

9016

Diag. Cht. No. 4102, 4115 & 4116-2.

FORM C&GS-504

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No. AR 80-1-69 Office No. H-9016

LOCALITY

State Hawaii
General locality Hawaii Island
Locality Alenuihaha Channel

1969

CHIEF OF PARTY

Ronald L. Newsom CDR, USESSA

LIBRARY & ARCHIVES

DATE 12-6-71

USCOMM-DC 87022-P86

9106

Chart 4000 ✓
4001 ✓
4102 ✓
4115 ✓
4116 ✓
4130 ✓
4140 ✓ marked
4179 ✓
9000 ✓

HYDROGRAPHIC TITLE SHEET

H-9016

FIELD NO.

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

AR 80-1-69

State Hawaii

General locality Hawaii Island

Locality Alenuihaha Channel

Scale 1:80,000 Date of survey 27 Mar-15 April 1969

Instructions dated 10/31/68; 11/12/68; 1/29/69 Project No. OPR-419, W. Coast Hawaii

Vessel USC&GSS McARTHUR

Chief of party Ronald L. Newsom CDR, USESSA

Surveyed by R.L. Newsom, R.A. Ganse, J.C. Albright, R.C. Husted, T.C. Howell

Soundings taken by echo sounder, ~~Beck~~ QON, EDO model 185 #161 w/PER #010
D.M. Spillman

Graphic record scaled by Ship's personnel

Graphic record checked by Ship's personnel

Projected by POSITIONS VERIFIED BY C.R. LEHMAN Automated plot by GERBER

Soundings penciled by VERIFIED BY C.A. J. PAUW

Soundings in fathoms ~~XMKK~~ at ~~XMKK~~ MLLW

REMARKS: This survey was accomplished using only the USC&GSS McARTHUR.

Applied to Stds 12-20-71
GAS

MAUI ISLAND

KAHOOLAWE

AR-80-1-69

H9016

AR40-1-69
H9015

HAWAII ISLAND

OPR - 419

West Coast HAWAII Island

DESCRIPTIVE REPORT
TO ACCOMPANY
HYDROGRAPHIC SURVEY H-9016 (AR 80-1-69)

USC&GSS McARTHUR
R.L. Newsom CDR, USESSA

1969
Scale: 1:80,000

A. PROJECT

Hydrography on this boatsheet was accomplished in accordance with Project Instructions OPR-419, West Coast Hawaii Island, Hawaii, dated 31 October 1968 (CFS2 4060/02) and with changes No. 1 and No. 2 thereto, dated 12 November 1968 and 29 January 1969 respectively.

B. AREA SURVEYED

The area surveyed is located off the western coast of Hawaii Island, extending north from latitude 19° 45' N to 20° 35' N and eastward from longitude 156° 40' W to 156° 10' W and its junction with the 1:40,000 scale boatsheet H-9015, and covers an area of 1280 square miles.

This survey was performed between 27 March and 15 April 1969 and overlaps the following prior surveys of the area:

<u>Registry No.</u>	<u>Scale</u>	<u>Date</u>
H-4957	1:80,000	1929
H-5052	1:80,000	1928-9
H-5054	1:250,000	1928-9

It also junctions with the following contemporary surveys:

H-9015	(AR 40-1-69)
H-8718	(PF 10-1-63)
H-8825	(PF 10-6-66)
H-8793	(PF 10-5-63)
H-8679	(PF 20-2-62)
H-8885	(PF 10-1-66)
H-8891	(PF 10-7-66)

C. SOUNDING VESSELS

All hydrography on this boatsheet was accomplished by the USC&GSS McARTHUR.

D. SOUNDING EQUIPMENT

Soundings for this boatsheet were obtained using a UQN, EDO model #185, serial # 161 Depth Recorder Indicator with a Precision Fathometer Recorder model #193, serial # 010 (operated in the 400 fathom normal mode). Velocity corrections were obtained to 109 fathoms from a Wansen cast taken off the West coast of Hawaii Island on 19 March 1969. In depths greater than 109 fathoms, velocity corrections were obtained from "Tables of the Velocity of Sound and of Depth Corrections for Echo Soundings in Hawaiian Waters", Applied Oceanography Series No. 5, University of Hawaii, by John C. Belshe, September, 1967. The fathometer initial was set at zero at all times. A mean transducer draft of 1.8 fathoms was determined for the ship. No settlement, squat, or phase corrections were necessary. Because this was an offshore survey and the depths were in excess of 101 fathoms (see Hydrographic Manual section 5-101), application of tide correctors was not necessary, thereby eliminating the need for tidal data.

E. SMOOTH SHEET

The smooth sheet is to be plotted at the Electronic Data Processing Division, Pacific Marine Center, using the following punched tapes:

<u>Data</u>	<u>Format</u>
Velocity Correctors	Velocity Tape, Type 2
Smoothed Raw Data	Dual Indicator Smooth Data Tape
Hi-Fix Corrections	Dual Indicator Corrector Tape
Transducer Draft and Initial Difference	Dual Indicator TC/TT Tape

F. CONTROL

Range-range Hi-Fix, frequency 1799.6 KHz, was used for control of this entire survey. Two shore stations were established, one by occupying triangulation station CAST on Hawaii Island (designated R2-green) and one by occupying triangulation station KEAHOLE #2, also on Hawaii Island (designated R1-red). The data pertaining to these two Hi-Fix stations accompanies the basic field records. Hi-Fix calibrations were performed on a 1:10,000 scale Mylar sheet once or twice daily using three-point sextant fixes to existing triangulation stations. The Hi-Fix held its calibration very well.

All lines run on this boatsheet were done so by following an

arc 0.50 lane off of the desired whole lane (see Plotting Abstracts). This procedure facilitated a more efficient use of the sawtooth recorder, producing a trace that was centered on the recorder paper. Corrections for lane jumps due to electrical interference or electronic malfunction were logged with the calibration corrections into a separate corrector tape. The Hi-Fix equipment performed very well and the control on this survey is considered to be excellent.

G. SHORELINE

None

H. CROSSLINES

1666.7 nautical miles of hydrography was run on this boatsheet, of which 170.0 nautical miles was crossline. This amounted to 10.2 % of the total. There were no discrepancies at crossings.

I. JUNCTIONS

Good agreement between this boatsheet and its junctions with all adjacent contemporary surveys was indicated with no discrepancies.

J. COMPARISON WITH PRIOR SURVEYS

There were no pre-survey review items applicable to this boatsheet. Three prior surveys were undertaken in the area of this boatsheet. H-4957 (1929, scale 1:80,000) showed good agreement with H-9016. Both H-5052 (1928, scale 1:80,000) and H-5054 (1928, scale 1:250,000) also showed good agreement with the exception of three soundings located in the area of latitude 19° 53' N and longitude 156° 20' W. The discrepancies in these three soundings can, however, be attributed to the limited offshore control capabilities available in 1928.

K. COMPARISON WITH THE CHART

This boatsheet was compared with C&GS Chart # 4115, scale 1:250,000, 8th edition, September 9, 1963. Correspondence between the two was fair with the chart always indicating a

deeper bottom than this survey. The discrepancy is, however, acceptable due to variation in precision of survey control in the last 40 years.

L. ADEQUACY OF SURVEY

This survey is complete and adequate to supercede prior surveys of the area for charting.

M. AIDS TO NAVIGATION

None

N. STATISTICS

Nautical miles sounding line	1666.7
Number of positions	1091
Total square miles	1280

O. MISCELLANEOUS

All tapes were logged in the dual indicator format using a HUL Logger, serial number 63-117 (BCD Code) and a Friden Flexowriter model SFD.

A proton magnetometer was towed throughout this survey. The data printout is included in the records submitted with this boatsheet. No strip recorder records were obtained as the recorder was not operative during the period of magnetometer operation.

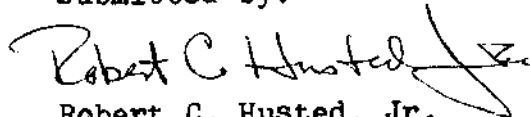
P. RECOMMENDATIONS

It is recommended that an endless tape be made up for 24 hour per day Hi-Fix work, which will type out all information required at the beginning of each day, merely by hitting the read button on the Flexowriter. This is a great help as there is much that needs to be done in the way of changing records at the end of a day of Hi-Fix and little time to do it in.

Q. REFERENCES TO REPORTS

None

Submitted by:



Robert C. Husted, Jr.
ENS, USESSA

Approved and Forwarded:

John C. Albright
LTJG, USESSA
for Ronald L. Newsom
CDR, USESSA
Commanding Officer, USC&GSS McARTHUR

Enclosures:

Abstract of Corrections to Echo Soundings (Table & Curve)
Abstract of Hi-Fix Corrections
Abstract of Position Numbers
List of Basic Field Records
Approval Sheet

GEOGRAPHICAL NAMES

ALENUHAHA CHANNEL

VELOCITY TAPE TYPE 2

All depths and corrections are in fathoms. These corrections apply to all soundings of the survey.

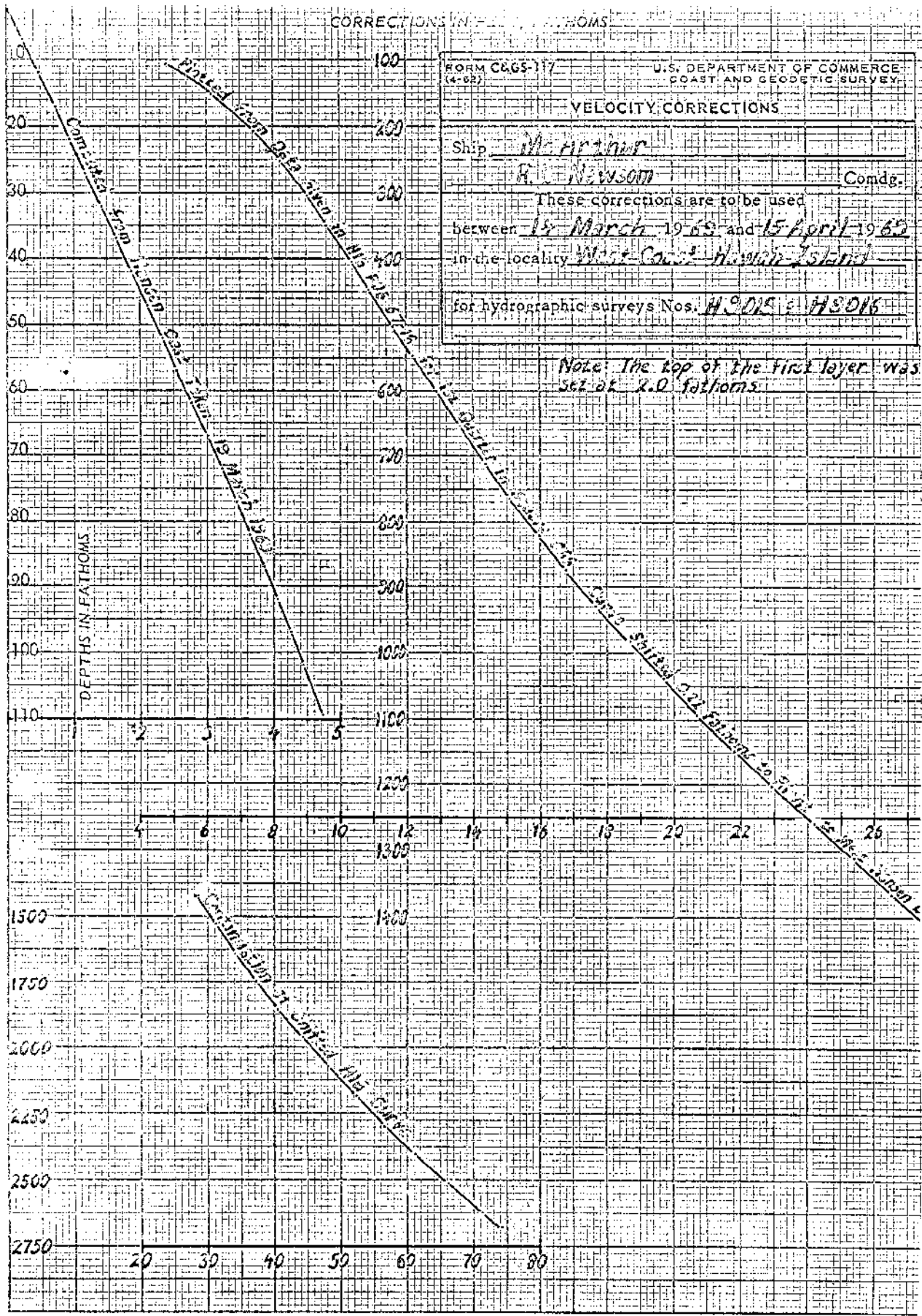
000032 00 0000 0001 000 0 000000 000000
000052 00 0001
000071 00 0002
000092 00 0003
000113 00 0004
000133 00 0005
000154 00 0006
000175 00 0007
000199 00 0008
000222 00 0009
000242 00 0010
000264 00 0011
000286 00 0012
000306 00 0013
000327 00 0014
000348 00 0015
000369 00 0016
000393 00 0017
000416 00 0018
000437 00 0019
000458 00 0020
000479 00 0021
000500 00 0022
000521 00 0023
000546 00 0024
000568 00 0025
000591 00 0026
000616 00 0027
000638 00 0028
000659 00 0029
000680 00 0030
000702 00 0031
000726 00 0032
000748 00 0033
000771 00 0034
000797 00 0035
000821 00 0036
000846 00 0037
000868 00 0038
000891 00 0039
000916 00 0040
000942 00 0041
000966 00 0042
000995 00 0043
001020 00 0044

001048 00 0045
001220 00 0050
001400 00 0055
001750 00 0060
002250 00 0070
002850 00 0080
003600 00 0090
004380 00 0100
005160 00 0110
005900 00 0120
006700 00 0130
007950 00 0140
009200 00 0160
010300 00 0180
011350 00 0200
012250 00 0220
013200 00 0240
014100 00 0260
014700 00 0280
015400 00 0300
016150 00 0320
016900 00 0340
017600 00 0360
018250 00 0380
018900 00 0400
019450 00 0420
020000 00 0440
020600 00 0460
021100 00 0480
021650 00 0500
022150 00 0520
022650 00 0540
023150 00 0560
023650 00 0580
024150 00 0600
024550 00 0620
025050 00 0640
025450 00 0660
025850 00 0680
026300 00 0700
026750 00 0720

CORRECTIONS IN FATHOMS

FORM C&GS-17 (4-62)	U.S. DEPARTMENT OF COMMERCE COAST AND GEODETIC SURVEY	
VELOCITY CORRECTIONS		
Ship	<i>McArthur</i>	
Comdg.	<i>R. Newsom</i>	
These corrections are to be used		
between <i>15 March 1965</i> and <i>15 April 1965</i>		
in the locality <i>West Coast Hawaiian Islands</i>		
for hydrographic surveys Nos. <i>H3015 & H3016</i>		

Note: The top of the first layer was set at 2.0 fathoms.



(For deep water add a 0 to these figures)

ABSTRACT OF HI-FIX CORRECTIONS
TO ACCOMPANY H-9016 (AR 80-1-69)

<u>Date</u>	<u>Time</u>	<u>Correction, R1</u>	<u>Correction, R2</u>
27 March	1845	+ 0.01 Lane	- 0.68 Lane
28 "	1800	+ 0.05	- 0.55
29 "	1400	+ 0.09	- 0.52
31 "	1945	+ 0.11	- 0.53
Secure Hi-Fix Equipment			
1 April	0920	- 0.49	- 0.01
2 "	1150	- 0.46	- 0.08
Secure Hi-Fix Equipment			
10 April	0945	- 0.52	- 0.33
11 "	1045	- 0.52	- 0.41
13 "	1205	- 0.60	- 0.27
Secure Hi-Fix Equipment			
14 April	1130	- 0.64	- 0.69
15 "	1900	- 0.50	- 0.77

The Hi-Fix equipment was calibrated on the above dates by simultaneously observing a three-point sextant fix with check angle and reading the Hi-Fix dials. The sextant fix was plotted on a 1:10,000 scale Mylar sheet and the Pattern I and II values were scaled from the sheet and compared with the observed readings to determine the above corrections. A minimum of three fixes was observed for each calibration.

ABSTRACT OF POSITION NUMBERS
H-9016 (AR 80-1-69)

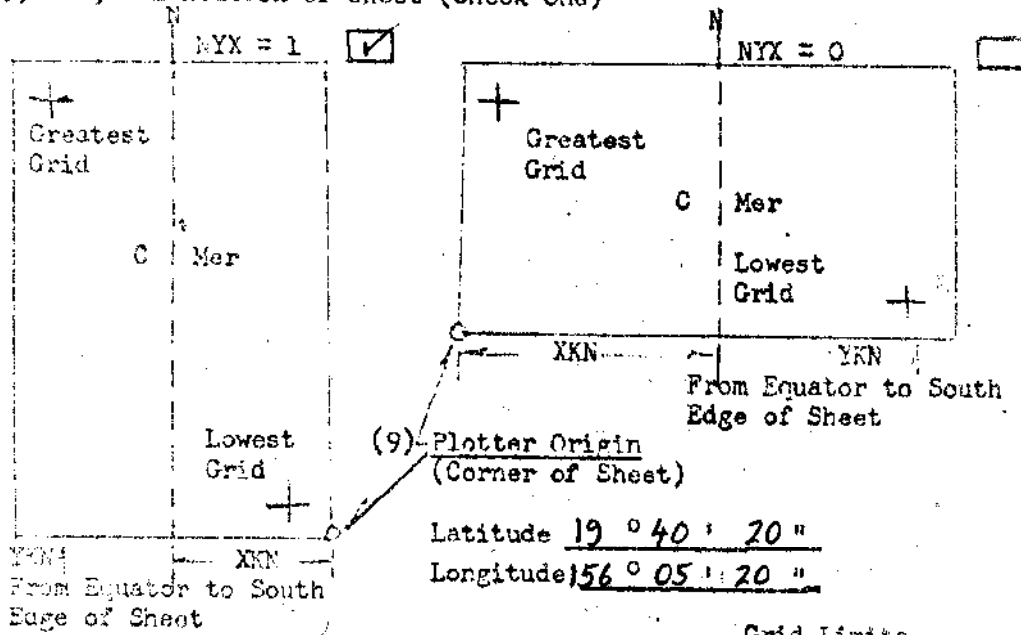
<u>Vessel</u>	<u>Day</u>	<u>Date</u>	<u>Julian Day</u>	<u>Positions</u>
McARTHUR	A	27 Mar 1969	086	0001-0018
"	B	28 Mar 1969	087	0019-0132
"	C	29 Mar 1969	088	0133-0166
"	D	30 Mar 1969	089	0167-0309
"	E	31 Mar 1969	090	0310-0396
"	F	1 Apr 1969	091	0397-0473
"	G	2 Apr 1969	092	0474-0537
"	H	10 Apr 1969	100	0538-0606
"	J	11 Apr 1969	101	0607-0726
"	K	12 Apr 1969	102	0727-0862
"	L	13 Apr 1969	103	0863-0926
"	M	14 Apr 1969	104	0927-0992
"	N	15 Apr 1969	105	0993-1090

LIST OF BASIC FIELD RECORDS
TO ACCOMPANY H-9016 (AR 80-1-69)

- 1 Mylar calibration sheet
- 1 Boatsheet
- 6 Envelopes PFR fathograms
- 4 Boxes with 13 sawtooth recorder records pos. 1-1090
- 13 Envelopes of raw data tapes and printouts pos. 1-1090
- 13 Envelopes of smoothed data tapes and printouts pos. 1-1090
- 13 Envelopes with 134 PFR sounding log sheets and 49
Form 817 Plotting Abstract Electronic Control sheets
- 1 Corrector tape and 1 page printout
- 1 Velocity tape and 2 pages printout
- 1 TC/TI tape and 1 page printout
- 2 Form # 1 Parameters for Digital Computing Polyconic
Projection (boatsheet and calibration sheet)
- 1 Folder containing 17 pages Hi-Fix calibrations
- 1 Form # 3 Computer Parameters for Electronically
Controlled Surveys
- 1 Form # 662 Inverse Position Computation
- 1 Form # 733A Oceanographic Log Sheet-A with 1 page of
curve and 2 pages of computations
- 11 Envelopes of Magnetometer printout and punched tapes
- 1 Envelope of Magnetometer time comparisons

PARAMETERS FOR DIGITAL COMPUTING
POLYCONIC PROJECTION

- (1) Project No. OPR 419
Hawaii Island
- (2) H No. _____
- (3) Field No. AI
- (4) Requested by R.L. Newsom
- (5) Ship or Office McArthur
- (6) Date Required 6th March
~~19 Feb 69~~
- (7) Visual
- (8) Electronic (fill out form #3)
- (10) XKN (SP 5) Distance from CMER to East Edge (NYX = 1) or West Edge (NYX = 0). 34,373.0 Meters
- (11) YKN (SP 241) Distance from Equator to South Edge of Sheet. 2,175,950.780 Meters
- (12) Central Meridian 156° 28' 00"
- (13) Survey Scale 1:80,000
- (14) Size of Sheet (Check one) 36x60 42x60
- (15) NYX, Orientation of sheet (Check one)



(9) Plotter Origin
(Corner of Sheet)

Latitude 19° 40' 20"
Longitude 156° 05' 20"

Grid Limits

- (16) Greatest Latitude 20° 35' " (Projection line
- (17) Lowest Latitude 19° 45' " Interval Page 4
- (18) Difference 0° 50' " Hydro Manual)
- (19) 5' "
- (20) 10 XSN
- (21) Greatest Longitude 156° 45' "
- (22) Lowest Longitude 156° 10' " (24) 5' "
- (23) Difference 0° 35' " (25) 7 XSN

Comp. RAG
JCA

H
Field No. AR 11
Date 5/22/69

HYDRONI ARAMETER CARDS
03019 From Electronic Controlled Baseline

Parameter Card 1

Def. Min.	Seconds	PROJ. Coded	1	2	3	4	5	6	7	8	9	10	
Master RI	Lat. ✓	RPD	7	1	0	1	9	8	6	0	0	5	
Hydro Name KEAHOLE 2	Long. ✓	RBD	5	6	1	8	1	8	7	2	0	6	
Slave R2	Lat.	Not Used											
Hydro Name EAST	Long.	Not Used											
Asimuth RI to R2	✓	RAD	7	1	3	6	9	7	0	8	0	6	
Baseline Distance in Meters	✓	SMP	Not Used										
Velocity Code	0 = No Vel. Table 2 = 2 Vel. E = W	IWL	3	2	3	4	5	6	6	2	0	5	
Conversion Factor for electronic distance to meters.	1 = 1 Vel. Table 3 = 2 Vel. E = W	CNV	8	3	2	6	0	1	6	6	0	2	
H-Identification Number	F-1799.6	JN	09016										
Location of survey with respect to electronic baseline	(A = 1) Long = 0	AAA											
Velocity Boundary	IWL = 2 Long = 0	VIE	58	59	60	61	62	63	64	65	66		
Shoran calibration correction is applied by equation (use Shoran card) punch 1 in column 80	IWL = 3 Lat =	YR											

Shoran Card Format (when calibration correction is applied by a time K K + C)
(Flag 5, 11, 17, or 25 if resp. constant is negative)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Computer RD M/E Vmk Purchased RTD Date 5/22/69

FORM # 3 FIG. 7
COMPUTER PARAMETERS FOR ELECTRONICALLY CONTROLLED SURVEYS

(RANGE - RANGE)

(1) PROJECT No. OPR 412 (2) H- No. _____ (3) FIELD No. A1 1:80,000
(4) TYPE OF CONTROL: _____ SHORAN, _____ RAYDIST, HI-FIX, RADAR
FREQUENCY (FOR CONVERSION OF RAYDIST OR HI-FIX LINES TO METERS) 1729.600 MHz

(5) RANGE ONE (R1) STATION NAME Keahole #2 1948 LATITUDE 19 ° 43 ' 39.860" 1225.6
LONGITUDE 156 ° 03 ' 38.925" 1133.4

(6) RANGE TWO (R2) STATION NAME Cast 1910 LATITUDE 20 ° 11 ' 41.498" 1276.1
LONGITUDE 155 ° 53 ' 51.563" 1497.0

(7) AZIMUTH FROM R1 TO R2 Geodetic (from South) 137 ° 14 ' 15.708" ✓

(8) BASELINE LENGTH IN METERS 54456.7862 ~~57900.01~~ M.

(9) LOCATION OF SURVEY WITH RESPECT TO ELECTRONIC BASELINE: CHECK ONE
(TO DETERMINE: IMAGINE AN OBSERVER STANDING AT R1 AND LOOKING DIRECTLY AT R2 --- IF THE SURVEY AREA IS TO THE OBSERVER'S LEFT THEN A IS NEGATIVE; IF THE SURVEY AREA IS TO THE OBSERVER'S RIGHT THEN A IS POSITIVE.)

-A (MINUS) _____ +A (PLUS)

(10) IF SHORAN CORRECTIONS ARE APPLIED BY THE EQUATION, $K(X) + C = D$, WHERE X IS SHORAN DISTANCE AND D IS TRUE DISTANCE, ENTER THE CONSTANT COEFFICIENTS OF THE EQUATIONS HERE:

K(R1) _____, C(R1) _____, K(R2) _____, C(R2) _____

(11) NUMBER OF VELOCITY TABLES TO BE USED: _____ NONE, _____ ONE, _____ MORE THAN ONE.

(12) THIS FORM IS SUBMITTED ONLY AS AN AID IN PREPARING A BOAT SHEET PROJECTION.

_____ THIS FORM APPLIES TO ALL DATA ON THIS SURVEY.
_____ THIS FORM APPLIES TO PART OF THE DATA ON THIS SURVEY.
TIME AND DATE LIMITATIONS: FROM _____ TO _____
POSITION NUMBER LIMITATIONS: FROM _____ TO _____
THIS IS FORM #3 SHEET # _____ OF _____ SHEETS FOR THIS SURVEY.

(13) OTHER REMARKS:

APPROVAL SHEET FOR
H-9016 (AR 80-1-69)

Field work on this survey was accomplished under my general supervision. Frequent inspections of the field data and boatsheet were made by me as the survey progressed. The sounding records have been inspected by me and are approved. This survey is complete and adequate and is hereby approved.

19 November 1969

John C. Albright
LTJG, USESSA
for Ronald L. Newsom
CDR, USESSA
Commanding Officer,
USC&GSS McARTHUR

GEOGRAPHIC NAMES

Survey No. H-9016

Name on Survey	Source											
	A	B	C	D	E	F	G	H	K			
												1
Alatakeiki Channel												2
Alepuihaha Channel												3
												4
												5
												6
												7
												8
												9
												10
												11
												12
												13
												14
												15
												16
												17
												18
												19
												20
												21
												22
												23
												24
												25
												26
												27

PREPARED BY

Frank W. Colett
CARTOGRAPHIC TECHNICIAN

APPROVED BY

A. J. Wright
CHIEF GEOGRAPHER
by [Signature]

VERIFIER'S REPORT

H-9016

ALENUHAHA CHANNEL, HAWAII

AR-80-1-69

This sheet was constructed and plotted at Pacific Marine Center, Seattle, Washington. Information relating to this will be noted under the heading by the number and letter as on the Verifier's Report C&GS Form 946A.

PART II SHORELINE AND SIGNALS

4. Two triangulation stations were used as R_1 and R_2 stations. Here are their G.P.'s respectfully;

R_1 KEAHOLE 2 1948 Lat $19^{\circ}43'1225.6''$
Long $156^{\circ}03'1133.4''$

R_2 CAST 1910 Lat $20^{\circ}11'1276.1''$
Long $155^{\circ}53'1497.0''$

There is no shoreline for this sheet.

PART III JUNCTIONS

10. Junction with H-9015, AR-40-1-69, on the southeast was not made because it is being processed. On the north section a comparison was made with the following sheets;

H-8718 (PF-10-1-63), H-8825 (PF-10-6-66), H-8793 (PF-10-5-63),
H-8679 (PF-20-2-62), H-8885 (PF-10-1-66), and H-8891 (PF-10-7-66).

PART VII CURVES

The depth curves were inspected by AE. Eichelberger, Carto. Tech.

PART XI NOTES TO THE REVIEWER

36. The position overlay was verified by C.R. Lehman, Carto. Tech, the soundings were verified by C.A.J. Pauw, Carto Tech and the smooth sheet was completed by Nicholas Lestenkof, Carto Tech.

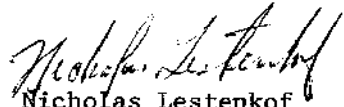
CHART COMPARISON

Comparison was made with C&GS Chart 4115, 9 Ed., June 6, 1970. I agree with the analysis made by the Hydrographer.

PRIOR SURVEYS

See the analysis made by the Hydrographer-I agree with his statement.

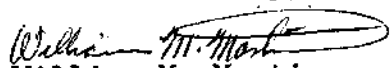
Respectfully submitted;


Nicholas Lestenkof
Cartographic Technician

APPROVAL SHEET

The smooth sheet has been inspected, is complete, and meets the requirements of the General Instructions for automated surveys and the Hydrographic Manual. (Note; All exceptions are listed in the Verifier's Report.)

Examined and approved


William M. Martin
Acting Chief, Processing
Division
Pacific Marine Center

HYDROGRAPHIC SURVEY STATISTICS
HYDROGRAPHIC SURVEY NO. H-9016

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET & PNO		1	BOAT SHEETS		—	
DESCRIPTIVE REPORT		1	OVERLAYS		3	
DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES	6					
<i>positions of depth</i> CAHIERS			1			
VOLUMES						
<i>Smooth Boxes</i>			1			

T-SHEET PRINTS (List)

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	VERIFICATION	REVIEW	TOTALS
POSITIONS ON SHEET				
POSITIONS CHECKED		1088		
POSITIONS REVISED		20		
DEPTH SOUNDINGS REVISED		106		
DEPTH SOUNDINGS ERRONEOUSLY SPACED		—		
SIGNALS ERRONEOUSLY PLOTTED OR TRANSFERRED		—		
	TIME (MANHOURS)			
TOPOGRAPHIC DETAILS		8		
JUNCTIONS		8		
VERIFICATION OF SOUNDINGS FROM GRAPHIC RECORDS		105		
SPECIAL ADJUSTMENTS		8		
ALL OTHER WORK		38		
TOTALS		167		
PRE-VERIFICATION BY	BEGINNING DATE	ENDING DATE		
VERIFICATION <i>SNDGS</i> by <i>GA J. PAUL</i>	BEGINNING DATE	ENDING DATE		
<i>positions</i> by <i>E. R. Lehmann</i>	<i>4/6/70</i>	<i>11/17/71</i>		
<i>smooth sheet</i> by <i>Nicholas Lostenkov</i>	BEGINNING DATE	ENDING DATE		
REVIEW BY	BEGINNING DATE	ENDING DATE		

Form 862
(2-56)

INVERSE POSITION COMPUTATION

$$s_1 \sin \left(\alpha + \frac{\Delta\alpha}{2} \right) = \frac{\Delta\lambda_1 \cos \phi_m}{A_m}$$

$$s_1 \cos \left(\alpha + \frac{\Delta\alpha}{2} \right) = \frac{-\Delta\phi_1 \cos \frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha = \Delta\lambda \csc \phi_m \sec \frac{\Delta\phi}{2} + F(\Delta\lambda)^2$$

In which $\log \Delta\lambda_1 = \log (\lambda' - \lambda)$ - correction for arc to sin*; $\log \Delta\phi_1 = \log (\phi' - \phi)$ - correction for arc to sin*; and $\log a = \log s_1 +$ correction for arc to sin*.

		NAME OF STATION			
1. ϕ	19° 43' 39.860	Keahole #2	λ	156° 03' 38.925	
2. ϕ'	20 11 41.498	Cast	λ'	155 53 51.563	
$\Delta\phi (= \phi' - \phi)$	28 01.638 ✓		$\Delta\lambda (= \lambda' - \lambda)$	-09 47.362 ✓	
$\frac{\Delta\phi}{2}$	14 00.819 ✓		$\frac{\Delta\lambda}{2}$	-04 53.681 ✓	
$\phi_m (= \phi + \frac{\Delta\phi}{2})$	19 57 40.679 ✓				
$\Delta\phi$ (secs.)	1681.639 ✓		$\Delta\lambda$ (secs.)	-587.362 ✓	
$\log \Delta\phi$	3.2257326 ✓		$\log \Delta\lambda$	2.7689059 n ✓	
cor. arc-sin	- 12 ✓		cor. arc-sin	- 1 ✓	
$\log \Delta\phi_1$	3.2257314 ✓		$\log \Delta\lambda_1$	2.7689058 n ✓	
$\log \cos \frac{\Delta\lambda}{2}$	9.9999996 ✓		$\log \cos \phi_m$	9.9730925 ✓	
$\text{colog } B_m$	1.4878379 ✓		$\text{colog } A_m$	1.4904448 ✓	
$\log \left\{ s_1 \cos \left(\alpha + \frac{\Delta\alpha}{2} \right) \right\}$	4.7135689 ✓ (opposite in sign to $\Delta\phi$)		$\log \left\{ s_1 \sin \left(\alpha + \frac{\Delta\alpha}{2} \right) \right\}$	4.2324431 n ✓	
			$\log \left\{ s_1 \cos \left(\alpha + \frac{\Delta\alpha}{2} \right) \right\}$	4.7135689 n ✓	
$\log \Delta\lambda$	2.7689059 n ✓	$3 \log \Delta\lambda$	8.307	$\log \tan \left(\alpha + \frac{\Delta\alpha}{2} \right)$	9.5188742 ✓
$\log \sin \phi_m$	9.5332449 ✓	$\log F$	7.772	$\alpha + \frac{\Delta\alpha}{2}$	198 16 37.34 ✓
$\log \sec \frac{\Delta\phi}{2}$	0.0000036 ✓	$\log b$	6.079	$\log \sin \left(\alpha + \frac{\Delta\alpha}{2} \right)$	- 9.4963926 n ✓
$\log a$	2.3021544 n ✓			$\log \cos \left(\alpha + \frac{\Delta\alpha}{2} \right)$	- 9.2775183 n ✓
a	- 200.52 ✓			$\log s_1$	4.73605045
b	0.00 ✓			cor. arc-sin	+ 133
$-\Delta\alpha$ (secs.)	-200.52° ✓			$\log s$	4.73605198
$\frac{\Delta\alpha}{2}$	-100.26° ✓				S = 54456.78 62
$\alpha + \frac{\Delta\alpha}{2}$	198 16 37.34 ✓				
α (1 to 2)	198 14 57.08 ✓				* Use the table on the back of this form for correction of arc to sin.
$\Delta\alpha$	3 20.52 ✓				
	180 18 17.60				
α' (2 to 1)	18 18 17.60 ✓				

NOTE.—For log s up to 4.0 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 3', omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 7 decimal places.

Comm-DC 34379

Computed by R.A.G.
✓ by J.C.A.

Table of arc-sin corrections for inverse position computations

$\log s_1$	Arc-sin correction in units of seventh decimal of logarithms	$\log \Delta\phi$ or $\log \Delta\lambda$	$\log s_1$	Arc-sin correction in units of seventh decimal of logarithms	$\log \Delta\phi$ or $\log \Delta\lambda$	$\log s_1$	Arc-sin correction in units of seventh decimal of logarithms	$\log \Delta\phi$ or $\log \Delta\lambda$
4.177	1	2.686	5.223	124	3.732	5.525	497	4.034
4.327	2	2.836	5.234	130	3.743	5.530	508	4.039
4.415	3	2.924	5.243	136	3.752	5.534	519	4.043
4.478	4	2.987	5.253	142	3.762	5.539	530	4.048
4.526	5	3.035	5.260	147	3.769	5.543	541	4.052
4.566	6	3.075	5.269	153	3.778	5.548	553	4.057
4.599	7	3.108	5.279	160	3.788	5.553	565	4.062
4.628	8	3.137	5.287	166	3.796	5.557	577	4.066
4.654	9	3.163	5.294	172	3.803	5.561	588	4.070
4.677	10	3.186	5.303	179	3.812	5.566	600	4.075
4.697	11	3.206	5.311	186	3.820	5.570	613	4.079
4.716	12	3.225	5.318	192	3.827	5.575	625	4.084
4.734	13	3.243	5.326	199	3.835	5.579	637	4.088
4.750	14	3.259	5.334	206	3.843	5.583	650	4.092
4.765	15	3.274	5.341	213	3.850	5.587	663	4.096
4.779	16	3.288	5.349	221	3.858	5.591	674	4.100
4.792	17	3.301	5.356	228	3.865	5.595	687	4.104
4.804	18	3.313	5.363	236	3.872	5.600	702	4.109
4.827	20	3.336	5.369	243	3.878	5.604	716	4.113
4.857	23	3.366	5.376	251	3.885	5.608	729	4.117
4.876	25	3.385	5.383	259	3.892	5.612	743	4.121
4.892	27	3.401	5.390	267	3.899	5.616	757	4.125
4.915	30	3.424	5.396	275	3.905	5.620	771	4.129
4.936	33	3.445	5.403	284	3.912	5.624	785	4.133
4.955	36	3.464	5.409	292	3.918	5.628	800	4.137
4.972	39	3.481	5.415	300	3.924	5.632	814	4.141
4.988	42	3.497	5.422	309	3.931	5.636	829	4.145
5.003	45	3.512	5.428	318	3.937	5.640	845	4.149
5.017	48	3.526	5.434	327	3.943	5.644	861	4.153
5.035	52	3.544	5.440	336	3.949	5.648	877	4.157
5.051	56	3.560	5.446	345	3.955	5.652	893	4.161
5.062	59	3.571	5.451	354	3.960	5.656	909	4.165
5.076	63	3.585	5.457	364	3.966	5.660	925	4.169
5.090	67	3.599	5.462	373	3.971	5.663	941	4.172
5.102	71	3.611	5.468	383	3.977	5.667	957	4.176
5.114	75	3.623	5.473	392	3.982	5.671	973	4.180
5.128	80	3.637	5.479	402	3.988	5.674	989	4.183
5.139	84	3.648	5.484	412	3.993	5.678	1005	4.187
5.151	89	3.660	5.489	422	3.998			
5.163	94	3.672	5.495	433	4.004			
5.172	98	3.681	5.500	443	4.009			
5.183	103	3.692	5.505	453	4.014			
5.193	108	3.702	5.510	464	4.019			
5.205	114	3.714	5.515	474	4.024			
5.214	119	3.723	5.520	486	4.029			

VERIFIER'S REPORT
HYDROGRAPHIC SURVEY, H. 9016

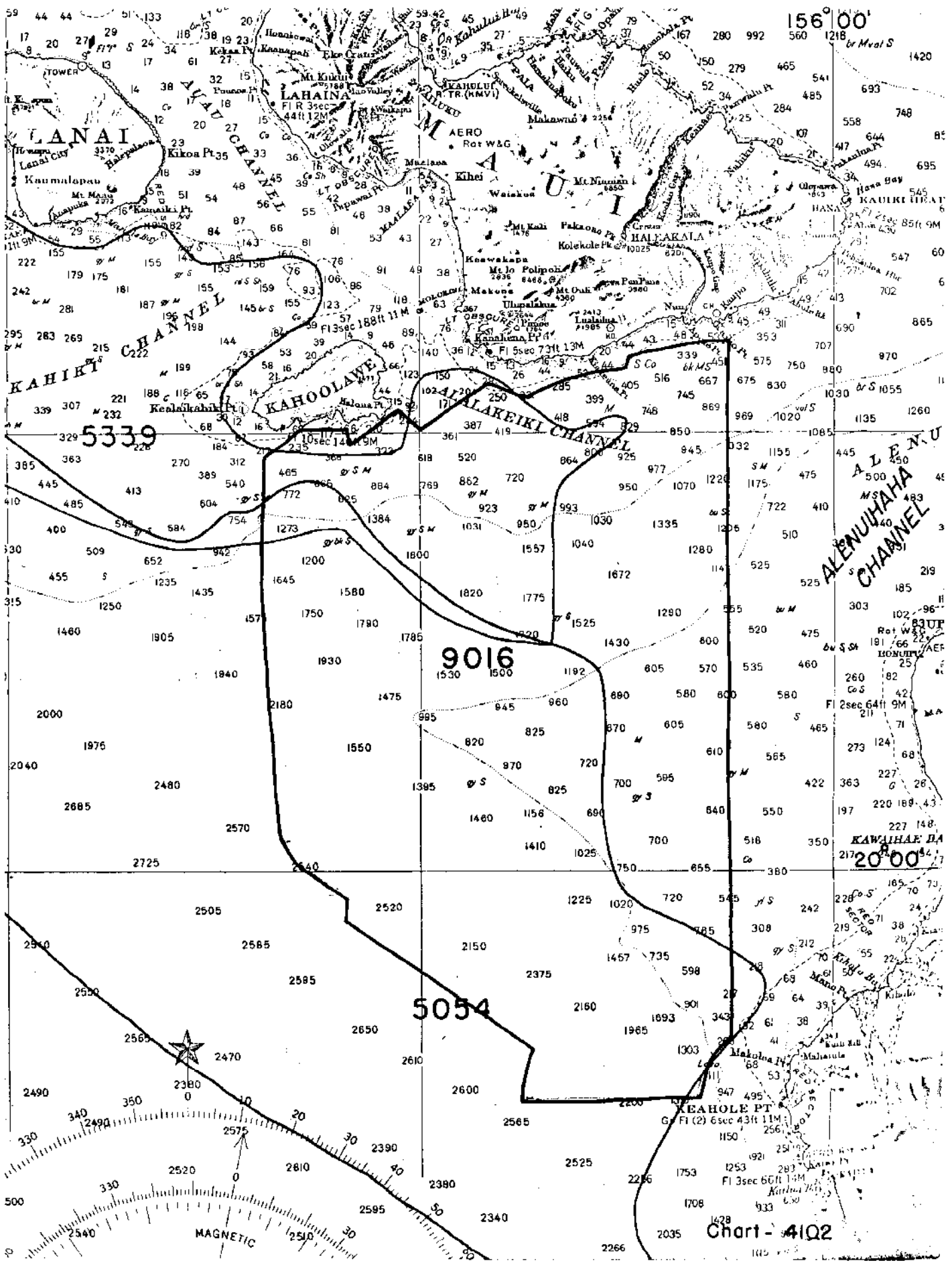
INSTRUCTIONS - This form serves to identify items of a check list in verification together with items which are separately reported to the Reviewer. The form is not to be forwarded to the Reviewer. A report, which is prepared for the Reviewer, should identify items by number and letter and will be filed in the Descriptive Report until the survey is reviewed.

CL - Check List Items: should be checked as having been completed during the verification processes.

R - Report Item: This column refers to those items reported to the reviewer and is used to indicate the items discussed.

Part I - DESCRIPTIVE REPORT	CL	R	Part III - JUNCTIONS (Continued)	CL	R
<p>Note: The verifier should first read the Descriptive Report for general information and problems.</p> <p>1. The Descriptive Report was consulted, paragraphs checked if found satisfactory, and notations were made in soft black pencil regarding action taken. Remarks Required: -- None</p>	✓		<p>10. Junctions with contemporary surveys were satisfactory except as follows: Remarks Required: -- Consider conditions after adjustments have been made; note adjustments made. Make special notes of Butt junctions and areas which are SUPERSEDED.</p>		✓
<p>2. Soundings originating with the survey and mentioned in the Descriptive Report have been verified and checked in soft black pencil, including latitude and longitude, together with position identification. Remarks Required: -- None</p>	✓		<p>Part IV - VOLUMES</p> <p>11. All items affecting the plotting of the survey which are entered in the remarks columns of the sounding records were noted and check marked. In all cases appropriate action was taken and exceptions noted in the volumes. Remarks Required: -- None</p>	✓	
<p>3. All reference to survey sheets mentioned in the Descriptive Report should include registry number and year. Remarks Required: -- None</p>	✓				
<p>Part II - SHORELINE AND SIGNALS</p> <p>4. Source of shoreline signals Remarks Required: -- List all surveys</p> <p>a. Give earliest and latest dates of photographs</p> <p>b. Field inspection date</p> <p>c. Field Edit date</p> <p>d. Reviewed-Unreviewed</p>		✓	<p>12. Condition of sounding records was satisfactory except as follows: Remarks Required: -- Mention deficiencies in completeness of notes or actions for the following:</p> <p>(a) rocks</p> <p>(b) line turns</p> <p>(c) position values of beginning and ending of lines</p> <p>(d) bar check or velocity correctors</p> <p>(e) time recording</p> <p>(f) notes or markings on fathograms</p> <p>(g) was reduction of soundings accurately done?</p> <p>(h) was scanning accurate?</p> <p>(i) were peaks at uneven intervals missed?</p> <p>(j) were stamps completed?</p> <p>(k) references to adjacent features</p>	✓	
<p>5. The transfer of contemporary topographic information was carefully examined and reconciled with the hydrography. Remarks Required: -- Discuss remaining differences.</p>	✓				
<p>6. The plotting of all triangulation stations, topographic stations and hydrographic signals has been checked and noted in processing stamp No. 42 on the smooth sheet. Remarks Required: -- None</p>	✓				
<p>7. Objects on which signals are located and which fall outside of the high-water line have been described on the sheet. Remarks Required: -- List those signals still unidentified.</p>	✓		<p>Part V - PROTRACTING</p> <p>13. All positions verified instrumentally were check marked in color in the sounding records, and verifier initialed the processing stamp. Remarks Required: -- None</p>	✓	
<p>Part III - JUNCTIONS</p> <p>Note: Make a cursory comparison preliminary to inking soundings in area of overlap.</p> <p>8. All junctions of contemporary or overlapping sheets were transferred in colored ink and overlapping curves were made identical. Remarks Required: -- None</p>	✓		<p>14. The protracting and plotting of all unsatisfactory crossings were verified. Remarks Required: -- None</p>	✓	
<p>9. The notation in slanted lettering "JOINS H--- (19)" was added in colored ink for all verified contemporary adjoining or overlapping sheets. Those not verified are shown in pencil. Remarks Required: -- None</p>	✓		<p>15. All detached positions locating critical soundings, rocks, buoys, breakers, obstructions, kelp, etc., were verified and the position numbers are legible. Remarks Required: -- None</p>	✓	

Part V - PROTRACTING (Continued)	CL	R	Part VIII - AIDS TO NAVIGATION	CL	R
16. The protracting was satisfactory except as follows: Remarks Required: -- Refers to protracting in general except for specific faults repeated often, or faults in control information, which required considerable replotting or adjustments.	✓		26. All fixed aids located together with those on the contemporary topographic sheets, have been shown on the survey. Remarks Required: -- Conflicts of any nature listed.	✓	
17. The protractor has been checked within the last three months. Remarks Required: -- Date of check, type of protractor and number.	✓		27. All floating aids listed in the Descriptive Report should be verified and checked in soft black pencil, including latitude and longitude and position identification. Remarks Required: -- None	✓	
Part VI - SOUNDINGS			Part IX - BOAT SHEET		
18. All soundings are clear and legible, and critical soundings are a little larger than adjacent soundings. Remarks Required: -- None	✓		28. The boat sheet was constantly compared with the smooth sheet with reference to notes, position of sounding lines and supplemental information. Remarks Required: -- None	✓	
19. Sounding line crossings were satisfactory except as follows: Remarks Required: -- Discuss adjustments.	✓		29. Heights of rocks awash were correctly reduced and compared with topographic information. Remarks Required: -- Note excessive conflicts with topographic information.	✓	
20. The spacing of soundings as recorded in the records was closely followed; Remarks Required: -- None	✓		Part X - GENERAL		
21. The scanning, reduction, spacing, plotting of questionable soundings have been verified. Remarks Required: -- None	✓		30. All information on the sheet is shown in accordance with figures 82 and 83 in the Hydrographic Manual (Pub. 20-2). Remarks Required: -- None	✓	
22. The smooth plotting of soundings was satisfactory except as follows: Remarks Required: -- Refer to legibility, errors in spacing, and errors in numbers - but not to errors in scanning.	✓		31. Unnecessary pencil notes have been removed from the sheet. Remarks Required: -- None	✓	
Part VII - CURVES			32. Degree, minute values and symbols have been checked; also electronic distance arcs have been properly identified and checked on the smooth sheet. Remarks Required: -- None	✓	
23. The depth curves have been inspected before inking. Remarks Required: -- By whom was the penciled curves inspected.		✓	33. The bottom characteristics are adequately shown. Remarks Required: -- None	✓	
24. The low-water line and delineation of shoal areas have been properly shown in accordance with the following: a. From T-Sheet in dotted black lines b. From soundings in orange c. Approximate position of sketched curve is dashed orange d. Approximate position of shoal area not sounded in black dashed Remarks Required: -- None	✓		Part XI - NOTES TO THE REVIEWER		
25. Depth curves were satisfactory except as follows: (This statement should not refer to the manner in which the curves were drawn). Remarks Required: -- Indicate areas where curves could not be drawn completely because of lack of soundings. For some inshore areas a general statement is sufficient.	✓		34. Unresolved discrepancies and questionable soundings.	✓	
			35. Notation of discrepancies with photogrammetric survey inserted in report of unreviewed photogrammetric survey or on copy.	✓	
			36. Supplemental information.		✓
Verified by <i>Stephen S. ...</i>			Date <i>11/17/71</i>		



156°00'

LANAI

KAHIKI CHANNEL

KAHOO LAWE

9016

5054

AIEHU CHANNEL

20°00'

Chart - 4102

MAGNETIC

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9016 (Category I)

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
4140	12-30-71	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Revised hydro and ^{500 f} 1000 fm curves
4000	2-14-72	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Examined for critical corrections only at proof stage - no corrections
4130	6-2-72	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Revised hydro and 100 fm curve.
4001	8-29-72	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Examined for critical corrections only Exam direct without going thru larger scales
4116	6-6-73	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Revised 1000 fm curve thru judge No correction
4179	6-16-73	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Examined for critical corrections - no corrections
4115	7-13-73	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Revised 1000 fm curve and three judges thru 4116, 417 - No corrections
4102	11-10-73	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Examined thru 4116 - No corrections
9000	11-5-74	C.S. Forbes	Full Part Before After Verification ^{before} Review Inspection Signed Via Drawing No. Examined thru critical corrections only thru chart 4000 - no corrections Revised one sounding
4179	9/15/75	HAUSMAN	Full Part Before After Verification Review Inspection Signed Via Drawing No. Exam thru 4102 No Corr.
4140	2/16/77	M.W. FRIESE	Full After Verification (Category I)
Revised	2/24/77	Kennon, D.J.	Added several sgs and revised 100-400 fm. curves Revised 1000 fm curve and added 2000 fm curve -
4115	3/9/77	Kennon, D.J.	Examined common area with 4140 made numerous changes. Direct application to 4115 outside of the coverage of ch. 4140 added two sgs -

CHART	DATE	CARTOGRAPHER	REMARKS
4000	9/20/77	M. Sager	Full application after verification (CATEGORY I) No corrections at this scale.
4179	2/12/77	C.S. Forbes	Part appl. after verification. Revised one s.d.g. (2000 ft. 1000 ft. 500 ft.) Consider revision of 1000 ft. curve at next print.
4115	1/30/78	m. J. France	Consider Class I fully appl thru 4140 (7 th Ed.) in conjunction with chib. 263. - final appl
4180 Aug 14	7/12/78	Ainton	Fully applied Class I thru 4115 Day 14 Final App.
530 (9000)	10/3/79	Kanis	Final Application of col 1 survey thru 540 (4000)
19004 (4102)	3/28/80	Stembel	Applied thru 19320 (4115). Consider fully applied
19007	5/11/81	Sager	Applied thru 19004 consider fully applied