

WORKING PAPERS

VK  
597  
.U6  
R38  
1979



NATIONAL OCEAN SURVEY

REVIEW

**HYDROGRAPHIC  
DOCUMENT  
STANDARDIZATION**

NAVAL OCEANOGRAPHIC OFFICE



30-31 JULY, 1979  
ROCKVILLE, MARYLAND

WORKING PAPERS

VK  
597  
.06  
R38  
1979

TABLE OF CONTENTS

	<u>PAGE</u>
PURPOSE	1
BACKGROUND	2
INTRODUCTION	3
ATTACHMENT A	4
- Differences Between NOS and NAVOCEANO Hydrographic Survey Procedures	A1
ATTACHMENT B	
- Technical Specifications Geodetic and Hydrographic Survey (Sample)	B1

NOAA CENTRAL LIBRARY

FEB 9 2018

National Oceanic &  
Atmospheric Administration  
US Dept of Commerce

PURPOSE

THE PURPOSE OF THIS DOCUMENT (WORKING PAPER) IS TO FACILITATE DISCUSSIONS BETWEEN NOS AND NAVOCEANO RELATIVE TO NAVY ADOPTION OF THE NOAA HYDROGRAPHIC MANUAL AND STANDARDIZATION OF HYDROGRAPHIC SURVEY SPECIFICATIONS BETWEEN THE TWO ORGANIZATIONS.

## BACKGROUND

In December 1978 the Naval Deputy to the National Oceanic and Atmospheric Administration [NAVDEP(NOAA)] requested by letter that the Naval Oceanographic Office (NAVOCEANO) contrast technical specifications for geodetic and hydrographic surveys with those of NOAA to determine the feasibility of standardizing NOAA/NAVY hydrographic surveys. Section 905, TITLE 3 of the code of Federal Regulations which directs the Department of Commerce to provide geodetic, hydrographic and oceanographic data and service to the Department of Defense in times of National Emergency, was cited as the basis for consideration of the requested standardization. The joint publication (NAVY/NOAA/USCG/DMA) "Guide to Marine Observing and Reporting" was referred to as a precedent in this matter.

In January 1979 the NAVDEP (NOAA) recommended to the Chief of Naval Operations (CNO) (OP-952) that the NOAA hydrographic manual (Fourth Edition) be reviewed and a determination made on adapting it to Navy needs. This matter was referred to NAVOCEANO for appropriate action.

Navy is in general agreement regarding implementation of both suggestions and fully intends to pursue the matter to successful completion. Both the National Oceanic Survey (NOS) and NAVOCEANO have been in virtually the same hydrographic business for a considerable number of years. The basic differences in missions are in geographic areas of responsibility and customer needs. Generally NOS has responsibility for surveying and charting of the United States and its Territories and NAVOCEANO the remaining world areas. NOS responds primarily to civil needs and NAVOCEANO to specific requirements of the Department of Defense. These differences have resulted in some variances in modus operandi and products/services that are tailored to particular user needs. NAVOCEANO welcomes the opportunity to close the gap further and improve an already good relationship.

## INTRODUCTION

Attachments A and B were developed as working papers to be utilized as a basis for discussion between NOS and NAVOCEANO relative to Navy adoption of the NOAA Hydrographic Manual and standardization of NOS/NAVOCEANO hydrographic survey specifications.

Attachment A delineates by item differences between NOS and NAVOCEANO survey procedures utilizing the NOAA Hydrographic Manual as a base. It is desired that these differences be reviewed, resolved and standardized. However, resolution of all differences is not mandatory, and will not preclude formal adoption of the manual by Navy. It is envisioned that the NAVOCEANO differences or variances will be compiled into an addendum to the NOAA manual that will be applicable to Navy hydrographic survey procedures. It is optimistically anticipated that a joint manual will eventually be developed that will rely primarily on the current NOAA manual which is considered excellent. A combined NOS/NAVOCEANO publication could well be considered as a national standard.

Attachment B is a sample composite of NOS and NAVOCEANO hydrographic survey specifications that has been compiled for review and consideration.

ATTACHMENT A

DIFFERENCES BETWEEN NOS  
AND  
NAVOCEANO HYDROGRAPHIC SURVEY PROCEDURES

DIFFERENCES BETWEEN NOS AND NAVOCEANO HYDROGRAPHIC SURVEY PROCEDURES

<u>NOS</u>	<u>NAVO</u>	<u>PROPOSED</u>
1.2.3. Scale of Survey 1:20,000 basic scale	1:50,000	REGATSO TO SUMMARY DENSITY - NO KEYS PROPOSED
1.2.4 Sheet sizes		
a. Recommended sizes	34"x42"/31"x34"	HANOWARE PROBLEM NO PROPOSAL
1. 36"x54" w/30"x48" hydrographic area	38"x50"/35"x47"	
2. Largest size: 36"x60" w/30"x54" hydrographic area		
3. Smallest size shall not be less than 30": in overall dimension with 3" margins	30"x30"/3" Margin	
1.2.6 Sheet Projections		
Mercator	a. Universal transverse Mercator	NO PROPOSAL NJS uses NAD '27 USN uses WGS '72
a. Modified transverse Mercator	b. Mercator	DATUM
b. Polyconic		
1.3.1. (3.1.1.3) Horizontal Control NOS disks	NAVOCEANO disks	A3 IS (WRITE 41 USING AGENCY DISCS)
1.3.4 (4.2.5) Plotting Control Hydrographic control station Shown in ink w/symbol & 3 digit number	In ink with symbol only	Adopt NOS method
1.4.5.2. (4.4.6) Position numbering Numbered consecutively over the range 1 through 9999	Start with position #1 each Julian day	CONCORDIA FUNCTION

NOS

1.5.2. (1.5.5) Echo Sounder Calibration  
Assume velocity of sound is at 800  
fm/sec for ft/fm units of  
measurement

- 1.5.1 Tidal Datums of reference
  - a. Atlantic, Gulf, Caribbean (MLW)
  - b. Pacific (MLLW)

1.6.1 Transfer of Topographic &  
Planimetric detail  
showing of shoreline (MHW) and the  
low water line

2.2 Hydrographic Project  
Project designation OPR-437-PE-75  
(OPR) routine operational-No.-  
ship (Pierce)-year

2.3.3 Presurvey Review

2.4.3.1 Field numbers WH-2.5-1A-75  
Whiting-1.2,500-First sheet overlay  
(A)-year (1975)

2.4.3.2 Registry number

- Chapter (3) Forms
- 76-81 "Description of Triangulation  
Intersection Station"
  - 76-96 "Recovery Note-triangulation  
Station"
  - 76-52 "Horizontal angles"
  - 76-86 "Abstract of directions"
  - 76-76 "List of directions"
  - 77-12 "Report of tide station"

(See Example 1, Items 1 through 4)

NAVO

Assume velocity of sound  
is at 1500 m/sec for meter  
units of measurement

Dependent on area  
Example: MLWS is at  
times used

Only as required by  
specifications,  
Surveys usually to 6 Fm curve

Archive No.

No presurvey review

Sheet No. 05XXX  
XXX-sheet No.

Archive no.

PRNC-NHO-705 (Rev 5-56)

PRNC-NHO-705 (Rev 5-56)

- Field Book
- PRNC-NHO-1152
- PRNC-NHO-1178
- PRNC-NHO-1178

PROPOSED

THIS IS NOT A  
MULTIPLICATION PROBLEM -  
IT IS A HARMONY  
SOFTWARE PROBLEM  
800 f/sec ≈ 1463 m/sec  
MJS MAY CHANGE WITHIN IF  
ALTERNATIVES

NOT RELEVANT INFORMATION FROM  
NAVO USES DATA OF CURRENTLY  
SURVEYED

NAVO SECTION SURVEYS TO  
THE BRANCH

COMPARABILITY MAY BE  
DESIRABLE

Adopt review

CHANG WITH CRT NAVO  
COPIES



**STATION DESCRIPTION**  
 FRNC-NHO-705 (Rev. 5-56)

*NOTE: Change heading to "STATION RECOVERY" when this form is so used.*

NAME OF STATION		LOCALITY		ESTABLISHED BY U. S. S.		ARCHIVE NO.		DATE STATION ESTABLISHED	
REFERENCE MARKS AND PROMINENT OBJECTS	DISTANCE (Meters)	DIRECTION	AZIMUTH	MARKED BY	DATE	FIELD BOOK NO.	PAGE	DATE	PAGE
△ IN MAIN SCHEME	-- -- -- --	0° 00' 00"							
				DESCRIBED BY	DATE				
				FIELD BOOK NO.	PAGE				
				SURFACE-STATION MARK					
				SUR-SURFACE MARK					

DETAILED DESCRIPTION (Covering general location and accessibility, reference and witness marks, local residents familiar with location of station, etc.)

SKETCH



**FIELD VALUES**

**ORIGIN OF COORDINATES**

ELEVATION		ft.	@ OBS. SPOT	
LATITUDE	0	1	LATITUDE	0
LONGITUDE			LONGITUDE	

LIST OF DIRECTIONS  
PRNC-8MO-1178

Show diagram of instrument or target eccentricity. Begin listing with all main scheme directions and follow with listing of all secondary directions to definite objects. Omit tangents.

STATION	LOCALITY		SHIP		YEAR		
COMPUTED BY	DATE	CHECKED BY		INSTRUMENT			
OBSERVED STATION	OBSERVED DIRECTION		ECCENTRIC REDUCTION	SEA LEVEL REDUCTION*	CORRECTED DIRECTION WITH ZERO INITIAL	ADJUSTED DIRECTION*	
	0°	00'	00.00		0°	00' 00.00	°

LIST OF DIRECTIONS  
PRNC-NHO-1178

Show diagram of instrument or target eccentricity. Begin listing with all main scheme directions and follow with listing of all secondary directions to definite objects. Omit tangents.

STATION	LOCALITY		SHIP		YEAR	
COMPUTED BY	DATE	CHECKED BY		INSTRUMENT		
OBSERVED STATION	OBSERVED DIRECTION		ECCENTRIC REDUCTION	SEA LEVEL REDUCTION*	CORRECTED DIRECTION WITH ZERO INITIAL	ADJUSTED DIRECTION*
	0°	00'	00.00		0° 00' 00.00	"

\* These columns are for office use and should be left blank in the field. NAVY-OPPO PRNC, WASH., D. C.



NOS

NAVO

PROPOSED

3.1.3.4 Plane table methods designation

SU-C-75, Surveyor-third sheet-1975

No mention of Geociever

No mention of Side Scan Sonar

No mention of field chart construction

4.2.2. Construction of field sheets

a. Hydrographic data are recorded, filed, & referenced on a separate sheet by sheet basis

b. Stamp #1

(See Example #5)

c. Table 4-1 projection line intervals drawn

(See Example #6)

4.2.5 Control Stations numbering

0-100 Basic & supplemental control stations

101-200 Other control Sta on 1st field sheet

201-250 Other control sta on 2nd field sheet

4.2.6 Electronic Control Lattice

a. Range 200 (126) lane 200 from Sta #126, hyperbolic 140 (103-211) lane from sta's 103-211

Abstract of Zenith distance  
OPNAV-25C-1210 New 8-87

No designation

*NAVO THIS USE APPROPRIATELY  
WILL APPEAR IN CH 2.  
NAVO DOES THIS*

a. On a JD basis

b. Stamp #1

c. No projection lines drawn although G.P. & UTM projection ties are drawn

Not used

Adopt NOS procedure

Lane count only

Adopt NOS procedure

*VERY INEFFICIENT USE*

*NAVO WILL LOOK AT THIS*

*NAVO WILL TRY TO ADJUST NOS SOUTH SHIP STATION*

*INTERNAL CAN BE SUBMITTED. COMPUTER PROJECTION LINES ARE FOR ~~CUSTOMER~~ MANUAL COMPUTATION*

NO. 1 SMOOTH SHEET

Archive No. \_\_\_\_\_ Sheet No. \_\_\_\_\_

Surveyed by \_\_\_\_\_ Year \_\_\_\_\_

Projection \_\_\_\_\_ Scale \_\_\_\_\_

Horizontal datum \_\_\_\_\_ Sounding datum \_\_\_\_\_

Tidal ref. sta. \_\_\_\_\_ Lat \_\_\_\_\_  
 Long \_\_\_\_\_

Soundings plotted in \_\_\_\_\_

Soundings corrected for \_\_\_\_\_

Draft \_\_\_\_\_

Tides \_\_\_\_\_

Velocity \_\_\_\_\_

Instr. errors \_\_\_\_\_

Set-squat \_\_\_\_\_

NOAA

No. 1 **HYDROGRAPHIC SURVEY**

Field no. \_\_\_\_\_

Reg no. \_\_\_\_\_

Scale \_\_\_\_\_

Datum \_\_\_\_\_

Projection \_\_\_\_\_

Soundings plotted in \_\_\_\_\_

Soundings corrected for \_\_\_\_\_

Draft \_\_\_\_\_

Tides \_\_\_\_\_

Velocity \_\_\_\_\_

Instr error \_\_\_\_\_

Set-squat \_\_\_\_\_

FIGURE 4-1.—Rubber stamp 1. This hydrographic field sheet title block is to be stamped or machine drafted on the lower right-hand corner of the sheet.

NAVOCEANO

PROJECTION LINE INTERVALS FOR VARIOUS SCALES

<u>Scale of Survey</u>	<u>Projection Line Interval</u>
1:1,000	5 sec.
1:1,5000	10 sec.
1:2,000	10 sec.
1:2,500	15 sec.
1:5,000	30 sec.
1:10,000	1 min.
1:12,500	1 min.
1:15,000	1 min.
1:20,000	2 min.
1:25,000	2 min.
1:36,457	4 min.
1:40,000	4 min.
1:50,000	5 min.
1:72,914	5 min.
1:75,000	5 min.
1:80,000	5 min.
1:100,000	10 min.
1:200,000	15 min.
1:250,000	20 min.
1:500,000	30 min.

NOAA

TABLE 4-1.—*Projection line intervals for various scales*

Scale of survey	Projection line interval
1:2,000 and larger	Every 5 s
1:2,001 to 1:3,000	Every 10 s
1:3,001 to 1:6,000	Every 15 s
1:6,001 to 1:12,500	Every 30 s
1:12,501 to 1:25,000	Every minute
1:25,001 to 1:60,000	Every even minute
1:60,001 to 1:125,000	Every 5th min
1:125,001 to 1:250,000	Every 10th min

Example 6

NOS

4.3.1 Sounding

a. Allowable difference of digital & graphic recorder should not exceed .5 Ft. or .2fm

b. Equipt. accuracy

1. Even bottom

1% accuracy at depths

greater than 20 fm., .5 ft accuracy at 0-20 fm

2. Irregular bottom

1 ft. in depths less than 20 fm

4.3.4. Spacing Sounding lines

4.3.4.1 Harbors, restricted areas,

bays, channel, rivers shall not exceed:

100 m in depths less than 20 fm

200 m from 20 to 30 fm

400 m in greater depths

4.3.4.2 Line spacing on open Coasts

a. areas of smooth bottom shall not exceed:

200 m depths less than 20 fm

400 m in depths of 20 to 30 fm

800 m in depths of 30 to 110 fm

b. Areas of irregular bottom should not exceed:

100 m in depths less than 20 fm

around rock points and spits and in entrances to channel

200 m in all other areas where

depth is less than 20 fm

400 in depths of 20 to 30 fm

800 m in depths of 30 to 110 fm

NAVO

a. Should not exceed ~~.8~~ meter

Adopt NOS standards in meters

NOS is more accurate than the SA SPECUS

5%

5%

SP-4 stated .5 m or less at scale of survey usually determined by NAVOCEANO as a function of bottom coverage



NOS

NAVO

PURPOSE

4.3.4.3 Offshore surveys

1600 m in depths of 110-500 fm  
3200 m in depths of 500-1500 fm  
8000 m in greater depths

Adopt NOAA  
procedure w/mod  
by specifications

4.4.3.3 (1.3.3.2.4) Systems Calibration

calibrated to .5 mm at scale of  
survey

1.5 mm @ scale  
w/plotting error

Adopt NOS  
Procedure

*NOS IS CALIBRATED TO THIS SCALE*

4.4.5 Position Frequency

40 mm but not greater than 50 mm

2 to 4 cm

Adopt NOS  
procedures

Sextant/electronic positioning  
calibration record (fig. 4-16).

Procedure not used

Adopt procedure  
& reword format

CALIBRATION RECORD									
Project	QPR-437		Sheet	44-20-174					
Adrian date	1982		Vessel	1320					
Control	AYP 188-130-142								
	Signals		Angles						
L	205		37-18						
C	207		97-12						
R	235								
Chart	206-207								
	P <sub>1</sub>		P <sub>2</sub>		P <sub>1</sub>		P <sub>2</sub>		
Time	173.45		104.17		173.48		104.17		
Observed	173.72		104.81		173.76		104.83		
Correction to observed	-0.27		-0.64		-0.28		-0.66		
Mean = -0.26									
-0.65									

4.5.6 (1.4.6) (7.3.8.2) Sounding Interval

- a. Field sheet
  - 1. Soundings parallel to track line (East-West lines)

.5 cm

Adopt NOS  
procedures

NOS

- 1 digit 4 mm
- 2 digit 6 mm
- 3-4 digit 8-10 mm
- 2. Sounding perpendicular to track line (North-South lines) 4.8 mm

4.7 Character of Bottom

- a. 4.7.1 General bottom samples sent to Smithsonian
- b. NOAA form Oceanographic Log Sheet "bottom sediment data"

4.8. Hydrographic

4.8.1 General

Sheets records identified by sheet registry No.

4.8.3. Manually recorded survey data

- a. Form 77-44 Soundings (Example #7)
  - 1. Continuous day by day
  - 2. Numbered consecutively as survey progressed
  - 3. GMT

4.8.3.3 Information beginning of days work, Stamp 2A, 2B (Example #9)

4.8.3.4. Electronic Control Information, Stamp 3

NAVO

.5 cm

Adopt NOS PROCEDURES

Archive No.

- a. Sounding Journal (Example #8)
  - 1. 1 book per day
  - 2. Numbered by J.D.
  - 3. Local time (Q)
  - 4. Book index number
  - 5. Columns different
  - 6. Columns color coded

Info in Sounding Journal (except equipt No.)

None

Adopt NOS but w/ equipt No.

Locality  
COAST OF MAINE

Date July 16, 1974

POSITION NUMBER	TIME	SOUNDINGS			CORRECTIONS			RECORDED SOUNDING		
		FEET	DEPTH	TEMP.	TEMP.	TEMP.	TEMP.	TEMP.	TEMP.	TEMP.
157	15 26 00	18			-0.5	-2.5	0.0	23		
	30	70								
	40	45	5		-0.4	-2.4	0.0	42	5	
	27	45	0							
	-20	42	5					39	5	
	-30	37	0					34	-	
158	-40	40	5					37	5	
	28	32	0		-0.4			29	-	
	20	21	0		-0.2			18	2	
	-27	6	4		0.0			5	8	
	40	17	5		-0.2	-2.4		10	7	
	29	11	5		-2.2	-0.2		8	9	
159	20	10	5		-0.2	0.0		8	1	
	40	6	0		0.0			3	8	
	30	4	5*					2	3	
		7	5	0.0				5	3	
160	20	10	-		-0.2	-2.2		7	6	
161	16 57	12	2		-0.2	-0.8	0.0	11	2	
		12	0*					11	2	

\* leadline depth

Locality  
FRENCHMAN BAR

Date Launch 1272 (044) 1974

POSITION NUMBER	TIME	DEPTH	TEMP.	REMARKS
157	205	37-40		
	217			
	220	71-03		
	221-205	37-40		0.5
	005			0.5
				0.5
158		74-51		
		30-51		
				Non #2
				30m port
				Adjusted 223 initial
159	201	52-45		s/s entering
	205			kelp
	220	101-44		
				* Rk. bars approx 2 ft - 10 m
				-00-199
				Leaving kelp -
160	205	77-11		Leads to search for shoal
	220			
	229	84-58		
161	205	34-09		Least depth on sharp pinnacle - probably rock.
	217			
	220	63-55		Item No. 4 of presurvey review. Searched area with 44 for 20m. Bottom not visible - kelp scattered throughout area.

FIGURE 4-22.—Manually recorded survey (NOAA Form 77-44, "Soundings") using visual sextant control and showing the application of rules for entering corrections and remarks

Example 7

# NAVOCEANO

ME	POS NO	FINAL SDG	SCALED SDG	FIELD FLD SDG	OBS SDG	CORRECTIONS IN FEET					COURSE AND SPEED	READINGS AND SIGNALS			NOTES			
						TOTAL	ZERO	OBS TIDE	FREQ	DRAFT		PH.D. TIME	17	18		19		
						10	11	12	13	14		15	16	20				
22 20																		
3 20																		
22 40																		
45 20																		
20 20																		
5 40																		
3 20																		
45 20																		
22 40																		
5 20																		
30 20																		
45 40																		
20 20																		
5 20																		
20 40																		
45 20																		
20 20																		
5 40																		
30 20																		
45 40																		
20 20																		
5 20																		
22 40																		
45 00																		
20 20																		
5 40																		
30 20																		
45 20																		
20 40																		
5 20																		
20 20																		
45 20																		

SOUNDING JOURNAL--Manually recorded surveys

Example 8

U.S. BUREAU OF OCEANOGRAPHY  
**SOUNDINGS**  
 (General locality)  
 (Special locality)  
 Date  
 Time  
 TIDAL REFERENCE STATION  
 WIND DIRECTION  
 VISUAL S.P. or Surf  
 Officer in Charge  
 BOAT'S LIST  
 STATION NUMBER  
 BOOK NUMBER

BOOK INDEXES AND RECORD

NO. SCALED BY  
 READING CHECKED BY  
 REDUCES TOPPED BY  
 REDUCES CHECKED BY  
 SOUNDINGS REDUCED BY  
 REDUCTIONS CHECKED BY

**FIELD OFFICE**

SMOOTH PLOTTING RECORD

POSITION NUMBER	SMOOTH SHEET NUMBER	POSITION NUMBER	SMOOTH SHEET NUMBER

DAILY INDEX OF FIELD

DATE	TIME	NO. OF SOUNDINGS	NO. OF REDUCTIONS	NO. OF PLOTS	NO. OF CHECKS	NO. OF CORRECTIONS

CALCULATION DATA FOR ELECTRONIC CONTROL

TIME	DATE	POSITION	DEPTH	REMARKS

HYDROGRAPHY

POSITION NUMBER

DATE

TIME

REMARKS

NO. OF SOUNDINGS

NO. OF REDUCTIONS

NO. OF PLOTS

NO. OF CHECKS

NO. OF CORRECTIONS

Example 9  
A16

NOAA

No. 2A

**PERSONNEL**

In charge J.M. Smith Cont

Piloter J.M.S. Protector no. A-719 of

L. aide R. Hopkins Sextant no. 1776 of

R. aide J.B. Skatsh Sextant no. 1492 of

Recorder J.L. McConnell Clock no. 4-23

At echo sounder T.J.M.

Leadman T.J.M. Lead line no. 76-13

No. 2B

**PERSONNEL**

Control See-Fix (hyper)

In charge G.D. Knight Plotter Complet

Recorder R.E.R.

At echo sds W.L.B.

At brush res L.D.D.

Clock no. Shep's. C. Clock Correction 0

FIGURE 4-26.—Rubber stamps 2A and 2B, personnel stamps used at the beginning of the day

No. 9

**STATISTICS 172 DAY**

This day day

No. positions 187 Total 961

Mean sig line 27.7 nml 27.7 nml

Dist to & from 3.5 nml 35.0 nml

Mean dist run 6.0 nml 18.7 nml

Total dist run 37.2 nml 271.6 nml

Soundings continued in volumes 13

No. 11

**GRAPHIC RECORD**

Sheet no. H-6513 Recorder no. Ross # 81

Locality Buzzards Bay, MA

Vessel WHITING (2127)

From pos no. 417 Date 136

To pos no. 470 Date 136

Adjusted profile (yes) checked by me ALF Operator

FIGURE 4-39.—Rubber stamp 11, a graphic record for identifying bottom profiles

No. 10

**PROCESSING**

Bubbler # A-131 tide gage at Cutter Pt. Ma.

Date of ref MLW entered checked

Tide or stage red  R.D.F. G.I.B.

Lead line corr  R.D.F. G.I.B.

Index corr  na

Vel corr  na

Soundings reduced  H/P

Positions plotted  H/P

Graph scaled   G.I.B.

Soundings plotted  H/P

FIGURE 4-35.—Rubber stamp 10, a processing checklist

FIGURE 4-34.—Rubber stamp 9, statistics for a day's work

ELECTRONIC CONTROL

No. 3

Acquisition: Manual HYPLOT HYLOG

Control: Via R/R HYP Other \_\_\_\_\_

Positioning system: Hi Fix

Frequency 1797.9

Location \_\_\_\_\_ Station number \_\_\_\_\_

Master Ship

61 or S1 \_\_\_\_\_

62 or S2 \_\_\_\_\_

127

132

4.8.3.5 Sounding Equip/Stamp 4

(Example #10)

4.8.3.6 Comparison of sounding Equip, Stamp 5, 5A

Bar Check

LEAD LINE COMPARISON

No. 5

Voltmeter \_\_\_\_\_ Frequency meter 60 Hz

Sea Calm Wind E S

Bar check results \_\_\_\_\_ Good  Fair \_\_\_\_\_ Poor \_\_\_\_\_

Lead line no. \_\_\_\_\_

Latitude 41-18.0 Longitude 71-32.7

Draft 5.6 ft

Mark or depth M	True length on depth D	Correction D - M	Gain setting
2.6	6.0	- 0.2	4
3.7	15.0	- 0.3	4
14.6	18.0	- 0.2	4
20.7	24.0	- 0.3	5
24.8	30.0	- 0.4	5
27.0	30.0	- 0.6	5
20.8	24.0	- 0.4	5
14.7	18.0	- 0.3	4
8.7	12.0	- 0.3	4
2.7	6.0	- 0.3	4

/ 6.18

No. 5A

SIMULTANEOUS COMPARISON

7/16/76  
@ 003 029

Vertical cast 64.2 ft

Corr -0.2

True depth 64.0

Echo sounding 62.5

LL # 33-69

No stamp

In Sounding Journal need equip #

Adopt w(M/S)  
Dependant w/type  
of fathometer

Adopted 5 only

NOS

4.8.3.7 Weather and Sea Cond.  
Stamp 6

No. 6
Weather <i>Pt cldy</i>
Wind <i>NE 15</i>
Sea <i>3-4 ft</i>
<i>1600 Z winds steadily increasing</i>

4.8.3.8 Column Entries  
GMT

4.8.3.10 Remarks Column  
a. Stamp 7

No. 7	LINE BEGINS
Lat. <i>45-17.6 N</i>	Long. <i>70-18.2 W</i>

b. LTLA Line turn left about  
LTRA Line turn right about

NAVO

New Stamp

WEATHER LOG	
No. 6	
Weather	-----
Wind:direction	-----strength-----
Seas:direction	-----height-----
Remarks	-----

Local time

No Stamp

Adopt NOS Stamp

E/L end Line  
S/L Start Line

Add NOS  
procedure to  
NAVOCEANOS

NOS

NAVO

PROPOSED

4.8.3.11. Indormation end of day

- a. Stamp No. 8

- a. None

Adopt NOS Stamp

No. 8	Serials # <u>27-18</u>	# <u>27-43</u>	# <u>19-62</u>
Clock no. <u>3-191</u>	Time checked <input checked="" type="checkbox"/> by <u>M/V</u>		
Sounding records inspected:			
<u>Russell R. Floyd</u>	Officer in charge		
<u>J. R. Connors</u>	Chief of party		

- b. Stamp No. 9
- c. Stamp No. 10

- b. In Sounding Journal
- c. On 1st page Sdng. Journal except bel. corr., index corr., lead line corr.

For b., c., See Example

4.8.4 Automated Survey Records  
Hydro plot

Data Logger

4.8.6 Analog position data  
Stamp 11

In Sounding Journal

(Example # 10)

4.9.2 Reducers  
Over 200 meters, corrections (excluding velocity) less than 1/2 of 1% of depth not added

Only draft convection applied in depth over 200 m

4.9.3 Tide & water level reductions  
Tidal zoning by Oceanographic Division

Performed by field party



NAVOCEANO (Proposed)

No. 4

SOUNDING EQUIPMENT

Echo Sdr. No. \_\_\_\_\_ Type \_\_\_\_\_  
Calibrated Velocity \_\_\_\_\_ fm/sec or m/sec \_\_\_\_\_  
Initial set at \_\_\_\_\_ ft/fm/m \_\_\_\_\_  
Transducer draft \_\_\_\_\_ ft/fm/m \_\_\_\_\_  
Phase correction None \_\_\_\_\_ Phase 1 \_\_\_\_\_ Phase 2 \_\_\_\_\_ Phase 3 \_\_\_\_\_  
Speed count \_\_\_\_\_ Revs \_\_\_\_\_  
Stylus length correct \_\_\_\_\_

NOAA

No. 4		SOUNDING EQUIPMENT	
Echo sdr no.	<u>517-38</u>	Type	<u>DE-223</u>
Calibrated velocity	<u>800</u>	fm/s	
Initial set at	<u>0.0</u>	ft/fm'	
Transducer draft	<u>12.8</u>	ft/fm'	
Phase correction	None <input checked="" type="checkbox"/>	A.B. <input type="checkbox"/>	B.C. <input type="checkbox"/> C.D. <input type="checkbox"/>
Speed count	<u>MRV</u>	Revs	<u>—</u>
Stylus length correct	<u>OK</u>	<u>EJS</u>	

FIGURE 4-28.—Rubber stamp 4, a record of sounding equipment

NOS

4.9.5 (1.5.4) Velocity Correction

4.9.7 Transducer Correction  
Fig 5-7/TRA correction  
(Example #11)

4.9.9 Final Field Sounding Table  
4-15 "Table of Reduced Soundings"  
(Example 12)

NAVO

Not currently done

w/o S&S in Sounding  
Journal

Add S&S

PROPOSED

From 0-20 meters, final reduced soundings will be to the nearest decimeter. 20.1-40 meters final reduced soundings will be to the nearest 1/2 meter. Greater than 40 meters, the final reduced sounding will be to the nearest meter. The following guidance is provided for final reduction of soundings.:

Those soundings having values including 1 to 2 decimeters will be dropped to the nearest lower whole meter. These soundings having 3 to 7 decimeters will be expressed as 1/2 meter (5 decimeters). Those soundings having values of 8 to 9 decimeters, will be raised to the nearest higher meter.

Example: XX.0 XX.3 XX.8  
XX.1-XX.0 XX.4-XX.5 XX.9=XX.0+1.0  
XX.2 XX.5 XX.0+1.0  
XX.6  
XX.7

Greater than 40 Meters. Those soundings having values including 1 to 7 decimeter will be dropped to the nearest lower whole meter. Those soundings having 8 to 9 decimeters will be raised to the nearest higher meter.

VESSEL _____		OPR _____				FIELD NO. _____				Remarks
SOUNDING CORRECTION ABSTRACT										
Registry No. H- _____	(Note: TRA Corr. is the algebraic sum of these columns)									
Julian Date	From Time (GMT)	To Time (GMT)	Velocity Corr Table No.	Draft Corr	Instrument Error Corr	Initial Corr	S&S Corr	TRA Corr ft/m		

FIGURE 5-7.—Sounding Correction Abstract

(JULY 4, 1976)

5-14

TABLE 4-15.—Conversion of reduced soundings

Reduced soundings in Sounding Record		To be plotted on smooth sheet in	Reduced soundings in Sounding Record		To be plotted on smooth sheet in
(ft)	(fm)	(ft)	(ft)	(ft)	(fm)
-3.2	-0.5	-3	-1.3	-0.8	-0'
-2.3	-0.4				
-2.2	-0.3	-2	-0.7	-0.2	-0'
-1.3					
-1.2	-0.2	-1	-0.1	0.4	0
-0.8					
-0.7	-0.1	-0 <sup>s</sup>	1	0.5	0'
-0.3				1.0	
-0.2	0.0	0		1.1	0'
0.2				1.6	
0.3	0.1	0 <sup>s</sup>	2	1.7	0'
0.7				2.2	
0.8	0.2	1		2.3	0'
1.7				2.8	
1.8	0.3	2	3	2.9	0'
2.7	0.4			3.4	
2.8	0.5	3	4	3.5	0'
3.7	0.6			4.0	
3.8	0.7	4		4.1	0'
4.7				4.6	
4.8	0.8	5	5	4.7	0 <sup>s</sup>
5.7	0.9			5.2	
				5.3	0'
				5.8	
			6	5.9	1
				6.4	

Example: XX.0      XX.8  
 XX.1      XX.9 = XX.0+1.0  
 XX.2      XX.1  
 XX.3      - XX.0  
 XX.4  
 XX.5  
 XX.6  
 XX.7

b. Smooth sheet  
 1. Soundings parallel to track line (East-West)  
 1 digit 5 mm  
 2 digit 7 mm  
 3 digit 10 mm  
 4 digit 15 mm  
 2. Sounding perpendicular to track line (North-South)  
 From 5 mm for single digit numbers to 7 mm for up to 4 digit numbers

.5 cm

.5 cm

c. Decimal sounding shown 1/2 width used and positioned at upper half of sounding (85)

Lower half (85)

4.5.7 Measuring depths table 4-4  
 "Depth units for scaling soundings and applying corrections"  
 (Example #13)

Scaled Soundings and corrections applies in decimeters

4.5.7.4 Depth contour interval table (4-5), (4-6)

a. 2, 5, 10, 20, 30, 50, 100, 200, 1000, 200 meters

(Example 14, 15)

Adopt color contours@ meter intervals

TABLE 4-4.—Depth units for scaling soundings and applying corrections \*

Depth range (fm)	Character of area or bottom	For soundings scaled in feet				For soundings scaled in fathoms			
		In protected waters	In exposed waters	In protected waters	In exposed waters	In protected waters	In exposed waters	In protected waters	In exposed waters
0-20	Least depths over shoals and dangers	0.2	0.2	0.5	0.2	0.1	0.1	0.1	0.1
	In channels, established sea lanes, and fairways								
	Delineation of appropriate low water line	0.5	0.2	1.	0.5	0.1	0.1	0.2	0.1
	Elsewhere, over regular bottom	1.	0.5	1.	0.5	0.2	0.1	0.5	0.2
20-110	Elsewhere, over irregular bottom	1.	0.5	1.	0.5	0.2	0.1	0.5	0.2
	Over regular bottom	1.	1.	1.	1.	0.2	0.1	0.5	0.2
Greater depths	Over irregular bottom	2.	1.	2.	1.	0.5	0.2	1.	0.5
	All bottom types	2.	1.	2.	1.	1.	1.	2.	1.

\* Digital soundings are recorded, and computer determined corrections are usually applied to the nearest tenth of the sounding unit regardless of depth or bottom character. If there is doubt as to which increment to use, select the more accurate. If soundings are being recorded in meters, select the nearest equivalent increment from the fathoms portion of the table. In areas of depths greater than 500 fm where the slopes are very steep and the echo trace is not sharp and clear, soundings may be scaled to the nearest 5 fm.

TABLE 4-5.—Standard depth contours

Contour (fm)	Contour (ft)		Contour color
0	0	(Datum of reference)	Orange
1	6	.....	Green
2	12	.....	Red
3	18	.....	Blue
5	30	.....	Red
10	60	.....	Orange
20	120	.....	Blue
30	180	.....	Violet
40	240	.....	Green
50	300	.....	Red
100	600	.....	Green
200	-	.....	Orange
300	-	.....	Violet
400	-	.....	Green
500	-	.....	Red
600	-	.....	Blue
700	-	.....	Green
800	-	.....	Red
900	-	.....	Violet
1000	-	.....	Blue
1100	-	.....	Green
1200	-	.....	Orange
1300	-	.....	Violet
1400	-	.....	Green
1500	-	.....	Red
2000	-	.....	Orange
3000	-	.....	Violet

TABLE 4-6.—Supplemental depth contours

Contour (fm)	Contour (ft)	Contour color
0.5	3	Violet
4	24	Orange
6	36	Green
60	360	Blue
70	420	Green
80	480	Red
90	540	Violet

Example 14

A26

NAVOCEANO (PROPOSED)

TABLE 4-5 STANDARD DEPTH CONTOURS

Contour (Meters)		Contour Color
0	Datum reference	Orange
2	.....	Green
5	.....	Blue
10	.....	Red
20	.....	Orange
30	.....	Blue
50	.....	Violet
100	.....	Red
200	.....	Green
1000	.....	Blue
2000	.....	Green
3000	.....	Red

TABLE 4-6 SUPPLEMENTAL DEPTH CONTOURS

Contour (meters)		Contour Color
1	.....	Violet
4	.....	Red
40	.....	Green
300	.....	Orange
400	.....	Red
500	.....	Violet

Sample 15

A27



NOS

NAVO

PROPOSED

4.10 Special Surveys

4.10.1 Track Line, Surveys

a. Stamp 30

No Stamp

Adopt NOS Stamp

No. 30

OCEANOGRAPHIC SURVEY

Registry no. SP-AMC-7-MI-76 BC index no. 704N-D

Field number MI-519-B-76

Control curves plotted by SALSONP Verified by W.L.J.

Type of control SAINAK, LORAN-C, OMEGA

Rate or station	Color code
<u>SS7-W LORAN-C</u>	<u>Blue</u>
<u>SS7-X LORAN-C</u>	<u>Red</u>
<u>SS7-Z LORAN-C</u>	<u>Green</u>
<u>A-B OMEGA</u>	<u>Brown</u>
<u>B-D OMEGA</u>	<u>Violet</u>

- b. Sounding logged  
5 min at depths over 5 min 100 fm  
2 min at depths under 100 fm
- c. For Ocean track use NOAA form 77-15 "Dead Reckoning"
- d. Positions numbers followed by cruise letters
- e. Bottom cores; BT profiles assigned serial numbers & recorded on NOAA form 77-2 "Marine Operations Log"

Use Sounding Journal

GMT w/symbols showing types of fix

Commanding Officers to develop  
One Seamount/track line  
Two Seamount/month

As required

# REPORTS

NOS

TABLE 1-2.—*Field reports*

Schedule	Report title	Section	Addressee
Routine during operations	Monthly Ship Accomplishment Report	5.1	C7
	Monthly Progress Sketch	5.1.1	C351
	Monthly Survey Status Report	5.1	C35X1
	Monthly Activities Report	5.1	C3
As required during operations	Dangers to Navigation	5.9	C322
	Photogrammetric Precompilation Field Report	5.2	C34
As appropriate during or immediately following operations	Chart Inspection	5.10	C322
	Visit to Authorized Chart Sales Agent	5.11	C44
	Coast Pilot	5.8	C324
	Great Lakes Pilot	5.8	C324
	Landmarks and Nonfloating Aids to Navigation	5.5	C322
	Tide and Water Level Station Report and Records	5.6	C331
	Photographs	5.12	C5131
	Geodetic	5.12	C18x2
	Magnetics	5.12	D62
	Special	5.12	C5131
Routine and as appropriate immediately following operations	Descriptive Report	5.3	C353
	Geographic Names	5.7	C51x2
	Field Edit	5.4	C3415
Immediately after close of field season	Season's Report	5.1.	C5131
	Season's Progress Sketch	5.1.2	C5131

NAVO

1. Weekly Situation Report
2. Periodic Report
3. Final Progress Report
4. SNR TAD Report
5. Ocean Sounding Report

Example 16

A29

NOS

NAVO

PROPOSED

4.10.1.1 Astronomic Observations

- a. NOAA form 77-30 or 77-30A  
"Astronomic Sight for Hydro-  
graphic Control"

Sounding Journal used

4.10.1.2. Dead Reckoning

NOAA form 17-15  
"Dead reckoning Abstract"

Sounding Journal used

1.7.1 (Chapter 5) (Table 1-2) (Example 16) Report

5.1. Periodic Administrative Reports

- a. Season's report
  - b. Cruise report
  - c. Special report
  - d. Monthly ship accomplishment
  - e. Monthly progress sketch
  - f. Season's progress sketch
- a. Weekly situation report
  - b. SURVOPS report
    1. Similar to all reports of Section 5.1
  - c. Final progress report
  - d. SNR TAD report
  - d. SNR TAD report

5.2. Photogrammetric precompletion field report

5.3. Descriptive report

- a. Cover sheet
- b. Title sheet
- c. Index of sheet
- d. Descriptive report text
  1. Project
  2. Area surveyed
  3. Sounding vessel
  4. Sounding equipmt & Corr.
  5. Hydrographic sheets
  6. Control stations
  7. Hydrographic position control
  8. Shoreline
  9. Crosslines

10. Junctions
11. Comparison w/prior surveys
12. Comparison w/the charts
13. Adequacy of survey
14. Aids to Navigation
15. Statistics
16. Miscellaneous
17. Recommendations
18. Automated data processing
19. Referral to reports

e. Separates following text

1. Hydrographic sheet projection and electronic control parameters
2. Field tide or water level note
3. Geographic names list
4. Abstract of corr. to echo soundings
5. Abstract of corr. to electronic position control
6. List of stations
7. Abstract of positions
8. Bottom samples
9. Landmarks for charts
10. Approval sheet

5.4 Field edit report

5.5 Report on landmarks and non-floating Aids to Navigation

6.3.3 Position Verification  
"Preliminary Position Overlays"  
"Smooth Position Overlap"

One track sheet  
Stamp (Example 17)

NOS

Position Numbers placed slightly below & to right of the position dot in vertical numerals approx. 1.5 mm high

6.3.4.1.1 Preliminary sounding overlay

- a. Field sheet
- b. Preliminary sounding overlay
- c. Smooth sheet

6.3.4.3 Crosslines

- a. Smooth plotting error of one unit in feet of .2 units of fathoms at depths less than 20 fm
- b. Irregular bottoms and depths Greater than 20 fm, error not to exceed 3% in lesser depths & not to exceed 1% (or less in ocean depths)

6.3.7.3. Retention of Prior Data

- a. For sounding of feature "From (Survey No./yr)," placed near items & arrow pointing to sounding
- b. For scattered soundings "Detached soundings in (color) from (survey No./yr, in marginal area)

6.6. Verification Reports

- a. Form 77-27 "Hydrographic Survey Statistics
- b. Form 76-97 "Verifiers Report"

NAVO

Smallest possible but legible, to be placed so that Nos. can be read from East side of the sheet Stamp "Plotting record" (Example 17)

- a. Penciled field sheet
- b. Smooth sheet

Agreement at intersections should be + 0.3 meter from 20-40 meters, + 1 meter from 40-100 meters, 1% at depth greater than 100 meters

*METRICIZATION  
PROGRAM*

Adopt NOS  
PROCEDURES

PLOTTING RECORD

FIELD RECORD/BOOK NO.	NET. NO.	DATE CY	DAY COLOR	MILES	TOTAL MILES	METEOROLOGICAL DATA	
						EST. WIND SPD. & DIR.	EST. WAVE HEIGHT

Track sheet stamp

NOS

7.3.12.7 Title Block  
Stamp No. 1A

NAVO

Information plotted  
on Smooth sheet

PROPOSED

*No. LAJSEK 4189*

No. 1A HYDROGRAPHIC SMOOTH SHEET  
Machine plotted by \_\_\_\_\_

Field no. \_\_\_\_\_ Reg no. \_\_\_\_\_  
 Scale \_\_\_\_\_ Control \_\_\_\_\_  
 Datum \_\_\_\_\_  
 Ref sta \_\_\_\_\_  
 Lat. \_\_\_\_\_ m adj \_\_\_\_\_  
 Long \_\_\_\_\_ m unadj \_\_\_\_\_

NOAA PUBS & FORMS

1. NOAA Form 76-81 "Description of Triangulation Intersection Station"
2. NOAA Form 76-96 "Recovery Note-Triangulation Station"
3. NOAA Form 76-52 "Horizontal Angles"
4. ESSA Technical Memorandum C&GSTM-4 "Specifications for Horizontal Control Marks" (Baker 1968)
5. U.S. Coast Guard Light List (1976)
6. Technical Monograph No. CS-2 "Suggested Spec. for Local Horizontal Control Surveys"
7. NOAA Form 76-86 "Abstract of Directions"
8. NOAA Form 76-76 "List of Direction"<sup>See</sup>
9. Photogrammetric Instructions #19 <sup>See</sup> Azimuths - Observations & Computations
10. NOAA Form 77-12 Report of Tide Station
11. Photogrammetric Instructions #22 Field Recovery & Identification of Horizontal & Vertical Control - Revision 1
12. Photogrammetric Instruction #45 Photogrammetric location of Hydrographic Control in the Field
13. SP-249 U.S. Coast & G.S. Topographic Manual
14. NOS-74 Provisional Photogrammetry Instructions for Field Edit Survey
15. Coast Pilot Manual
16. Office of Marine Surveys & Maps (1959) Letter Instruction, File DO-T-3/2 (revised) "Directions for using a Transit Magnetometer"
17. NOAA Form 75-55 "Oceanographic Log Sheet-M, Bottom Sediment data
18. NOAA Form 77-44 "Soundings"
19. NOAA Form 77-6 "Coast Pilot Report"
20. NOAA Form 77-12 "Report-Tide Station"
21. NOAA Form 76-77 "Leveling Record Tide Station"
22. Photogrammetry Instructions No. 63, Instructions Geographic Names and Object
23. Names for Photogrammetric Maps-Field & Office USC & GS 1969b)
24. Special Publication #5 Tables for a Polyconic Projection of Maps & Lengths of Terrestrial Areas of Meridians & Parallels Based upon Clark Reference Period of 1866
25. NOAA Form 77-27 "Hydrographic Survey Statistics"
26. NOAA Form 76-97 "Verifiers Report"
27. NOAA Form 76-40 "Nonfloating Aids or Landmarks for Charts"
28. NOAA Form 76-155 "Geographic Names"
29. ~~NOAA Form "Oceanographic Log Sheet-M Bottom Sediment Data"~~
30. NOAA/NGS Memorandum "Monumentation of less than second-order surveys



TERMS TO BE CHANGED/DEFINED

1. Fathoms, feet
2. Marine Centers
3. Junctions
4. National Ocean Survey Hq
5. Coast Pilot; ~~Great Lakes Pilot~~
6. Position of Hydrographer; Field Editor; Chief of Party; *Commanding Officer*
7. Sounding Volume (NOAA Form 77 "Soundings")
8. NOS, e.g., "Most echo sounders used by NOS
9. Preliminary/smooth position overlay
10. Reference to Hydroplot

ATTACHMENT B

TECHNICAL SPECIFICATIONS  
GEODETTIC AND HYDROGRAPHIC SURVEY  
(Sample)

PROJECT INSTRUCTIONS  
TECHNICAL SPECIFICATIONS  
GEODETIC AND HYDROGRAPHIC SURVEY IN  
(give area or country)

CHIEF OF PARTY / Commanding Officer  
Commanding Officer/Party Chief  
Vessel  
Project/Archive No.

1.0 General

- ✓ 1.1 Introduction. Specify the purpose of the survey to provide the Chief of Party with all pertinent background information.
- ✓ 1.2 Security Classification. Results of this survey either as raw data or a finished chart, will be (give classification).
- ✓ 1.3 Locale. Limits of the area to be surveyed shall be specified and shown as an appendix.
- ✓ 1.4 Priority. State priorities of survey operations by areas, sheets, or activities.
- ✓ 1.5 Time Frame of Survey.
- ✓ 1.6 Printing Schedule for Affected Charts (if applicable)
- 1.7 Previous Specification/Instructions. List previous specifications/instructions and give the effects on same (if applicable).
- 1.8 Scope. This project involves combined operations. To adequately fulfill the requirements of such operations, the Coast Pilot/Sailing Directions, field edit, Presurvey Review, verification or selection of landmarks, verification of charted features, and positioning of fixed and floating aids to navigation must be properly and completely addressed in addition to the completion of assigned hydrographic surveys in the area
- 1.9 Schedule. To prevent misinterpretation of time parameters, no estimate is provided. The ship is encouraged to determine a proposed progress plan; however, the <sup>CO</sup>OIC must remember that time schedules will be self imposed.

It is imperative to the overall charting effort of the National Ocean Survey/ NAVOCEANO that, within reasonable limits, data quality be stressed in lieu of data quantity.

1.10 Technical Operations. The project will be accomplished within the limits of the accuracy standards in accordance with instructions in the Hydrographic Manual and as <sup>modified</sup> supplemented by these specifications. Changes, due to unforeseen conditions, when necessary to ~~expedite the operations~~ are authorized; however, major deviations from specifications must be approved by the Commander, Naval Oceanographic Office/Director, NOS.

2.0 Participation. Provide the participating activities and their responsibilities

Example 2.1 Military Sealift Command. The Ship's Master will provide personnel to operate cranes and davits, to offload and reload Hydrographic Survey Launches (HSL's), LCVP's, vehicles, and equipment. He will also provide personnel for fire control and assist during helicopter operations.

3.0 Geodesy.<sup>3.1</sup> Satellite doppler positioning systems will be the primary system used to position main electronic hydrographic control shore stations. Where local geodetic control is in the vicinity, satellite positioning stations will be tied to local geodetic controls using conventional geodetic survey methods. When satellite positioning is not available, conventional geodetic surveys will be utilized as outlined below.

3.1 Geodetic Control. Geodetic control stations required for hydrographic operations will be searched for and recovery notes submitted in accordance with ~~procedures~~ in the Hydrographic Manual.

3.1.1 Monumented horizontal control stations established during the survey within 150 meters of existing triangulation stations shall be named reference marks of the existing station.

3.1.2 Supplemental horizontal control established to support survey operations under these instructions shall be to Third Order, Class 1 accuracy standards (or better) except where lesser accuracy is permitted by section 1.3.1 of the Hydrographic Manual. It shall be established by EDM traverse, intersection, or spur-intersect techniques or methods. All geodetic control survey procedures, techniques, and accuracy standards shall be in strict conformance with the specifications listed in the Manual of Geodetic Triangulation (C-65 SP 247) and the Classification Standards of Accuracy, and General Specifications of Geodetic Control Surveys (NOAA-NOS) dated February 1974 (reprint February 1977). Monumentation of Third Order stations shall be performed in accordance with latest specifications detailed in NOAA/NOS memorandum "Monumentation of Less than Second Order Surveys", dated July 17, 1974 (CLxL). All geodetic data shall be submitted as required by section 3.1.2.1.9 of the Hydrographic Manual.

3.2 Vertical Control. All elevations (heights) will be referred to Mean Sea Level (MSL) using trigonometric leveling. Tide operations will be tied to permanent markers or to local control net using differential levels. Where vertical control is not in vicinity, geociever elevations will be determined by map sources and barometric elevations.

4.0 Hydrography. Hydrography shall be basic and in accordance with the Hydrographic Manual, except as modified by these instructions.

✓ 4.1 Navigation Control. Control shall be by electronic and/or visual methods whichever is most effective and commensurate with accuracy requirements.

✓ 4.2 Proposed Site Locations and Minimum Characteristics. (if required)

✓ 4.3 Calibration. Calibration of launch and ship navigation control will be accomplished as described in the Hydrographic Manual. Use of baseline-baseline extension and baseline extensions crossing methods for calibration will be limited to checking whole lane counts.

✓ 4.4 Plotting Sheets. (sheet layout) to include:

- (1) Local area datum shift
- (2) Datum sheets are to be constructed
- (3) Sheet layout appendix

✓ 4.5 Scale.

- (1) The scale of the project area shall be at \_\_\_\_\_
- (2) Reference to appendix

✓ 4.6 Line Spacing.

a. Delineate line spacing requirements as described in the Hydrographic Manual, Section 4.3.4 or as modified below.

b. Line spacing shall be reduced as necessary for full development of any bottom irregularities.

✓ 4.7 Cross Checks/Crosslines. Spacing and agreement will be as outlined in the Hydrographic Manual or as modified below.

✓ 4.8 Junctions. Junctions shall be accomplished with the following surveys outlined in Section 4.3.2 of the Hydrographic Manual;

Archive No./Registry No.	Scale	Year Surveyed
--------------------------	-------	---------------

✓ 4.9 Prior Surveys. The following prior surveys shall be compared to during the cause of the survey.

Archive No./Registry No.	Scale	Year Surveyed
--------------------------	-------	---------------

✓ 4.10 Bottom Samples. Bottom samples are required as described in Sections 1.6.3 and 4.7.1 of the Hydrographic Manual. (spacing of samples)

4.11 Currents. Current observations will be carried out as required. Observations will be made for a sufficient period of time to cover maximum flood and ebb tides.

4.12 XBT Observations. Standard XBT data will be collected in accordance with OCEANAVINST 3160.9B (unless otherwise advised, XBT's should not

be expended where water depths are less than 330 meters). In the event bottom mounted current meters are implanted, a series of SBTs will be taken about the time of implant and removal of the meters along the approximate courses laid out for the meter stations.

#### 5.0 Tides/Water Levels

5.1 Tidal Datum. Tide gages will be established to reduce all soundings to \_\_\_\_\_ (Tidal Datum) \_\_\_\_\_. Tidal reductions will be followed as outlined in the Hydrographic Manual and will be applied to the nearest 0.1 <sup>meter</sup> ~~unit~~.

5.2 Monitoring of Tide Station. It is the responsibility of the Commanding Officer to ascertain that proper field monitoring of all tide gages in support of this project is carried out. Breaks or invalid tide records from a gage in excess of three continuous days cannot be interpolated. This might result in a loss of tide control to the extent that a resurvey of the area involved would be required.

5.3 Station Locations. Tide stations shall be installed and maintained at the locations listed below and shall be operated during the period of hydrography for the listed limits.

Station Number	Station Name	Lat ( )	Long ( )	Sheets
-------------------	-----------------	---------	----------	--------

5.4 Operation of Tide Stations. All tide stations shall be operated for a minimum of 30 days. A minimum of ~~x~~3 bench marks shall be connected by levels to the tide shaft on installation and removal of all tide gages.

5.5 Bubbler Tide Gages. Due to problems in the processing of bubbler tide gage marigrams, certain precautionary measures must be taken by field personnel in the installation and monitoring of bubbler tide gages. When installing a bubbler tide gage, the dampening microvalves should not be adjusted so that the stylus line on the marigram is perfectly smooth (i.e., free of

noise from higher frequency waves). A record with a small, but noticeable, amount of noise (e.g., a band width of 5cm to 10cm (2 to 0.4 foot) on a 0- to 600cm (0- to 20 foot)) marigram scale under moderate weather conditions) indicates that the times and heights of the tidal wave are being accurately recorded. During the first day of gage operations, the gage/staff values should be read and recorded every twelve minutes over a period of three hours. The gage/staff differences should remain constant from one reading to the next. This will provide sufficient information on whether the bubbler gage is functioning correctly at the time of installation. In accordance with the Hydrographic Manual, the logging of hourly heights is required for all bubbler tide gage marigrams during the periods of hydrography.

5.6 Tidal Station Description and Reports. For each station location, the following shall be provided: photographs of the general areas as well as the tide gage and staff installations; a section of the large-scale nautical chart of the area or other large-scale map section (e.g., 7.5 minutes USGS Quad) indicating the location of the tide station; a description and a sketch of the location of the bench marks, tide gage, and tide staff; and a picture of a rubbing of all newly installed bench marks. In addition, NOAA Form 77-12 (Report of Tide Station) shall be submitted on installation, removal, and inspection or servicing of all tide stations. Please note that the latitude and longitude lines must be labeled on the large-scale chart indicating the location of the tide station. All original records shall be submitted in individual envelopes for each tide station.

5.7 Data Reduction. All tide work shall be accomplished in accordance with the Manual of Tide Observations (Special Publication 30-1), User's Guide and the Hydrographic Manual. The particular time zone used for each tide station shall be noted on the marigram.



## 6.0 Wire Drag

6.1 General. The Commanding Officer has the responsibility and the authority to review assigned investigations after on site inspection and judge the advisability of actually conducting the investigation. In cases in which, in his judgment, investigation cannot be justified, the decision shall be explained in the Descriptive Report.

6.2 Advance Notice. Advance notice shall be provided to the appropriate agencies (Coast Guard) before wire-drag operations begin to permit publication of planned survey activities in Notice to Mariners.

6.3 Guidelines. Wire-drag work shall be in accordance with the Wire-Drag Manual except as modified by these instructions.

6.4 Control. Control shall be by electronic and/or visual methods, whichever is most effective and commensurate with accuracy requirements.

6.5 Scale. The smallest scale to be used for field sheets shall be 1:40,000. In areas covered by charts of larger scale than 1:40,000, the drag strips should be plotted at the scale of the chart or a larger scale if considered necessary.

6.6 Overlap. Overlap of adjacent strips shall be adequate to ensure complete coverage of an area. Splits shall be cleared as work progresses (section 4-10, Wire-Drag Manual).

6.7 Bottom Clearances. The drag shall be set to clear bottom by desired amounts--stated in the Wire-Drag Manual, section 3-20-- as three feet (1 meter) in Atlantic and smooth waters and five feet (1.6 meter) feet in the Pacific.

6.8 Hangs and Temporary Groundings. All hangs and temporary groundings shall be cleared by subsequent drag strips. According to section 3-20 obstructions in harbors and channels are to be cleared no more than two feet (6-meters), in other areas of less than sixty feet cleared less than three feet (1 meter) and in areas greater than sixty feet cleared less than five feet

(1.6 meter). Circumstances may alter these requirements. All hangs, other than temporary grounds or anticipated groundings in shoal water at the beginning and end of drag strips, shall be investigated by divers, if practicable, before attempting to clear with subsequent drag strips. During normal ship operations, when expected groundings are encountered in areas of irregular bottom (verified by reconnaissance lines), a clearing by subsequent drag strips is not required. Obtain leadline soundings, if practicable, in order to determine the drag depth for clearance. The Bryson Gage and/or the Farallon digital depth gage are appropriate for least depth determination if properly tested and of accuracy compatible with other survey data. Where wreckage is suspected or found by divers, hangs shall be cleared by two strips from opposite directions in accordance with section 4-19, Wire-Drag Manual. Clearing from one direction will suffice where divers are able to determine that there is no sloping protrusion smooth enough to allow the ground wire to slip over without catching. If, however, underwater visibility is good and divers can identify the object hung as being the item sought with no surrounding wreckage and obtain a least depth accompanied by a strong detached position, no subsequent clearing strips over the item are required. Drag strips in one direction are considered adequate for establishing effective cleared depths when no hangs are encountered.

6.9 Investigations. During investigations, each obstruction shall be hung or a depth obtained to support a subsequent clearance. Drag strips shall cover an area within a radius of one-half mile from the charted position of obstructions if possible. In case of doubtful or approximate positions, investigations shall cover the area within a one mile radius of the reported position.

6.10 Item Investigations. List specific items by name, position, and organization.

6.11 Report Letters. Each chart or boat sheet should have an accompanying letter or report explaining the methods used, the result of each investigation, and final recommendations for charting or deleting each item.

6.12 Fathograms. Fathograms used in fathometer calibration tests and in locating obstructions shall be submitted with other records.

6.13 Navigation Buoys. All navigation buoys within the project limits shall be hung from opposite directions to ensure that no unknown obstruction exists in their vicinity.

6.14 Prior Surveys. List all applicable prior surveys to aid in planning drag sweeps.

6.15 Records. A permanent record shall be made of all fix angles and geographic positions of objects used for calibration. A report on electronic control calibration and calibration checks shall be made as outlined in section 5.3.4 (paragraph F) of the Hydrographic Manual.

6.15 Time. All hydrographic data records that involve time shall be recorded in Greenwich Mean Time.

6.16 Processing. For item investigations only the maximum clearing strip and the minimum hang strip need to be smooth plotted. The remaining strips need only be rough plotted. For area plots, the entire survey must be smooth plotted.

## 7.0 Photogrammetry

7.1 Map Availability. Statement of map availability and dates of furnishing.

7.2 Field Edit. Field edit operations shall remain approximately current with hydrography to avoid application of obsolete data for smooth sheet use. Field edit operations shall be planned so that once a manuscript is started, a diligent effort shall be made to complete all field edit on that sheet

even though the area of hydrography may cover only a portion of the manuscript. Agreement between the hydrography and the field edit is required when the two surveys cover common details. The field editor and hydrographer shall make final determination of positions, heights, and depths in the field. They bear the responsibility for complete, accurate surveys. This includes positions of objects recommended for charting if they are not on the photogrammetric manuscripts. All discrepancies must be resolved before field edit data are shipped.

7.3 Shoreline Source. If no photogrammetry is available, provide statement defining source of shoreline data and the origin date of that source.

8.0 Data Reduction. All records collected will be clearly annotated and reduced in accordance with the Hydrographic Manual, or as modified by these instructions.

#### 9.0 Reports

9.1 General. Reports shall be submitted in accordance with Chapter 5 of the Hydrographic Manual.

#### 10.0 Miscellaneous

10.1 Sailing Directions/Coast Pilot. Existing Sailing Directions/Coast Pilot of the project area will be verified or corrected in accordance with sections 6.6 (source documentation) and 9, Coast Pilot Manual, Third (1969) Edition, and section 5.8 of the Hydrographic Manual.

10.2 Non-Floating Aids to Navigation. The position of non-floating aids to navigation, azimuth of ranges, and landmarks shall be investigated for either chart additions or deletions in accordance with section 4.5.13.1 of the Hydrographic Manual.

10.3 Aids to Navigation. Aids to Navigation shall be located and described in accordance with section 4.5.13 and 7.3.11 of the Hydrographic Manual. Comparison shall be made with the latest edition of the largest scale

charts covering each Field Sheet. Floating aids found to be off station by an amount that makes them unsuited to mark features intended shall be reported immediately to the appropriate agency (e.g., Defense Mapping Agency, Coast Guard, etc.).

10.4 Dangers to Navigation. All areas dangerous to navigation whether discovered during the survey or appearing on existing charts, will be fully developed and accurately positioned and delineated. To make possible an accurate investigation on all questionable areas, it is essential that each day's work be scheduled so that all hydrographic data is plotted and contoured in time for designation of any additional development required prior to leaving the immediate area. When a shoal that is considered dangerous to surface or sub-surface navigation is discovered, the position of least depth will be reported to NAVOCEANO (Coast Guard) and DMAHTC by message. A list of shoals is included in ANNEX C. These shoals are to be investigated, either during the SURVOPS or any transit to and from port in accordance with sections 1.6.4, 4.5.15, 5.3.4, and 5.9 of the Hydrographic Manual.

10.5 Photographs. Properly annotated photographic views depicting landfalls and port approaches from either ship or aircraft are desirable.