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HUGO SOFTWARE MODULES: USER'S MAINTENANCE MANUALS

H. J. Byrnes

Mapping, Charting, and Geodesy Division
Ocean Science Directorate

Stephen B. Hartley

Shirley Baker

Planning Systems Incorporated

Richard Goldkamp

Sverdrup Technology, Incorporated

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Naval Ocean Research and Development Activity
Stennis Space Center, Mississippi 39529-5004

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Section II. Tide Epoch Analysis

Part A. Software User's Manual for Tide Epoch
Evaluations and Analysis Module

Part B. Software Programmer's Maintenance Manual for
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Section III. Interactive Graphics Analysis

Part A. HUGO Interactive Graphics Depth and
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HUGO Software Modules

INTRODUCTION

Software modules for implementing drivers and menu tasks for system integration with the Hydrographic Upgrade to Oceanis (HUGO) are reported. The components comprising the HUGO system are the Harris 700 minicomputer, Megatek Whizzard 7200 graphic engine and Oracle Data Base Management System. The software is tailored specifically for the above system. The HUGO system is implemented as a combination Harris/VT100 configuration and a Harris/Megatek configuration. The Harris/VT100 configuration is operated from a VT100 terminal in a text mode and is comprised of shipboard software modules Hydrographic Post Time System (HPTS) converted to the Harris computer and interfaced to the Oracle Data Base Management System (DBMS). The converted modules will be used to load data into the DBMS and perform other tasks similar to shipboard operations. The Harris/Megatek configuration will operate in a graphics mode and be operated from any of three graphics work stations; the graphic stations will retrieve data from the DBMS, display the data and perform interactive edit operations.

This User's and Maintenance Manual is presented in three sections, as listed below:

Section I. Depth-Track/Contour Plot

Part A. Software User's Manual for Depth-Track/Contour Module

Part B. Software Programmer's Maintenance Manual for Depth-Track/Contour Module

SECTION I

PART A

SOFTWARE USER'S MANUAL

FOR

DEPTH-TRACK/CONTOUR MODULE

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1.0 GENERAL

1.1 Purpose of the User's Manual

The objective of the User's Manual for the Depth-Track/Contour Plot (DETRCO) is to provide necessary training, in order to run the program and to provide a reference guide for daily users of the software.

1.2 Project References

The Depth-Track/Contour Plot (DETRCO) module is being developed for the Hydrographic Upgrade to OCEANIS (HUGO) system at NAVOCEANO to provide the hydrographers or users of the system the ability to display specific data retrieved from the Oracle DBMS for post processing. Development of the DETRCO module was sponsored by NORDA Code 352 for NAVOCEANO. Documents which contain background information and model documentation for the Depth-Track/Contour Plot program is given in the following list:

1. "Software Programers Maintenance Manual for Depth-Track/Contour Module," Stephen B. Hartley and Shirley Baker, Planning Systems, Inc., Section I., Part B, 1988.
2. "Wand User's Guide", Document No. 0252-0024-01, April, 1984, Ver. 3.0, Megatek Corp., San Diego, California.
3. "NCAR GKS-Compatible Graphics System", NCAR/TN-267+1A, National Center for Atmospheric Research, Boulder, Colorado, April, 1986.

4. "A Data Management Scheme for Single - Beam Hydrographic Surveying," Mapp, G.R. and H.J. Byrnes, Naval Ocean Research and Development Activity, NORDA Technical Note 397, August 1988.
5. "VISP -- VOS Indexed Sequential File Package," Section 7, VOS Utilities, Doc. # 0869001-200.

1.3 List of Acronyms

HUGO	-	Hydrographic Upgrade to OCEANIS
SUM	-	Software User's Manual
DETRCO:X	-	Executable Source Code
GETAC:X	-	Executable Source Code
JCL	-	Job Control Language
MACRO	-	Is a JCL executable under the Harris system
DBMS	-	Data Base Management System
DETRCO	-	Depth-Track/Contour Plot
HIHAN	-	Hydrographic Information Handling Project
WS_MACRO	-	Workstation Macro

2.0 SYSTEM SUMMARY

2.1 System Application

The Depth-Track/Contour plot (DETRCO) software, as a module for HUGO, provides the hydrographer information on where to plan future survey runs, compares adjacent data in a spatial relationship and aids in evaluating end products.

2.2 Security and Privacy

The source code for the HUGO system is entirely unclassified. The source code is located on the unclassified Harris 700 minicomputer at NAVOCEANO.

2.3 System Configuration

The software is developed on a Harris 700 minicomputer/Megatek graphics engine located at the Naval Oceanographic Office, Bay St. Louis, MS. The bulk of the source code is written in Fortran, except for the Oracle data base and Wand graphic calls. The Oracle data base calls are converted into Fortran code by precompiling with the Pro-Fortran compiler.

2.4 Performance

The software is designed to view multiple area tracks, depending on the user's inputs into the Oracle DBMS, and contour the area tracks, with the ability to zoom in or out on a specific contour location. The time required to access the Oracle DBMS is relatively

small compared with the time to contour an entire survey area, without filtering the data. Also, heavy usage of the Harris computer will slow down the response time.

2.5 Data Files

There are three types of data files referenced by DETRCO. The first is the Oracle data base file. This file is accessed by the Oracle command "EXEC SQL". The Oracle data base files contain the pointers for the appropriate VISP files (See ref. 4 for more detail). The second type of file is the VISP file. This file is accessed by the VISP command "ISSQRD" (See ref. 5 for more detail). See Table 2.5.1 for the contents of the VISP file. The third type of file used is a simple, sequential Fortran file. Data passed through this file is located in Table 2.5.2.

TIME	LON	SCALE
SNR-NO	TIDCOR	MEASMNT
LAT	SVCOR	DRAFT

Table 2.5.1. Contents of the VISP product file.

LOCATION	ARCHIVE-NO	IDONE
SHIP-NAME	ARCHIVE-CODE	LAT-OFFSET
DATA-AQ-SYS	DATA-SET-NO	LON-OFFSET
SSHEET-ID	PLATFORM	ACCESS-NO
	PSHEET-NO	

Table 2.5.2 Contents of the Scratch Sequential File.

3.0 TECHNICAL OPERATION

3.1 Initiation Procedures

To run the software on the Harris/Megatek system, simply type in the disk area and the area name. This is accomplished with the command:

0352GRAP*HIHAN

and press the [RETURN] key.

3.2 Inputs

The software will prompt the user to enter an option. The following table summarizes the options available at this time. All of these responses are entered from the keyboard.

ENTER THE WORKSTATION PDN(50, 60 or 70)"

(NOTE: This question will only appear if the user is not located at one of the Megatek Workstations).

WELCOME TO THE HUGO INTERACTIVE GRAPHICS SYSTEM

1. NAV AND DEPTH EDIT
2. TIDE EPOCH ANALYSIS
3. DEPTH-TRACK/CONTOUR PLOT

99. EXIT

ENTER OPTION

(NOTE: Since this "SUM" only applies to option three, the following inputs will only pertain to this choice).

If the user chooses option 99, the program terminates. When option 3 is chosen, the Oracle DBMS is accessed to retrieve the accession numbers associated with user inputs to the data base queries. The following table summarizes the questions issued by the Oracle DBMS.

<u>PROMPTS</u>	<u>ACCEPTABLE RESPONSES</u>
SHIP NAME ?	H OR C
PRIMARY SHEET NUMBER?	A two digit number (0-99)
SECONDARY SHEET ID?	One character (A-Z)
PLATFORM	A one digit number (0-9)
DATA SET NUMBER?	A one digit number (0-9)
ARCHIVE CODE?	A one to two digit number
Julian Start Day?	A 1-3 digit number
Julian Start Year?	A two digit number
Julian End Day?	A 1-3 digit number
Julian End Year?	A two digit number

After all data base queries have been answered, the user inputs will be displayed and the user will be prompted: ARE ENTRIES CORRECT (Y/N)? If "N" or "n" is entered, the program continues by repeating the above questions; otherwise, the program retrieves the necessary data from the Oracle DBMS.

Upon completion, the following prompt will appear:

```

THE FOLLOWING #N ACCESSION NUMBER(S) HAVE BEEN RETRIEVED
#   #   #   #   ..... #N
DO YOU WANT TO USE ALL OF THEM Y/N?

```

If the user chooses to use all of them, the program proceeds to read all VISP Product files associated with all accession numbers. However, if the user chooses "N", the program will prompt the user to enter the number of accessions to use and then to enter the accession number(s). When all accession numbers have been entered, the program proceeds to read all data associated with these accession numbers from VISP Product files.

After all selected data has been read, the following prompt is displayed:

WELCOME TO HUGO DEPTH/TRACK/CONTOUR PLOT

CHOOSE ONE OF THE FOLLOWING:

1. AREA TRACKS AS COLOR DEPTHS
2. DEPTH CONTOURS
3. AREA TRACKS AND CONTOURS
4. RETRIEVE NEW ACCESSION(S) FOR PLOTTING
5. ZOOM
6. RE-DEFINE CONTOUR PARAMETERS
7. RETRIEVE NEW DATA FROM ORACLE
8. CALCULATE SHIP TRACK CROSSING

99. EXIT

Table 3.2.1 Options Available for Viewing the Data

If the user chooses option 1, the ship tracks are drawn in colors corresponding to the bottom depths at each location on the Megatek graphics terminal.

If the user chooses option 2, the following prompt is displayed:

CONTOURING METHOD

- 1 = CONTOUR ENTIRE AREA AS A WHOLE
- 2 = CONTOUR INDIVIDUAL GRID SQUARES

If a 1 is entered, all input data will be contoured and displayed on the Megatek graphics terminal. If a 2 is entered, the input data will be broken up into grid squares (25 grid squares for entire area) and contoured one grid square at a time.

The user will be prompted for contouring parameters:

CONTOUR SMOOTHING

- 1 = MINIMUM SMOOTHING
- 2 = DEFAULT SMOOTHING (RETURN)
- 3 = MAXIMUM SMOOTHING

Enter a 1, 2, or 3. Normally the default smoothing here is preferable and can be obtained by pressing the RETURN key. Contour smoothing (thinning of data points) is the minimum distance apart data points must be in order to be included in the data set for contouring.

GRIDDING RESOLUTION

- 1 = LOW RESOLUTION
- 2 = DEFAULT RESOLUTION (RETURN)
- 3 = HIGH RESOLUTION

Enter 1, 2, or 3. Here again the default resolution is normally adequate and can be obtained by pressing the RETURN key.

If the data is to be contoured one grid square at a time, contouring is now performed and the contours will be drawn on the Megatek graphics terminal in each grid square as contouring for that square is completed.

If all the input data is to be contoured as a whole, the following prompt will be displayed:

CONTOUR LINES DRAWN IN AREA

- 1 = ALWAYS (RETURN)
- 2 = IF AT LEAST 1 DATA POINT IN AREA
- 3 = IF AT LEAST 4 DATA POINTS IN AREA

Enter 1, 2, or 3. If all contour lines are to be drawn even if there is no data in some areas, enter a 1 or press RETURN. Enter 2 if contour lines will only be drawn in an area if there is at least 1 data point in that area. Enter 3 if contour lines will be drawn only in areas where there are at least 4 data points. An area is one grid square of a (20 x 20) grid over-laying the entire map display.

The following prompt is displayed:

FILTERING DATA SET ...

while input data is filtered (thinned) according to the smoothing parameter entered previously. All thinned data is contoured and contours are drawn on the Megatek graphics terminal.

If the user chooses option 3, ship tracks are drawn on the Megatek graphics terminal and contours are produced with user inputs described above.

If the user chooses option 4, the accession numbers retrieved from the Oracle DBMS are again displayed and new accession numbers may be selected.

If the user chooses option 5, a specific area or grid square is selected by moving the joystick on the Megatek graphics terminal until the crosshair on the screen is in the area to be enlarged and depressing the button on the joystick once.

If the entire data set was contoured as a whole, the selected area is enlarged to fill the graphics screen. The selected area can be further enlarged or shrunk by moving the joystick up or down. To end zooming, depress the button on the joystick.

If the data was contoured one grid square at a time, the following prompt is displayed:

CHOOSE TYPE OF DISPLAY DESIRED

- 1 = CONTOURS FOR SELECTED SQUARE
- 2 = DATA VALUES FOR SELECTED SQUARE
- 3 = CONTOURS AND DATA FOR SQUARE
- 99 = RETURN TO FULL SCREEN

If a 1 is entered, the contours for the selected grid square will be enlarged to the size of the full screen. If a 2 is entered, the data values will be displayed for the selected grid square in the color associated with the depth as a "+" and the actual depth values displayed if data points are not too close. If a 3 is entered, both the contour lines and data values will be displayed. If a 99 is entered, the original 25 grid squares of contours will be displayed.

If the user chooses option 6, the program will proceed as if option 2 had been entered. New smoothing and resolution parameters will be entered and contours will be drawn in the selected method.

If the user chooses option 7, the program returns to the Oracle Data Base queries as described in Table 3.2.1 and continues from that point.

If the user chooses option 8, the user is prompted:

ENTER NAME OF FILE FOR TRACK CROSS POINTS (RETURN FOR NO FILE)

Enter a filename for storing the latitudes, longitudes, and depths at ship track crossings if such a file is desired; otherwise, press RETURN and no file will be written. The input data is scanned to determine points at which ship tracks cross. The latitudes, longitudes, and depths of these points will be displayed on the terminal screen as they are located and displayed on the Megatek graphics terminal as "+"s in the color associated with each depth after all points have been located. The information is written to a file if the user has provided one.

If the user chooses option 99, the graphics screen is cleared and the "WELCOME TO THE HUGO INTERACTIVE GRAPHICS SYSTEM" menu is displayed as described at the start of this section.

3.3 Outputs

The outputs from the DEPTH-TRACK/CONTOUR option are in graphic form and are routed to the Megatek graphics terminal. Print outs of the graphics can be accomplished simply by pressing the start button on the SEIKO color printer. Figures 1-5 shows the graphic outputs available for the DEPTH-TRACK/CONTOUR and Table 3.3.1 lists ship track crossing points.

SHIP TRACK CROSS POINTS

<u>LONGITUDE</u>	<u>LATITUDE</u>	<u>DEPTH 1</u>	<u>DEPTH 2</u>	<u>DELTA</u>
5 50 41 E	0 19 48 S	2829	2827	2
5 50 42 E	0 19 47 S	2842	2850	8
5 50 41 E	0 19 45 S	2853	2853	0

Table 3.3.1 Ship Track Crossing Points

DEPTH TRACK PLOT

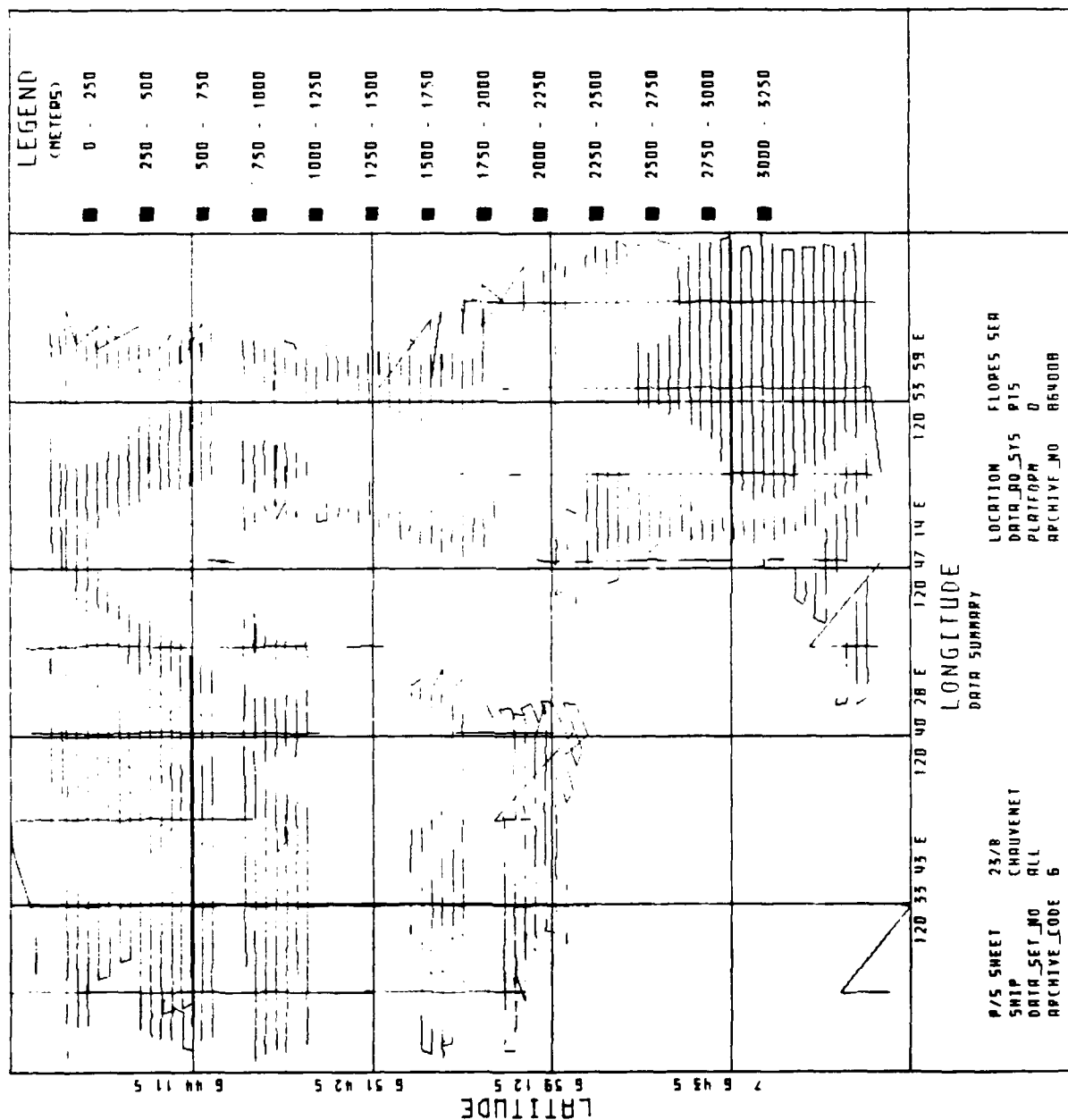


Figure 1a. AREA TRACKS AS COLOR DEPTHS, PLOTTED AS A WHOLE

DEPTH TRACK PLOT

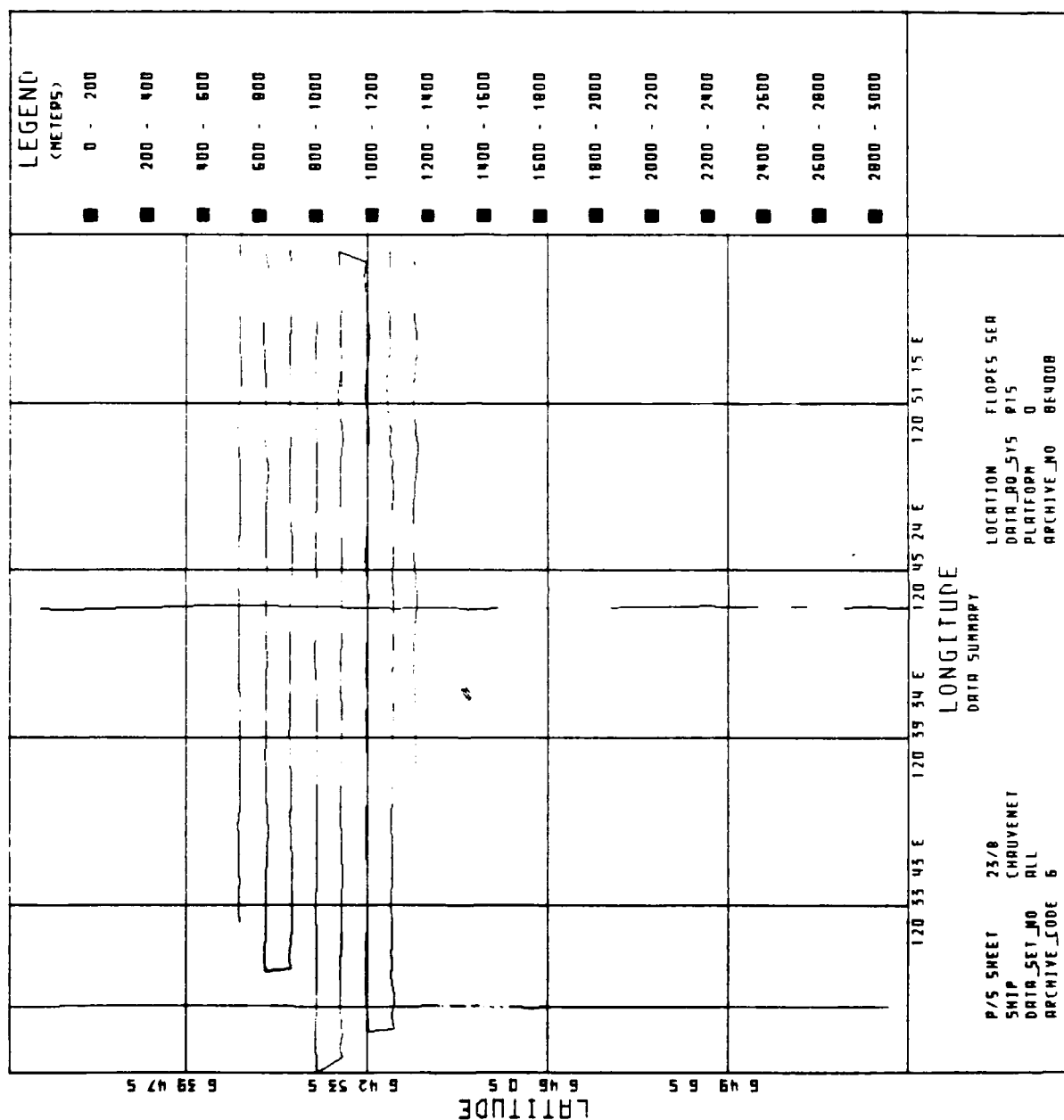


Figure 1b. AREA TRACKS AS COLOR DEPTHS, PLOTTED AS INDIVIDUAL SQUARES

CONTOUP PLOT

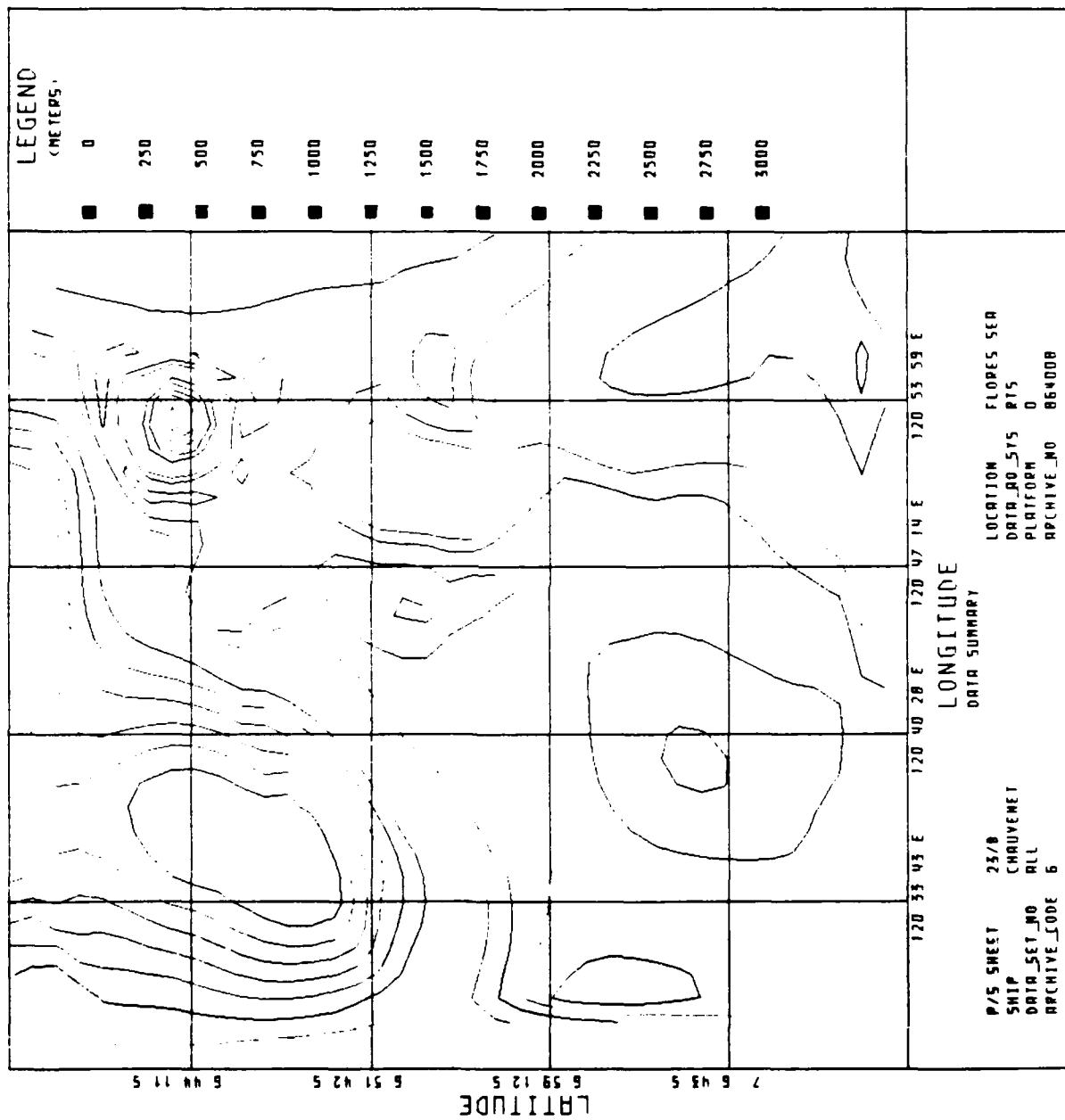


Figure 2a. DEPTH CONTOURS, PLOTTED AS A WHOLE

CONTOUP PLOT

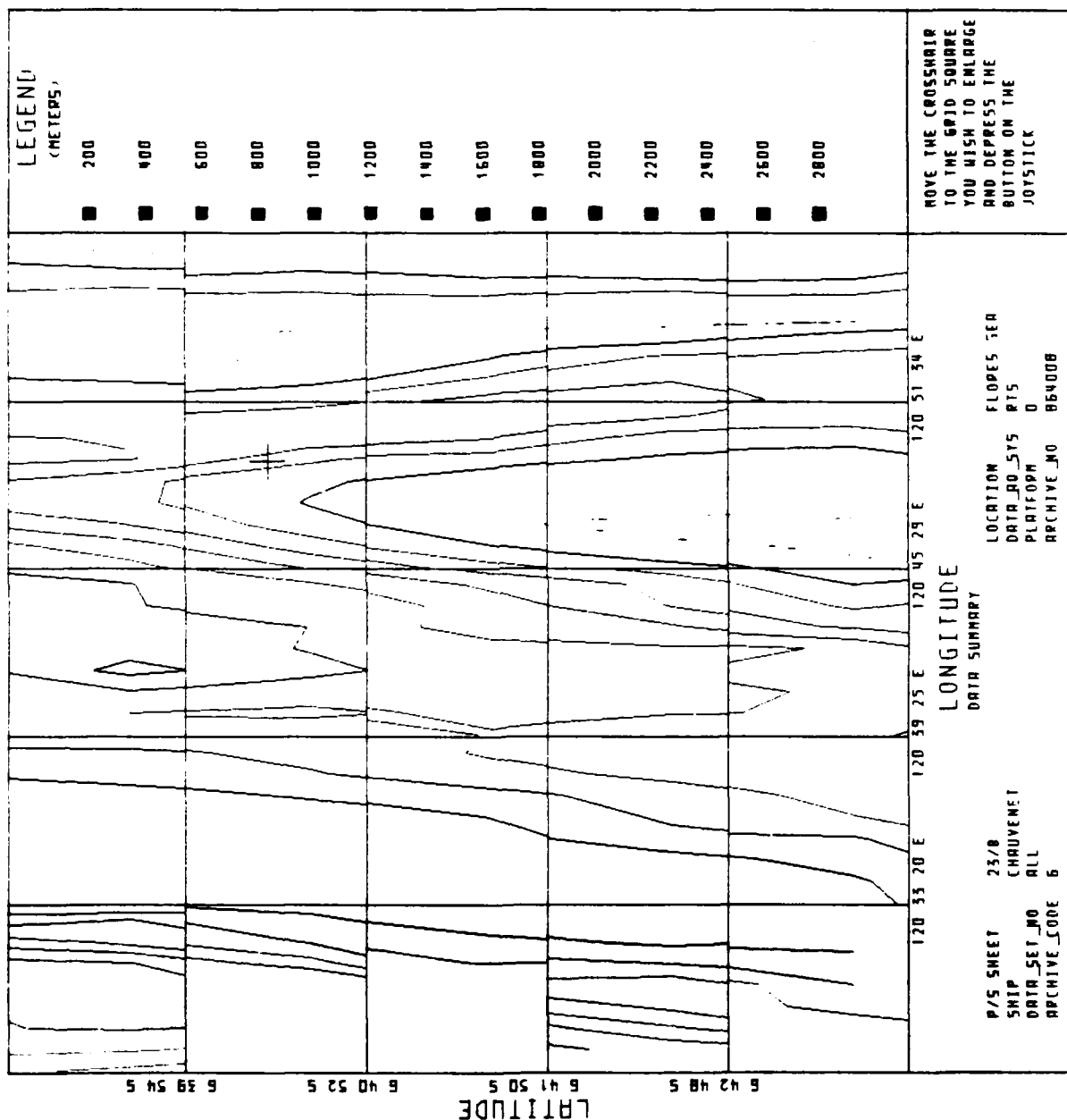


Figure 2b. DEPTH CONTOURS, PLOTTED AS INDIVIDUAL SQUARES

DEPTH TRACK/CONTOUR PLOT

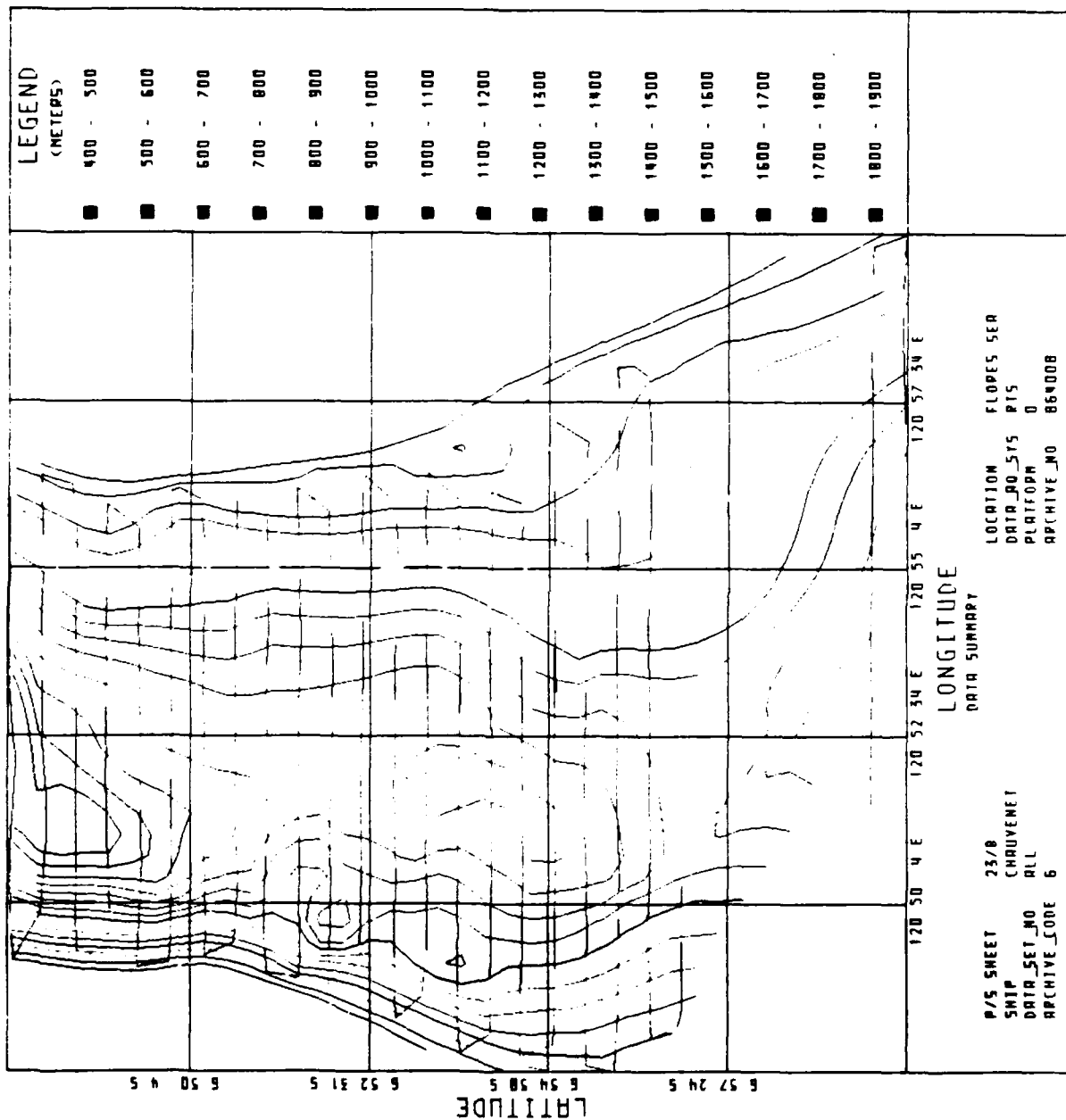


Figure 3. AREA TRACKS AND CONTOURS, PLOTTED AS A WHOLE

DEPTH TRACE/CONTOUR PLOT

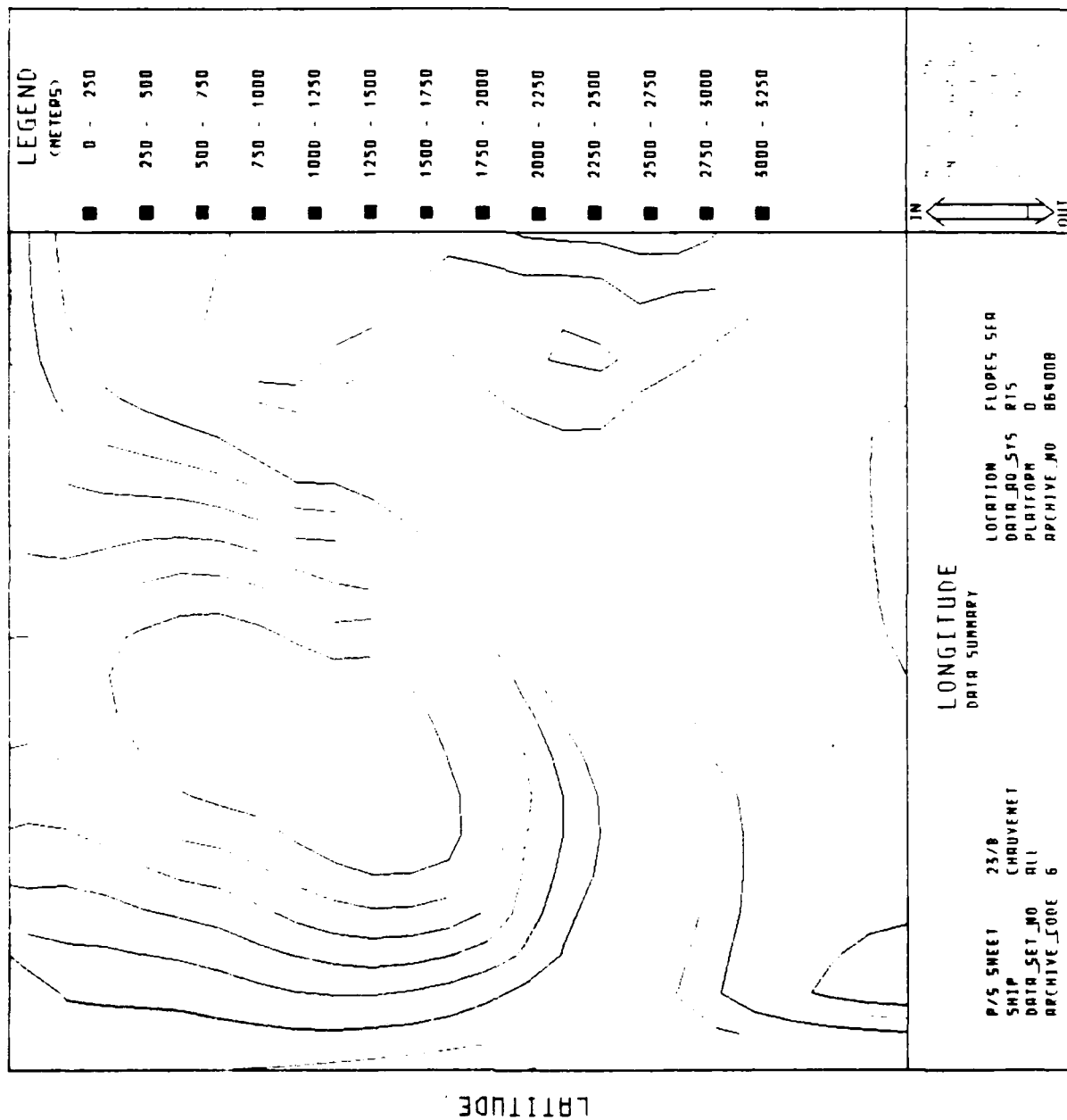


Figure 4a. DISPLAY OF THE ZOOM OPTION, PLOTTED AS A WHOLE

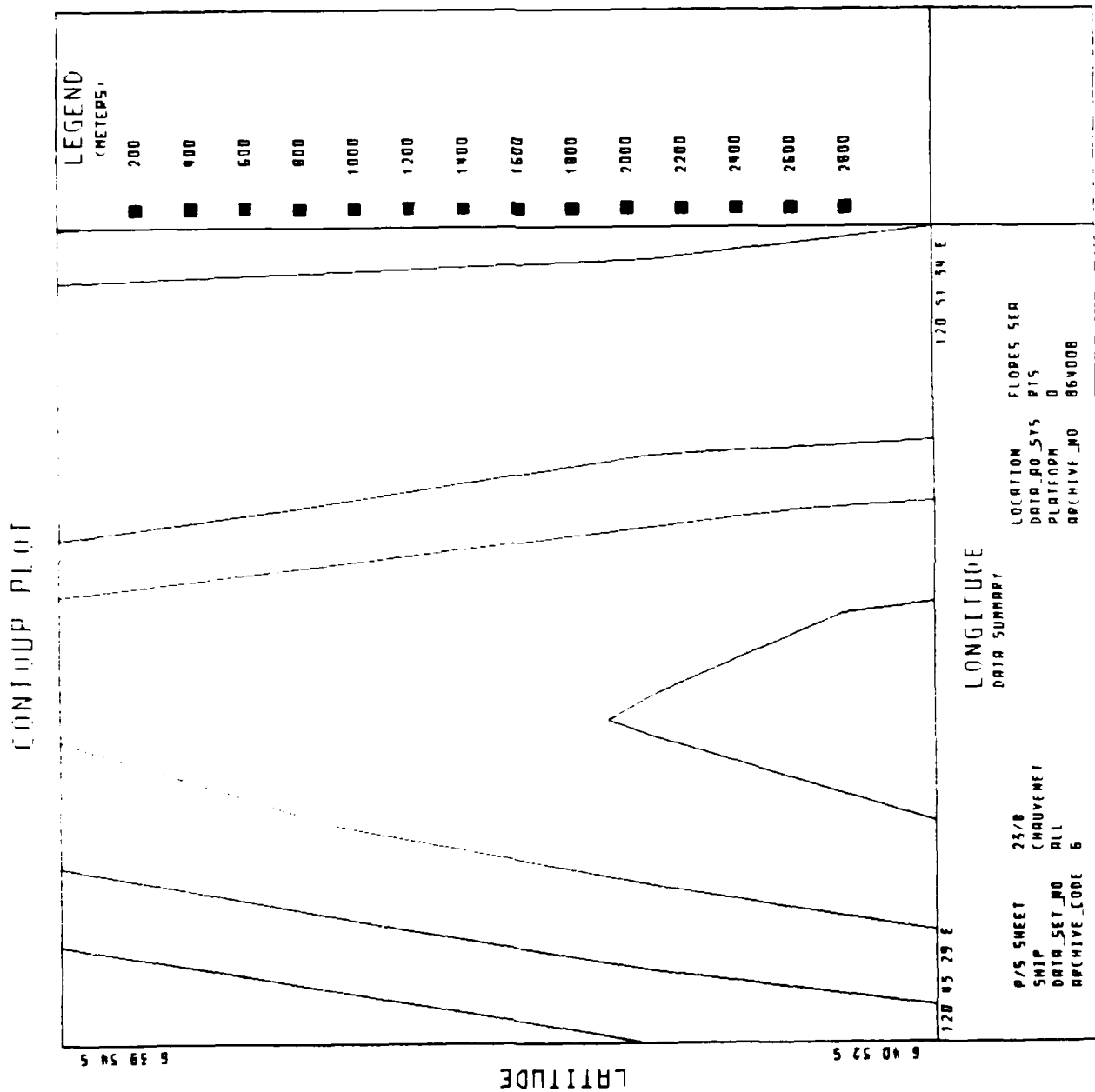


Figure 4b. DISPLAY OF THE ZOOM OPTION, SHOWING CONTOUR LINES FOR 1 GRID SQUARE

CONTOUR PLOT

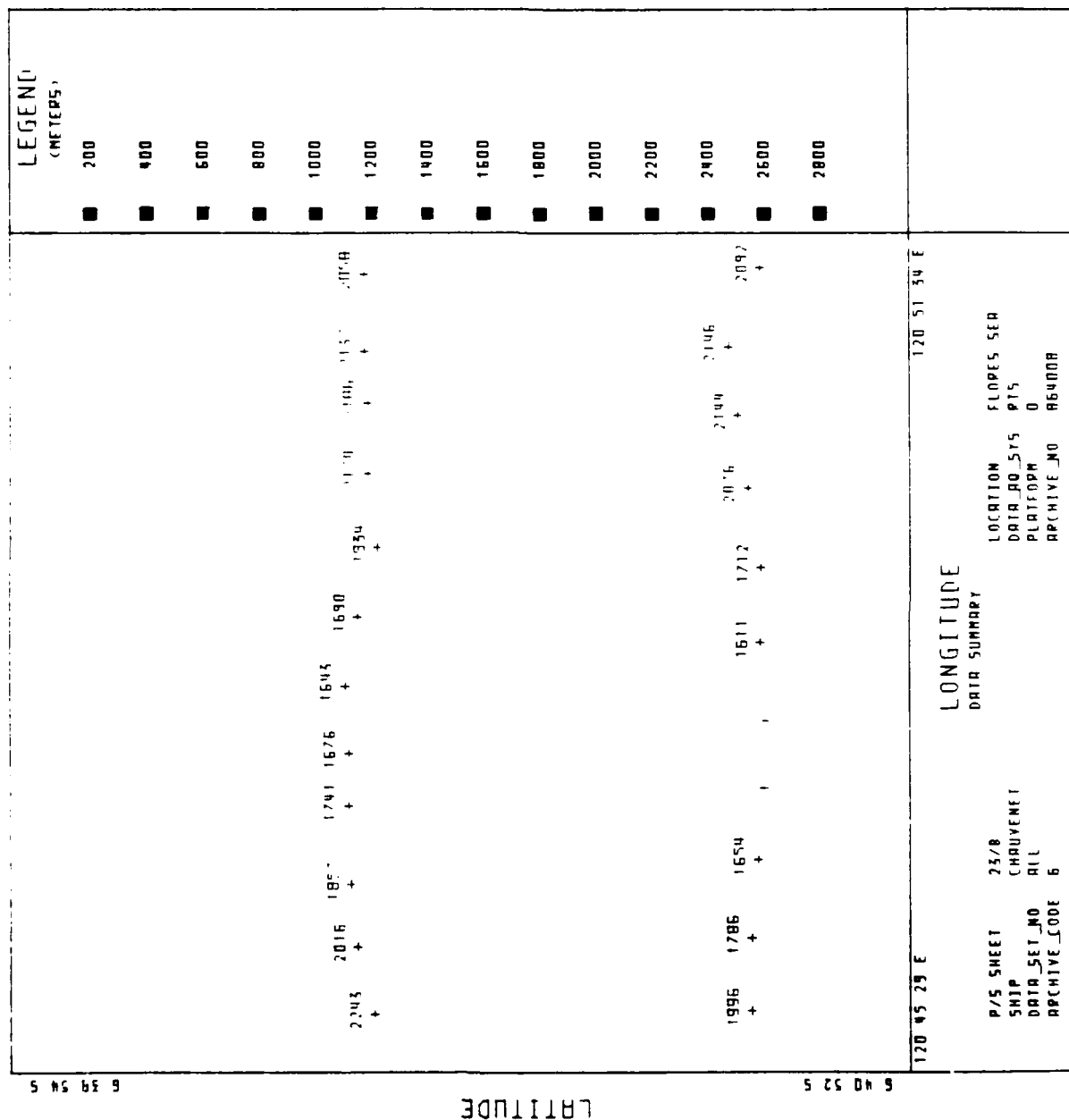


Figure 4c. DISPLAY OF THE ZOOM OPTION SHOWING DATA VALUES FOR 1 GRID SQUARE

CONTOUR PLOT

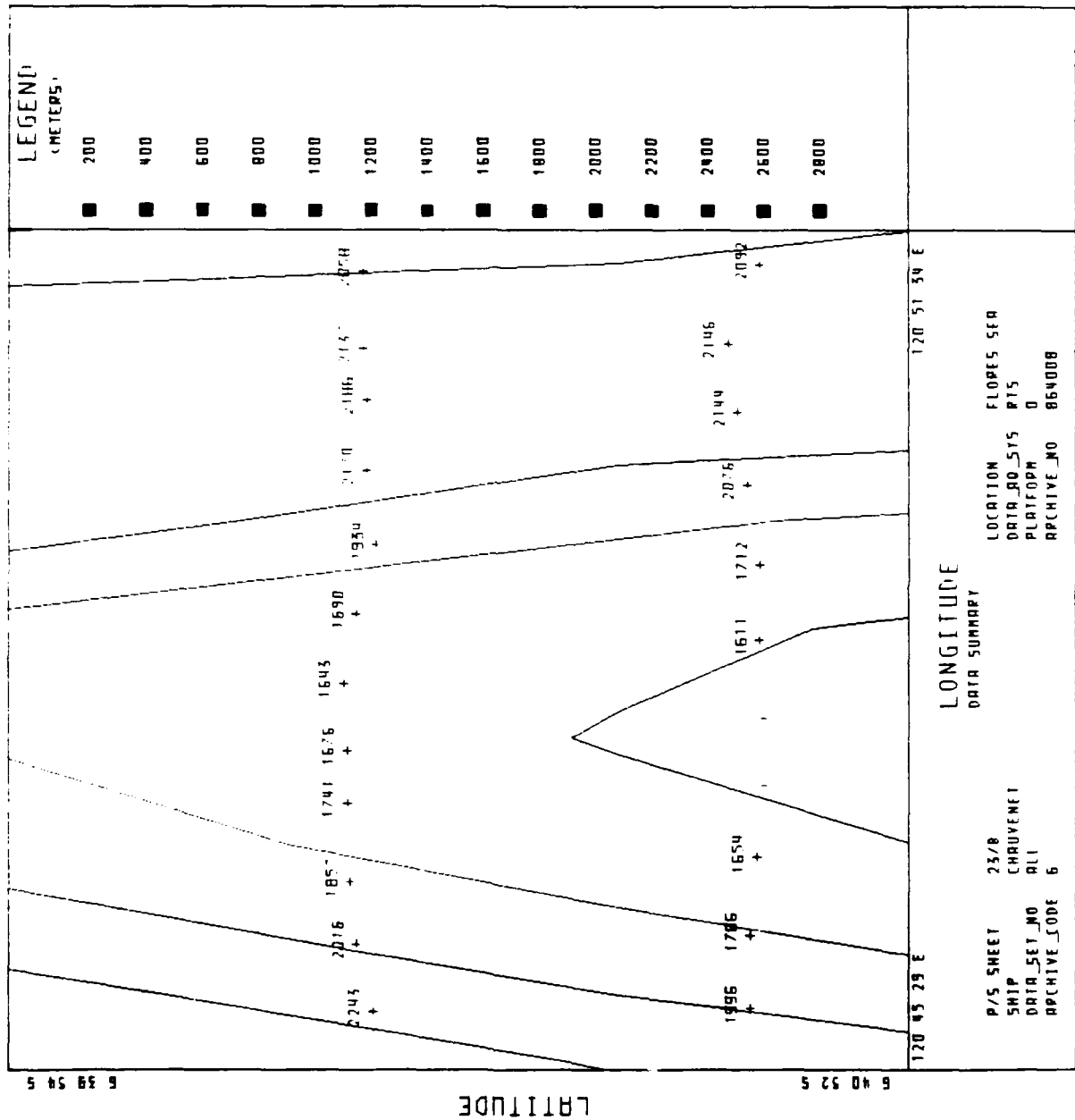


Figure 4d. DISPLAY OF THE ZOOM OPTION SHOWING CONTOUR LINES AND DATA FOR 1 GRID SQUARE

DEPTH TRACK PLOT

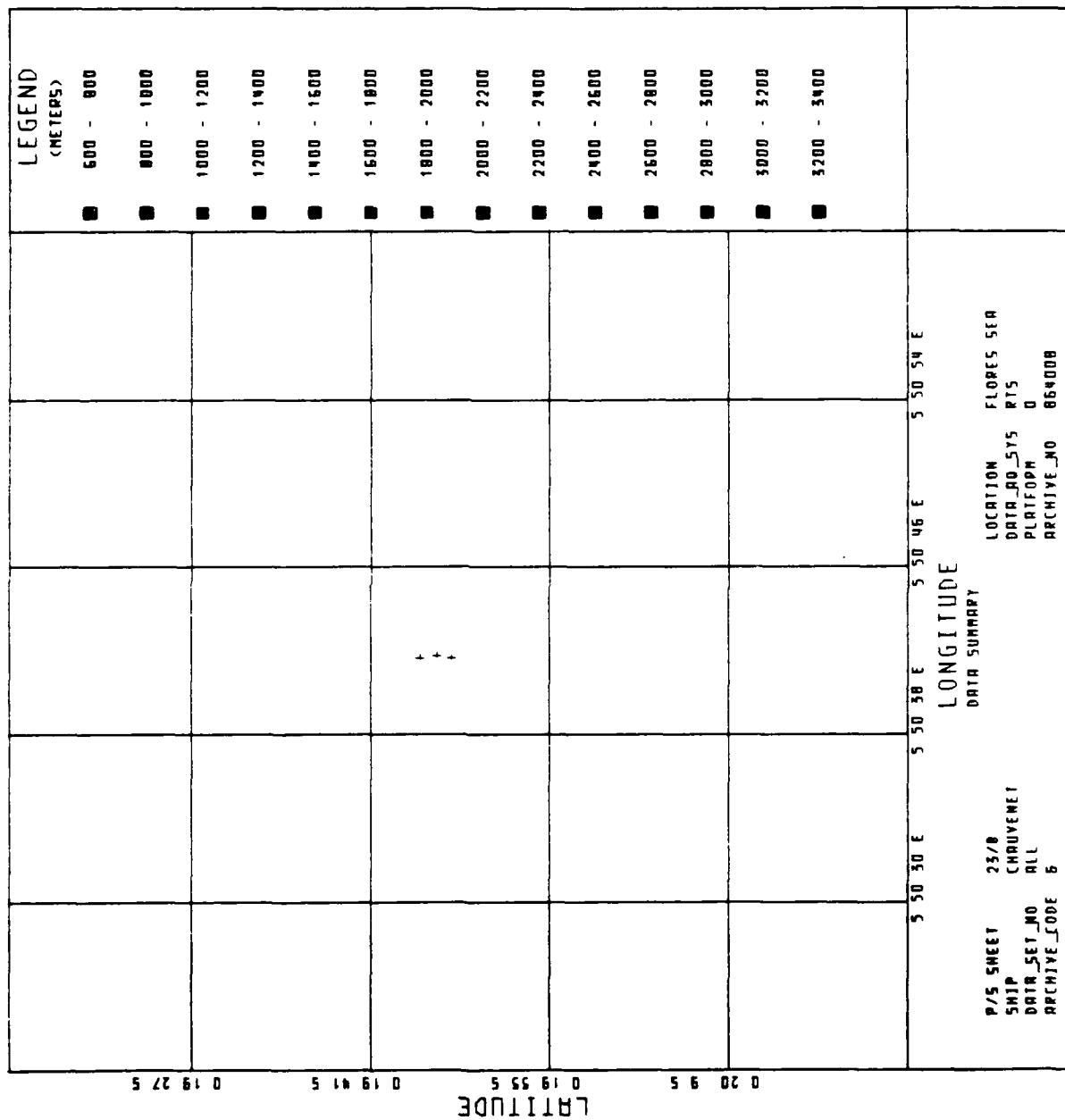


Figure 5. SHIP TRACK CROSSING POINTS.

SECTION I

PART B

SOFTWARE PROGRAMMER'S MAINTENANCE MANUAL

FOR

DEPTH-TRACK/CONTOUR MODULE

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APPENDIX B

Depth-Track/Contour Source Code

**DETRCO Programmer's
Maintenance Manual (Fortran/JCL)**

1.0 GENERAL DESCRIPTION

1.1 Purpose

The purpose of this Maintenance Manual (MM) is to provide maintenance programmer personnel with the information necessary to effectively maintain and modify the Depth-Track/Contour module. Some familiarity with the Harris 700 system and the Fortran programming language is assumed.

1.2 Project References

The module is being developed for the HUGO system at NAVOCEANO, under the sponsorship of NORDA, Code 352, to provide the hydrographer the ability to display specific data for post-processing. The NORDA technical point of contact is Mr. H.J. Brynes, Ext. 4773.

1.3 List of Acronyms

HUGO	-	Hydrographic Upgrade to Oceanis
MM	-	Maintenance Manual
OPT	-	User Input Option
WS	-	Workstation
TNO	-	Terminal Number
PDN	-	Physical Device Number
DETRCO:X	-	Executable Source Code
GETAC:X	-	Executable Source Code
JCL	-	Job Control Language
Macro	-	Is a JCL Executable under the Harris System

DBMS	-	Data Base Management System
HIHAN	-	Hydrographic Information Handling Project
WS_MACRO	-	Workstation Macro

2.0 SYSTEM DESCRIPTION

2.1 System Application

The overall purpose of the HIHAN project is to provide the hydrographer the ability to display/edit soundings. The specific purpose of the Depth-Track/Contour module, in the HIHAN project, is to provide the hydrographer information on where to plan future survey runs.

2.2 Security and Privacy

The source code for this function is entirely unclassified. The source code is located on the unclassified Harris 700 computer at NAVOCEANO.

2.3 General Description

The HIHAN executable, located under the system qualifier (352GRAP), is the driver for the HIHAN functions. It provides interactive execution of executable modules, based on the user's input.

The options (#OPT) provided are:

- 1 - NAV and DEPTH EDITOR
- 2 - TIDE EPOCH ANALYSIS
- 3 - DEPTH-TRACK/CONTOUR PLOT
- 99 - EXIT

Option 1 - initiates processing for the NAV/DEPTH EDITOR executable. (Note: This executable is found under the system qualifier "352DEPE").

Option 2 - initiates processing for the TIDE EPOCH EVALUATION and ANALYSIS executable (TIDE:X). (Note: This executable is found under the system qualifier "352TID3").

Option 3 - initiates processing for the DEPTH-TRACK/CONTOUR executable. (Note: This executable is found under the system qualifier "0352GRAP").

Option 99 - terminates the HIHAN function.

2.3.1 Diagram

Diagram 2.3.1 is a visual presentation of the relationship between the HIHAN (executable) and the WS_Macro commands and the other executable modules.

This Maintenance Manual will only include program description and code for the WS_Macro and the HIHAN and the GETAC:X and DETRCO:X executables. Diagram 2.3.2 is a visual presentation of the relationship between the main program (DE_TR_CO) and its subroutines.

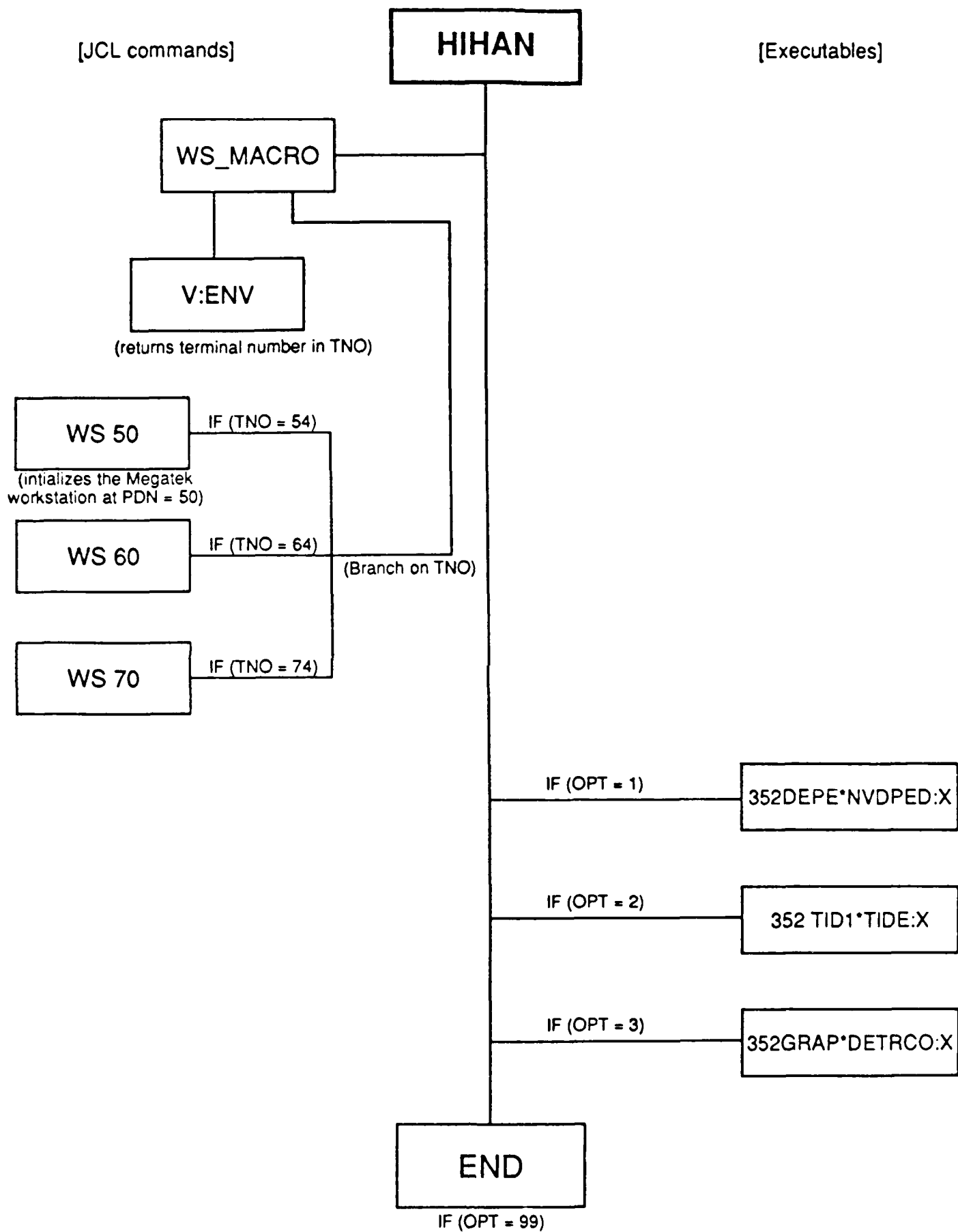


Diagram 2.3.1 Diagramatic Structure of the HIHAN Executable.

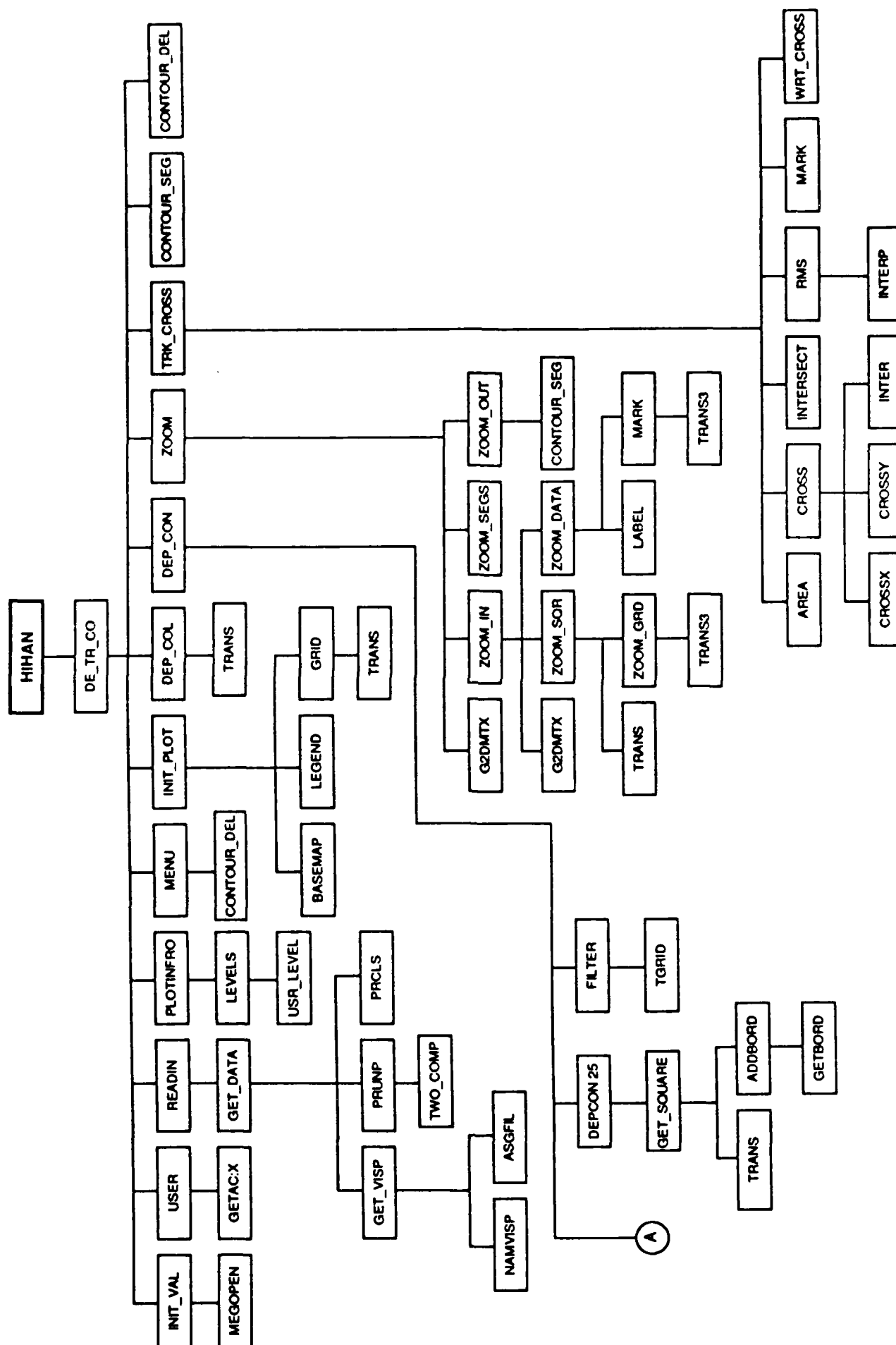


Figure 2.3.2 Diagrammatic Structure of Executable DETRACO:X

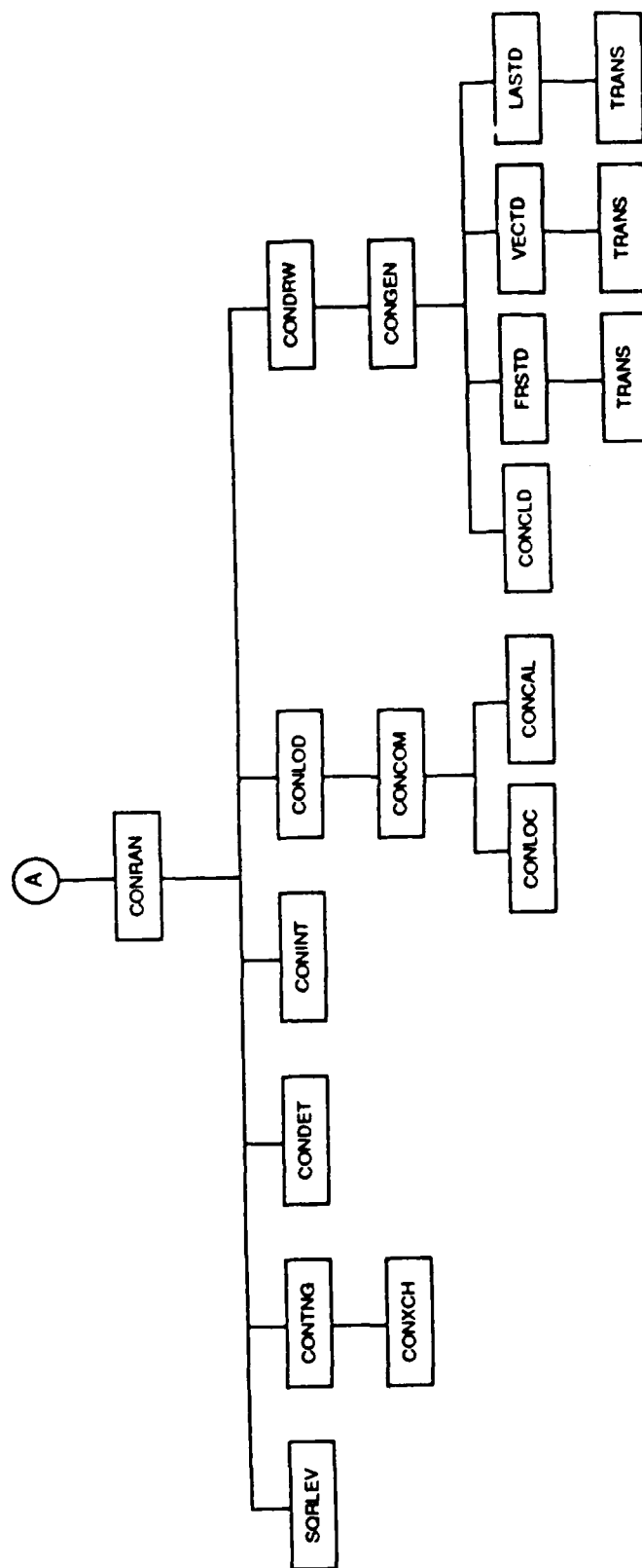


Figure 2.3.2 Diagramatic Structure of Executable DETRCO:X (cont)

3.0 PROGRAM DESCRIPTION

3.1 The HIHAN Executable

The main purpose of the HIHAN executable is to initialize a Megatek workstation for graphics output and then branch to one of the menu's executables. (Refer to diagram 2.3.1).

Only the 'Depth-Track/Contour' executable will be discussed in more detail in the following sections. When control returns to HIHAN after the execution of an option, HIHAN prompts the user for another execution or terminates.

3.2 Execution Options

This section details the function and description of each subroutine in the DEPTH-TRACK/CONTOUR executable.

3.2.1 DEPTH-TRACK/CONTOUR PLOT

The function of the DEPTH-TRACK/CONTOUR option is to optionally display area tracks as colored depths and/or select soundings in color contour form. Other features include zooming in on selected contours and displaying interpolated depths at locations of ship track crossings.

3.2.1.1 DETRCO:X

Name:	DE_TR_CO
Purpose:	To plot ship tracks and/or depth contours in color.
Inputs:	By argument - None By common - None

By input file - SHIP_NAME, PSHEET_NO
SSHEET_ID, PLATFORM, DATA_SET_NO,
ARCHIVE_CODE, ARCHIVE_NO,
LAT_OFFSET, LON_OFFSET,
LOCATION, IDONE, ACCESS_NO

Outputs: By argument - None
By common - None
By file - None

Calling Routine: HIHAN

Routines Called: INIT_VAR
USER
READIN
PLOTINFO
MENU
INIT_PLOT
TRK_CROSS
CONTOUR_SEG
ZOOM
DEP_COL
DEP_CON
DELETE (system call)
MEGOPEN
MEGCLOSE
Wand system calls (see reference 1)

Glossary: NCL - maximum number of contour
levels
MAXFILE - maximum number of VISP
Product files

MAXRECS - maximum number of records
per VISP Product file

3.2.1.1.1 INIT_VAR

Name: Subroutine INIT_VAR

Purpose: To define constants and initialize screen and
window coordinates and WAND graphics.

Inputs: By argument - None
By common - None
By input file - None

Outputs: By argument - None
By common - /CONSTANTS//, /WINDOW//,
/MAPAREA/ (See Appendix A for
definitions for variables passed
through common)
By file - None

Calling Routines: DE_TR_CO

Routines Called: MEGOPEN

3.2.1.1.1.1 MEGOPEN

Name: Subroutine MEGOPEN

Purpose: To initialize the Wand Graphics package.

Inputs: By argument - None
 By common - None
 By file - None

Outputs: By argument - None
 By common - None
 By file - None

Calling Routine: INIT_VAR

Routines Called: Wand system calls

3.2.1.1.2 USER

Name: Subroutine USER

Purpose: To query the Oracle Data Base to determine
 the accession numbers for VISP Product files
 containing input data.

Inputs: By argument - None
 By common - None
 By file - None

Outputs: By argument - FNAME
 By common - None

By file - PSHEET NO, DATA SET_NO, PLATFORM
ARCHIVE NO, ARCHIVE_CODE,
SSHEET_ID, SHIP_NAME, LOCATION,
DATA_AQ_SYS

Calling Routines: DE_TR_CO

Routines Called: SUBPROG (Executes GET_AC:X)

Glossary: FNAME - name of scratch file written
by GET_AC

3.2.1.1.2.1 GET_AC:X

Name: GET_AC.P

Purpose: To initialize the Oracle DBMS and to prompt
the user for input parameters, which are used
to retrieve the ACCESSION numbers.

Inputs: From keyboard: SHIP_NAME,
PRIMARY_SHEET_NO, SSHEET_ID,
PLATFORM, DATA_SET_NO, ARCHIVE_CODE,
JULIAN START DAY, JULIAN ENDING DAY,
JULIAN START YEAR, JULIAN ENDING YEAR

By argument - None

By common - None

By input file - None

Outputs: By argument - None

By common - None

By file - (352GRAP*SCRATCH) PSHEET_NO,
SSHEET_ID, SHIP_NAME,
DATA_SET_NO, PLATFORM,
ARCHIVE_CODE, ARCHIVE_NO,
LAT_OFFSET, LON_OFFSET,
LOCATION, IDONE, ACCESS_NO

Calling Routines: USER

Routines Called: "EXEC SQL..." (Oracle system calls)

Glossary: IDONE - number of accession files
retrieved

ACCESS_NO - an array of the
accession numbers

3.2.1.1.3 READIN

Name: Subroutine READIN

Purpose: To read the scratch file written by GET_AC
containing user input to Oracle Data Base
queries and the accession numbers corre-
sponding to the VISP Product files to be used
as input data.

Inputs: By argument - FNAME
By common - None

By file - PSHEET NO, DATA SET_NO,
PLATFORM, ARCHIVE_NO,
ARCHIVE_CODE, SSHEET_ID,
SHIP_NAME, LOCATION,
DATA_AQ_SYS

Outputs:

By argument - NPT, NACCESS

By common - /SUMMARY/, /DATA/, /COVERAGE/,
/SCALE/ (See Appendix A for
definitions for variables
passed through common)

By file - None

Calling Routines: DE_TR_CO

Routines Called: VT100

TOADS (system call)

GET_DATA

Glossary:

FNAME - name of scratch file written
by GET_AC

NPT - no. of data values in selected
input VISP Product files

NACCESS - no. of accession numbers
selected

3.2.1.1.3.1 GET_DATA

Name: Subroutine GET_DATA

Purpose: To open and read VISP Product files that are associated with the accession numbers retrieved by 'GETAC'.

Inputs: By argument - NACCESS, ACCESS_NO, NPT
By common - /OFFSET/ (Note: See Appendix A for definitions of variables passed through common)
By file - LATITUDE, LONGITUDE, MEASMNT, SVCOR, DRAFT, TIDCOR

Outputs: By argument - NPT
By common - /SCALE/, /COVERAGE/, /DATA/
By file - None

Calling Routine: READIN

Routines Called: GETVISP
PRUNP
PRCLS
ISREWI - system call for VISP rewind
ISSQRD - system call for VISP read

Glossary: NACCESS - no. of accession numbers
ACCESS_NO - accession numbers
NPT - no. of data values

3.2.1.1.3.1.1 GETVISP

Name: Subroutine GETVISP

Purpose: To name, assign LFN, and open an existing VISP file.

Inputs: By argument - ACCNO, LFN, TYP
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - none

Calling Routine: GET_DATA

Routines Called: NAMVISP
ASGFIL
ISOPEN - system call for VISP open

Glossary: ACCNO - accession number for opening VISP file
LFN - logical unit number to assign to file
TYP - character designating type of VISP file to open (i.e. "P" for Product file)

3.2.1.1.3.1.1.1 NAMVISP

Name: Subroutine NAMVISP

Purpose: To return the name of the VISP file associated with the accession number.

Inputs: By argument - ACCNO, TYP
By common - None
By file - None

Outputs: By argument - File
By common - None
By file - None

Calling Routine: GETVISP

Routines Called: None

Glossary: FILE - Name of VISP file in character form
ACCNO - Accession number
TYP - Character designating type of VISP file (i.e. "P" for Product file)

3.2.1.1.3.1.1.2 ASGFIL

Name: Subroutine ASGFIL

Purpose: To assign a logical file number to the VISP file using the FORTRAN ASSIGN command.

Inputs: By argument - LFN, FILE
 By common - None
 By file - None

Outputs: By argument - None
 By common - None
 By file - None

Calling Routine: GETVISP

Routines Called: ASSIGN (system call)

Glossary: LFN - Logical unit number for reading
 VISP file
 FILE - Name of VISP file

3.2.1.1.3.1.2 PRUNP

Name: Subroutine PRUNP

Purpose: To unpack the variables in the current VISP
 Product file record.

Inputs: By argument - REC
 By common - LAT_OFFSET, LON_OFFSET
 By file - None

Outputs: By argument - TIME, SNR_NO, LAT, LON,
 TIDCOR, SVCOR, SCALE,
 MEASMNT, DRAFT

By common - None

By file - None

Calling Routines: GET_DATA

Routines Called: TWO_COMP

Glossary:

REC -	Current VISP Product file record
TIME -	Time in seconds
SNR_NO -	Sensor number
LAT -	Latitude in radians
LON -	Longitude in radians
TIDCOR -	Tide corrector
SVCOR -	Sound velocity corrector
SCALE -	Scaling code
MEASMNT -	Depth measurement
DRAFT -	Draft
LAT_OFFSET	-Latitude offset from survey area table
LON_OFFSET	-Longitude offset from survey area table

3.2.1.1.3.1.2.1 TWO_COMP

Name: Subroutine TWO_COMP

Purpose: To take the two's complement of the input integer. Bit 1 of the input value is set, indicating that it should be a negative number.

Inputs: By argument - IVAL
By common - None
By file - None

Outputs: By argument - IVAL
By common - None
By file - None

Calling Routines: PRUNP

Routines Called: None

Glossary: IVAL - integer value for which two's complement value is returned

3.2.1.1.3.1.3 PRCLS

Name: Subroutine PRCLS

Purpose: To close the current VISP Product file.

Inputs: By argument - None

By common - /UNITS/

By file - None

Outputs: By argument - None

By common - None

By file - None

Calling Routines: GET_DATA

Routines Called: ISCLSE - system call for VISP close

3.2.1.1.4 PLOTINFO

Name: Subroutine PLOTINFO

Purpose: To determine plotting parameters.

Inputs: By argument - None

By common - /COVERAGE/, /SCALE/

By file - None

Outputs: By argument - None

By common - /TRANSFORM/

By file - None

Calling Routines: DE_TR_CO

Routines Called: LEVELS

3.2.1.1.4.1 LEVELS

Name: Subroutine LEVELS

Purpose: To determine the appropriate contour levels given the minimum and maximum depths of a data set.

Inputs: By argument - MINDEPTH, MAXDEPTH
By common - None
By file - None

Outputs: By argument - MINDEPTH, MAXDEPTH,
RANGEINC, NUMLEV
By common - None
By file - None

Calling Routine: PLOTINFO

Routines Called: USR_LEVEL

Glossary: MINDEPTH - minimum contour level
MAXDEPTH - maximum contour level
RANGEINC - depth increment for contour levels
NUMLEV - number of contour levels

3.2.1.1.4.1.1 USR_LEVEL

Name: Subroutine USR_LEVEL

Purpose: To determine min and max depth levels for user-input depth increment.

Inputs: By argument - DINC, DMIN, DMAX
By common - None
By file - None

Outputs: By argument - DMIN, DMAX
By common - None
By file - None

Calling Routine: LEVELS

Routines Called: None

Glossary: DINC - Depth increment entered by user
DMIN - Minimum depth level for contouring
DMAX - Maximum depth level for contouring

3.2.1.1.5 MENU

Name: Subroutine MENU

Purpose: To get plotting option from user and, if option involves contouring, the method to use for contouring (Mosaic or Regular).

Inputs: By argument - IOP, CON1FIRST, CON2FIRST
 By common - None
 By input file - None

Outputs: By argument - IOP_OLD, IOP, NTYPE
 By common - None
 By file - None

Calling Routines: DE_TR_CO

Routines Called: CONTOUR_DEL

Glossary: IOP - option for plotting
 IOP_OLD - previous plotting option
 NTYPE - contouring method where:
 1 = contour entire area as a
 whole
 2 = contour individual grid
 squares
 CON1FIRST - logical set to true if no
 contours have been drawn using
 contouring method 1
 CON2FIRST - logical set to true if no
 contours have been drawn using
 contouring method 2

3.2.1.1.5.1 CONTOUR_DEL

Name: Subroutine CONTOUR_DEL

Purpose: To delete all contour segments for the specified contour method.

Inputs: By argument - MOSAIC
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - None

Calling Routine: MENU

Routines Called: Wand system calls (see reference 1)

Glossary: MOSAIC - logical set to true if contour lines have been drawn 1 grid square at a time

3.2.1.1.6 INIT_PLOT

Name: Subroutine INIT_PLOT

Purpose: To define all plotting subroutines and segments and draw the basemap and the grid.

Inputs: By argument - None

By common - None

By file - None

Outputs: By argument - None

By common - None

By file - None

Calling Routines: DE_TR_CO

Routines Called: BASEMAP

LEGEND

GRID

3.2.1.1.6.1 BASEMAP

Name: Subroutine BASEMAP

Purpose: To label the data summary and draw the outline
of the picture.

Inputs: By argument - None

By common - /WINDOW/,/MAPAREA/,/SUMMARY/

By file - None

Outputs: Picture to Megatek workstation

By argument - None

By common - None

By file - None

Calling Routine: INIT_PLOT

Routines Called: Wand system calls
MEGCOLOR

3.2.1.1.6.1.1 MEGCOLOR

Name: Subroutine MEGCOLOR

Purpose: To define a color.

Inputs: By argument - Kolor
By common - None
By file - None

Outputs: None

Calling Routine: BASEMAP
LEGEND
GRID
DEP_COL
CONRAN
TGRID
MARK
ZOOM_GRD
CONRAN

Routines Called: Wand system calls

Glossary: Kolor - color number (1 - 16)

3.2.1.1.6.2 LEGEND

Name: Subroutine LEGEND

Purpose: To draw and label the legend with the appropriate contour levels.

Inputs: By argument - None
By common - /CONTOUR/,/SCALE/
By file - None

Outputs: Picture on the Megatek workstation
By argument - None
By common - None
By file - None

Calling Routine: INIT_PLOT

Routines Called: Wand system calls

3.2.1.1.6.3 GRID

Name: Subroutine GRID

Purpose: To draw and label the latitude and longitude lines.

Inputs: By argument - None
By common - /CONSTANTS/,/COVERAGE/,
/SCALE/,/WINDOW/

By file - None

Outputs: Picture to Megatek workstation

By argument - None

By common - /TRANSFORM/

By file - None

Calling Routine: INIT_PLOT

Routines Called: Wand system calls

TRANS

MEGCOLOR

3.2.1.1.6.3.1 TRANSFORM

Name: Subroutine TRANS

Purpose: To transform the input coordinates into the
Wand screen coordinates.

Inputs: By argument - MAPX, MAPY
By common - /WINDOW/,/TRANSFORM/
By file - None

Outputs: By argument - WX, WY
By common - None
By file - None

Calling Routine: GRID
DEP_COL
FRSTD
VECTD
GET_SQUARE
MARK
ZOOM_SQR

Routines Called: None

Glossary: MAPX, MAPY - user X & Y coordinates
WX, WY - corresponding screen
coordinates

3.2.1.1.7 CONTOUR_SEG

Name: Subroutine CONTOUR_SEG

Purpose: To turn on or off contour lines previously
drawn by either contouring method: mosaic
or regular.

Inputs: By argument - MOSAIC, IND
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - None

Calling Routines: DE_TR_CO

Routines Called: Wand system calls (see reference 1)

Glossary: MOSAIC - logical set to true if contour
lines have been drawn 1 grid
square at a time

IND -indicator where:

1 = turn on visibility

2 = turn off visibility

3.2.1.1.8 DEP_COL

Name: Subroutine DEP_COL

Purpose: To assign colors to the ship-track depths and
draw the area tracks.

Inputs: By argument - NACCESS, NPT
By common - /SCALE/,/TRANSFORM/,
/WINDOW/,/DATA
By file - None

Outputs: Picture to the Megatek workstation
By argument - None
By common - None
By file - None

Calling Routine: DE_TR_CO

Routines Called: TRANS
MEGCOLOR
Wand system calls

Glossary: NACCESS - number of accession files
NPT - number of data values

3.2.1.1.9 DEP_CON

Name: Subroutine DEP_CON

Purpose: To set up the latitude, longitude and depth arrays that are to be contoured.

Inputs: From keyboard - NSMTH, NRES, NDRAW
By argument - NPT, MOSAIC, CON1FIRST,
CON2FIRST
By common - /DATA/, /CONSTANTS/,
/CONTOUR/, /TRANSFORM/
By file - None

Outputs: Picture to the Megatek workstation
By argument - None
By common - /CONDATA/, /COVERAGE/,
/SQUARE/
By file - None

Calling Routine: DE_TR_CO

Routines Called: VT100
DEPCON25
FILTER
CONRAN

Glossary:

NSMTH - defines amount of filtering
for data to be contoured
1 = minimum smoothing (10
seconds apart)
2 = default smoothing (20
seconds apart)
3 = maximum smoothing (30
seconds apart)

NRES - defines the resolution for
gridding data
1 = low resolution (20 grid
lines max)
2 = default resolution (40 grid
lines max)
3 = high resolution (60 grid
lines max)

NDRAW - 1 = draw all contour lines
(Default)
2 = draw contour lines if at
least 1 data point in area
3 = draw contour lines if at
least 4 data points in area

NPT - no. of data points read from VISP
files

MOSAIC - logical set to true if
contours are to be drawn 1 grid
square at a time

CON1FIRST - logical set to true if no
contours have been drawn
for entire data set

CON2FIRST - logical set to true if no
contours have been drawn 1
grid square at a time

3.2.1.1.9.1 DEPCON25

Name: Subroutine DEPCON25

Purpose: To set up arrays of latitude, longitude, and
depth for contouring input data in 25 grid
squares.

Inputs: By argument - NPT, DIV
By common - /COVERAGE/, /WINDOW/
By file - None

Outputs: Contours of input data drawn as a series of
25 grid squares on a Megatek graphics terminal
By argument - None
By common - /CONDATA/
By file - None

Calling Routine: DEP_CON

Routines Called: VT100
GET_SQUARE
CONRAN

Glossary: NPT - no. of data values for entire area
 DIV - minimum distance apart data values
 must be to be included in data
 arrays to be contoured

3.2.1.1.9.1.1 GET_SQUARE

Name: Subroutine GET_SQUARE

Purpose: To get data for the current grid square for
 contouring and determine the user and screen
 coordinates for this square.

Inputs: By argument - NPT, ICOL, IROW, ISEG, DIV
 By common - /TRANSFORM/
 By file - None

Outputs: By argument - None
 By common -/CONDATA/,/COVERAGE/,/SQRINFO/,
 /SQRWIND/,/SQRTRANS/
 By file - None

Calling Routine: DEPCON25

Routines Called: TRANS
 ADDBORD

Glossary: NPT - no. of data values for entire area
 ICOL - column number for current grid square
 IROW - row number for current grid square

ISEG - plotting segment number for current grid square

DIV - minimum distance apart data points must be in order to be included in data arrays for contouring

3.2.1.1.9.1.1.1 ADDBORD

Name: Subroutine ADDBORD

Purpose: To add all border points to the current grid square for which there is data in the general region inside the grid square.

Inputs: By argument - XLOW, XHIGH, XBORD, XINC,
YLOW, YHIGH, YBORD, YINC

By common - /BORDER/, /CONDATA/, /SCALE/

By file - None

Outputs: By argument - None

By common - /CONDATA/

By file - None

Calling Routines: GET_SQUARE

Routines Called: GETBORD

Glossary: XLOW, XHIGH - Minimum and maximum longitudes
for current grid square

XBORD -	Size of longitude border outside grid square
XINC -	Longitude area covered by current grid square
YLOW,YHIGH -	Minimum and maximum latitudes for current grid square
YBORD -	Size of latitude border outside grid square
YINC -	Latitude area covered by current grid square

3.2.1.1.9.1.1.1.1 GETBORD

Name: Subroutine GETBORD

Purpose: To determine if the current latitude, longitude, and depth are to be included in the data to be contoured for the current grid square.

```

Inputs:          By argument - XLONG, YLAT, DEPTH, NPTS,
                  X1, X2, Y1, Y2, D1, D2

                  By common - /CONDATA/,/SCALE/

                  By file - None

```

```

Outputs:          By argument - None
                  By common - /CONDATA/
                  By file - None

```

Calling Routines: ADDBORD

Routines Called: None

Glossary:	XLONG -	Current longitude in border area
	YLAT -	Current latitude in border area
	DEPTH -	Depth value associated with XLONG and YLAT
	NPTS -	Current no. of data values to be contoured for current grid square
	X1,X2 -	Longitude area in which there must be data within grid square if current data values are to be included
	Y1,Y2 -	Latitude area in which there must be data within grid square if current data values are to be included
	D1,D2 -	Depth range that data must fall within

3.2.1.1.9.2 FILTER

Name: Subroutine FILTER

Purpose: To filter the original data set, based on the minimum distance that points can lie next to another.

Inputs: By argument - DIV

By common - /CONDATA/,/SQUARE/

By file - None

Outputs: By argument - None

By common - /CONDATA/,/SQUARE/

By file - None

Calling Routine: DEP_CON

Routines Called: TGRID

Glossary: DIV - minimum distance apart data values
must be to be included in data
arrays to be contoured

3.2.1.1.9.2.1 TGRID

Name: Subroutine TGRID

Purpose: To define where to draw contour lines based
on the minimum number of data points inside
a 20 x 20 grid.

Inputs: By argument - X, Y

By common - /TRANSFORM/,/SQUARE/

By file - None

Outputs: By argument - None

By common - /SQUARE/

By file - None

Calling Routine: FILTER

Routines Called: MEGCOLOR

Glossary: IPEN - color value to be passed
to MEGCOLOR
ISQUARE - index pointer into the
IGRID array for a specified
latitude and longitude point

3.2.1.1.9.3 CONRAN

Name: Subroutine CONRAN

Purpose: To plot contour lines for sparse or irregular data sets using triangulation. This is the driver for the NCAR contouring software residing on the VAX and HP computers. It has been modified to run on a Harris computer and Megatek workstation. (Note: See Reference 2 for all details associated with the NCAR Package and Note 2 in Section 4.).

Inputs: By argument - MOSAIC
By common - /CONDATA/,/CONTOUR/,
/COVERAGE/,/SQUARE/
By file - None

Outputs: Contour lines drawn on a Megatek graphics terminal

By argument - None

By common - None

By file - None

Calling Routine: DEP_CON
DEPCON25

Routines Called: SQRLEV
CONTNG
CONDET
CONINT
CONLOD
MEGCOLOR
CONDRW

Glossary: MOSAIC - logical set to true if contouring
1 grid square at a time

3.2.1.1.9.3.1 SQRLEV

Name: Subroutine SQRLEV

Purpose: To determine the contour levels for the current grid square if contouring 1 grid square at a time.

Inputs: By argument - None
By common - /CONDATA/,/CONTOUR/
By file - None

Outputs: By argument - CL, NCL, LEV1
 By common - None
 By file - None

Calling Routines: CONRAN

Routines Called: None

Glossary: CL - array of contour levels for
 current grid square
 NCL - number of contour levels for
 current grid square
 LEV1 - Index of first contour level
 for current grid square in
 array of contour levels
 for entire data set

3.2.1.1.10 ZOOM

Name: Subroutine ZOOM

Purpose: To allow the user to zoom in or out on a
 specific contour area.

Inputs: By argument - ZFIRST, NPT, IOP_SAVE,
 MOSAIC
 By common - /WINDOW/
 By file - None

Outputs: Picture to Megatek workstation

By argument - None

By common - None

By file - None

Calling Routine: DE_TR_CO

Routines Called: ZOOM_SEGS

G2DMTX

ZOOM_IN

ZOOM_OUT

Wand systems calls

TOADS (system call)

Glossary: ZFIRST - logical variable set to true
on first call

NPT - number of data values

IOP_SAVE - last option selected before
ZOOM

MOSAIC - logical set to true if
contours were drawn one grid
square at a time

3.2.1.1.10.1 ZOOM_SEGS

Name: Subroutine ZOOM_SEGS

Purpose: To define plotting segments for zooming in
on contours drawn in a selected region.

Inputs: By argument - None

By common - None

By file - None

Outputs: By argument - None

By common - None

By file - None

Calling Routine: ZOOM

Routines Called: Wand system calls

3.2.1.1.10.2 G2DMTX

Name: Subroutine G2DMTX

Purpose: To perform scaling, translation, and rotation
on a plotting segment.

Inputs: By argument - SCLX, SCLY, SCTR, SCTRY,
RCTR, RCTRY, ROTZ, TRX, TRY

By common - None

By file - None

Outputs: By argument - None

By common - None

By file - None

Calling Routine: ZOOM
ZOOM_IN

Routines Called: None

Glossary: SCLX,SCLY - X and Y scaling factors
 ROTZ - rotation angle
 TRX,TRY - X and Y translation factors
 RMX - transformation matrix

3.2.1.1.10.3 ZOOM_IN

Name: Subroutine ZOOM_IN

Purpose: To allow the user to select a grid square to
 enlarge.

Inputs: By argument - NPT, LAST
 By common - /WINDOW/, /COVERAGE/
 By file - None

Outputs: Selected grid square enlarged to fill Megatek
 screen
 By argument - None
 By common - None
 By file - None

Calling Routine: ZOOM

Routines Called: ZOOM_SQR
 ZOOM_DATA
 G2DMTX

Glossary: NPT - no. of data values for entire
 data set
 LAST - last option selected before ZOOM

3.2.1.1.10.3.1 ZOOM_SQR

Name: Subroutine ZOOM_SQR

Purpose: To determine user and screen coordinates and
 segment number for grid square selected by
 user.

Inputs: By argument - IX, IY
 By common - /TRANSFORM/, /SQRINFO/
 By file - None

Outputs: By argument - ISEG
 By common - /COVERAGE/, /SQRWIND/, /SQRTRANS/
 By file - None

Calling Routines: ZOOM_IN

Routines Called: TRANS
 ZOOM_GRD

Glossary: IX,IY - screen coordinates of location
 selected by user for zooming
 ISEG - plotting segment number for
 selected grid square

3.2.1.1.10.3.1.1 ZOOM_GRD

Name: Subroutine ZOOM_GRD

Purpose: To label corners of selected grid square enlarged to the full screen.

Inputs: By argument - None
By common - /COVERAGE/,/WINDOW/,/CONSTANTS/
By file - None

Outputs: Latitudes and longitudes for selected grid square corners displayed at corners of full plotting area.
By argument - None
By common - None
By file - None

Calling Routines: ZOOM_SQR

Routines Called: TRANS3

3.2.1.1.10.3.1.1.1 TRANS3

Name: Subroutine TRANS3

Purpose: To transform input coordinates to screen coordinates when mapping 1 grid square to entire screen.

Inputs: By argument - MAPX, MAPY

By common - /SQRTRANS/,/WINDOW/

By file - None

Outputs: By argument - WX, WY

By common - None

By file - None

Calling Routines: ZOOM_GRD

MARK

Routines Called: None

Glossary: MAPX, MAPY - Input user coordinates

WX, WY - Output screen coordinates

3.2.1.1.10.3.2 ZOOM_DATA

Name: Subroutine ZOOM_DATA

Purpose: To display the data values for a selected grid square enlarged to the full Megatek screen.

Inputs: By argument - NPT

By common - /COVERAGE/,/DATA/

By file - None

Outputs: Data positions for selected grid square marked on Megatek graphics terminal with a "+" in

the color associated with the depth value and depth value written slightly above "+" if location is not too close to previous position

By argument - None

By common - None

By file - None

Calling Routines: ZOOM_IN

Routines Called: MARK

LABEL

Glossary: NPT - no. of data values for entire area

3.2.1.1.10.3.2.1 MARK

Name: Subroutine MARK

Purpose: To mark the current position in the color associated with the current depth value with a "+".

Inputs: By argument - X, Y, Z, NTR

By common - /SCALE/

By file - None

Outputs: Input position marked with a "+" on the Megatek graphics terminal in the color associated with the input depth

By argument - LON, LAT

By common - None

By file - None

Calling Routines: ZOOM_DATA

Routines Called: TRANS
TRANS3
MEGCOLOR

Glossary:

- X,Y - X and Y coordinates of position to be marked
- Z - Depth value at this position
- NTR - Type of transform to be used where:
 - 1 = 1 to 1 mapping
 - 2 = Data for 1 grid square is mapped to full screen
- LON - Screen coordinate for input X coordinate
- LAT - Screen coordinate for input Y coordinate

3.2.1.1.10.3.2.2 LABEL

Name: Subroutine LABEL

Purpose: To label input point on Megatek graphics terminal with input value.

Inputs: By argument - IX, IY, VAL
By common - None

By file - None

Outputs: Input value labeled at input position on the
Megatek graphics terminal

By argument - None

By common - None

By file - None

Calling Routines: ZOOM_DATA

Routines Called: None

Glossary: IX,IY - Screen coordinates of position
to be labeled

VAL - Value to be written to Megatek
graphics terminal at position
IX,IY

3.2.1.1.10.4 ZOOM_OUT

Name: Subroutine ZOOM_OUT

Purpose: To restore the contours drawn before zooming.

Inputs: By argument - MOSAIC, LAST
By common - /SEG/,/SQRWIND/
By file - None

Outputs: By argument - None

By common - None

By file - None

Calling Routine: ZOOM

Routines Called: CONTOUR_SEG

Glossary: MOSAIC - Logical set to true if contours
were previously drawn 1 grid
square at a time.

LAST - Previous option selected before
ZOOM.

3.2.1.1.11 TRK_CROSS

Name: Subroutine TRK_CROSS

Purpose: To determine points of intersection for ship
tracks and calculate interpolated depths at
these crossings.

Inputs: By argument - NPTS
By common - /DATA/,/CONSTANTS/
By file - None

Outputs: By argument - None
By common - /CROSSPTS/
By file - None

Calling Routine: DE_TR_CO

Routines Called: AREA
CROSS
INTERSECT
RMS
MARK
WRT_CROSS

Glossary: NPTS - no. of data values for entire
data set

3.2.1.1.11.1 AREA

Name: Subroutine AREA

Purpose: To define an area to be searched for lines
crossing the input line segment.

Inputs: By argument - X1, Y1, X2, Y2
By common - None
By file - None

Outputs: By argument - XMIN, XMAX, YMIN, YMAX
By common - None
By file - None

Calling Routine: TRK_CROSS

Routines Called: None

Glossary: X1,Y1 - first point of input line segment

X2,Y2 - last point of input line segment
XMIN - minimum longitude for area to be searched
XMAX - maximum longitude for area to be searched
YMIN - minimum latitude for area to be searched
YMAX - maximum latitude for area to be searched

3.2.1.1.11.2 CROSS

Name: Subroutine CROSS

Purpose: To determine if 2 input line segments intersect.

Inputs: By argument - X1, Y1, X2, Y2, X3, Y3, X4, Y4
By common - None
By file - None

Outputs: By function - CROSS
By argument - None
By common - None
By file - None

Calling Routine: TRK_CROSS

Routines Called: CROSSX
CROSSY
INTER

Glossary: X1,Y1 - first point of input line
segment 1
X2,Y2 - last point of input line
segment 1
X3,X3 - first point of input line
segment 2
X4,Y4 - last point of input line
segment 2
CROSS - logical set to true if 2 input
line segments intersect

3.2.1.1.11.2.1 CROSSX

Name: Logical Function CROSSX

Purpose: To determine if input line segment intersects
second line segment parallel to Y axis.

Inputs: By argument - X1, Y1, X2, Y2, X3, Y3, X4, Y4
By common - None
By file - None

Outputs: By function - CROSSX
By argument - None
By common - None
By file - None

Calling Routines: CROSS

Routines Called: None

Glossary: X1,Y1 - first point of input line segment 1
 X2,Y2 - last point of input line segment 1
 X3,Y3 - first point of input line
 segment 2
 X4,Y4 - last point of input line segment 2
 CROSSX - logical set to true if 2 input
 segments intersect

3.2.1.1.11.2.2 CROSSY

Name: Logical Function CROSSY

Purpose: To determine if input line segment intersects
 second line segment parallel to X axis.

Inputs: By argument - X1, Y1, X2, Y2, X3, Y3, X4, Y4
 By common - None
 By file - None

Outputs: By function - CROSSY
 By argument - None
 By common - None
 By file - None

Calling Routines: CROSS

Routines Called: None

Glossary: X1,Y1 - first point of input line segment 1
 X2,Y2 - last point of input line segment 1
 X3,Y3 - first point of input line
 segment 2
 X4,Y4 - last point of input line segment 2
 CROSSY - logical set to true if input
 segments intersect

3.2.1.1.11.2.3 INTER

Name: Logical Funciton INTER

Purpose: To determine if 2 input line segments
 intersect.

Inputs: By argument - X1, Y1, X2, Y2, X3, Y3, X4, Y4
 By common - None
 By file - None

Outputs: By argument - None
 By common - None
 By file - None

Calling Routines: CROSS

Routines Called: None

Glossary: X1,Y1 - first point of input line
 segment 1
 X2,Y2 - last point of input line
 segment 1
 X3,Y3 - first point of input line
 segment 2
 X4,Y4 - last point of input line
 segment 2

3.2.1.1.11.3 INTERSECT

Name: Subroutine INTERSECT

Purpose: To determine the coordinates of the point of
 intersection of 2 input line segments.

Inputs: By argument - X1, Y1, X2, Y2, X3, Y3, X4, Y4
 By common - None
 By file - None

Outputs: By argument - XINT, YINT
 By common - None
 By file - None

Calling Routine: TRK_CROSS

Routines Called: None

Glossary: X1,Y1 - first point of input line
 segment 1

X2,Y2 - last point of input line
segment 1
X3,X3 - first point of input line
segment 2
X4,Y4 - last point of input line
segment 2
XINT - X coordinate of point of
intersection
YINT - Y coordinate of point of
intersection

3.2.1.1.11.4 RMS

Name: Subroutine RMS

Purpose: To calculate the root mean square using linear
interpolation in 2 directions.

Inputs: By argument - X1, Y1, X2, Y2, X3, Y3, X4,
Y4, X, Y, Z1, Z2, Z3, Z4

By common - None

By file - None

Outputs: By argument - Z

By common - None

By file - None

Calling Routine: TRK_CROSS

Routines Called: INTERP

Glossary:	X1,Y1 - first point of input line segment 1 X2,Y2 - last point of input line segment 1 X3,Y3 - first point of input line segment 2 X4,Y4 - last point of input line segment 2 X,Y - coordinates of point of intersection of 2 line segments Z1,Z2 - depth values at X1,Y1 and X2,Y2 Z3,Z4 - depth values at X3,Y3 and X4,Y4 Z - interpolated depth value at point of intersection X,Y
-----------	---

3.2.1.1.11.4.1 INTERP

Name:	Subroutine INTERP
Purpose:	To linearly interpolate between 2 points to determine the X value corresponding to the input Y value.
Inputs:	By argument - Y1, Y2, YVAL, X1, X2 By common - None By file - None
Outputs:	By argument - XVAL By common - None

By file - None

Calling Routines: RMS

Routines Called: None

Glossary:

- X1,Y1 - first point of input line
segment 1
- X2,Y2 - last point of input line
segment 1
- YVAL - Y coordinate of point to be
determined
- XVAL - X coordinate of point calculated
by linear interpolation

3.2.1.1.11.5 WRT_CROSS

Name: Subroutine WRT_CROSS

Purpose: To write to a user-specified file a list of
ship track crossing points and the depths at
these crossing points.

Inputs:

- By argument - LUNIT
- By common - /CROSSPTS/,/CONSTANTS/
- By file - None

Outputs:

- File containing latitudes, longitudes, and
depths of ship track crossing points
- By argument - None

By common - None

By file - None

Calling Routine: TRK_CROSS

Routines Called: None

Glossary: LUNIT - Logical unit number for writing
file of ship track crossing
points

3.2.1.1.12 MEGCLOSE

Name: Subroutine MEGCLOSE

Purpose: To terminate the Wand Graphics package.

Inputs: By argument - None

By common - None

By file - None

Outputs: By argument - None

By common - None

By file - None

Calling Routine: DE_TR_CO

Routines Called: Wand system calls

4.0 NOTES

1) The module GETAC could not be incorporated into this module as a subroutine called by DE_TR_CO due to the DCM limits of the Harris system. Therefore, it was set up as a separate executable module.

2) The NCAR package was modified dramatically to accommodate the Harris and Wand systems. Reference 2 should only serve as an overview of what the package can do on other systems. The lack of compatibility between the NCAR package, as a whole, and the Harris system has severely limited the graphics output.

5.0 REFERENCES

- 1) "Wand User's Guide," Document No. 0252-0024-01, April 1984, Ver. 3.0, Megatek Corporation, San Diego, California.
- 2) "NCAR GKS-Compatible Graphics System," NCAR/TN-267+1A, National Center for Atmospheric Research, Boulder, Colorado, April 1986.

APPENDIX A

COMMON NAME	ARGUMENT(S) PASSED	DEFINITION
/BORDER/	BORDX -	Array of longitudes in border area for current grid square
	BORDY -	Array of latitudes in border area for current grid square
	BORDZ -	Array of associated depths in border area for current grid square
	NBORD -	Number of data values in above arrays
/CONDATA/	XD -	Array of longitudes to be contoured
	YD -	Array of latitudes to be contoured
	ZD -	Array of associated depths
	NPD -	Number of values in above arrays
/CONSTANTS/	PI -	Value of pi -- $4 * \text{ATAN}(1.)$
	DTR -	Factor for converting degrees to radians -- $\text{PI}/180.$
	RTD -	Factor for converting radians to degrees -- $180./\text{PI}$

/CONTOUR/	NCL -	Number of contour levels for data set (max = 15)
	CONLVL -	Contour levels for data set
/COVERAGE/	MINLAT -	Minimum latitude for data set
	MAXLAT -	Maximum latitude for data set
	MINLON -	Minimum longitude for data set
	MAXLON -	Maximum longitude for data set
	STPSZ -	Step size for gridding data
	IGRAD -	Maximum number of rows/columns for gridding data
/CROSSPTS/	XLON -	Array of longitudes of ship track crossing points
	YLAT -	Array of latitudes of ship track crossing points
	DEPS -	Array of interpolated depths at ship track crossing points
	NCROSS -	Number of data values in above arrays

/DATA/	DATA_ARRAY -	Array of latitudes, longitudes, and depths read from VISIP Product files
	REC_ARRAY -	Array containing record numbers for last record in each VISIP Product file read
/MAPAREA/	IXMAPMIN -	Screen coordinate for left side of plotting area
	IXMAPMAX -	Screen coordinate for right side of plotting area
	IYMAPMIN -	Screen coordinate for bottom of plotting area
	IYMAPMAX -	Screen coordinate for top of plotting area
/OFFSET/	LAT_OFFSET -	Base latitude found in Survey Area Table
	LON_OFFSET -	Base longitude found in Survey Area Table
/REGION/	XMIN -	Minimum longitude for area to be searched for line segments intersecting current line segment

	XMAX -	Maximum longitude for area to be searched for line segments intersecting current line segment
	YMIN -	Minimum latitude for area to be searched for line segments intersecting current line segment
	YMAX -	Maximum latitude for area to be searched for line segments intersecting current line segment
/SCALE/	MINDEPTH -	Minimum depth in data set
	MAXDEPTH -	Maximum depth in data set
	RANGEINC -	Depth range for data set
/SEG/	ISEG -	Segment number for current grid square
	NTYPE -	Type of display for enlarging selected grid square where: 1 = contours enlarged 2 = data values enlarged 3 = contours and data values enlarged

/SQRINFO/	XINC -	Longitude range for current grid square
	YINC -	Latitude range for current grid square
	ZMIN -	Minimum depth for current grid square
	ZMAX -	Maximum depth for current grid square
/SQRTRANS/	SXDIFF -	Longitude range for current grid square
	SYDIFF -	Latitude range for current grid square
	SXSTART -	Minimum longitude for current grid square
	SYSTART -	Minimum latitude for current grid square
/SQRWIND/	SXMIN -	Screen coordinate for left side of grid square
	SYMAX -	Screen coordinate for right side of grid square
	SYMIN -	Screen coordinate for bottom of grid square

	SYMAX -	Screen coordinate for top of grid square
/SQUARE/	IPEN -	Color value for contour lines
	ISQUARE -	Number of the current square in a 20 x 20 grid of squares
	IGRID -	Array containing the number of data points in each of the squares in a 20 x 20 grid
/SUMMARY/	PSHEET_NO -	Primary sheet number
	DATA_SET_NO -	Data set number
	PLATFORM -	Platform
	ARCHIVE_NO -	Archive number
	ARCHIVE_CODE -	Archive code
	SSHEET_ID -	Secondary sheet id
	SHIP_NAME -	Ship name
	LOCATION -	Survey location
	DATA_AQ_SYS -	Data acquisition system (RTS)

/TRANSFORM/	XDIFF -	Longitude range for data set
	YDIFF -	Latitude range for data set
	XSTART -	Minimum longitude for data set
	YSTART -	Minimum latitude for data set
/UNITS/	PROLFN -	Logical unit number for reading VISP Product files
	PDN -	Physical device number
	IDLUN -	Logical unit number for addressing the terminal screen
/WINDOW/	XMIN -	Screen coordinate for left side of grid
	XMAX -	Screen coordinate for right side of grid
	YMIN -	Screen coordinate for bottom of grid
	YMAX -	Screen coordinate for top of grid

SECTION II

PART A

SOFTWARE USER'S MANUAL
FOR
TIDE EPOCH EVALUATION AND
ANALYSIS MODULE

TABLE OF CONTENTS

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1.0 GENERAL

1.1 Purpose of the User's Manual

The objective of the User's Manual, for the Tide Epoch Evaluation and Analysis program, is to provide the necessary training, in order to run the program and to provide a reference guide for daily users of the software.

1.2 Project References

The Tide Epoch Evaluation and Analysis module is being developed for the Hydrographic Upgrade to OCEANIS (HUGO) system at NAVOCEANO to provide the hydrographers or users of the system the ability to display specific data retrieved from the Oracle DBMS for post-processing. Development of the TEEA module was sponsored by NORDA Code 352 for NAVOCEANO. Documents which contain background information and model documentation for the Tide Epoch program is given in the following list:

1. "Software Programers Maintenance Manual for Tide Epoch Evaluation and Analysis Module," Stephen B. Hartley and Shirley Baker, Planning Systems, Inc., Section II, Part B, 1989.
2. "Wand User's Guide," Document No. 0252-0024-01, April 1984, Ver. 3.0, Megatek Corp., San Diego, California.
3. "Summer Employment Accomplishments," Samuel F. Clark, Naval Ocean Research and Development Activity, Unpublished, August 1988.
4. "A Data Management Scheme for Single-Beam Hydrographic Surveying," Mapp, G.R. and H.J. Byrnes, Naval Ocean Research and Development Activity, NORDA Technical Note 397, August 1988.

1.3 List Of Acronyms

HUGO	-	Hydrographic Upgrade to OCEANIS
SUM	-	Software User's Manual
JCL	-	Job Control Language
MACRO	-	Is a JCL executable under the Harris system
DBMS	-	Data Base Management System
HIHAN	-	Hydrographic Information Handling Project
TEEA	-	Tide Epoch Evaluation and Analysis Program
WS_MACRO	-	Workstation Macro

2.0 SYSTEM SUMMARY

2.1 System Application

The Tide Epoch Evaluation and Analysis software, as a module for HUGO, provides the hydrographer with a spatial view of observed tides, covering a 30 day period, for data evaluation. The user has the ability to edit anomalies for the 30 day tide observation set (although this has no affect on the tide tables already in the database). Once an acceptable tide observation set has been obtained, tidal constituents are computed and are inserted into the Oracle tables TID_STA, TID_ZON, and TID_CONST.

2.2 Security and Privacy

The source code for the HUGO system is entirely unclassified. The source code is located on the unclassified Harris 700 minicomputer at NAVOCEANO.

2.3 System Configuration

The software is developed on a Harris 700 minicomputer/Megatek graphics engine located at the NAVAL Oceanographic Office, Bay St. Louis, MS. The bulk of the source code is written in Fortran, except for the "WS_Macro" and the Oracle data base and Wand graphic calls. The Oracle data base calls are converted into Fortran code by precompiling with the Pro-Fortran compiler.

2.4 Performance

The software is designed to display and edit a spatial view of observed tides, covering a 30 day period. The time required to compute the tidal constituents is relatively small compared with the time to retrieve data from the Oracle DBMS and fill the work array. Also, heavy usage of the Harris computer will slow down the response time.

2.5 Data Files

There are two types of files used in TEEA. The first is the Oracle data base file. This file is accessed by the Oracle command "EXCL SQL". The TEEA accesses four Oracle tables. These four tables along with the attributes in them is listed in table 2.5.1. The second type of file used is a simple, sequential Fortran file named "SGA". The SGA file contains tidal harmonics, selected tidal heights and astronomical derivations and relationships (see tables 3.1 - 3.4).

<u>Oracle Table</u>	<u>Attributes</u>
TID_COR	Archive code Tide zone Begin time Tide corrector
TID_STA	Archive code Tide station Year Datum Time Meridian Latitude Longitude
TID_CONST	Archive code Tide station Constituent name Phase Ampltiude
TID_ZON	Archive code Tide zone

Table 2.5.1 Contents of the Oracle Tables.

3.0 TECHNICAL OPERATION

3.1 Initiation Procedures

To run the software on the Harris/Megatek system, simply type in the disk area and areaname. This is accomplished with the command:

```
=>0352GRAP*HIHAN  
and press the [RETURN] key.
```

3.2 Inputs

The software will prompt the user to enter an option. The following table summarizes the options available at this time. All of these responses are entered from the keyboard.

ENTER THE WORKSTATION PDN (50, 60, or 70)

(Note: This question will only appear if the user is not located at one of the Megatek Workstations).

WELCOME TO THE HUGO INTERACTIVE GRAPHICS SYSTEM

1. NAV AND DEPTH EDITOR
2. TIDE EPOCH ANALYSIS
3. DEPTH-TRACK/CONTOUR PLOT
- 99 EXIT

ENTER OPTION

(Note: Since this "SUM" only applies to option two, the following inputs will only pertain to this choice).

If the user chooses option 99, the HIHAN executable terminates. When option 2 is chosen TEEA accesses the Oracle DBMS. The following example is a session of the tides program and editor.

```

    Successful login to Oracle
5    Enter the archive code (01-99) >
    > 2
    Enter the tide zone # (01-99) >
    > 2
    Enter the Julian day beginning (001-365)
        the tide file >
    > 1
    Enter year (2 digits) >
    > 88
    Archive Code = 2
    Tide Zone = 2
    Day = 1
    Year = 1988
    Are the entries correct ? Y/N >
> Y [otherwise return to 5]
    Retrieving Tide Correctors, takes between 5 and 10
    minutes, so take a break

```

Note: At this point, the Megatek terminal displays the Tide Corrector Sheet in multicolor with contour plot (see Figure 1).

```

10 Do you wish to edit the Tide Corrector Sheet? Y/N?
> Y [N will send the program to compute the select heights]
    Enter Day (1-30) to Edit
> 1
    Enter Hour Range to change a tide corrector value
    xx.x xx.x
> 00.5 03.0
    Enter type of tide corrector change >
    (A)dd, (S)ubtract, (M)ultiply, (R)eplace
> R
    Enter value of tide corrector change >
> - 0.6

Day = 1
Hour Range = 0.5 to 3.0
Tide Corrector = - 0.6
Mode = R

    Are these values correct? Y/N >
> Y [N would prompt the user to re-enter the day, etc.
    without committing these changes]
    Is further editing needed? Y/N >
> N [Y would prompt the user to enter additional edits]
    Graphing ...

```

Note: At this point, the Megatek terminal would redisplay the edited version of the Tide Corrector Sheet in multicolor with contour plot (see Figure 2).

```
Do you wish to continue editing? Y/N
> N [Y would branch back to 10]
Do you wish to commit all these changes? Y/N
> N [Y keeps edited version of tide correctors current and
      sends these values for computation of the select
      heights]
Wait ...
Unrevised Tide Correctors Restored
Graphing ...
```

The program then computes the select heights using either the original or edited version of the tide correctors and overlays the select heights on the tide corrector sheet (see Figure 3). The constituent analysis and archival is then performed.

Note: An out of range value on any of the above prompts will return the user to the same prompt. At this point, the program logs onto Oracle to insert the tidal constituents and location into the Oracle data base.

```
Successful Login to Oracle
Initiating Oracle inserts
Enter Tide Station >
> TEST
Enter Datum (-10.0 - +10.0) >
> 5.0
Enter Time Meridian (-12 - +12) >
> 6
Enter latitude (DDDMM) >
> 343
Enter Longitude (DDDMM) >
> 88
```

```
Tide Station = TEST
Datum = 5.0000
Time Meridian = 6
Latitude = 343
Longitude = 81
```

Are these values correct? Y/N

> Y

Record inserted into TID_STA.

30 Records inserted into TID_CONST.

Record inserted into TID_ZON.

3.3 Outputs

The outputs from the HIHAN TEEA option are in graphic and tabular forms. The tabular forms are listed in tables 3.1 - 3.4. Print outs of the graphics can be accomplished by pressing the start button on the SEIKO color printer. Figures 1 - 2 shows the graphic outputs available for the TEEA.

#	Const.	E(#)	F(#)
1	J1	311.85	1.164
2	K1	24.15	1.112
3	K2	228.39	1.317
4	L2	229.00	1.005
5	M1	114.76	1.940
6	M2	99.36	0.963
7	M3	329.05	0.945
8	M4	198.73	0.928
9	N2	171.88	0.963
10	2N2	244.40	0.963
11	O1	75.00	1.181
12	P1	336.32	1.000
13	Q1	147.51	1.181

PRESS RETURN TO CONTINUE ...

>

.
.
.

25 0.00 0.000

Writing to File: ARGUMENT.

Table 3.1.

SEMI-GRAPHIC ANALYSIS OF 30 DAYS TIDES

Sections 1. Plotting Sheet and Section 2, HW & LW Heights are manually completed and the data inputted to this program.

Central Time/Date of Analysis

0: 0 1/15/1988

ASTRONOMICAL DERIVATIONS AND RELATIONSHIPS

No.	Constit.	Eo + u	f	w	f .W
1	J1	311.9	1.164	0.0	1.000
2	K1	24.1	1.112	-10.1	1.348
3	K2	228.4	1.317	0.0	1.000
4	L2	229.0	1.005	-8.9	1.201
5	M1	114.8	1.940	0.0	1.000
6	M2	99.4	0.963	0.0	1.000
7	M3	329.0	0.945	0.0	1.000
8	M4	198.7	0.928	0.0	0.928
9	N2	171.9	0.963	-6.8	1.099
10	2N2	244.4	0.963	0.0	1.000
11	O1	75.0	1.181	0.0	1.000
12	P1	336.3	1.000	0.0	1.000
13	Q1	147.5	1.181	0.0	1.000
14	S2	0.0	1.000	-19.7	0.864
15	T2	11.0	1.000	11.0	1.000
16	LAMB	252.7	0.963	0.0	1.000
17	MU2	198.6	0.963	0.0	1.000
18	NU2	126.1	0.963	0.0	1.000
19	MK4	327.8	1.269	0.0	1.000
20	MS4	99.4	0.963	-19.7	0.832
21	MF	129.4	1.454	0.0	1.000
22	MSF	260.8	0.963	0.0	1.000
23	MM	287.5	0.870	0.0	1.000
24	MO3	174.4	0.000	0.0	1.137
25	MK3	123.5	0.000	-10.1	1.298
26	MN4	271.2	1.000	-6.8	0.949
27	SN4	171.9	1.000	-26.6	0.949
28	2MN6	370.6	1.000	-6.8	1.019
29	M6	298.1	1.000	0.0	0.893
30	2MS6	198.7	1.000	-19.7	0.801

Table 3.2.

Tide Station = TEST
 Datum = 5.00000E-03
 Time Meridian = 6
 Latitude = 343
 Longitude = 81

SELECTED HEIGHTS

	A	B	C	D	E	F	G	H
a	-0.60	-0.58	-0.56	-0.53	-0.53	-0.72	-0.70	-0.50
b	-0.71	-0.70	-0.60	-0.48	-0.47	-0.61	-0.77	-0.47
c	-0.69	-0.74	-0.69	-0.58	-0.39	-0.53	-0.83	-0.57
d	-0.55	-0.69	-0.83	-0.77	-0.47	-0.38	-0.84	-0.78
e	-0.48	-0.59	-0.91	-0.97	-0.62	-0.29	-0.72	-1.04
f	-0.39	-0.48	-0.86	-1.01	-0.87	-0.36	-0.47	-1.17
g	-0.40	-0.34	-0.70	-0.89	-0.98	-0.52	-0.25	-1.01
h	-0.40	-0.31	-0.43	-0.52	-0.90	-0.58	0.00	-0.62
i	-0.48	-0.30	-0.09	-0.10	-0.59	-0.59	0.08	-0.06
j	-0.46	-0.36	0.11	0.20	-0.19	-0.42	0.10	0.33
k	-0.39	-0.32	0.14	0.31	0.12	-0.30	-0.04	0.51
l	-0.31	-0.31	0.03	0.21	0.20	-0.14	-0.20	0.32
m	-0.22	-0.30	-0.12	-0.10	0.17	-0.13	-0.33	0.00
n	-0.24	-0.24	-0.35	-0.41	-0.18	-0.16	-0.45	-0.35
o	-0.30	-0.35	-0.49	-0.57	-0.45	-0.38	-0.48	-0.57
p	-0.42	-0.40	-0.58	-0.61	-0.58	-0.59	-0.58	-0.64
SUM	-7.05	-7.03	-6.94	-6.81	-6.74	-6.71	-6.47	-6.63
1/2 SUM	-3.52	-3.52	-3.47	-3.41	-3.37	-3.36	-3.24	-3.31
DELTA	0.001	0.000	0.002	0.000	0.009	0.013	0.001	0.005
SQUARED								

Square Root of Sum of DELTA SQUARED 0.180

MEAN LEVELS

HALF TIDE - LEVEL, A₀ = -0.42
 ADD TIDAL BIAS, C = 0.01

HALF TIDE - LEVEL, S₀ = -0.43
 GAGE CHART DATUM, D = 0.01

TIDAL DATUM, Z₀ = -0.43
 SEASONAL CORR., S.C = 0.00

TIDAL DATUM, Z₀₀ = -0.44

Table 3.3.

SUMMARY OF RESULTS

No.	Constituent	Amplitude	Phase
1	J1	0.036	298.8
2	K1	0.024	136.3
3	K2	0.021	9.9
4	L2	0.039	37.5
5	M1	0.170	186.6
6	M2	0.130	213.7
7	M3	0.003	358.1
8	M4	0.004	279.1
9	N2	0.045	275.2
10	2N2	0.006	336.8
11	O1	0.031	235.5
12	P1	0.008	136.3
13	Q1	0.134	285.4
14	S2	0.077	9.9
15	T2	0.000	0.0
16	LAMB	0.000	0.0
17	MU2	0.174	337.9
18	NU2	0.000	0.0
19	MK4	0.000	0.0
20	MS4	0.007	98.5
21	MF	0.000	0.0
22	MSF	0.008	164.2
23	MM	0.016	18.2
24	MO3	0.004	118.1
25	MK3	0.003	358.8
26	MN4	0.008	345.3
27	SN4	0.004	315.3
28	2MN6	0.003	173.8
29	M6	0.002	211.0
30	2MS6	0.005	189.7

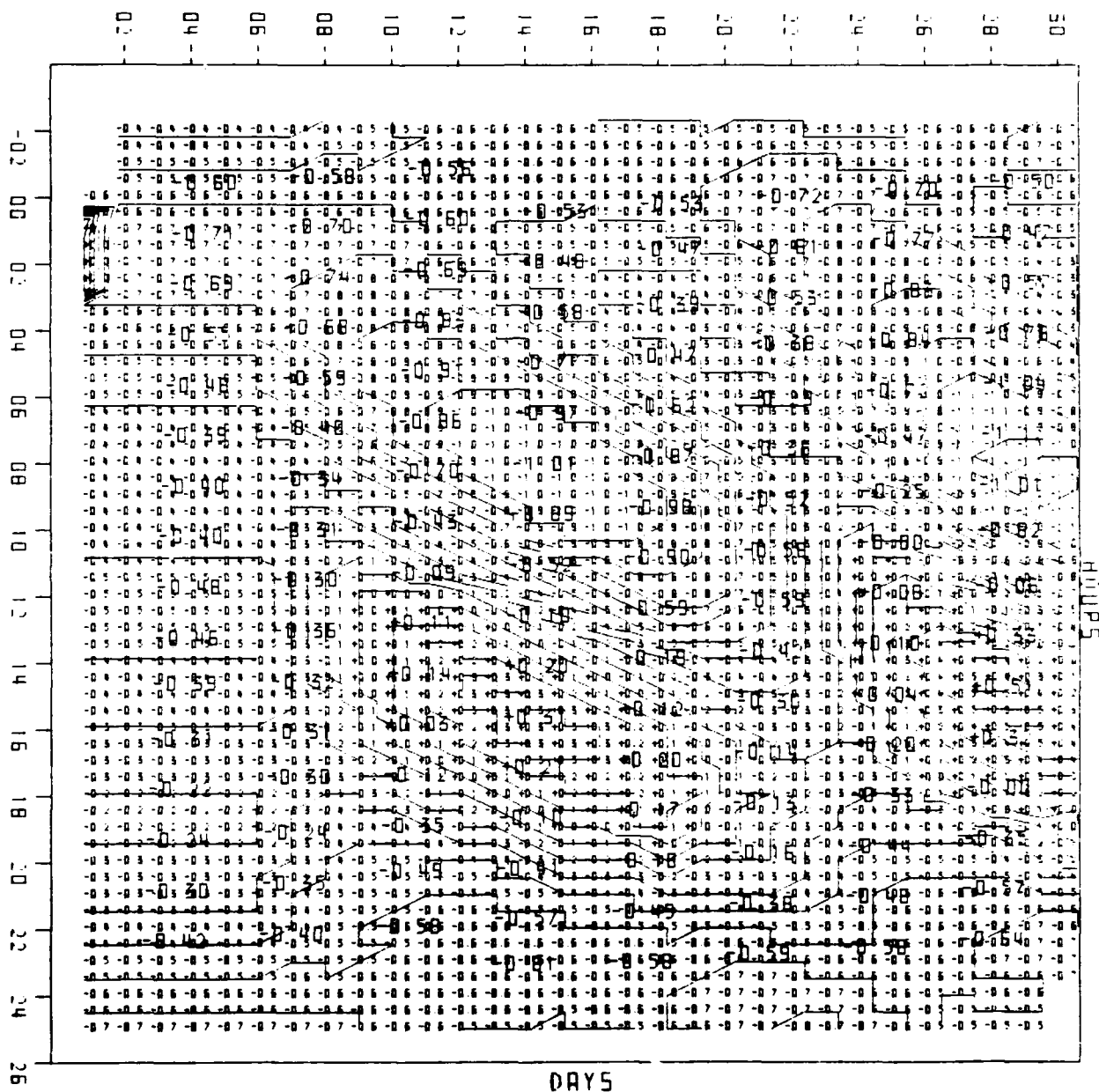
SHALLOW WATER CORRECTIONS

For use with Admiralty Method of Tidal Prediction

Shallow Water	Amplitude	Phase
F4:	0.364	224.2
F6:	0.681	131.2

Table 3.4.

Figure 2. Display of the Select Heights.



SECTION II

PART B

SOFTWARE PROGRAMMER'S MAINTENANCE MANUAL

FOR

TIDE EPOCH EVALUATION AND ANALYSIS MODULE

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APPENDIX B

Tide Source Code	
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TIDE EPOCH EVALUATION and ANALYSIS
Programmer's Maintenance Manual (Fortran/JCL)

1.0 GENERAL DESCRIPTION

1.1 Purpose

The purpose of this Maintenance Manual (MM) is to provide maintenance programmer personnel with the information necessary to effectively maintain and modify the Tide Epoch Evaluation and Analysis module. Some familiarity with the Harris 700 system and the Fortran programming language is assumed.

1.2 Project References

The module is being developed for the HUGO system at NAVOCEANO, under the sponsorship of NORDA, Code 352, to provide the hydrographer the ability to display specific data for post-processing. The NORDA technical point of contact is Mr. H.J. Brynes, Ext. 4773.

1.3 List of Acronyms

HUGO	-	Hydrographic Upgrade to Oceanis
MM	-	Maintenance Manual
OPT	-	User Input Option
WS	-	Workstation
TNO	-	Terminal Number
PDN	-	Physical Device Number
JCL	-	Job Control Language
Macro	-	Is a JCL Executable under the Harris System
DBMS	-	Data Base Management System
HIHAN	-	Hydrographic Information Handling Project
TEEA	-	Tide Epoch Evaluation Analysis
WS_MACRO	-	Workstation Macro

2.0 SYSTEM DESCRIPTION

2.1 System Application

The overall purpose of the HIHAN project is to provide the hydrographer the ability to display/edit soundings or tide heights. The specific purpose of the TEEA module, is to allow the hydrographer to edit tide heights and to produce tidal constituents for insertion into the Oracle data base.

2.2 Security and Privacy

The source code for this function is entirely unclassified. The source code is located on the unclassified Harris 700 computer at NAVOCEANO.

2.3 General Description

The HIHAN executable located under the system qualifier (352GRAP), is the driver for the HIHAN functions. It provides interactive execution of executable modules, based on the user's input.

The options (#OPT) provided are:

- 1 - NAV and DEPTH EDITOR
- 2 - TIDE EPOCH ANALYSIS
- 3 - DEPTH-TRACK/CONTOUR PLOT
- 99 - EXIT

Option 1 - initiates processing for the NAV/DEPTH EDITOR executable. (Note: This executable is found under the system qualifier "352DEPE").

Option 2 - initiates processing for the TIDE EPOCH EVALUATION and ANALYSIS executable (TIDE:X). (Note: This executable is found under the system qualifier "352TID3").

Option 3 - initiates processing for the DEPTH-TRACK/CONTOUR executable. (Note: This executable is found under the system qualifier "0352GRAP").

Option 99 - terminates the HIHAN function.

2.3.1 Diagram

Diagram 2.3.1 is a visual presentation of the relationship between the HIHAN executable and the WS_Macro commands and the other executable modules.

This Maintenance Manual will only include program description and source code for the WS_MACRO HIHAN, and TIDE:X executables. Diagram 2.3.2 is a visual presentation of the relationship between the main program (TIDPLT) and its subroutines.

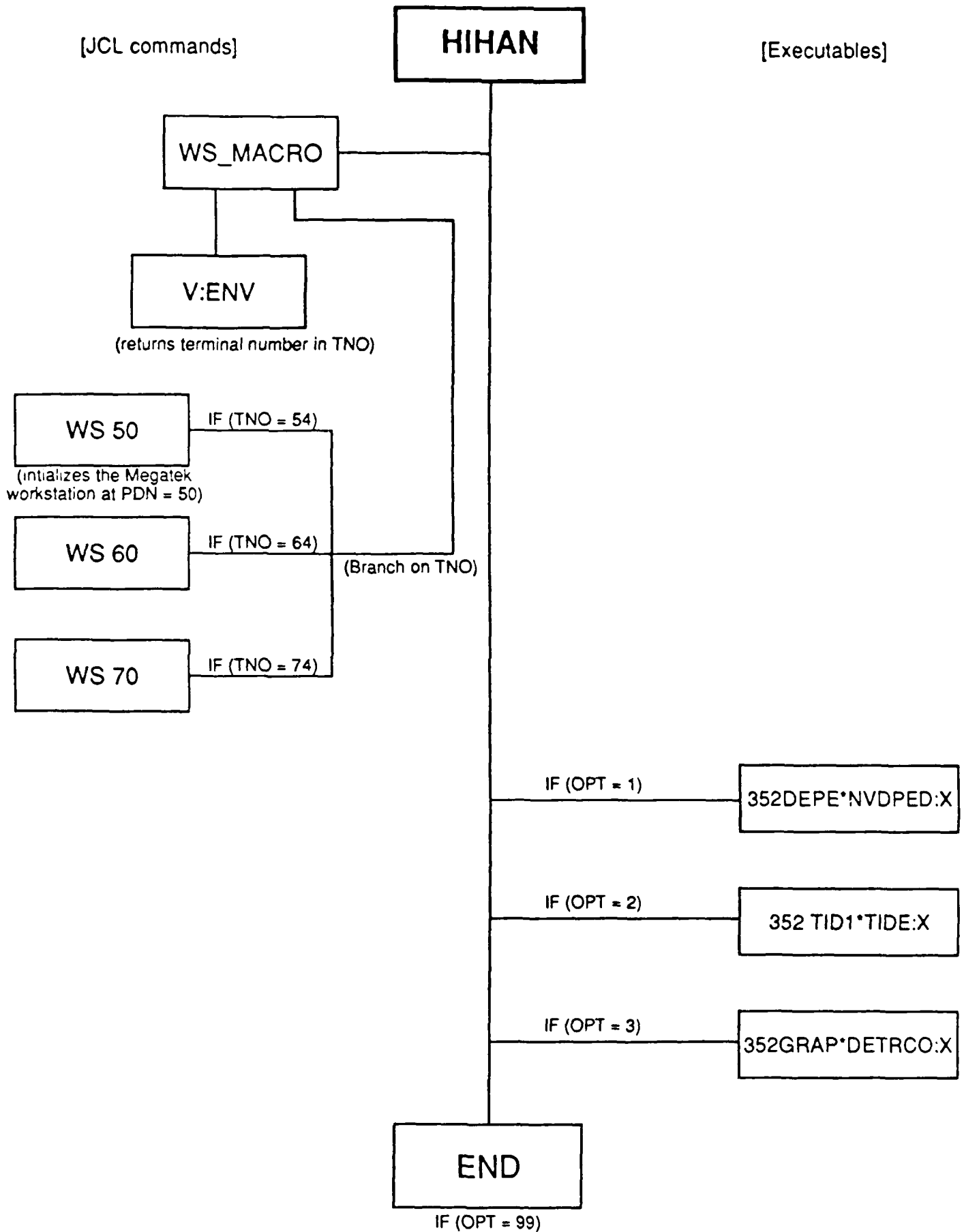


Diagram 2.3.1 Diagrammatic Structure of the HIHAN Executable.

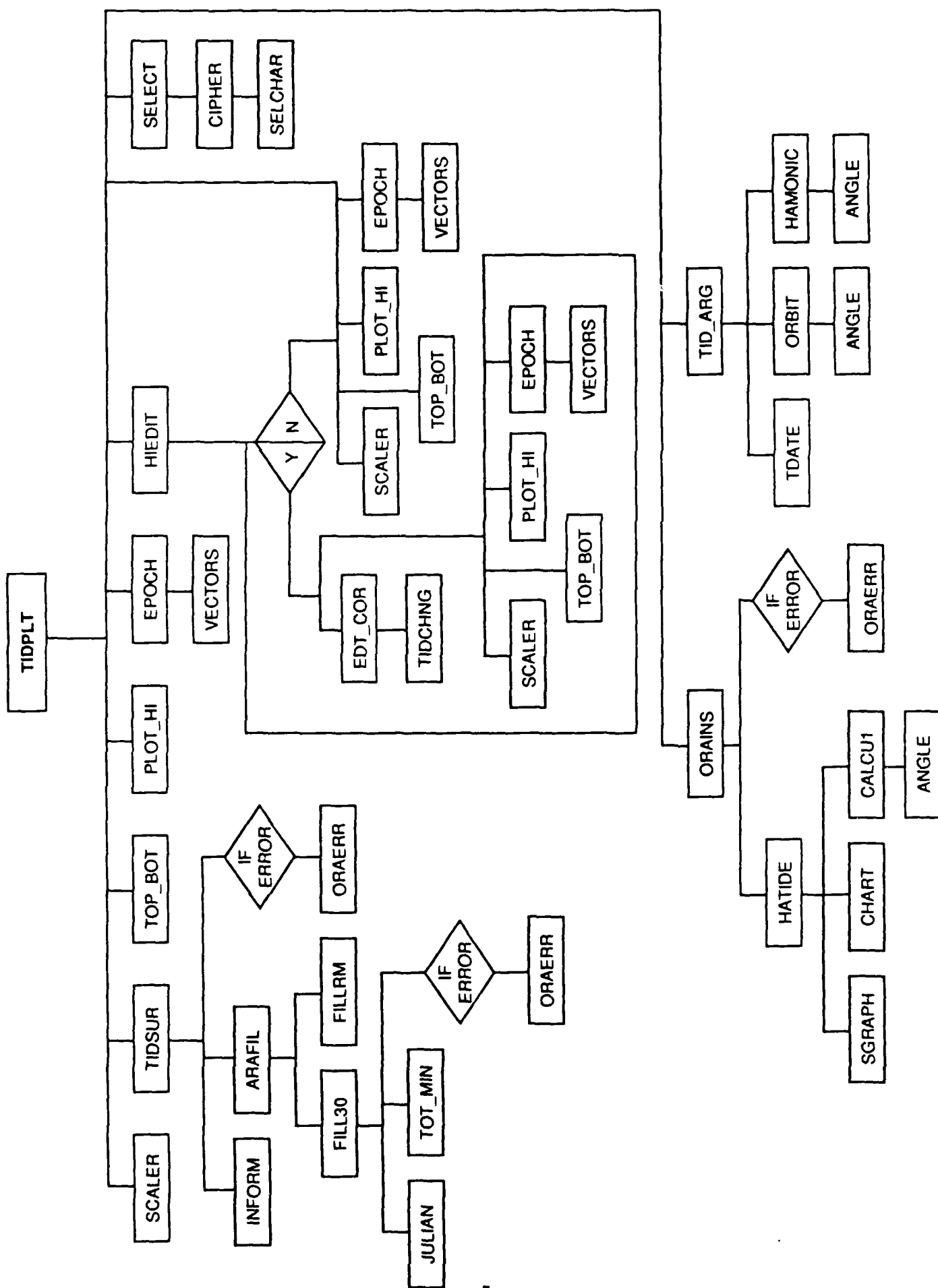


Diagram 2.3.2 Diagrammatic Structure of the Tide Epoch Evaluation and Analysis Program

3.0 PROGRAM DESCRIPTION

3.1 HIHAN

The main purpose of the HIHAN executable is to initialize a Megatek workstation for graphics output and to branch to one of the menu's executables (refer to diagram 2.3.1)

Only the TEEA executable will be discussed in more detail in the following sections. When control returns back to the executable, after the execution of an option, HIHAN prompts the user for another execution or terminates.

3.2 Execution Options

This section details the function and description of each subroutine in the TEEA executable.

3.2.1 TIDE EPOCH EVALUATION and ANALYSIS

The function of the TEEA option is to display a spatial view of observed tides, covering a thirty day period, for data evaluation.

3.2.1.1 TIDPLT

Name: TIDPLT

Purpose: TIDPLT is the main driver for the TEEA module. It "initializes" the Wand graphics package and calls the main subroutines that allow the user to display, edit and insert data.

Inputs: By argument - None
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - None

Calling Routine: HIHAN

Routines Called: Wand system calls

SCALER

TIDSUR

TOP_BOT

PLOT_HI

EPOCH

HIEDIT

SELECT

TID_ARG

ORAINS

Glossary:

EDIT - logical value, relating to
editing the tide correctors

IARCOD - archive code

IZONE - tide zone

IYEAR - year

IDAY - day

HI_RA - an array of 30 day tide
correctors

SELEKT - an array of selected heights

3.2.1.2 SCALER

Name:

Subroutine SCALER

Purpose:

To draw and scale an X-Y coordinate
system on the Megatek screen at the
workstation level.

Inputs:

By argument - None

By common - None

By file - None

Outputs: Picture to the Megatek screen
 By argument - None
 By common - None
 By file - None

Calling Routines: TIDPLT, HIEDIT

Routines Called: Wand system calls (See reference 1 for
 specific descriptions of Wand calls)

3.2.1.3 TIDSUR

Name: Subroutine TIDSUR

Purpose: To login to the Oracle DBMS and fill
 the tide corrector array with dummy
 values.

Inputs: By argument - None
 By common - None
 By file - None

Outputs: By argument - None
 By common - None
 By file - None

Calling Routine: TIDPLT

Routines Called: INFORM
 ARAFIL
 ORACLE commands
 VT100

Glossary: UID - user id into the Oracle DBMS
 PWD - password id into Oracle

3.2.1.4 INFORM

Name: Subroutine INFORM

Purpose: Queries the operator for input parameters for retrieving data out of the Oracle DBMS.

Inputs: IARCOD, IZONE, IDAY, IYEAR, ANS
By argument - None
By common - None
By file - None

Outputs: By argument - IARCOD, IZONE, IDAY, IYEAR
By common - None
By file - None

Calling Routines: TIDSUR

Routines Called: VT100

Glossary: ANS - variable defining if inputs are correct

3.2.1.5 ARAFIL

Name: ARAFIL

Purpose: To fill matrix with tide heights at half hour intervals for next 30 days.

Inputs: By argument - HI_RA, IARCOD, IZONE, IDAY, IYEAR
By common - None
By input file - None

Outputs: By argument - HI_RA, ERR_F
 By common - None
 By file - None

Calling Routines: TIDSUR

Routines Called: FILL30
 FILLRM

Glossary: ERR_F - is a error flag indicating
 there was a problem retrieving
 data from the ORACLE DBMS.

3.2.1.6 FILL30

Name: Subroutine FILL30

Purpose: To retrieve thirty days of tide correctors
 at thirty minute intervals from the Oracle
 DBMS.

Inputs: By argument - HI_RA, IARCOD, IZONE,
 IDAY, IYEAR
 By common - None
 By file - None

Outputs: By argument - HI_RA, ERR_F
 By common - None
 By file - None

Calling Routines: ARAFIL

Routines Called: JULIAN
 TOT_MIN
 ORACLE commands

Glossary: DAYCTR - is days past starting day
TIMCTR - is minutes past starting day
END_F - logical variable defining
the end of data
TID_COR - tide corrector

3.2.1.7 JULIAN

Name: Subroutine JULIAN

Purpose: To convert the date entered into julian date.
The date is computed given year, day of year
for dates after 1959 (reference date: Jan.
1, 1960 = 2,436,935).

Inputs: By argument - IYEAR, IDAY
By common - None
By file - None

Outputs: By argument - JULIAN
By common - None
By file - None

Calling Routine: FILL30

Routines Called: None

3.2.1.8 TOT_MIN

Name: Subroutine TOT_MIN

Purpose: To calculate the total minutes from past iday
(initial day).

Inputs: By argument - BEGIN_TIM, IDAY

By common - None

By file - None

Outputs: By argument - JDAY, TOTMIN
By common - None
By file - None

Calling Routine: FILL30

Routines Called: None

Glossary: IDAY - julian day
CJDAY - character representation of
the beginning julian time
JDAY - integer representation of CJDAY
CTOTSEC - character representation of
the beginning seconds
TOTSEC - integer representation of
CTOTSEC
TOTMIN - integer representation of the
total minutes

3.2.1.9 FILLRM

Name: Subroutine FILLRM

Purpose: To fill remainder of height array.
Fills the array for two hours of the
previous day and one hour of the next
day.

Inputs: By argument - HI_RA
By common - None
By file - None

Outputs: By argument - HI_RA
 By common - None
 By file - None

Calling Routine: ARAFIL

Routines Called: None

3.2.1.10 TOP_BOT

Name: Subroutine TOP_BOT

Purpose: To find the maximum and minimum values of the
 HI_RA array and determine the range of the
 colors for the plot.

Inputs: By argument - HI_RA, FIRST
 By common - None
 By file - None

Outputs: By argument - TOP, RANGE
 By common - None
 By file - HI_RA

Calling Routines: TIDPLT

Routines Called: None

Glossary: TOP - maximum value in the HI_RRA array

BOT - minimum value in the HI_RA array

RANGE - difference between the TOP and BOT
 divided by fifteen. Fifteen was

chosen, because that is the maximum number of colors that the MEGATEK can display.

3.2.1.11 PLOT_HI

Name: Subroutine PLOT_HI

Purpose: To plot out the values of HI_RA, with the correct color assigned to it.

Inputs: By argument - HI_RA, TOP, RANGE, EDIT
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - None

Calling Routines: TIDPLT, HIEDIT

Routines Called: Wand graphic calls

Glossary: TIDE - Character representation of the tide corrector to be plotted on the Megatek screen

3.2.1.12 EPOCH

Name: Subroutine EPOCH

Purpose: To generate a crude contour surface for a thirty day tide height observation. The

contour technique is fashioned after Watson's triangular technique but with predetermined subdivided triangles.

Inputs: By argument - HI_RA
 By common - None
 By file - None

Outputs: By argument - None
 By common - None
 By file - None

Calling Routines: TIDPLT, HIEDIT

Routines Called: VECTORS
 Wand graphic calls

3.2.1.13 VECTORS

Name: Subroutine VECTORS

Purpose: To generate a plot vector on the
 Megatek screen, through a triangle
 relative to a contour value.

Inputs: By argument - CONT, A, B, C, A1, A2,
 B1, B2, C1, C2
 By common - None
 By file - None

Outputs: By argument - None
 By common - None
 By file - None

Calling Routines: EPOCH

Routines Called: Wand graphic calls

3.2.1.14 HIEDIT

Name: Subroutine HIEDIT

Purpose: To prompt the user to edit the tide corrector sheet or continue to compute the select heights.

Inputs: By argument - HI_RA, TDP, RANGE, EDIT
By common - None
By file - None

Outputs: By argument - HI_RA, EDIT
By common - None
By file - None

Calling Routine: TIDPLT

Routines Called: EDT_COR
TIDCHNG
SCALER
PLOT_HI
EPOCH
VECTORS
VT100
TOP_BOT

3.2.1.15 EDT_COR

Name: Subroutine EDT_COR

Purpose: To prompt the user for tide corrector parameter.

Inputs: By argument - HI_RA
 By common - None
 By file - None

Outputs: By argument - HI_RA
 By common - None
 By file - None

Calling Routine: HIEDIT

Routines Called: TIDCHNG
 VT100

3.2.1.16 TID_CHNG

Name: Subroutine TID_CHNG

Purpose: To change the tide correctors either by
 adding, subtracting, replacing or multiplying
 the values in the array.

Inputs: By argument - HI_RA, MAP, DAY, TYPE,
 VALUE
 By common - None
 By file - None

Outputs: By argument - HI_RA
 By common - None
 By file - None

Calling Routine: EDT_COR

Routines Called: None

3.2.1.17 SELECT

Name: Subroutine SELECT

Purpose: To compute selected heights through the technique described in N.P. 122(1), the Admiralty method of long period observation for harmonic tidal analysis.

Inputs: By argument - HI_RA
By common - None
By file - None

Outputs: By argument - SELEKT
By common - None
By file - None

Calling Routine: TIDPLT

Routines Called: VT100
CIPHER

3.2.1.18 CIPHER

Name: Subroutine CIPHER

Purpose: Determines the position on the Megatek on which to write the Select Heights.

Inputs: By argument - SELEKT
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - None

Calling Routine: SELECT

Routines Called: SELCHAR

3.2.1.19 SELCHAR

Name: Subroutine SELCHAR

Purpose: To convert the select height value to character and write the value out to the Megatek screen.

Inputs: By argument - VAL, IX, IY
By common - None
By file - None

Outputs: By argument - None
By common - None
By file - None

Calling Routine: CIPHER

Routines Called: Wand graphic calls

3.2.1.20 TID_ARG

Name: Subroutine TID_ARG

Purpose: To compute the E and F values of 25 tidal arguments given the time.

Inputs: By argument - None
By common - None
By file - None

Outputs: By argument - None
By common - /HAR//DAT/ (See Appendix
A for definitions of
variables past in common)
By file - HR, MN, DD, MM, YR, LL,
NAMES, E, F

Calling Routines: TIDPLT

Routines Called: TDATE
ORBIT
HAMONIC
VT100

3.2.1.21 TDATE

Name: Subroutine TDATE

Purpose: To compute the julian date.

Inputs: By argument - MON, DAYS
By common - None
By file - None

Outputs: By argument - MM
By common - /DAT/
By file - None

Calling Routines: TID_ARG

Routines Called: VT100

3.2.1.22 ORBIT

Name: Subroutine ORBIT

Purpose: To compute the orbital elements.

Inputs: By argument - Y, D
By common - None
By file - None

Outputs: By argument - SS, PP, NN, HH, P1
By common - None
By file - None

Calling Routines: TID_ARG

Routines Called: ANGLE

3.2.1.23 ANGLE

Name: Subroutine ANGLE

Purpose: To make the angle passed fall within 0 and 360 degrees.

Inputs: By argument - X
By common - None
By file - None

Outputs: By argument - X
By common - None
By file - None

Calling Routine: ORBIT

Routines Called: None

3.2.1.24 HAMONIC

Name: Subroutine HAMONIC

Purpose: To calculate the tidal constituents U, V, E, F.

Inputs: By argument - HR, P1
By common - /HAR/
By file - None

Outputs: By argument - U, V, F, E
By common - None
By file - None

Calling Routine: TID_ARG

Routines Called: ANGLE

3.2.1.25 ORAINS

Name: Subroutine ORAINS

Purpose: To insert records into the Oracle tables TID_STA, TID_CONST, TID_ZON.

Inputs: TID_STA, DATUM, TIME_MERIDIAN,
LAT_DM, LON_DM, ANS
By argument - IARCOD, IZONE, IYEAR,
SELEKT
By common - None
By file - None

Outputs: By argument - None
By common - /TIDSTST/
By file - None

Calling Routine: TIDPLT

Routines Called: HATIDE
VT100
Oracle commands

3.2.1.26 HATIDE

Name: Subroutine HATIDE

Purpose: To compute the harmonic analysis of tides
using the semigraph method.

Inputs: By argument - SELEKT
By common - /TIDSTAT/
By file - None

Outputs: By argument - PHAS, AMPLI, NAMES
By common - /SGRAPH//, /SCHART//, /CAL/
By file - TID_STA, DATUM,
TIME_MERIDIAN, LAT_DUM,
LON_DM

Calling Routine: ORAINS

Routines Called: S_GRAPH
VT100
CHART
CALCU1

3.2.1.27 S_GRAPH

Name: Subroutine S_GRAPH

Purpose: To compute a semi-graph analysis of thirty days tides.

Inputs: By argument - None
By common - None
By file - HR, MN, DD, MM, YR, N,
NAMES, E, F

Outputs: By argument - E, F, W, FW, NAMES
By common - /SGRAPH/
By file - HR, MN, MM, DD, YR, I,
NAMES E, F, W, FW

Calling Routine: HATIDE

Routines Called: VT100

3.2.1.28 CHART

Name: Subroutine CHART

Purpose: To print out a chart of select heights and to compute the sum, delta's, delta's squared and the square root of the sum of delta squared for the tidal heights.

Inputs: C, D, S
By argument - HH
By common - None
By file - None

Outputs: By argument - SH, DEL, SHT
 By common - /SChart/
 By file - HH, SH, DEL, X, A0, C,
 S0, D, Z0, S, Z00

Calling Routine: HATIDE

Routines Called: VT100

Glossary: C - gauge correction for MSL
 D - chart datum on gauge
 S - seasonal correction
 DEL - delta
 HH - select heights
 SH - sum of select heights
 X - square root of delta
 A0, S0 - half tide-level
 Z0, Z00 - tidal datum

3.2.1.29 CALCU1

Name: Subroutine CALCU1

Purpose: To compute the diurnal constituents of
 the tides and print out a summary of the
 results.

Inputs: By argument - FW, E, F, W, SH, SHT,
 HH, NAMES
 By common - None
 By file - None

Outputs: By argument - G, H
 By common - /CAL/
 By file - NAMES, H, G

Calling Routine: HATIDE

Routines Called: ANGLE
VT100

Glossary: NAMES - constituent names
G - phase
H - amplitude

4.0 REFERENCES

- 1) "Wand User's Guide," Document No. 0252-0024-01, April 1984, Version 3.0, Megatek Corporation, San Diego, California.
- 2) "Summer Employment Accomplishments", Samuel F. Clark, Naval Ocean Research and Development Activity, Unpublished, August 1988.

APPENDIX A

<u>Common</u> <u>Name</u>	<u>Argument(s)</u> <u>Passed</u>	<u>Definition</u>
/HAR/	MM -	month in integer representation
	NN -	lunar element
	HH -	solar element
	PP -	solar element
	SS -	lunar element
/DAT/	YR -	year in 4 digit representation
	Y -	year in 2 digit representation
	D -	julian day
	HR -	hour
	MN -	minutes
	DD -	day
	MON -	month
	LMON -	representation of month in 3 characters
/TIDSTAT/	LAT_DM -	latitude in degrees minutes
	LON_DM -	longitude in degrees minutes
	TIME_MERIDIAN -	hours
	TID_STA -	tide station
	DATUM -	meters

/SGRAPH/	HR -	hour
	MN -	minutes
	DD -	day
	MM -	month
	YR -	year in 4 digit representation
	N -	integer number
	PI -	3.1415926
	SW -	sin of W
	CW -	cosine of W

/SCHART/	A0, S0, Z0, -	half tide-level
	Z00	
	C -	gauge correction for NSL
	D -	chart datum on gauge
	S -	seasonal correction

/CAL/	FF4, F4, FF6, -	shallow water corrections for
	F6	use with Admiralty Method of
		Tidal Prediction

SECTION III

PART A

HUGO INTERACTIVE GRAPHICS
DEPTH AND NAVIGATION EDITOR'S
USER'S MANUAL

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APPENDIX A

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I. INTRODUCTION

HIHAN is a menu-driven program which runs various graphics tasks which have been implemented for the Harris H-700 using Megatek graphics color displays.

The depth and navigation editors are dedicated to the editing of 1 millimeter extracted depth and navigation data. Options exist which allow the editing of individual data points of which allow identical changes to be entered over a span of data. When editing, the user has the option to display the entire data set graphically, or he can home in on a particular portion of the data defined by a specific time.

II. HUGO START-UP PROCEDURES

To run the software on the Harris/Megatek system, simply type in the disk area and areaname. This is accomplished with the command:

```
=> 352GRAP*HIHAN  
and press the [RETURN] key.
```

III. VT 100 MENUS AND HELP

To commence execution of the NAV and DEPTH editors, type a 1 at the prompt. This will establish the program's contact with the NAVDEP:X executable and display the selection menu.

The navigation and depth editor menu is fully implemented and has four editing options, which include Graphics Depth Plot and Edit, Graphics Line of Position (LOP) Plot and Edit, Time Specific Depth Edit, and Time Specific NAV Edit. To access any of these editors, type the corresponding menu number at the prompt.

The user will then be prompted for the information which will identify the desired data set and locate the associated files. Information prompted for will include: Ship Name, Primary Sheet, Secondary Sheet, Platform, Data Set, Archive Code, Julian Day, and Year. This data is checked to ensure that values are within reasonable ranges, and error messages are sent to the user when improper values are entered. When all of the values are entered,

the user will be queried "Is this Correct (Y/N)?" If the user wishes to change any of the requested information, "N" should be entered and the entire set of prompts will be reissued. When the user enters "Y", the ORACLE data base is searched for the requested data set. If the desired information is not found, an error message is generated, and the user is re-prompted for the data; otherwise, processing continues if the information is present.

If the user has selected the Graphics Depth Plot and Edit (synoptic depth edit) option, the ORACLE data base will be searched to determine if any sonars are available for this data set. If there are, control proceeds to the graphics display. If no sonars are present, the program will stop.

If the option taken is the Graphics Line of Position Plot and Edit (synoptic nav edit), the ORACLE data base is searched to find all LOPs corresponding to this data. If none are found, the program will stop; otherwise, the available LOPs will be displayed on the screen, and the user will be prompted to select the one he wishes to edit. Again, error messages are issued for inappropriate responses, and the user is re-prompted. Once an acceptable LOP is entered, the program control will continue at the graphics display. Only LOPs 1 through 4 (the true navigation readings) are editable.

If either of the Time Specific editors is selected, the user will first be prompted to select which Sonar or LOP he wishes to edit from a list of those available. When a valid selection is made, the user will be asked whether he wants to do point editing or span editing. If point editing is chosen, the user will be prompted for a Julian day, hour, and minute which will define the center point of the data to be edited (See V. Point Editing for more information). If the option is span editing, a prompt will be issued to enter a starting time (Julian day, hour, and minute). This time will define the start of the data to be edited. After proper values have been entered for the starting time, the user is prompted to enter a time which will define the end of the span to be edited (See VI. Span Editing for more information). Once the times are correctly entered, control will proceed to the graphics display.

There is also a HELP option available on this menu. If the user wishes to see a brief description of the editors, he should select this option. The description will appear on the screen one page at a time. The user may exit HELP at any time by entering "E", or

may continue by simply pressing a RETURN. At the end of the Help file, control will return to the navigation and depth editor menu. To exit from this menu, just enter "99".

It is important to note that the initial menu displays are generated using Hot Writes. Because of this, the user should always wait for the ? prompt before typing in a response. Typing a response before the prompt appears may cause the program to lock up.

IV. THE SYNOPTIC VIEW

This initial graphics display is generated for both the synoptic depth and nav editors. Creation of this display is the slowest part of the program, although the time taken may vary greatly depending on the size of the data file being edited.

The basic graphics background information and menus are generated first, and then a message will appear on the display telling the user that a temporary file is being copied from the original nav or depth file to be edited. A temporary file is used so that the user will have the flexibility to scrap an editing session should he not wish to make his changes permanent. Once the file is copied, the information which will identify the survey unit is displayed in the lower center window (i.e. ship name, primary sheet, etc.). The lower left window will show a display of the sonars or LOP numbers and types being edited. In the case of LOPs the station will also be displayed.

The next step is the generation of the graphics segments which will display the entire data set. These segments are generated one level at a time where one level corresponds to roughly 375 millimeters of 1 millimeter depth or nav data. Only three adjacent levels of data can be displayed on the display at any given time, so all excess graphics segments are saved to disk for later usage.

The graphic display of the data will be color coded to make interpretation of the data easier. When depth editing, minimum depths will be plotted as yellow points, and maximum data will be plotted as green points. When editing navigation data, all LOP data will be plotted as yellow points which connote no particular meaning. All suspect points in the nav and depth data will be flagged with red stems. Selected depth data will be identified by blue stems.

If depth editing is being done, the display will include either one or two sonars if available. If two sonars are displayed, the user should note the use of offset Y axes. The labeled Y axis will appear on the left side of the display and will correspond to the top track of data displayed. The Y axis on the right will not have any labels, but its tick marks will represent the same values as found on the left Y axis. This right Y axis corresponds to the bottom track of data. The user should also note that the values on the Y axis are descending. This is done to simulate the ocean where the greatest depths are found at the bottom.

When navigation is being edited, there will be only one Y axis used, and therefore only one track of data will appear in each plot level. Its labels will appear in ascending order.

The X axis for both depth and navigation data will be labelled in millimeters of data. Y axis labels will be in meters for the depth editor, and in LOP readings for the navigation editor.

Below the display of the editable depth or nav data will be a static display of navigation data. All available LOPs will be displayed as a straight white line, with red portions indicating time periods where the LOP data is suspect. This display is intended only as an indicator to the availability of navigation data. When nav editing is being done, the LOP being edited will not appear in this static display of LOP data, since it already appears.

The menu for the synoptic view is displayed at the right hand side of the graphics display. Menu choices are taken by positioning the joystick cursor over an option. When the desired option is flashing, the user should press the joystick button to activate that option. If the user presses the button when no option is flashing, an error message is displayed.

The NEXT LEVEL option allows the user to view levels of data which are "below" the lowest level displayed on the screen. This option is only valid if more than three levels of data exist for the data set. When this option is chosen, the top level visible on the screen is erased, the two levels below that are moved up one, and a new level is displayed at the bottom. If the user reaches the last level of data, a message is displayed, and the NEXT LEVEL option is disabled.

The PREVIOUS LEVEL option is similar to the NEXT LEVEL option, except that it works in the reverse direction. Since the top three levels of data are displayed initially, this option is not valid until after the NEXT LEVEL option has been executed. An error message is displayed to the user when there are no levels previous to those on the graphics display. When this option is selected, the bottom level of data on the screen is erased, the two above it are moved down one, and the next earlier plot level is displayed at the top of the screen.

The EDIT POINT menu item is used to activate the POINT DEPTH EDIT SCENE or the POINT NAVIGATION EDIT SCENE. This option will remain flashing once chosen until the edit scene has been created. When selected, this option will prompt the user to select the central point of the edit scene. To do this the user should position the joystick cursor over a portion of the track of depth or navigation data which he desires to edit. When the joystick button is pressed, the synoptic view displayed will be deleted, and the edit scene will be generated. All other options are disabled while the EDIT POINT is occurring. The edit scene generated will contain 100 millimeters of data on either side of the point chosen by the user.

The EDIT SPAN option is used to generate the SPAN DEPTH EDIT SCENE or the SPAN NAVIGATION EDIT SCENE. When chosen, this option will also remain flashing, but the prompts to the user are different than those of the EDIT POINT option. Initially the user is asked to select the left hand point of the edit scene. This is done in the same manner as above. Once the left hand point is selected, the user is instructed to select the right hand point for the edit scene. This point must be later in time sequence (a larger millimeter label on the X axis) than the previous point, and it must also be from the same sonar as the other point if depth editing is being done. If the user desires, the NEXT LEVEL option may be executed (if possible) before the selection of the right hand point of the edit scene. If the span of data defined by the user exceeds 200 millimeters of data, the edit scene display generated will contain a break in the center representing data between the two ends of the span; the 100 millimeters nearest each of the endpoints chosen will be displayed in the edit scene.

All four of these options, NEXT LEVEL, PREVIOUS LEVEL, EDIT POINT, and EDIT SPAN work the same for the depth and navigation editors. The SAVE, SCRAP, and EXIT DEPTH EDIT options will be discussed in Section VIII, Exiting the Editors.

All error messages and instructions to the user will be displayed in the window entitled Program Status Information which is located in the lower right hand portion of the graphics display. In general, all error messages will be displayed in red, and all instructions and comments will be displayed in green. The Program Status Information window is also used by the point and span edit scenes.

NOTE: None of the editing done in the edit scenes will be displayed at the synoptic level, although the changes will be updated continuously in the data file. Subsequent generations of the edit scene which include portions of the data which have been edited will display the edited and updated data.

V. THE EDIT SCENE

The edit scene display is similar to the synoptic view, but a few key differences should be pointed out. First, the menu on the right hand side of the graphics display is replaced by either a point or a span editing menu. These will be explained in detail later.

The display of data in the edit scene represents a magnification of the data in the synoptic view by a factor of 7.5. This allows a sufficient spacing of data points such that all can be perceived as discrete points. To further enhance viewing, the data is displayed as symbols rather than simply points. For navigation and minimum sonar data, the symbol used will be a yellow v; maximum depth data will be displayed as a green ^ . For either symbol, the vertex will represent the actual depth or navaid value. Suspect points will still be represented by red stems, and selected depth data will be displayed with a blue stem. The labelling of the axes in the edit scene is the same as that of the synoptic view; however, since only one sonar can appear in any given edit scene, no offset Y axis will be used for the display of depth data.

A set of shaded arrows will appear at the bottom of the display window containing the identifying information for this data set (the lower central portion of the display). These arrows allow the user to scroll the displayed data either right or left revealing additional data on either side of the initial edit scene display. To activate data scrolling, the joystick should be positioned over any portion of either of the arrows. Scrolling will continue as long as the cursor remains over the arrows, or until an end of the

data is reached. To scroll the data to the right, place the cursor over the arrow pointing right; conversely, to scroll the data left, the joystick cursor should be placed over the arrow which points left. The different shades of the arrows represent different speeds at which scrolling can occur. To scroll at the lowest speed, the cursor should be placed on the darkest portion of the arrows. The brightest portion of the arrows (the points) will cause the fastest scrolling. It should be noted, however, that the speed of the scrolling is directly influenced by the number of users on the system. Even the fastest speed may appear slow when the system is fully loaded with users.

The lower left hand window of the display will be used to display the values of various data points chosen by the user, and can be used as an aid in evaluating and editing the data. To display the values associated with a particular point of data, the user must position the joystick cursor over the desired data point until it flashes. The joystick button should be pressed while the point is flashing in order to retrieve the data. When a point has been successfully selected, it will be marked by a "+" which will be displayed just above the point for navigation or minimum sonar data, or just below the point for maximum sonar data. A corresponding "+" will appear in the data window adjacent to the data values for the desired point. In addition to these values, values for the two points immediately preceding and following the chosen point will be displayed in top to bottom order within the value window. When evaluating sonar data, all five data points will represent selections made from the same sonar.

The left column of this display represents the time of the given point. The format for the time display is HH:MM:SS where HH runs from 0-23 and MM and SS both run from 0-59. The Julian day for the start of the data set is displayed in the center information window, so it is not included in the value window. If the point selected by the user occurs after midnight and the data set crosses midnight (i.e. the data set spans two days), the Julian day of the selected point will be one greater than the day displayed in the center window. The next column displays the depth values in tenths of meters or navigation values in hundredths, depending on which is being edited. The third column is a status column which displays "SUS" for points which are suspect, "SEL" for depth data which are selected, and "DEL" for points which have been deleted from the display. All other points will have nothing displayed in the status

column. The final column on the right displays the "+" which identifies the data point selected in the data display. The top of this column is blank for navigation data, or reads "Min" or "Max" for minimum or maximum depth data, respectively.

VI. POINT EDITING

The point editor can be invoked from either the VT 100 menus or the synoptic level, and can be used for either depth or navigation editing. The menu items are displayed on the right hand side of the graphics display and they are selected in the same manner as the options of the synoptic view level. When selected, the chosen option will remain flashing until the operations necessary to perform that option are complete. The SELECT POINT and DESELECT POINT options are available only from the depth editor; all other options are available with either the depth or the navigation editors.

For all editing options other than INSERT POINT, the editing process will begin with the selection of the point to be edited. When a menu option has been selected, the user will be prompted to select the point to be edited. If desired, the user may scroll the data before selecting a point for editing. The selection is made by pressing the joystick button when the cursor is over a flashing point. Once a selection has been made, the values for the selected point will be displayed in the value window, and the user will be forced to confirm or reject this point for editing. That is, the joystick cursor will not be able to move away from the C R region of the menu. If the user decides that he does not want to edit the chosen point, the joystick button should be pressed when the R is flashing. The user will then be directed to select another point for the desired edit. When a point for editing has been confirmed (by pressing the joystick button while over the flashing C), the user will be prompted for any other input necessary for the desired change.

When all information necessary to display an edited point has been entered, the proposed display is displayed as a flashing data point. The user will be boxed into the C R area again and asked to confirm or reject the proposed change. If the change is rejected, it is erased from the screen, and the user is free to continue with other options. If the change is accepted, the flashing change becomes solid on the edit scene display, and the change is appended

to the data file. It is important to note that once an editing option has been invoked, it must be carried out at least to the display of the flashing proposed change. If the edit is not desired, it can then be rejected.

To mark a depth sounding as selected, the user must invoke the SELECT POINT option. No input other than selecting a point to edit, and confirming and rejecting various actions (as described above) is required. When selecting a depth, an error message will be generated if the user tries to select a point which is already selected or suspect. Hitting the RETURN key on the graphics keyboard will free the user from this error condition and exit him from the SELECT POINT option.

The DESELECT POINT option works in the same fashion as selecting a point. An error message is displayed if a point which is not select is chosen for deselection.

If the user wishes to delete a data point from the file, the DELETE POINT menu item should be selected. The only user input required is selecting a point for deletion, and confirmation or rejection of the point and the final operation.

Selecting the MULTIPLY POINT option will allow the user to multiply the value of a given data point by a constant factor. After a point is confirmed for editing, the user will be prompted to enter the multiplication factor. This factor should be a real value between 0. and 10., and it should be entered from the graphics keyboard.

The ADD POINT option permits the user to add a constant value to (or subtract from) a depth or nav value. As in the MULTIPLY POINT option, the user will be queried once a point is selected for editing. The additive factor for the point should be between -10000. and 10000.

By choosing the REPLACE VALUE option, the user can change the value of an existing data point by simply entering the new value for the point when prompted. The value entered by the user must be between -400. and 10000. The negative values are allowed for certain LOP data.

To insert a new point into the data file, the INSERT POINT menu item should be chosen. Once this option is chosen, the joystick will be disabled, and all user input will come from the graphics keyboard. Prompts will be issued to the user for Julian day, hour, minute, and second in that order. The value of the day should be

between 1 and 366; hour between 0 and 23; and minute and second from 0 to 59. Once a time is completely entered, the user will be asked to confirm or reject the entered time. Upon rejection, the entire set of prompts will be reissued to the user. Once the given time is accepted by the user, it is checked to ensure that the time falls within the time range of the data within the edit scene, and to ensure that no other point exists at that time. If either of these conditions occurs, an error message is reported to the user, and the prompts for time appear again. When a valid time has been entered, the user is prompted for a depth or navigation value. The proposed new point is then displayed for confirmation or rejection. If the user wishes, he may scroll the data to find the proposed insertion, if it does not initially appear on the visible portion of the data.

All of the options which require keyboard input go through error checking to ensure that valid data falling within acceptable bounds has been entered by the user. If any invalid or out of range data is detected, an error message is shown to the user, and the prompts reappear. It is important that the user be careful when entering keyboard data, because any backspacing (e.g. for an attempted correction) causes the data to be unreadable to the program, which will force an error message.

When all desired edits for the current edit scene have been entered and confirmed by the user, the EXIT EDIT SCENE option should be selected. Upon selection of this option, all confirmed edits are written to the data file. If a synoptic view editor is running, program control will return to the stacked plots of the synoptic view; otherwise, if a time specific editor is running, the program will begin exiting procedures (see VIII, Exiting the Editors).

If an edit occurs in which the new value of the data point does not fall within the data range of the edit scene (the range of values found on the Y axis), the edited point may not appear on the display, or it may appear at an unexpected place. If this happens, the user can verify that the value is correct by setting the joystick cursor over the point (or an adjacent point if the desired point does not appear on the screen) until it flashes, and then pressing the button, causing the point's values to be displayed in the value window. Even though the point is not coherent with the display, the value will be correctly updated in the data file.

VII. SPAN EDITING

As with point editing, the span editor can be invoked either from the VT100 menus or from the synoptic view level. In span editing, however, editing cannot be done on a single point unless both of the span's endpoints are defined as the same point. In addition, when the span editor has been activated from the synoptic view level, control will return to the synoptic view level as soon as one span edit is confirmed. When the time specific span editor is being run, there will be a brief delay after each confirmed edit. This delay will allow for the writing of the updated data to the file, and for regeneration of the edit scene to display the changes. If editing has occurred across a break in the data -- signified by two zigzagged lines in the center of the scene -- there may also be an additional delay in program control returning to the user depending on how much data exists between the breaks of the scene. This additional delay allows the program to update all of the data values which occur in the edit scene break.

All span editing options will prompt the user to first select a point which defines the left end of the span and to confirm or reject it. Once the left hand point has been defined, a prompt will appear directing selection of the right hand endpoint, which must also be confirmed or rejected. If desired, the user may scroll the data before selecting the right endpoint in order to edit a span which is larger than will fit on the screen at one time. As implied, this endpoint must be on the right of the first point selected. That is, it must be later in time sequence than the initial point. If it is not, an error will occur, and the user will have to reselect the right hand point. Remember that once an editing option has been selected, it must be carried through until a flashing proposed change is displayed. Once displayed, the proposed change can be confirmed or rejected. The endpoints which define the span for editing can both occur on the same side of the break in the data (if one exists), or on opposite sides. If the endpoints are on opposite sides of a break in data, the editing will also affect all points which lie in between. The span defined by the user will encompass both minimum and maximum data, and no points beyond either of the endpoints will be effected by the proposed edit. When a proposed change is flashing and awaiting the user's confirmation or rejection, the user may scroll to view the entire portion of data effected.

DESELECT SPAN is an option only available for the depth editor, since navigation data cannot be select. The only points which are affected by this operation, are those points between the endpoints which are select. Error messages are not generated when a "non-select" point is encountered.

The DELETE SPAN option is used to eliminate a stretch of data and works similarly to the DELETE POINT option. Once the endpoints have been chosen the entire span between them will flash indicating the possible deletion which must be confirmed or rejected by the user.

The MULTIPLY SPAN and ADD SPAN options also work in the same fashion as the point editing version of these commands. Once the proposed flashing change is displayed, the user may scroll the data before confirming or rejecting the edit.

When the user is running a synoptic view editor, he may return to the synoptic view level without making any edits by selecting the EXIT EDIT SCENE option. This option will also allow the user to exit the program when one of the time specific editors is being run (see VIII, Exiting the Editors).

VIII. EXITING THE EDITORS

The navigation and depth editors begin to complete execution when an exit has been called for from either of the time specific edit scenes, or when the EXIT DEPTH EDIT option is selected from the synoptic view menu. When exiting, the user will be prompted to either save or scrap the edit session, and the joystick cursor will be boxed in around the SAVE and SCRAP menu options. If the user wishes to save all changes made to the data file, the joystick button should be pressed when the cursor is over the SAVE option and it is flashing. A message will then be flashed to the user confirming that the changes are being saved. If the user does not wish to save the changes made for any reason, SCRAP should be selected with the joystick. If the edit session is scrapped, the program exits.

If the user decide to save the changes made, he will then be prompted as to whether or not he wants a report generated. If a report is desired, the user should enter a "Y" at the given prompt. Entering "N" will cause the program to exit, and the audit file will be permanently lost. If the user wants the report, he will

then be queried for a printer number to send the audit trail to. The entries that are currently valid are 53, 63,, and 73. The colon identifying the PDN of the desired printer should not be included with the printer number. If there is a problem spooling the file to the printer requested, an error message will be displayed to the user, and another printer number should be entered. Once the report is spooled to the printer, program execution will stop.

The audit trail report will identify the data set which the user has edited. A complete listing will be given for all confirmed edits, and errors which occurred while attempting to insert points into the data will also be recorded here.

IX. SHUT DOWN AND CLEAN UP PROCEDURES

When program execution has been completed, the user should immediately type HUGODOWN on the VT100 or VT220 terminal. This job control macro will free the graphics workstation for other users and will return the user's session to a normal state.

In the event that the HUGO program is aborted or suffers from any abnormal end of execution, a clean up macro should be invoked as soon as possible to remove all side files generated by the program, and to prevent problems for later users. The macro is invoked by typing CLEAN_UP, and it can run from the terminal that the HUGO program was run from. The macro will query the user for the Julian day of the data set being edited, and for the terminal which the graphics program was run from. The terminal number supplied by the user should not include a colon (:). The macro will then eliminate all side files generated by the program including the temporary work file, the audit trail file, and all graphics segment files save to disk. If the HUGO program is aborted or bombs for any reason, all edits and changes made will be lost.

APPENDIX A - PROGRAMMER'S NOTES

The HUGO depth and navigation editors operate on nav and depth data files which are created using VISP. Currently, there are only three test data sets on the Harris system which are implemented in VISP. For these editors to be fully functional in the future, all navigation and depth files (and other programs which handle them) will have to be converted to VISP format.

The data sets available for testing purposes are:

<u>ACC</u>	<u>Ship Name</u>	<u>P Sheet</u>	<u>S Sheet</u>	<u>Pform</u>	<u>Data Set</u>	<u>Archive</u>	<u>Day</u>	<u>Year</u>
2	HARKNESS	2	D	O	3	1	76	86
3	CHAUVENET	11	A	O	1	1	256	86
4	CHAUVENET	11	A	O	1	1	257	86

The HUGO program is currently implemented in the area 0352DEPE. To implement HUGO in another area on the system, all files ending with either .P, .F, or .M should be copied to the new area. In addition, several macros are needed to do the initialization. These files include HUGO_UP, HUGODOWN, COMPHUGO, BLD_HUGO, CLEAN_UP, and C_C_C_C_. CLEARX, NDHELP.D, and CALL.D should also be copied into the new area. There should be a total of 88 files copied.

To generate a new working program, the job control macro COMPHUGO should be invoked. This macro will generate three libraries; one for the VT100 driver menu software, one for the depth and nav editor software, and one which contains software for the VISP file interfaces. All source ForTran source code will be compiled with this macro, placed into the appropriate libraries, and finally the HUGO program will be Vulcanized. All source code modules are compiled with the B option for subscript and bounds checking, the G option for optimization, the N option to prohibit implicit typing of variables, and the W option to provide run-time error walkback. The program is Vulcanized as reentrant to allow multiple users to access the program without placing multiple copies into core memory.

There are several suffixes used to identify various types of files. Files ending in .P are source code ForTran files which contain ProForTran ORACLE calls. These files must be run through the ORACLE pre-compiler before they can be compiled. ForTran source

code files are identified by a suffix of .F. Files that end with .L are ForTran compiler listing files that are produced by the pre-compiler. All common blocks are placed in files of their own which end in .M. This prevents repetition of the blocks of code in every routine which uses them. They are imported into their source files by the \$ADD command. Files ending in .D are documentation files. The files remaining are either macros (mentioned above, executable files, or subroutine libraries).

CHANGES NEEDED TO CONVERT THE NAVDEP.P SUBROUTINE TO THE MAIN EXECUTABLE NVDPED:X

The following changes were needed to make the subroutine "NAVDEP.P" into a main routine (NVDPED.P). The ORACLE calls made in HUGO.P were inserted into "NVDPED.P" and a system chain statement was used at the end to jump back to the HIHAN driver in "352GRAP". Because of these changes the user does not have to run HUGO_UP or type "HUGO" at the prompt. The WS_MACRO in the HIHAN executable takes the place of the HUGO_UP macro.

In order to use the HELP menu, the user must copy the help file into the qualifier that has the system driver (i.e. 352GRAP).

To compile the new "NVDPED.P" file use the BLD_HUGO macro and copy the executable output "NVDPED" into "NVDPED:X".

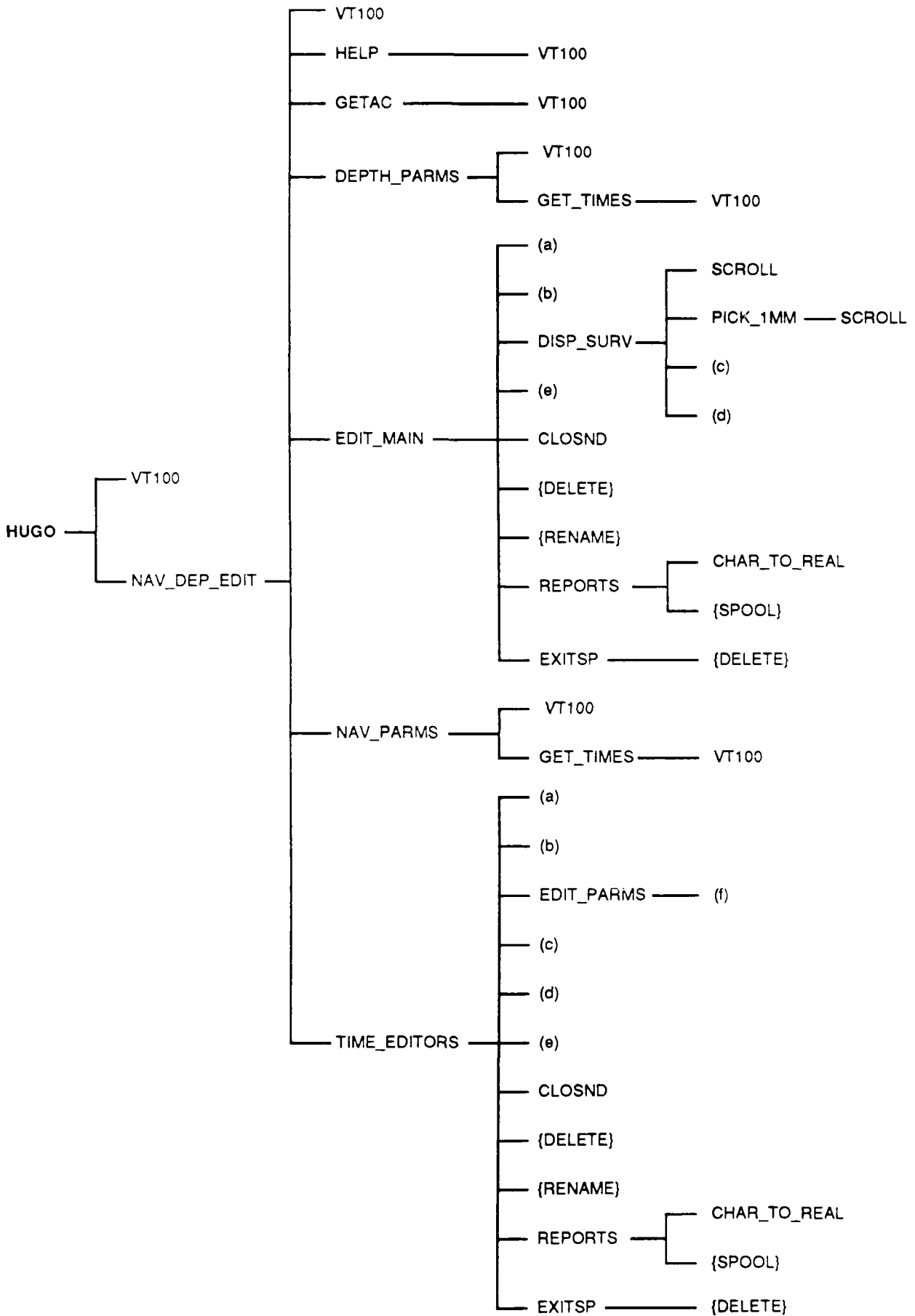
SECTION III

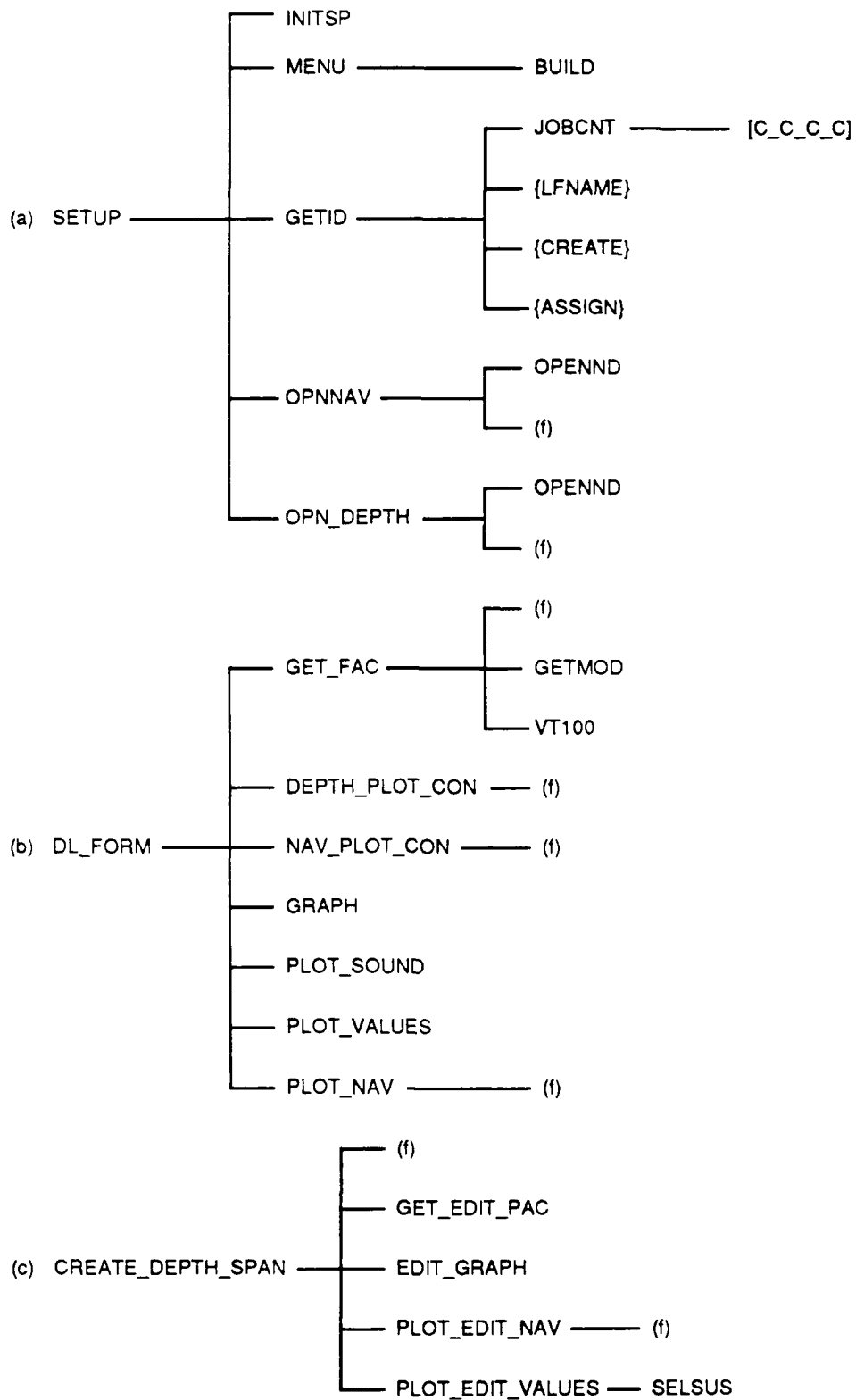
PART B

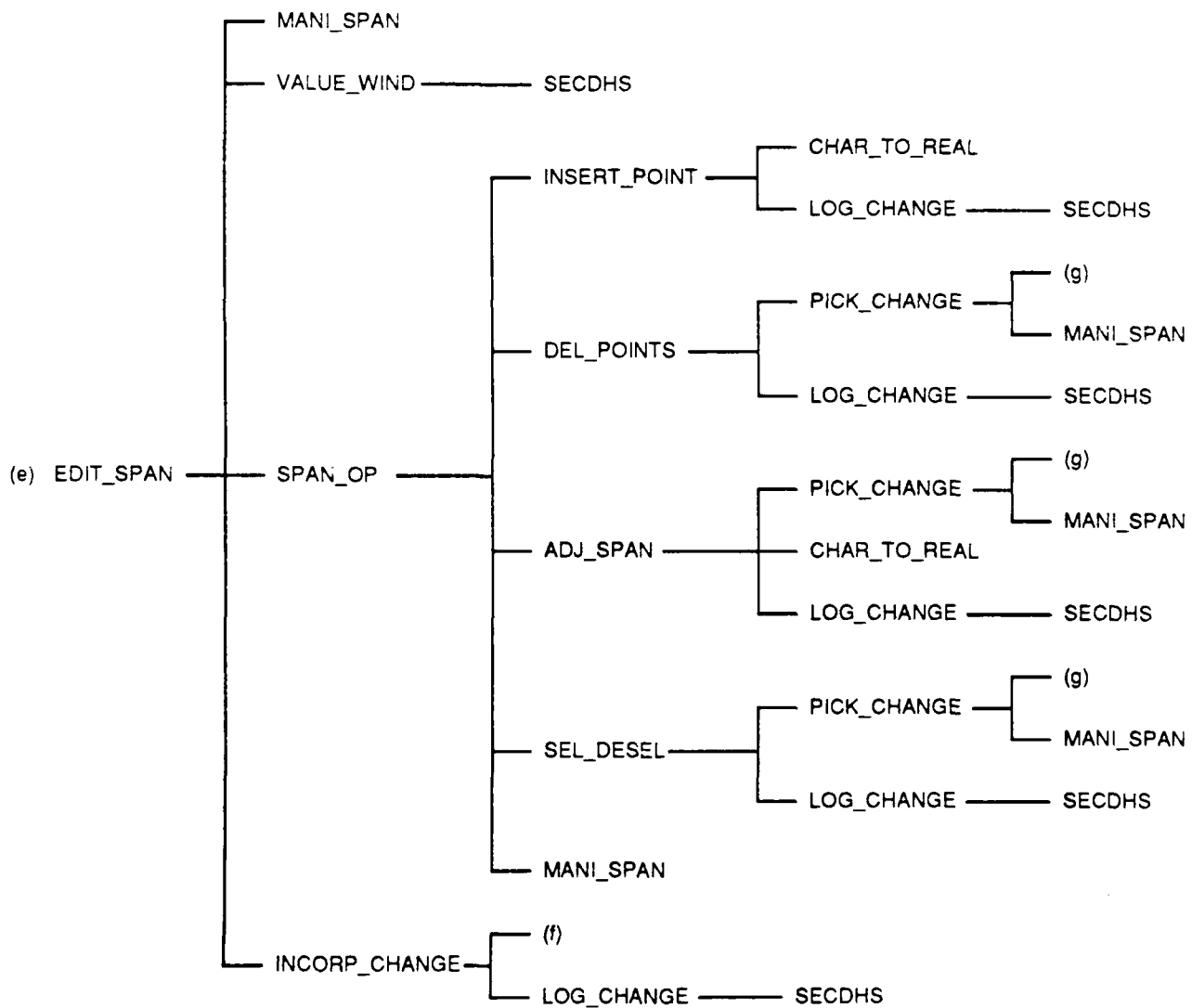
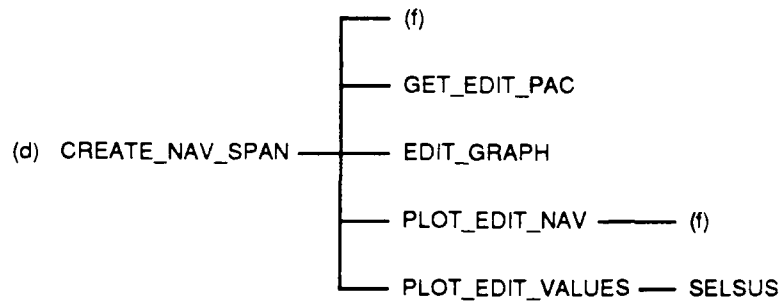
Editor's User's Manual

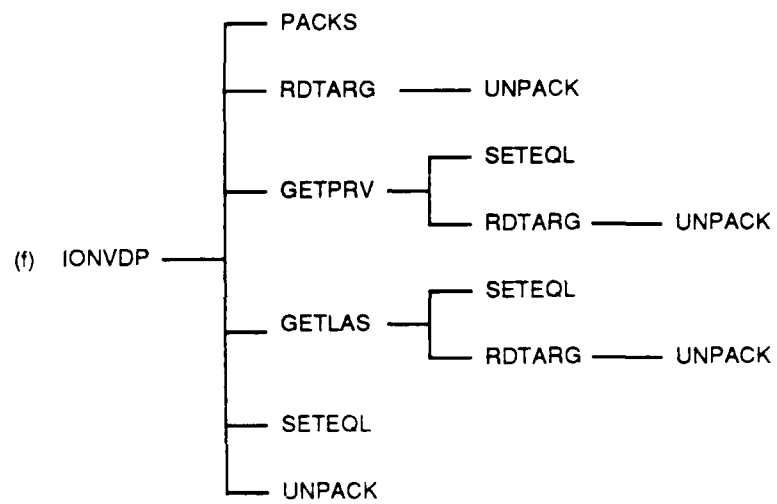
Calling Sequence

Note: This calling sequence represents all user written subroutines. Special purpose system ForTran callable subroutines are indicated by {}. [] indicates a job control macro chained to by in-line assembly. ORACLE, WAND, and VISIP routines called from within the program are not represented within this calling tree.









(g) VALUE_WIND — SEC DHS

SECTION IV

HUGO FUNCTIONAL DESCRIPTION

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SECTION IV

1.0 GRAPHICS DEPTH PLOT AND EDIT

The interactive graphics synoptic view plot shows a time series profile of the max and min 1 mm soundings, each selected sounding (approx. 5 mm on plotter paper) is specifically marked; the CRT display is similar to the paper status plot and can be used to find where edits have been user pre-decided or the CRT plot can be used directly while evaluating the HPTS extraction report, RTS printout, and echogram. When edits need to be applied the cursor is set on the profile area in need of repair and the display changes to an edit scene. To activate the edit scene for a single point operation the operator sets the cursor on "EDIT POINT" and presses the device button, "EDIT POINT" now remains highlighted. The operator then sets the cursor on the data point requiring edit and presses the button again, to activate the "Point Depth Edit Scene." The point picked will appear on the edit scene along with associated points plotted on each side.

To activate the edit scene for span operation the operator sets the cursor on "EDIT SPAN" and presses the device button, "EDIT SPAN" now remains highlighted. To perform a span edit the operator must pick a begin point and end point. Points are picked as above. The operator sets the cursor on the first data point of the profile segment to be edited and presses the device button. The "EDIT SPAN" option remains highlighted until the second span point is selected. The operator may extend the data segment length by setting the cursor on "next level" and pressing the device button. The operator is locked out of option for "Previous level" and from selecting a second point with an earlier time tag. When the desired profile appears on screen the operator picks the second point and the "Span Depth Edit Scene" is activated. The points picked will appear on the edit scene along with associated points plotted on each side. The first point and associates will appear on the left side of the edit scene; the second point and associates will appear on the right side of the scene. Each set of points will be plotted with the same scale factor. When the synoptic view is completed a temporary duplicate survey unit file is created. The temporary file contains

the old data modified by edits as they are performed and is used to create the point and span edit scene. When the operator has completed all his edits he sets his cursor on "EXIT" and presses the device button. The operator is now presented with the option to save the edited file or to scrap the edit secession. When the operator sets the cursor on "SAVE" (and presses the device button) the temporary file is renamed as the survey unit and the old file is discarded. If the operator chooses to scrap the edit session the temporary file is discarded and the old survey unit file is left intact.

1.1 Point Depth Edit Scene

The point depth edit scene displays the picked point in the center of the edit scene with 25 associated points shown on each side. An additional 75 associated points on each side of the edit scene may be shown by setting the cursor on arrows below the task summary; the profile moves right or left as the cursor is set on the right arrow or the left arrow.

The depth edit scene provides a close up look at the data profile with a more sensitive scale usually associated with a shorter data length than seen on the synoptic view. To perform an edit the operator sets the cursor on the action desired ("Add", "Multiply", "Replace", "Select", "Deselect", "Delete" or "Insert") at the right side of the edit scene. When the operator presses the button the desired action remains highlighted. The operator then sets the cursor on the data point requiring edit and presses the button again, data values associated with the picked point now appear in the lower left display box. When the values appearing the display box are satisfactory the operator sets the cursor on confirm and presses the device button to complete the action. The edit scene now shows the data set with the edit accomplished for "Select", "Deselect" and "Delete" action items. When the action is "Add", "Multiply" or "Replace" the operator is queried via program status information, lower right corner of display, for a keyboard value. The entered value is echoed in the lower right display status box

where the operator views and confirms or rejects the value. When the operator confirms the value the action is completed and the edit scene shows the action accomplished.

When required to "Insert" a point the operator responds to queries from the status box to enter time. When the insert time is satisfactory the operator sets the cursor on confirm and presses the device button. A new query now appears at the lower right box and a keyboard entry for depth is input and echoed in status box. When the operator confirms the value the insert operation is performed and the edit scene shows the completed action.

The operator may perform as many edits as desired on the 200 points visible in the edit scene; when point edits are required for points beyond the range of this segment the operator sets the cursor on the "EXIT" option and presses the device button. The exit returns control to the synoptic view where a new point segment may be picked.

On exiting from the point depth edit scene all changes are incorporated into a temporary duplicate survey unit file. All subsequent point and span depth edit scenes are generated from this file. An audit trail identifying changes is prepared.

1.2 Span Depth Edit Scene

The span depth edit scene shows a profile comprised of two joined data segments of 100 points each; each segment begins 10 points before the start and ends 10 points after end points which were picked from the status plot. The first segment and the second segment are separated by a special symbol; intermediate points are not necessarily shown in the display. The scene provides a close up look at the beginning and ending of a data span with both segments adjusted to the same scale. The operator may view the begin segment or the end segment by setting the cursor on the left going or right going arrow. To perform a span edit the operator sets the cursor on the action desired ("Add", "Multiply", "Select", "Deselect" or "Delete") at the right side of the edit scene; when the operator presses the button the desired action is highlighted. The operator sets the cursor on the "move arrow" and moves the profile till the begin point is in view on the scene. The operator sets the cursor

on the first data point to begin the span and presses the device button. Values at the cursor are now displayed in the lower left view box. The operator, when satisfied with the value, sets the cursor on "confirm" and established the first data point of the sequence intended for edit. When dissatisfied with the value in the view box the operator sets the cursor on "reject" before pressing the button and then picks a new point.

The operator sets the cursor on the "move arrow" again and moves the profile to the left until the end time of the segment is in view on the scene. The cursor is set on the last data point ending the span and the device button is pushed. Values at the cursor are again displayed in the lower left view box. When satisfied with the value in the display box the cursor is set on "confirm" and the data span for edit is established. When the action desired was "Select", "Deselect" or "Delete" the display scene profile disappears and then returns when the required operation is complete.

When the desired action was to "Add to" or "Multiply" a span the operator is queried for a value. The query and the keyboard entered value appear in the lower right display box. When the operator is satisfied with the entry he moves the cursor to the "confirm" block and presses the device button. When confirmed the display scene profile is overlayed with a new profile of the edited data. When the operation is complete the operator can move the edited profiles by setting the cursor on the "move arrow" to view the results of the edit. After viewing the edit results the operator sets the cursor on the "CONFIRM" option to post the edit and return to the synoptic view. On exiting via "CONFIRM" from this edit scene all changes are incorporated into a temporary duplicate survey unit file and audit trail entries are prepared. The span depth edit scene allow only one edit operation for a picked span before exit returning to the synoptic view. When the operator "REJECTS" the applied edits which he has viewed the edit is not posted, the overlayed profile disappears, and the operator is queried for a new cursor selected option.

The synoptic view never displays the results of point or span edits until the edits are posted and the synoptic view recomputed from a new file.

1.3 Time Specific Depth Edit

The benefit of this editor as opposed to the interactive editor is that the operator can go directly to a specific time observation and effect a change without waiting for graphic segments relating to the whole survey unit to be generated.

To activate the edit scene for a single point operation the operator sets the cursor on the appropriate option box and presses the control device button, picks the desired sonar via cursor and control device button and then enters the time (day, hour, and minutes) where the operator wants the edit scene centered. The Point Depth edit scene appears identical to (1.1) where a segment of 100 points on each side of the entered time are available for edit. At the edit scene the operator can "Add", "Multiply", "Replace", "Select", "Deselect", "Delete" or "Insert" values. To perform an edit function over a span of points the operator sets the cursor on the appropriate option box and presses the button, picks the desired sonar and enters both "from time" and "to time." The Span Depth Edit scene appears identical to (1.2) where the scene shows a profile comprised of two joined segments of 100 points each. At the span edit scene the operator can add a value to a span of points, multiply by a value a span of points, select a span, deselect a span, and delete a span.

2.0 GRAPHICS LINE OF POSITION EDITOR

The interactive graphics LOP editor plots a sequence of profiles and derivatives, each scaled independent of the other. The operator can advance or retard the time segment displayed in the window via cursor control. With the cursor and keyboard the operator can call an edit scene to add, multiply, delete, replace, or insert a single value or can add a value to each of a sequence or multiply each value of a sequence or delete a sequence. When edits need to be applied the cursor is set on the profile area in need of repair and the display changes to an edit scene. To activate the edit scene for a single point operation the operator sets the cursor on "EDIT POINT" and presses the device button, "EDIT POINT" now remains highlighted. The operator then sets the cursor on the data point requiring edit and presses the button again, to activate the "Point Nav Edit Scene." The point picked will appear on the edit scene along with associated points plotted on each side.

To activate the edit scene for span operation the operator sets the cursor on "EDIT SPAN" and presses the device button, "EDIT SPAN" now remains highlighted. To perform a span edit the operator must pick a begin point and end point. Points are picked as above. The operator sets the cursor on the first data point of the profile segment to be edited and presses the device button. The "EDIT SPAN" option remains highlighted until the second span point is selected. The operator may extend the data segment length by setting the cursor on "next level" and pressing the device button. The operator is locked out of option for "Previous level" and from selecting a second point with an earlier time tag. When the desired profile appears on screen the operator picks the second point and the "Span Nav Edit Scene" is activated. The points picked will appear on the edit scene along with associated points plotted on each side. The first point and associates will appear on the left side of the edit scene; the second point and associates will appear on the right side of the scene. Each set of points will be plotted with the same scale factor. When the synoptic view is completed a temporary duplicate survey unit file is created. The temporary file contains the old data modified by edits as they are performed and is used to create the point and span edit scene. When the operator has completed all his edits he sets his cursor on "EXIT" and presses

the device button. The operator is now presented with the option to save the edited file or to scrap the edit secession. When the operator sets the cursor on "SAVE" (and presses the device button) the temporary file is renamed as the survey unit and the old file is discarded. If the operator chooses to scrap the edit session the temporary file is discarded and the old survey unit file is left intact.

2.1 Point Nav Edit Scene

The point nav edit scene displays the picked point in the center of the edit scene with 25 associated points shown on each side. An additional 75 associated points on each side of the edit scene may be shown by setting the cursor on arrows below the task summary; the profile moves right or left as the cursor is set on the right arrow or the left arrow.

The nav edit scene provides a close up look at the LOP profile with a more sensitive scale usually associated with a shorter data length than seen on the synoptic view. To perform an edit the operator sets the cursor on the action desired ("Add," "Multiply," "Replace," "Delete," or "Insert") at the right side of the edit scene. When the operator presses the button the desired action remains highlighted. The operator then sets the cursor on the data point requiring edit and presses the button again, data values associated with the picked point now appear in the lower left display box. When the values appearing in the display box are satisfactory the operator sets the cursor on confirm and presses the device button to complete the action. The edit scene now shows the data set with the edit accomplished for "Delete" action items. When the action is "Add", "Multiply" or "Replace" the operator is queried via program status information, lower right corner of display, for a keyboard value. The entered value is echoed in the lower right display status box where the operator views and confirms or rejects the value. When the operator confirms the value the action is completed and the edit scene shows the action accomplished.

When required to "Insert" a point the operator responds to queries from the status box to enter time. When the insert time is satisfactory the operator sets the cursor on confirm and presses the device button. A new query in appropriate units now appears at the lower right box and a keyboard entry for LOP is input and echoed in status box. When the operator confirms the value the insert operation is performed and the edit scene shows the completed action.

The operator may perform as many edits as desired on the 200 points visible in the edit scene; when point edits are required for points beyond the range of this segment the operator sets the cursor on the "EXIT" option and presses the device button. The exit returns control to the synoptic view where a new point segment may be picked.

On exiting from the point nav edit scene all changes are incorporated into a temporary duplicate survey unit file. All subsequent point and span nav edit scenes are generated from this file. An audit trail identifying changes is prepared.

2.2 Span Nav Edit Scene

The span nav edit scene shows a profile comprised of two joined data segments of 100 points each; each segment begins 10 points before the start and ends 10 points after the end points which were picked from the status plot. The first segment and the second segment are separated by a special symbol; intermediate points are not necessarily shown in the display. The scene provides a close up look at the beginning and ending of a data span with both segments adjusted to the same scale. The operator may view the begin segment or the end segment by setting the cursor on the left going or right going arrow. To perform a span edit the operator sets the cursor on the action desired ("Add", "Multiply" or "Delete") at the right side of the edit scene; when the operator presses the button the desired action is highlighted. The operator sets the cursor on the "move arrow" and moves the profile till the begin point is in view on the scene. The operator sets the cursor on the first data point to begin the span and presses the device button. Values at the cursor are now displayed in the lower left view box. The operator, when satisfied with the value, sets the cursor on "confirm" and

establishes the first data point of the sequence intended for edit. When dissatisfied with the value in the view box the operator sets the cursor on "reject" before pressing the button and then picks a new point.

The operator sets the cursor on the "move arrow" again and moves the profile to the left until the end time of the segment is in view on the scene. The cursor is set on the last data point ending the span and the device button is pushed. Values at the cursor are again displayed in the lower left view box. When satisfied with the value in the display box the cursor is set on "confirm" and the data span for edit is established. When the action desired was "Delete" the display scene profile disappears and then returns when the required operation is complete.

When the desired action was to "Add to" or "Multiply" a span the operator is queried for a value. The query and the keyboard entered value appear in the lower right display box. When the operator is satisfied with the entry he moves the cursor to the "confirm" block and presses the device button. When confirmed the display scene profile is overlayed with a new profile of the edited data. When the operation is complete the operator can move the edited profiles by setting the cursor on the "move arrow" to view the results of the edit. After viewing the edit results the operator sets the cursor on the "CONFIRM" option to post the edit and return to the synoptic view. On exiting via "CONFIRM" from this edit scene all changes are incorporated into a temporary duplicate survey unit file and audit trail entries are prepared. The span nav edit scene allows only one edit operation for a picked span before exit returning to the synoptic view. When the operator "REJECTS" the applied edits which he has viewed the edit is not posted, the overlayed profile disappears, and the operator is queried for a new cursor selected option.

2.3 Time Specific LOP Edit

To activate the edit scene for a single point operation the operator sets the cursor on the appropriate option box and presses the control device button, picks the desired LOP via cursor and control device button and then enters the time (day, hour, and

minutes) where the operator wants the edit scene centered. The Point Nav edit scene appears identical to (2.1) where a segment of 100 points on each side of the entered time are available for edit. At the edit scene the operator can "Add", "Multiply", "Replace", "Delete" or "Insert" values. To perform an edit function over a span of points the operator sets the cursor on the appropriate option box and presses the button, picks the desired LOP and enters both "from time" and "to time." The Span Nav Edit scene appears identical to (2.2) where the scene shows a profile comprised of two joined segments of 100 points each. At the span edit scene the operator can add a value to a span of points, multiply by a value a span of points, and delete a span.

3.0 TIDE EPOCH SURFACE/ANALYSIS

3.1 Contour 30 Day Surface

The tide epoch surface provides a spatial view of observed tide, covering a 30 day period, for data evaluation; the program also generates select tide heights for use in analysis programs. The operator indicates via keyboard the starting day and area for a 30 day group of tide height observations which are already installed in the data base via other tide table building tasks. The program then prepares a plot emulating the British Admiralty semi-graphic "form 112" and prepares contours intended to aid the operator in his manual preparation of smooth contours. After smoothing the contours the operator evaluates the "select" height and performs edit tasks as required via an installed edit routine.

3.2 Edit 30 Day Surface

The edit tide surface provides a means to copy the observed tide height array used to generate "Epoch Surface", to change values in that array and to generate a new set of "select heights." Any of the copied heights may be altered by viewing a CRT display and setting the cursor on the defective heights and entering a replacement via keyboard. This function is intended to be used to remove weather anomalies from a 30 day tide observation set and has no impact on the already established tide tables. Where anomalies appear to be caused by instrument malfunction or operator input error the original tide corrector table should be replaced. To replace a table the operator should review his original tide marigram for the day in question and reestablish a tide table by exercising "Generate Tide Table from Observed Tides."

3.3 Compute Select Heights

This program is for computing selected heights via technique described in N.P. 122(1), The Admiralty method of Long Period Observation for Harmonic Tidal Analysis.

This subroutine provides an array of computed selected heights which the hydrographer can later modify via an editor provided as another tool. The purpose of the computed array is to reduce the keyboard entry effort required in establishing the array.

3.4 Compute Coefficients and Datum

The tide analysis program computes datum and constituents from the 128 select heights generated via the tide epoch surface task and the edit. The constituents are then added, as a new station, to the constituent data base. The operator manually enters the latitude and longitude of the station which will be stored in the constituent data base.

4.0 AREA DISPLAYS

The area display provides graphics useful for evaluating end products and comparing adjacent data in a spatial relationship.

4.1 Area Tracks as Color Depth

The track plot is a sequence of colored dots with color changing relative to depth. The display provides the hydrographer with a spatial view of related tracks and a view of color agreement where tracks cross. The soundings under consideration are confined to soundings selected for product.

4.2 Specific Area Contour

The contour plot shows a display of select soundings or dense soundings in rough color contour form. The display has no interactive functions and is intended for viewing only. This display is intended primarily to evaluate bottom character.

4.3 Tracks with Color Depths and Contour

The tracks and contours plot provide a sequence of discrete colored data with color changing relative to depth overlaid with color contours.

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