

# 5051

Diag. Cht. No. 4000

Original

Form 504	
DEPARTMENT OF COMMERCE	
U. S. COAST AND GEODETIC SURVEY	
R.S. Patton, Director	
State: <del>Terr. of Hawaiian</del> <b>JAN 20 1931</b> Is.	
DESCRIPTIVE REPORT	
Topographic } Hydrographic }	Field No. 68 Sheet No. 5051
LOCALITY	
Hawaiian Ids.	
<del>Shoal area west of Nihoa Id.</del>	
Shoals between Nihoa and Necker Is.	
1928-9	
CHIEF OF PARTY	
K.T. Adams	

GOVERNMENT PRINTING OFFICE

# 5051

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

REG. NO. 5051

HYDROGRAPHIC TITLE SHEET

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. 6 B

REGISTER NO. **5051**

State Territory of Hawaiian Is.

Shoals

General locality between Necker and Nihoa Islands

Locality Latitude 23° 13' N, Longitude 163° 00' W.

Scale 1:50,000 Date of survey October 19 - 28, 1928  
May 17 - 18, 1929

Vessel GUIDE

Chief of Party K. T. Adams

Surveyed by K. T. Adams

Protracted by F. G. Johnson

Soundings penciled by M. G. Ricketts

Soundings in fathoms **feet**

Plane of reference L L W

Subdivision of wire dragged areas by

Inked by J. D. Torrey

Verified by J. D. T.

Instructions dated March 26, 1928 and April 12, 1929

Remarks: SUB-PLAN of Sheet No. 6

DESCRIPTIVE REPORT  
to accompany  
HYDROGRAPHIC SHEET NO. 6 B  
Hawaiian Islands

DATE OF INSTRUCTIONS: This survey was executed in compliance with instructions for Project 22, dated March 26, 1928.

SCOPE OF WORK: This survey is a survey of two detached shoals, on a sub-plan, scale 1:50000, of the larger Sheet No. 6, scale 1:500,000. Scale 1:50,000 was chosen as it gave a good examination of the area involved and being exactly 1/10th of the scale of the larger survey, made possible the use of scales and data made for Sheet No. 6.

The detail executed on this sub-plan was an examination of the two shoal areas to determine the least depths, a delineation of the size and shape of the shoal and lines run to determine the depth curves, in all cases to 500 fathoms, and in most cases to 1000 fathoms. This gave depth curves to which to tie in the dead reckoning lines on Sheet No. 6.

SUB-PLAN: Although the work is plotted on a separate sheet and a separate descriptive report is written, this sheet is still a sub-plan, and must be considered as such, because all of the data cannot be separated from the accompanying Sheet No. 6.

Insofar as possible the records and data are separated and such records as accompany this sheet are separate and complete in themselves. However, for all data not found separately marked for this sheet, reference should be made to the records accompanying Sheet No. 6.

SURVEY METHODS: All soundings were made by the Fathometer, an officer reading the Fathometer, except a few vertical wire soundings, taken on B day.

Two buoys established on the two shoals were located separately and independently by star sights.

All sounding lines were dead reckoning, full speed run loops; from the buoy out into deep water and back, and tied in again to the buoy. A few detached vertical wire soundings taken on B day were located by bearing and vertical angle on the buoy.

Two logs were streamed. All sounding and dead reckoning data were entered in the sounding record. No separate dead reckoning book was used.

For method of treating star sights, for method of reducing Fathometer soundings, and for method of constructing dead reckoning sheets, refer to the descriptive report accompanying Sheet No. 6.

**DATA:** Data used on this sheet for which reference must be made to the data accompanying Sheet No. 6, are the following:

Serial Temperature Used was that taken at NIHOA ISLAND.

Salinity used was 34.5

Velocity correction Table used was NO. 1.

Compass Deviation Curves used were:

in 1928 work use Curve dated Sept.16,1928.

in 1929 work use Curve dated Apr.23-25,1929.

Log factors used were:

1928;- Log No. 194, 0.875; Log No. 195, 0.945.

1929;- Log No. 194, 0.931; Log No. 195, 1.013.

Red light soundings were corrected for velocity. All soundings were corrected for slope. Soundings under 100 fathoms were corrected for tide and constant error in the Fathometer. Soundings were corrected for slope by using a celluloid scale devised by Lieut. J. A. Bond in which the slope is taken off in a percentage.

White light soundings were not corrected for velocity as per authority of the Director dated December 12, 1929, which authority was based on data submitted by me in letter dated December 5, 1929, from which the following is quoted in part:

"I give herewith a resume' of the reductions necessary on one sheet which has already been reduced.

From zero to 200 fathoms the reductions are plus and gradually increase from zero to three fathoms.

From 200 fathoms to 450 fathoms the reductions gradually decrease from plus three fathoms to zero.

From 450 fathoms to 1500 fathoms the reductions are negative and gradually increase from zero to seven fathoms.

From 1500 fathoms to 2250 fathom the reductions are negative and gradually decrease from seven fathoms to zero.

From 2250 fathoms to 2635 fathoms the reduction is again positive and gradually increase from zero to eleven fathoms.

It is therefore to be seen that this reduction is always less than one half of one percent and is generally very much less than that. Also this reduction is always less than half of the probable error of observation of a whitelight sounding."

**BOAT SHEETS:** Two boat sheets are submitted. These two shoals were developed separately in different seasons. It had been expected to plot these surveys on two different sheets. But when the shoals were found to be so close together, all the work was recorded in one volume with the intention of plotting it all on one smooth sheet.

Two boat sheets were necessitated because the final locations

of the two buoys were not known until after the work was done.

The boat sheets are without projection, latitude or longitude, each sheet having merely one point designating the buoy with a north and south azimuth line running through this point.

All sounding lines were plotted in nautical miles on a 1:50,000 scale.

**CORRELATION OF WORK:** The eastern shoal was surveyed in 1928. Buoy BAR was located by star sights at that time. The intention was to make two separate surveys of the two shoals. Deep water was expected in between them. Sounding lines were to be run out to 500 fathoms and in an effort to reach this depth, unintentionally a line was run from the eastern shoal over and onto the western one.

The western shoal was surveyed in 1929. Buoy Odd was located by star sights at that time. It must thus be understood that there was no buoy at Odd when the above mentioned line was run within a mile and a half of that position.

This sounding line however tied the two shoals together by the soundings and depth curves. After the entire survey was completed and the positions of both buoys were determined, a determination of the discrepancy, where the above line fitted the western shoal, was made. This was less than three-quarters of a mile. Of course, the dead reckoning could easily be out that much.

However, with this in mind, the star sight positions were again studied over to see if the position of either buoy could be logically changed, in the desired direction, to lessen this discrepancy.

The star sight position of one buoy was changed slightly.

When the sheet was plotted, after all the work was adjusted for dead reckoning, the lines were further slightly adjusted to make the soundings fit better,

**DISCREPANCIES:** The sounding on Position 27 A was questioned in the record but is apparently about correct.

The 327 fathom sounding between Positions 78 and 79A appears incorrect but has been retained on the sheet. I feel that it was a stray which was read but do not feel that there is sufficient justification for the rejection of it.

The largest crossing difference is about 10 fathoms between 32 to 33 C and 81 to 82 A. Other crossing differences are less than four fathoms.

It is probable that the long dead reckoning line 69 to 73 A could be adjusted better to the shoal on which buoy ODD was located. This line apparently should go farther west. This would make the depth curves between 69 and 73 A appear more normal and the soundings near Position 16 C check better.

RECORDS: The following records form a part of and accompany this sheet:

- 1 Descriptive Report
- 1 Title Sheet
- 1 Sounding Volume .
- 1 Smooth Sheet
- 2 Boat Sheets
- 1 Table of Statistics

For the following, refer to Sheet No. 6:

Star Sight Position of Buoy  
Compass Curves Used  
Serial Temperature  
Velocity Factor Tables.

*K. T. Adams*

K. T. Adams,  
H & G E, C & G S,  
Chief of Party.

VERIFICATION REPORT  
to accompany  
HYDROGRAPHIC SHEET NO. 6B.  
Hawaiian Islands

This will certify that I have examined  
the smooth sheet and records and hereby ap-  
prove same.

The field work was done under my direct  
supervision.

This sheet is a sub-plan of Sheet No.6.

*K. T. Adams*

K. T. Adams  
Commanding  
Steamer GUIDE

SHEET NO. 6-B.

SHOAL AREA WEST OF NIHOA ID., T. H.

STATISTICS.

DAY	DATE	Red Lt. Sta. mi.	White Light		V. mi. for C. day.	Tot. sta. Sndgs		Pos.
			Sta. mi.	No of Sndgs.		for day	for day	
A	10/19/28	86.3	20.6	65	2	106.9	67	86
B	10/20/28	23.4	4.4	15	16	27.8	31	36
C	5/17/29	73.0	63.0	175	2	136.0	177	144
D	5/18/29	48.3	1.7	8	2	50.0	10	55
TOTALS		231.0	89.7	263	22	320.7	285	321

✓



(FOR FIELD RECORDS FILE)

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January 29, 1931.

Division of Hydrography and Topography:

Division of Charts:

Tide Reducers are approved in  
1 volume/ of sounding records for

HYDROGRAPHIC SHEET - 5051

Locality **Territory of Hawaii (Nihoa Islands)**

Chief of Party: **K. T. Adams in 1928, 1929**

Plane of reference is **mean lower low water, reading**

**3.5 ft. on ~~tide staff~~ tabulations at Honolulu**  
**17.3 ft. below B. M. 2**

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

P. C. W.

Chief, Division of Tides and Currents.

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

December 2, 1931.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 5051

Shoals between Necker and Nihoa Islands, Hawaiian Islands

Surveyed in 1928 and 1929

Instructions dated March 26, 1928 - GUIDE

Fathometer soundings and Dead Reckoning based on astronomically located buoys.

Chief of Party, K. T. Adams

Surveyed by K.T.A.

Protracted by F. G. Johnson

Soundings plotted by M. G. Ricketts

Verified and inked by J. D. Torrey

1. Nature of survey

This sheet comprises a development of two shoals that fall within the limits of H. 5055a. It is in reality a sub-plan of that sheet. Besides the soundings shown on this sheet, there are several additional lines that were run on the main sheet that fall within the limits of the sub-plan. It is understood that these lines have been adjusted by the field party to conform to the depth curves as developed on the sub-plan. Hence the lines on the main sheet that extend beyond the limits of the sub-plan should be in proper relation to the work on the sub-plan. Within the limits of the sub-plan, the work on the main sheet should not be used for charting, as the development on the large scale sheet will be found quite sufficient for the chart scales in this area. (This is recommended by the Chief of Party.)

2. Hydrographic Manual

The work is in conformity with the Hydrographic Manual with the exception that no bottom characteristics are recorded for this survey. However, there are several notations on the main sheet for this area that can be used for charting.

3. Specific instructions

The work conforms to the specific instructions as far as the development on the shoals is concerned. In the deep water area the spacing for lines under 300 fathoms is too great.

4. Adjustment of work

As the development around each shoal was based upon independent astronomic determinations of the buoys planted on the shoals, it was to be expected that some differences would be found where the lines run from one shoal overlapped another shoal. This was true of the line 63 to 86 A which was a closed loop run from the eastern shoal across the deep and on to the western shoal. This line appeared the logical one to adjust rather than the lines radiating from the western shoal. The adjustment consisted chiefly in changing the azimuth of the loop so as to make the several crossings agree.

It should not be supposed that any excessive differences were encountered. The maximum shift necessary to bring the lines in harmony was 750 meters at the outer end of the loop or less than 1/2 mile. And when it is considered that each buoy was independently determined and the lines all run by dead reckoning, the adjusted line being a closed loop of 30 nautical miles, the comparatively small difference encountered is rather a proof of the efficiency of this method of surveying exposed offlying shoals and reefs when the usual methods of surveying are not applicable.

5. Slope corrections

Slope corrections having been applied by the field party (this sheet having been done prior to the publication of Special Publication No. 165) the corrections were accepted by the office cartographer. In no cases were the corrections excessive, hence no difficulty will be experienced in combining this work with the work on the main sheet (H. 5055a) where, owing to the smallness of the scale, the character of the control, and the difficulty of drawing accurate depth curves, all slope corrections were omitted. This matter will, however, be gone into further when H. 5055a is completed and the two sheets compared. All abnormalities resulting from corrections on one sheet and the non-correction on another sheet will then be smoothed out.

6. Comparison with old work

The only old work within the limits of the present survey are two 20 fathom soundings that were reported in 1919 and fall about where the two shoals are indicated on the present survey. As

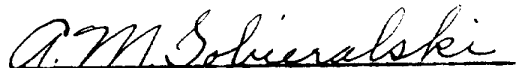
these shoals were removed from the chart when the unverified sheet H. 5055a was applied, they were presumably gone into at that time. They have therefore not been further considered in this review.

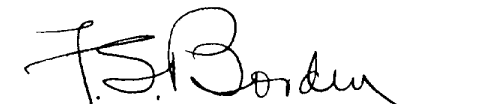
7. Additional work

No additional work is recommended for this area.

8. Reviewed by A. L. Shalowitz, November 1931.

Approved:

  
Chief, Section of Field Records

  
Chief, Section of Field Work

Applied to chart 4181 July 25, 1940 J.H.S.