8797

Diag. Cht. Nos. 1001-3,1237 & 1238-2.

Form 504

U. S. DEPARTMENT OF COMMERCE

COAST AND GEODETIC SURVEY

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No. PE-40-2-64 *Office No.* H-8797

LOCALITY

State SOUTH CAROLINA

General locality COAST OF SOUTH CAROLINA

Locality VICINITY OF

WINYAH BAY ENTRANCE

1964

CHIEF OF PARTY

LCDR. RONALD M. BUFFINGTON

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DATE AUG 5 - 1965

USCOMM-DC 5087

FORM C&GS-537
(8-15-59)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

REGISTER NO.

H-8797

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.

PE-40-2-64

State South Carolina

General locality Coast of South Carolina

Locality Vicinity of Winyah Bay Entrance

Scale 1:40,000 Date of survey August 19 - October 21 1964

Instructions dated April 22, 1964 Project No. OPR-436

Vessel U.S.C.&G.S. SHIP PEIRCE * CSS-28

Chief of party LCDR. Ronald M. Buffington

Surveyed by LTJG Richard J. Derycke

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

Graphic record scaled by Ship Personnel

Graphic record checked by Officers & CQMS

Protracted by LTJG Derycke & ENS. J.W. DROPP

Soundings penciled by LTJG Joseph W. Dropp

Soundings in fathoms feet at MLW MLLW FEET at MLW

REMARKS: The survey was done as a smooth-boat sheet with Decca Range-Range HiFix as a control medium.

USCOMM-DC 8272-P62

DESCRIPTIVE REPORT TO ACCOMPANY

HYDROGRAPHIC SURVEY H-8797 (PE 40-2-64)

SURVEY VESSEL: USC&GSS PEIRCE

CHIEF OF PARTY: LCDR RONALD M. BUFFINGTON

SCALE: 1:40,000

YEAR 1964

A. PROJECT:

Authority for the survey was contained in Instructions from the Director dated April 22, 1964, entitled - - Winyah Bay to Cape Hatteras --- Coast of North and South Carolina, (Reference 211-S-2-PE).

The registry number of PE 40-2-64 was established by a letter from Chief of Operations dated 26 October 1964.

B. AREA SURVEYED:

The survey covered an off-shore area from 3 nautical miles to 27 nautical miles east of Winyah Bay entrance. The limits of the survey are as follows:

LATITUDE	LONGITUDE
33° 02.6'N	78° 55'W
33° 10.00'N	79° 02.90'W
33° 11.1'N	79° 06.6'W
33° 13.5'N	79° 06.6'W
33° 13.5'N	79° 01.0'W
33° 16.6'N	79° 01.0'W
33° 16.6'N	79° 38.0'W
33° 02.6'N	78° 49.0'W

The survey was conducted from August 19, 1964 to October 21, 1964.

The survey junctions with prior surveys: H-4616, 1:40,000, 1926; H-6539, 1:80,000, 1939-40; H-6710, 1:40,000, 1941; H-5820, 1:10,000, 1935; contemporary surveys: H-8794, 1:10,000, 1964, and PE 20-2-64.

C. SOUNDING VESSEL:

Hydrography was performed by the Ship PEIRCE and denoted by the color blue.

D. SOUNDING EQUIPMENT:

Two fathometers were used on the survey: the main fathometer was Raytheon Model 723-1, Serial #246, and the stand-by fathometer was Raytheon Model 723-1, Serial #266. The stand-by fathometer was used intermittently as recorded in the sounding volumes. The fathometers were used in depths from 29 feet to 72 feet.

D. SOUNDING EQUIPMENT (CONTINUED):

The velocity corrections were determined by means of a B.T. cast from which a graph was constructed (included in appendix). The values resulting from this graph were then adjusted by a one foot correction provided by a memo dated October 1, 1962, from the Chief, Instrument Division (memo included in appendix).

E. SMOOTH SHEET:

The smooth sheet projection was ruled by machine and checked in the Washington office.

The survey was done by the smooth-boat sheet method. The transfer of positions was done by pricking through the overlay into the smooth sheet. The maximum probable error as indicated in HI-FIX CALIBRATION REPORT 1964, by LCDR Ronald M. Buffington is in the order of one tenth of a lane or 28.6 feet. (The report is included in the appendix).

F. CONTROL:

Hi-Fix control was used for positioning control of the ship from 3 miles offshore to the outer limits of the survey. Hi-Fix stations were located at Georgetown, S. C. (known as station "CITY" and located by third order triangulation), and at Myrtle Beach, S. C. (known as "VANDAL" and located by third order traverse). Distances from the two stations were taken to determine the ship's position.

Hi-Fix calibration was accomplished through three point sextant fixes. Prior to a day's operations the ship was brought close enough to the shore so as to be able to obtain a good three point fix. There three fixes were taken by sextants (a fix consisted of a three point fix taken by two sextant men and a check angle taken by a third sextant man). The three fixes were then plotted by a three arm protractor on a 1:20,000 Hi-Fix marked calibration sheet of the area and checked with a check angle. With the sextant fixes plotted on the calibration sheet, corresponding Hi-Fix values could be read from the sheet. Simultaneously with the three fixes, the Hi-Fix operator read the values from the Hi-Fix console. The difference between the values corresponding to the sextant fixes and the values from the Hi-Fix console for the three fixes were then meaned. This meaned value was then entered as a corrector into the Hi-Fix system.

F. CONTROL (CONTINUED):

After this was completed a second round of three simultaneous fixes and readings was done. If the mean value of these differences fell within a range of 0.05 lanes of the Hi-Fix readings from the console, then the Hi-Fix system was regarded as having been calibrated. If the values did not fall within the allowable limit, then the process was repeated until agreement was made. (Appendix HI-FIX CALIBRATION REPORT 1964" by LCDR Ronald M. Buffington).

G. SHORELINE:

The survey included no shoreline.

H. CROSSLINES:

Crosslines were run 8% of regular sounding lines. Crosslines were in good agreement.

Places where crosslines disagreed by more than one foot on the smooth sheet were double checked and corrected if results warranted.

I. JUNCTIONS:

Junctions with prior surveys H-6539, H-6710 and contemporary surveys H-8794 and PE 20-2-64 were good. Prior survey H-4616 was not available for a comparison. Prior survey H-5820 was superseded by contemporary survey H-8794.

J. COMPARISON WITH PRIOR SURVEYS:

Of the presurvey items:

ITEM # 1: The sunken wreck, φ33° 15'N, λ79° 00'W., was searched for by one launch a total of one day. The ship's search is shown on a "dog ear" attached to PE 20-2-64. The results of both searches showed no evidence of the sunken wreck.

Several persons were consulted in Georgetown about this wreck and two persons stated that they had seen the wreck from an airplane on different occasions.

Conditions had to be perfect in order to see it:
(1) Northeast wind to move muddy water line south of wreck.
(2) High tide so that muddy water line will be closer to beach.
(3) Clear day to be able to see wreck.

J. COMPARISON WITH PRIOR SURVEYS (CONTINUED):

Mr. Frank Stalvey who operates a business in Georgetown volunteered to fly out over the wreck and guide one of our launches to it when conditions were right. The ship was to call him any morning that conditions were good, but conditions were never suitable the last few weeks of the season so we never called on Mr. Stalvey. I believe the wreck can be located easier by air and I'm sure Mr. Stalvey will be glad to fly out if prior arrangements are made.

It is recommended that the wreck continue to be charted.

Minor discrepancies with prior surveys do exist but they are believed to be due to natural changes over the past 23 to 38 years.

K. COMPARISON WITH THE CHART:

Chart 787: (3ed Ed. Oct/26/64)

(a) Buoy "2WB" - New Location - See section "M"

Chart 1238: (Revised Ed. 1o/29/62)

(a) At φ 33° 12.2'N - 34 foot depth charted and the
λ 79° 01.8'W survey recorded a 35 foot depth.

(b) At φ 33° 12.5'N - It is recommended that a 33 foot
λ 79° 01.75'W depth be charted at this location.

(c) At φ33°10.1'N - Depth of 33 feet on this survey and 34
λ79°01.3'W feet on chart 1238.

(d) At φ 33°10.15'N - Depth of 34 feet on this survey and 36
λ 79°00.3'W feet on chart 1238.

(e) At φ 33°09.8'N - Depth of 30 feet on this survey and 32
λ 79°00.15'W feet on chart 1238.

(f) At φ 33°08.1'N - Depth of 34 feet of this survey. A depth
λ 78°59.2'W this shallow is not indicated at this
locations on chart 1238.

(g) At φ 33°09.25'N - Depth of 36 feet on this survey. The
λ 79°01.87'W shoal area of 35 feet on the chart is
somewhat to the SE and did not appear
on this survey. It seems the area has
changed to a slight degree.

K. CHART COMPARISON (Continued)

(h) At φ 33°09.85'N - Depth of 29 feet on this survey. This
λ 79°02.00'W shoal is indicated on Chart 1239 , but the shoalest point has changed to the above location.

(i) At φ 33°10.50'- Depth of 28 feet on this survey. This
λ 79°02.90' shoal is indicated on chart 1239, but the shoalest point has changed to the above location.

(j) At φ 33°10.90'N -Depth of 28 feet on this survey and 29 feet
λ 79°03.60'W on chart 1239.

L. ADEQUACY OF SURVEY

This survey is considered complete and adequate to supersede prior surveys.

M. AIDS TO NAVIGATION

A comparison was made of navigation aids listed in United States Coast Guard's LIGHT LIST - Volume II, Atlantic & Gulf Coast - 1965. The results of this comparison are below:

Light List #	Light List Position	Survey Position
4310-Buoy"2WB"	-φ 33°11.8'N λ 79°05.4'W	φ 33°11.73'N λ 79°05.32'W

4310.5 Buoy "WR2A" - is located 240 yds.(insted of 100yds.) at 113° (instead of 110°) from the last reported position of wreck.

WRECK - "City of Richmond"

φ33°01.8'N λ 78°55.0'W	φ 33°01.84'N λ 78°55.32'W

See next page

Comparison with Char 787 indicates that Buoy "2WB" is located in a different position than the survey recorded.

CHART	SURVEY
φ33°11.8'N λ79°05.2'W	φ33°11.73'N λ79°05.32'W

The discrepancy is believed to be due to the relocation of Buoy "2WB" shortly before September 14th,1964 by the Coast Guard. The survey position of this buoy supersedes the Charted position.

50.4" 31.8"

City of Richmond Wreck

Wreck is incorrectly plotted on Smooth Sheet H-8797. Should be 120 meters SW of plotted position. Corrected position is Lat. 33°01.84'N., Long. 78°55.53'W.

H-8797 located the Bell Buoy which was replaced by a Gong Buoy N.M. 32, 1965 subsequent to the 1964 survey. Where the C. G. placed the new buoy and what position of wreck they used for reference is unknown to undersigned. H-8797 located Bell Buoy (old) at Lat. 33°01.85'N., Long. 78°54.32'W. or 343 yards 88° from position of wreck as located by HI-Fix at same time.

313.6m

It is recommended above position of wreck be used for charting.

D. R. Engle
August 17, 1965

N. STATISTICS

VESSEL .....U.S.C.& G.S. SHIP PEIRCE

NUMBER OF POSITIONS 2237

SOUNDING MILES (Naut. Mi.). 2171.9

Area (Sq. Naut. Mi.) 195.7

Number of Bottom Samples .. 60

O. MISCELLANEOUS

General areas covered in the survey sheet is of a sloping bottom dotted with ridges and mounds extending approximately 5 to 10 feet from the bottom.

P. RECOMMENDATIONS

Presurvey Item #1. (φ33°15'N, λ79°00'W), wreck of 2000 ton ship, was not discovered after several days of launch and ship hydrography. It is recommended that further search be by wire drag methods or by an air assisted search on a day of appropriate weather. Local people indicate this ship has been seen from the air. (Refer - Section J.)

Q. REFERENCE TO REPORTS

HI-FIX calibration volume included in this survey as Volume #12..

Ronald M. Buffington
LCDR, U.S.C.& G.S.
Comdg.-Ship PEIRCE

Descriptive Report
Written By:

Joseph W. Dropp
LTJG - U.S.C.& G.S.

APPROVAL SHEET

Smooth sheet H-8797 & Descriptive Report are approved.

Continuous supervision was maintained during the survey.

Ronald M. Buffington

APPENDIX

TIDE NOTE

Hourly heights were furnished by the Washington Office for this survey. The station originally intended for use in this survey was the Myrtle Beach, S.C. standard tide gage. However, since the gage at Myrtle Beach failed to operate correctly, hourly heights for Myrtle Beach were inferred from the standard gage at Charleston, S.C..

To infer the hourly heights for Myrtle Beach, subtract ½ hour from the time of high and low water and subtract 0.1 feet from the height of high water tabulated for Charleston, which are referred to a datum 2.6 feet below mean low water.

To infer the hourly heights for the area surveyed use no time correction and apply a height ratio of 0.9 to the hourly heights at Myrtle Beach.

The time meridian was the 75° West for this survey.

FORM CD-121A (7-11-63)
(PREV. BY A.O. 206-10)

UNITED STATES GOVERNMENT

Memorandum

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

IN REPLY REFER TO: 232-102-982pi

TO: The Commanding Officer
USC&GSS PIERCE
P. O. Box 2508
Savannah, Georgia

DATE: June 23, 1964

FROM: Acting Chief, Marine Data Division

JUN 29 1964

SUBJECT: Tide Zones, Sheet PE-10-1-64, Winyah Bay Entrance

In accordance with your request by memorandum of June 14, 1964, zoning for tidal control of subject Hydrographic Sheet is given below using tide reducers from the gage records for Georgetown Light and Myrtle Beach, S. C.

Zone 1. Open coast area to a cross in the vicinity of Buoy N-10

Use Myrtle Beach Tides
Height ratio 0.9
Time correction -0

Zone 2. Winyah Bay Entrance, inside the reefs, bounded by Channel Buoys N-10 to C-13

use (b)

(a) Use Myrtle Beach Tides
Height ratio 0.9
Time correction + 20 minutes

or (b) Use Georgetown Light Tides
Height ratio 1.1
Time correction - 20 minutes

Zone 3. Vicinity of Georgetown Light south to Channel Buoy C-13

Use Georgetown Light Tides
without correction

William Shofnos

William Shofnos

APPENDIX

VELOCITY CORRECTIONS FOR SHIP

The velocity corrections were determined by means of a B.T. cast from which a graph was constructed(included in this appendix). The values resulting from this were then adjusted by a one foot correction provided by a memo dated October 1,1962, from the Chief Instrument Division-Memo included in this appendix.

FORM 732
(3-61)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

FIELD RECORD OF BT DATA

YEAR 1964

VESSEL: USC&GSS PEIRCE

GENERAL LOCATION: Vicinity of Winyah Bay, S.C.

CHIEF OF PARTY: Ronald M. Buffington

PROJECT NO.: OPR-436

(TEMPERATURE IN °F DEPTH IN FT.)

SLIDE NO.	1																	
DATE	9/12/64																	
TIME	1145																	
LATITUDE	32°58'N																	
LONGITUDE	78°55'W																	
SRF. TEMP. (BUCKET)	79°																	
SRF. TEMP. (BT.)	77°																	
*TRACE a OR b	1a																	
TEMP	DEPTH																	
77.2	0																	
77.2	10																	
77.2	20																	
77.2	30																	
77.2	40																	
77.2	50																	
77.2	59																	
BOTTOM TEMP (BT)	77.2°																	
BOTTOM DEPTH (BT)	59'																	

*INDICATE NUMBER OF FEET BT TRACE TERMINATES ABOVE (a) OR BELOW (b) SURFACE LINE ON VIEWING GRID.

USCOMM-DC 25383-P61

VELOCITY CORRECTIONS
RAYTHEON FATHOMETER DE-723-1
(VELOCITY = 800 FMS/SEC)

MID DEPTH EA. LAYER (fms)	Temp. (°C)	SALIN. (0/00)	LAYER VEL. (MET/SEC)	CORR'N FACTOR	LAYER CORR'N (fms)	DEPTH CORR'N (fms)	APPLIC DEPTH (ft)	DEPTH CORR'N (ft)
2.5	25.7	36.2	1534.6	.04894	+.24470	+.24	30	+1.4
7.5	25.3	36.1	1533.7	.04833	+.24163	+.49	60	+2.9
12.5	24.8	36.0	1532.6	.04757	+.23785	+.73	90	+4.4

U.S. DEPARTMENT OF COMMERCE
Coast and Geodetic Survey
Washington 25, D.C.

October 1,1962

MEMORANDUM

To: All U.S.C.& G.S. Ships

From: Chief, Instrument Division

Subject: Setting of "Initial" on DE-723 Survey Fathometer

A direct signal path to the "D.C. Write" circuit in th the DE-723 Survey Fathometer provides a reference mark which is independent of the gain and by-passes the receiving amplifier circuitry. We have found that in order to get a correct depth recording, the initial (draft) setting should be set one foot less than the active draft of the ship. For example, if the ship's draft is 12 feet, the "initial" of the DE DE-723 Fathometer should be set for 11 feet.

T. J. Hickley
Chief, Instrument Division

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

CORRECTIONS IN FEET, ~~FATHOMS~~

0	+1	+2	+3	+4	+5

FORM C&GS-117 (4-62) — U.S. DEPARTMENT OF COMMERCE, COAST AND GEODETIC SURVEY

VELOCITY CORRECTIONS

Ship PEIRCE

R. M. Buffington, Comdg.

These corrections are to be used between August 19 19 64 and ____ 1964.

in the locality Vicinity of Wingan Bay Entrance

for hydrographic surveys Nos. ____

Velocity Corr'ns: 27' - 37' = +1.5'
47' = +2.0
57' = +2.5
67' = +3.0
77' = +3.5

FEET	DEPTHS IN FATHOMS
0	0
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
130	
140	
150	
160	
170	
180	
190	

(For deep water add a 0 to these figures)

Fathom Correction

FROM MEMO DATED OCT 1, 1962 FROM CHIEF, INSTRUMENT DIVISION:

INITIAL WAS SET TO ELIMINATE DRAFT CORRECTION EACH DAY, SO TO APPLY CORR'N MENTIONED IN MEMO, ADD A MINUS ONE FOOT (-1.0') TO ALL SDGS.

OR - CORRECTION = VELOCITY CORR'N - 1.0'

USE

27' to 37' → +0.5'
37.2' to 47' → +1.0'
47.2' to 57' → +1.5'
57.2' to 67' → +2.0'
67.2' to 77' → +2.5'

APPENDIX

ABSTRACT OF CORRECTION TO DISTANCE MEASUREMENTS

Electronic control used on this survey was HI-FIX of the Decca Navigator Company of England.

The HI-FIX system was adjusted to read correctly while the ship was running sounding lines.

APPENDIX

LIST OF SIGNALS

There were no signal on sheet H-8797 (PE-40-2-64)

The following signals were those used in the calibration of the HI-FIX navigation system. The listed signals were located on 1:20,00 calibration sheet mentioned in section "F" of the main text.

NAME	SOURCE
LIG	Δ Station - GeorgeTown Lighthouse 1925
RAN	Δ Station - Winyah Bay Range "A" Rear Light, 1963
WIN	Δ Station - Winyah Bay Range "A" Front Light, 1963
YAK	T-12302

SHIP PEIRCE

HI-FIX CALIBRATION REPORT 1964

LCDR RONALD M. BUFFINGTON

COMMANDING OFFICER

FEBRUARY 1, 1965

INDEX

HI-FIX CALIBRATION REPORT 1964

1. SUMMARY:

We do not know exactly what the Hi-Fix equipment is capable of providing and it is believed that a test to determine this should be made in the near future.

Calibrating the equipment every day is time consuming and efforts should be made to reduce this time by a considerable amount. Either determine that the equipment only needs to be calibrated to the nearest lane, or obtain an electronic device to calibrate the equipment where ever the vessel might be.

Better utilization could be made of this equipment with some additional components, a saw tooth recorder, print-out, etc.

The equipment is stable and will operate for reasonably long periods of time without breakdown if it is maintained properly and if the technicians are familiar with all trouble shooting procedures.

2. BOAT SHEETS USED IN 1964:

There were two sheets that the Ship PEIRCE worked on during August, September and October, an inshore 1:20,000 sheet and an offshore 1:40,000 sheet. The Hi-Fix control survey limits on the 1:20,000 sheet were from 2 miles offshore to 9 miles offshore, and the 1:40,000 sheet limits were from 5 miles offshore to 28 miles offshore. The 1:40,000 sheet was used as a boat-smooth sheet with an overlay.

The calibration sheet was a 1:20,000 scale sheet with range circles every 20 lanes.

3. SHORE STATIONS:

The shore stations were established at Georgetown, S. C. and Myrtle Beach, S. C. The Georgetown station (CITY) was approximately 6-1/2 miles from the shoreline and the station at Myrtle Beach (VANDAL) was about 50 yards from the shoreline. The base line distance between the stations was 27.7 nautical miles.

4. CONTROL FOR CALIBRATION:

The control for calibration fixes consisted of three triangulation stations and one good photo station which checked out very well. These stations were located very near Winyah Bay entrance. This location was the only place a calibration could be made near the working area. Calibrations were made at the same location for the 1:20,000 sheet because the area was very close to the area to be surveyed. Control stations for calibration were installed farther north to be used as the work was extended north but the season ended before the work progressed that far.

5. CALIBRATION PROCEDURES:

The calibrations were made two to three miles from the shoreline. It was necessary to get reasonably close to the beach to keep the intersection angles as large as possible. Three anglemen placed themselves at a point halfway between the transmitting and receiving antennas. The sextants were checked before every calibration and adjusted to zero or the correction determined which was then applied to the angles. The anglemen stood shoulder to shoulder to keep the error resulting in the sextants being some distance apart horizontally at a minimum. On the "mark" which was transmitted to the chart room by an intercom speaker the values were recorded from the receiver dials. The plotter would then plot the fix using a three arm metal protractor. If the check angle did not agree with the plotted angle within 2 minutes the fix was rejected. If the check angle checked the Hi-Fix values would be read from the sheet using an Odessey protractor. Three such fixes were taken for each calibration and the differences were meaned. If, when the three Hi-Fix differences were meaned and one of the values differed from the mean by more than 0.15 lane it would be rejected and another fix taken. If the meaned value of the differences was more than 0.07 lane for either station the value was radioed to the shore camp at which the difference occured and the operator would adjust his receiver by that amount. Three more fixes would then be taken after the shore camp operator adjusted his receiver dials and if the results were within 0.07 lane the calibration would be considered complete.

The Hi-Fix receiver dials read to the nearest 0.01 lane. Using a wave propogation value of 299.670 km/s and at our frequency of 1718.59 KC, 0.01 lane is a distance of 2.85 ft. An error of 0.07 lane would be a distance error of about 20 feet and was set as an arbitrary calibration limit. Although on some days when conditions were very poor this limit was exceeded a little, but a difference of more than 0.1 lane was never carried.

This was not intended to be a hard and fast maximum but rather a value that the equipment was capable of and something that our visual fix methods were capable of providing. Our adjustments at the shore stations were made to eliminate a processing step. When we calibrated and adjusted we did not apply any small difference to each fix because we could only plot the fix to the nearest 0.1 lane on both the 1:40,000 and 1:20,000 scale sheets.

6. CALIBRATION ERRORS:

Hi-Fix equipment errors are not discussed here. This is considered to be an accuracy problem rather than a calibration problem.

Attenuation due to transmitting signals over land and changing weather is not a calibration error but we found that this error can be appreciable. At times we would carry the same calibration values at the shore stations for several days when the weather was good. When the weather would change to worse conditions we would have to use new shore station values. The effects of weather are more pronounced on stations that transmit over land as can be seen by comparing the abstract of the two stations we were using. See attachment No. 1. Station "CITY" which was transmitting over 6-1/2 miles of land had greater calibration changes from day to day than station "VANDAL".

(1). The error due to the three sextants not being exactly at the same location was kept to a minimum by having each man stand shoulder to shoulder. The amount of error introduced is not considered to be appreciable.

(2). With Range-Range operation there are two antennas used aboard ship, a transmitting antenna and a receiving antenna. The center of the antennas was estimated and the anglemen stood as near as practical to that center. The difference was not more than 10 feet, and the error introduced would not be appreciable.

(3). The roll of the ship could introduce an appreciable error in calibrating when a large swell was running but in general it would mean out with several fixes. Usually the swell was not large enough to cause any appreciable roll.

(4). Sextant error. Each sextant was checked every day before calibration and corrections were applied. The sextant error was not considered to be a source of calibration problems.

(5). Incorrect alignment of objects resulting in an angle error. This error probably caused more calibration problems than all other sources combined. A large number of fixes were rejected during the three months due to the check angle being out by more than 2 minutes. We found that if the check angle did not check within 1' we obtained our maximum differences between the visual and Hi-Fix reading. Some of the problems were due to visibility. The area we were working in is well known for its haze. This caused some calibrations to take over an hour. One of the objects we used was a lighthouse which was larger than the other signals and matching this object with another was difficult at times. Our best results were always obtained on calm clear days.

(6). Plotting error. There is always some error in plotting a fix using a three arm protractor and especially in trying to adjust the Odessey protractor over the large circle that results in running a pencil around the protractor center.

(7). Error in reading protractor. At a 1:20,000 scale the Odessey protractor was made with circles every 1/2 lane, and it could be read to the nearest 0.1 lane, with some estimates to the nearest 0.05 lane. The center of the metal protractor used to plot fixes is 0.2 lanes in diameter. Therefore the Odessey protractor could be misaligned by as much as 0.05 lane unless extreme care was taken.

(8). Calibration sheet construction errors and errors in drawing distance curves cannot be estimated but they could be as large as 0.05 lane.

(9). Changing weather is a source of error especially when a signal is being transmitted over land. This is evident when reviewing the abstract of calibrations. It is not possible to determine this error but when a calibration was made in the A.M. and the weather changed during the day some error is introduced.

7. RESULTS:

Considering the care taken during the entire calibration procedure, it is believed that all calibrations were well within the limits that could be expected. At times a position may have been plotted at a location as much as 0.2 lane from the actual position, but this error was due to changing weather that could not be controlled, and impossible to determine. We probably consumed more time during some calibrations than the results warranted, but it is better to be positive than doubtful. This was the first time that Hi-Fix operations had continued over a period of time without excessive breakdowns and was really a trial period. It had been our intention to calibrate the ship at different locations for a comparison but it was never practical to accomplish this. At first it was also planned to use a buoy for recalibration during work on the 1:40,000 sheet but as it worked out the equipment operated very well and a buoy was not necessary. Calibrations at buoys are accurate only to the nearest lane and not for partial lane adjustment. The equipment will operate with a minimum amount of breakdowns if it is maintained and operated properly. It is relatively stable during adverse weather. The only times that lanes were lost due to thunder storms was when very severe storms passed over the shore stations.

It is believed that in calibrating the Hi-Fix, values within 0.10 lane are of sufficient accuracy to be used rather than the 0.05 lane used in 1964. Also, not enough time was saved in processing to warrant adjusting the shore station receiver dials with the correction rather than carrying the correction and applying it to every fix.

Therefore in 1965 three visual fixes will be taken and the difference between the Hi-Fix and the fix readings will be meaned. If none of the differences is more than +0.15 from the mean the meaned value will be recorded and applied to each fix before plotting the fix. This will cut calibration times considerably. All other precautions previously discussed will be observed.

There will have to be some adjustments made during the 1965 season because of changing from Range-Range to Hyperbolic operations but they will not be major differences.

8. RECOMMENDATIONS:

The following recommendations are made with a strong emphasis that action be initiated to resolve some of our major problems.

(1). A saw tooth recorder is needed to determine when a lane has been lost during marginal operating periods. At least twice last season two hours of operation were lost because it appeared to the man watching the dials that a lane had been lost (or gained) during a thunder storm. Surveying was discontinued and a recalibration made. It was found that no lanes had been lost. It doesn't appear that obtaining this small piece of equipment would be unusually difficult or expensive.

(2). A print-out is needed to print a visible record of the receiver dials at the time of the fix. It is almost impossible to read both spinning receiver dials at the same time. The only way we can operate at all at the present time is to run ares which then requires reading one spinning dial and one that is almost stationary. Still, after sitting a few hours watching dials, a person will misread some of them.

(3). An electronic device is needed to calibrate the Hi-Fix. A device (Shipboard Telugometer) such as the Canadians use is almost mandatory. It is felt that we are calibrating equipment that is several times more accurate than the calibrating method. The receiver dials read to the nearest 2.85 ft. but our visual fix is probably good only to the nearest 20 ft.

(4). The equipment is supposed to be able to adjust itself to a fractional lane and all that really needs to be done in calibrating is adjusting to the nearest lane. This has not been proven as yet. An accuracy test should be conducted to determine exactly what the Hi-Fix equipment is capable of. It is possible that we are using a great deal of time to calibrate when it isn't necessary. Maybe we only need to calibrate a few times each month and use a mean value the remaining time. This would certainly enable the vessel to accomplish much more during a field season.

ATTACHMENT # 1.

SHIP HI-FIX CALIBRATIONS 1964

ALL VALUES ARE IN LANES

	STATION "CITY"			STATION "VANDAL"		
Date 1	2	3	4	5	6	7
8/19/64	.07	+.20	+.25	.62	+.11	+.14
20	.39	-.12	-.07	.72	+.01	+.04
21	.50	-.23	-.18	.89	-.16	-.13
22	.30	-.03	+.02	.71	+.02	+.05
24	.30	-.03	+.02	.78	-.05	-.02
25	.37	-.10	-.05	.77	-.04	-.01
26	.37	-.10	-.05	.77	-.04	-.01
9/4/64	.37	-.10	-.05	.77	-.04	-.01
5	.27	.00	+.05	.77	-.04	-.01
6	.27	.00	+.05	.77	-.04	-.01
7	.15	+.12	+.17	.60	+.13	+.16
14	.10	+.17	+.22	.50	+.23	+.26
15	.10	+.17	+.22	.73	.00	+.03
16	.10	+.17	+.22	.73	.00	+.03
25	.10	+.17	+.22	.68	+.05	+.08
26	.10	+.17	+.22	.68	+.05	+.08
27	.23	+.04	+.09	.77	-.04	-.01
28	.23	+.04	+.09	.77	-.04	-.01
29	.23	+.04	+.09	.77	-.04	-.01
30	.23	+.04	+.09	.77	-.04	-.01
10/1/64	.23	+.04	+.09	.77	-.04	-.01
2	.16	+.11	+.16	.62	+.11	+.14
3	.39	-.12	-.07	.84	-.11	-.08
4	.39	-.12	-.07	.84	-.11	-.08
5	.39	-.12	-.07	.84	-.11	-.08
14	.10	+.17	+.22	.64	+.09	+.12
18	.24	+.03	+.08	.67	+.06	+.09
19	.42	-.15	-.10	.67	+.06	+.09
20	.83	-.56	-.51	.52	+.21	+.24
Mean	0.27			0.73		
Mean of first 10 days	0.32			0.76		

NOTE: Ship receiver changed on evening of 8/19/64.
Transmitter at Station "CITY" was changed the morning of 10/18/64.
10/20/64 The weather this day was very bad, rain and 20 to 25 knot winds.

Attachment one gives a summary of all ship calibrations taken during the three months of ship operations.

Column (1) Date calibration was made.

Column (2) Transmitter dial setting at station "CITY" after adjustment from calibration fixes.

Column (3) Differences between the dial setting each day and the mean of all the calibrations, "CITY".

Column (4) Difference between the dial setting each day and the mean of the first 10 days calibrations.

Column (5) Transmitter dial setting at station "VANDAL" after adjustment from calibration fixes.

Column (6) Difference between the dial setting each day and the mean of all the calibrations, "VANDAL".

Column (7) Difference between the dial setting each day and the mean of the first 10 days calibrations.

The results of the 29 calibrations taken at the same location during the three months of work indicate that weather variations have an effect on the system. It would appear that we can calibrate from 5 to 10 days at one location and use the mean value for a few days at least before calibrating again without being in error more than approximately 0.20 lane or about 60 feet. It is difficult if not impossible to make a concrete deduction about the calibration results because the calibrations were made with visual fixes which could very well be in error as much as 0.10 lane.

Better results will also be obtained by using 1:10,000 scale calibration sheets instead of 1:20,000 scale sheets.

FORM 197
(3-16-55)

GEOGRAPHIC NAMES

Survey No. H-8797

Name on Survey	A On Chart No.	B On previous survey No.	C On U. S. quadrangle Maps	D From local information	E On local Maps	F P. O. Guide or Map	G Rand McNally Atlas	H U. S. Light List	K	
Atlantic Ocean										1
Wingah Bay Entrance			(title)							2
										3
										4
										5
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FORM C&GS-712
(3-9-64)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDE NOTE FOR HYDROGRAPHIC SHEET

June 16, 1970

~~Nautical Chart Division~~ R. H. Carstens

Plane of reference approved in
12 volumes of sounding records for

HYDROGRAPHIC SHEET 8797

Locality: Vicinity of Winyah Bay Entrance, S.C.

Year
~~Chart Corr~~ 1964

Plane of reference is mean low water

Tide Station Used (Form C&GS-681):

Myrtle Beach, S.C.

at the working grounds
Height of Mean High Water above Plane of Reference is as follows:

5.1 feet

Remarks

J. M. Symons
Chief, Tides and Currents Branch

USCOMM-DC 6680-P64

FORM C&GS-946
(REV. 3-1-64)
(PRESC. BY HYDROGRAPHIC MANUAL 20-2, 6-94, 7-13)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
NAUTICAL CHART DIVISION

HYDROGRAPHIC SURVEY STATISTICS

HYDROGRAPHIC SURVEY NO. 8797

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS (Mylar)	1
DESCRIPTIVE REPORT	1	OVERLAYS	

DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/ SOURCE DOCUMENTS
ENVELOPES						
CAHIERS	2					
VOLUMES	12					
BOXES						

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				
POSITIONS REVISED				
DEPTH SOUNDINGS REVISED				
DEPTH SOUNDINGS ERRONEOUSLY SPACED				
SIGNALS ERRONEOUSLY PLOTTED OR TRANSFERRED				
	TIME (MANHOURS)			
TOPOGRAPHIC DETAILS				
JUNCTIONS				
VERIFICATION OF SOUNDINGS FROM GRAPHIC RECORDS				
SPECIAL ADJUSTMENTS				
ALL OTHER WORK				
TOTALS				

PRE-VERIFICATION BY	BEGINNING DATE	ENDING DATE
VERIFICATION BY	BEGINNING DATE	ENDING DATE
REVIEW BY	BEGINNING DATE	ENDING DATE

USCOMM-DC 6641-P64

FORM C&GS-946A
(REV. 2-1-64)
(PRES. BY HYDROGRAPHIC MANUAL, 6-94)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

VERIFIER'S REPORT

HYDROGRAPHIC SURVEY, H-8797

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
Note: The verifier should first read the Descriptive Report for general information and problems.		
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		
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		
3. All reference to survey sheets mentioned in the Descriptive Report should include registry number and year. Remarks Required: -- None		
Part II - SHORELINE AND SIGNALS		
4. Source of shoreline signals Remarks Required: -- List all surveys		
a. Give earliest and latest dates of photographs		
b. Field inspection date		
c. Field Edit date		
d. Reviewed-Unreviewed		
5. The transfer of contemporary topographic information was carefully examined and reconciled with the hydrography. Remarks Required: -- Discuss remaining differences.		
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		
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.		
Part III - JUNCTIONS		
Note: Make a cursory comparison preliminary to linking soundings in area of overlap.		
8. All junctions of contemporary or overlapping sheets were transferred in colored ink and overlapping curves were made identical. Remarks Required: -- None		
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		

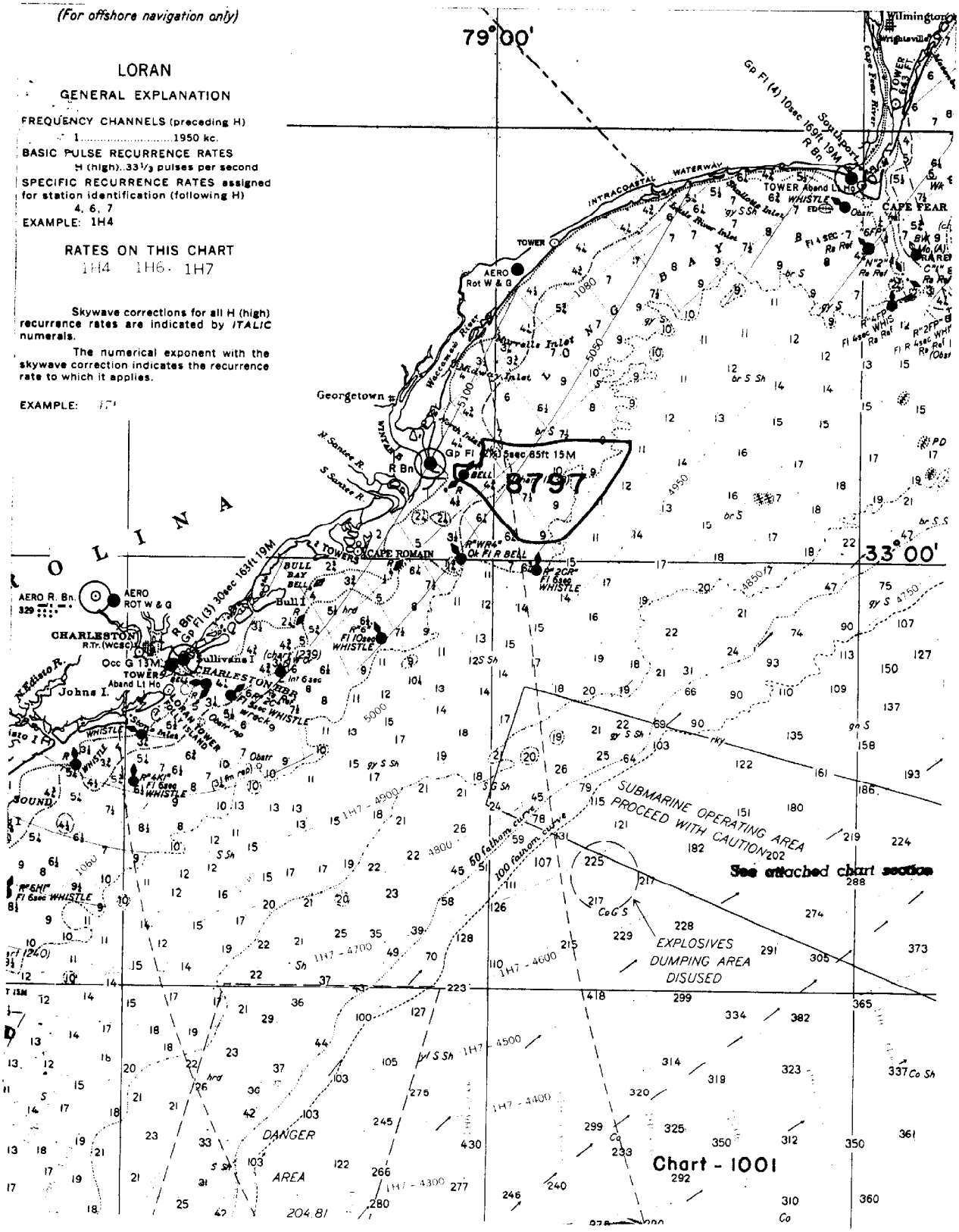
Part III - JUNCTIONS (Continued)	CL	R
10. Junctions with contemporary surveys were satisfactory except as follows: Remarks Required: -- Consider conditions after adjustments have been made; note adjustments made. Make special notes of **Butt** junctions and areas which are **SUPERSEDED.**		
Part IV - VOLUMES		
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		
12. Condition of sounding records was satisfactory except as follows: Remarks Required: -- Mention deficiencies in completeness of notes or actions for the following:		
(a) rocks		
(b) line turns		
(c) position values of beginning and ending of lines		
(d) bar check or velocity correctors		
(e) time recording		
(f) notes or markings on fathograms		
(g) was reduction of soundings accurately done ?		
(h) was scanning accurate?		
(i) were peaks at uneven intervals missed?		
(j) were stamps completed?		
(k) references to adjacent features		
Part V - PROTRACTING		
13. All positions verified instrumentally were check marked in color in the sounding records, and verifier initialed the processing stamp. Remarks Required: -- None		
14. The protracting and plotting of all unsatisfactory crossings were verified. Remarks Required: -- None		
15. All detached positions locating critical soundings, rocks, buoys, breakers, obstructions, kelp, etc., were verified and the position numbers are legible. Remarks Required: -- None		

USCOMM-DC 6623-P64

Part V - PROTRACTING (Continued)	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.		
17. The protractor has been checked within the last three months. Remarks Required: -- Date of check, type of protractor and number.		
Part VI - SOUNDINGS		
18. All soundings are clear and legible, and critical soundings are a little larger than adjacent soundings. Remarks Required: -- None		
19. Sounding line crossings were satisfactory except as follows: Remarks Required: -- Discuss adjustments.		
20. The spacing of soundings as recorded in the records was closely followed; Remarks Required: -- None		
21. The scanning, reduction, spacing, plotting of questionable soundings have been verified. 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.		
Part VII - CURVES		
23. The depth curves have been inspected **before** inking. Remarks Required: -- By whom was the penciled curves inspected.		
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		
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.		

Part VIII - AIDS TO NAVIGATION	CL	R
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.		
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 IX - BOAT SHEET		
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		
29. Heights of rocks awash were correctly reduced and compared with topographic information. Remarks Required: -- Note excessive conflicts with topographic information.		
Part X - GENERAL		
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		
31. Unnecessary pencil notes have been removed from the sheet. Remarks Required: -- None		
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		
33. The bottom characteristics are adequately shown. Remarks Required: -- None		
Part XI - NOTES TO THE REVIEWER		
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	Date


(For offshore navigation only)
LORAN
GENERAL EXPLANATION
FREQUENCY CHANNELS (preceding H)
1.....1950 kc.
BASIC PULSE RECURRENCE RATES
H (high)..33⅓ pulses per second
SPECIFIC RECURRENCE RATES assigned for station identification (following H)
4, 6, 7
EXAMPLE: 1H4
RATES ON THIS CHART
1H4 1H6 1H7
Skywave corrections for all H (high) recurrence rates are indicated by ITALIC numerals.
The numerical exponent with the skywave correction indicates the recurrence rate to which it applies.
EXAMPLE: 1H7
79°00'
33°00'
Wilmington
Southport
CAPE FEAR
Georgetown
CHARLESTON
Johns I.
Sullivans I
CAPE ROMAIN
Murrells Inlet
Waccamaw River
INTRACOASTAL WATERWAY
Gp Fl (4) 10sec 169ft 19M R Bn
Gp Fl (3) 30sec 163ft 19M R Bn
Gp Fl 15sec 85ft 15M R Bn
AERO Rot W & G
TOWER
TOWER Aband Lt Ho
AERO R. Bn.
AERO ROT W & G
CHARLESTON HBR
SUBMARINE OPERATING AREA PROCEED WITH CAUTION
See attached chart section
EXPLOSIVES DUMPING AREA DISUSED
DANGER AREA
Chart - 1001
1H7 - 4900
1H7 - 4800
1H7 - 4700
1H7 - 4600
1H7 - 4500
1H7 - 4400
1H7 - 4300
50 fathom curve
100 fathom curve
204.81

FORM C&GS-8352
(9-25-63)

NAUTICAL CHART DIVISION

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-8797

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
1001	1-5-66	H. Radtke	Full ~~Part~~ Before ~~After~~ Verification Review Inspection Signed Via
			Drawing No. Revised 10 fm curve (consider fully app'd hydro falls inside 10 fm curve)
787	11/12/65	E Sheeks	~~Full~~ Part Before ~~After~~ Verification Review Inspection Signed Via
			Drawing No. Revised Soundings
1238	6/28/66	M.H. Mall	~~Full~~ Part Before ~~After~~ Verification Review Inspection Signed Via
			Drawing No. Revised several sdgs & curves thru 787 (incomplete)
			app thru 787. Partly applied
1110	6/28/66	M.H. Mall	~~Full~~ Part Before ~~After~~ Verification Review Inspection Signed Via
			Drawing No. Revised several sdgs. app thru
			Chart 1238 but not thru 1237 (Chart right on schedule to Repro. in common area) Partly applied
1237	7/24/68	John P. Weis	~~Full~~ Part Before ~~After~~ Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.
			Full Part Before After Verification Review Inspection Signed Via
			Drawing No.

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

USCOMM-DC 8558-P63