10061

Diagram No. 4116-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. FA-20-3-82

Office No. H-10061

LOCALITY

State Hawaii

General Locality East Coast of Oahu

Locality Kahana Bay to Kahuku Point

19 82-83

CHIEF OF PARTY
CDR W.F. Forster & CAPT C.Andreasen

LIBRARY & ARCHIVES

DATE March 29, 1985

☆U.S. GOV. PRINTING OFFICE: 1980—768-230

Area 6
CHS

19357 ✓	80,000
19340 ✓	250,000
19004 ✓	600,000
19010 ✓	675,000
19007 ✓	1:660,000 TO SIGN OFF SEE "RECORD OF APPLICATION"
19013 ✓	675,000
540 ✓	3,121,170
530 ✓	4,860,700

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

H-10061

HYDROGRAPHIC TITLE SHEET

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD NO.

FA-20-3-82

State: Hawaii

General locality: East Coast of Oahu

Locality: Kahana Bay to Kahuku Point

Scale: 1:20,000

Date of survey: ~~26 October-19 November 1982~~ 5 October-30 November 1983

Instructions dated: 30 July 1982, 19 August 1983

Project No.: OPR-T126-FA-82, OPR-T126-FA-83

Vessel: FAIRWEATHER (2020), (2023), (2024), (2025), Whaler-2 (2028), Monark-4 (2029)

Chief of party: Cdr. W. Forster and Capt. C. Andreasen

Surveyed by: Lt. K. Andreen, Lt. S Ramsey, Lt. T. Rulon, Lt. T. Otsubo, Lt(jg) J. Bailey, Ens. R. Migaiolo, Ens. A. Francis, Ens. J. Koch, Ens. T. Tisch, Ens. J. Salmore, Ens. W. Mitchell, CST E. Krick

Soundings taken by echo sounder, hand lead, pole: Ross Fineline 5000, Raytheon DE 719B

Graphic record scaled by: FAIRWEATHER Personnel

Graphic record checked by: FAIRWEATHER Personnel

Verified by: M.G. Sanders

Automated plot by: PMC Xynetics Plotter

Evaluated by: C.R. Davies

Soundings in: fathoms at MLLW and tenths

REMARKS: Marginal notes in black by evaluator. Separates are filed with the hydrographic data.

Quality Assurance 3/16/89 GRM

SC 4-22-97

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

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-665-010-1174

158 00 157 50 157 40

	OCT	NOV
SQ NM SOUNDING LINE	19	579
LNM SOUNDING LINE	651.3	1364.4
BOTTOM SAMPLES	58	140
NANSEN CAST	1	2
WATER SAMPLES ANALYZED	11	31
HYDRO CONTROL STATIONS	10	1
TIDE GAGE INSTALLED,	1	1

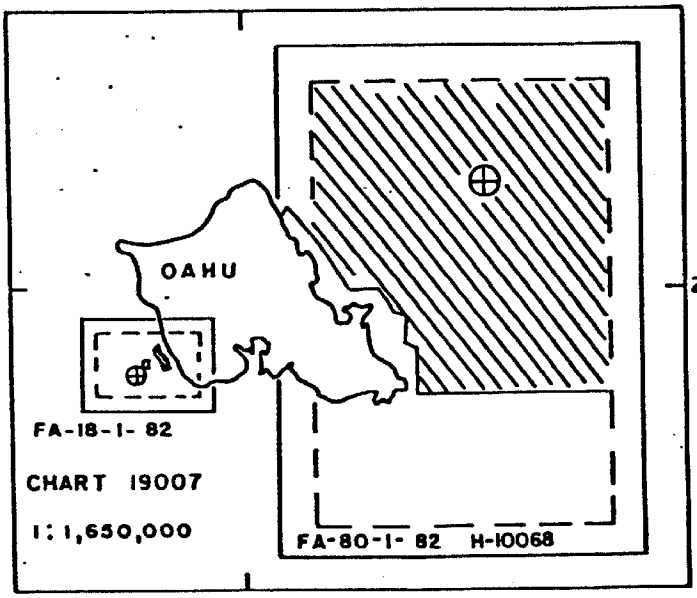
△ STATIONS ESTABLISHED

⊘ STATIONS RECOVERED

⊖ TIDE GAGE

⊕ NANSEN CAST

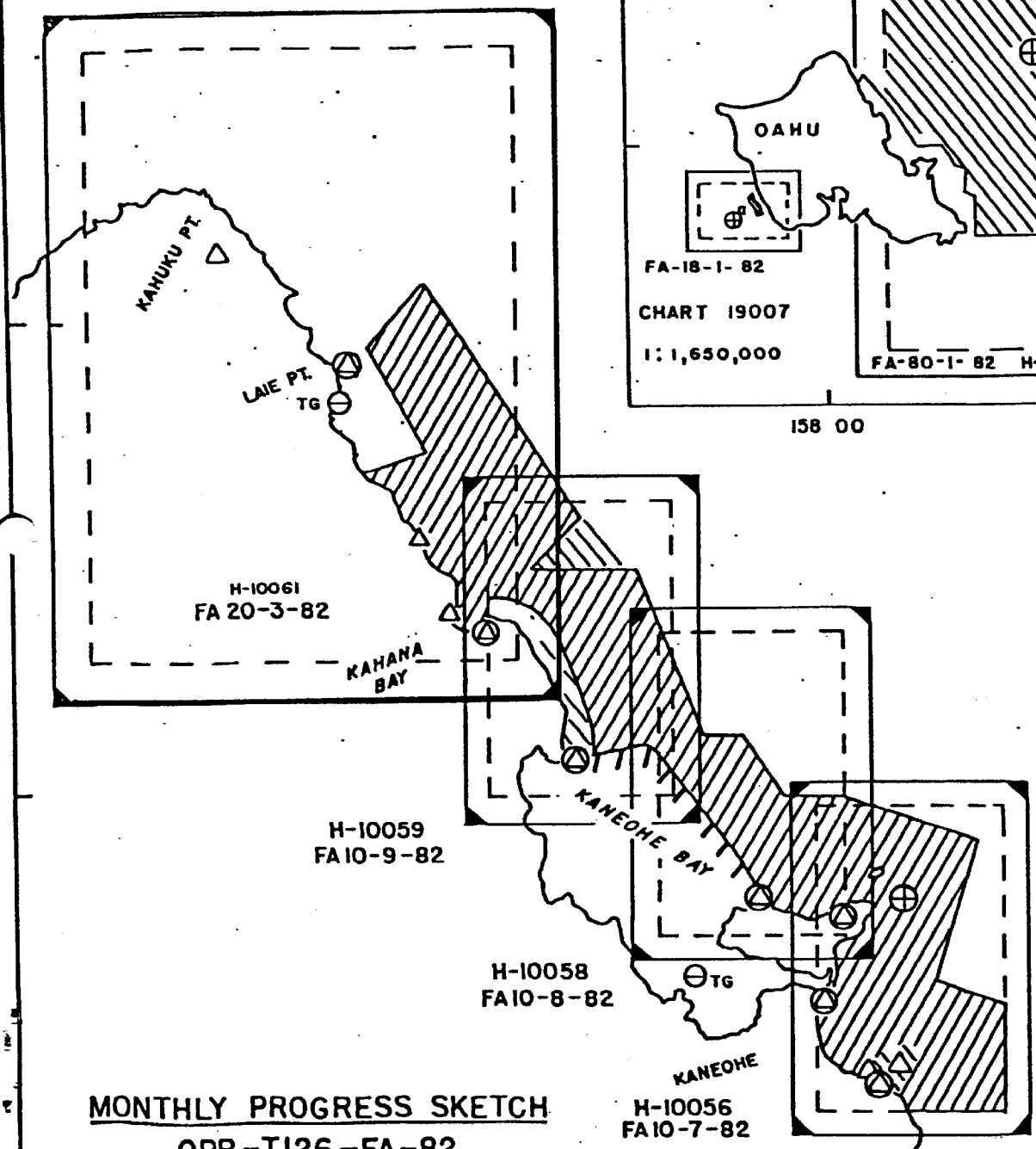
21 50



21 30

21 40

158 00



21 3

21 2

MONTHLY PROGRESS SKETCH

OPR-T126-FA-82

ISLAND OF OAHU, HAWAII

NOAA SHIP FAIRWEATHER (S-220)

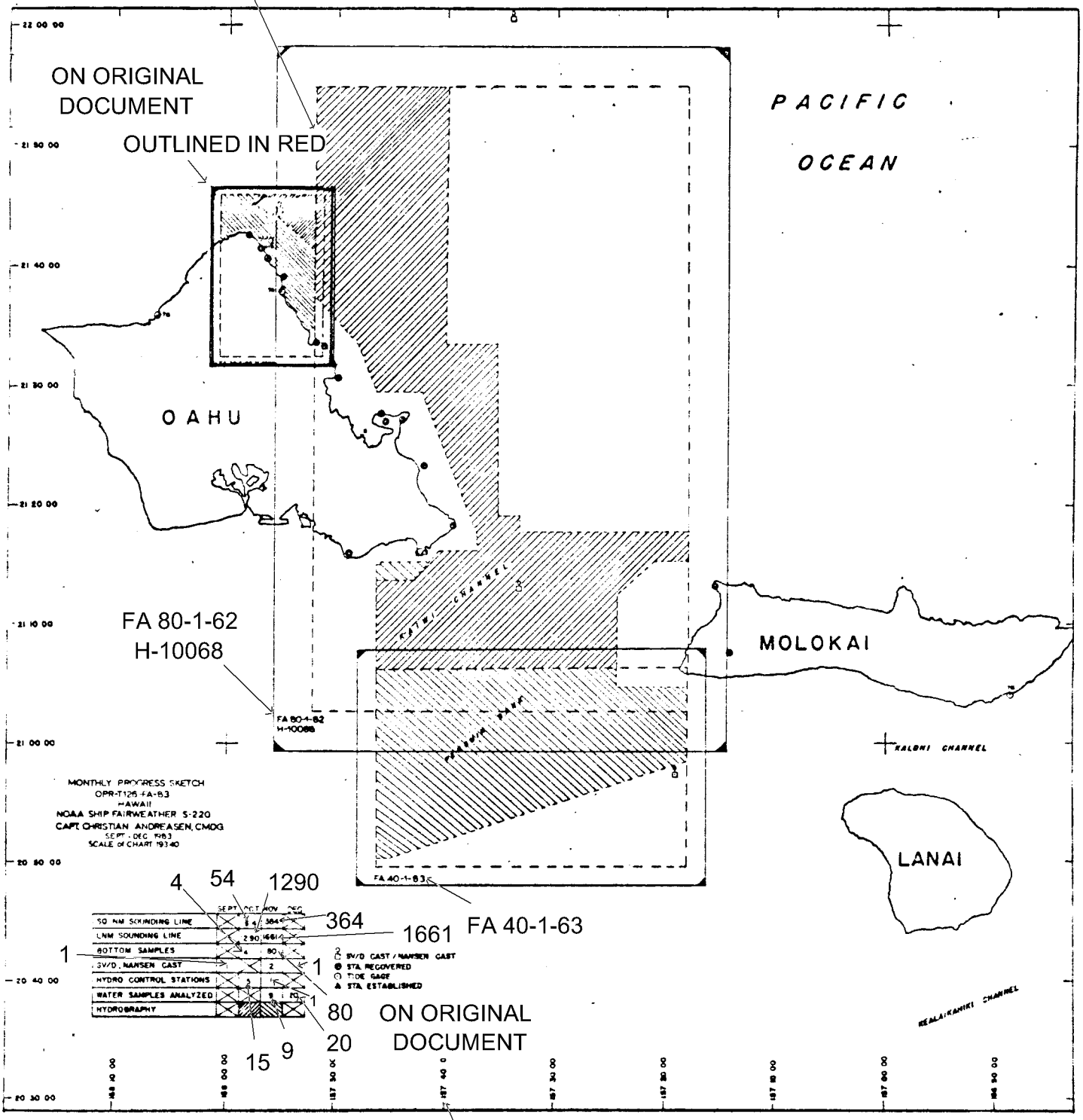
CDR. WALTER F. FORSTER, CMDG.

CHART 19340 1:80,000

2

ON ORIGINAL DOCUMENT

FILLED TO EDGE WHERE RED OVERWRITES RED



Descriptive Report

to Accompany

Hydrographic Survey H-10061 (Field Number FA-20-3-82)

Scale: 1:20,000

NOAA Ship FAIRWEATHER S220

Cdr. Walter F. Forster, NOAA — Commanding Officer (1982)
Capt. Christian Andreasen, NOAA — Commanding Officer (1983)

A. Project

This survey was conducted during two field seasons in accordance with the following sets of Project Instructions: 1) OPR-T126-FA-82 dated 30 July 1982 with Change No. 1 dated 7 September 1982, Change No. 2 dated 17 November 1982, and Change No. 3 dated 20 January 1983; and 2) OPR-T126-FA-83 dated 19 August 1983 with Change No. 1 dated 20 September 1983. The Hydrographic Manual (Fourth Edition), PMC OPORDER, and the Data Requirements Letter dated 14 April 1983 are also applicable to this survey.

B. Area Surveyed

The area covered by this survey lies on the northeast coast of the Island of Oahu and ranges from Kahana Bay to Kahuku Point. The area is bounded by the Island of Oahu and longitude 158°00'W to the West, latitude 21°46'N to the North, latitude 21°34'N to the South, and to the East by longitude 157°52'W southward to latitude 21°38'N and thence along a line extending southeastward to longitude 157°49'W at latitude 21°34'N.

Survey operations were conducted from 26 October (JD 299) to 19 November (JD 323) 1982 and from 5 October (JD 278) to 30 November (JD 333) 1983.

C. Sounding Vessels

Soundings were obtained by the ship FAIRWEATHER (2020), the Jensen survey launches FA-3 (2023), FA-4 (2024), FA-5 (2025), Whaler-2 (2028) and Monark-4 (2029). FAIRWEATHER (2020) was used to obtain all Nansen and SV/D casts for this survey. See Table III, Nansen and SV/D Casts.

D. Sounding Equipment and Corrections to Echo Soundings

The Jensen survey launches were equipped with Ross Fineline 5000 narrow beam echo sounders. FAIRWEATHER was equipped with a Raytheon Line Scan Recorder/ EDO transceiver. The 17' Whaler-2 and Monark-4 were equipped with portable Raytheon 719B fathometers. Serial numbers and days of usage are listed in Table I, Sounding Equipment.

Table I
Sounding Equipment

Dates JD	Instrument	Model	Analog	Transceiver	Digitizer	Inverter
1982						
Launch FA-3 (2023)						
299-323	Ross	5000	1097	1047	1054	1046

Table I, Sounding Equipment (Cont'd)

Dates JD	Instrument	Model	Analog	Transceiver	Digitizer	Inverter
Launch FA-4 (2024)						
299-323	Ross	5000	1047	1046	1046	1054
Launch FA-5 (2025)						
299-323	Ross	5000	1036	1054	1036	1052
FAIRWEATHER (2020)						
283-284	Raytheon	LSR	C256	203	----	317
1983						
Launch FA-3 (2023)						
278-312	Ross	5000	1046	1046	1046	1046
313-314	Ross	5000	1054	1046	1047	1046
318-333	Ross	5000	1046	1046	1047	1046
Launch FA-4 (2024)						
278	Ross	5000	1097	1048	1046	1054
279-293	Ross	5000	1097	1048	1054	1054
296-308	Ross	5000	1097	1048	1046	1054
309-318	Ross	5000	1097	1048	1046	1054
320-333	Ross	5000	1097	1048	1046	1054
Launch FA-5 (2025)						
278-333	Ross	5000	1036	1054	1036	1103
Launch WH-2 (2028)						
313	Raytheon	719B	6261	----	----	----
Launch MON-4 (2029)						
333	Raytheon	719B	7348	----	----	----

The Ross recorders were phase calibrated and the belt tension was checked daily and whenever paper was changed. The fathometer initial was continuously monitored and adjusted as necessary. Initial and phase errors were insignificant and not applicable to soundings collected on this survey. All data was scanned at least twice, to compare analog values to corresponding digital depths and to insert peaks and deeps between soundings. The effects of excessive wave and swell action were adjusted at this time in accordance with Section 4.9.8.2 of the Hydrographic Manual. Depths on this survey range from 0.½ to 271 fathoms.

The FAIRWEATHER was equipped with a Raytheon Line Scan Recorder/EDO transceiver combination which was used for all soundings taken from the ship.

The transducer for the FAIRWEATHER's sounding system is located on the centerline of the ship. The EDO number 1 transducer, which is skeg mounted, was used for all soundings acquired by the Raytheon system. See figure 1, FAIRWEATHER Transducer Location Diagram, for a sketch of the transducer locations.

A 17 foot aluminum skiff, Monark-4 (2029), and a 17 foot fiberglass skiff, Whaler-2 (2028) were used to survey close inshore areas around reefs. These vessels were equipped with a Raytheon DE-719 portable fathometer. The transducers for these units were securely mounted to a rigid frame at a transducer draft of 1.0 foot. All data acquired by these vessels was read from the analog traces and logged by hand in the sounding volume. Data for these two vessels is recorded in feet on the fathometer trace, sounding volume, and on all data tapes. Plotting on the field sheet was done in fathoms. Calibration and adjustment of the DE-719's was typically conducted before/during hydrography and whenever paper was changed, in accordance with PMC OPORDER, Appendix T, dated 2 April 1982.

Two problems remain with the skiff data. On 313/314 no leadline comparison was made (Lt. Ramsey, OIC) with the portable sounding equipment in Whaler-2 (2028). Due to this, the data obtained should be rejected (Pos. 9001-9010 and 9012-9041). However, the data was plotted for informational purposes. For this data a TRA of one foot was used for plotting. On JD 333 Monark-4 (2029) capsized and the analog record (fathogram) was lost/destroyed; however, that day's data has been plotted on the final field sheet using the data as recorded in the sounding volume. *All data shown on smooth sheet. No significant problems apparent.*

Other problems encountered with echo sounders while performing this project consisted of the following:

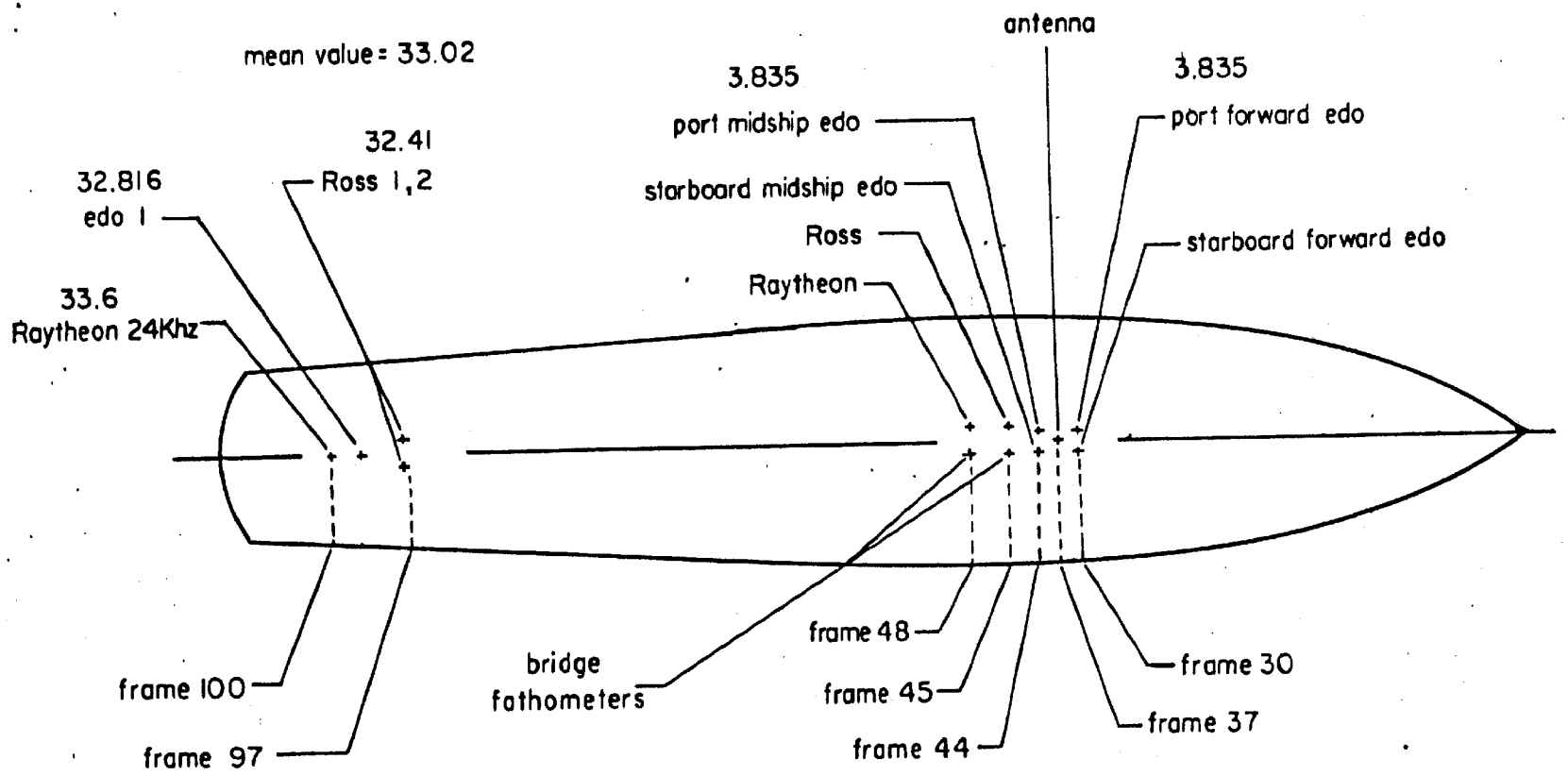
On JD 279 the power supply of the Ross transceiver (1048) in vessel 2024 short circuited and the unit was replaced by transceiver (1047) which had previously been installed in vessel 2020. Ross transceiver (1048) was repaired and reinstalled aboard vessel 2020. No data was lost due to this problem. *concur*

On JD 309 no hardware interrupt was being generated by the Ross system aboard vessel 2024. The digitizer (1054) was replaced by one (1046) which had previously been installed aboard vessel 2020. No data was lost due to this problem. *concur*

On JD 313 the Ross 5000 recorder (1046) in vessel 2023 could not be calibrated properly and the unit was replaced by recorder (1054) which had previously been installed aboard vessel 2020. Recorder (1046) was repaired and returned to service aboard vessel 2023 on JD 318. No data was lost due to this problem. *concur*

On JD 333 after the completion of hydrography, vessel 2029 was caught in heavy surf and capsized. Therefore, no graphic records are available and no vertical cast was conducted to check the systems operation. With the exception of one short sounding line, however, the data collected was accomplished by sounding pole and only verified by the fathometer. It is recommended that all sounding data from

FAIRWEATHER TRANSDUCER LOCATION DIAGRAM, APRIL 1982



numerical values are distance in meters forward or aft of antenna

this day not be rejected as the fathometer is considered to have been operating properly, and the data is from areas behind and near the fringing reefs, areas where hydrography is extremely dangerous to obtain. concur

The FAIRWEATHER's three survey launches, FA-3 (2023), FA-4 (2024), and FA-5 (2025), were tested for settlement and squat between 10 March and 23 March 1982 and between 3 April and 7 April 1983 in Shilshole Bay, Seattle, Washington. Settlement and squat measurements were conducted in accordance with Section 4.9.4.2 of the Hydrographic Manual. All launches were tested at speeds from idle to 2700 RPM in 200 RPM increments. A Zeiss Ni 2 level was used to read a stadia rod held over the transducer once launch speed was attained. A tide staff was read simultaneously with the stadia rod reading to correct for tidal influences. The test results were used to plot settlement and squat curves for each launch.

According to Section 4.4.9.2 of the Hydrographic Manual, settlement and squat correctors shall be determined to the nearest 0.2 foot. However, for surveys in fathoms Table 4-4 and Section 4.9.2 state that corrections need not be applied for correctors less than 0.1 fathom. In addition, there are no means available for the Hydroplot system to accept corrector increments of less than 0.1 fathom when surveying in fathoms. Using this criteria, launch speeds at which a 0.1 fathom corrector becomes applicable are listed in Table II. During survey operations, survey speeds of the three survey launches were restricted to a range (see Table II) such that the corrector would not exceed 0.1 fathom, eliminating the need for applying settlement and squat correctors to the data.

Table II
Restricted Settlement and Squat Speeds

1982

Launch	Restricted RPM
FA-3 (2023)	2250-2700
FA-4 (2024)	2450-2700
FA-5 (2025)	2300-2700

1983

Launch	Restricted RPM
FA-3 (2023)	None
FA-4 (2024)	Above 2650
FA-5 (2025)	Above 2530

Settlement and squat correctors were not applied to data collected by the ship during this project nor was a ship settlement and squat test conducted. According to Table 4-4 of the Hydrographic Manual, settlement and squat correctors of less than 0.2 fathom need not be applied for depths over 20 fathoms in exposed waters. FAIRWEATHER's TRA of 2.3 fathoms is based on mean draft of 13.8 feet.

Settlement and squat tests were not conducted for the two skiffs (vessels 2028 and 2029) as they operated at low speeds where the effect of settlement and squat is minimized. Therefore, no settlement and squat correctors were applied to data collected by these two vessels. The TRA of 1.0 feet is based on physical measurements of the two transducer installations.

Due to large swells and rough seas, launch bar checks were conducted primarily in the protected waters of Kaneohe Bay which lies adjacent to the survey area. Bar check data combined with velocity data were used to determine launch TRA correctors. During the 1982 field season a TRA value of 0.2 fathom was obtained for all launches. In 1983, these graphs show TRA values of 0.4 fathom for launches FA-3 and FA-4 and 0.3 fathom for launch FA-5. All soundings on the final field sheet were plotted using the 0.3 fathom TRA for all launches.

Leadlines and sounding poles were used to measure least depths over shoal areas. All leadline, sounding poles and bar check lines were calibrated prior to beginning and upon completion of the Hawaiian project during both field seasons. No leadline correctors are applicable to soundings collected during this project.

Velocity correctors were determined by using data from four Nansen and SV/D casts in accordance with the Hydrographic Manual, section 4.9.5.2.

Velocity correctors for 1982 field work were determined from one Nansen cast (No. II). For this cast, reversing thermometers and Beckman salinometer (59435 and 1063) were calibrated by Northwest Regional Calibration Center (NRCC), Seattle, Washington in March 1982.

The 1983 velocity correctors were determined from one Nansen and two SV/D casts. The tow SV/D casts were taken using a Plessy Model 9040 Environmental Profiling System (5638), calibrated by the NRCC in April 1983. An onboard PDP8/E FOCAL computer program was used to convert the frequency readings of the SV/D system into engineering units for determination of the sound velocity profiles. The unit suffered a data communication failure sometime prior to the last cast requiring a Nansen cast to be performed. The reversing thermometers and Beckman Salinometer (59435) used during 1983 were calibrated by NRCC in March and April, 1983. See Table III, Nansen and SV/D Casts, for the dates and geographic positions of each cast.

Table III
Nansen and SV/D Casts

1982

Cast Number	Date	Latitude	Longitude
II	JD 291	21°31'59"N	157°42'52"W

1983

I (SV/D)	JD 271	21°44'00"N	157°49'30"W
II (SV/D)	JD 307	21°12'00"N	157°33'00"W
IV	JD 336	21°02'00"N	156°34'24"W

For more information and calibration data refer to Corrections to Echo Soundings Reports, OPR-T126-FA-82 and OPR-T126-FA-83.

E. Hydrographic Sheets ✓

All field sheets were plotted aboard FAIRWEATHER using PDP/8E and Complot plotters. All hydrographic records will be forwarded to Pacific Marine Center, Seattle, Washington for verification.

The sheets were plotted as follows:

Sheet	Dimensions	Skew
FA20-3N-82	21x36 inches	302 degrees
South Sheet	20x56 inches	307 degrees
1:5,000 insert	21x40 inches	040 degrees
1:1,000 develop.	12x20 inches	000 degrees

F. Control Stations ✓

Horizontal control for this survey was performed by FAIRWEATHER personnel. Conventional traverse and triangulation methods were used throughout the project.

The following stations were used in support of this usrvey:

Station Name	Signal Number
MAKA PUU PT SOUTH RAYDIST 1982 d.m.	100
BOZO 1982 d.m.	450
STATE SURVEY 5-1 1969 r.m.	500
STATE SURVEY 5-3 1969 r.m.	502
STATE SURVEY 5-3 RM1 1969 r.m.	504
ELNA d.m.	530
ELNA RM 1 d.m.	531
LAIE POINT 1969 r.m.	~~550~~ *
LAIE POINT ECC #1 d.n.m.	551
LAIE POINT ECC #2 d.n.m.	553
LAIE POINT RM 2 1969 r.m.	~~554~~ *
MAKA 1982 d.m.	560
DUNE 1982 d.m.	602
WIND 1982 d.m. (Mini-Ranger)	609
WIND 1982 d.m. (Raydist)	610
WIND RM 1 1982 d.m.	~~611~~ *
WIND AZIMUTH 1983 d.m.	614
TIP 1932 r.m.	654
HYATT 1982 d.n.m.	656

r=recovered m=monumented d=described n=not * not used on H-10061

All control was based on the Old Hawaiian Datum. All field measurements and shipboard calculations were accomplished to Third Order Class I accuracy or better. Concur No unconventional survey methods were used, no anomalies in control adjustment or in closures and ties were encountered.

For further details on horizontal control for this project see the horizontal control reports OPR-T126-FA-82 and OPR-T126-FA-83.

G. Hydrographic Position Control ✓

Hydrographic position control for the launches and skiffs was accomplished using Motorola Mini-Ranger III in range-range and range-azimuth configurations. For ship hydrography, the Teledyne-Hastings Raydist system, Type DR-S, was used in the range-range mode. Continuous observation of the Raydist strip chart recorder was maintained to insure prompt detection of lane jumps or problems with the Raydist system.

In 1982 four launch-days of hydrography were rejected due to a position control problem. Range-azimuth hydrography conducted by Vessel 2023 on JD 321 (pos. 2645-2687) and vessel 2025 on JD 301, 302 and 322 (pos. nos. 6000-6223) failed to junction with concurrent range-range hydrography. This data failed to conform to the shoreline limits of survey. Detailed analysis of system check data for all Mini-Rangers used on this survey revealed no deficiencies in the electronic positioning equipment. Positions of the instrument and initial stations were checked and verified on the signal listing. The theodolite used was inspected and found operational. Comments on the raw data printout indicated that visibility was limited by rain and mist during JD 321/322. The azimuth observer confirmed that he experienced considerable difficulty on several occasions. Because no consistent or documentable corrector could be used to obtain junctional and shoreline agreement, the data in question was rejected.

No data was lost as a result of electronic positioning errors. All data rejections were caused by visual control problems, as previously discussed.

Table IV summarizes the electronic control equipment used for this survey.

Table IV
Electronic Control Equipment

Vessel	Mini-Ranger Console-R/T Unit	Dates
	1982	
FA-3 (2023)	701/1538	JD 299-302
FA-4 (2024)	B0323/1946	JD 301-323
FA-5 (2025)	701/1538	JD 322-323
	1983	
FA (2020)	701/1538 Raydist Navigator - 96 Hazlow Interface - 20 Transmitter - 090	JD 284, 293
FA-3 (2023)	B0323/1946	JD 278-328
FA-4 (2024)	703/B1419	JD 279-328
FA-5 (2025)	506042/B1398	JD 278-314
WH-2 (2028)	506042/B1398	JD 313, 314
MON-4 (2029)	701/1538	JD 333

Calibration and system checks of the Mini-Ranger system consisted of the following methods: baseline calibrations, fixed point, theodolite intersection, multirate comparison and baseline crossing. Calibration of the Raydist system was accomplished using three Motorola Mini-Ranger III transponders and RK 561

with a check computation, Calibrations were performed at the beginning of hydrography and periodically throughout the survey to ensure accounting of full and partial lanes. Calibrations were routinely performed at dawn and dusk, and whenever a lane-jump was suspected or indicated by RK 112 NAVRERR 01 message.

Baseline calibrations and system checks were conducted in accordance with Appendices M and S of the PMC OPORDER. Details of the baseline calibrations in support of this survey are contained in the Electronic Control Reports OPR-T126-FA-82 and OPR-T126-FA-83. Attempts to conduct system checks on the open coast were generally unsuccessful due to rough seas and lack of suitable stationary calibration points. Baseline crossings were conducted in the survey area on calm days, supporting the BLC corrector values and providing general confirmation of the signal list positions for those stations utilized. All critical, and the remainder of non-critical systems checks, were conducted in the sheltered waters of Kahana and Kaneohe Bays. Kaneohe Bay Entrance Range Front Light was geodetically located for use as a fixed point system check. In order to make system checks possible, transponders were regularly relocated from stations in the survey area to Stations Pako or Mokolii in Kaneohe Bay or Station Elna in Kahana Bay.

Launch and skiff antennae were located over the transducers, eliminating the need for ANDIST corrections to the launch data. The ship used the skeg transducer with an ANDIST correction of 32.8 meters.

No unusual weather conditions adversely affected positional accuracy on this survey although a number of hurricanes, including Iwa, occurred during the Hawaii deployment. No hydrography was conducted with weak control geometry or less than minimum signal strength values as determined by BLC data.

For more information, refer to the electronic control reports for OPR-T126-FA-82 and OPR-T126-FA-83.

H. Shoreline ✓

In this survey area, shoreline maps are not available. On the final field sheet shoreline was provided by 1:20,000 enlargements of 1:24,000 USGS orthophoto quadrangle maps plotted on our survey sheets "for orientation purposes only".

Shore details have not been field edited and no control stations were located seaward of the shoreline.

I. Crosslines ✓

Crosslines comprised 20% of mainscheme hydrography for this survey. For the 1:5,000 harbor of refuge development (Kahana Bay), crosslines comprised 19% of mainscheme hydrography.

All crossline soundings meet the requirements of Section 1.1.2 of the Hydrographic Manual.

J. Junctions ✓

This survey junctions with contemporary surveys H-10059 (1982, 1:10,000) and H-10068 (1982-83, 1:80,000). All sounding comparisons meet the requirements of Section 1.1.2, Part B of the Hydrographic Manual. However, in one area at 21°36.2'N, 157°57.5'W sounding lines do not overlap. This should present no problem since there is no evidence of unusual bottom characteristics in this area.

See EVAL Report Section V

K. Comparison with Prior Surveys ✓

No AWOIS items were located within the limits of this survey.

Comparisons were made between this survey and 1:20,000 scale copies of six prior surveys which overlapped the limits of this survey. These prior surveys are:

Survey	Scale	Year
H-3252	1:20,000	1910
H-3289	1:20,000	1910-11
H-3290	1:20,000	1910-11
H-5318	1:5,000	1932-33 (not blown up to 1:20,000)
H-5319	1:5,000	1933
H-5320	1:5,000	1933
H-5335	1:5,000	1933

All soundings which do not meet the criteria of "Section 1.1.2, Part B of The Hydrographic Manual are indicated on the prior surveys by color coding; blue indicates depths deeper than H-10061 and green indicates depths shoaler than H-10061.

Overall agreement is excellent between this and the prior surveys with over 98% agreement between corresponding soundings. In one case a previously surveyed depth was neither verified nor disproved by this survey. At 21°40'00"N, 157°35'22"W a least depth of 1.8fm over a pinnacle rock is shown on surveys H-5319 and H-5335. The nearest sounding on H-10061 was 6.5 fm. It is recommended that the depth of 1.8fm be carried forward to the smooth sheet. For all other discrepancies it is recommended that H-10061 supercede all prior surveys.

See Section VII of EVAL Report

concur

L. Comparison with the Chart ✓

Comparison was made between this survey and Chart 19357, 16th Edition, 5 December 1981 enlarged to 1:20,000 scale. Over 95% of soundings meet the requirements of Section 1.1.2, Part B of the Hydrographic Manual.

Discrepancies have been indicated on the chart enlargement. Depths in green are shoaler than H-10061 with depths in blue being deeper. In one instance, at 21°40'00"N, 157°55'27"W, the charted depth of 1 3/4 fm was neither verified nor disproved. An adjacent sounding on H-10061 shows a depth of 6 fm. It is recommended that the charted depth be carried forward. For all other discrepancies, it is recommended that soundings from this survey supercede the charted depths.

See Section VII of EVAL Report

Four localized contour discrepancies exist between this survey and chart 19357. These are: entrance to Kahana Bay, 21°34.7'N, 157°51.5'W; Punaluu, 21°35.1'N, 157°52.5'W ; Kalaipaloa, 21°36.1'N, 157°53.3'W; and North Laie Bay, 21°39.7'N, 157°55.5'W. This survey shows that the 3 and 10 fathom contour lines extend farther inshore than is shown by the chart. It is recommended that these contours supersede charted contours. concur

One special shoal investigation was performed just north of Kiheiwamuku rock in the vicinity of 21°40.7'N, 157°55.5'W. The position and sounding of the least depth for this area correspond exactly to that shown on the chart. The position of the least depth was determined by reducing line spacing to 4 m across the area of the shoal which could be visually observed by launch personnel during its development. Position numbers used for this investigation were 4604 through 4644.

Additionally, a 1:5,000 scale survey was performed of Kahana Bay in accordance with Section 10.4, Harbors of Refuge, of the "Project Instructions". The bay provides a boat ramp and a sheltered anchorage for small vessels. It is also possible, at times, for small boats to make beach landings here. The entrance to the bay was free of breaking waves on a day when ship's personnel observed eight foot seas and 20 knot winds. The bay also provides access to the relatively sheltered areas behind the reefs just north of Makalii Point where refuge could also be available.

One non-sounding feature was found in this area. At 21°38.45'N, 157°55.24'W, 0.6 NM SSW of Laie Point (position number 9011), a drain pipe was present which was not shown on the chart, prior surveys or the topographic quadrangle maps. copy attached The position of the pipe was determined by the range-azimuth method. A sketch of the pipe, along with its dimensions, may be found on page three of sounding volume two which is included in the data records of this survey.

In many areas of this survey, dangerous breakers are present. These are indicated on the field sheet and are annotated on the raw records. Breakers are rarely indicated on this portion of the chart and indeed, if the word "breakers" were used to indicated their presence it would stretch over the whole range of shoreline. In an area such as this it perhaps would be better if a symbol to identify areas of breakers rather than the word existed as a charted cartographic symbol such that areas generally free of breakers could be identified for a boater to gain access for a beach landing. However, from a practical standpoint, revision of depth curves to delineate "cuts" through the reefs with deeper waters extending nearshore will provide the same result.
On the chart, sunken rocks are located in areas of breakers on the smooth sheet. No source for the sunken rocks were found.

M. Adequacy of Survey ✓

With the exception of shoreline, which is not based on current manuscripts, this survey is complete and adequate to supercede prior surveys. However, additional hydrography, at a larger scale, is necessary to further define reefs and the shallow areas inside of them on the inshore parts of this survey. See Eval Report Section VI

N. Aids to Navigation ✓

No aids to navigation exist within the limits of this survey. concur

O. Statistics

1982

Vessel

	2020	2023	2024	2025	2028	2029	Total
Positions	--	94	340	60	--	--	494
Nautical Miles	--	17	46	4.5	--	--	66.5
Square Miles	--	2	7	0.3	--	--	9.3
Bottom Samples	--	0	0	0	--	--	0

Kahana Bay Harbor of Refuge Development

Positions	--	343	--	--	--	--	343
Nautical Miles	--	24	--	--	--	--	24
Square Miles	--	0.3	--	--	--	--	0.3
Bottom Samples	--	8	--	--	--	--	8

1983

Vessel

	2020	2023	2024	2025	2028	2029	Total
Positions	103	535	452	285	42	15	1432
Nautical Miles	25.2	66	131	37.4	0	0	259.6
Square Miles	9.5	3.7	18.5	2.2	0	0	33.9
Bottom Samples	3	0	28	0	0	0	31

Combined Totals

1982-1983

	2020	2023	2024	2025	2028	2029	Total
Positions	103	972	792	345	42	15	2269
Nautical Miles	25.2	107	177	41.9	0	0	351.1
Square Miles	9.5	6	25.5	2.5	0	0	43.5
Bottom Samples	3	8	28	0	0	0	39

Tide control for this survey was by tide gauge 2702 located one mile south of Laie Point. Two velocity casts were made in 1982 and four in 1983. No magnetic or current stations were established within the survey limits.

P. Miscellaneous

Anomalous longshore and rip currents are common along the shoreline in the survey area. For a detailed discussion of currents, in compliance with Section 8.2 of the "Project Instructions", see the memo following this section entitled: "Currents OPR-T126-FA-82, Hawaiian Islands".

Q. Recommendations ✓

It is recommended that further hydrography at a larger scale be conducted in the areas inshore of the reefs, especially in the area between Laie Point and Kahana Bay. Weather/lack of time precluded such work in 1983. This area is widely used by pleasure boaters and recreational fishermen, whose vessels are smaller than a survey launch. A larger scale survey would better delineate the reefs and channels through them which lead to the relatively calm, shoal areas inshore. concur

It is also recommended that as hydrography continues on the north shore of Oahu, consideration of seasonal weather variation be taken into account in the "Project Instrcutions." On many days, hydrography could not be conducted because of the severe winds and swells common to this area in the Fall. Approach from seaward with craft small enough to work inside the reef is very difficult because of the breakers and seas offshore. Consideration should be given to gaining access from shoreside. Reef delineation is possible only in the calmest of weather, which occurs infrequently along the windward coast. Thus, a shore based field unit is likely to be a more effective means for accomplishing work inside the reefs. concur

R. Automated Data Processing ✓

The following is a list of programs used for acquisition and processing during this survey.

Number	Program Name	Version Date
RK 112	R/R Real Time Plot	09/11/80
RK 112	R/R Real Time Plot	08/04/81
RK 201	Grid Signal and Lattice Plot	04/18/75
RK 211	R/R Non-Real Time Plot	02/02/81
RK 212	Visual Station Load and Plot	04/01/74
RK 216	R/AZ Non-Real Time Plot	02/09/81
RK 407	Geodetic Inverse/Direct Comps	09/25/78
RK 409	Geodetic Utility Program	09/20/78
RK 300	Utility Package	10/21/81
RK 330	Data Reformat and Check	05/04/76
RK 360	Electronic Corrector Abstract	02/02/76
AM 500	Predicted Tide Generator	11/10/72
RK 530	Layer Corrections for Velocity	05/10/76
RK 561	H/R Geodetic Calibration	02/19/75
RK 561	H/R Geodetic Calibration	12/01/82
AM 602	Elinore	05/20/75
AM 602	Elinore	12/08/82

S. Referral to Reports ✓

The following is a list of additional reports for OPR-T126-FA-82 and OPR-T126-FA-83 submitted separately from the descriptive report and hydrographic records:

Report	Date of Submission
Horizontal Control Report (1983)	February 1984
Electronic Control Report (1983)	February 1984
Corrections to Echo Soundings Report (1983)	February 1984

Report	Date of Submission
Horizontal Control Report (1982)	January 1983
Electronic Control Report (1982)	February 1983
Corrections to Echo Soundings Report (1982)	February 1983
Coast Pilot Report	March 1983

National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY

NOAA Ship FAIRWEATHER S220

January 21, 1983

TO : N/OMS - Wesley V. Hull

THRU : N/MOP - Charles K. Townsend
ATTN: N/MOP21 - Ned Austin

FROM : N/S220 - Commanding Officer
NOAA Ship FAIRWEATHER

SUBJECT: Currents, OPR-T126-FA-82, Hawaiian Islands

In accordance with section 8.2.(1-3) of project instruction OPR-T126-FA-82, Hawaiian Islands, the following information regarding tidal currents around the Islands of Hawaii and Oahu is provided:

1. No anomalous currents or tidal conditions were observed on or near the project area on the northeast coast of Hawaii Island. Local residents could provide no further information on this subject.

2. An anomalous current, setting to the northeast in and about the mouth of Kahana Bay was reported by knowledgeable local residents. Heavy surf and wind conditions prevented FAIRWEATHER launches from confirming this information during survey operations. Nevertheless, this current is firmly upheld by mariners and fishermen frequenting the area.

3. During ship survey operations a prominent tide rip was observed 5 nautical miles east southeast of Mokapu Point, extending in a roughly east - west direction. The current was evidenced by a water discoloration line, visibly different sea surfaces, and wind interaction and course offset as the ship crossed the current interface. This effect had been noticed by survey launches farther inshore, in this general area, but to a lesser degree. The configuration of Mokapu Point and Mokumanu Island may influence this phenomenon.

4. Rip currents are common along the shores of Oahu Island in the vicinity of the project areas, and are the subject of public information broadcasts to warn swimmers of this danger. No significant or outstanding examples were noted during survey operations. At least one swimmer fatality was directly related to these currents when a U. S. Marine from Kaneohe USMCAS drowned on a recreational beach.

5. During coastal navigation and channel entrances, no difficulties were encountered by FAIRWEATHER.

Approval Sheet

During field operations, the Commanding Officer inspected all field sheets and data on a daily basis. All survey sheets, reports and records are accurate. This survey is complete and shall require no additional field work.

Submitted by:

Jeffy F. Salmore

Jeffrey F. Salmore
ENS NOAA

Approved By:

Christian Andreasen

Christian Andreasen
CAPT NOAA
Commanding Officer

SIGNAL LISTING

OPR-P126-FA-83

OAHU, HAWAII

MAKA PUU PT SOUTH RAYDIST 1982; FAIRWEATHER 1982
100 1 21 18 44504 157 39 12838 250 0170 330040

BOZO 1982 FAIRWEATHER 1982
450 3 21 33 11353 157 50 58165 250 0002 000000

STATE SURVEY 5-1 1969 NGS QUAD 211574 1012
500 3 21 33 45145 157 52 00153 250 0049 000000

STATE SURVEY 5-3 1969 NGS QUAD 211574 1005
502 3 21 35 21082 157 53 25190 139 0002 000000

STATE SURVEY 5-3 1969 RM1 1982 FAIRWEATHER 1982
504 3 21 35 20843 157 53 24839 250 0002 000000

ELNA FAIRWEATHER 1982
530 3 21 33 42870 157 52 42545 139 0009 000000

ELNA RM1 1982 FAIRWEATHER 1982
531 3 21 33 42641 157 52 43295 250 0001 000000

~~LAIE POINT 1969 NGS QUAD 211574 1011~~
~~550 3 21 39 05875 157 55 01852 250 0009 000000~~

LAIE PT ECC #1 FAIRWEATHER 1983
551 0 21 39 06134 157 55 01787 250 0009 000000

LAIE PT ECC #2 FAIRWEATHER 1983
553 5 21 39 05640 157 55 01683 250 0009 000000

~~LAIE POINT RM2 1969 FAIRWEATHER 1982~~
~~554 3 21 39 05846 157 55 01662 250 0009 000000~~

MAKA 1982 FAIRWEATHER 1982
560 3 21 40 41010 157 56 17834 139 0005 000000

DUNE 1982 FAIRWEATHER 1982
602 1 21 41 27086 157 56 53236 139 0002 000000

WIND 1982 (MINI-RANGER) FAIRWEATHER 1982
609 1 21 42 33062 157 58 02219 250 0006 000000

WIND 1982 FAIRWEATHER 1982
610 1 21 42 33062 157 58 02219 250 0006 330040

~~WIND RM1 1982 FAIRWEATHER 1983~~
~~611 1 21 42 34640 157 50 01302 250 0000 000000~~

WIND AZIMUTH 1983 FAIRWEATHER 1983
614 3 21 42 42299 157 58 07962 250 0000 000000

TIP 1932 (FIELD POSITION) FAIRWEATHER 1982
654 3 21 42 53586 157 59 12351 250 0003 000000

HYATT 1982 FAIRWEATHER 1982
656 3 21 42 32840 158 00 04493 250 0028 000000

Field Tide Note

OPR-T126-FA-82

Island of Oahu, Hawaiian Islands

Field tide reduction of sounding was based on predicted tides from Honolulu, Oahu. Correctors were interpolated by the Hydroplot system using program AM 500. All times of both predicted and recorded tides were based on Universal Coordinated Time (UCT). Predicted tides were acceptable for hydrography with no discrepancies attributable to tide errors.

Honolulu Standard Gauge (161-2340)

The permanent tide station at Honolulu, Oahu (161-2340) was the primary controlling gauge for project OPR-T126-FA-82, Island of Oahu. Levels were run by FAIRWEATHER personnel at the beginning and end of the project. Opening levels run on 7 October 1982 (JD 280) to four existing benchmarks were closed to 4.3 mm over the entire run of .49 km. Closing levels, run on 23 November 1982 (JD 327) to the same four benchmarks were closed to 5.0 mm over the entire run of .50 km. No changes in elevation were observed during hydrographic operations. Tide marigrams from station 161-2340 (Honolulu) will be transmitted by the local tide observer in charge of this station.

Mokuoloe Island Subordinate Gauge (161-2480)

The permanent tide station located on Mokuoloe Island (161-2480) was used for controlling the entire survey area along the northeast coast of Oahu. Opening and closing levels were run by FAIRWEATHER personnel to three existing benchmarks at the beginning and end of the project. Opening levels run on 8 October 1982 (JD 281) were closed to 2.1 mm over a run of .49 km. Closing levels, run on 24 November 1982 (JD 328) were closed to 2.0 mm over a run of .50 km. No changes in elevation were observed during hydrographic operations. Tide marigrams will be transmitted by the local tide observer in charge of this station.

Laiemaloo Subordinate Gauge (161-2702)

Tide station Laiemaloo (161-2702) was used to control survey operations run between Kaoio Point and longitude 158°00.0'W along the northeast coast of Oahu. A 1-10 foot scale Metercraft bubbler tide gauge (#7601-7536-34) was installed on 25 October 1982 (JD 298). Two gauge problems developed (see Tide Gauge Problems section) which were field corrected. The gauge then functioned properly until removal on 22 November 1982 (JD 326). Opening and closing levels were run by FAIRWEATHER personnel to five existing benchmarks. Opening levels, run on 26 October 1982 (JD 299) closed to 7 mm over a run of 3.0 km. Closing levels, run on 22 November 1982 (JD 326) closed to 4 mm over the 3.0 km run. An apparent shift in the tide gauge orifice of 4 mm downward was discovered after the running of the closing levels. The orifice movement is a result of the heavy surf conditions in this area. The apparent orifice movement of 4 mm downward is not significant enough that correctors be applied to tide data from this station.

Waimanalo Subordinate Gauge (161-2396)

Tide station Waimanalo (161-2396) was used to control survey operations from the southern limit of hydrography northward to Makapu Point on the northeast coast of Oahu. Investigation of the historical tide station site proved that all the historical benchmarks had been destroyed by recent construction and renovations. A new tide station site, and five new benchmarks were established on the University of Hawaii pier located approximately one mile south of the historical site. Five benchmarks stamped 2376A - 2376E consecutively, were set in the northern cement curb along the length of the pier, running shoreward from the tide gauge location. State survey mark U-11, located at the western limit of the pier, was included in the leveling runs, opening levels, run on 12 October 1982 (JD 285) to all six marks, closed to 1.3 mm over a run of .65 km. Closing levels, run on 24 November 1982 (JD 328) to the same marks, closed to 1.8 mm over a .65 km run. No changes in elevation were seen during hydrographic operations. A 1-10 foot scale Metercraft bubbler gauge (#7601-7536-31) was installed on 11 October 1982 (JD 284) and ran well until removed on 29 November 1982 (JD 333).

Gauge Problems

Laiemaloo Tide Gauge (161-2702)

On 27 October 1982 (JD 300) tide gauge #7601-7536-34 located at tide station Laiemaloo (161-2702) began to malfunction. An interrupted pen trace, caused by corroded pen pivots on the recording mechanism of the gauge, was randomly seen between Julian dates 300 to 312. All periods of lost tidal trace were recoverable by interpolation of the marigram and no hydrography was lost as a result of this malfunction.

Table 1, Periods of Interrupted Tidal Trace, is a listing by Julian dates of periods in which no tidal trace was recorded on the marigram.

On 06 November 1982 (JD 310), gauge #7601-7536-34 located at station Laiemaloo (161-2702) was found to be jammed. No tidal record was gathered between 0100, 4 November 1982 (JD 308) to 0200, 6 November 1982 (JD 310). No hydrography, controlled by this gauge, was run during this period.

Table 1

Times of Lost Tidal Record

Laiemaloo Tide Station (161-2702)

Julian Day	Times (+10)
300	1928-1936
300	1939-2155
301	0945-0950
301	1533-1600
301	1945-2250
301	2315-2340
302	0650-0725
302	0825-0905
302/303	2110-0135
303	0720-1345
303/304	2025-0120
304	0225-0305

Table 1 continued

Julian Day	Times (+10)
304	0631-0708
304	0840-0850
304	0930-1450
304/305	2345-0000
305	1017-1235
307	1058-1735
307	2117-2143
307	2215-2232
312	2020-2035

Miscellaneous

All tidal records were based on a +10 time meridan corresponding to Universal Coordinated Time (UCT).

On 23 November 1982 (JD 327) Hurricane Iwa struck the islands of Oahu, Kauai, and Niihau. A tidal surge of 3-5 feet was predicted for the area on and around these islands. Although the gauge located at station Laiemaloo (161-2702) was removed prior to the hurricane and station Wiamanalo (161-2376) showed no sign of tidal surge, a close inspection of data from both permanent gauge sites should be made on this date to see if either location experienced a tidal surge.

Because the tidal records from the permanent gauge sites will not be transmitted until a later date by the local tide observers, a comparison between adjacent tide gauges could not be made, and should be performed at a later date when all tidal records are available. A recommendation for zoning and time correctors could not be made for the same reasons.

For station Laiemaloo gauge, zero was equivalent to 0.880 feet (0.268 meters) on the adjacent staff. Gauge zero for station Wiamanalo was equivalent to 1.420 feet (-0.433 meters) on the adjacent tide staff. Gauge to staff comparisons for both permenent sites should be taken from historical data because records from both sites were unavailable for determination.

The gauge at station Laiemaloo (161-2702) was only under operation for a period of 28 days. Its removal was necessitated by the approach of Hurricane Iwa.

Times of hydrography abstracts are appended to this field note.

Submitted by:

Arthur E. Francis

Arthur E. Francis
Ensign, NOAA

Approved by:

Walter F. Forster

Walter F. Forster
Commander, NOAA
Commanding Officer

Field Tide Note
OPR-T126-FA-83
Oahu Island, Hawaii

The primary tide gauge (161-2340) at Honolulu, Hawaii, served as reference station for the predicted tides used on the Oahu Island project as stated in the Project Instructions, OPR-T126-FA-83.

Predicted tide correctors for the field sheets were interpolated aboard the FAIRWEATHER using the program AM 500 dated 10 NOV 72. Zone correctors from Project Instructions were applied to the reference station for hydrography on the inshore sheet FA-20-3-83 (H-10061) only. Due to the surveyed depths (between 100 & 2000 fathoms) of the offshore sheet FA-80-1-82 (H-10068), tide correctors were not applied to this survey. Since Project Instructions did not specify zoning correctors for the Penguin Bank area, correctors for the closest subordinate tide station (Hanauma Bay) were used to obtain the predicted tidal data used on the final field sheet of the offshore survey FA-40-1-83 (H-10117).

All times of both predicted and recorded tides are expressed in Universal Coordinated Time (UTC or Z). All predicted tides were acceptable for hydrography with no discrepancies in data attributable to tide errors.

Four tide gauges were used to support hydrographic operations of the Hawaiian Islands project, OPR-T126-FA-83. These gauges consisted of the primary reference gauge at Honolulu (161-2340); the primary gauge at Mokuoloe Island in Kaneohe Bay (161-2480); and the two field gauges established by FAIRWEATHER personnel; Laiemaloo (161-2702) and Haleiwa (161-2668). Installed at Laiemaloo was a Metercraft analog tide gauge, S/N 7602-705-101. The Haleiwa gauge was also a Metercraft analog recorder, S/N 7601-7536-29.

Levels

Third order levels were performed at all four tide stations before the beginning of hydrographic operations and again before departing the working grounds in accordance with Project Instructions, OPR-T126-FA-83, dated 31 AUG 83.

Levels were performed at the primary reference gauge in Honolulu, Hawaii (161-2340) on 29 SEP 83 (JD 272) and again on 22 NOV 83 (JD 236) between the reference mark of the electric tape gauge and three bench marks. Comparison of opening and closing levels to historic data showed no indication of any vertical movement in the marks or the tape gauge reference mark. The maximum deviation between present and historic levels was 2 mm.

Levels were performed at the primary tide station on Moluoloe Island, Kaneohe Bay, Hawaii, (161-2480) on 28 SEP 83 (JD 271) and again on 21 NOV 83 (JD 325) between the tide staff and three bench marks. Comparison of opening and closing levels showed no indication of any vertical movement in the marks or the staff. Present levels agreed to historic levels to within 1 mm.

Levels at the Laiemaloo field tide gauge were conducted on 3/4 OCT 83 (JD 276/277) and again on 22 NOV 83 (JD 326) to the five existing bench marks from the staff. Closing levels agreed within 4 mm to opening levels indicating no vertical movement in the marks or the staff. The maximum deviation between present and historic levels was 2 mm.

Levels for the Haleiwa tide gauge were conducted on five separate occasions during survey operations: 13 OCT (JD 286), 21 NOV (JD 325), 25 NOV (JD 329), 28 NOV (JD 332), and 1 DEC (JD 335), 1983. Opening levels were conducted on 13 OCT 83 to establish initial elevations for the five bench marks used.

The first set of closing levels were conducted on 21 NOV 83. Two problems were encountered during these levels. First, the onset of darkness precipitated the loss of the rod level bubble in the water near the staff thus preventing the closure of the level loop to the staff. The second problem was the discovery of a 0.802 meter discrepancy in the elevation of bench mark "2668 D 1983".

On 25 NOV 83, two level loops were run from bench mark "C&GS No. 5 1969" to "2668 D 1983" in an effort to resolve the 0.802 meter discrepancy. These levels confirmed that an error was made during the 13 OCT 83 opening levels.

On 28 NOV 83, one level loop was run from the staff stop to BM "2668 A 1983" in an effort to close out the levels begun on 21 NOV 83. These levels failed to confirm the opening elevation for BM A.

After piecemealing the levels to agree, the complete level run from the staff to all five bench marks were releveled on 1 DEC 83. These final closing levels agreed with the 13 OCT 83 opening levels for bench marks A, B, C, and No. 5 with a maximum variance of 3 mm. They also confirmed the run from C&GS No. 5 to BM D obtained from levels conducted on 21 and 25 NOV 83.

Operational Problems

The bubbler gauge at Laiemaloo only experienced two problems during the course of survey operations. The first problem detected was a minor inconsistency with the speed of the chart drive. This required only that the clock mechanism be reset several times during survey operations. The second problem occurred on 18 OCT 83 at Ø135Z when high surf conditions tore the bubbler tubing apart at the surf zone. The bubbler tubing was replaced and the gauge was restarted at Ø121Z on 26 OCT 83. No hydrographic data was lost due to this problem as ship survey operations were being conducted in water depths that ranged from approximately 100 to 2000 fathoms during the time of the gauge failure.

The Haleiwa bubbler gauge failed to collect tidal data on two occasions as a result of a dry pen. The first gap is from Ø11ØZ on 9 OCT 83 to 22ØØZ on 13 OCT 83. The second gap is on 17 OCT 83 from 113ØZ to 19Ø2Z.

No hydrographic data was lost as a result of the 117 hour gap between 9 OCT and 13 OCT since only deep water ship hydrography was being conducted during this period of time. Interpolation can be used to provide tidal information for the 9.5 hour gap in tidal data on 17 OCT 83.

One additional problem was encountered with the Haleiwa tide record. The printed time on the chart paper was centered between time lines in such a way as to cause confusion for different observers as to the actual gauge time of observations. This problem was corrected during the final scan of the marigram.

No other problems were encountered with this or the other tide gauges.

For processing information the 0.24 foot mark of the staff at Haleiwa (161-2668) was found to be equal to the zero foot mark on the gauge. At Laiemaloo (161-2702), the 6.9 foot mark on the staff was equal to the zero foot mark on the gauge.

DATE: August 4, 1983

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): 161-2702 Laiemaloo, Hawaii

Period: October 26 - November 19, 1982

HYDROGRAPHIC SHEET: H - 10061

OPR: T 126

Locality: North Shore Island of Oahu, Hawaii

Plane of reference (mean lower low water): 9.95 ft.

Height of Mean High Water above Plane of Reference is 1.7 ft.

REMARKS: Recommended Zoning
Zone Direct

for Donald Carrier
Chief, Tidal Datums Section, Tides & Water Levels Branch

DATE: 8/14/84

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Marine Center: Pacific

OPR: T126

Hydrographic Sheet: H-10061

Locality: North Coast Oahu, HI

Time Period: October 26, 1982 - November 18, 1982 and
October 5, 1983 - November 29, 1983

Tide Station Used:
161-2668 Haleiwa, HI
161-2702 Laiemaloo, HI

Plane of Reference (Mean Lower Low Water): 161-2668 = 2.68 ft.
(1982 work) 161-2702 = 9.95 ft.
(1983 work) 161-2702 = 9.88 ft.

Height of Mean High Water Above Plane of Reference: 161-2668 = 1.6 ft.
(1982 work) 161-2702 = 1.7 ft.
(1983 work) 161-2702 = ~~0.80 ft.~~ 1.8 FT. *

* FROM PHONE CONVERSATION WITH JOE MULLEN ON 9/6/84.

Remarks: Recommended Zoning:

1) For 1982 Work, Zone Direct on 161-2702
2) For 1983 Work
   a) West of Longitude 157° 59.0' Zone Direct on 161-2668
   b) East of Longitude 157° 59.0' Zone Direct on 161-2702

James R. Hubbard
Chief, Tidal Datums Section

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10061

GEOGRAPHIC NAMES

Kahana Bay to Kahuku Pt.

Name on Survey

	A ON CHART NO. 19357 16th Ed.	B ON PREVIOUS SURVEY NO. 3252, 3289, 3290, 5318, 5319, 5320, 5335	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	
Hauula	X	X	X							1
Island of Oahu	X	X	X							2
Kaaawa			X							3
Kaaawa Pt.			X							4
Kaaawa Stream			X							5
Kahana	X	X	X							6
Kahana Bay	X	X	X							7
Kahuku	X	X	X							8
Kahuku Pt.	X	X	X							9
Kaipapau Hill	X		X							10
Kaipapau Pt.	X	X	X							11
Kalaipaloa Pt.	X	X	X							12
Kalanai Pt.	X	X	X							13
Kihewamoku	X	X	X							14
Kukuihoolua	X		X							15
Laie	X	X	X							16
Laie Bay	X	X	X							17
Laie Pt.	X	X	X							18
Laniloa	X		X							19
Mahie Pt.	X		X							20
Makahoa Pt.	X	X	X							21
Makalii Pt.	X	X	X							22
Mokualai	X	X	X							23
Mokuauia	X	X	X							24
Pacific Ocean	X	X	X							25

NOAA FORM 76-155 SUPERSEDES C&GS 197

☆ U.S. G.P.O. 1972-769-565/516 REG. #6

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10061

GEOGRAPHIC NAMES

Kahana Bay to Kahuku Pt.

Name on Survey

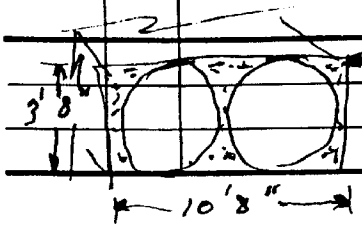
Name on Survey	A ON CHART NO. 1957	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
Pulemoku	X		X							1
Punaluu	X	X	X							2
Puu Ki	X	X	X							3
Puu Papau	X									4
Puu Piei	X		X							5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

☆ U.S. G.P.O. 1972-769-565/516 REG.#6

FATHOMS	FATHOMS	FATHOMS	FATHOMS		FATHOMS
LAIE PT ECC 2		STA #	553		
PT ECC 2		STA #	~~56~~ 553		
0' ON		MAKA	STA # 560		

COMPASS		R/AZ - DETACHED POSITIONS		10 KT WIND 090°
		T1 12932 ON LAIE ECC 2		
		INITIAL ON MAKA #560 090°00.0'		FATHO-DE 719B
				RAYTHEON
		M/R CODE C ON		S/N 6261
		LAIE PT ECC 2 (SOUTHERN SIDE OF POINT)		
		M/R CONSOLE S/N ~~3525~~ 701		
		M/R CORRECTOR		
		℄	M/R CODE C	
9001		270°00.0'	200	DP
9002		320° 00.0'	400	DP
9003		340° 00.0'	404	DP
9004		338°44.0'	600	DP
9005		346°49.5'	601	AT RATE 591 HIT BOTTOM DP
9006		338° 48.9'	796	DP
9007		315° 07.3'		DP
9007		315°43.7'	802	DP
9008		310°32.8'	730	REEF AWASH 10 m NORTH ~~DP~~
9009		315° 00.0'	999	DP
9010		327°07.2'	1008	BOAT BOUNCING DP ON CORAL
		(DRAIN PIPE)		TWO PIPES
9011		327°38.7'	1069	3' DIAMETER 3.5' SQUARED ENDS
				CONCRETE
				D.P. ON END OF PIPES



3'8" ABOVE WATER WIDTH 10.8'

U.S. DEPARTMENT OF COMMERCE | REGISTRY NUMBER

HYDROGRAPHIC SURVEY STATISTICS

H-10061

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	SMOOTH OVERLAYS: POS., ARC, EXCESS	6
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	3

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDIAN FILES						
ENVELOPES						
VOLUMES	2					
CAHIERS	2					
BOXES	1					

SHORELINE DATA

SHORELINE MAPS(List):

PHOTOBATHYMETRIC MAPS(List):

NOTES TO THE HYDROGRAPHER(List):

SPECIAL REPORTS(List):

NAUTICAL CHARTS(List): Enlargment Chart 19357

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS VERIFICATION	AMOUNTS EVALUATION	AMOUNTS TOTALS
POSITIONS ON SHEET			2301
POSITIONS REVISED	28		
SOUNDINGS REVISED	115		
CONTROL STATIONS REVISED	1		
TIME-HOURS	**VERIFICATION**	**EVALUATION**	**TOTALS**
PRE-PROCESSING EXAMINATION	3		3
VERIFICATION OF CONTROL	1		1
VERIFICATION OF POSITIONS	47		47
VERIFICATION OF SOUNDINGS	65		65
VERIFICATION OF JUNCTIONS	5		5
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	113.5		113.5
COMPARISON WITH PRIOR SURVEYS AND CHARTS		16.5	16.5
EVALUATION OF SIDESCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT (Verifiers)	4	11.0	15.0
OTHER Re-work	3.5	8.5	12.0
Digitization			11.5
TOTALS	242.3	36.0	289.5

Pre-processing Examination by		Beginning Date	Ending Date
Verification of Field Data by	M.G. Sanders	Time(Hours) Beg DATE 6/22/84	Ending Date 2/5/85
Verification Check by	J.S. Green, S.H. Otsubo	~~Time(Hours)~~ Begin Hours 35	Ending Date 2/28/85
Evaluation and Analysis by	C.R. Davies	~~Time(Hours)~~ Begin 2/19/85	Ending Date 2/28/85
Inspection by	D. Hill	Time(Hours) 2	Ending Date 3/5/85

PACIFIC MARINE CENTER

EVALUATION REPORT
H-10061

I. INTRODUCTION

H-10061 is a basic hydrographic survey conducted by the NOAA Ship FAIRWEATHER in accordance with the following:

Project Instructions for OPR-T126-FA-82, dated July 30, 1982
Change No. 1, dated September 7, 1982
Change No. 2, dated November 17, 1982
Change No. 3, dated January 20, 1983
Project Instructions for OPR-T126-FA-83, dated August 19, 1983
Change No. 1, dated September 20, 1983

The survey was conducted on the northeast coast of Oahu, Hawaii between latitude 21°33'40"N and latitude 21°46'00"N. It extends from the two fathom curve to longitude 157°52'00"W north of latitude 21°38'00"N. South of latitude 21°38'00"N, the survey extends from the two fathom curve offshore three nautical miles to the 100 fathom curve.

Predicted tides based on the Honolulu tide gage (161-2340) with times and range adjustments were utilized during shipboard processing. Tide correctors used for the reduction of the final soundings are computed from approved hourly heights from two temporary tide gages, Haleiwa (161-2668) and Laiemaloo (161-2702).

During office processing the projection parameters were changed to center the hydrography on the smooth sheet and to change the projection to polyconic.

II. CONTROL AND SHORELINE

Hydrographic control and positioning are adequately discussed in Descriptive Report paragraphs F and G, and Horizontal and Electronic Control Reports for OPR-T126-FA-82 and 83.

The smooth sheet was plotted using published and field positions based on the Old Hawaiian Datum.

Although a basic hydrographic survey, photogrammetric manuscripts to assist the hydrographer in the positioning and delineation of foreshore features were not available. Shoreline is not shown on H-10061, in accordance with N/CG letter dated February 16, 1984, entitled "Reduction of Marine Center Hydrographic Survey Processing Backlog". No conflicts were found when a comparison was made with H-10061 and the charted shoreline.

III. HYDROGRAPHY

Crossline soundings are in fair agreement, a steep sloping bottom throughout the area caused differences in crossline and mainscheme soundings.

Standard depth curves were adequately drawn and developed with the exception of the zero, one, two-fathom curves and areas which were foul with breakers. Inshore of the two-fathom curve, hydrography was terminated because of surf conditions and areas that were foul. The bottom configuration and least depths were adequately determined with the exception of the following:

Present Depths (fm)	Latitude (N)	Longitude (W)
$2\frac{1}{2}$	21°41'35"±	157°56'35"±
$2\frac{2}{3}$	21°41'20"±	157°56'28"±
$3\frac{1}{3}$	21°41'08"±	157°56'12"±
$2\frac{3}{7}$	21'40'40"±	157°55'46"±
$1\frac{7}{1}$	21°40'28"±	157°55'52"±
$1\frac{1}{1}$	21°40'22"±	157°55'32"±
$2\frac{1}{1}$	21°38'05"±	157°54'56"±
3	21°34'59"±	157°52'00"±
Island	21°40'33"±	157°55'36"±
Island	21°39'46"±	157°55'06"±
Island	21°39'06"±	157°54'42"±

IV. CONDITION OF SURVEY

The hydrographic records and reports are adequate and conform to the requirements of the Hydrographic Manual with the exceptions found in the Preprocessing Examination Report, dated May 22, 1984 and the following:

a. Several soundings warranted further development to locate the least depths (see section III, Hydrography). The investigations of these features was incomplete (Hydrographic Manual, 4.3.4).

b. A "holiday" in soundings and depth curves at latitude 21°35'45"N, longitude 157°50'50"W occurred with the junction of the present survey and H-10059. A 300-400 meters hiatus exists in the junctional area. An overlap of at least one sounding line or equivalent distance shall be made with an adjoining survey (Hydrographic Manual 4.3.2).

c. A 1.8-fathom prior survey rock at latitude 21°40'00"N, longitude 157°55'12"W was not investigated during survey operations. Comparison with prior surveys must be made during the course of data acquisition (Project Instructions section 6.10, 6.11) so that required investigations can be accomplished.

d. A least depth of 4 feet plotted on the field sheet at latitude 21°40'45"N, longitude 157°55'30"W should have been plotted in the same sounding units as the survey is plotted (0.7 fm).

e. The hydrographer discussed a 1.8-fms prior survey sounding and a 1 3/4-fms charted sounding in the Descriptive Report under both Comparison with Prior Surveys and Chart. These two soundings are one and the same. When making a chart comparison, only charted soundings and features which do not originate from the prior survey should be discussed (Hydrographic Manual section 5.3.4. K, L).

V. JUNCTIONS

H-10061 is bordered by two contemporary surveys to the south and southeast.
H-10059 (1982)
H-10068 (1982-83)

Soundings and depth curves in the junctional area are in agreement except at latitude 21°34'30"N, longitude 157°51'46"W where the five and ten-fathom curves on H-10059 do not coincide. See smooth sheet for portrayal of depth curves in the area. Several soundings were transferred from H-10059 to facilitate the drawing of depth curves in the junctional area. There was one area, see section IV of this report, where the junction was not completed. This resulted in a small holiday that was deemed not significant. No additional field work is required as depth curves could be drawn continuously. There are no contemporary surveys to the north and northeast. A comparison with charted depths reveals good agreement with present survey.

VI. COMPARISON WITH PRIOR SURVEYS

H-3252 (1910) 1:20,000
H-3289 (1910-11) 1:20,000
H-3290 (1910-11) 1:20,000

The present survey compares very well, ±1 to 2 fathoms, with the prior surveys. These differences are attributed to the relative accuracy of data acquisition. Several prior soundings were transferred to H-10061 to depict shoaler information. Considering the items brought forward, the present survey supersedes the prior surveys within the limits of hydrography.

H-5318 (1932-33) 1:5,000
H-5319 (1933) 1:5,000
H-5320 (1933) 1:5,000
H-5335 (1933) 1:5,000

These prior surveys compare well with H-10061. Differences are small, ±1 to 3 fathoms, attributable to the different survey methods. The many rocks located on these priors are inshore of hydrography or located in areas of breakers on the present survey. Several shoaler soundings have been brought forward from the prior surveys. The present survey is adequate to supersede these prior surveys offshore of the three fathom curve or within limits of the present hydrography where the three fathom curve was not established. Between the three fathom curve and the high water line the prior surveys should be retained as the charting source except within Kahaua Bay where the present hydrography is adequate to supersede H-5320 within the common areas.

VII. COMPARISON WITH CHART

Chart 19357, 16th Edition, December 5, 1981

a. Hydrography - Charted information originates with the prior surveys discussed previously. A charted submerged rock located beyond the three fathom curve at latitude 21°37'06"N, longitude 157°54'04"W originates

from a miscellaneous source not readily ascertainable. The source should be reviewed and if the position of the submerged rock is confirmed, it should remain as charted.

No new dangers to navigation were found on H-10061.

The geographic names shown on the smooth sheet originate from the chart. H-10061 is adequate to supersede the charted information offshore of the three-fathom curve or within the limits of hydrography where the three-fathom curve has not been established.

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

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

VIII. COMPLIANCE WITH INSTRUCTIONS

H-10061 adequately complies with the project instructions as amended and noted in section 1 of this report.

IX. ADDITIONAL FIELD WORK

H-10061 is an adequate hydrographic survey. No additional field work is required at this time. Should larger scale charting of the area be required, additional hydrography of the area inshore of the three-fathom curve should be acquired. See section Q of hydrographer's report.

Respectfully submitted,

Charles R. Davies

Charles R. Davies
Cartographer
February 28, 1985

This survey has been examined by me and it meets the 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.

Dennis Hill

Dennis Hill
Chief, Hydrographic Section

ATTACHMENT TO DESCRIPTIVE REPORT FOR H-10061

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.

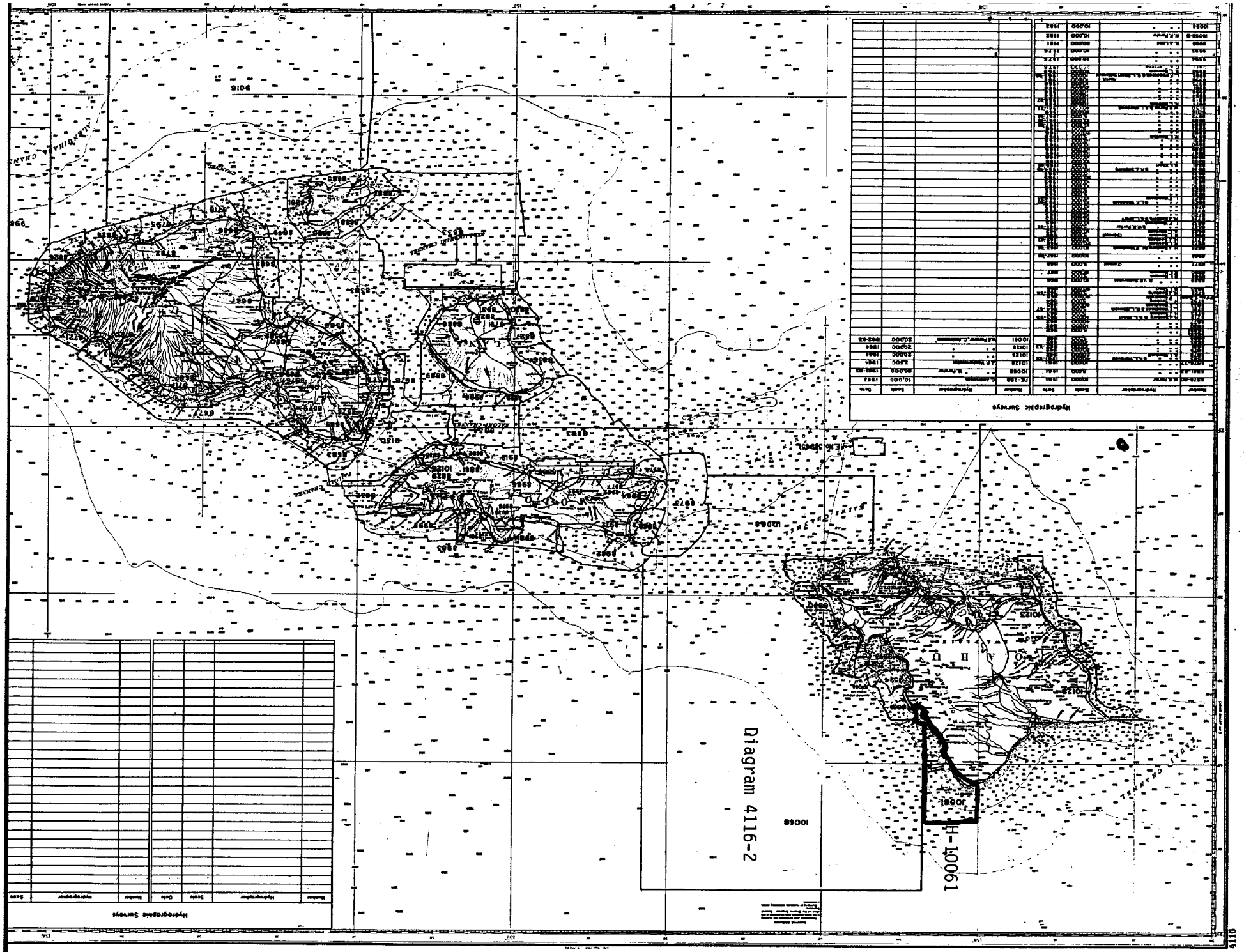
David W. Yeager 3/7/85
Chief, Nautical Chart Branch (Date)

CLEARANCE: SIGNATURE AND DATE:

N/MOP2:LWMordock Larry W. Mordock 3/7/85

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.

Robert L. Faught 3-11-85
Director, Pacific Marine Center (Date)



No. 2 (2 sheets)

(2 sheets) 4116 No. 2

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10061

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	6-14-85	J.M. O'Connor	Full Part Before After Marine Center Approval Signed Via
			Drawing No. 15 Exam ~~Exam~~ for critical corr. only
530	9/23/85	H.J. Borawski	~~Full~~ Part Before After Marine Center Approval Signed Via
			Drawing No. #38 Exam'd for critical corr's only.
19340	9/30/85	H.J. Borawski	~~Full~~ Part Before After Marine Center Approval Signed Via
			Drawing No. #35 ~~Fully~~ app'd prior to application to larger scale 19357
			Re-examine 19340 for accuracy & content after application to 19357
19357	7/28/88	H.J. Borawski	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. #28 Fully app'd
540	4-16-90	Roy Diamond	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 18 applied thru 19340
19004	7/17/90	Hancock	Full ~~Part Before~~ After Marine Center Approval Signed Via full application of
			Drawing No. Sndgs from SS thru 19340.
19007	8/6/90	Hancock	Full ~~Part Before~~ After Marine Center Approval Signed Via full application of
			Drawing No. Sndgs - from SS thru 19340.
19010	8/6/90	Chief B. Dominguez	Full ~~Part Before~~ After Marine Center Approval Signed Via Full application
			Drawing No. of sndgs from SS thru 19004
19013	8/9/90	Chief B. Dominguez	Full ~~Part Before~~ After Marine Center Approval Signed Via Full application of
			Drawing No. Sndgs from SS thru 19004
19340	8/10/90	Chief B. Dominguez	Full ~~Part Before~~ After Marine Center Approval Signed Via No soundings
			Drawing No. applied.
530	8/26/90	Chief B. Dominguez	Exam'd No soundings + Corrections applied
			STANDARDS CK'D 4-2-85
			C.LOY

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.