

9944

Diagram No. LS-5

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey **Hydrographic**
Field No. **HSB-20-3-81**
Office No. **H-9944**

LOCALITY

State **Michigan**
General Locality **Lake Huron**
Locality **Harbor Beach to Port Hope**

1981

CHIEF OF PARTY
LT. CDR G.W. Jamerson

LIBRARY & ARCHIVES

DATE **July 6, 1983**

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

AREA 7
CHT
14862
14860

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HYDROGRAPHIC TITLE SHEET

H - 9944

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.

HSB --20-3-81

State MICHIGAN

General locality LAKE HURON

Locality HARBOR BEACH TO PORT HOPE

Scale 1 : 20,000

Date of survey JUNE 1²⁵ to AUGUST 2, 1981

Instructions dated February 2, 1981*

Project No. OPR - X115 - HSB - 81

Vessel NOAA LAUNCH 1255 - HFP #4

Chief of party George W. Jamerson, LCDR, NOAA

Surveyed by Samuel P. De Bow, JR, LT(jg), NOAA

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

Graphic record scaled by SPD, EM, DP, WS, DB, MS

Graphic record checked by SPD, EM, WS, DP, DB

Protracted by N/A

Field- PDP 8/e Hydroplot 1
Automated plot by AMC - Xynetics 1200
Xynetics

Verification by VERIFICATION BRANCH - AMC R.L. KEENE EVALUATION & ANALYSIS BY L.G. CRAM

Soundings in fathoms feet at ~~LOW~~ ~~KXXX~~ IGLD - LWD - 576.8 feet

REMARKS: * CHANGE NO. 1 - April 3, 1981

Notes & changes made in redink in the

SPD - Samuel P. De Bow

Descriptive Report.

EM - Edwin^L Martin

DB - Danny^M Bryant

"Digital Data Completed at AMC"

DP - Dennis^K Parris

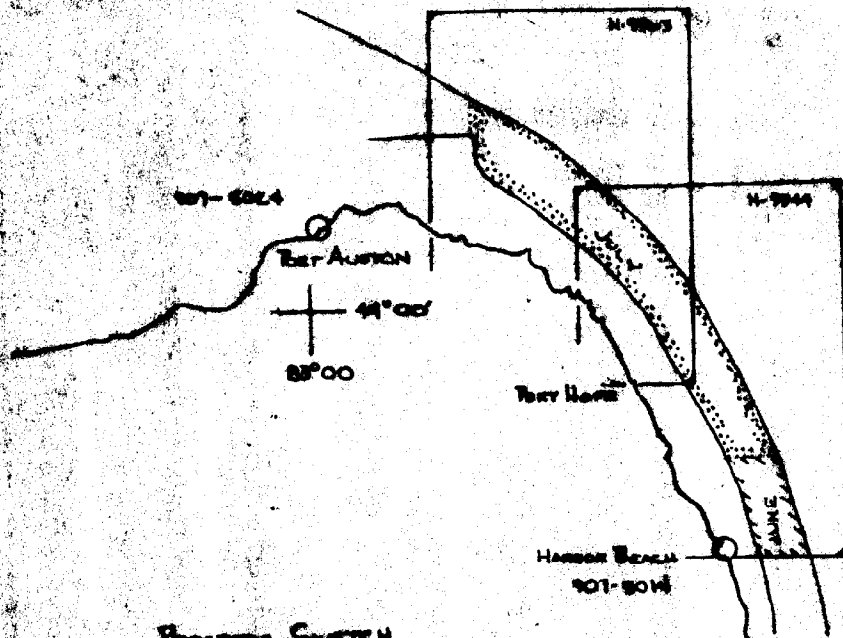
WS - Wayne^L Sprye

MS - Mark Stewart

STANDARDS CK'D 8-2-83

C.loy

AWOIS, 55V - 8/11/83



PROGRESS SWITCH
 OPER. 116
 HEB. 20-24-61
 4-7-61, 11-61
 NOAA LAUNCH 1285
 Ft. JAMARSON, LEDE NOAA

Chart 18560, 27th Ed. Feb. 760

| Station | Location |
|---------|---------------------|
| 81 30 4 | So. N.M. SOUNDING |
| 81 30 5 | LAKE SOUNDING |
| 81 30 6 | LAKE DEPT. 10 - 15m |
| 81 30 7 | LAKE DEPT. 15m |
| 0 32 15 | BOTTOM SAMPLES |
| 3 8 4 | GENERAL STA. |
| 2 - 2 | TIDE GAUGE |
| | |
| | |
| | |

DESCRIPTIVE REPORT
TO ACCOMPANY
HYDROGRAPHIC SURVEY H-9944
HSB-20-03-81

SCALE: 1:20,000

Chief of Party: LCDR George W. Jamerson

Officer-in-Charge: LTJG Samuel P. De Bow, Jr.

Hydrographic Surveys Branch, Hydrographic Field Party #4
Launch 1255

A. PROJECT

The authority for this project was granted under Project Instructions OPR-XI15-HSB-81, dated February 2, 1981 and amended by:

Change No. 1, April 3, 1981 ✓

B. AREA SURVEYED ✓

The area surveyed was in Lake Huron, north of Harbor Beach, Michigan. The approximate limits of the survey are:

Latitude $43^{\circ}51.5' N$, Longitude $82^{\circ}38.1' W$ ✓

Latitude $43^{\circ}51.5' N$, Longitude $82^{\circ}35.7' W$ ✓

Latitude $43^{\circ}59.4' N$, Longitude $82^{\circ}43.0' W$ ✓

Latitude $44^{\circ}00.5' N$, Longitude $82^{\circ}41.5' W$ ✓

The survey ran from June ²⁵ 1, 1981 to July 14, 1981, inclusive, and August 1 & 2, 1981.

C. SOUNDING VESSEL ✓

All hydrographic soundings obtained on this project were taken aboard NOAA Launch 1255 (EDP #1255). All survey records are annotated with the vessel number 1255.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

The following Raytheon Survey fathometer was used for the entire survey:

Recorder: Model #DE-723
Serial #37018

ECU: Model #DE-723-D
Serial #2132

Digitizer Model: #DDM
Serial #1907

No other sounding equipment was used during the survey.

A digital phase check was made at the beginning and end of the project and the results are incorporated with this report. No other major problems were encountered with the equipment during operations. The initial was monitored continuously and A-F checks were made at the start of each day and after every line, for the most part. On one day it was noticed that the digital printout was recording depths shoaler than the analog record by as much as .3 feet. This discrepancy was caused by a stylus that was too short and the problem was corrected before another day was run.

✓ All soundings were scanned within the limits prescribed in the Hydrographic Manual, table 4-4, for soundings in exposed waters, over an irregular bottom.

✓ Settlement and squat was run on Launch 1255 on 31 July (JD 212) off the breakwater at Harbor Beach, MI. The level method was used, rather than the fathometer method, due to the extremely irregular bottom in the area. 1255 was completely fueled and watered immediately before the tests begun. Results are recorded in the volume and in the Appendix of this report. Settlement and squat corrections were not applied on the field sheets but will be applied via the TC/TI tape during smooth plotting at the Atlantic Marine Center.

✓ Velocity and instrument corrections were determined by TDC casts, taken once a week, and barchecks, taken twice daily.

✓ Barchecks were taken to the full extent of the chain, which was 45 feet, whenever possible. TDC Casts were taken down to 30 meters, at 2 meter intervals. The length of the barcheck chain was measured by the OIC before, and after, the survey with no variation noticed. The TDC unit was calibrated by the Electronics Engineering Division at AMC prior to the survey. A MARTEC, model #101-10, serial #477, was the TDC used for the project. TDC Casts were taken on the following dates and the following locations:

| <u>DATE</u> | <u>LOCATIONS</u> |
|-------------|---|
| JD 189 | Latitude 43°55'00" ✓ Longitude 82°36'20" ✓ |
| JD 195 | Latitude 43°57'48" ✓ Longitude 82°37'18" ✓ |
| JD 203 | Latitude 44°06'30" ✓ Longitude 82°49'18" ✓ |
| JD 213 | Latitude 43°55'30" ✓ Longitude 82°36'30" ✓ |

The velocity correctors used for the project were computed from the four (4) TDC casts. Velocity tables and curves are attached. In addition, a composite of all the barchecks taken was graphed and compared to a composite of the four TDC casts. From this comparison, an inherent instrument correction of 0.2 feet was found. This correction will be applied during smooth plotting via the TC/TI tape.

A fair amount of variability was observed in the four TDC casts. The reason for this variability is assumed to be related to the prevailing weather patterns prior to making the cast. Southerly flows tend to cause a deeper thermocline, whereas Northerly flows cause the thermocline to be at a shoaler depth. It was for this reason that a composite curve was compared to the barcheck curve.

Days of hydrography were grouped with Velocity data in the following manner:

| <u>TDC CAST</u> | <u>VELOCITY TABLE</u> | <u>DAYS OF HYDRO</u> |
|-----------------|-----------------------|--|
| JD 189 | 1 | JD 176, 177, 180, 181,183, 188, 189 |
| JD 195 | 2 | JD 195, 196 |
| JD 203 | 3 | JD 197, 199, 203, 204, 205 |
| JD 213 | 4 | JD 211, 212,213, 214 |

Velocity tapes were made but not applied to the smooth plot, and will be applied at AMC during final processing.

E. HYDROGRAPHIC SHEETS ✓

Field sheets used for the survey were prepared in the field using a PDP 8/e computer and a DP-3 Complot Plotter. Boatsheets, semi-smooth, smooth field sheets, and overlays are included with this survey. Mainscheme and crosslines are plotted on the smooth field sheets. Developments, splits, bottom samples, pre-survey review investigations, junction soundings, prior survey soundings, charted soundings, and aids to navigation are shown on various other overlay sheets. Projection parameter tape listings are enclosed in the appendix. All records will be forwarded to the Verification Branch at the Atlantic Marine Center for final smooth plotting by the Harris/7 computer and the Xynetics 1201 plotter.

F. CONTROL STATIONS ✓

Control stations used during the survey were either existing geodetic control published by NGS or control established by the Hydrographic Surveys Branch Support Section to a minimum of third-order standards. All stations are referred to the North American 1927 datum. A list of calibration and electronic signals used during the course of the survey are included in the appended signal list.

G. HYDROGRAPHIC POSITION CONTROL ✓

Sounding line position control utilized was Del Norte Trisponder in the range-range mode. The following electronic positioning equipment was used:

NOAA Launch 1255

| <u>EQUIPMENT</u> | <u>SERIAL #</u> |
|------------------|-----------------|
| DMU | 179 |
| Master | 1070 |
| Pararell Buffer | 111 |

| <u>EQUIPMENT</u> | <u>SERIAL #</u> |
|------------------|-----------------|
| Remote 72 | 245 |
| Remote 76 | 217 |
| Remote 78 | 253 |

The master unit aboard Launch 1255 was mounted on a galvanized pipe mast about 20 feet above the water surface. Remote units were either mounted on signal tripods 10 feet in height or on the two lighthouses within the survey limits. Shore stations were powered by 2 12-volt auto batteries which were changed every other day.

The control equipment was visually calibrated twice daily using sextant fixes, visibility permitting. On a number of days afternoon calibrations were unobtainable due to the haze which developed on the shoreline. Every effort was made to obtain a tight fix whenever possible. Only those sextant fixes with less than 5 meters inverse were used for calibration. Four fixes each were averaged to obtain morning and afternoon correctors. Later a mean for the day was computed. For this survey, no correctors were applied on the corrector tape, if the average daily calibration was less than 10 meters for each rate. The actual printouts of RK561 are included in the survey records. *See section 4. a. of the Evaluation Report*

In addition to sextant calibrations, each Master/DMU/remote pair were baseline calibrated over a distance of 1.5 km at the start of the survey. After running a few days, it was noticed that the correctors on Remote 76 were increasing. Consequently, another baseline calibration was run over a distance of 3.8 km on JD 194. It was found that the unit had a 6 meter increase from the initial calibration. The units were zeroed out and no other drifts were noticed.

The only other problems encountered were caused by the water-surface grazing effect (Skp Zone) and the phase cancellation effect (Null Zone) normally associated with this equipment. Such situations were rectified by changing the station geometry or the antenna height of the shore station.

The longevity of the project was due to a three week delay at the start due to Hydroplot Controller interface problems. Once corrected, the system ran faultlessly.

H. SHORELINE ✓

Shoreline on the field smoothsheet was traced from an enlargement of chart 14862, 23rd edition, July 29, 1978, and is for orientation purposes only. No shoreline was included within the survey limits.

I. CROSSLINES ✓ *See section 3. a. of the Evaluation Report*

Crosslines constitute 12.5% of the mainscheme hydrography. 99% of the crossings agree to within 1 foot. The remainder of the crosslines agree within 2-3 feet.

J. JUNCTIONS *See section 5. of the Evaluation Report*

This survey junctions with the following survey:

1. H-9907 to the south
2. ~~LS-2003 to the west~~
3. ~~LS-2005 to the west~~
H-9963 (1981) to the north

4. ~~LS-2006 to the west~~
5. ~~Canadian Survey 3831 to the east.~~

Since the field smooth plot is uncorrected for the lake level, an assumed water level of 2-3 feet above low water datum was used to compare soundings. Overall, 57% of the junctional soundings agree to within 1-2 feet. No soundings were in disagreement by more than 5 feet. Of course allowances should be made for the steep incline inshore and the less accurate position control of the earlier surveys.

When compared to Survey H-9907, 30% of the junctional soundings agree to within 1 foot. The remainder were in agreement from 2-4 feet. Lake Survey 2003 agreed to within 1 foot on 17% of the soundings and the remainder varied no more than 3 feet. On LS-2005, 71% of the soundings agreed to within 2 feet, while the other soundings varied from 3-5 feet. It was on this survey that the lack of consistency was observed. 55% of the junctional soundings agree to within 1 foot on the next adjoining Lake Survey, 2006, with no sounding in disagreement from 3-4 feet.

Finally, this survey has to junction with the Canadian Survey #3831, 1974. From the outset of the survey it was noticed that the soundings transferred for comparison were going to be vastly different than the observed hydrography. A reason for this discrepancy could be the scale with which the Canadian Survey was run, i.e., 1:100,000. The accuracy of the survey as 1 mm at the scale of 100,000 or 100 meters. With this much variability, obviously a discrepancy will exist.

From the junctional soundings compared, 54% agreed to within 3 feet. The remainder varied between 4 to 6 feet in comparison. Consequently, sounding lines were carried well offshore on the present survey in order to insure adequate junctioning. In general, lines were terminated when the 60 foot contour could be accurately drawn, no matter how well the junctions compared. Sources indicate that the NOAA Ship WHITING ran into the same difficulty last field season and a letter relating this problem from the Commanding Officer is appended to this report.

It is the opinion of the hydrographer that the present survey's soundings should be charted in junctional areas. *concur*

K. COMPARISON WITH PRIOR SURVEYS** See Section 6. of the Evaluation Report

The only prior survey available in the field for comparison purposes was LS-1847*, an offshore deep-water survey from 1946, scale 1:120,000. Only one line from this survey was transferred to the present sheet. Considering the depth and bottom configuration in this area, the survey compared well. All of the transferred soundings agreed to within 3 feet when an assumed lake level of 2-3 feet is applied to the uncorrected soundings from the present survey. *not considered as a prior survey as only one line falls in the survey area.

** The Project Instructions stated that the prior survey to be compared was LS-1846, however, that particular survey was a deep water survey outside the limits of this sheet. *concur*

L. COMPARISON WITH THE CHART See section 7. of the Evaluation Report

Chart 1486², 23rd edition, July 29, 1978, scale 1:120,000 enlarged to 1:20,000 was used to compare with the present hydrography. When the distortion inherent in the process of enlarging charts is taken into account, the two agree well. Of the

24 soundings compared, 54% agree to within 2 feet and 92% within 4-5 feet. No other discernable features were noticed during the survey.

There were no pre-survey review items to be investigated within the limits of HSB-20-3-81 for ^{Project} Project OPR-X115-HSB-81. *concur*

M. ADEQUACY OF SURVEY *See section 6. of the Evaluation Report.*

The present survey was run to NOS standards and is considered adequate to supercede prior surveys for charting.

N. AIDS TO NAVIGATION ✓

There are no aids to navigation within the limits of this survey.

O. STATISTICS

| | |
|--|-------|
| Nautical miles of Mainscheme Hydrography | 342 |
| Nautical Miles of Crosslines | 42 |
| Nautical Miles of Developments | 19 |
| Total Miles of Hydrography | 403 |
| Square Miles of Hydrography | 18 |
| Total Number of Positions | 1,383 |
| Number of Bottom Samples* | 40 |
| Number of Barchecks** | 13 |
| Number of TDC Casts | 3 |

* Log Sheet "M" appended to this report

** All of the barchecks for the entire project (2 sheets) were used to make the velocity tables and tape.

P. MISCELLANEOUS ✓

After semi-smooth plotting, a number of "bullseyes" were noticed near the 30 and 36 foot contour lines. These stray soundings were not investigated further because they were assumed to be boulders or large rocks similar to those which are strewn all over the shoreline, and they did not rise off the bottom by more than 3 feet.

On one particular day, while changing batteries on Remote Del Norte station, a "surge" in the water level was noticed close to the shoreline. At first this surge was believed to be rather large. However, upon inspection of the tide records no appreciable change was seen. Ater deliberating over this phenonmenon a long time, it was ascertained that the change was probably very small, no more than .5 feet, but due to the depth at the shoreline this change seemed extreme.

Q. RECOMMENDATIONS

It is recommended that this survey supercede all prior surveys in this area and, after verification and smooth plotting, be applied to Chart 14862. *see section 6. of the Evaluation Report.*

R. AUTOMATED DATA PROCESSING

The following Hydroplot system programs were used during this survey:

| <u>PROGRAM</u> | <u>VERSION</u> | |
|----------------|---------------------------------|---------|
| RK111 | Range-range Real Time Hydroplot | 1/30/76 |
| RK201 | Grid, Signal and Lattice Plot | 5/18/76 |
| RK211 | Range-Range Non real Time Plot | 1/15/76 |
| RK300 | Utility Computations | 2/05/76 |
| RK330 | Data Reformat and Check | 5/04/76 |
| PM360 | Electronic Corrector Abstract | 2/02/81 |
| RK530 | Layer Corrections for Velocity | 5/10/76 |
| RK561 | H/R Geodetic Calibration | 2/19/75 |
| AM602 | Extended Line Oriented Editor | 5/20/75 |

S. REFERENCE TO REPORTS

Horizontal Control Report, OPR-X115-HFP-80
NOAA Ship WHITING Descriptive Report for H-9907

Respectfully submitted,



LT (jg) Samuel P. De Bow, Jr., NOAA
OIC, Hydrographic Field Party, #4

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

WATER LEVEL NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Atlantic Marine Center: CAM3

Hourly heights are approved for

Water Level Station Used: Harbor Beach, Michigan (907-5014)

Period: June 25, 1981 - August 2, 1981

HYDROGRAPHIC SHEET: H-9944

OPR- X115-HSB-81

Locality: Lake Huron

Plane of reference: Low Water Datum (IGLD 1955 : 576.8 Feet)

Remarks: Zoning not required. Data from other gages on Lake Huron indicate no unusual water level movement during the survey period.

JW(AMC)

Philip C. Morris

Chief, Water Level Branch

FIELD WATER LEVEL NOTE

H-9944

HSB 20-3-81

Predicted or actual water level reductions were not applied to the field sheet. Times of recorded water levels are Eastern Standard Time (+4 hours).

One temporary Fisher-Porter ADR gage was installed at:

| | LATITUDE | LONGITUDE | PERIOD |
|-------------|----------|-----------|-----------------|
| PORT AUSTIN | 44°03'N | 82°59'W | 1 June-3 August |

In addition, the permanent water level gage at Harbor Beach, MI controlled the survey area. This gage was inspected and leveled at the beginning and end of the survey. The gage is located at:

| | LATITUDE | LONGITUDE |
|--------------|----------|-----------|
| HARBOR BEACH | 43°50.7' | 82°38.6' |

PORT AUSTIN

Gage and staff were installed on 2 June, 1981 by field party personnel and levelled out on 3 August, 1981. A contract observer was hired to monitor the gage. Over the 4th of July weekend he did not make observations and the gage went down. Mr. Lippencott of the Tides and Water Levels Branch was notified of the discrepancy and he informed the OIC that since the permanent gage was located close to the survey area, that there should be no problem interpolating the data. No other problems were observed from that point on.

All water level records have been sent to the Tides and Water Levels Branch in Rockville, MD.



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY

Atlantic Marine Center
439 W. York Street
Norfolk, Virginia 23510

October 22, 1981

OA/CAM11

TO: Chief, Water Levels Branch, OA/C234
FROM: *Robert Lewis*
George W. Jamerson, Lt. Cdr.
Chief, Hydrographic Surveys Branch

SUBJECT: Request for water level data

Please furnish smooth water level correctors and zoning information to AMC Processing Division, OA/CAM3, for Survey H-9944 (HSB-20-3-81), OPR-X115-HSB-81, Lake Huron, for the following dates and times:

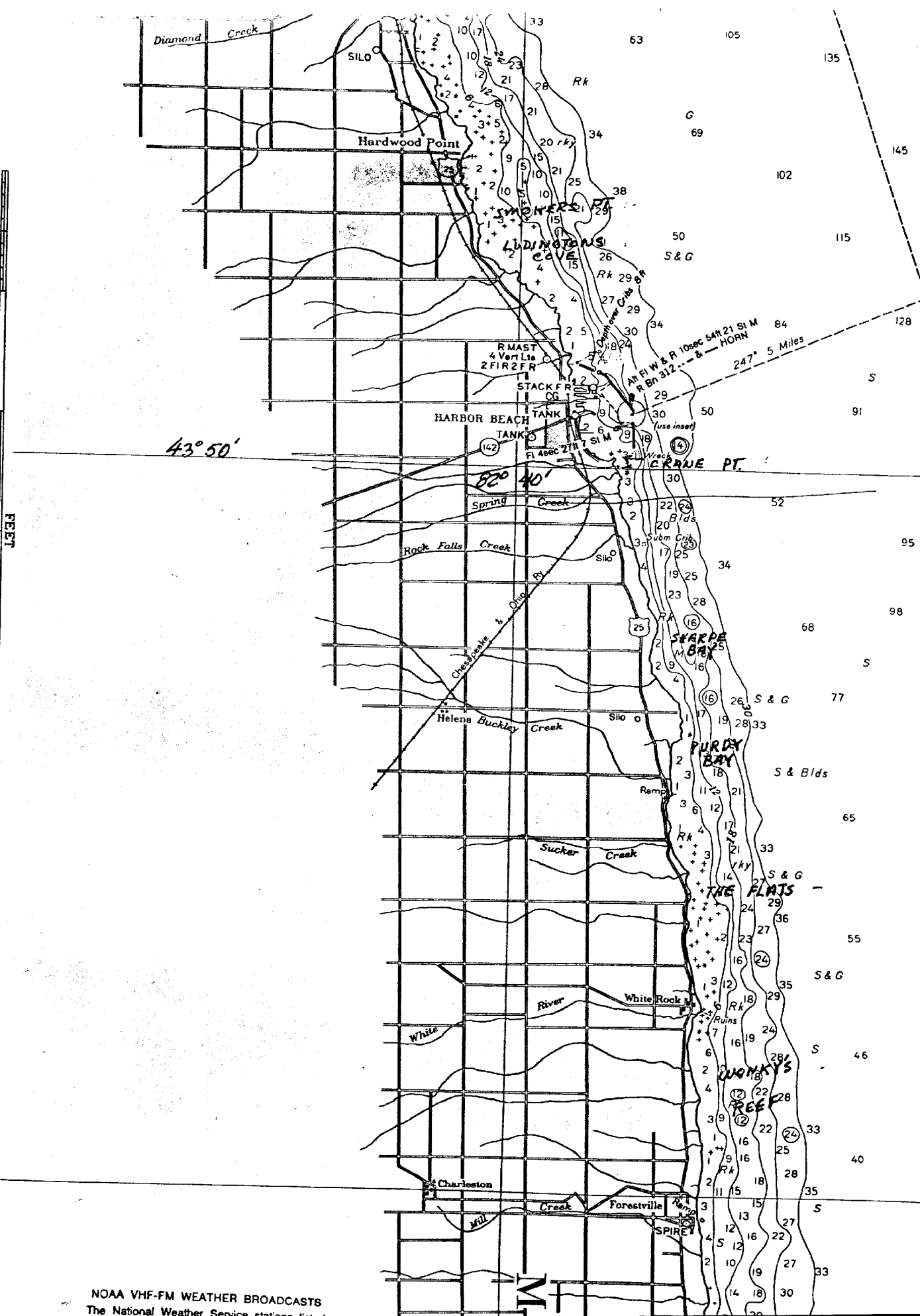
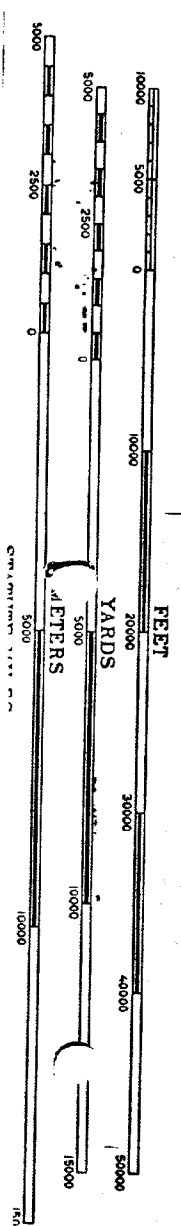
| <u>1981</u> | <u>Hydro Begins</u> | <u>Hydro Ends</u> |
|-------------|---------------------|-------------------|
| JD 176 | 1700 ✓ | 2200 |
| 177 | 1400 ✓ | 2000 |
| 180 | 1400 ✓ | 2000 |
| 181 | 1200 ✓ | 2100 |
| 183 | 1200 ✓ | 2100 |
| 188 | 1200 ✓ | 2300 |
| 189 | 1400 ✓ | 2100 |
| 195 | 1500 ✓ | 2000 |
| 213 | 1400 ✓ | 2200 |
| 214 | 1400 ✓ | 1900 |



10TH ANNIVERSARY 1970-1980

National Oceanic and Atmospheric Administration

A young agency with a historic
tradition of service to the Nation



43° 50'



NOAA VHF-FM WEATHER BROADCASTS
The National Weather Service stations listed

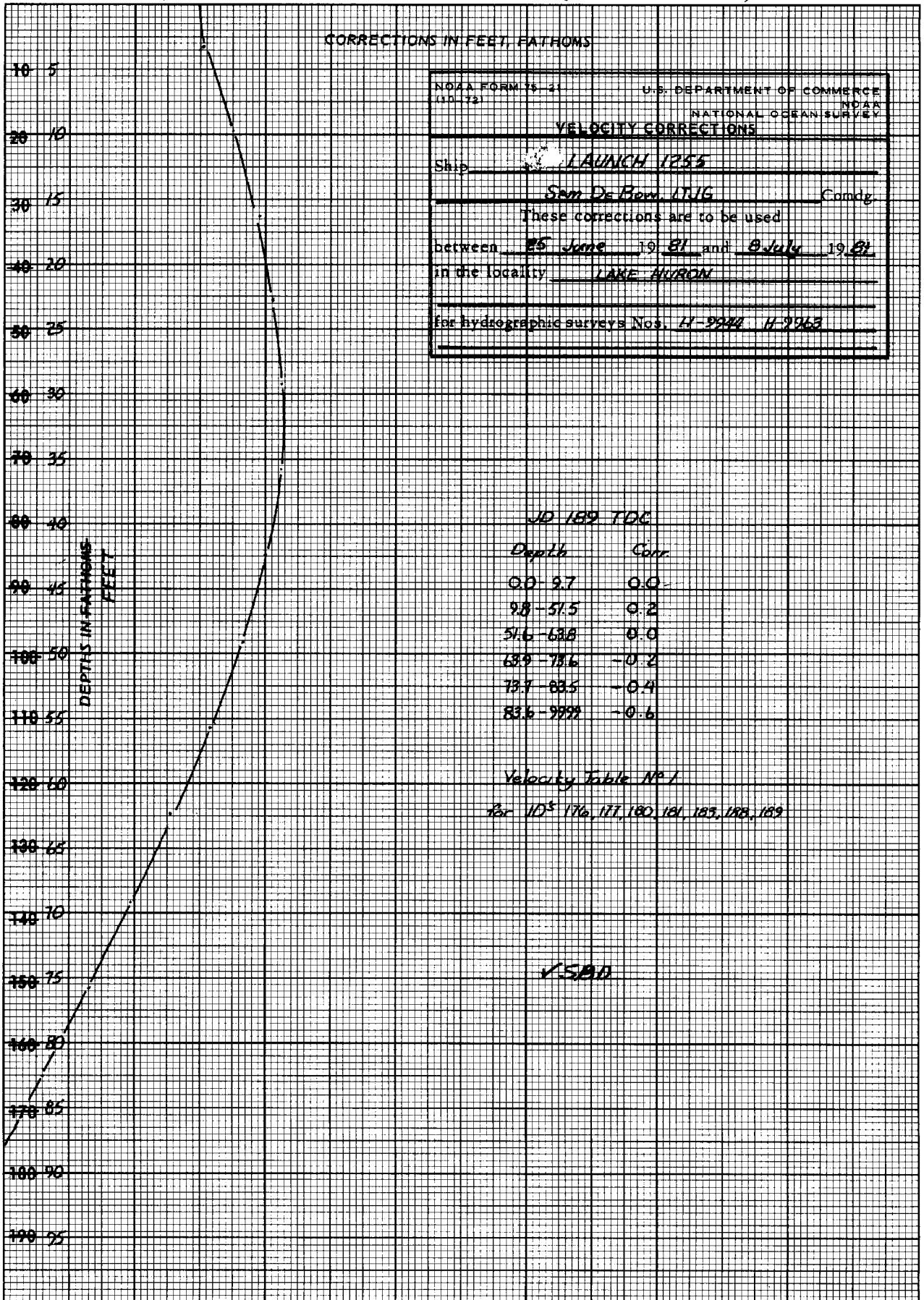
-4 -3 -2 -1 0 1 2 3 4

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

CORRECTIONS IN FEET, FATHOMS

| | | |
|--|--|-------------------------|
| NOAA FORM 15-21 (10-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEAN SURVEY | |
| VELOCITY CORRECTIONS | | |
| Ship | <u>LAUNCH 1255</u> | |
| | <u>San De Bon 1716</u> | Comdg. |
| These corrections are to be used | | |
| between | <u>25 June 19 81</u> | and <u>9 July 19 81</u> |
| in the locality | <u>LAKE HURON</u> | |
| for hydrographic surveys Nos. <u>11-9944 11-9963</u> | | |

(For deep water add a 0 to these figures)



JD 189 TDC

| Depth | Corr. |
|-------|-------|
| 0.0 | 0.0 |
| 9.8 | 0.2 |
| 51.6 | 0.0 |
| 68.9 | -0.2 |
| 73.7 | -0.4 |
| 83.6 | -0.6 |

Velocity Table NP 1

For IDs 176, 177, 180, 181, 183, 188, 189

V.580

K+E 20 X 20 TO THE INCH KEUFFEL & ESSER CO. U.S.A.

1240

OPR XII5
HSB 20-3-81
H-9944
VELOCITY TABLE 1

000097 0 0000 0001 000 125500 020381 /JW

000515 0 0002

000638 0 0000

000736 1 0002

000835 1 0004

001000 1 0006

999999 1 0006

-4 -3 -2 -1 0 1 2 3 4

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

CORRECTIONS IN FEET, FATHOMS

NOAA FORM 75-21
(10-72)

U.S. DEPARTMENT OF COMMERCE
NOAA
NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship LAUNCH 1255

Samm De Bow LTJG Comdg.

These corrections are to be used

between 14 July 1961 and 15 July 1961

in the locality LAKE HURON

for hydrographic surveys Nos. H 9994 H 9963

(For deep water add a 0 to these figures)

DEPTHS IN FATHOMS
FEET

JD 195 TDC

| Depth | Corr |
|--------------|------|
| 0.0 - 8.6 | 0.0 |
| 8.7 - 20.1 | 0.2 |
| 20.2 - 31.1 | 0.4 |
| 31.2 - 44.4 | 0.6 |
| 44.5 - 60.0 | 0.8 |
| 60.1 - 75.5 | 0.6 |
| 75.6 - 87.4 | 0.4 |
| 87.5 - 99.4 | 0.2 |
| 99.5 - 999.9 | 0.0 |

Velocity Table No. 2
for JD's 195, 196

VSPD

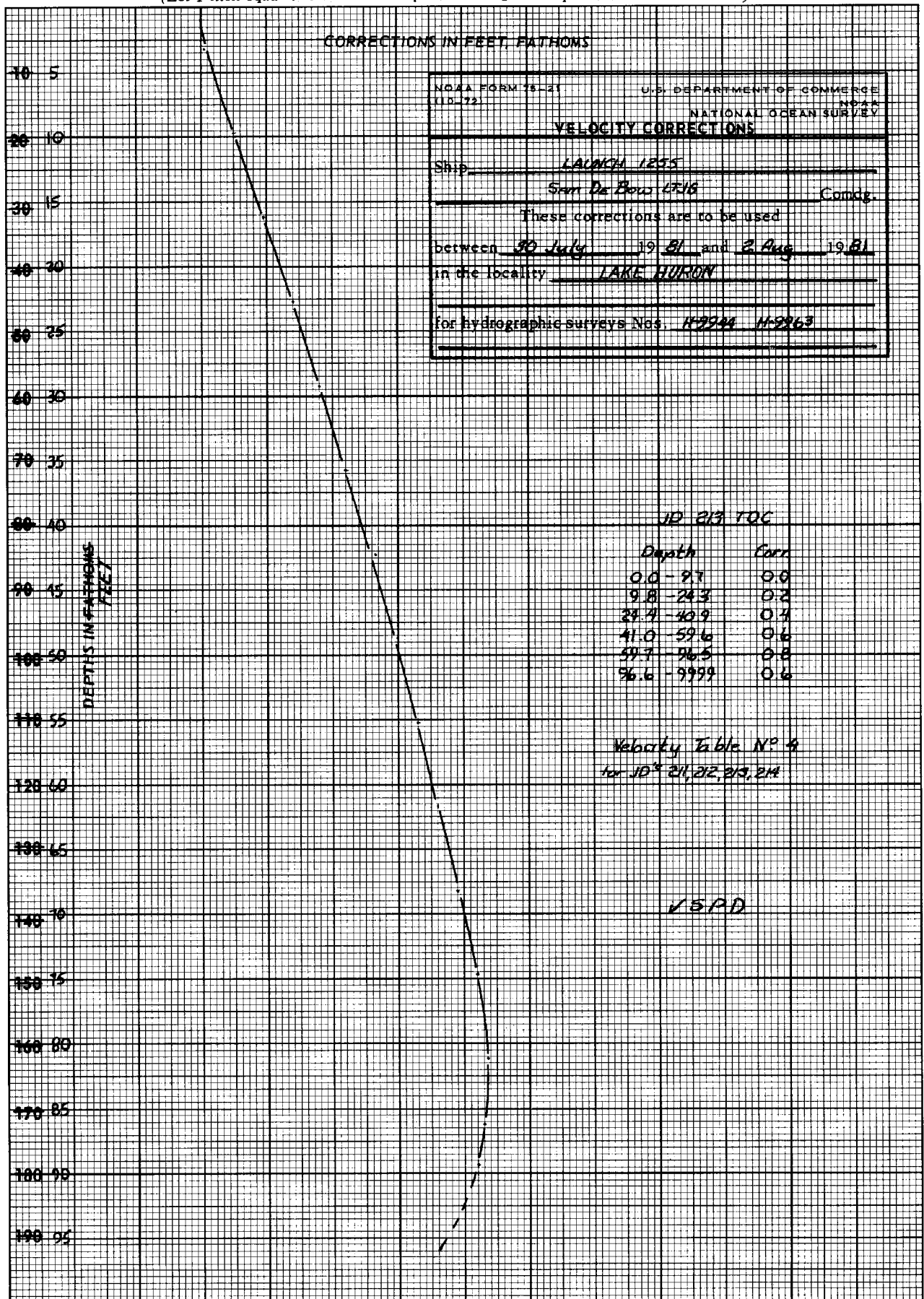
K+E 20 X 20 TO THE INCH KEUFFEL & ESSER CO. U.S.A.

240

OPR XIIS
HSB 20-3-81
H 9944
VELOCITY TABLE 2

000086 0 0000 0002 000 125500 020381 ✓ JW
000201 0 0002
000311 0 0004
000444 0 0006
000600 0 0008
000755 0 0006
000874 0 0004
000994 0 0002
999999 0 0000

-4 -3 -2 -1 0 1 2 3 4
 (Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)



(For deep water add a 0 to these figures)

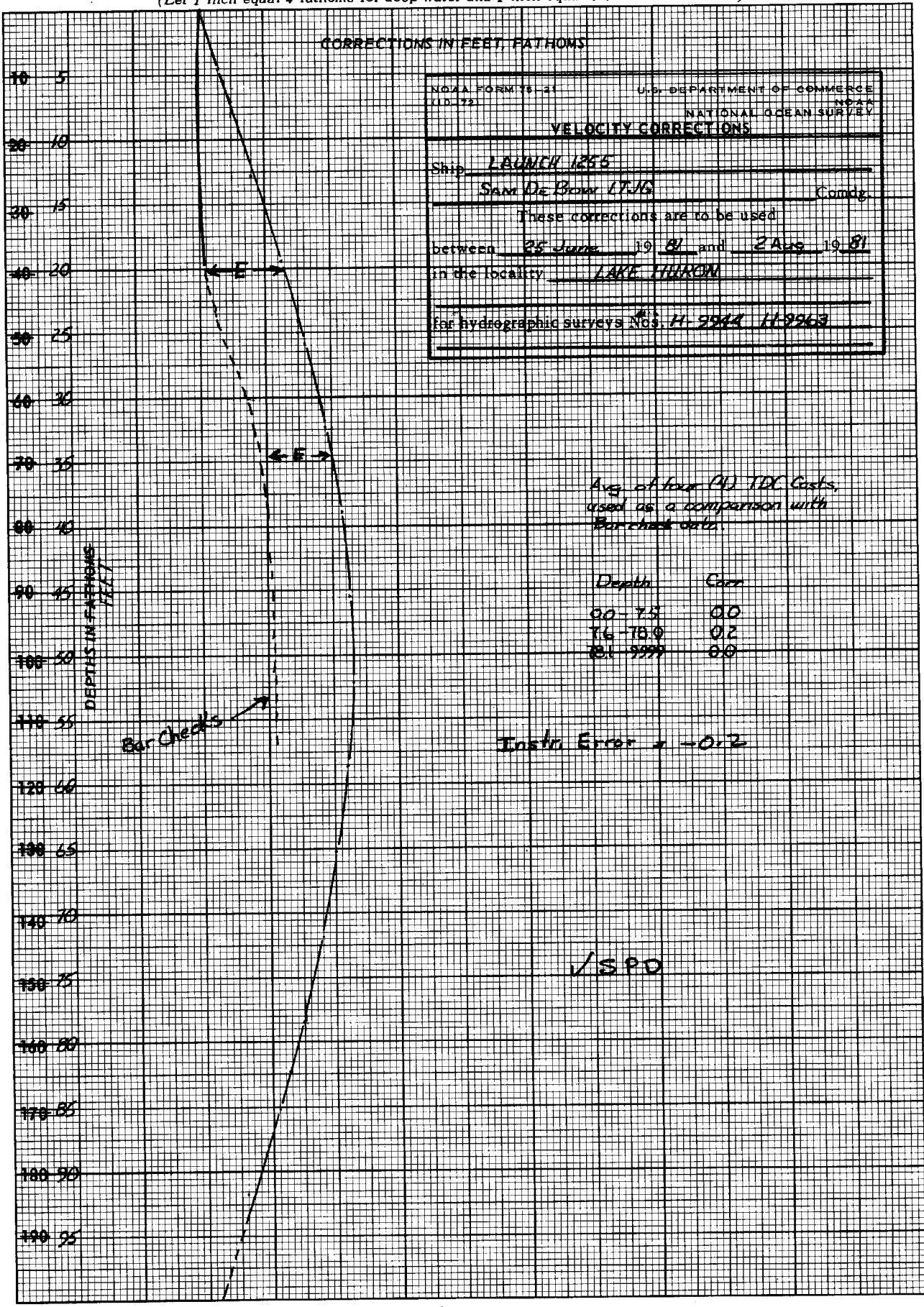
1240

20 X 20 TO THE INCH
 KEUFFEL & ESSER CO. M.
 U.S.A.

OPR XIIS
HSB 20-4-81
H-9963
VELOCITY TABLE 4

000097 0 0000 0004 000 125500 020481 VJW
000243 0 0002
000409 0 0004
000596 0 0006
000965 0 0008
999999 0 0006

-4 -3 -2 -1 0 1 2 3 4
 (Let 1 inch equal 4 fathoms for deep water and 1 inch equal 0.4 fathom for shoal.)



(For deep water add a 0 to these figures)

1240

20 X 20 TO THE INCH
 KEUFFEL & ESSER CO. U.S.A.

WORKSHEET
723-D S/N 37018

| JD | 5' | 10' | 15' | 20' | 25' | 30' | 35' | 40' | A B 45' | |
|----------|------|-------------|-------|------|------|------|------|------|------------|------|
| 177 | 0' | .1' | 0' | 0' | | | | | | |
| | .2' | 0' | .1' | -.1' | 0' | | | | | |
| 180 | -.3' | -.2' | -.4' | -.4' | -.4' | | | | | |
| | | -.1' | -.4' | -.4' | -.5' | -.6' | | | | |
| 181 | -.1' | 0' | -.2' | -.1' | 0' | -.2' | | | | |
| | -.2' | 0' | .2' | .1' | | | | | | |
| 183 | 0' | 0' | -.1' | -.2' | -.2' | -.2' | -.4' | | | |
| | .1' | 0' | 0' | 0' | 0' | -.2' | | | | |
| 188 | | 0' | 0' | 0' | 0' | -.1' | -.2' | -.2' | -.3' | -.3' |
| | | .2' | .2' | .2' | .2' | .2' | .2' | .2' | 0' | 0' |
| 189 | | 0' | .2' | -.1' | .1' | 0' | 0' | -.2' | -.1' | -.2' |
| 196 | | .2' | .1' | .4' | .4' | .4' | .5' | .5' | .4' | .3' |
| | | -.1' | .1' | 0' | .1' | .2' | .2' | .4' | .4' | .3' |
| 197 | 0' | .1' | .1' | .2' | .4' | .4' | .4' | .6' | .6' | .6' |
| 199 | -.2' | .1' | 0' | .2' | .2' | .2' | .3' | .3' | .4' | .4' |
| | .2' | .1' | .2' | .2' | .3' | .4' | .4' | .4' | .4' | .3' |
| 204 | -.1' | 0' | 0' | 0' | .1' | .2' | .4' | | | |
| | -.2' | .1' | 0' | .1' | .2' | .2' | .2' | .4' | .2' | .2' |
| 205 | 0' | .1' | .2' | .2' | .2' | 0' | | | | |
| | 0' | -.1' | -.1' | .2' | .2' | .2' | .2' | .2' | .4' | .3' |
| 211 | 0' | .2' | .2' | .2' | .2' | 0' | .2' | 0' | .2' | .2' |
| | 0' | .1' | .1' | 0' | .1' | .2' | .2' | 0' | .2' | .3' |
| 212 | .2' | .2' | .3' | .1' | .2' | .2' | .4' | .4' | .4' | .4' |
| 213 | .1' | .2' | .1' | .2' | 0' | .1' | 0' | .1' | 0' | |
| 214 | 0' | 0' | 0' | 0' | .1' | .1' | 0' | .1' | .1' | 0' |
| | .10' | 0' | +.32' | .2' | .1' | .1' | .2' | .5' | .2' | .2' |
| Σ | -.3' | 1.2' | 1.1' | 1.2' | 2.0' | 1.8' | 3.2' | 3.7' | 3.5' | 3.0' |
| Mean | 0' | 0' | 0' | 0' | .1' | .1' | .2' | .2' | .2' | .2' |
| | | TRIKE DEPTH | | (P) | (N) | | | | | |
| | | | 5 | 0.0 | 5.0 | | | | | |
| | | | 10 | 0.0 | 10.0 | | | | | |
| | | | 15 | 0.0 | 15.0 | | | | | |
| | | | 20 | 0.0 | 20.0 | | | | | |
| | | | 25 | 0.1 | 24.9 | | | | | |
| | | | 30 | 0.1 | 29.9 | | | | | |
| | | | 35 | 0.2 | 34.8 | | | | | |
| | | | 40 | 0.2 | 39.8 | | | | | |
| | | | 45 | 0.2 | 44.8 | | | | | |

-4 -3 -2 -1 0 1 2 3 4

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

CORRECTIONS IN FEET, FATHOMS

(For deep water add a 0 to these figures)

10 5
20 10
30 15
40 20
50 25
60 30
70 35
80 40
90 45
100 50
110 55
120 60
130 66
140 70
150 75
160 80
170 85
180 90
190 95

DEPTH IN FATHOMS FEET

NOAA FORM 15-21 (10-72) U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEAN SURVEY

VELOCITY CORRECTIONS

Ship LAUNCH 1255
SAM DE BOY LTJG Comdr.

These corrections are to be used
 between 25 June 19 81 and 2 Aug 19 81
 in the locality LAKE HURON

for hydrographic surveys Nos. 11-95414 11-9963

BAR CHECKS

| Depth | Corr |
|----------|------|
| 0.0-272 | 0.0 |
| 213-9999 | 0.2 |

USPD

(21.)

1240
10 INCHES U.S.A.
20 X 20 TO THE INCH
KEUFFEL & ESSER CO. 1
K&E

NOAA LAUNCH 1255

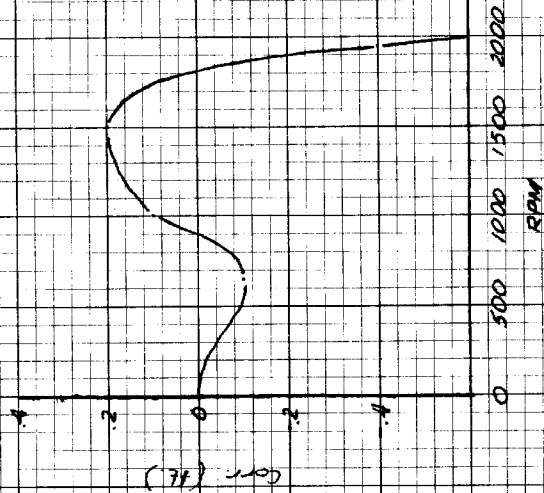
SETTLEMENT & SQUAT

Determined off Harbor Beach, Okla. Harbor Beach, MI.
on 31 July 1987 by the Level Method.

original data located in H 9941 Survey Records
H 9963

| RPM | Mean | Corr. (ft.) |
|------|------|-------------|
| 0 | 9.0 | 0 |
| 650 | 8.9 | -1 |
| 1000 | 9.1 | +1 |
| 1500 | 9.2 | +2 |
| 1950 | 8.6 | -4 |

(1950 RPM Normal Survey Speed)



VJW

HYDROGRAPHIC MANUAL

| OPR <u>XII.5</u> BOUNDING CORRECTION ABSTRACT | | | | | | | | | |
|--|-----------------|---------------|--|---|-----------------------|---|----------|---------|---------------|
| VESSEL <u>1255</u> | | | <u>* 2.6' DRAFT APPLIED VIA CORRECTOR TARE</u> | | | FIELD NO. <u>HSB 20-3-81</u> REGISTRY NO. N- <u>9944</u> | | | |
| Julian Date | From Time (GMT) | To Time (GMT) | Velocity Corr Table No. | (Note: TRA Corr. is the algebraic sum of these columns) | | | | Remarks | |
| | | | | Draft Corr * | Instrument Error Corr | Initial Corr | SAS Corr | | TRA Corr ft/m |
| 176 | 190811 | | 1 | 0 | -2 | 0 | -0.4 | -0.6 | 1950 RPM |
| 189 | 180918 | | | | | | 0 | -0.20.0 | AS |
| 195 | 170610 | | 2 | | | | -0.4 | -0.6 | 1950 RPM |
| 213 | 1726.23 | | 4 | | | | 0 | -0.20.0 | AS |
| 214 | 194216 | | 1 | | | | -0.4 | -0.6 | 1950 RPM |
| | 162233 | | | | | | 0 | -0.20.0 | AS |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

FIGURE 5-7.—Sounding Correction Abstract

OPR XIIS
HSB 20-3-81
H-9944
TC/TI

190811 0 1006 0001 176 125500 001981
180918 0 1002 0001 189 125500 001981
170610 0 1006 0002 195 125500 001981
172623 0 1002 0004 213 125500 001981
194516 0 1006
162833 0 1002 0004 214 125500 001981
235959 0 0000 0000 356 125500 001981

SIGNAL LIST

SPR M115

HSB 23-3-81

H 9944

| | | | | | | | | | | | |
|----------------|--------------|---------------|---------------|------------------|----------------|---------------|------------------|----------------|-----------------|-------------------|---|
| 374 | 7 | 43 | 53 | 44333 | 382 | 37 | 52132 | 253 | 3333 | 333333 | HARBOR BEACH LIGHT 1980 |
| 375 | 7 | 43 | 53 | 37731 | 382 | 37 | 51973 | 139 | 3333 | 333333 | HARBOR BEACH S. PIER 1980 |
| 376 | 7 | 43 | 53 | 45936 | 382 | 37 | 52613 | 139 | 3333 | 333333 | HARBOR BEACH N. BRW ANTENNA 1980 |
| 377 | 7 | 43 | 53 | 28234 | 382 | 38 | 53921 | 139 | 3333 | 333333 | HARBOR BEACH MUN. PIER RAD TWR 198 |
| 378 | 7 | 43 | 51 | 28535 | 382 | 39 | 29232 | 139 | 3333 | 333333 | HARBOR BEACH CABLE T.V. MAST 1980 |
| 379 | 7 | 43 | 51 | 36495 | 382 | 38 | 37261 | 139 | 3333 | 333333 | DETROIT EDISON STACK 1980 |
| 380 | 7 | 43 | 53 | 43207 | 382 | 38 | 57532 | 139 | 3333 | 333333 | ^{Harbor Beach} HERCULES WATER STACK 1980 |
| 381 | 7 | 43 | 52 | 27481 | 382 | 39 | 44303 | 139 | 3333 | 333333 | HARBOR BEACH WATER TANK 1980 |
| 353 | 7 | 43 | 53 | 44135 | 382 | 37 | 53283 | 139 | 3333 | 333333 | H-62-MI 1980 |
| 355 | 7 | 43 | 52 | 39872 | 382 | 39 | 23313 | 139 | 3333 | 333333 | H-63-MI 1980 |
| 356 | 7 | 43 | 53 | 16975 | 382 | 40 | 47636 | 139 | 3333 | 333333 | H-64-MI 1980 |
| 357 | 7 | 43 | 54 | 26338 | 382 | 40 | 58559 | 139 | 3333 | 333333 | H-65-MI 1980 |
| 358 | 7 | 43 | 54 | 38154 | 382 | 41 | 35626 | 252 | 3333 | 333333 | H-66-MI 1980 |
| 359 | 7 | 43 | 55 | 39343 | 382 | 42 | 23176 | 139 | 3333 | 333333 | H-67-MI 1980 |
| 352 | 7 | 43 | 57 | 55339 | 382 | 43 | 24617 | 139 | 3333 | 333333 | H-68-MI 1980* |
| 351 | 7 | 43 | 53 | 27396 | 382 | 43 | 43736 | 253 | 3333 | 333333 | H-69-MI 1980 |
| 352 | 7 | 43 | 59 | 31377 | 382 | 44 | 35485 | 139 | 3333 | 333333 | H-70-MI 1980* |
| 353 | 7 | 43 | 59 | 27527 | 382 | 44 | 23295 | 139 | 3333 | 333333 | H-71-MI 1980* |
| 354 | 7 | 43 | 59 | 44838 | 382 | 44 | 53156 | 139 | 3333 | 333333 | H-72-MI 1980* |
| 355 | 7 | 44 | 33 | 15375 | 382 | 45 | 27958 | 139 | 3333 | 333333 | H-73-MI 1980* |
| 356 | 7 | 44 | 32 | 15131 | 382 | 49 | 52285 | 139 | 3333 | 333333 | H-74-MI 1980* |
| 357 | 7 | 44 | 32 | 37754 | 382 | 51 | 35753 | 139 | 3333 | 333333 | H-75-MI 1980* |
| 358 | 7 | 44 | 32 | 48357 | 382 | 52 | 42652 | 253 | 3333 | 333333 | H-76-MI 1980 |
| 359 | 7 | 44 | 33 | 34935 | 382 | 53 | 31521 | 139 | 3333 | 333333 | H-77-MI 1980* |
| 329 | 7 | 44 | 31 | 22208 | 382 | 47 | 35728 | 253 | 3333 | 333333 | PEE AUX BARQUES LIGHTHOUSE 1979 |
| 331 | 7 | 44 | 31 | 57433 | 382 | 48 | 53913 | 252 | 3333 | 333333 | H-6-MI-79 1979 |
| 334 | 7 | 43 | 56 | 26853 | 382 | 43 | 36783 | 139 | 3333 | 333333 | PORT HOPE LUTHERN CHURCH SPIRE ⁽¹⁹⁸⁰⁾ |
| 336 | 7 | 43 | 56 | 37636 | 382 | 42 | 32557 | 139 | 3333 | 333333 | PORT HOPE STACK 1980 |

HISTORICAL

379 * Not used on this survey!

WORKSHEET

| JD | From Pos | To Pos | CTR | S1 | M | S2 | REMARKS |
|-----|----------|--------|-----|-----|-----|-----|----------------------------------|
| 176 | 1 | 45 | R/R | 374 | 000 | 358 | CROSSLINE |
| | 46 | 62 | | | | | REJECTED |
| 177 | 63 | 98 | | 374 | 000 | 358 | MAINSCHHEME |
| | 99 | 145 | | | | | REJECTED |
| | 146 | 161 | | | | | MAINSCHHEME |
| | 162 | 164 | | | | | REJECTED |
| | 165 | 170 | | | | | MAINSCHHEME |
| | 171 | 176 | | | | | REJECTED |
| 180 | 177 | 182 | | | | | MAINSCHHEME |
| | 183 | 206 | | 374 | 000 | 358 | MAINSCHHEME |
| | 207 | 222 | | | | | CROSSLINE |
| | | 223 | | | | | REJECTED |
| | 224 | 238 | | | | | CROSSLINE |
| | 181 | 239 | 255 | | 374 | 000 | 358 |
| 183 | | 256 | | | | | REJECTED |
| | 257 | 328 | | | | | MAINSCHHEME |
| | | 329 | | | | | REJECTED |
| | 330 | 335 | | | | | MAINSCHHEME |
| | 336 | 337 | | | | | REJECTED |
| | 338 | 377 | | | | | MAINSCHHEME |
| | 378 | 379 | | | | | REJECTED |
| | 380 | 431 | | | | | MAINSCHHEME |
| | 432 | 433 | | | | | REJECTED |
| | 434 | 483 | | | | | MAINSCHHEME |
| 183 | 484 | 725 | | 358 | 000 | 361 | MAINSCHHEME |
| 188 | 726 | 776 | | 358 | 000 | 361 | CROSSLINE |
| | 777 | 840 | | | | | MAINSCHHEME |
| | | 841 | | | | | REJECTED |
| | 842 | 967 | | | | | MAINSCHHEME |
| | 968 | 969 | | | | | REJECTED |
| | 970 | 1059 | | | | | MAINSCHHEME |
| 189 | 1060 | 1079 | | 358 | 000 | 361 | MAINSCHHEME |
| | | 1080 | | | | | REJECTED |
| | 1081 | 1092 | | | | | MAINSCHHEME |
| | | 1093 | | | | | REJECTED |
| | 1094 | 1158 | | | | | MAINSCHHEME |
| 195 | 1159 | 1163 | | | | | BOTTOM SAMPLES, Bc 1164 REJECTED |
| | 1165 | 1167 | | 361 | 000 | 329 | REJECTED |
| 213 | 1168 | 1243 | | | | | MAINSCHHEME |
| | 2634 | 2716 | | 358 | 000 | 361 | DEVELOPMENT |
| 213 | 2717 | 2719 | | | | | BOTTOM SAMPLES |
| | | 2720 | | | | | REJECTED |
| | 2721 | 2741 | | | | | BOTTOM SAMPLES |
| | 2742 | 2759 | | | | | DEVELOPMENT |

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

**U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
HARBOR LANDMARKS FOR CHARTS**

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT (If Isid Party, Ship or Office)
 HFP-4, Launch 1255

LOCALITY
 Lake Huron, Harbor Beach

DATE
 8/2/81

STATE
 Michigan

DATUM
 North American 1927

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

JOB NUMBER
 HSB 20-3-81

SURVEY NUMBER
 H-9944

ORIGINATING ACTIVITY
 HYDROGRAPHIC PARTY
 GEODETIC PARTY
 PHOTO FIELD PARTY
 COMPILATION ACTIVITY
 FINAL REVIEWER
 QUALITY CONTROL & REVIEW GRP.
 COAST PILOT BRANCH
 (See reverse for responsible personnel)

| CHARTING NAME | DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses) | POSITION | | | | METHOD AND DATE OF LOCATION (See instructions on reverse side) | | CHARTS AFFECTED |
|---------------|--|----------|-------------|-----------|-------------|---|-----------------|-----------------|
| | | LATITUDE | | LONGITUDE | | OFFICE | FIELD | |
| | | ° / ' " | D.M. Meters | ° / ' " | D.P. Meters | | | |
| Antenna | Harbor Beach North Breakwater Antenna | 43 50 | 45.906 | 82 37 | 52.618 | | F-1-6-V 1980 | 14860 14862 |
| R TWR | Harbor Beach Municipal Radio Tower | 43 50 | 28.234 | 82 38 | 50.931 | | F-1-6-V 1980 | 14860 14862 |
| Tank | Harbor Beach Water Tank | 43 50 | 27.481 | 82 39 | 44.379 | | F-1-6-V 1980 | 14860 14862 |
| Tank | Harbor Beach Hercules Water Tank | 43 50 | 43.207 | 82 38 | 57.532 | | F-1-6-V 1980 | 14860 14862 |
| Stack | Harbor Beach Edison Stack | 43 51 | 06.495 | 82 38 | 37.261 | | F-1-6-V 1980 | 14860 14862 |
| R MAST | Harbor Beach Cable TV Mast | 43 51 | 28.535 | 82 39 | 29.229 | | F-1-6-V 1980 | 14860 14862 |
| Stack | Port Hope Historical Stack | 43 56 | 37.635 | 82 42 | 32.557 | | F-1-6-V 1980 | 14860 14862 |
| | Dup. of L-642(83) | | | | | | | |
| | 136 | | | | | | | |

| RESPONSIBLE PERSONNEL | |
|---|---|
| TYPE OF ACTION | NAME |
| OBJECTS INSPECTED FROM SEAWARD | It (Jg) Samuel P. De Bow, Jr. OIC - HRP-4 |
| POSITIONS DETERMINED AND/OR VERIFIED | |
| FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES | |
| INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' <i>(Consult Photogrammetric Instructions No. 64.)</i> | |
| <p>OFFICE</p> <p>I. OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75</p> <p>FIELD</p> <p>1. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection</p> <p>A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75</p> <p>*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.</p> | <p>ORIGINATOR</p> <p><input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)</p> <p>FIELD ACTIVITY REPRESENTATIVE</p> <p>OFFICE ACTIVITY REPRESENTATIVE</p> <p><input type="checkbox"/> REVIEWER <input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE</p> |
| <p>FIELD (Cont'd)</p> <p>B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982</p> <p>II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75</p> <p>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75</p> <p>**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.</p> | |

NOAA FORM 76-40
(6-74)
Replaces C&GS Form 567.

NONFLOATING AIDS TO NAVIGATION FOR CHARTS

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

TO BE CHARTED
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT (if field party, ship or office)
 HFP-4, Launch 1255

STATE
 Michigan

LOCALITY
 Lake Huron, Harbor Beach

DATE
 8/2/81

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.
 OPR PROJECT NO. X115-HSB-81

| CHARTING NAME | JOB NUMBER | SURVEY NUMBER | DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses) | LATITUDE | | LONGITUDE | | METHOD AND DATE OF LOCATION (See instructions on reverse side) | CHARTS AFFECTED |
|---------------|-------------|---------------|---|----------|-------------|-----------|-------------|---|-----------------|
| | | | | ° / ' " | D.M. Meters | ° / ' " | D.P. Meters | | |
| Light | HSB 20-3-81 | H-9944 | Harbor Beach Light | 43 50 | 44.299 | 82 37 | 53.102 | F-1-6-V 1980 | 14860 14862 |
| Light | | | Harbor Beach South Pier Light | 43 50 | 37.701 | 82 37 | 51.970 | F-1-6-V 1980 | 14860 14862 |
| | | | Dup of L-642 (83) | | | | | | |

| ORIGINATING ACTIVITY | |
|--|--|
| <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY | |
| <input type="checkbox"/> GEODETIC PARTY | |
| <input type="checkbox"/> PHOTO FIELD PARTY | |
| <input type="checkbox"/> COMPILATION ACTIVITY | |
| <input type="checkbox"/> FINAL REVIEWER | |
| <input type="checkbox"/> QUALITY CONTROL & REVIEW GRP. | |
| <input type="checkbox"/> COAST PILOT BRANCH | |

(See reverse for responsible personnel)

| RESPONSIBLE PERSONNEL | |
|--|--|
| TYPE OF ACTION | NAME |
| OBJECTS INSPECTED FROM SEAWARD | Lt (jg) Samuel P. De Bow, Jr. OIC - HRP-4 |
| POSITIONS DETERMINED AND/OR VERIFIED | |
| FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES | |
| INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION' | |
| (Consult Photogrammetric Instructions No. 64.) | |
| <p>OFFICE</p> <p>I. OFFICE IDENTIFIED AND LOCATED OBJECTS Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object. EXAMPLE: 75E(C)6042 8-12-75</p> <p>FIELD</p> <p>I. NEW POSITION DETERMINED OR VERIFIED Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection</p> <p>A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75</p> <p>*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.</p> | <p>FIELD (Cont'd)</p> <p>B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object. EXAMPLE: P-8-V 8-12-75 74L(C)2982</p> <p>II. TRIANGULATION STATION RECOVERED When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery. EXAMPLE: Triang. Rec. 8-12-75</p> <p>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75</p> <p>**PHOTOGAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.</p> |
| | <p>ORIGINATOR</p> <p><input type="checkbox"/> PHOTO FIELD PARTY</p> <p><input checked="" type="checkbox"/> HYDROGRAPHIC PARTY</p> <p><input type="checkbox"/> GEODETIC PARTY</p> <p><input type="checkbox"/> OTHER (Specify)</p> <p>FIELD ACTIVITY REPRESENTATIVE</p> <p><input type="checkbox"/> OFFICE ACTIVITY REPRESENTATIVE</p> <p><input type="checkbox"/> REVIEWER</p> <p><input type="checkbox"/> QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE</p> |



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY

Atlantic Marine Center
439 West York Street
Norfolk, Virginia 23510

July 26, 1982

OA/CAM61/125
101-15

TO: OA/CAM11 - George W. Jamerson
FROM: OA/CAM61 - G. Bloom
SUBJECT: DE-723D Fatho Repairs/1255 - HFP4
REF: Your memo - 6 May 1982 - Same Subject

The problem experienced by HFP4/1255's Raytheon Model DE-723D Survey System was found to be generated by the RECORDER (S/N 37018) after both Recorder and ECU were tested in the lab.

The Recorder was found to have a spring pin partially broken but still in place. This pin normally secures the Stylus ARM HUB Assembly to the main gearbox shaft (Shaft D).

The "spiking" recorded on the analog chart was the result of the stylus arm slipping (slowing down) thereby causing the bottom return to appear to rise up. The spring pin would then catch and the stylus arm would resume the normal speed with the bottom return falling back to its correct depth.

A complete overhaul of the gearbox with replacement of bearings/shaftD/stylus arm hub assy, etc. was performed and a system checkout produced a solid bottom return with no further signs of the previous problem.

This recorder is considered to be RFI (ready for issue) and available for future use as required.

A copy of the analog chart is attached showing BEFORE and AFTER overhaul. A copy of the recorder's failog is also attached.

It should be noted, however, that although the analog presentation did indicate the spikes the digital information recorded by the hydroplot system was unaffected by this mechanical problem. All digital data should not be subject to question where the chart spikes occurred.

CC: CAM611



10TH ANNIVERSARY 1970-1980

National Oceanic and Atmospheric Administration

A young agency with a historic
tradition of service to the Nation



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
NOAA Ship WHITING
439 W. York Street
Norfolk, Virginia 23510

November 14, 1980

TO : AMC Processing, OA/CAM

FROM : *Frank P. Rossi*
Commander Frank P. Rossi, NOAA
Commanding Officer, NOAA Ship WHITING

SUBJECT: 1980 Lake Huron Surveys: Depth Descrancy between
WHITING's Surveys and Canadian Surveys.

In late October I talked with Ross Douglas, Canadian Hydrographic Service, Burlington, Ontario, about our junction problem with the Canadian Surveys. He said that they were having problems with these Canadian Surveys, and indicated they were rejecting some of the work. The surveys were primarily for limnological studies and hydrographic use of them was secondary.

The fact that our junctions get worse the further one is from Port Huron - Sarnia would indicate that the CHS may be experiencing a problem with the propagation velocity they used. They did not calibrate the Mini-Fix on the United States side of their work. A modest error in the propagation velocity will produce a considerable position error when carried to distances greater than 30 miles.

The WHITING generally did not work more than 15 miles from a calibration site; therefore, there should be little error (less than 10 meters) in the WHITING's positions.



APPROVAL SHEET
SURVEY H-9944 (HSB-20-3-81)

The hydrographic records transmitted with this report are complete and adequate to supersede prior surveys for charting with no additional field work recommended.

Direct daily supervision was not given by me during the field work.

Approved and forwarded,



George W. Jamerson
Lt. Cdr., NOAA
Chief, Hydrographic Surveys Branch

APPROVAL SHEET
FOR
SURVEY H-9944

- A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position printout has/~~XXXXXX~~ been made. A new final sounding printout has/~~XXXXXX~~ been made.
- B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the HYDROGRAPHIC MANUAL. Exceptions are listed in the Verification Report.
- Date: Jan. 18, 1983


Chief, Verification Branch

GEOGRAPHIC NAMES

H-9944

| Name on Survey | Source of Information | | | | | | | | | | | |
|-------------------------|-----------------------|------------------------|-------------------------|------------------------|---------------|-------------------|--------------------|-----------------|---|--|--|----|
| | A | B | C | D | E | F | G | H | K | | | |
| | ON CHART NO. | ON PREVIOUS SURVEY NO. | ON U.S. QUADRANGLE MAPS | FROM LOCAL INFORMATION | ON LOCAL MAPS | P.O. GUIDE OR MAP | RAND McNALLY ATLAS | U.S. LIGHT LIST | | | | |
| Harbor Beach (pop. pl.) | 14862 | | | | | | | | | | | 1 |
| Lake Huron | 14862 | | | | | | | | | | | 2 |
| Port Hope (pop. place) | 14862 | | | | | | | | | | | 3 |
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Approved:

Chas. E. Harrington
Chief Geographer - N/CG2 x5

18 FEB. 1983

| NOAA FORM 77-27 | | U.S. DEPARTMENT OF COMMERCE | | REGISTRY NUMBER | |
|---|---|-----------------------------|---------------------------|-----------------------------------|-----------------------------------|
| HYDROGRAPHIC SURVEY STATISTICS | | | | H-9944 | |
| RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed. | | | | | |
| RECORD DESCRIPTION | | AMOUNT | | RECORD DESCRIPTION | |
| SMOOTH SHEET | | 1 | | SMOOTH OVERLAYS: POS. ARC. EXCESS | |
| DESCRIPTIVE REPORT | | 1 | | FIELD SHEETS AND OTHER OVERLAYS | |
| DESCRIPT- TION | DEPTH/POS RECORDS | HORIZ. CONT. RECORDS | SONAR- GRAMS | PRINTOUTS | ABSTRACTS/ SOURCE DOCUMENTS |
| ACCORDIAN FILES | 1 - Fathograms, Raw PLO, Misc Data | | | | |
| ENVELOPES | | | | | |
| VOLUMES | | | | | |
| CAHIERS | | | | | |
| BOXES | 1 - Smooth, Plo, Sound Vol., Env. of Tides. | | | | |
| SHORELINE DATA | | | | | |
| SHORELINE MAPS(List): | | | | | |
| PHOTOBATHYMETRIC MAPS(List): | | | | | |
| NOTES TO THE HYDROGRAPHER(List): | | | | | |
| SPECIAL REPORTS(List): | | | | | |
| NAUTICAL CHARTS(List): 14862 | | | | | |
| OFFICE PROCESSING ACTIVITIES | | | | | |
| The following statistics will be submitted with the cartographer's report on the survey | | | | | |
| PROCESSING ACTIVITY | | | AMOUNTS | | |
| | | | VERIFICATION | EVALUATION | TOTALS |
| POSITIONS ON SHEET | | | | | 1383 |
| POSITIONS REVISED | | | 0 | 0 | |
| SOUNDINGS REVISED | | | 30 | 5 | |
| CONTROL STATIONS REVISED | | | | | |
| | | | TIME - HOURS | | |
| | | | VERIFICATION | EVALUATION | TOTALS |
| PRE-PROCESSING EXAMINATION | | | 26 | | |
| VERIFICATION OF CONTROL | | | | | |
| VERIFICATION OF POSITIONS | | | 32 | | |
| VERIFICATION OF SOUNDINGS | | | 80 | | |
| VERIFICATION OF JUNCTIONS | | | | 2 | |
| APPLICATION OF PHOTOBATHYMETRY | | | | | |
| SHORELINE APPLICATION/VERIFICATION | | | | | |
| COMPILATION OF SMOOTH SHEET | | | 125 | 13 | |
| COMPARISON WITH PRIOR SURVEYS AND CHARTS | | | | 26 | |
| EVALUATION OF SIDESCAN SONAR RECORDS | | | | | |
| EVALUATION OF WIRE DRAGS AND SWEEPS | | | | | |
| EVALUATION REPORT | | | | 10 | |
| OTHER Digitizing | | | 16 | | |
| TOTALS | | | 279 | 51 | 330 |
| Pre-processing Examination by HYDROGRAPHIC SURVEYS BRANCH (AMC) | | | Beginning Date 11/2/81 | Ending Date 11/10/81 | |
| Verification of Field Data by J. Wilson, R.L. Keene | | | Time(Hours) 279 | Ending Date 10/15/82 | |
| Verification Check by H. R. Smith | | | Time(Hours) 34 | Ending Date 10/13/82 | |
| Evaluation and Analysis by L.G. Cram | | | Time(Hours) 51 | Ending Date 11/3/82 | |
| Inspection by R.D. Sanocki and R.G. Roberson/F. Scullisbury | | | Time(Hours) 8 | Ending Date 12/07/83 | |

VERIFIER'S REPORT
HYDROGRAPHIC SURVEY, H -9944

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>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</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 b. Field inspection date c. Field Edit date d. Reviewed-Unreviewed</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>The transfer of contemporary topographic information was carefully examined and reconciled with the hydrography. Remarks Required: -- Discuss remaining differences.</p> | | | <p>14. The protracting and plotting of all unsatisfactory crossings were verified. Remarks Required: -- None</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>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> | | |
| <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 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>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> | | | | | |

c. This survey is considered adequate to delineate the basic bottom configuration and to determine least depths with one exception. A 700 meter by 500 meter holiday exists in the vicinity of Latitude $43^{\circ} 59.5'$, Longitude $82^{\circ} 41.1'$, where no soundings were obtained. This holiday does not appear to be in an area that would pose a danger to navigation (65 to 74 feet). However, it is recommended that at an opportune time this holiday be filled in.

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports comply with the Hydrographic Manual with the exceptions listed below:

a. It appears that the electronic control calibrations done on this survey were minimal, and at times questionable. Of the ten days of survey work conducted, four days had no evening calibrations. Of the six remaining days, two days exceeded the 10 meter (0.5mm at scale of survey) value as stated in section G of the Descriptive Report. The requirements as specified in sections 1.3.3.2.4. and 4.4.3.3. of the Hydrographic Manual for System Calibrations were not met. This data should have been abstracted and documented in such a manner as to make it clear as to what the hydrographer did to correct the problems discussed in section G of the Descriptive Report.

b. The lack of notes in the sounding volume and the incomplete nature of the notes found on the raw data printouts detracted from the completeness on the survey (with what knowledge did the hydrographer use the term "hard for bottom samples").

5. JUNCTIONS

H-9907 (1980) to the south
H-9963 (1981) to the north

The junctions with H-9963 is complete and requires no further work. The curves on H-9907 (1980) will have to be revised to agree with the curves on H-9944 (1981).

There were no contemporary junctional surveys to the east or west of the present survey. The three surveys LS-2003 (1957), LS-2005 (1957) and LS-2006 to the west of the present survey and Canadian Survey 3831 (1974) to the east, were not considered as contemporary, as the line spacing was not in accordance with the requirements for this scale survey as per section 4.3.4 of the Hydrographic Manual. The Lake Survey Center (LS) Surveys are discussed under section 6. of this report. The Canadian Survey (3831) is adequately addressed under section J. of the Descriptive Report.

6. COMPARISONS WITH PRIOR SURVEYS

- a. LS - 1271 (1913) 1:20,000
LS - 1272 (1913) 1:20,000
LS - 1273 (1913) 1:20,000
LS - 2003 (1957) 1:10,000
LS - 2005 (1957) 1:10,000
LS - 2006 (1957) 1:10,000

The above prior surveys from the U.S. Army Corps of Engineers Lake Survey Center were determined to be the most appropriate for comparison purposes in the area common to the present survey.

In general, the prior surveys agree very well (plus or minus 1 to 2 feet) with the present survey. The basic bottom configuration and least depths are in good agreement, with the present survey providing more information on the topography of the bottom configuration.

It is reasonable to attribute these differences to some natural changes and to a greater degree on the increased sounding density (100 meter line spacing versus 250 meter line spacing) on the present survey.

A number of bottom characteristics were carried forward to the present survey from these prior surveys. The transfer of these bottom characteristics was mainly in irregular bottom areas, and provided additional information and defined the hard bottom found on the present survey.

With the addition of the bottom characteristics described above to supplement the present survey, the present survey is adequate to supersede the above prior surveys in the common area.

b. Wire Drag Surveys

- LS - 1271 (1913)
- LS - 1272 (1913)
- LS - 1273 (1913)

These surveys are basically hydrographic surveys with wire drag swept areas portrayed on the most inshore areas of these surveys. There are no conflicts between the effective depths of these wire drag areas and the present survey.

7. COMPARISON WITH CHART #14862 (23rd Edition, July 29, 1978)

a. Hydrography

The charted hydrography (95%) originates with the previously discussed prior surveys, this hydrography requires no further discussion. The remaining

5% of the hydrography originates with unascertainable sources. These soundings appear to be from three to five feet shoaler than the present survey, however, some amount of this difference could be due to the one to six scale difference between the present survey (1:20,000) and the chart (1:20,000).

It is noted that the chart mark-up was done on chart #14862 (24th Edition, November 7, 1981). The comparison was made with the edition stated above and there is no difference between the hydrographic data on these two charts.

The present survey is adequate to supersede the charted hydrography in the common area.

b. Aids to Navigation

The fixed aids to navigation appear to adequately mark the intended features, there were no floating aids in the survey area.

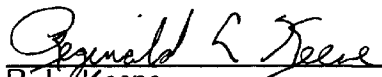
8. COMPLIANCE WITH INSTRUCTIONS


This survey adequately complies with the Project Instructions, with the exceptions noted elsewhere in this report and the following:

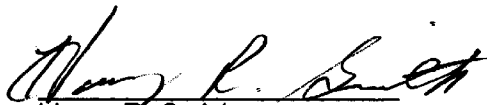
a. The Project Instructions (section 6.10.1.) list the prior surveys to be used for comparison and addresses how these surveys can be obtained. The hydrographer should have obtained the appropriate prior surveys for comparison.

9. ADDITIONAL FIELD WORK

This is a good basic survey. Additional field work is not recommended.


R. L. Keene
Cartographic Technician
Verification of Data


L. G. Cram
Cartographer
Evaluation and Analysis
November 3, 1982


Harry R. Smith
Senior Cartographic Technician
Verification Check

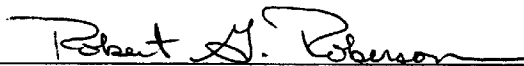
INSPECTION REPORT
H-9944

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The survey complies with National Ocean Service requirements except as noted in the Evaluation Report. The survey records comply with NOS requirements except where noted in the Evaluation Report.

Inspected



R. D. Sanocki
Acting Chief, Hydrographic Surveys Branch
Program Services Division



Robert G. Roberson
Acting Chief, Verification Section
Hydrographic Surveys Branch
Program Services Division

Approved December 15, 1982



Richard H. Houlder, RADM, NOAA
Director, Atlantic Marine Center

REC'D JUN 25 1984
HYDROGRAPHIC SURVEYS BRANCH
NAUTICAL CHARTING DIVISION



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

N/CG242:FPS

June 21, 1984

TO: N/CG24 - Roy K. Matsushige
FROM: N/CG242 - *George K. Myers, Jr.*
SUBJECT: Examination of Hydrographic Survey H-9944 (1981), Michigan, Lake Huron, Harbor Beach to Port Hope

Chief of Party Lt. Cdr. G. W. Jamerson
Officer in Charge Lt. (jg) S. P. DeBow, Jr.
Field Unit Hydrographic Field Party No. 4
Processed by Atlantic Marine Center
Examined by F. P. Saulsbury

1. Deficiencies in data acquisition are addressed in the Evaluation Report under item 4.
2. Project instructions were satisfied.
3. The delineation of the bottom is considered very good.

The holiday in the vicinity of latitude 43°59.5'N, longitude 82°41.1'W, contrary to the evaluator's recommendation, is considered inconsequential. Probable depths of 65 to 81 feet negate the need for any additional work in this area. Two prior survey depths, an 80 and an 81, being the only available depths in this holiday area, should have been carried forward to the present survey from LS-1271 (1913). These depths are in harmony with surrounding depths on the present survey.

4. The determination of least depths is considered adequate.

Two shoal depths, a 21-foot sounding in latitude 43°53.66'N, longitude 82°38.98'W and a 20-foot sounding, acquired on a turn between fixes, in latitude 43°53.56'N, longitude 82°38.93'W, representing the least depth on this feature, should have been entered into the survey records and plotted on the smooth sheet.

5. Shoal features, which may be considered hazards to navigation, are considered adequately developed to ascertain probable least depths.



6. While there is no sounding conflict, depth curves in the junctional area on the south with H-9907 (1980) are not in agreement. Also there is no junctional note shown on H-9907 (1980). Because of this, the junctional note on the present survey should be "Adjoins H-9907 (1980)," instead of "Joins H-9907 (1980)."

The other junctions and junctional notes are adequate.

7. Sounding line crossings were found to be satisfactory except in the vicinity of latitude $43^{\circ}52.20'N$, longitude $82^{\circ}37.67'W$. Here, soundings of 37 feet and 38 feet on a northwest-southeast crossline are respectively in conflict with 34- to 35-foot soundings and 35- to 36-foot soundings on east-west lines.

Elimination of conflicts should have been accomplished in this case by rescanning echograms acquired in rough seas.

8. The smooth plotting is considered satisfactory; in some cases, inked curves revised during processing were not completely erased.

9. This is an offshore survey; therefore, no shoreline is shown on the smooth sheet.

10. Decisions made and actions taken by the evaluator are considered reasonable and proper, except as noted in this examination report.

11. The cartographic presentation of data is considered very good. An exception is the use of nonstandard abbreviations in the descriptions of landmarks/triangulation stations on the smooth sheet. Standard abbreviations may be found in Chart No. 1. When no standard abbreviation is available, the word should be spelled out.

A very minor infraction is noted in latitude $43^{\circ}57.55'N$, longitude $82^{\circ}41.80'W$; an isolated 24-foot depth curve is mistakenly inked in red instead of orange.

Contrary to what the Hydrographic Manual states, page 6-8, item 6.3.4.1.2, paragraph 3, it has been the practice of this office to plot soundings on the smooth sheet to support the delineation of depth curves. Soundings critical to the delineation of the depth curve should not be excessed during verification. Several soundings falling in this category are excessed on the present survey and are identified on the one-half scale copy of the survey.

It is recommended that a guideline addressing this matter be compiled and promulgated.

12. Part of the statement in section 3.b of the Evaluation Report is considered misleading. The 24- and 30-foot depth curves could not be fully delineated because soundings controlling the delineation of these curves are outside the limits of the present survey.

A very minor oversight is noted in the Evaluation Report in section 3.c where latitude and longitude references are not identified as north and west.

13. On page 8 of the Descriptive Report in the first paragraph of Section P, Miscellaneous, the surveyor addressed "bullseyes" as stray soundings, assumed them to be boulders or large rocks, and noted that no further investigation was necessary because these features did not rise more than 3 feet off the bottom.

The evaluator's checkmark of compliance is appended. Clarification follows:

The use of the term "bullseyes" is considered an inappropriate description of isolated shoal soundings.

Stray soundings are invalid soundings, are not entered in the survey records, and are not shown on the survey. Traces from fish, kelp, grass, or electrical noise are properly classified as strays. Traces or side echoes on boulders or large rocks should be entered in the survey records and shown on the survey as valid soundings. Traces or side echoes that are not easily classified as strays should be investigated by the hydrographer to determine their least depth, and, where possible, the results should be confirmed by pole, lead line, or visual means. "Stray" soundings addressed by the hydrographer are in fact valid soundings and are shown on the present survey.

A search of the Hydrographic Manual revealed nothing that would support the hydrographer's assertion that a shoal trace not more than 3 feet off the bottom relieves the surveyor of the responsibility of any further development or investigation for a least depth.

The development of shoals on the present survey is considered adequate to ascertain probable least depths.

14. On the digital data plot produced in Rockville from the Atlantic Marine Center magnetic tape, the following deficiencies are noted:

a. A bottom characteristic "rky" carried forward to the present survey from prior survey LS-2005 (1957) in latitude $43^{\circ}55.57'N$, longitude $82^{\circ}40.25'W$ was overlooked and was not included in the digital data.

b. A "Tide Station" in latitude $43^{\circ}50.70'N$, longitude $82^{\circ}38.60'W$ on the smooth sheet was overlooked and is not included in the digital data.

c. The position of a 51-foot depth at latitude $43^{\circ}59.14'N$, longitude $82^{\circ}42.0'W$ on the smooth sheet is correct. However, the digital data plot shows this 51-foot depth about 150 meters east of its smooth sheet position.

15. The project instructions required a junction with the U.S. Lake Survey surveys inshore. Therefore, these U.S. Lake Survey surveys should have been addressed in section 5, under the heading "Junctions" in the Evaluation Report. Though there was adequate agreement between adjoining soundings in the area of overlap, the inadequacy of the earlier surveys in meeting today's basic survey standards should have been noted. The Operations Section has been alerted to the possible inadequacy of the inshore surveys.

SURVEY H-9944
 MASTER DIAGRAM LS-5
 LAKE HURON

UNITED STATES - GREAT LAKES
LAKE HURON

Published Pursuant to
 Act of October 3, 1917
 and Act of August 1, 1946
 On all publications printed and so indicated hereon
 the Government assumes no liability for errors or omissions.

MANUAL OF
 HYDROGRAPHIC SURVEYING
 Chapter 10
 Chapter 11

Chart No. 1
 Chart No. 2

Chart No. 3
 Chart No. 4

Chart No. 5
 Chart No. 6

Chart No. 7
 Chart No. 8

Chart No. 9
 Chart No. 10

Chart No. 11
 Chart No. 12

Chart No. 13
 Chart No. 14

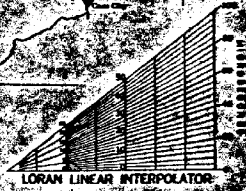
Chart No. 15
 Chart No. 16

Chart No. 17
 Chart No. 18

Chart No. 19
 Chart No. 20

Chart No. 21
 Chart No. 22

Chart No. 23
 Chart No. 24



NEW CHART NUMBERING SYSTEM
 The National Ocean Survey, in cooperation with the
 Defense Mapping Agency Hydrographic Center, is in the
 process of adopting a new national chart numbering
 system. See Notice to Mariners No. 2, June 20, 1974,
 published by the West Coast Guard District, or National
 Chart Catalog for more information of old and new chart
 numbers.

Chart Numbering
 New System: Old System
 1482Z: 1482
 1483Z: 1483
 1484Z: 1484

REQUEST FOR INFORMATION
 Mariners are urged to report promptly to The Director, National Ocean Survey,
 National Oceanic and Atmospheric Administration, Rockville, Maryland 20852, any
 conditions found to differ from or to be additional to those shown on this chart in
 order that they may be fully investigated and proper corrections made. In some
 instances, a revision of the chart should be submitted to the office. In some
 cases, in which event, a new chart will be issued to replace the used copy, providing
 the revised chart is the current edition and not an obsolete copy.

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9944

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 |
|-------|---------|---------------|---|
| 14962 | 12-7-84 | Ralph B. Ross | Full Part Before After Verification Review Inspection Signed Via |
| | | | Drawing No. 4 |
| | | | Full Part Before After Verification Review Inspection Signed Via |
| | | | Drawing No. |
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