290 and 291. These checks were done on the leeward side of Hawaii before beginning work on RA-20-5-81. These values, when corrected for velocity, agreed with the historic value of 0.3 fathoms for the survey launches' TRA. Since there have not been any changes in the other survey launches to cause a change in draft, the historic draft correction was used throughout all field sheets.

LAUNCH SETTLEMENT AND SQUAT CORRECTIONS

Settlement and squat characteristics of survey launches RA-3, RA-5 and RA-6 were performed on 15 April, 1981 off of Sand Point Naval Support Activity, Lake Washington. Tests were performed on RA-4 on 27 April, 1981. The maximum-speed test of RA-3 was performed at Kawaihae Harbor, Hawaii on 30 October, 1981.

This information is included for reference only since the largest potential error based on the tests is 0.05 fathoms. The settlement and squat corrections are not on the TC/TI tapes or applied to soundings on field plotted sheets. These correctors are not considered necessary for this project in accordance with PMC OPORDER 3-03.06 x 1.

SOUNDING EQUIPMENT CORRECTIONS

During survey operations, the "blanking" was usually set at the minimum-plus-one of the scale the fathometer was set (e.g., if the scale was 50-100 fathoms, the blanking was set at 51 fathoms). However, when a launch approached

shore and depths were less than 5 fathoms, blanking was 0 fathoms.

The initial trace on the analog recorders was continuously and scrupulously monitored by dedicated and highly trained personnel to prevent any error that might be caused by a drifting initial.

Everyday RAINIER personnel performed phase calibrations to prevent belt length error and stylus/paper misalignment on launch fathometers. This was done in accordance with the calibration procedures contained in the PMC OPORDER.

The depth limit of the launch fathometers is 200 fms. This limit was approached a few times on this survey. Due to the faintness of the return on RA-6, this was very carefully done.

MANUAL SOUNDING CORRECTORS

One leadline sounding was taken in this survey project, a detached position to find a 20 fathom peak. The leadline was compared to a steel tape and found to be accurate. Pos. No. 6512 launch 2126 JD 304

See Eval. Rpt. Sect. 7

E. HYDROGRAPHIC SHEETS

Hydrographic field and smooth field sheets were prepared by the RAINIER Survey Department using the ship's PDP 8/e Comlot systems. The sheets were constructed using a modified transverse mercator projection. The list of parameters used to define the hydrographic sheets is included in the attachments to this report. All field records will be forwarded to the Pacific Marine Center, Seattle, Washington, for verification.

F. CONTROL STATIONS

Horizontal control for RA-20-5-81 was provided by the recovery of 11 existing stations and the establishment of 9 new stations. A copy of the master station list is included in the attachments to this report. The stations

See Eval. Rpt. Sect. 2

used each day are listed in the raw records and found on the master station list. The new stations were established using Third Order, Class I methods, and were monumented and described. The ~~North American Datum of 1927~~ OLD HAWAIIAN DATUM was used in the survey. Details concerning the location and recovery of each station, including the field records and processing computations, are located in the Horizontal Control Report, OPR-T126-RA-81. No unconventional survey methods were used for determining the positions of horizontal control stations.

G. HYDROGRAPHIC POSITION CONTROL

Range-azimuth methods utilizing a Motorola MiniRanger III System were used exclusively for hydrographic position control.

CALIBRATION METHODS

MiniRanger baseline calibrations were performed, prior to and after all MiniRanger data collection for this project. The calibrations took place at Hilo Harbor on JD 287/288, JD 331, and JD 338.

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

DAILY SYSTEM CHECKS

To provide verification of MiniRanger system performance, daily system checks were performed. Three point sextant fixes, with check angles where possible, on at least Third Order, Class I stations were accomplished generally twice daily in accordance with PMC OPORDER, Appendix M. Calibration records

are included with the raw data. A calibration summary is provided with the MiniRanger statistics table.

No unusual methods of operating or calibrating were used, nor were any equipment malfunctions or unusual conditions experienced. Signal strengths were generally well above cutoff values. No data utilizing electronic position control was collected at signal strengths below the cutoff value.

MOBILE SHORE M/R DATA

Electronic stations were positioned over Third Order, Class I geodetic control stations. Power to shore stations was provided by 2-12V batteries connected in series.

Shore station code characteristics are as follows:

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

* Universal Station units

A synopsis of MiniRanger mobile unit/shore unit statistics is in the addenda to this report.

H. SHORELINE

The shoreline for this survey was taken from field edit sheets T-12528 (1:10,000) and TP-00064 (1:20,000), H-3651 (1:20,000 dated 1914), and photograph 27 AUG 63 S 7748 (There is a ~~15~~ 30" of latitude gap between the two field edit sheets which was covered by the photograph). See Eval. Rpt. Sect. 2

Only shoreline details on T-12528 and TP-00064 were field edited and this information was transferred to the field sheet. There was some discrepancy in shoreline where H-3651 and T-12528 meet due, we believe, to the inaccuracy of the plane table methods used on H-3651. See the Master Field Edit film ozalids and Field Edit Reports for T-12528 and TP-00064 for all field edit information.

I. CROSSLINES

A total of 39.25 linear miles or 16% of the total mileage consists of crosslines. Of a total of 205 soundings, all agree within allowable limits. This survey was performed by three different launches. There is more than sufficient overlap to conclude that their work agrees well.

J. JUNCTIONS

This survey junctions with the following surveys:

Registry No./Field Sheet No.	Scale	Year Surveyed
H-9129	1:40,000	1970
H-9019	1:10,000	1968
H-9983 (RA-20-6-81)	1:20,000	1981
H-9974 (RA-80-1-81)	1:80,000	1981

This survey's mylar smooth sheet was compared to the soundings on H-9129. All four soundings compared were consistent with the trend of the contours established by this survey.

Also, it was compared to H-9019. There were 16 soundings compared; 14 were within 1 fathom and 2 were within 3 fathoms. Survey H-9974 was compared to this survey and the junction was excellent. The soundings that overlap follow the contour trends of this survey very closely.

This survey was also compared to H-9983 and the results were excellent. The junction was well within specifications.

K. COMPARISON WITH PRIOR SURVEYS

This survey did not have any pre-survey review items. The following prior surveys were compared to this survey:

Registry No.	Scale	Year
H-3651	1:20,000	1914
H-3652	1:60,000	1914

Comparing this survey to H-3651, agreement was good, with 95% within 3 fathoms. The larger discrepancies are as follows:

20° 15'39" N	155° 46'26" W	35 fm	vs.	44 fm (6314 + 1)
20° 14'21" N	155° 45'13" W	5 5/6 fm	vs.	10.9 fm (5406)
20° 14'37" N	155° 44'55" W	22 fm	vs.	17 fm (3394 + 3)
20° 14'30" N	155° 44'08" W	35 fm	vs.	40 fm (5428 + 4)
20° 12'48" N	155° 42'30" W	38 fm	vs.	46 fm (5543)
20° 12'58" N	155° 42'47" W	46 fm	vs.	54 fm (6414 + 3)
20° 12'34" N	155° 42'10" W	30 fm	vs.	40 fm (5580 + 2)
20° 12'28" N	155° 41'25" W	74 fm	vs.	79 fm (5620 + 3)
20° 11'59" N	155° 41'54" W	28 fm	vs.	42 fm (5633 + 1)
20° 11'50" N	155° 41'39" W	35 fm	vs.	45 fm (5629)

See Eval. Rpt. Sect. 6

There was no specific investigation done to resolve these discrepancies. Due to the steep character of the bottom, they are likely the result of positional inaccuracies. And consideration of our more accurate methods of sounding and location suggest the error was in the previous survey. Further, while com-

paring the surveys, a discrepancy in shoreline features of up to 3 mm was noticed when lining up latitude and longitude lines. It is difficult to say where the problem lies. Such a shift would place all of the above soundings outside the 1.5 mm radius criteria for comparisons.

Due to surf conditions, the launches could not approach the coast as closely as had been done by the previous hydrographers. Those soundings closer in should be retained for charting purposes. In addition, there is a 3 5/6 sounding at 20°14'39" 155°45'46" which should be retained.

See Eval Rpt Sect. 6

This survey was also compared with H-3652. Of 20 comparisons, agreement was good, with 80% of the depths within 2 fm and no disagreement of more than 4 fm.

LN. COMPARISON WITH THE CHART

A comparison was made between the survey and chart 19320 (12th Edition, 6/28) with a total of 15 soundings. Thirteen soundings were in very good agreement, one sounding was deeper than this survey showed and one sounding was shoaler but well within specifications.

A comparison with 19327 (8th Edition, 9/81) was not required but was done also. Out of eighteen soundings, one was shoaler by less than 10% of the depth and two soundings on the chart were deeper than this survey showed. The rest compared favorably with the results of this survey. Refer to Field Edit sheets for rocks observed.

In addition, all rocks on the charts were compared against hydrography and field edit. There were a number of rocks which couldn't be verified by either source. In the addenda to this report is a copy of the charts, with unverified rocks denoted. Due to the disparity in scales between the surveys and the charts, it is likely that some rocks were placed further offshore than

See Eval. Rpt Sect 7

their true position. Their sources should be investigated.

A rock submerged 2.1 fm (at predicted MLLW) was discovered and investigated at 20° 12' 01" N 155° 42'20" W (position #6512). A copy of the DANGER to NAVIGATION report to the Coast Guard is included in the addenda to this report.

Comparison with the FFAID printout disclosed no error but the location of Upolu Aero Lt. A third order position is included in the addenda to this report (see Master Station List).

Tully's Silo should be charted as a landmark. This feature, the northernmost of 3 silos in a row, is an obvious landmark in the North Kohala area (for position, see Master Station List).

M. ADEQUACY OF SURVEY

This hydrographic survey is considered complete and adequate to supersede all prior surveys for charting, except as noted in section K.

N. AIDS TO NAVIGATION

There are four aids to navigation that have been listed in the survey prior to this survey's completion. They are:

Loran C Tower 1964

Hawi Upolu Airport Beacon

Kauhola Point Light 1948

Kohala Mill Stack 1948

Also, there is a new landmark, Tully's Silo (see section H).

O. STATISTICS

Survey Launch	Number of Positions	Linear Nautical Miles of Hydrography	Bottom Samples
RA-4	185	18.5	0
RA-5	714	138.65	0
RA-6	515	92.5	0
S-221 (RAINIER)	-	-	3
TOTAL	1414	249.65	3

This survey covers an area of approximately 25 square nautical miles. Two tide stations at Upolu Point and Hilo were used for tidal observations during this survey (see Field Tide note in the addenda).

P. MISCELLANEOUS

There were five expansion sheets done on this survey. Expansion #1 was done to help delineate the shelf extending offshore near station Kealahewa 2 1948. Expansion #2 is a 1:5,000 survey of the bay west of Kauhola Point (Keawaeli Bay). It was surveyed using 50 meter line spacing as a possible harbor of refuge. The shelf areas and peaks around the point were better defined by this expansion. Also, deeper water peaks were defined by this expansion. Expansion #3 delineates a shoal area near Paokalani Island with a least depth of 2.1 fathoms. (This was a Danger to Navigation mentioned in section L). Expansion #4 is a development of a shelf area around Alanahihi Point. Expansion #5 is a development of several shelves which extend seaward between Kapaaiki Point and Akokoa Point.

On two separate days, there were problems with the timers in the launch computers. On JD 290, RA-6 had a bad chip which caused a gradually increasing time error over the day. This was discovered after the day's work, but by using

the fathometer paper, we were able to reconstruct the work and apply suitable corrections to the time. On JD 292/293, RA-4 suffered a similar but one-time problem of 3 hr. 20 min. 33 sec. This was discovered by comparison with a (separate) quartz clock in the launch.

The size of this sheet was taken from the sheet layout, OPR-T126 (revised 9-4-80), but was found to be slightly longer than "normal" limits after the project ended. It is well within the extended limits outlined in Hydrographic Survey Guidelines #6, and it is recommended it be plotted as is.

Q. RECOMMENDATIONS

This survey is considered complete and adequate for charting and there are no recommendations for further field work.

Survey operations during the spring or summer in this area would be more advantageous. The calmer sea conditions would allow sounding lines to be carried closer to the shore than was possible during this survey.

Kapana Bay (20°14'00" N 155°45'15" W) was noticed to be protected from winds but it is not a harbor of refuge. It is open to seas from the north and northeast, and could only be used when seas and swell from these directions were negligible. No soundings were taken due to the seas that were there during our operations.

Our investigation of Keawaeli Bay similarly showed little protection from the north and northeast seas (dominant through most of the year). It should not be considered a harbor of refuge.

R. AUTOMATED DATA PROCESSING

Data acquisition and processing were accomplished as per instructions in

the Hydrographic Manual (4th Edition), Instruction Manual for Automated Hydrographic Surveys, Hydrographic Survey Guidelines, PMC OPORDER, and Hydrographic Data Requirements for the 1981 field season.

Soundings and positions were taken by a Hydroplot system using range-azimuth program FA 181 and range-range program RK 111. There are daily master tapes and corresponding corrector tapes which include the TRA, electronic control calibration correctors for Raydist or baseline correctors for Mini-Ranger, and all depth corrections. Velocity tapes were generated from Nansen cast data. The following is a list of all computer programs and version dates used for data acquisition or processing:

		Version Date
RK 111	Range/Range Real-Time Hydroplot	1/30/76
FA 181	Range/Azimuth Hydrolog	2/23/78
RK 201	Grid, Signal and Lattice Plot	4/18/75
RK 211	Range/Range Non-Real Time Plot	2/02/81
RK 212	Visual Station Table Load	4/01/74
RK 216	Range/Azimuth Non-Real Time Plot	2/09/81
RK 300	Utility Computations	10/21/81
RK 330	Reformat and Data Check	5/04/76
PM 360	Electronic Corrector Abstract	2/02/76
RK 407	Geodetic Inverse/Direct Computation	9/25/78
AM 500	Predicted Tide Generator	11/10/72
RK 530	Layer Corrections for Velocity	5/10/76
RK 561	H/R Geodetic Calibration	2/19/75
AM 602	ELINORE - Line Oriented Editor	5/20/75
RK 606	Tape Duplicator	8/22/74
RK 612	Line Printer List	3/22/78

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

S. REFERRAL TO REPORTS

The following reports, submitted separately to PMC, contain information related to this survey:

Horizontal Control Report, OPR-T126-RA-81

Electronic Control Report, OPR-T126-RA-81

Echo Sounder Report, OPR-T126-RA-81

Field Edit Reports, T-12528, TP-00064

Coast Pilot Report, OPR-P114-RA-81

Submitted,

Thomas G. Clark
for James R. Gordon
LTJG, NOAA

Approved and forwarded,

Ralph J. Land
CDR, NOAA
Commanding

PARAMETER TAPE LISTING
RA-20-5-81(H-9975)

RA-20-5-81
SKEW=341,22,64
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=60
PLSCL=20000
PLAT=20/15/25
PLON=155/55/50
VESNO=2123
YR=81
ANDIST=0.0

EXPAN #1
SCALE=1:5000
SKEW=0,20,20
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=15
PLSCL=5000
PLAT=20/15/37
PLON=155/53/18
VESNO=2123
YR=81
ANDIST=0.0

EXPAN #2
SCALE=1:5000
SKEW=0,16,18
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=15
PLSCL=5000
PLAT=20/14/47
PLON=155/46/53
VESNO=2123
YR=81
ANDIST=0.0

EXPAN #3
SCALE=1:2500
SKEW=293,16,48
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=10
PLSCL=2500
PLAT=20/12/49
PLON=155/42/59
VESNO=2123
YR=81
ANDIST=0.0

EXPAN #4
SCALE=1:5000
SKEW=0,06,06
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=15
PLSCL=5000
PLAT=20/15/54
PLON=155/50/08
VESNO=2123
YR=81
ANDIST=0.0

EXPAN #5
SCALE=1:5000
SKEW=313/12/28
FEST=70000
CLAT=2176000
CMER=155/30/0
GRID=15
PLSCL=5000
PLAT=20/14/23
PLON=155/45/26
VESNO=2123
YR=81
ANDIST=0.0

FIELD TIDE NOTE

OPR-T126-RA-81

HAWAII, HAWAIIAN ISLANDS

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

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

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

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

*(see discussion in next section)

UPOLU POINT (161-7737)

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

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

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

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

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

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

HILO (161-7760)

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

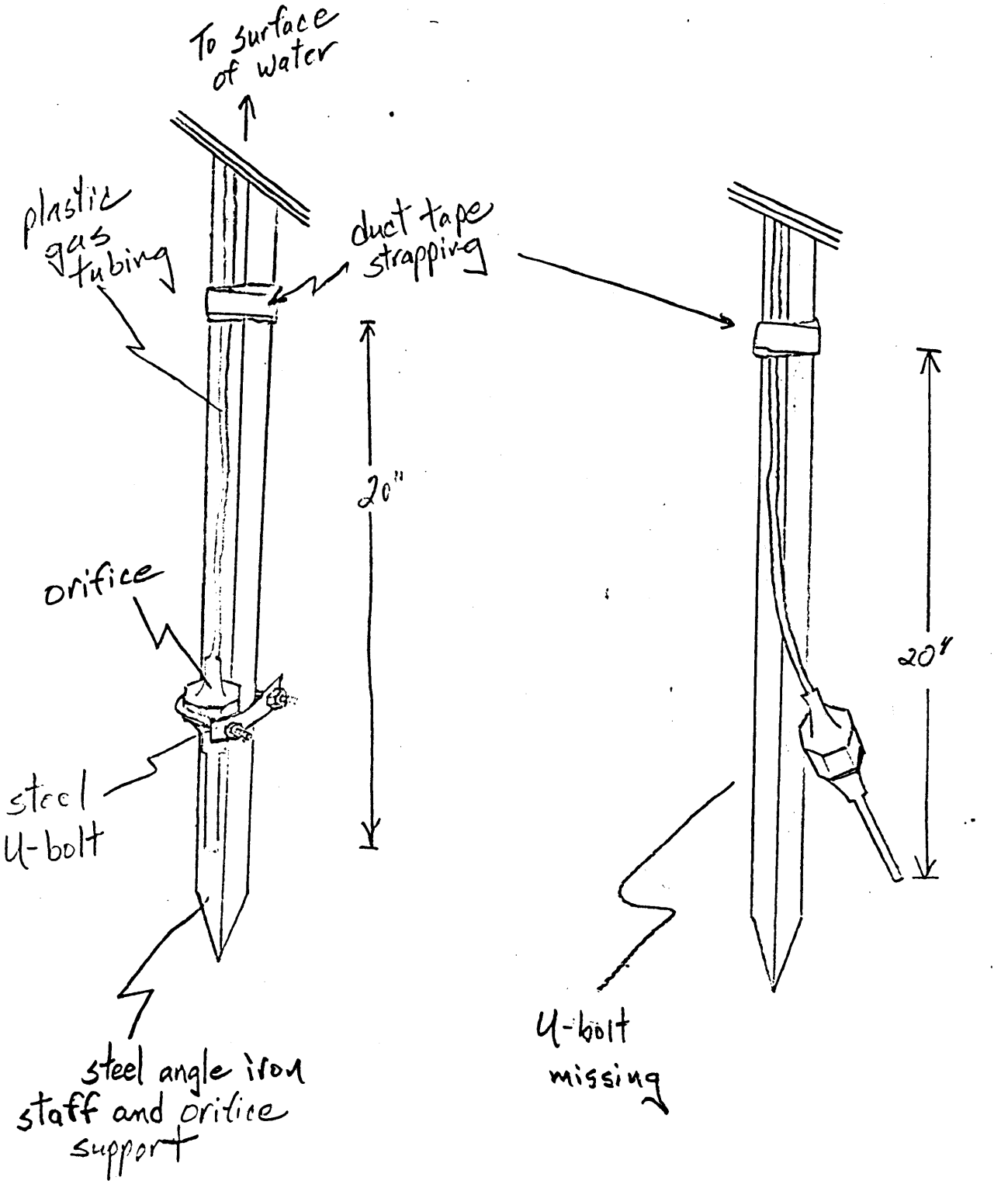
LEVELS

UPOLU POINT

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

AT INSTALLATION

UPON REMOVAL



Height Between Benchmarks

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

Height Between Benchmarks

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

	New Staff Installation	Removal	Difference
Staff Stop - BM A	.787 ft.	.781 ft.	1.8 mm

Total Cumulative Difference: 6.0 mm

HILO

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

Height Between Benchmarks

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

Total Cumulative Difference: 14.3 mm

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

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

BM F and the BM 5- BM 4 sections.

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

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

Respectfully submitted,

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

Approved and Forwarded,

Ralph J. Land
CDR, NOAA
Commanding

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-9975

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
AKOAKOA POINT										1
ALANAHIHI POINT										2
ALENUIHAHA CHANNEL										3
HAPUU BAY										4
HAWAII (State-title block)										5
HAWAII (island)										6
HONOKAHEKA POINT										7
HONOKANE IKI STREAM										8
HONOKANE NUI STREAM										9
HONOKEA STREAM										10
HONOPUE STREAM										11
KAHEO POINT										12
KAILIKAULA STREAM										13
KALALAE POINT										14
KAPAAIKI POINT										15
KAPANA BAY										16
KAUHOLA POINT										17
KEAWAILI BAY										18
KEOKEA BAY										19
KEPUHI POINT										20
KOLEALIILII STREAM										21
LIMUKOKO POINT										22
MOKUPUKU (island)										23
MOKUPUPU (island)										24
NEUE BAY										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-9975

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
NIULII										1
NIULII STREAM										2
OHIAHUEA STREAM										3
PAALAEA (island)										4
PAHOA BEACH										5
PAOKALANI ISLAND										6
PAUEKOLU										7
POLOLU STREAM										8
UMIWAI BAY										9
UPOLU POINT										10
WAIPAHI STREAM										11
										12
										13
										14
										15
										16
										17
										18
					Approved:					19
										20
					Charles E. Harrington					21
					Chief Geographer - N/CG2x5					22
					21 June 1983					23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

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

CORRECTIONS IN FEET, FATHOMS

NOAA FORM 76-21 (10-72) U.S. DEPARTMENT OF COMMERCE NOAA NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship RAINIER

Cdr. R. J. LAND Comdg.

These corrections are to be used

between OCT. 1981 and 19

in the locality NE COAST, ISLAND OF HAWAII

for hydrographic surveys Nos. H-9983 (2424)

Recomputed by PMC

(For deep water add a 0 to these figures)

DEPTHS IN FATHOMS

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28

0 10 20 30 40 50 60 70 80 90 100

3.0	− 0.0	34.5	− 1.6	89.0	− 4.2		
5.5	− 0.1	38.0	− 1.8	93.5	− 4.4		
7.5	− 0.2	42.0	− 2.0	98.0	− 4.6		
9.0	− 0.3	46.0	− 2.2	103.0	− 4.8		
11.0	− 0.4	50.0	− 2.4	108.0	− 5.0		
13.0	− 0.5	54.0	− 2.6	113.0	− 5.2		
15.0	− 0.6	58.0	− 2.8	118.0	− 5.4		
16.5	− 0.7	62.0	− 3.0	123.0	− 5.6		
18.5	− 0.8	66.5	− 3.2	128.5	− 5.8		
20.0	− 0.9	70.5	− 3.4	133.5	− 6.0		
22.5	− 1.0	75.0	− 3.6				
25.0	− 1.2	80.0	− 3.8				
31.0	− 1.4	84.0	− 4.0				

46 1240

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

☆ U.S. GOV. PRINTING OFFICE: 1977—767-212

2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6

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

0

CORRECTIONS IN FEET, FATHOMS

NOAA FORM 76-21 (10-72) U.S. DEPARTMENT OF COMMERCE NOAA NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship _____

Cont'd

These corrections are to be used

between _____ 19____ and _____ 19____

in the locality _____

for hydrographic surveys Nos. _____

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

DEPTHS IN FATHOMS

(For deep water add a 0 to these figures)

192.0 = 7.0	1462.0 = 30.0	2056.0 = 50.0	
250.0 = 8.0	1494.0 = 31.0	2081.0 = 51.0	
316.0 = 9.0	1526.0 = 32.0	2106.0 = 52.0	
384.0 = 10.0	1559.0 = 33.0	2133.0 = 53.0	
452.0 = 11.0	1592.0 = 34.0	2158.0 = 54.0	
520.0 = 12.0	1624.0 = 35.0	2184.0 = 55.0	
590.0 = 13.0	1658.0 = 36.0	2210.0 = 56.0	
670.0 = 14.0	1690.0 = 37.0	2237.0 = 57.0	
732.0 = 15.0	1724.0 = 38.0	2258.0 = 58.0	
794.0 = 16.0	1757.0 = 39.0	2278.0 = 59.0	
858.0 = 17.0	1790.0 = 40.0	2300.0 = 60.0	
922.0 = 18.0	1811.0 = 41.0	2320.0 = 61.0	
984.0 = 19.0	1847.0 = 42.0	2341.0 = 62.0	
1022.0 = 20.0	1873.0 = 43.0	2362.0 = 63.0	
1068.0 = 21.0	1900.0 = 44.0	2385.0 = 64.0	
1114.0 = 22.0	1926.0 = 45.0	2404.0 = 65.0	
1160.0 = 23.0	1951.0 = 46.0	2425.0 = 66.0	
1208.0 = 24.0	1977.0 = 47.0		
1254.0 = 25.0	2003.0 = 48.0		
1300.0 = 26.0	2029.0 = 49.0		
1348.0 = 27.0			
1393.0 = 28.0			
1429.0 = 29.0			

46 1240

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

1/19

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5.6 5.8 6.0 6.2 6.4 6.6 6.8 7.0 7.2 7.4 7.6 7.8 8.0 8.2 8.4

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

100

CORRECTIONS IN FEET, FATHOMS

10

20

30

40

50

60

70

80

90

200 100

110

120

130

140

150

160

170

180

190

300

DEPTHS IN FATHOMS

(For deep water add a 0 to these figures)

NOAA FORM 75-21 (10-72) U.S. DEPARTMENT OF COMMERCE NOAA NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship

Comdg.

These corrections are to be used

between 19 and 19

in the locality

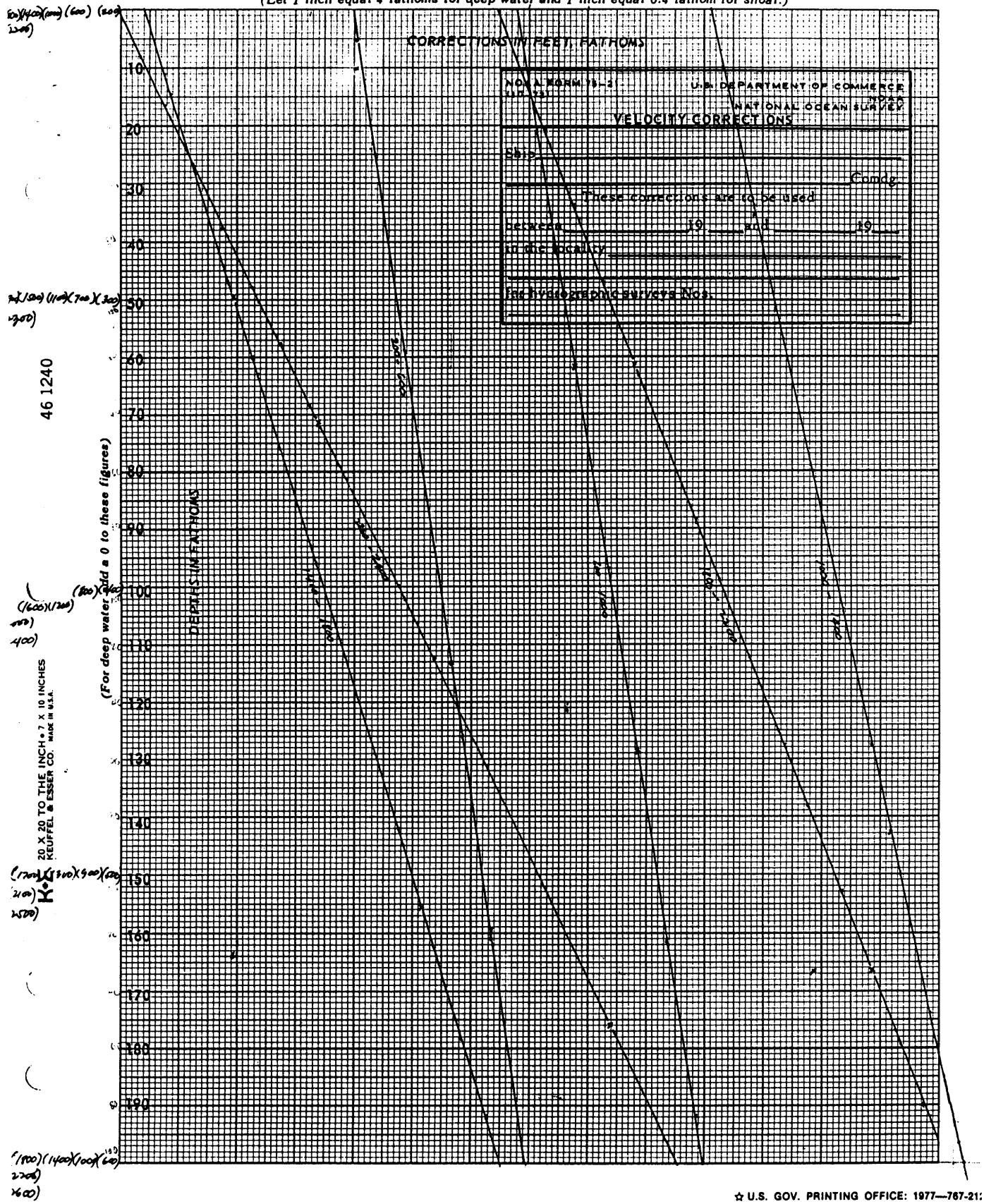
for hydrographic surveys Nos.

46 1240

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

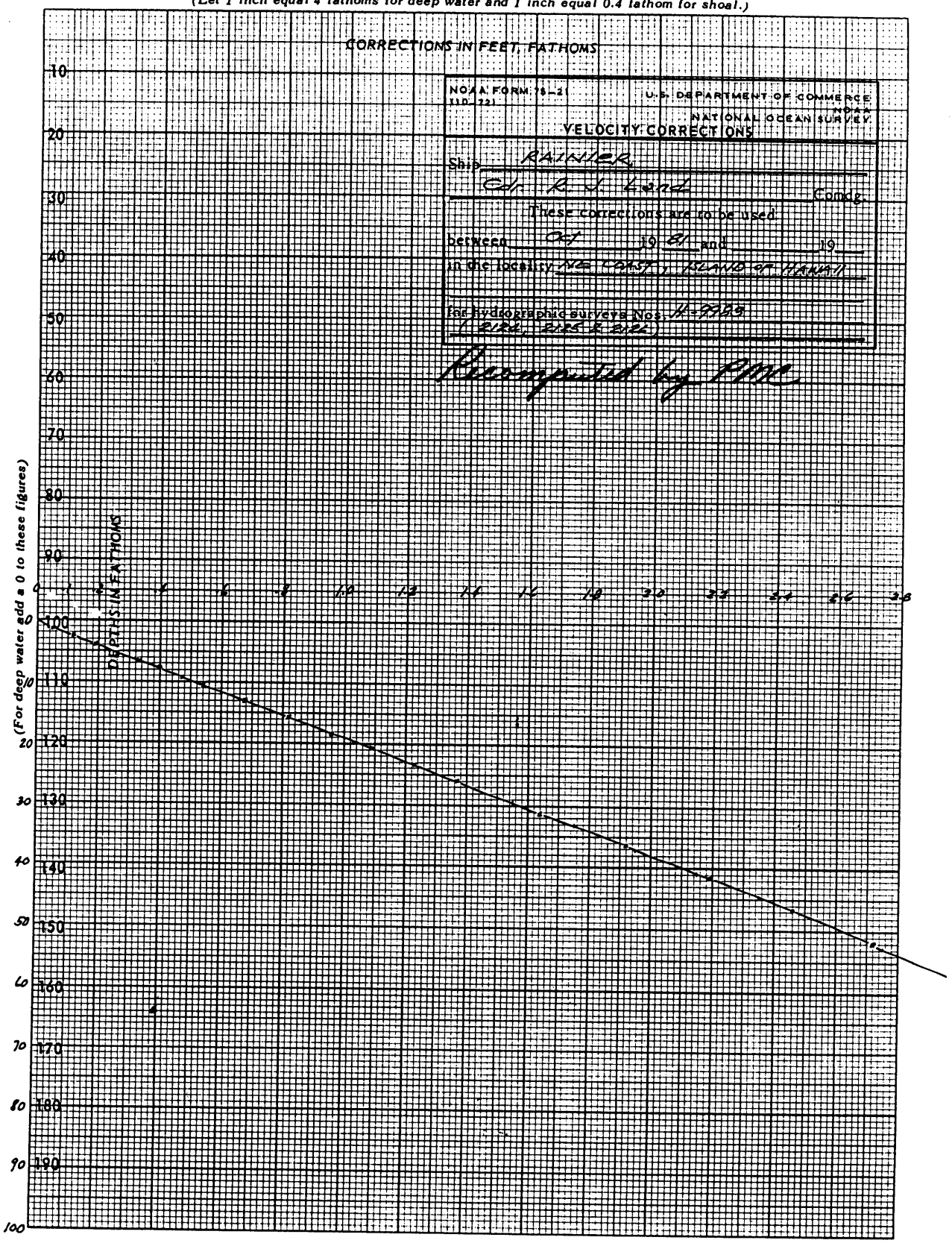
☆ U.S. GOV. PRINTING OFFICE: 1977—767-21

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



☆ U.S. GOV. PRINTING OFFICE: 1977—767-21

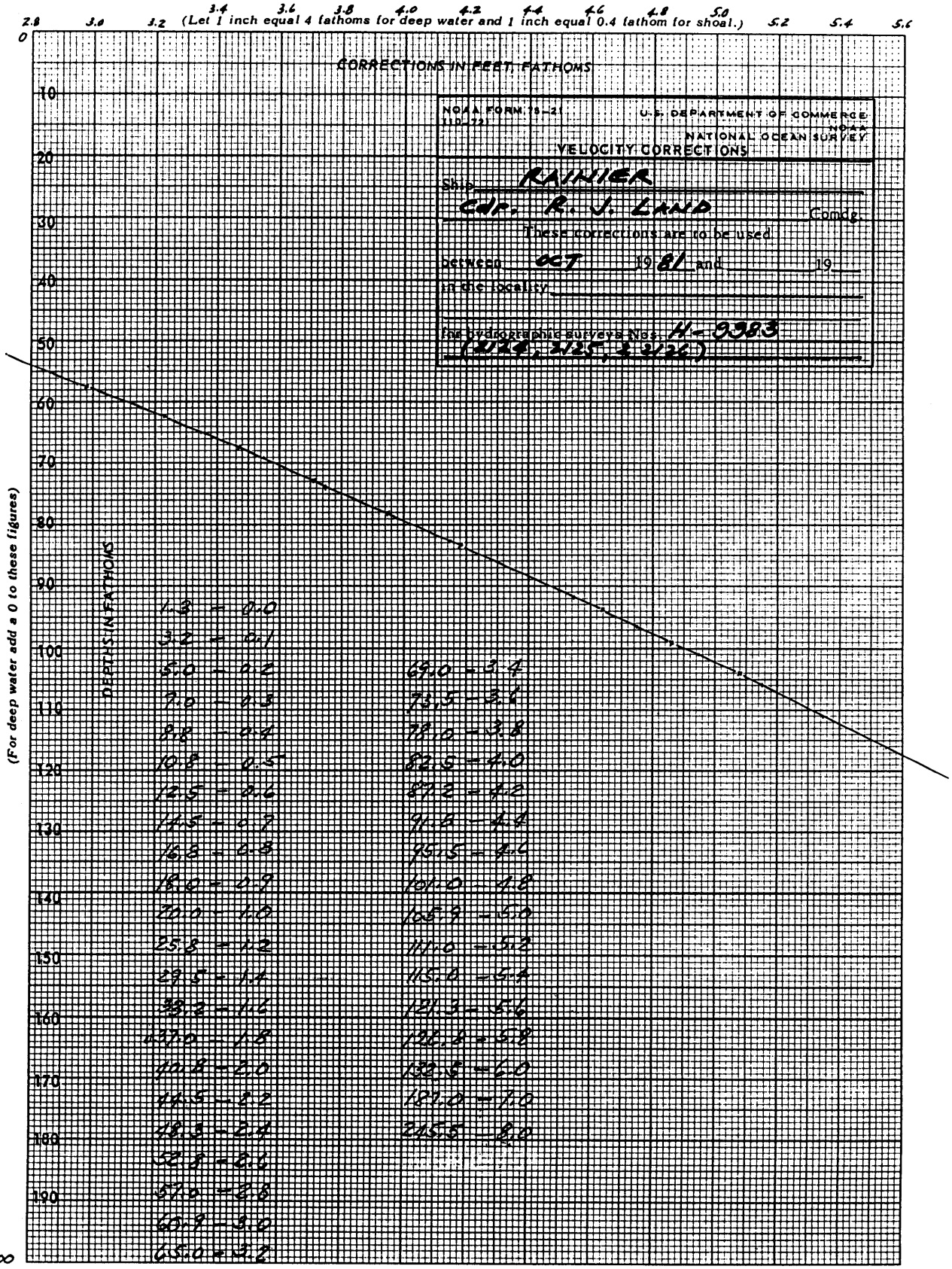
(Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)



46 1240

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

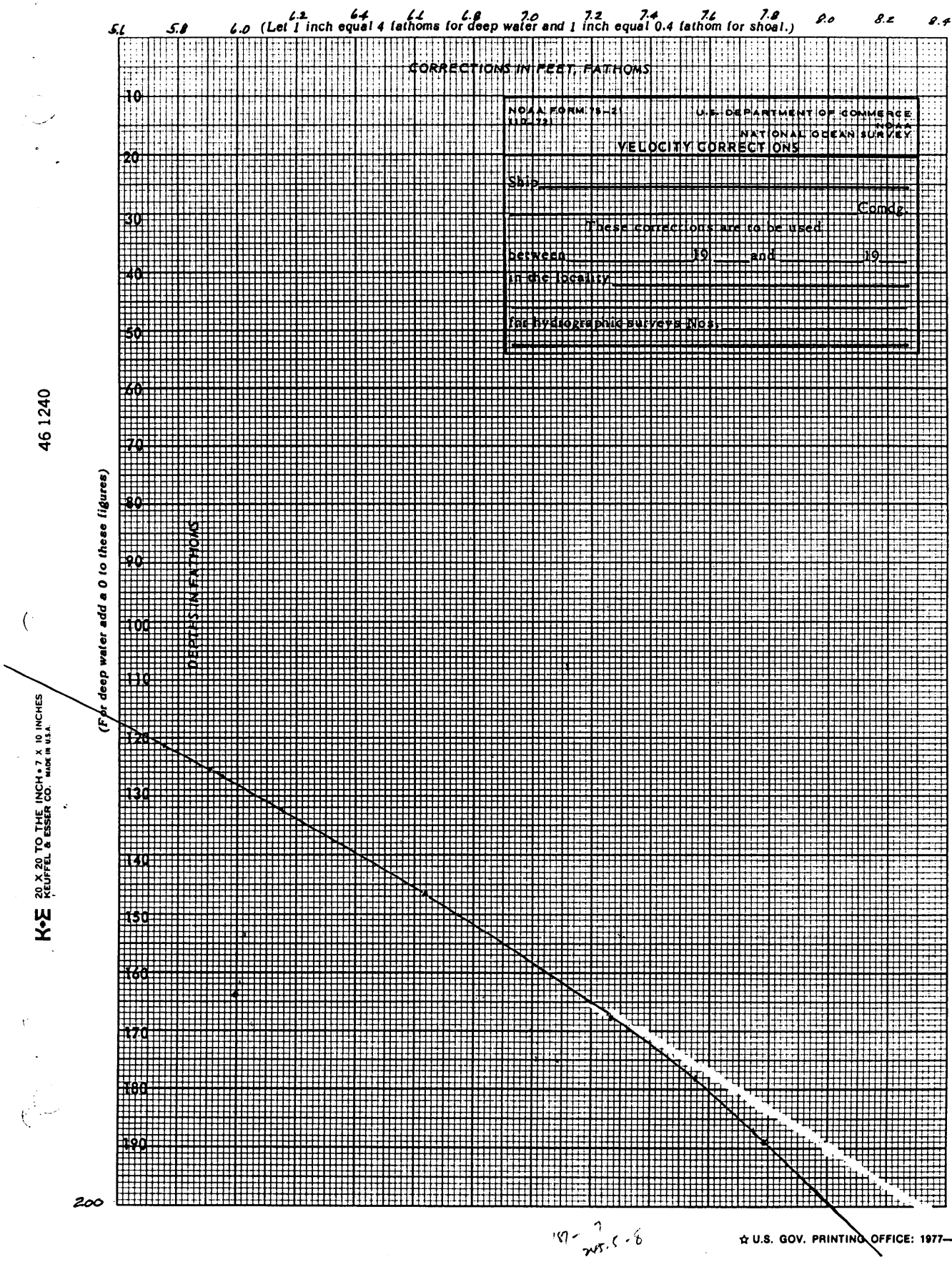
☆ U.S. GOV. PRINTING OFFICE: 1977—767-212



46 1240

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

☆ U.S. GOV. PRINTING OFFICE: 1977—767-21



46 1240

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197- 7
WS.C-6

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8.6 8.8 9.0 9.2 9.4 9.6

8.0 8.2 8.4 (Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)

100

CORRECTIONS IN FEET, FATHOMS

10
20
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150
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170
180
190

NOAA FORM 76-2
(10-72)

U.S. DEPARTMENT OF COMMERCE
NOAA
NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship _____ Comdg.

These corrections are to be used

between _____ 19___ and _____ 19___

in the locality _____

for hydrographic surveys Nos. _____

(For deep water add a 0 to these figures)

DEPTHS IN FATHOMS

46 1240

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

8.0 8.4

☆ U.S. GOV. PRINTING OFFICE: 1977—76

TRA (TC/TI) TAPE: VESSEL 2120 (RAINIER) SURVEY RA-20-5-81 (H-9975) FATHOMETER S/N BOTTOM SAMPLES YR 81 PAGE 1 OF 1

From TIME	TRA CORR.	DAY	VEL. TBL.	TRA corr. is the algebraic sum of these columns INITIAL	SCALE-PHASE	DRAFT	F. ARC	S./ SQUAT	COMMENTS
013000	0.0	292	0	0.0	N/A	0.0	N/A	N/A	BOTTOM SAMPLES
002000	0.0	303	0	0.0	N/A	0.0	N/A	N/A	" " ENDS

3-32

TRA (TC/TI) TAPE: VESSEL 2124 (RA-4) SURVEY RA-20-6-81 (H-9975) FATHOMETER S/N 1071 YR 81 PAGE 1 OF 1

From TIME	TRA CORR.	DAY	VEL. TBL.	TRA corr. is the algebraic sum of these columns INITIAL	SCALE-PHASE	DRAFT	F. ARC	S./ SQUAT	COMMENTS
183215	0.3	292	1	0.0	N/A	0.0	N/A	0.0	HYDRO BEGINS
001800	0.3	295	1	0.0	N/A	0.0	N/A	0.0	HYDRO ENDS

3-32

RA-20-5-81

TRA (TC/TI) TAPE: VESSEL 2125 (RA-5) SURVEY (H-9975) FATHOMETER S/N 1070 YR 81 PAGE 1 OF 1

From TIME	TRA CORR.	DAY	VEL. TBL.	TRA corr. is the algebraic sum of these columns INITIAL	SCALE-PHASE	DRAFT	F. ARC	S./ SQUAT	COMMENTS
202230	0.3	287	1	0.0	N/A	0.3	N/A	0.0	HYDRO BEGINS
215953	0.0	289	0	0.0	N/A	0.0	N/A	0.0	D.P ON ROCK
220220	0.3	289	1	0.0	N/A	0.3	N/A	0.0	HYDRO RESUMES
005800	0.3	304	1	0.0	N/A	0.3	N/A	0.0	HYDRO ENDS

3-3P

TRA (TC/TI) TAPE: VESSEL 2126 (RA-6) SURVEY RA-20-5-81 (H-9975) FATHOMETER S/N 1040 YR 81 PAGE 1 OF 1

From TIME	TRA CORR.	DAY	VEL. TBL.	TRA corr. is the algebraic sum of these columns INITIAL	SCALE-PHASE	DRAFT	F. ARC	S./ SQUAT	COMMENTS
201614	0.3	287	1	0.0	N/A	0.3	N/A	0.0	HYDRO BEGINS
183235	0.0	304	0	0.0	N/A	0.0	N/A	0.0	D.P ON SHOAL
184758	0.3	304	1	0.0	N/A	0.3	N/A	0.0	HYDRO RESUME
185000	0.3	304	1	0.0	N/A	0.3	N/A	0.0	HYDRO ENDS

3-32

TC/TI TAPE LISTING
RA-20-5-81(H-9975)

SHIP RAINIER - 2120

013000 0 0000 0000 292 212000 000000
002000 0 0000 0000 303 000000 000000

Bottom Samples

LAUNCH - 2124 (RA-4)

183215 0 0003 0002 292 212400 000000
001800 0 0003 0002 295 000000 000000

LAUNCH - 2125 (RA-5)

202230 0 0003 0002 287 212500 000000
215953 0 0000 0000 289 000000 000000
220220 0 0003 0002 289 000000 000000
005800 0 0003 0002 304 000000 000000

LAUNCH - 2126 (RA-6)

201614 0 0003 0002 287 212600 000000
183235 0 0000 0000 304 000000 000000
184758 0 0003 0002 304 000000 000000
185000 0 0003 0002 304 000000 000000

NOAA Ship RAINIER

Launch Settlement and Squat Tests

1981

The settlement and squat tests on RA-3, RA-5, and RA-6 were performed on 15 April 1981 off Sand Point Naval Support Activity, Lake Washington. Tests were performed on RA-4 on 27 April 1981. The full-speed test of RA-3 was performed at Kawaihae Harbor, Hawaii, on 3 October 1981.

Tests were conducted as follows: One man with a leveling rod stood over the transducer while another on shore sighted through a level to read the mark. The boats were run to the observer at the following RPM: 0, 800 (idle), 1000, 1200, 1500, 1800, 2000, 2200, and 2400. Launch RA-4 was also run at 2600 and full throttle, 2800, and Launch RA-3 at full-speed, 2750 RPM. At each speed there were at least two readings which agreed within 0.1 feet.

	RA-3 (1007)		RA-4 (1016)		RA-5 (1003)		RA-6 (1013)	
RPM	FT	FM	FT	FM	FT	FM	FT	FM
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
800	0.0	0.0	+0.1	0.0	0.0	0.0	0.0	0.0
1000	+0.1	0.0	+0.1	0.0	+0.1	0.0	0.0	0.0
1200	+0.2	0.0	+0.1	0.0	+0.1	0.0	+0.1	0.0
1500	+0.2	0.0	+0.2	0.0	+0.2	0.0	+0.1	0.0
1800	+0.3	0.0	+0.1	0.0	+0.2	0.0	+0.1	0.0
2000	+0.2	0.0	0.0	0.0	+0.2	0.0	0.0	0.0
2200	+0.1	0.0	-0.2	0.0	+0.1	0.0	-0.2	0.0
2400	0.0	0.0	-0.4	-0.1	-0.1	0.0	-0.3	0.0
2600	--	--	-0.5	-0.1				
Full RPM	-0.4 (2750)	-0.1	-0.6 (2800)	-0.1				

ABSTRACT OF POSITIONS

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

VESSEL: 2120(Ship Rainier) ANDIST: 33.5

Day	Positions	Control	S1,M,S2	Remarks
292	1000-1001	04	101-122	Bottom Samples
303	1002	04	101-122	Bottom Samples

Duplicate Positions: None.

Rejected Positions: None.

VESSEL: 2126 (RA-6) ANDIST: 0.0

Day	Positions	Control	S1,M,S2	Remarks
287	6000-6004	03	213 R/Azi	Mainscheme (mainscheme inside Exp. #1.)
287	6005-6046	03	213 R/Azi	Shoreline,Expansion #1 *(N.P.)
288	6047-6169	03	213 R/Azi	Mainscheme (mainscheme inside Exp. #1 pos. 6047-6078,6086-6120 6137-6142.)
288 -	6170-6183	03	213 R/Azi	Crossline (crossline inside Exp. #1 pos.6174-6183.)
289	6184-6276	03	112 R/Azi	Mainscheme (mainscheme inside Exp. #1 pos. 6184-6197,6202-6205.)
290	6277-6285	03	115 R/Azi	Mainscheme (mainscheme inside Exp. #2.)
290	6286-6295	03	115 R/Azi	Shoreline (shoreline inside Exp. #2.)
290/291	6296-6362	03	115 R/Azi	Mainscheme (mainscheme inside Exp. #2 pos. 6296-6304,6307-6312, 6314-6316,6320-6322.)
291	6363-6365	03	115 R/Azi	Crossline
291	6366-6409	03	115 R/Azi	Mainscheme
295	6410-6425	03	207 R/Azi	Crossline (crossline inside Exp. #3 pos.6415-6417.)
295	6426-6472	03	207 R/Azi	Mainscheme
295	6473-6479	03	207 R/Azi	Crossline
303	6480-6482	03	207 R/Azi	Crossline
304	6480-6508	03	207 R/Azi	Development,Expansion #3 *(N.P.)
304	6512	03	207 R/Azi	Detached Position (Exp. #3 Leadline.)
304	6513-6514	03	207 R/Azi	Development,Expansion #3 *(N.P.)

Duplicate Positions: 6266,6320,6394,6441,6480,6481,6482.

Rejected Positions: 6080,6187,6428,6438,6439,6509,6510,6511.

*(N.P.) = Positions are not plotted on the Smooth Sheet.

VESSEL: 2124 (RA-4) ANDIST: 0.0

Day	Positions	Control	S1,M,S2	Remarks
292	4012	03	115 R/Azi	Development,Expansion #4 *(N.P.)
292	4013-4032	03	115 R/Azi	Crossline
292/293	4033-4085	03	115 R/Azi	Development,Expansion #2 *(N.P.)
293	4086-4090	03	115 R/Azi	Mainscheme
294	4092-4113	03	115 R/Azi	Development,Expansion #2 *(N.P.)
294	4114-4127	03	115 R/Azi	Development
294	4128-4165	03	207 R/Azi	Mainscheme
294/295	4169-4184	03	207 R/Azi	Crossline (crossline inside Exp. #3 pos. 4174-4180)

Duplicate Positions: None.

Rejected Positions: 4005,4006,4082,4091,4130,4142,4143,4153,4166,4168.

*(N.P.) = Positions are not plotted on the Smooth Sheet.

VESSEL: 2125 (RA-5) ANDIST: 0.0

Day	Positions	Control	S1,M,S2	Remarks
287	5000-5014	03	213 R/Azi	Mainscheme (mainscheme inside Exp. #1)
288	5015-5106	03	213 R/Azi	Mainscheme (mainscheme inside Exp. #1 pos. 5017-5035,5045-5061 5068-5070.)
288	5107-5123	03	213 R/Azi	Crossline (crossline inside Exp. #1 pos. 5110-5116.)
289	5124-5147	03	106 R/Azi	Development,Expansion #1*(N.P.)
289	5148-5203	03	106 R/Azi	Mainscheme
290	5204-5214	03	106 R/Azi	Development,Expansion #1 *(N.P.)
290	5215-5242	03	106 R/Azi	Mainscheme
290	5243-5254	03	106 R/Azi	Crossline
290/291	5255-5285	03	114 R/Azi	Mainscheme (mainscheme inside Exp. #2 pos. 5255-5266,5268-5277 5281-5285.)
291	5286-5335	03	114 R/Azi	Mainscheme (mainscheme inside Exp. #2 pos. 5286-5290,5296-5305 5315-5318; mainscheme inside Exp.#5 pos. 5327-5328,5333-5335.)
291	5336-5345	03	114 R/Azi	Crossline (crossline inside Exp.#5 pos. 5336-5337; crossline inside Exp. #2 5339-5345.)
291	5346-5374	03	115 R/Azi	Development,Expansion #2 *(N.P.)
293	5375-5445	03	108 R/Azi	Mainscheme (mainscheme inside Exp. #5 pos. 5375-5420,5422-5427 5430-5438.)
293	5446-5462	03	108 R/Azi	Crossline (crossline inside Exp. #5 pos. 5447-5454,5458-5462.)
294	5463-5501	03	103 R/Azi	Mainscheme (mainscheme inside Exp. #5 pos. 5463-5472,5478-5486.)
294/295	5502-5568	03	104 R/Azi	Mainscheme (mainscheme inside Exp. #3 pos.5523-5526,5536-5539 5542-5545,5549-5555,5557-5560 5565-5568.)

VESSEL: 2125 (RA-5) (Cont.) Andist: 0.0

Day	Position	Control	S1,M,S2	Remarks
295	5569-5574	03	104 R/Azi	Crossline (crossline inside Exp. #5 pos. 5573-5574.)
295	5575-5581	03	104 R/Azi	Crossline (crossline inside Exp. #3 pos. 5578-5580.)
295	5582-5639	03	104 R/Azi	Mainscheme (mainscheme inside Exp. #3 pos. 5582-5585,5587-5589 5591-5593,5602-5618,5630-5639; Expansion #3 pos. 5607-5614 *(N.P.)
295	5640-5663	03	104 R/Azi	Development,Expansion #3 *(N.P.)
295/296	5664-5674	03	207 R/Azi	Development,Expansion #5 *(N.P.)
296	5675-5678	03	207 R/Azi	Mainscheme
296	5679-5691	03	207 R/Azi	Development,Expansion #5 *(N.P.)
303	5692-5701	03	207 R/Azi	Development,Expansion #5 *(N.P.)
304	5727-5738	03	207 R/Azi	Crossline

Duplicate Positions: 5560,5561,5670.

Rejected Positions: 5013,5038,5041,5278,5702,5726.

*(N.P.) = Positions are not plotted on the Smooth Sheet.

FINAL BASELINE CORRECTORS

OPR-T126-RA-81

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

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 2124 SHEET : RA-20-5-81

TIME	DAY	PATTERN 1	PATTERN 2
183215	292	+00000	+76466
000014	293	+00000	-58502
005100		+00000	+00000
180617	294	+00000	+62425
000011	295	+00000	-68585
001800		+00000	+00000

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 2120 SHEET : RA-20-5-81

TIME	DAY	PATTERN 1	PATTERN 2
013000	292	+00000	+00000
001400	303	+00000	+00000

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 2125 SHEET : RA-20-5-81

TIME	DAY	PATTERN 1	PATTERN 2
202230	287	+00000	-98302
205930		+00000	+00000
180330	288	+00000	-22041
234000		+00000	+00000
182220	289	+00000	-63115
232500		+00000	+00000
183241	290	+00000	+64205
231530		+00000	-14122
000540	291	+00000	-73438
004100		+00000	+00000
17 5720	291	+00000	-22038
224430		+00000	-31569
234500		+00000	+00000
172231	293	+00000	+54275
211000		+00000	+00000
174700	294	+00000	-62126
210400		+00000	-56234
000000	295	+00000	-50338
004200		+00000	+00000
173800	295	+00000	-60555
234400		+00000	-09568
000000	296	+00000	-47587
011000		+00000	+00000
195501	303	+00000	-13352
003620	304	+00000	-46223
005800		+00000	+00000

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 2126 SHEET : RA-20-5-81

TIME	DAY	PATTERN 1	PATTERN 2
201614	287	-00001	-06204
~~210100~~		~~+00000~~	~~+00000~~
181230	288	+00000	-19350
~~233000~~		~~+00000~~	~~+00000~~
191236	289	-00001	+32357
~~225500~~		~~+00000~~	~~+00000~~
194651	290	-00001	+16360
001410	291	-00001	+67268
~~003000~~		~~+00000~~	~~+00000~~
210034	291	-00001	-03236
~~233000~~		~~+00000~~	~~+00000~~
174009	295	-00001	-60558
~~230000~~		~~+00000~~	~~+00000~~
200214	303	-00001	-62049
~~201000~~		~~+00000~~	~~+00000~~
173457	304	-00004	-80357
183235		-00004	-81447
184758		-00004	-81440
~~185000~~		~~+00000~~	~~+00000~~

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

FINAL VERSION

101 3 20 01 40714 155 18 23484 254 0000 329649
/RED RAYDIST, 1981 VOL.1 PAGE 10

102 3 20 14 52767 155 46 19068 250 0000 329649
/KAUHOLA AZ., 1981 GREEN RAYDIST NO. 1 VOL.1 PAGE 1

103 3 20 13 14209 155 44 01327 250 0000 000000
/~~AKOHOA~~ AKOAKOA AZ MARK, 1981 VOL.1 PAGE 36

104 2 20 13 21203 155 44 03002 250 0000 000000
AKØKØA, 1913-1981 RM 1 VOL.1 PAGE 35

~~105 3 20 16 06465 155 52 02252 250 0000 000000~~
~~/GITABRIA 1981 VOL.1 PAGE 14~~

106 3 20 16 15523 155 51 15523 250 0000 000000
/EVELYN, 1981 VOL.1 PAGE 20

~~107 7 20 01 40618 155 18 23458 250 0000 000000~~
~~/KAHOLO AZ MARK 1981 VOL.1 PAGE 18~~

108 3 20 13 55873 155 44 50012 250 0020 000000
/~~KALALAE~~ KALAELAE, 1981 VOL.1 PAGE 31

~~109 2 20 01 40509 155 18 23786 250 0000 000000~~
~~/KAHOLO AZ "A" PT 1981 VOL.1 PAGE 11~~

~~110 3 20 16 10089 155 50 40551 250 0000 000000~~
~~/TULLY 1981 VOL.1 PAGE 23~~

111 3 20 15 40248 155 51 35855 250 0000 000000
/TULLY'S SILO, 1981 VOL.1 PAGE 23

112 3 20 16 02598 155 50 01229 139 0022 000000
/KEPUHI 2, 1948 201553(1042)

113 3 20 14 18619 155 45 22464 139 0023 000000
/KAPAAIKI, 1913 201553(1021)

114 7 20 14 52767 155 46 19068 250 0000 000000
/KAUHOLA AZ, 1981 VOL.1 PAGE 1

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

~~131 3 19 58 15784 155 13 52047 250 0260 000000~~
/PAPAALOA 1877 191551(1129)

132 3 19 57 18174 155 11 30481 250 0122 000000
/LONE HALE 2 1981 VOL.3 PAGE 16

133 3 20 00 05515 155 16 47981 250 0331 000000
/HUMUULA 1877 201552(1006)

134 3 20 13 21333 155 44 03383 250 0000 000000
/AKOKOA 1913-1981 RM 2 VOL.1 PAGE 34

200 3 20 15 01276 155 53 17859 139 0187 000000
/LORAN C TOWER 1964 201553(1051)

~~201 0 20 14 22440 155 49 55371 139 0024 000000~~
~~/HIND STACK 1948 201553(1011)~~

202 3 20 14 13643 155 46 55121 139 0041 000000
/KOHALA MILL STACK, 1948 201553(1044)

~~203 7 20 07 51742 155 33 31619 139 0046 000000~~
~~/KUKUIHAELE LIGHT 1981 VOL.1 PAGE 41~~

204 6 20 14 57687 155 46 27146 139 0025 000000
/KAUHOLA POINT LIGHT, 1948 201553(1026)

~~205 3 20 04 50792 155 28 00315 139 0045 000000~~
/HONOKAA HAWAIIAN TEL MICROWAVE 1967 201552(1004)

206 3 20 05 24916 155 26 16037 139 0000 000000
~~/PAAUHAU SUGAR CO STACK 1913 001558(1025)~~

207 7 20 13 21424 155 44 03232 139 0028 000000
/AKOKOA, 1913 201553(1001)

~~208 6 19 59 48364 155 14 35963 139 0008 000000~~
/LAUPAHOEHOE PT LT 1981 VOL.2 PAGE 39

209 3 20 01 01963 155 18 32630 139 0291 000000
/KAHOLO 1877 201552(1011)

210 3 20 03 14546 155 38 18626 139 1214 000000
/KAALA 1877 201553(1017)

211 3 20 02 40827 155 22 35995 139 0253 000000
~~/UPIHILALA 1881 201552(1022)~~

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

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

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

215 3 20 03 15155 155 21 47630 139 0030 000000
/PAAUILO STACK 1948 201552(1027)

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

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

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

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

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

ABSTRACT OF TIME OF HYDROGRAPHY
~~AND/OR FIELD EDIT~~

Date 12/17/81

Project No. OPR-T126-RA-81 Vessel 2120, 2124, 2125, 2126

Date of Survey

Field Sheet No. RA-20-5-81 Registry No. H-9975

Field Sheet is Complete/~~Incomplete~~

J.D.	Time (Z)		J.D.	Time (Z)
287	201614	-	287	210029
288	180330	-	288	233930
289	182220	-	289	232040
290	183241	-	291	004020
291	175720	-	291	234430
292	013000	-	293	005011
293	172231	-	293	210525
294	174700	-	295	004130
295	173800	-	296	010800
303	001400	-	304	005620
304	173457	-	304	184851

J.D.	Time (Z)		J.D.	Time (Z)
		-		

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

ABSTRACT OF TIME OF HYDROGRAPHY OR FIELD EDIT

Date 9 Dec 1981

Project No. OPR-T126-RA-81 Vessel Rainier S-221

Date of Survey 17 November - 30 November

Fieldsheet No. TP 00067/RA-20-5-81/RA-20-6-81 Registry No. _____

Fieldsheet is Complete/Incomplete

J.D.	Time(Z)		J.D.	Time(Z)
321	1800	-	321	2000
324	1800	-	324	1936
334	1800.	-	334	1945

J.D.	Time(Z)		J.D.	Time(Z)
		-		

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

ABSTRACT OF TIME OF HYDROGRAPHY OR FIELD EDIT

Date 9 December 1981

Project No OPR-T126-RA-81 Vessel Rainier S-221

Date of Survey 3-4 November 1981

Fieldsheet No. TP-00065/RA-20-6-81/RA-20-5-81 Registry No. _____

Fieldsheet is Complete/Incomplete

J.D.	Time(Z)	J.D.	Time(Z)
307	1800Z	307	1930
308	1600	308	1800Z

J.D.	Time(Z)	J.D.	Time(Z)

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

ABSTRACT OF TIME OF HYDROGRAPHY OR FIELD EDIT

Date 9 December 1981

Project No. OPR-T126-RA-81 Vessel Rainier S-221

Date of Survey 30,31 October - 3 November 1981

Fieldsheet No. TP00064 / RA-20-5-81 / Registry No. _____

Fieldsheet is Complete/Incomplete

J.D.	Time(Z)		J.D.	Time(Z)
303	2000	-	303	2359
304	1920	-	304	2200
305	1750	-	305	2000
307	1800	-	307	1900

J.D.	Time(Z)		J.D.	Time(Z)
		-		

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

ABSTRACT OF TIME OF HYDROGRAPHY OR FIELD EDIT

Date 9 December 1981

Project No. OPR-T126-RA-81 Vessel RAINIER S-221

Date of Survey 28 - 29 October 1981

Fieldsheet No. T-12528/RA-20-5-81/ Registry No. _____

Fieldsheet is (Complete)/Incomplete

J.D.	Time(Z)		J.D.	Time(Z)
301	2036	-	301	2320
302	1730	-	302	2000

J.D.	Time(Z)		J.D.	Time(Z)
		-		

NMO | 0230
SRM | 6455 mhz

RTTUZYUW RUHPTEF0188 3180045-UUUU--RUHPSUU.
ZNR UUUUU
R 140045Z NOV 81
FM NOAAS RAINIER
TO CCGD FOURTEEN HONOLULU HI
INFO NOAACPM SEATTLE WA
CM GRNC (NONE)
BT
UNCLAS
DANGER TO NAVIGATION - NOS CHART 19320. ROCK SUBMERGED
2.1 FM AT PREDICTED MLLW AT LAT 20/12/00.8 N, LONG
155/42/20.4 W. POSITION IS 2.1 NM BEARING 130 DEGREES
T FROM AKOKOA PT.
BT
#188

NNNN

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102

August 13, 1981 OA/CPM221:TGC
~~1102-19~~ Hawaii Project
1703-13

Department of the Army
Pacific Ocean Division
Corps of Engineers
Building 320
Ft. Shafter, Hawaii 96858

Dear Sir:

The NOAA Ship RAINIER will be conducting surveying operations off the Island of Hawaii this fall. The project area is from Hakalou to Upolu Pt. on the northeast coast. The ship is scheduled to be working in this area from September 24 through December 1.

In going through our files, we noted your request for a 1:1,000 scale survey off Laupahoehoe. Are there any other areas you are interested in?

Our project instructions call for investigation of possible harbors of refuge in the following areas:

Laupahoehoe Landing
Paauhau Landing
Honokaa Landing
Kukuihaele Landing
Waipio Bay
Kaewaeli Bay

We would appreciate any information on the above, such as approximate level of use and size of vessel that uses any of the above areas for landing and/or protection in rough weather.

Sincerely,

Ralph J. Land
Commander, NOAA
Commanding Officer

PODED-PH 3 September 1981

SUBJECT: Hydrographic Surveys, East Coast Island of Hawaii

Commander Ralph J. Land
Commanding Officer
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102

1. This is in response to your letter of 13 August 1981 concerning information on the following possible harbors of refuge areas on the northeast coast of the island of Hawaii:

a. Laupahoehoe Landing. This landing has the only boat ramp located in the NOAA project area. The ramp is unusable most of the time due to severe wave and surge conditions. Vessels that generally use the area are trailered motor boats (fiber glass) up to 20 feet in length. We have been requested by the State of Hawaii to evaluate the feasibility for navigation improvements at this site. The proposed 1: 1000 scale for surveys is adequate. Since we expect to initiate our studies in Fiscal Year 1982, early completion of your survey for this site will be appreciated.

b. Paauhau, Honokaa and Kukuihaele Landings. These landings are shown on NOAA charts 1926 and 1922. Historically, these launching sites were old freight landings where livestock and goods were transferred from barge to shore using longboats and outboard motorboats. We have no present plans for studies associated with these landing sites.

c. Waipio and Kaewaeli Bays. Boaters have reported beaching their boats in these bays in extreme emergencies. Otherwise, we do not have any information on present level of use and size of vessel that uses these areas. We do not expect any studies in these bays in the near future.

2. If there are any questions, please contact Mr. Earl Nagasawa of my staff at (808) 438-1907. We appreciate your cooperation in this matter.

FOR THE COMMANDER:

KISUK CHEUNG
Chief, Engineering Division

APPROVAL SHEET

DESCRIPTIVE REPORT TO ACCOMPANY

HYDROGRAPHIC SURVEY

H-9975

OPR-T126-RA-81

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

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

Ralph J. Land
Commander, NOAA
Commanding Officer

NOAA FORM 77-27
(5-77)

U. S. DEPARTMENT OF COMMERCE
NOAA

HYDROGRAPHIC SURVEY STATISTICS

HYDROGRAPHIC SURVEY NUMBER
H-9975

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS & PRELIMINARY OVERLAYS	1
DESCRIPTIVE REPORT	1	SMOOTH OVERLAYS: POS. ARC, EXCESS	12

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

T-SHEET PRINTS (List) T-12527 (1:20,000 reductions),

SPECIAL REPORTS (List)

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

PROCESSING ACTIVITY	AMOUNTS PRE-VERIFICATION	AMOUNTS VERIFICATION	AMOUNTS TOTALS
POSITIONS ON SHEET			1405
POSITIONS CHECKED		1405	
POSITIONS REVISED		526	
SOUNDINGS REVISED		291	
SOUNDINGS ERRONEOUSLY SPACED		--	
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED		--	
	TIME – HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	6	*(VER)/(EVAL)	06
VERIFICATION OF CONTROL		02/01	03
VERIFICATION OF POSITIONS		59/00	59
VERIFICATION OF SOUNDINGS		124/00	124
COMPILATION OF SMOOTH SHEET		31/11	42
APPLICATION OF TOPOGRAPHY		08/03	11
APPLICATION OF PHOTOBATHYMETRY			
JUNCTIONS		03/02	05
COMPARISON WITH PRIOR SURVEYS & CHARTS		00/18	18
VERIFIER'S REPORT		01/22	23
OTHER Geographic Names		00/06	06
TOTALS	6	228/63	297

Pre-Verification by J. S. Green	Beginning Date 2/28/82	Ending Date 2/28/82
Verification by J. N. Shofner; Evaluation by K. M. Scott	Beginning Date 5/28/82	Ending Date 6/3/83
Verification Check by J. L. Stringham, J. S. Green	Time (Hours) 31	Date 6/7/83
Marine Center Inspection by HIT	Time (Hours) 4	Date 6/17/83
Quality Control Inspection by	Time (Hours)	Date
Requirements Evaluation by	Time (Hours)	Date

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

Exam: S. Baumgardner 90 hrs 6/19/84; App [illegible] 7/5/84

PACIFIC MARINE CENTER
EVALUATION REPORT

REGISTRY NO: H-9975 FIELD NO: RA-20-5-81

Hawaii, Island of Hawaii, Upolu Point and Southeast

SURVEYED: October 14 - October 31, 1981

SCALE: 1:20,000 PROJECT NO: OPR-T126-RA-81

SOUNDINGS: Ross Fineline Model 5000 CONTROL: Mini-Ranger Range/Azimuth

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

Surveyed By.....LT R. Morris
LT S. Ludwig
LTJG J. Gordon
ENS M. Mathwig
ENS R. Koehler

Automated Plot By.....PMC Xynetics Plotter

Verified By.....J. N. Shofner

Evaluated By.....K. M. Scott

1. INTRODUCTION

H-9975 is a basic survey conducted in accordance with Project Instructions OPR-T126-RA-81, Hawaiian Islands, dated June 11, 1981, and Change No. 1 dated July 13, 1981.

This survey includes the shoreline of the Kohala region, the northern tip of the island of Hawaii. It has a predominately rocky coastline with breakers limiting the inshore hydrography.

Predicted tides based on the Honolulu gage with time and range adjustments to Hilo were used during shipboard processing. Tides used for the reduction of final soundings reflect approved hourly heights with direct zoning from the Upolu Point gage (16-7737).

Velocity corrector tables have been revised to adjust for the draft of the vessels and to average Nansen Cast data so that the correctors were more representative than a single cast.

The signal list has been revised to reflect the names and geographic positions included in the geodetic data base.

Projection parameters, revised velocity correctors and revised signal list are shown in the smooth printouts accompanying the smooth sheet and are noted in the appropriate listing included in the descriptive report.

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

2. CONTROL AND SHORELINE

Geodetic positions for control stations used during hydrography are published, and preliminarily adjusted field positions computed, using the Old Hawaiian Datum. The landmarks, Loran A Tower, 1977, Loran C Tower, 1964, and Hind Stack, 1948, are displayed at the published positions which were also computed on the Old Hawaiian Datum.

Range-azimuth methods of control were used during hydrographic operations. Calibration and system checks are discussed in section G of the descriptive report.

The following manuscripts were used for shoreline detail:

Number	Dates of Photography/Field Edit	Scale
Class I (unreviewed maps)		
T-12527	Aug. 1963/Dec. 1968 reduced to	1:20,000
TP-00064	Dec. 1976, Jan. & Mar. 1977/Nov. 1981	1:20,000
T-12528	Aug. 1963/Oct. 1981 reduced to	1:20,000

There is a thirty second section of the shoreline on T-12528 between longitudes 155°48'15"W and 155°48'45"W that has not been field edited due to a gap in photography. It has been inked on the smooth sheet. (See Descriptive Report, section H.)

The rock awash located at latitude 20°15'41.45"N, longitude 155°53'01.5"W on T-12527 is not shown on the smooth sheet due to change of manuscript compilation scale.

The rock northwest of Kepuhi Point at latitude 20°16'18.89"N, longitude 155°50'28.03"W has been added from hydrographic records.

Triangulation station KEALAHEWA 2, 1948, is misplotted on manuscript T-12528. This station is plotted at its correct geographic position on the smooth sheet.

3. HYDROGRAPHY

Crosslines incorporated within this survey are in good agreement. The discrepancies are attributed to the nature of the bottom which is steep and irregular.

The bottom configuration, development of shoal soundings, determination of least depths, and delineation of standard depth curves seaward of the five fathom curve are adequate. Inshore surf conditions precluded hydrography in most areas with depths less than five fathoms. Depth curves in those areas are segmented and the zero curve has not been delineated.

4. CONDITION OF SURVEY

The hydrographic records and reports are adequate and conform to the requirements of the Hydrographic Manual of July 4, 1976.

5. JUNCTIONS

H-9975 joins H-9019 (1:10,000) 1968 to the west. Soundings, features and elevations have been transferred to complete hydrography in the junction area. Depth curves and the junction note are inked in agreement.

H-9129 (1:40,000) 1970 lies to the northwest. There are few soundings joining the two surveys. The forty and fifty fathom curves were not drawn on H-9129. One sounding has been transferred and the junction curves completed. The note is inked accordingly.

The remainder of the survey's perimeter is bounded by surveys H-9974 (1:80,000) 1981 and H-9983 (1:20,000) 1981. Soundings are in good agreement. Depth curves and junction notes have been completed and inked.

6. COMPARISON WITH PRIOR SURVEYS

H-3651 (1914) 1:20,000
H-3652 (1914) 1:60,000

The prior surveys of this area employed sextant navigation, leadline soundings and plane tabled shoreline. Present survey soundings are consistantly less deep with differences of as much as 20 fathoms at latitude 20°12'15"N and longitude 155°41'15"W. Most soundings lie with 0-5 fathoms difference. The general bottom configuration has not changed appreciably. Differences are attributed to updated hydrographic surveying systems and methods. Due to the age of the prior surveys and the fact the soundings are consistantly less deep, no soundings have been transferred to the present survey.

There are no pre-survey review items within the limits of the survey.

H-9975 is adequate to supersede the prior surveys within the common areas.

7. COMPARISON WITH CHART

19320 (12th Ed., June 17, 1978)
19327 (8th Ed., Sept. 5, 1981)

a. Hydrography - Charted information from 19327, with only two exceptions, originates with the aforementioned prior surveys. (See section 6 of this report.) The rocks at approximately latitude 20°15'02"N, longitude 155°47'17"W do not originate with prior surveys, but are confirmed by the present survey. The charted shoreline appears to be from a more recent source.

Charted shoreline is offset seaward approximately 100m west of longitude 155°45'15"W; however, the general configuration is in agreement with the current survey except for two points of land at longitudes 155°48'12"W and 155°48'16"W. The eastern point lies at the western extremities of

photographic coverage and the other falls beyond coverage. Chart from the present source.

The two rocks at latitude 20°14'24"N, longitude 155°45'50"W and latitude 20°14'27"N, longitude 155°45'52"W were not included on the chart. Other rocks awash, sunken rocks, and ledge symbols shown on the chart, although originating with the priors, seem to indicate general foreshore features and not individual details. Soundings are in good agreement. To emphasize foreshore detail, chart from H-9975.

The eastern charting limit of chart 19327 is longitude 155°43'00"W. Comparison of the remaining hydrography was made with chart 19320.

All charted information from 19320 is in good agreement with H-9975. A rock submerged two fathoms located at latitude 20°12'00.5"N and longitude 155°42'20.3"W is considered critical to navigation and should be given special consideration during the next charting cycle. This survey should be used as the charting source. noted as 2RK (reported) on current chart.

H-9975 is adequate to supersede all charted hydrography within the common area.

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

c. Aids to Navigation - There are no floating aids to navigation within the survey area. However, there are two non-floating aids included. Both aids are accurately portrayed on H-9975 and adequately serve the purpose for which they were intended.

8. COMPLIANCE WITH PROJECT INSTRUCTIONS

H-9975 (RA-20-5-81) adequately complies with the project instructions as amended and noted in section 1 of this report.

9. ADDITIONAL FIELD WORK

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

Respectfully submitted,

Karol M. Scott

Karol M. Scott
Cartographer
June 3, 1983

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

James S. Green
Supervisory Cartographer

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

N/CG242:SRB

November 14, 1984

TO: N/CG24 - Roy K. Matsushige *ccm*

FROM: N/CG242 - George K. Myers, Jr. *George K. Myers, Jr.*

SUBJECT: Examination of Hydrographic Survey H-9975 (1981), Hawaii, Island of Hawaii, Upolu Point and Southeast

Chief of Party	R. J. Land
Field Unit	NOAA Ship RAINIER
Processed by	Pacific Marine Center
Examined by	S. R. Baumgardner

An examination of hydrographic survey H-9975 (1981) was accomplished to monitor the survey for adequacy with respect to data acquisition, conformance with applicable project instructions, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, smooth plotting, shoreline transfer, digital data standards, decisions made and actions taken by the evaluator, and the cartographic presentation of data.

Cartographic deficiencies and constructive comments are noted on a ½-scale copy of the survey smooth sheet which will be forwarded to the marine center. Digital data and/or programming deficiencies are identified on a full-scale plot made from the magnetic tape transmitted by the marine center. This plot will also be forwarded to the marine center.

In general, the survey was found to conform to National Ocean Service standards and requirements except as stated in the Evaluation Report and as follows:

1. The sounding line orientation does not conform to section 4.3.5 of the Hydrographic Manual as required by the project instructions. The requirement to run the system of sounding lines approximately normal to the depth contours was not met in all cases. Additional lines should have been run to cross depth curves where the pattern of electronic arcs parallel the bottom slope.

2. In a few cases, the line spacing requirement of 100 meters in depths of less than 20 fathoms near rocky points alongshore was not met. (See section 4.3.4.2 of the Hydrographic Manual and section 6.5.2 of the project instructions.)

3. The required number of bottom samples was not obtained. (See section 1.6.3 of the Hydrographic Manual and section 8.1.1 of the project instructions.) Therefore, bottom characteristics should have been brought forward from the prior survey in areas where depths are in agreement with the present survey.

4. The excess sounding overlays do not appear to have been utilized in drawing depth curves; also, there are numerous excessed soundings which should have been plotted. These soundings fall in open areas on the smooth sheet where developments of shoals, sounding crossings, and depth curves exist.

5. The evaluator did not specifically address the hydrographer's recommendation to retain inshore prior survey data, or to retain a 3 5/6-fathom sounding. (See section K of the Hydrographer's Report and section 6 of the Evaluator's Report.) Representative inshore soundings from the prior survey should have been brought forward to supplement the present survey.

a. A 3½-fathom sounding (about 60 meters southeast of the aforementioned 3 5/6-fathom sounding, not charted) charted at latitude 20°14.60'N, longitude 155°45.83'W originates with H-3651 (1914). This sounding, falling in deeper depths on the present survey, was not investigated. It should have been addressed in section 6 of the Evaluator's Report and brought forward to the present survey. This 3½-fathom depth should be retained on the chart until verified or disproved.

b. The 16-fathom sounding charted at latitude 20°16.78'N, longitude 155°51.10'W from H-3651 (1914) falls in present depths of 24 fathoms. This sounding appears as an isolated depth over a gravel shoal on the prior survey. It should have been investigated in the field. However, due to this omission, this depth should have been brought forward to the present survey and discussed in section 6 of the Evaluator's Report. The 16-fathom depth should be retained on the chart until verified or disproved.

6. The Comparison with Chart section of the Evaluator's Report is confusing and contains irrelevant information. The comparison, with the exception of the discussion of the shoreline offset, should have been addressed in the Comparison with Prior Surveys section of the report. With the exception of one rock, at latitude 20°15'01.4"N, longitude 155°47'17.9"W which originates with Class III Shoreline Map TP-00064 (Chart Maintenance Print, BP-108035), charted data originate with the prior surveys. This rock is on chart 19327.

7. For two landmarks, located on T-12527, the heights above ground and above MHW were not transferred to the smooth sheet as required; if the submitted form 76-40 dated 1981 (field) is correct. However, the existence in 1981 of the Loran-A tower at latitude 20°15'15.05"N, longitude 155°53'22.93"W is doubtful. The latest information furnished by the U.S. Coast Guard in Local Notice to Mariners 2, 1980, and Chart Letter 971 of 1981 indicates the tower to have been removed. Based on the above, the Loran-A tower has been deleted from the chart.

8. Two labels "ledge" between longitude 155°48'45"W, longitude 155°49'00"W appear on the final field sheet. However, the limits of the feature are

delineated by a black dashed line, rather than by the standard ledge symbol. The area delimited by the dashed line is described as ledge and foul on the Class I Shoreline Map T-12528, while the smooth sheet only shows a foul area. It is unclear whether this feature is foul, ledge, or submerged ledge.

9. The absence of delimiting lines normally drawn on the final field sheet to separate specifically described conditions or features alongshore, such as the differentiation of submerged ledge from breaker zones and foul areas, precluded an adequate portrayal of their extent on the smooth sheet.

10. Soundings identified as "missed" in the final sounding listings are annotated observed depths in the field records. These values, unsupported by a continuous profile trace, are shown on the final field sheet. Reasons for the rejection of these soundings at positions 6429 to 6432, 6449+6 to 6451, and 6471 to 6472 should have been mentioned in the Evaluator's Report.

11. Evidence of breakers noted by the hydrographer in the vicinity of the rock awash that uncovers 1 foot at mean lower low water at latitude 20°12.15'N, longitude 155°42.75'W should have been noted on the smooth sheet.

12. An outermost limit line of breakers near shore should have been delineated by the hydrographer to indicate why soundings were not run closer to shore in some areas. The inshore foul limits depicted on the smooth sheet originate with the present topographic manuscripts.

13. Except for dashed foul/breakers limit lines having been digitized twice, a few extraneous dashes, one bottom characteristic omitted, an incorrect cartographic code used for a 2-fathom depth with a "Rk" annotation, two minor depth errors, foreshore descriptions (foul, breakers, etc.) not digitized, and bottom characteristics not digitized where they appear on the smooth sheet, the digital data for this survey is conditionally accepted. However, it is suggested that more complete quality control of the digital data be initiated prior to its certification by the marine center.

DATE: May 21, 1982

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Pacific Marine Center:

Hourly heights are approved for

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

Period: October 14 - November 3, 1981

HYDROGRAPHIC SHEET: H-9975

OPR: T126

Locality: Northeast Coast, Island of Hawaii

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

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

REMARKS: Zone Direct.

Chief, Tidal Datums and Information Branch

ATTACHMENT TO DESCRIPTIVE REPORT FOR H-9975

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

11/8/83
Chief, Nautical Chart Branch (Date)

CLEARANCE:

N/MOP2:RLSandquist

SIGNATURE AND DATE:

11/8/83

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

11/9/83
Director, Pacific Marine Center (Date)

NOAA FORM 75-44
(11-72)

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

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

VESSEL	PROJ. NO.	YEAR		CHECKED BY	DATE CHECKED
2120	OPR-T126-RA-81	1981	RA-20-5-81 (H-9975)		

SERIAL NO.	DATE	SAMPLE POSITION		DEPTH (Fathoms)	WEIGHT OF SAMPLER	APPROX. PENETRATION	LENGTH OF CORE	COLOR OF SEDIMENT	FIELD DESCRIPTION	REMARKS (Unusual conditions, cohesiveness, dented cutter, stat. no., type of bottom relief i.e., slope, plain, disposition, etc.)	OBS. INIT.
		LATITUDE 20°N	LONGITUDE 155°W								
1000	10/18	16/48.0	51/12.0	27.2	80#	1"		br	Co S		RLH
1001	10/20	15/00.0	45/15.0	31.5	"				S, brk Sh		
1002	10/30	13/48.0	42/42.0	82.0	"			bk	S, brk Sh		

Use more than one line per sample if necessary.

☆ U.S.GPO:1978-765-092/1190 Region No. 6

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

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

LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY
- [XX] HYDROGRAPHIC PARTY
- [ ] GEODETIC PARTY
- [ ] PHOTO FIELD PARTY
- [ ] COMPILATION ACTIVITY
- [ ] FINAL REVIEWER
- [ ] QUALITY CONTROL & REVIEW GRP.
- [ ] COAST PILOT BRANCH

(See reverse for responsible personnel)

[XX] TO BE CHARTED
[ ] TO BE REVISED
[ ] TO BE DELETED

REPORTING UNIT (Field Party, Ship or Office)	STATE	LOCALITY	DATE
NOAA Ship RAINIER	HAWAII	NE Coast, Island of Hawaii	1/12/82

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

OPR PROJECT NO.	JOB NUMBER	SURVEY NUMBER	DATUM
OPR-T126-RA-81		H-9975	Old Hawaiian

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)	POSITION LATITUDE ° ′	LATITUDE ″ D.M. Meters	POSITION LONGITUDE ° ′	LONGITUDE ″ D.P. Meters	METHOD AND DATE OF LOCATION (See instructions on reverse side) OFFICE	FIELD	CHARTS AFFECTED
STACK	KOHALA MILL STACK, 1948	20 14	13.643	155 46	55.121		Triang. Rec. 10/81	19320 19327
LORAN TR	LORAN C TOWER, 1964	20 15	01.276	155 53	17.859		Triang. Rec. 10/81	19320 19327
LORAN TR	LORAN A TOWER, 1977 Deleted per LNM 2/80 jms	20 15	15.05651	155 53	22.95686		Triang. Rec. 10/81	19320 19327
SILO N OF THREE	TULLY"S SILO, 1981	20 15	40.243	155 51	35.864		F-3-6-L 10/81	19320 19327
STACK	HIND STACK, 1948	20 14	22.440	155 49	55.371		Triang. Rec. 10/81	19320 19327
	Dup made See L-261(84)							

RESPONSIBLE PERSONNEL		
TYPE OF ACTION	**NAME**	**ORIGINATOR**
OBJECTS INSPECTED FROM SEAWARD	LTJG JAMES R. GORDON, NOAA	☐ PHOTO FIELD PARTY ☒ HYDROGRAPHIC PARTY ☐ GEODETIC PARTY ☐ OTHER *(Specify)*
POSITIONS DETERMINED AND/OR VERIFIED	LTJG DAVID J. KRUTH, NOAA	FIELD ACTIVITY REPRESENTATIVE
		OFFICE ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		☐ REVIEWER ☐ QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.

EXAMPLE: 75E(C)6042
8-12-75

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

F - Field	P - Photogrammetric
L - Located	Vis - Visually
V - Verified	
1 - Triangulation	5 - Field Identified
2 - Traverse	6 - Theodolite
3 - Intersection	7 - Planetable
4 - Resection	8 - Sextant

A. Field positions* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L
8-12-75

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

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

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.

☆ U.S.GPO:1975-0-665-080/1155

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

NONFLOATING AIDS

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

FOR CHARTS

ORIGINATING ACTIVITY
- [XX] HYDROGRAPHIC PARTY
- [ ] GEODETIC PARTY
- [ ] PHOTO FIELD PARTY
- [ ] COMPILATION ACTIVITY
- [ ] FINAL REVIEWER
- [ ] QUALITY CONTROL & REVIEW GRP.
- [ ] COAST PILOT BRANCH

(See reverse for responsible personnel)

- [XX] TO BE CHARTED
- [ ] TO BE REVISED
- [ ] TO BE DELETED

REPORTING UNIT (Field Party, Ship or Office)	STATE	LOCALITY	DATE
NOAA Ship RAINIER	HAWAII	NE Coast, Island of Hawaii	1/12/82

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

OPR PROJECT NO.	JOB NUMBER	SURVEY NUMBER	DATUM
OPR-T126-RA-81		H-9975	Old Hawaiian

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)	POSITION LATITUDE ° ′	POSITION LATITUDE ″ D.M. Meters	POSITION LONGITUDE ° ′	POSITION LONGITUDE ″ D.P. Meters	METHOD AND DATE OF LOCATION (See instructions on reverse side) OFFICE	METHOD AND DATE OF LOCATION FIELD	CHARTS AFFECTED
LIGHT	KAUHOLA POINT LIGHT, 1948 (Kauhola Point Light L/L # 3668)	20 14	57.687	155 46	27.146		Triang. Rec. 10/81	19320 19327
AERO	HAWI UPOLU AIRPORT BCN, 1977	20 15	57.5057	155 51	53.0758		Triang. Rec. 10/81	19320 19327
	NC/dip file							

RESPONSIBLE PERSONNEL		
TYPE OF ACTION	**NAME**	**ORIGINATOR**
OBJECTS INSPECTED FROM SEAWARD	LTJG JAMES R. GORDON, NOAA	☐ PHOTO FIELD PARTY ☒ HYDROGRAPHIC PARTY ☐ GEODETIC PARTY ☐ OTHER *(Specify)*
POSITIONS DETERMINED AND/OR VERIFIED	LTJG DAVID J. KRUTH, NOAA	FIELD ACTIVITY REPRESENTATIVE
		OFFICE ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		☐ REVIEWER ☐ QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS
Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.
EXAMPLE: 75E(C)6042
8-12-75

FIELD

I. NEW POSITION DETERMINED OR VERIFIED
Enter the applicable data by symbols as follows:

F - Field	P - Photogrammetric
L - Located	Vis - Visually
V - Verified	
1 - Triangulation	5 - Field identified
2 - Traverse	6 - Theodolite
3 - Intersection	7 - Planetable
4 - Resection	8 - Sextant

A. Field positions* require entry of method of location and date of field work.
EXAMPLE: F-2-6-L
8-12-75

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

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

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.

☆ U.S.GPO:1975-0-665-080/1155

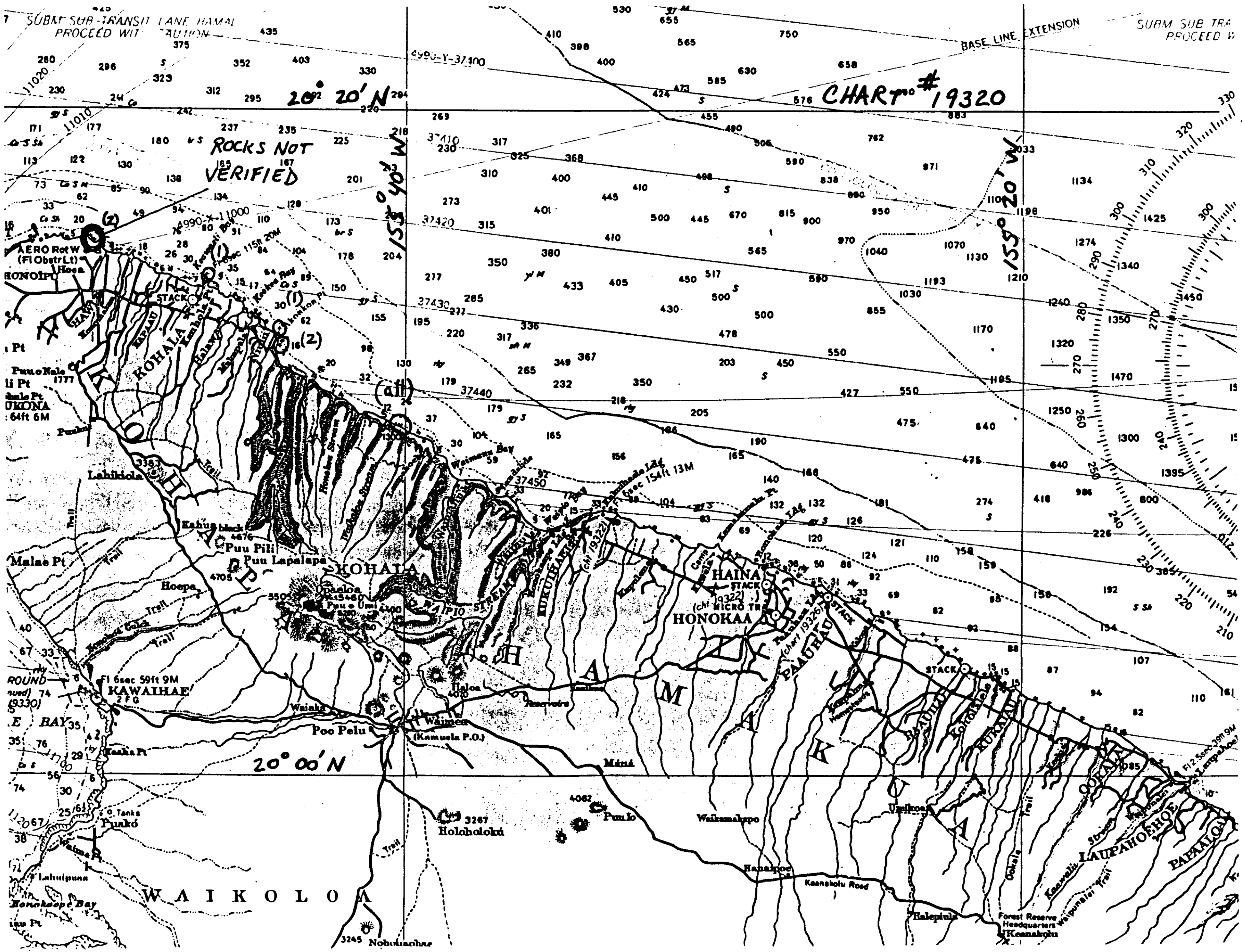
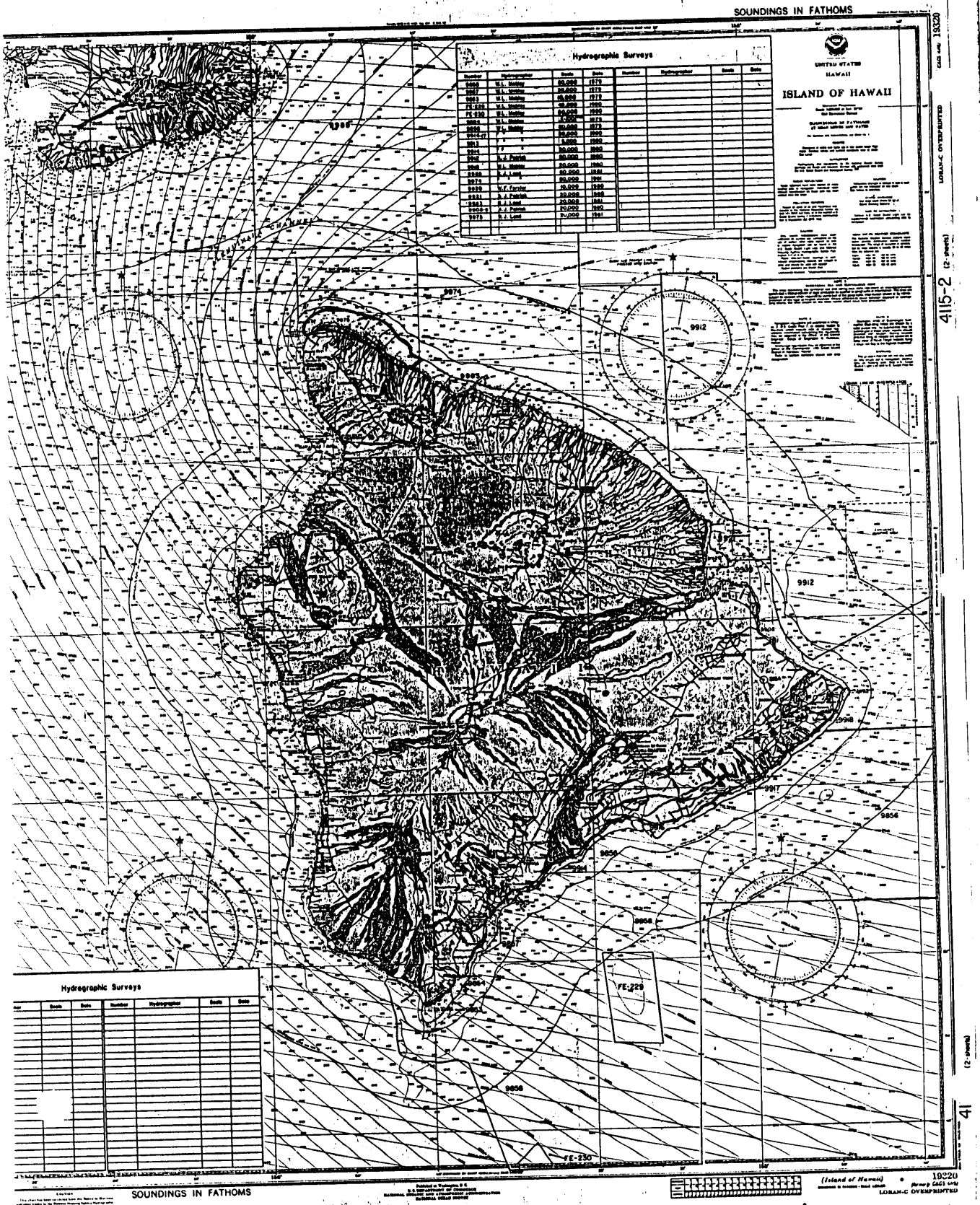
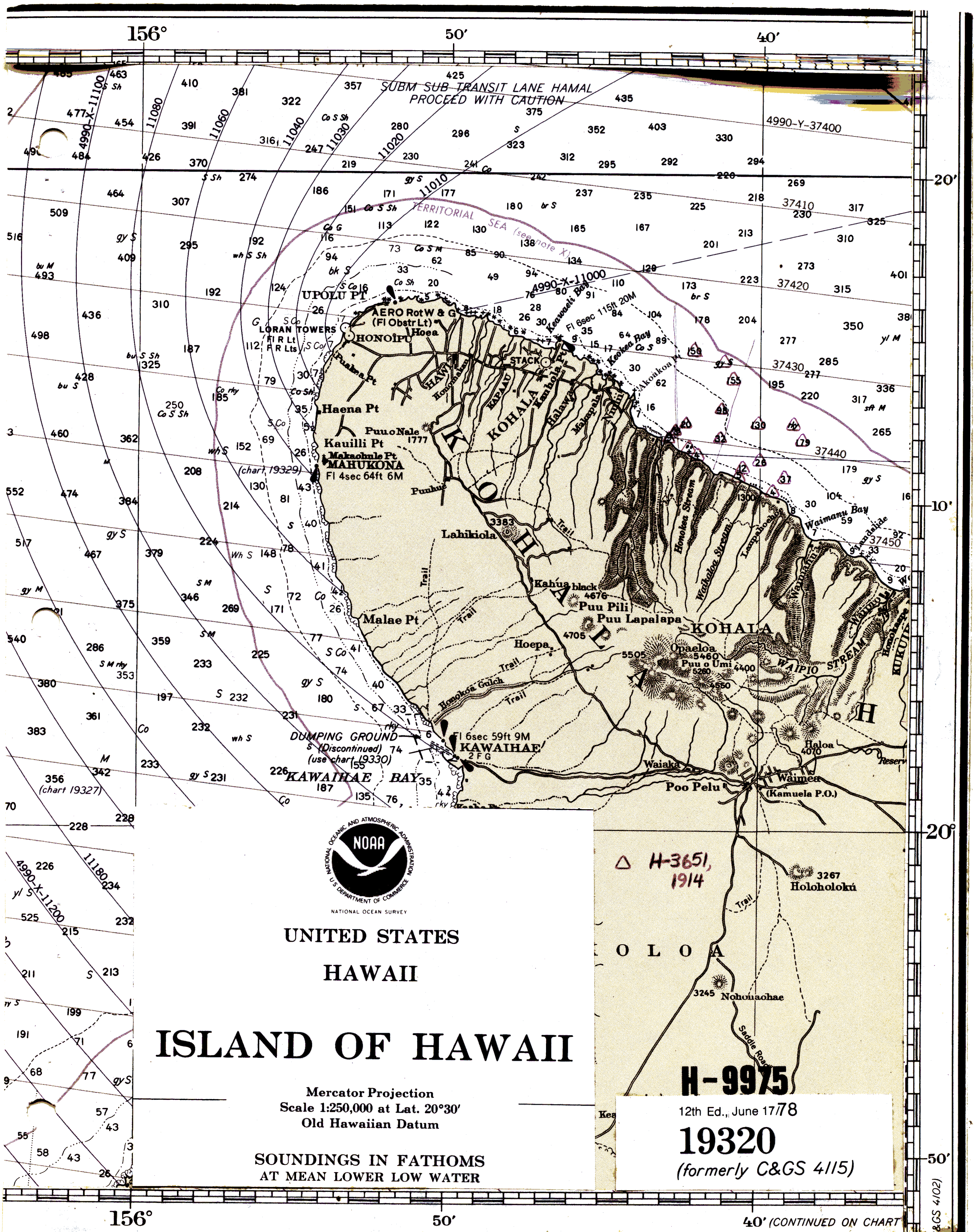


CHART #19320
20° 20' N
20° 00' N
155° 40' W
155° 20' W
ROCKS NOT VERIFIED
SUBM SUB-TRANSIT LANE HAMAL PROCEED WITH CAUTION
SUBM SUB TRA PROCEED W
BASE LINE EXTENSION
4990-Y-37400
4990-X-11000
AERO Rot W (Fl Obstr Lt)
HONOIPU
KOHALA
KAWAIHAE
Fl 6sec 59ft 9M
Puu Pili
Puu Lapalapa
Waimea
(Kamuela P.O.)
Poo Pelu
HONOKAA
HAINA
PAAUHAU
KUKUIHAELE
WAIPIO STREAM
Waimanu Bay
Holoholoku
Puako
WAIKOLOA
HAMAKUA
LAUPAHOEHOE
PAPAALOA
STACK
Keaaholu Road
Forest Reserve Headquarters


SOUNDINGS IN FATHOMS
ISLAND OF HAWAII
UNITED STATES
HAWAII
Hydrographic Surveys
4115-2 (2 sheets)
19320
LORAN-C OVERPRINTED
9912
9974
9917
9856
9868
9867
9864
9858
FE-229
FE-230
SOUNDINGS IN FATHOMS
(Island of Hawaii)
19220
LORAN-C OVERPRINTED
41 (2 sheets)



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

UNITED STATES

HAWAII

ISLAND OF HAWAII

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

SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER

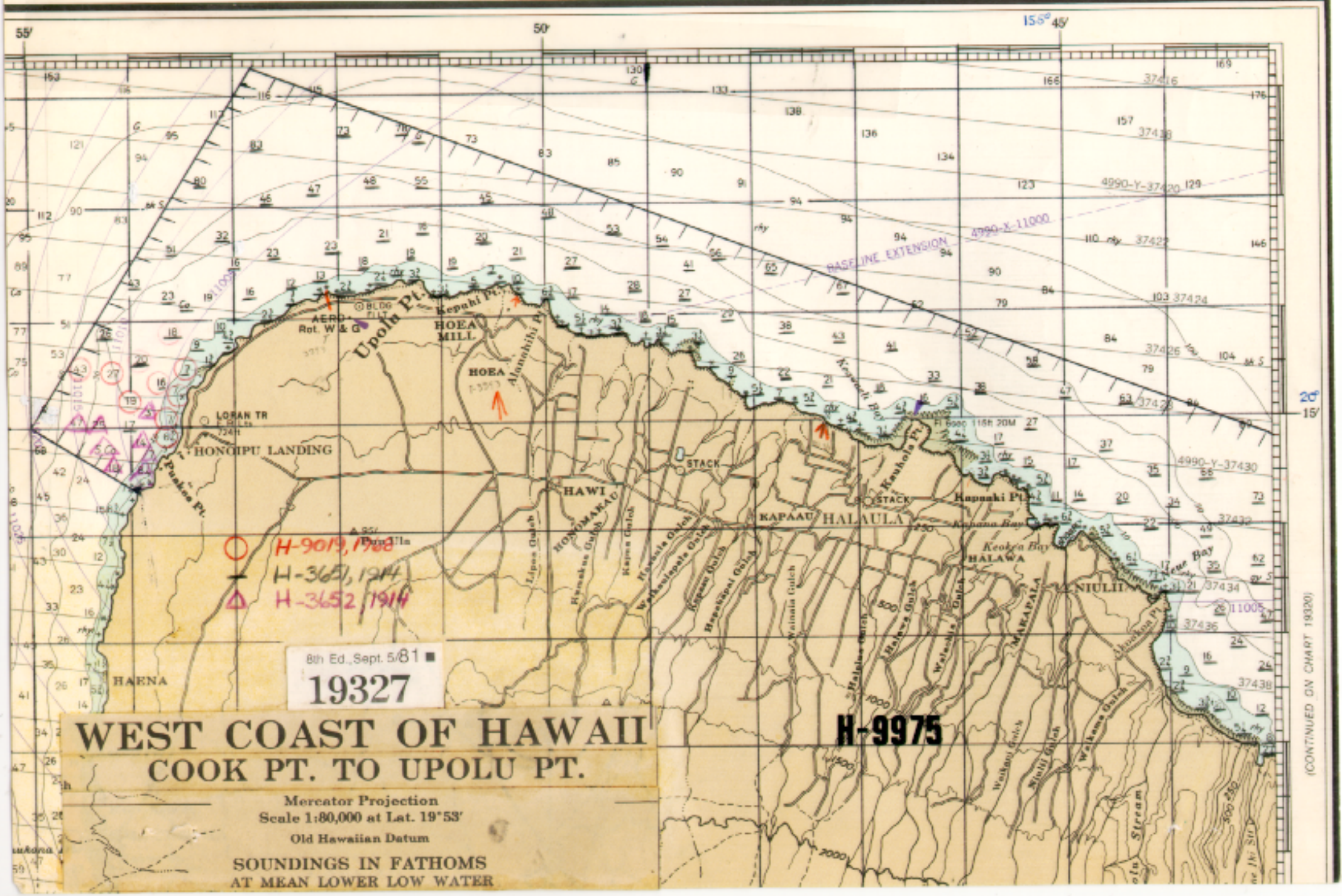
12th Ed., June 17/78

19320

(formerly C&GS 4115)

SOUNDINGS IN FATHOMS

Nautical Chart Catalog No. 2, Panel C



FORM C&GS-8352
(3-25-63)

NAUTICAL CHART DIVISION

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9975

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
19010	9-24-84	B. Fernandes	~~Full~~ Part Before After Verification Review Inspection Signed Via Drawing No. 15 Exam for Critical Coor only, N.Cor
19320	8-11-88	Charles E James	~~Full~~ Part Before ~~After Verification~~ Review Inspection Signed Via Drawing No. 16
19327	8-10-88	Charles E James	~~Full~~ Part Before ~~After Verification~~ Review Inspection Signed Via Drawing No. 11
540	5-1-90	B. Fernandes	Full ~~Part Before~~ After ~~Verification Review~~ Inspection Signed Via Drawing No. 18
19004	7/11/90	Jamescon	Full ~~Part Before~~ After Verification Review Inspection Signed Via Drawing No. full application of Sndgs. from SS thru 19320.
19010	7/31/90	Elsie B. Domingo Jr	Full ~~Part Before~~ After Verification Review Inspection Signed Via Drawing No. Full application of Sndgs from SS thru 19004
19007	8/30/90	Elsie B. Domingo Jr	Full ~~Part Before~~ After Verification Review Inspection Signed Via Drawing No. Full application of Sndgs from SS thru 19004
19320	9/9/90	Stanley Clark	~~Full Part Before After Verification Review Inspection Signed Via~~ ~~Drawing No.~~ full application of Sndgs from SS
19340	10/3/90	Elsie B. Domingo Jr	Full ~~Part Before~~ After Verification Review Inspection Signed Via Drawing No. Full application of Sndgs from SS thru 19320.
19327	10/12/90	Elsie B. Domingo Jr	Full ~~Part Before~~ After Verification Review Inspection Signed Via Drawing No. Full application of Sndgs from SS.
19327	2-6-91	Ed Martin	in full after verification, Review, Inspection Drawing 12, replace 3½ fm & 16 fm sdg, improve sdgs & sym
19320	2-6-91	Ed Martin	in full after Verification, Review, Inspection Drawing 17, agreement with 19327 drg 12, improve sdgs & curves

FORM C&GS-8352 SUPERSEDES ALL EDITIONS OF FORM C&GS-975.

USCOMM-DC 8558-P63